



Success Stories

High-End Product Engineering Services



Right Sized Company
(~1500+ engineers)
with Top Management Commitment

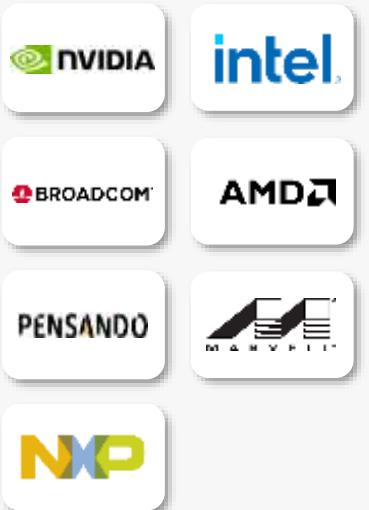
PUNE BEST EMPLOYER BRAND AWARDS 2021



Key Strategic Partnerships



7 of top 10
Silicon Providers



7 of top 10
Networking Companies



10 of top 10 Storage, Server & Virtualization Companies



6 of top 10
Security Companies



AI/Gen AI for Fortune 500 Companies



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Success Stories:
Application Storage (SAN/NAS)

OS Independent Unified Snapshot Solution Development



Engagement

Calsoft was engaged with the client for development of a unified Snapshot Solution. The engagement underpinned:

- Efficient storage provisioning and storage management
- Data Protection from corruptions and attacks
- Support for Heterogeneous OS and various applications



Benefits

- Client attained uniform snapshot management GUI.
- Client benefitted from quick application instance provisioning from the snapshots



Technology

- C, C++, Powershell MS-Exchange, SQL, Oracle, Windows, Linux



Solution

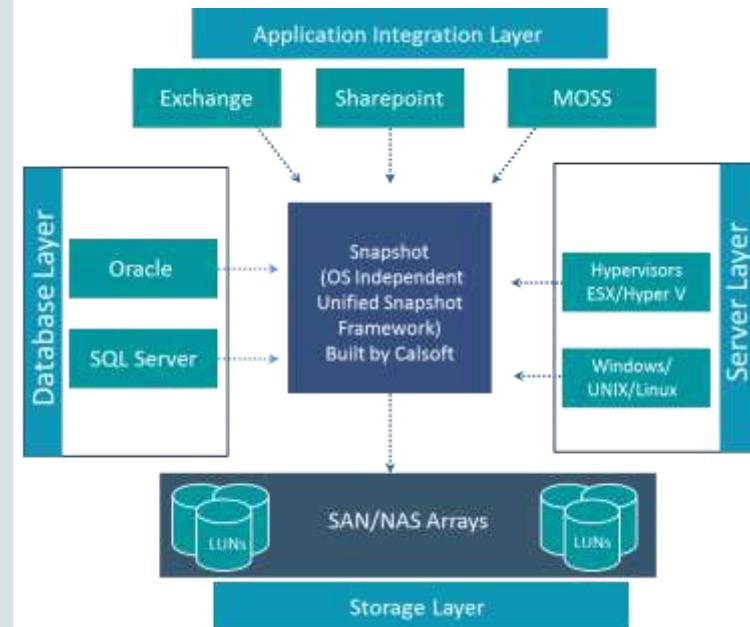
Developed an OS Independent/Unified Snapshot Solution.

Features:

- Unified Snapshot mechanism for SAN / NAS arrays
- Consistent Snapshot interface across OSs
- Supports both Volume & File Snapshots
- Provides a Generic API

Functionality:

- Snapshot Management UI using MMC
- Provisioning
- Backend storage aggregation
- Building Logical Objects (Volumes, LUNs)
- RAID configuration
- Multi Application Integration – e.g. MS-Exchange, SQL, Oracle, etc.





Engagement

Calsoft was engaged with the client for development of a unified Snapshot Solution Microsoft/Oracle/SAP. The engagement underpinned:

- Efficient storage provisioning and storage management across heterogeneous OS and application environments of MS Windows and Unix
- Data protection from corruptions and attacks



Benefits

- The solution enabled reduction in compatibility testing time
- A tight integration with MS-Exchange, SQL, Oracle, SAP was established.



Technology

- C, C++, Powershell MS-Exchange, SQL, Oracle, Windows, Linux



Solution

Data Protection

Application consistent backup of application objects -

- Full copy, space efficient
- Snapshot retention policies
- Scheduled backups
- Security – Audit logs, authorization, etc.

Recovery

- Quick Recovery – Volume level
- Point in time recovery with Roll Forward
- Granular Recovery – File / Object level

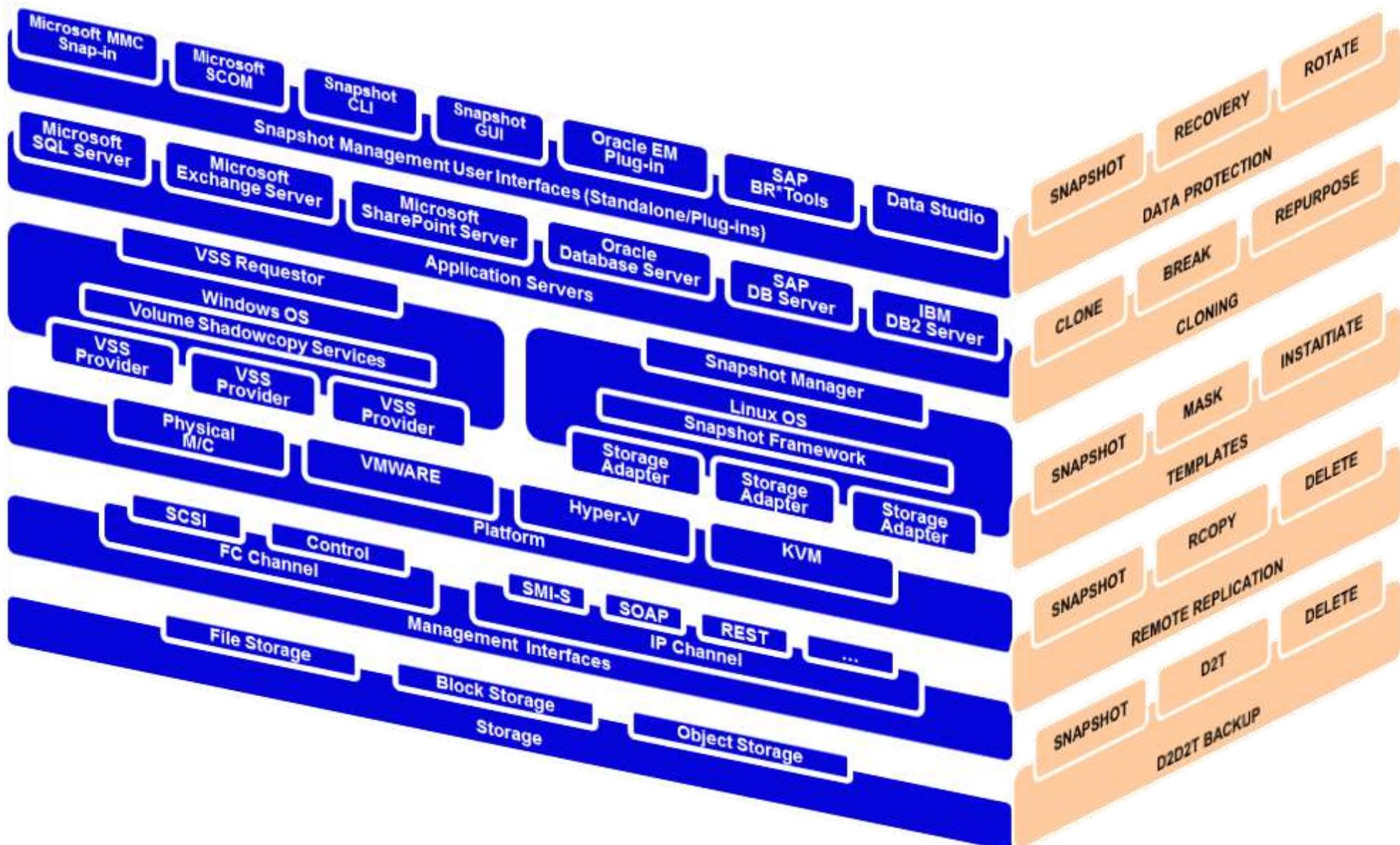
Cloning

- Create copies of application objects from snapshots
- Pre/post scripts associated with snapshot creation for cloning.

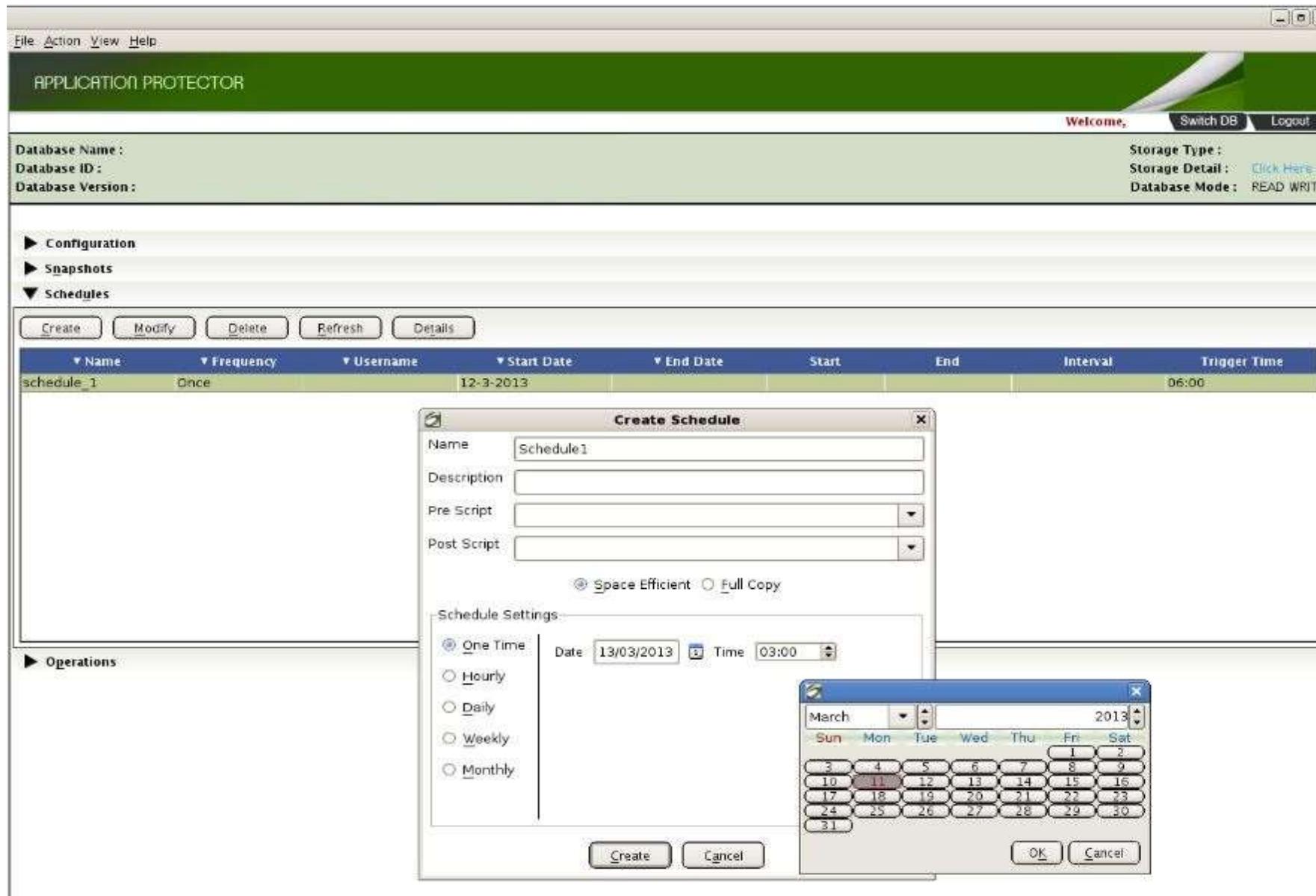
Functionality

- Unified snapshot solution for Application Servers - Microsoft, Oracle and SAP
- Snapshot management Interfaces
 - Snapshot management using CLI, MMC GUI, Oracle GUI and SAP BRTOOLS
 - Generic snapshot interfaces across these operating systems – Windows, Linux
- Snapshot Methods
 - Converged snapshot mechanism for SAN / NAS arrays
 - Snapshots at various levels – volume group, volume & file system
- Provisioning
 - Backend storage aggregation
 - Logical objects (Volumes, LUNs) 1

Snapshot Management Landscape

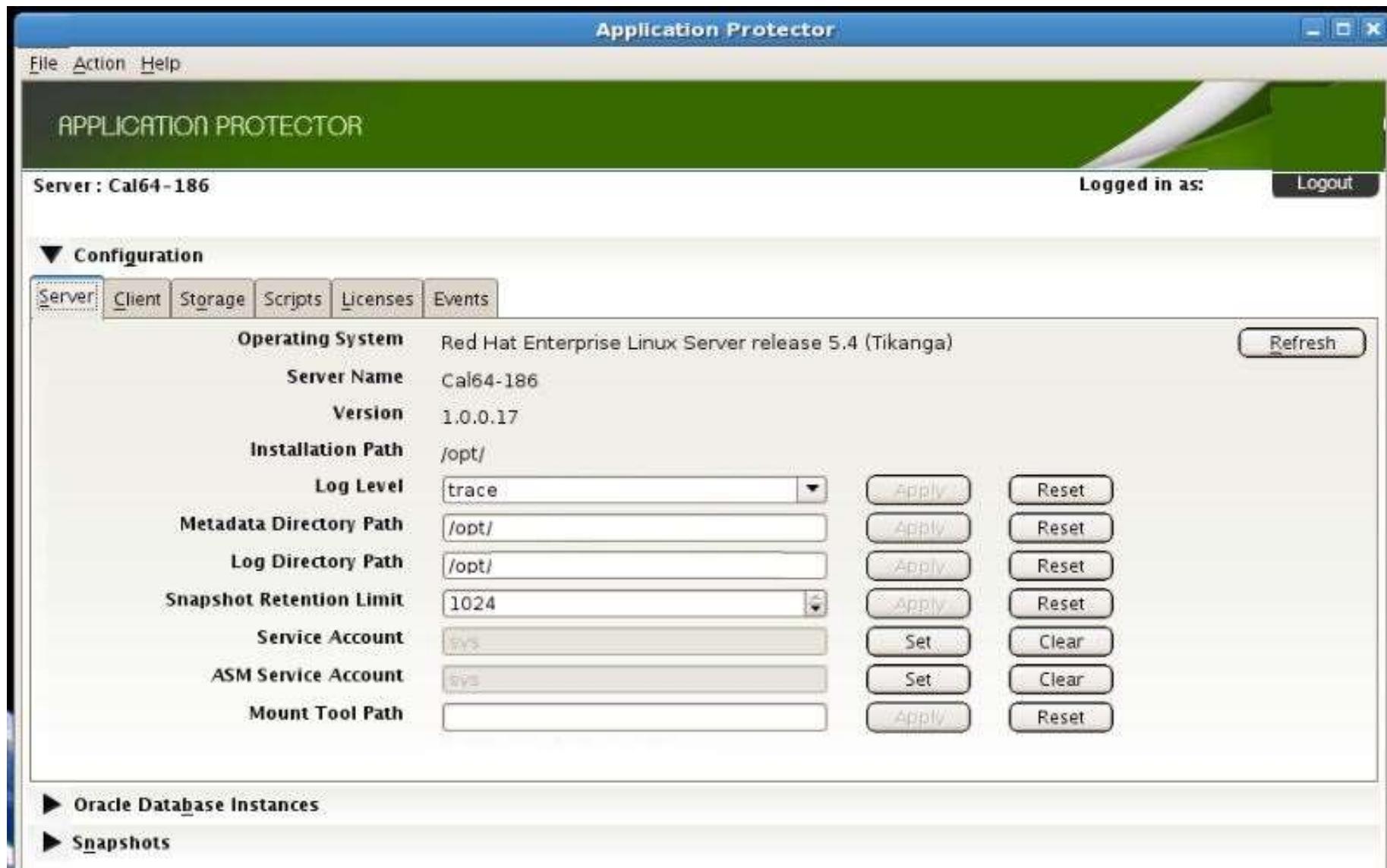


Snapshot Solution Development Screenshot - 1



Customer under NDA

Snapshot Solution Development Screenshot - 2



Monitor HA/DR capabilities for datacenters



Engagement

Calsoft was engaged with the client for monitoring HA/DR capabilities for datacenters. The engagement underpinned:

- Discovery of physical and virtual servers in a datacenter in an agentless manner
- Identification of dependencies between business critical services and discovery/ analysis of holes in server protection schemes implemented by businesses



Benefits

- Client received platform Independent computer identification and business services identification
- Improvement in HA/DR analysis for servers (physical and virtual) and business continuity
- Client acquired plug-in application to protect networked computers through a single interface
- Achieved seamless integration with a variety of external tools



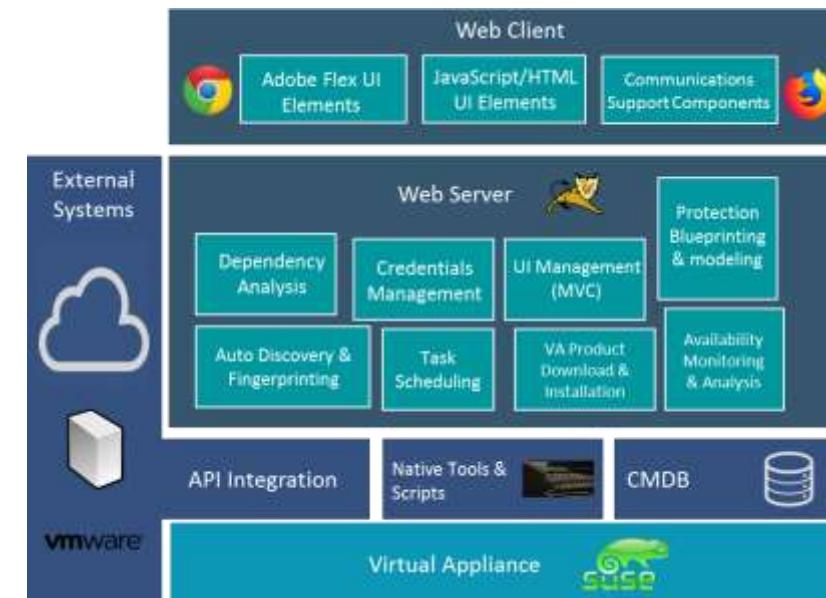
Technology

- Languages: Java, vCenter SDK, VMware SRA SDK, WMI, NMAP Ant., OS: Windows



Solution

- Server identification using a combination of network monitoring tools VMware SDK's
- Established directionality for dependencies using remote command execution tools
- Use of -
 - Spring framework, network connection analysis
 - Hibernate and opportunistic locking mechanism for object update ad monitoring





Engagement

Calsoft was engaged with the client to replace Microsoft's USMT with a proprietary tool. The engagement underpinned:

- Dealing with limitations of USMT like no support while migrating to a newer version of any application except for MS-Office
- Handling Microsoft licensing issues



Solution

Calsoft recommended a phased approach for executing the project. The phases include:

- Reverse engineering phase
Understand and document the format of USMT data files (.mig and .dat files)
- Design and Implementation I
Based on the understanding of USMT files, design and develop a library for replacing USMT Restore functionality
- Design and Implementation II
Based on the understanding of USMT files, design and develop a library for replacing USMT Backup functionality



Benefits

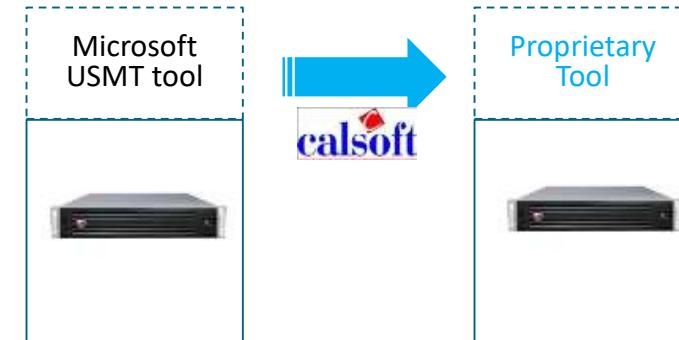
- The client experienced effective decoding of internal structure of .mig and .dat files
- Client could give up dependency on USMT for migration of User, OS and Application settings



Technology

- C++, Win 32 SDK, Hex Editor

Phase - I



Built a VSS Provider for SAN storage



Engagement

Calsoft was engaged with the client to Built a VSS Provider for SAN storage. The engagement underpinned:

- Protection of VSS enabled enterprise applications
- Creation of consistent backups of a volume
- Restoration of hardware LUN snapshot
- Ensuring point-in-time (PIT) copies of volumes and data synchronization



Benefits

- Consistent backups with no file conflicts ensured
- Frees-up valuable server cache and I/O resources
- Effective data protection
- Swift restoration using VSS Re-sync feature



Technology

- Platform: C++, Powershell



Solution

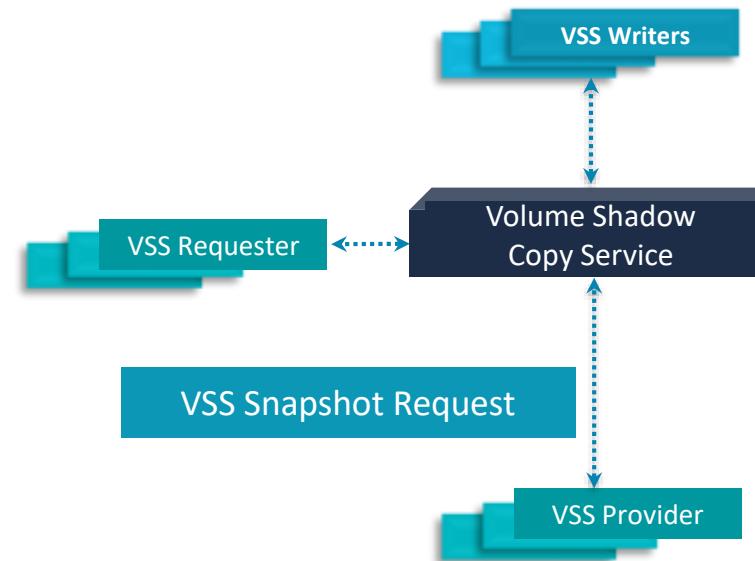
Built a Windows VSS based application data protection solution (VSS provider for SAN storage)

Features:

- Unified Snapshot mechanism for SAN storage
- Supports both file system and database snapshots
- Simple UI (Shell Extension or a MMC snap-in) based Requester
- Secured communication with storage administration server
- Consistent file system UI

Functionality:

- Snapshot Management UI using MMC
- Simple MSI based Installer (with basic interaction) for installation and configuration of the VSS components



Calsoft's Connector Integrates IBM SCO with Partner's NAS



Engagement

Calsoft was engaged with the client to Integrate IBM SCO with it's NAS. The engagement underpinned:

- Provisioning HNAS storage by SCO engine
- Quickly creating multiple SCO connectors



Benefits

- Partner's NAS was enabled to provide a cloud solution using IBM's SmartCloud solution



Technology

- IBM SCO software, NAS Command Line Interface(CLI)



Solution

Calsoft's connector enables interface between IBM Smart Cloud Orchestrator (SCO) and partner's NAS Platform (NAS). Calsoft's connector provides capability to provision hardware

Key features:

- Bridge functionality gap to operate partner's NAS from IBM SCO
- Perform 'CRUD' operations i.e. Create, Read, Update and Delete





Engagement

Calsoft was engaged with the client to develop infrastructure for Video analytic that used client's h/w as a backend storage



Benefits

- Easy for client as a service provider to built VA application using this infrastructure
- Client can now effectively sell its hardware to companies providing VA solution



Technology

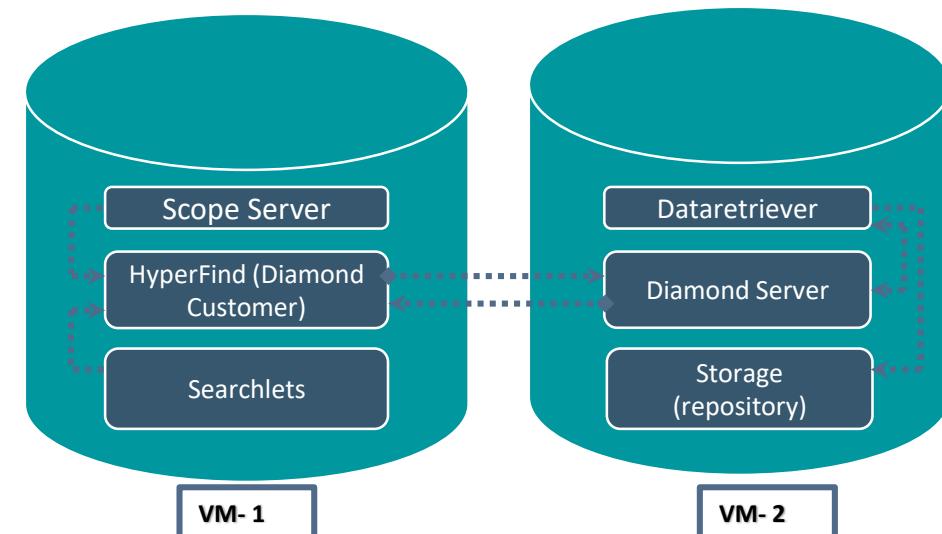
- Linux, C, Python, Java, ImageJ



Solution

- Prepared setup of open diamond platform
- Developed new searchlet using ImageJ and integrate with open diamond
- Proposed deployment and sequence diagram as per customer use-case
- Performance Profiling (observe the I/O wait and searchlet execution time on diamond server)

High Level Architecture



Change Block Tracking (CBT) for Hyper-V



Engagement

Calsoft was engaged with the client to change Block Tracking (CBT) for Hyper-V. The engagement underpinned:

- Tracking change VHD/VHDX blocks and map them to VM disk changed blocks
- The mapping algorithm to be VM OS agnostic that would assure accuracy
- Tracking to be minimally intrusive on I/O performance and optimal memory utilization
- Zero VM/Hyper-V host downtime during deployment and tracking



Benefits

- Facilitated orchestration between customer's backup solution, Windows VSS and VM backup
- Reduced time for VM backup significantly
- Maintained CBT driver with real-time incremental changes



Technology

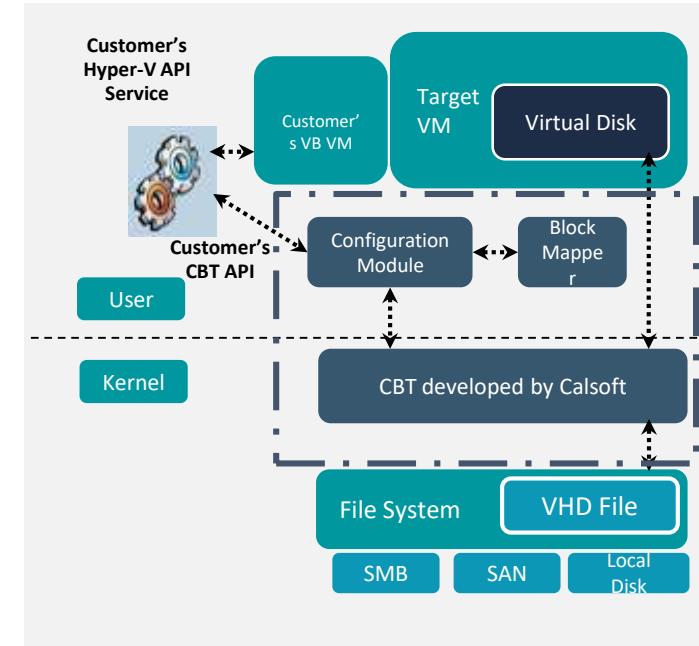
- Windows Driver (WDK 8.1), C/C++



Solution

Calsoft engineered high performing 'CBT mini-filter driver' to track block changes done to user identified VHD and/or VHDX files.

- Achieved minimal intrusion using FS File context functionality in Windows kernel and memory optimization using custom hashing algorithm
- Implemented efficient and accurate mapping algorithm to translate VHD/VHDX file offsets to virtual disk offsets. Tests were designed to prove the correctness of the algorithm
- Integrated with customer's backup appliance and Windows VSS and added tracking scheme to ensure zero-downtime.
- Added support for data stores from SMB, SAN and local disks





Engagement

Calsoft was engaged with the client in:

- Evaluating customer hardware for cluster solution provided in windows server 2012 R2
- Validating CIB (cluster in box) solution using Windows Server 2012 for customer hardware
- Evaluating File Server, Hyper-V cluster features using customer hardware



Benefits

- Windows Server 2012 R2 enables to build ready to use, Continuous Available, MS SQL-Server, MS Exchange Server, Hyper-v, NAS box appliance using Xyratex OneStor Storage application product



Technology

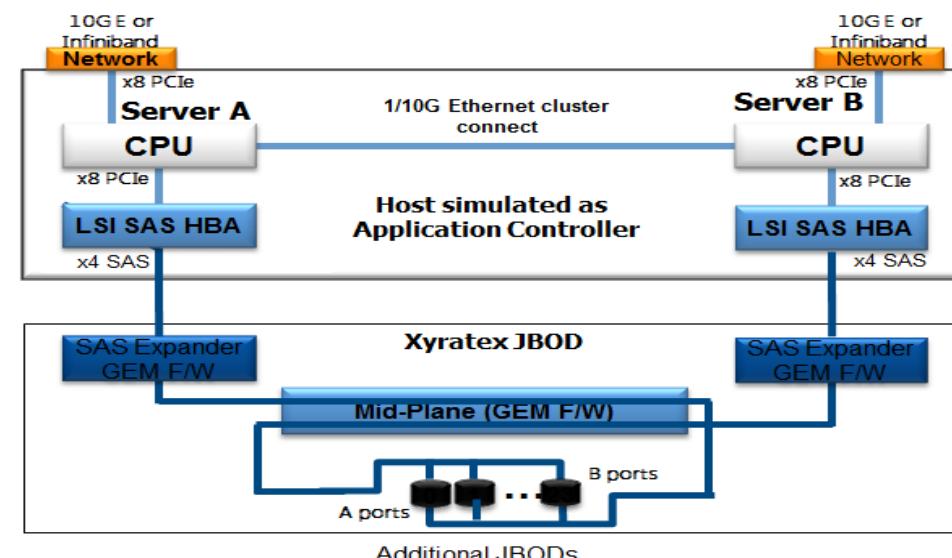
- Windows Server 2012 R2, Storage Spaces, File Server, Hyper-V cluster



Solution

- Built a Failover Cluster running file server app, using 2 Host and Xyratex JBOD as a backend
- Verified data access in various failover cases like bad disk and controller failure
- Transparent failover w/o data loss
- Qualify for WHQL industry wide known certification

High Level Architecture



Hardware failure Auto correction for SES Enclosure



Engagement

Calsoft was engaged with the client to:

- Identify hardware failure for SES compliant JBODs
- Identify opportunities to auto correct drive failure and use SES functionality to add extra features.



Benefits

- False Hardware failure is avoided by performing auto correction before application detect actual hardware failure.



Technology

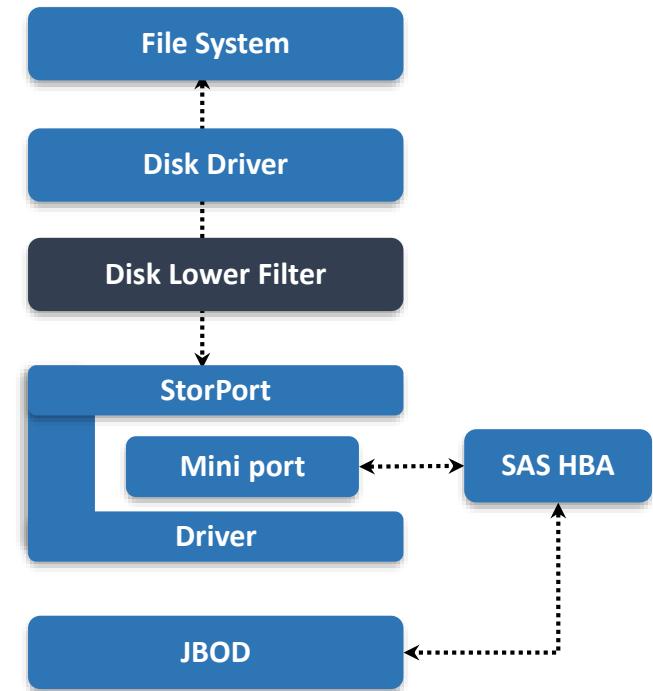
- Windows Server 2012R2, Windows DDK, SCSI Enclosure Services



Solution

- Develop Windows Kernel Disk filter driver to intercept all type of SCSI commands flowing through
- Identify SCSI commands specific to SES protocol and understand operations being performed
- Alter fault detection commands to send auto correction operation to avoid false fault notification.

High Level Block Diagram



Storage Multipathing



Engagement

Calsoft was engaged with the client to multipath storage. The engagement underpinned:

- Improving fault-tolerance and performance was a challenge
- Difficulty in Storage network traffic shaping
- Increasing flexibility of the Dynamic Data Center (DDC) Server systems software



Benefits

- Client experienced dynamic load balancing
- Automatically programmed path management



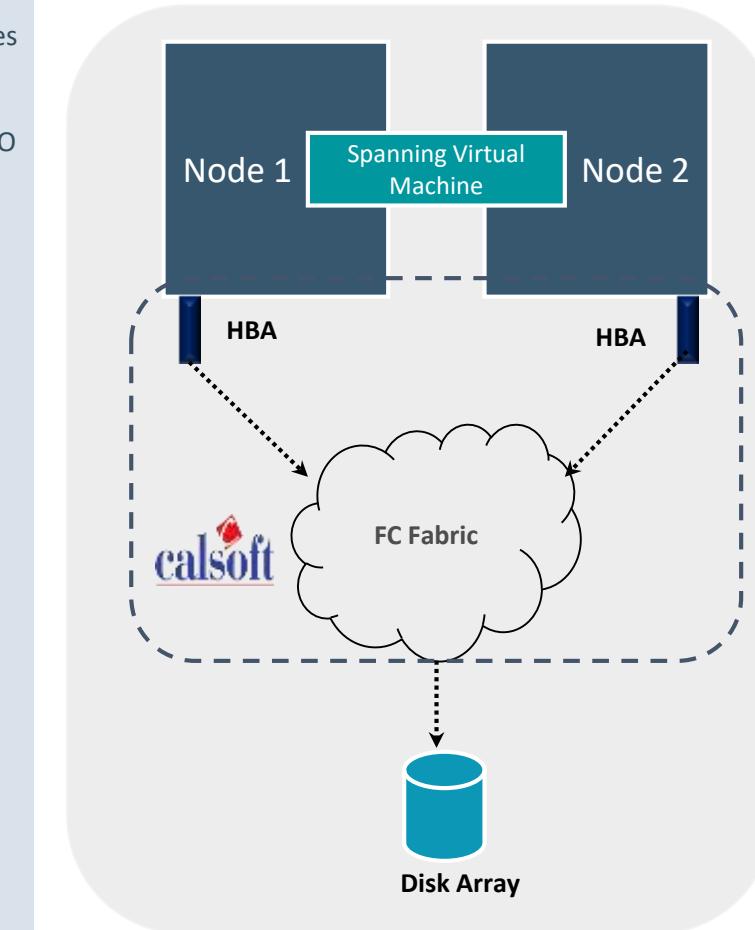
Technology

- Linux, C, OS: Linux



Solution

- Added virtual NICs and virtual host bus adapters (HBAs)
- Provided each home node with two InfiniBand interfaces
- Connected each interface through an InfiniBand switch to one or more resource nodes
- Built 3Leaf Systems multipathing upon the Distributed IO capability to provide load balancing and failover of disk traffic across HBAs on multiple DDC– Nodes



Development of Storage Cache Mirroring Feature



Engagement

Calsoft was engaged with the client to add “Cache Mirroring” feature to SAN Appliance product quickly and cost effectively.



Benefits

- Integration was enabled for connecting multiple object storage servers to one object storage layer
- New use case helped boost business of the object storage product



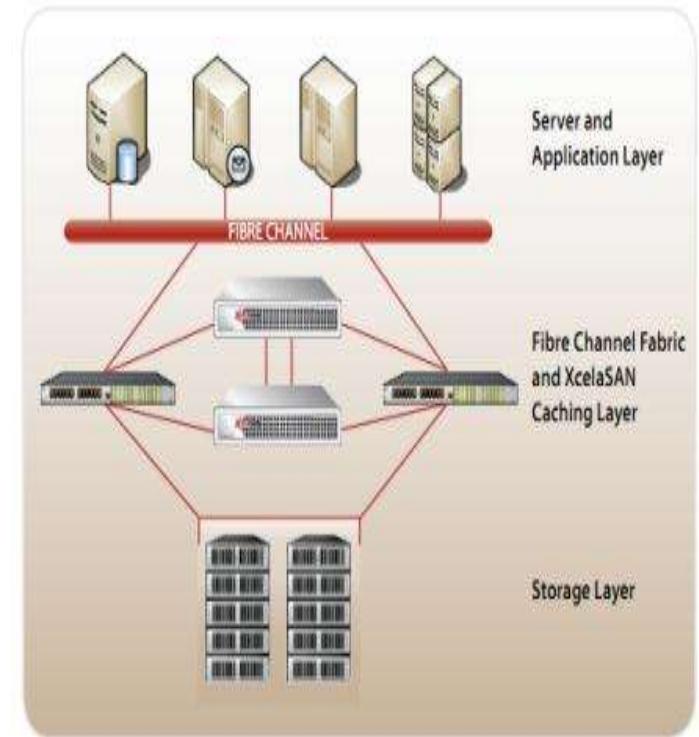
Technology

- Protocols: Fibre Channel, SCSI, SCST, OS: Linux Red Hat RHEL 5.x; CentOS 5.x; , Windows Server 2003, 2008; Solaris Sparc 8, 10; Solaris x86 10; VMware ESX 3.5



Solution

- Designed, developed and implemented cache mirroring features
 - Write-through / Write-back / Pass-through in Dataram’s SAN appliance
- Enhanced and added additional features in existing GUI
- Supported –
 - Multipathing
 - Load balancing
 - Redundancy
- Designed a user friendly, feature enhanced GUI



Implementation of SOAP based Management Layer



Engagement

Calsoft was engaged with the client to solve productivity challenges occurring due to inefficient RPC based management console



Benefits

- Client was able to manage multiple firmware versions of the server
- Client could provide a publishable interface as a web service for 3rd party use
- Poses as an efficient alternative to current RPC based management



Customer Testimonial

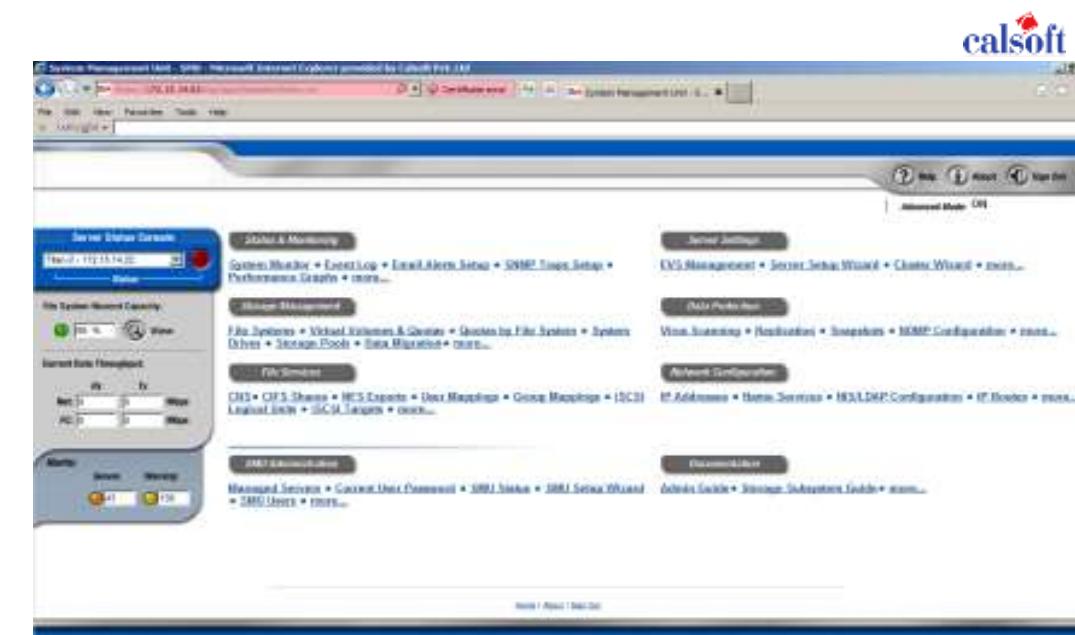
"We were searching for a partner to implement our SOAP Management layer for our NAS server and help us through the design and architectural issues. After assessing several companies on these and a number of other criteria, Calsoft were definitely the best candidate"

Director Engineering



Solution

- Implemented **SOAP (XML over HTTP)** based communication framework
- Exposed management API of the NAS server as a web service (using WSDL)
- Allowed 3rd party's access to complete customer's **NAS server management library**
- Interfaced with lower level management **APIs**
- Developed **JUnit based automated test framework** to test each of the exposed SOAP APIs



Implemented HA product to protect Enterprise Applications



Engagement

Calsoft was engaged with the client to Implement HA product to protect Enterprise Applications. The engagement underpinned:

- Building a robust **file system replication engine** with optimum throughput for I/O
- Building an **automation framework** to test a range of file operations
- Managing network identity of servers in a cluster pair
- Monitoring health of an application on the server
- Quickly adapting to architectural changes in the application



Benefits

- Ability to manage multiple firmware versions of the server



Technology

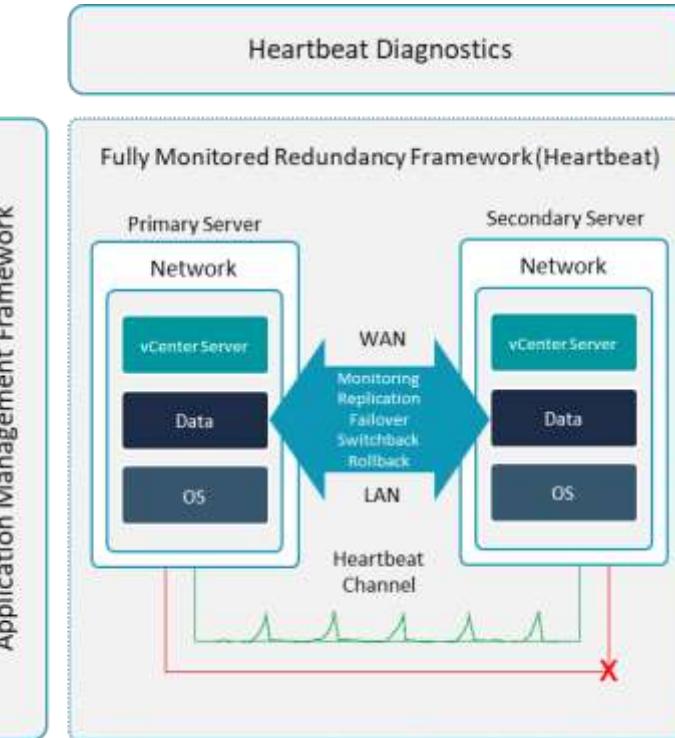
- C, Java, Python, Web services, UI technology



Solution

Calsoft built a high availability software solution for protecting enterprise server applications running on a Linux platform. The server may be virtual, or physical. The solution involved:

- Robust application monitoring and recovery framework
- Use of Wraps to intercept updates to a file system
- Use of netlink API's for network monitoring and control
- Use of Python Fabric Module for rapid development of test automation framework



Engagement

Calsoft was engaged with the client to develop REST API for a Security appliance.

The engagement underpinned:

- Configuration remotely from 3rd party applications
- Feature and regression tested by running automation tests
- Usage as channel for its existing GUI to interact with its backend

Benefits

- Versioning mechanisms for rolling out newer APIs in phased manner
- Improved security, robustness, consistency and scalability

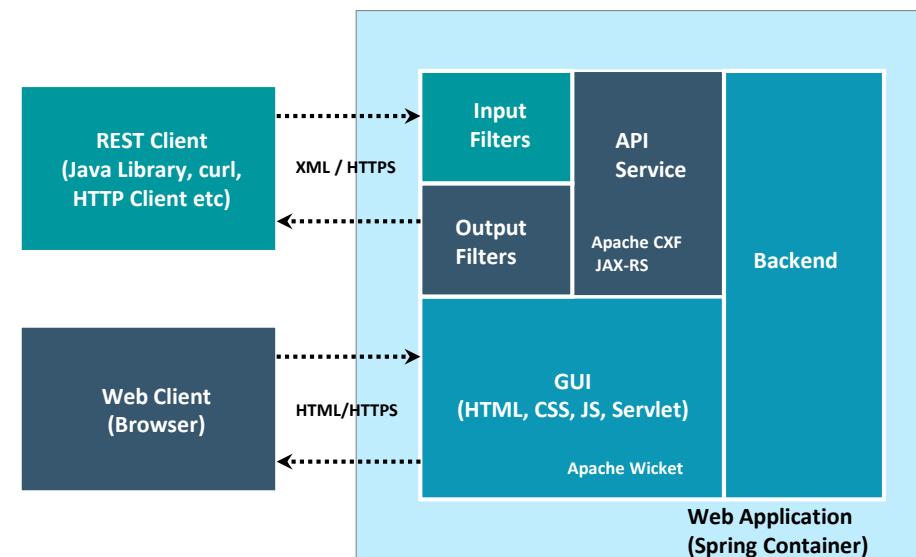
Technology

- Java, Apache Tomcat, Spring framework, apache CXF, framework, Hibernate

Solution

- Developed **REST API Framework** for customer's security appliances
- **Security**: Provided standard security model for protecting the backend functionality exposed as APIs
- **Robustness**: Provided generic error handling for APIs
- **Consistency**: Created request/response definitions including data format for complete set of APIs
- **Scalability**: Created modular approach for easy scalability of API development
- **Performance**: Provided a thin layer over existing backend functionality to provide high performance APIs
- **Versioning**: Provided versioning mechanisms for rolling out newer APIs in phased manner
- Integrated with 3rd party applications Symantec CCS etc.

Components





Engagement

Calsoft was engaged with the client to maximize I/O performance from Lustre file system. The engagement underpinned:

- Creation of Lustre client and server deps for Ubuntu OS, corresponding Lustre client and server rpms for CentOS.
- Configuring RAID6 devices created from Dell JBOD with 60 SEAGATE SAS drives.



Benefits

- Identification of difference between RAID6 driver of 2.6.32 and 3.16.3 kernel
- I/O performance for Lustre file system on commodity hardware was identical to what can be achieved with proprietary



Technology

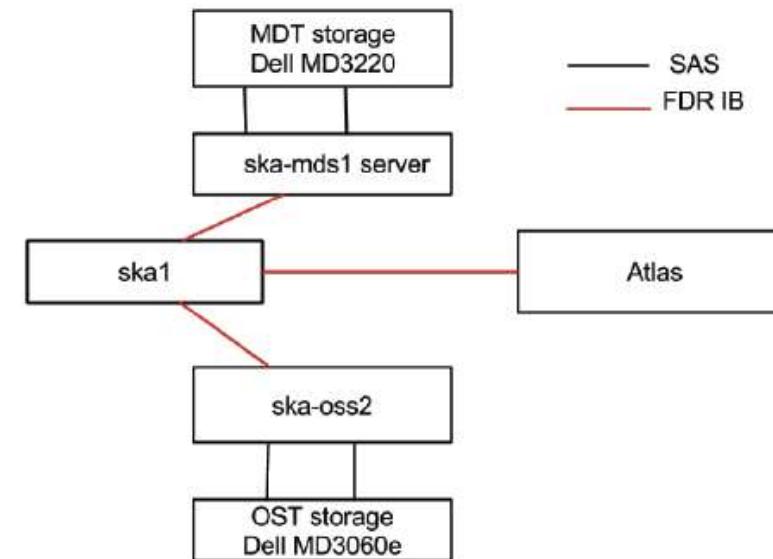
- Lustre file system, RAID driver in linux kernel 2.6.32 and 3.16.3



Solution

Calsoft proposed to port Lustre related patches on latest kernel 3.16.3. It included:

- Porting of a Zero-copy patch on Linux kernel
- Coupling the Linux kernel with latest Lustre, and work layer by layer, starting from SAS drives moving up to RAID0, RAID6, Lustre server and client while tuning all performance related parameters.





Engagement

Calsoft was engaged with the client for server provisioning. The engagement underpinned:

- Development of Graphical User Interface (GUI) for monitoring and administrating servers
- Solving the issue of reduced productivity due to featureless (CLI)



Benefits

- User friendly monitoring and administering application
- Greater accessibility of to their servers



Technology



Solution

- Developed a Graphical User Interface (GUI) to interact with customer's Speed and Range Expansion (SRX) gateways

Features:

- Action Panel – easy identification of possible user actions
- Resizable & Redirecting Charts
- Client side sorting and server side search for grid data
- Reverse **AJAX** used to update grid data without user interaction
- Multiple (icon, table etc.) views for every grid data
- Auto-complete on search
- Adhering to **Apple UI guidelines**
- Emphasis on rendering only necessary information (drill-down approach) and reuse of controls

The screenshot displays a desktop interface for 'Secure Application Switch' (SPACE). The top navigation bar includes 'File', 'Edit', 'View', 'Help', and a 'Logout' button. The main window is divided into several sections:

- Alerts:** A table listing alerts with columns for 'Message', 'Time', and 'Type'. One entry is highlighted.
- VISUAL SERVER:** A table showing server details with columns for 'Name', 'IP', and 'Status'.
- RAX Statistics:** A bar chart comparing RAX metrics across three categories: Pending, Failed, and Completed.
- RAX Objects:** A bar chart showing the count of RAX objects for three categories: Small, Large, and Total.
- Top 10 Received via SRX IP:** A table listing the top 10 IP addresses with their corresponding counts.

The bottom right corner features the Calsoft logo.

Snapshot Solution Screenshot - 1

Secure Application Switch

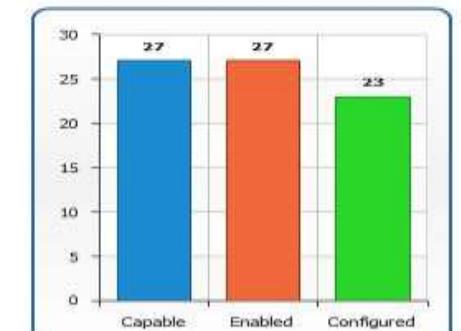
Tue Dec 07 2010 07:11 PM IST

Getting Started
How May I Assist You?

Alerts

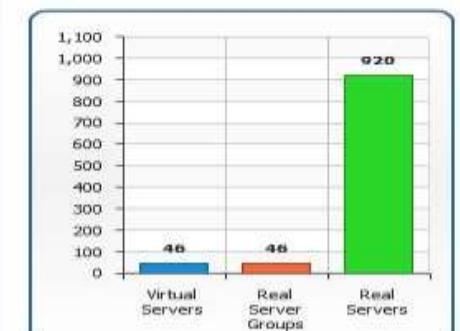
Message	Time	Type
Discovered 40 Real Server(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered 2 Real Server Group(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered 2 Virtual Server(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered SAX device: 4.4.4.83(4.4.4.83).	2010-12-07 19:07:02.0	INFO
Discovered 40 Real Server(s) on SAX device: 4.4.4.78	2010-12-07 19:06:41.0	INFO
Discovered 2 Real Server Group(s) on SAX device: 4.4.4.78	2010-12-07 19:06:41.0	INFO

SAX Devices



Category	Value
Capable	27
Enabled	27
Configured	23

SAX Objects



Object Type	Count
Virtual Servers	46
Real Server Groups	46
Real Servers	920

Virtual Servers

Top 5 based on throughput

- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs01(46.46.46.46)

Top 5 based on connections per second

- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs02(117.116.115.4)

Top 5 based on # of connections

- vs02(117.116.115.4)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)

Top 5 based on SSL TPS

- vs02(117.116.115.4)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)

Show Getting Started on Startup

Help

About



Engagement

Calsoft's engagement with the client involved:

- Enablement of interoperable management across heterogeneous storage vendor systems
- Management of all devices in a data center with a single, consistent, web based user interface



Benefits

- SMI-S shifted the development process to enable vendor efficiencies
- Accelerated the delivery of interoperability
- Improved manageability of storage networks



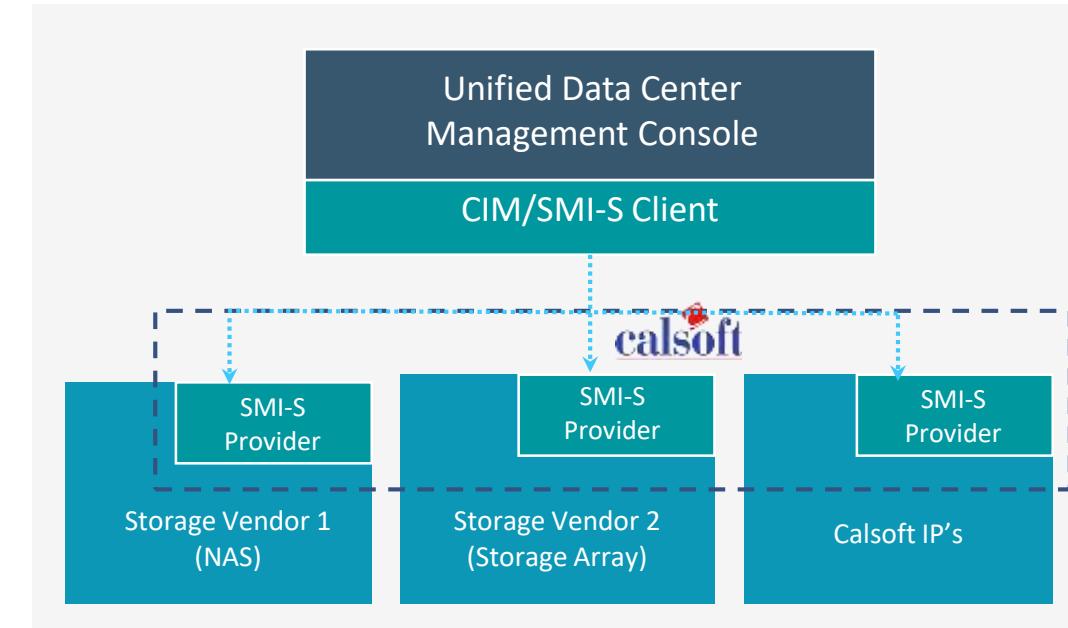
Technology

- CIM, Pegasus CIMOM, UML, C++, Design Patterns, Perl, C, and Java are used in writing providers, Firmware programming using C



Solution

- Calsoft SMI-S developers accelerated the adoption of SMI-S based solutions that simplified the interoperability challenges while building storage solutions
- We streamlined management of multi-vendor networked storage and executed the project right from design to testing phase



Development of Management Stack for Deduplication Appliance



Engagement

Calsoft was engaged with the client for developing management stack for managing their deduplication appliance. The engagement underpinned:

- Development of REST APIs for appliance management
- Development of GUI using the REST APIs
- Automation of testing the REST APIs
- Development of SDK for 3rd party application integration with deduplication application



Benefits

- Improved manageability through easy to use GUI
- Ease of integration with 3rd party applications
- Reduced time for testing
- Reduced manual efforts for testing REST APIs



Technology

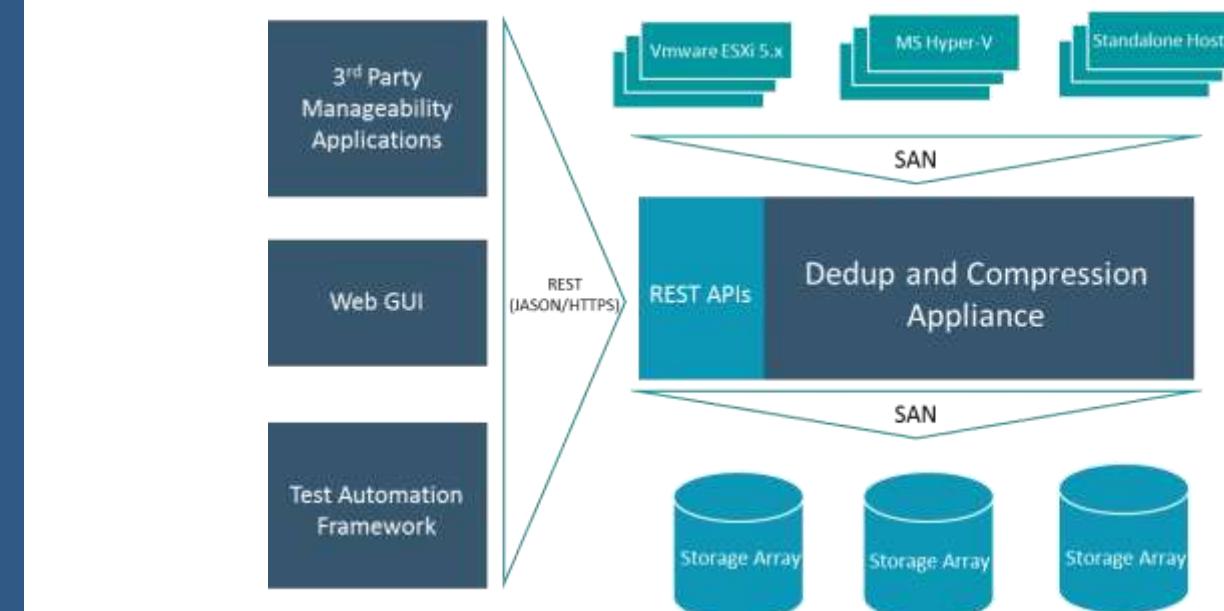
- Python, Flask, Flask-RESTful, AngularJS, CSS3, Apache



Solution

Calsoft helped the customer to design and develop:

- Intuitive GUI
- Standards based REST APIs for their compression and de-dupe appliance
- Python based Test Automation Framework for testing REST APIs
- Python based client SDK for integrating with appliance using REST APIs



Cloud Disaster Recovery Solution



Engagement

Development of a Cloud Disaster Solution allowing end users to protect their private datacenters by replicating to cloud vendors.



Benefits

- Replication offloaded to Storage
- Test recovery execution to assure site recovery.
- Email notification for recovery execution status
- Multi-tenancy for CSPs



Technology

- Server side - Java 1.7, Hibernate 2.0, RESTEasy 3.0.6. Client side - HTML5, AJAX, Backbone 1.0.0, Underscore 1.4.4, SlikGrid 2.2, Recline.

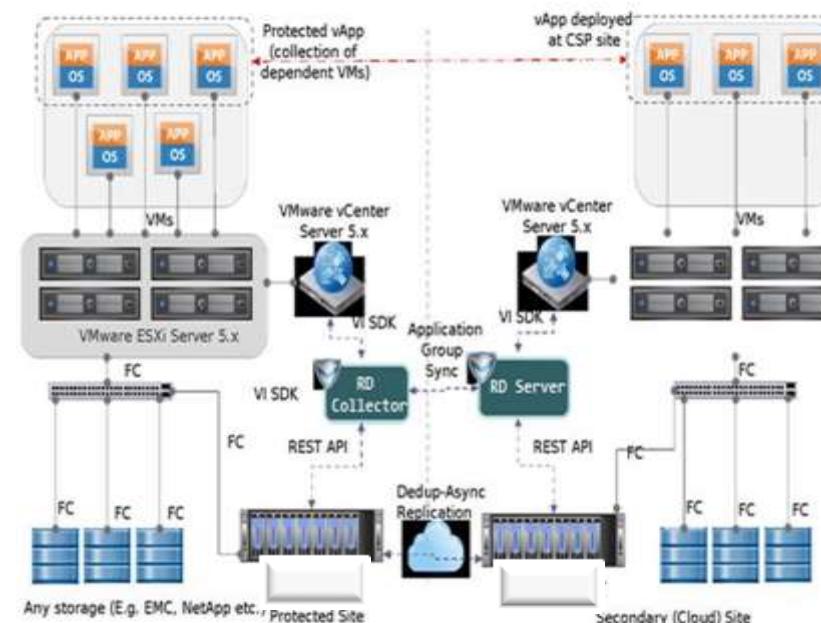


Solution

Design, development and testing of the open Cloud DR solution.

Features:

- Virtualization platform agnostic
- Utilizes storage level replication features to free up load on the server
- User friendly intuitive process to recover site.
- Regular test recoveries to assure final site recovery.
- Site recovery for multiple tenants.
- Support for VMware virtualization platform.
- Security of vApps when recovered on cloud
- Service dependency management



Testing for High End NAS Server



Engagement

Calsoft was engaged with the client for analyzing the gaps in their existing test approach and augment their NAS testing to the next level



Benefits

- Increased and wide test coverage
- Increased QA efficiency to take the testing to the next level



Technology

- NFS, SMB, NDMP, Windows, Linux



Solution

- Reviewed the existing NAS test suite and identified the gaps
- Developed new test strategy & test schemas for the gaps to enhance the test coverage
- Recommended tools and methodology to carry out system and the application specific workload testing as part of their solution testing
- Performed testing in some core areas and founds issues
- Developed protocol conformance testing by implementing tools

NAS Areas

NAS Protocol Functional & Robustness

Virtualization Testing

NAS Reliability Testing

Data Migration Testing

File System Testing

Scalability Enhancement of Solid State System



Engagement

Calsoft is engaged with client in delivering end to end engineering activities involving design, development, testing client OS and build and release of OS. The engagement is listed below:

- To provide I3 support for two all flash array products.
- 24*7 engineering support to I1/I2 engineers.



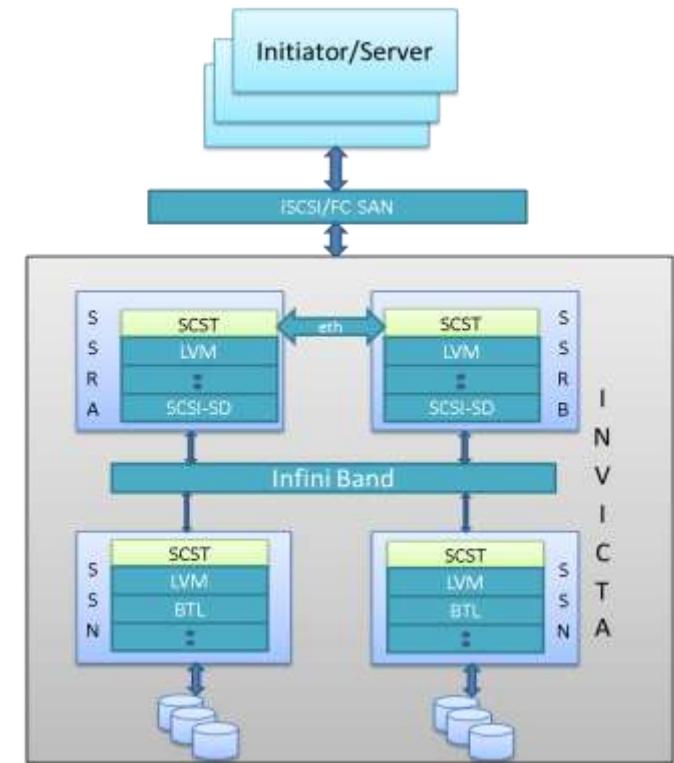
Technology

- C, Linux Kernel & User, DLM, MDRAID, SCST, LVM, Python



Solution

- Multi-system, high-performance, flash-based silicon Storage system
- Architecture consists of router (SSR) and data node (SSN)
- Improves workload performance for analytics, batch processing, email, online transaction processing, video, virtual desktops, database loads, and high-performance computing.
- Collection of applications that needs more throughput, add more scaling system routers. To support high data volumes, add more scaling system nodes.
- Support for all standard networking and file protocols



Scalability Enhancement of Solid State System- Solution and Benefits



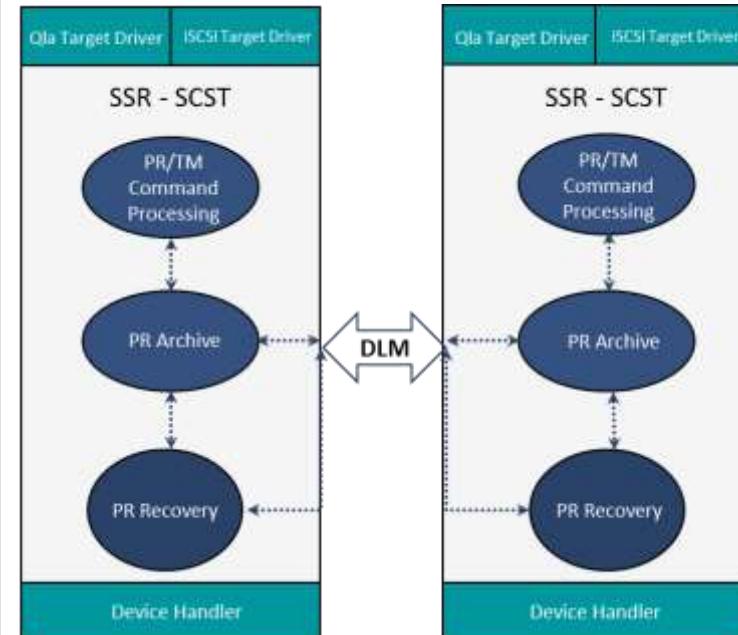
Benefits

- Reduce licensing and maintenance costs:** Application consolidation simplifies management and licensing.
- Meet changing application performance requirements:** A scale-up and scale-out architecture lets you increase throughput or capacity based on workload demands.
- Reduce energy costs:** Reduced power consumption helps lower energy costs.
- Save space:** A small footprint conserves valuable data center floor space.
- Benefit sooner:** Fast deployment delivers faster return on investment.
- Increase application performance easily:** Accelerate applications without code modifications.
- Lower operating expenses:** Application consolidation and simplified management help reduce management costs.



Solution

- Designed, developed and tested Block Translation Layer
 - Better(lower) write amplification factors
 - High speed data deduplication
 - Enhanced error detection and correction
 - Data integrity in event of power loss
 - Data management (Data protected and organised)
 - Virtual Garbage collection
- SCSI reservation sharing among targets in cluster
 - Multipaths for storage through SSRs
 - DLM used to serialize and synchronize SCSI reservation operation between all targets.
 - SCST DB sharing using DLM
 - Cluster safe snapshots using DLM
 - Heartbeat mechanism using DLM
- Designed, developed and tested VAAI support for storage array
 - Copy offload(XCOPY), Write same offload, Atomic Test & Set (ATS) or Hardware-assisted locking



SCSI Reservation Sharing Diagram

VMware AirWatch Storage Integration



Engagement

Calsoft was engaged with the client for analysis, validation and integration of Storage appliances within the AirWatch ecosystem.



Solution

Calsoft is assisting VMware AirWatch engineering team in their storage integration. As part of this project, Calsoft worked on evaluation and integration of Block and File Storage with AirWatch.

- Evaluated Hybrid Block Storage (from two major storage vendors)
 - Performed IO tests for performance characterization
 - Performed workload testing using simulated cloud workloads
 - Evaluated performance characterization and cost vs ROI factors
- Integrating block storage for various workloads with VMware AirWatch management products (vRO/vRA).



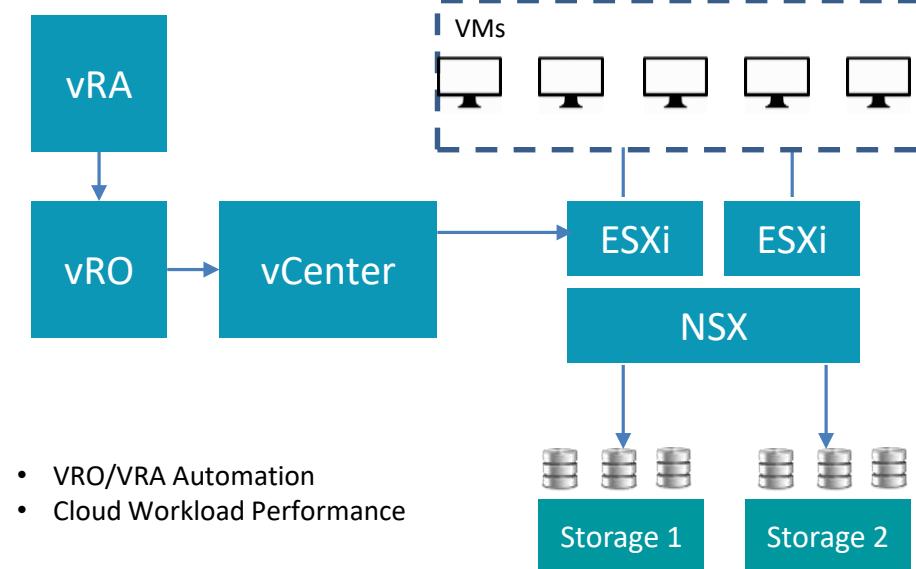
Benefits

- Provided analysis reports to choose the optimum storage solutions for targeted cloud workloads
- Provided deep insights into storage configuration and deployment strategies
- Automation workflows for provisioning and management integrated into existing management products



Technology

- Platform: ESXi, vCenter, lometer, JAVA, vRO, vRA



VMware VAAI Block Certification for TrueNAS Storage



Engagement

Calsoft was engaged with client to carry out certification testing of client's iSCSI block storage product—"TrueNAS" for its VAAI compatibility



Benefits

- Calsoft helped client in running and verifying the success of iSCSi Protocol and VAAI Block Primitives test suite on VMware Workbench 3.5 for VMware Certification for TrueNAS Storage Box.



Technology

- Vsphere 6.0, Vcenter 6.0, VMwareWorkbench 3.5, Software test Automation FrameWork (STAF)



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "TrueNAS" product.
- Setup the required test lab.
- Setup the VAAI environment.
- Execute VMware VAAI/Block certification test cases in a standard way as suggested by VMware.
- Report the test results to client.

Non-Volatile Memory Address Resolution (NVMAR)



Engagement

Calsoft was engaged in developing and testing protocol server for Non-Volatile Memory Address Resolution (NVMAR). The aim was to implement a server that can assign and resolve protocol specific addresses to NVMe Hosts and Targets.



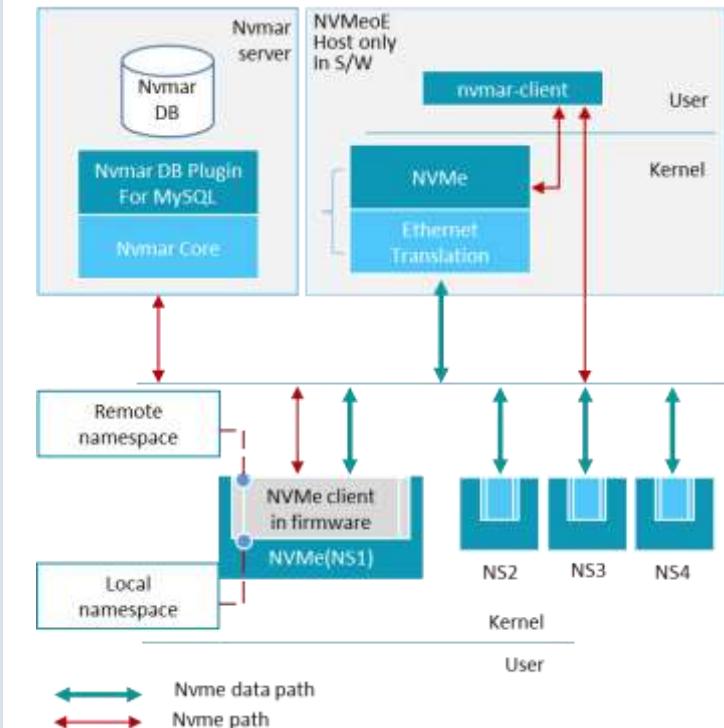
Technology

- C, Python, LUA scripting, Bash scripting, MYSQL, Debian packaging, NW namespaces.



Solution

- Developing DHCP-style protocol to allocate unique static/dynamic IDs to requesting clients.
- Support for commands like discover, request and release among others.
- Developing test client and automated scripts to create environment and verify the server.
- Integrate with database to store the state of the server including details of all the clients.
- DB plugin framework to support any database.
- Scalability test framework using NW namespaces.
- Wireshark plugin to decode and display NVMAR packets.



Datacenter Migration and Consolidation



Engagement

Calsoft was engaged with the client for P2V2C migration. Key hurdles were large data (64TB), scattered over multiple servers and complex dependency between applications and with legacy storage infrastructure.

The engagement underpinned:

- Migration of 900 physical servers running approx. 20 live business applications to a completely virtualized infrastructure
- Limited downtime window (SAT 6AM till SUN 6AM)



Benefits

- Seamless migration between datacenters without affecting the business day operations or backend processing
- Reduced Capex and Opex
- Increased maximum average system utilization
- Reduced space, power and maintenance requirement for datacenters
- Reduced overprovisioning



Calsoft Add-ons

- In depth experience in:
- Core strength in VMware Virtualization platform & storage
- Comprehensive coverage to the migration as well as DR setup and testing
- Scaling up and scaling out
- Deliver DR friendly setup



Solution

Calsoft provided client with the following solutions:

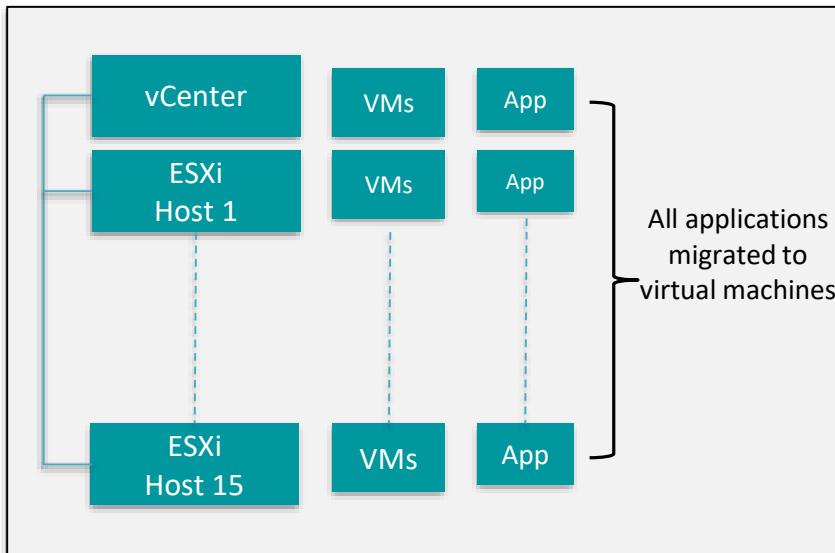
- Setup a virtualized infrastructure environment using VMware VSphere
- Configure 15 high-end servers as ESXi Host
- Configure new storage hardware to work with VSphere
- Migrate all applications to virtual machines in a phased manner
- Setup OpenStack private cloud
- Configure and customise the OpenStack cloud to fit requirements
- Calsoft approach -
 - Assessment of current applications (Dependency Mapping) and feasibility study with onsite team of Calsoft
 - Sizing and high level diagram of planned infrastructure with remote team of Calsoft expertise
 - Implementation plan and review discussions
 - Actual implementation and migration in phases
 - After migration assessment and support

Datacenter Migration and Consolidation

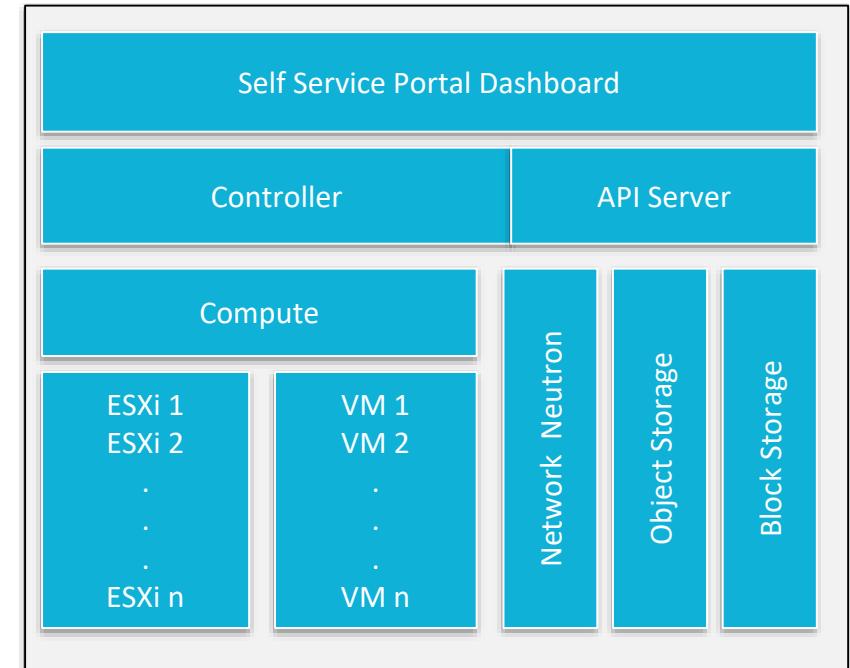
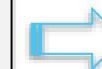


900 Physical servers
90% Windows based
10% Linux based

Primary site
(run complete online trading,
customer management
portal, MIS, book keeping and
report generation portals)



Enterprise virtualization solution
(15 ESXi hosts managed by vCenter transfer data from legacy storage to new storage)



Scalable OpenStack Cloud
(Site movement from primary datacentre to private cloud site situated 20kms apart,
OS setup at primary datacentre,
Reduced physical servers from 900 to 100 ,
Site Recovery Management to create snapshots and move to cloud)

Change Block Tracking (CBT) Framework



Engagement

- Incremental snapshots degrades the IO performance (a single IO may convert to multiple IOs if snapshots exists)
- Managing snapshots also causes performance degradation.
- CBT conceptually tries to reduce the life of each snapshot to the time taken for the associated backup.
- Snapshot can be deleted once backup is taken.



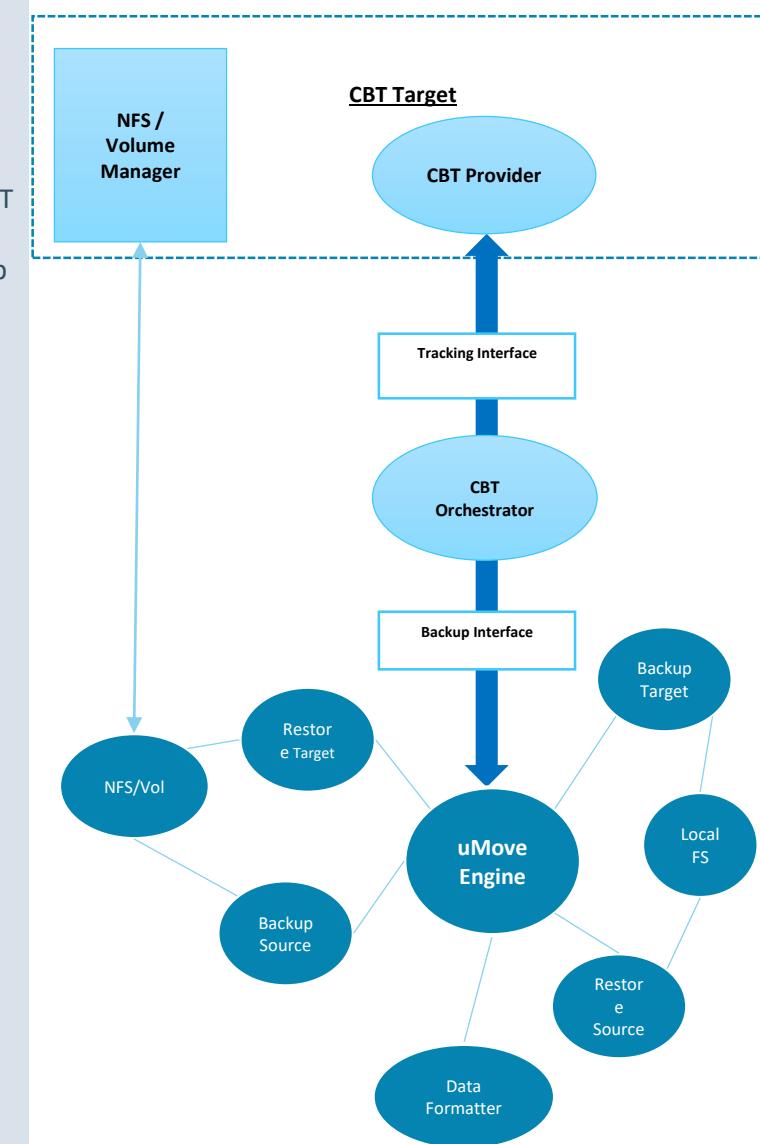
Technology

- Linux, Dockers, YAML, C, NFS Ganesha, Python



Overview

- CBT Provider - Generates tracking information for any object.
- Tracker Interface - Common XML based interface for CBT commands
- CBT Orchestrator - Provides library interfaces for backup agent



Linux Based Data Migration Solution



Engagement

Calsoft was engaged to provide Linux based solution for customer's existing Data Migration Appliance.



Benefits

- Being Generic OS based solution, we can scale it for multiple types of storage (like FC, iscsi, or even SAS)
- Developing and maintaining applications/features on top of linux will be much easier than existing firmware based solution.



Technology

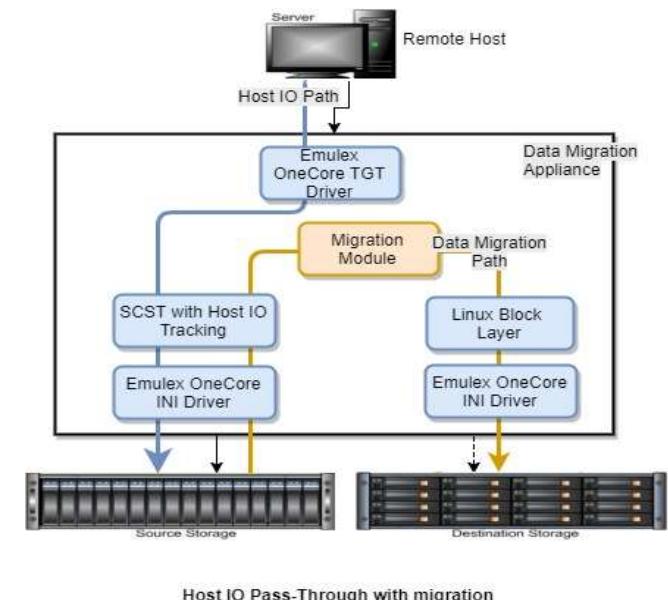
- Linux, SCST, OneCore Emulex Storage Driver, gdb/kgdb, C, Python



Solution

Feature Development

- Existing product is firmware based, which sits in-between SCSI host and Storage to migrate storage LUNs for any customer.
- Calsoft is providing complete Linux based solution, without affecting core functionality.
- Using SCST, provided pass through interface for Host IO for online data migration without affecting performance maintaining host to storage transparency.
- We are modifying existing SCST driver and low level emulex FC HBA driver for linux to provide same functionality.
- Provided CBT within SCST and modified emulex One Core FC driver to track dirty blocks for delta migration.





Engagement

Calsoft was engaged with client to: support SCSI Target and do mirror of SCSI IOs between two controllers over local 40G ethernet with propriety L2 protocol.



Features

SSBLIC layer for transporting data over NTB interface has the following characteristics:

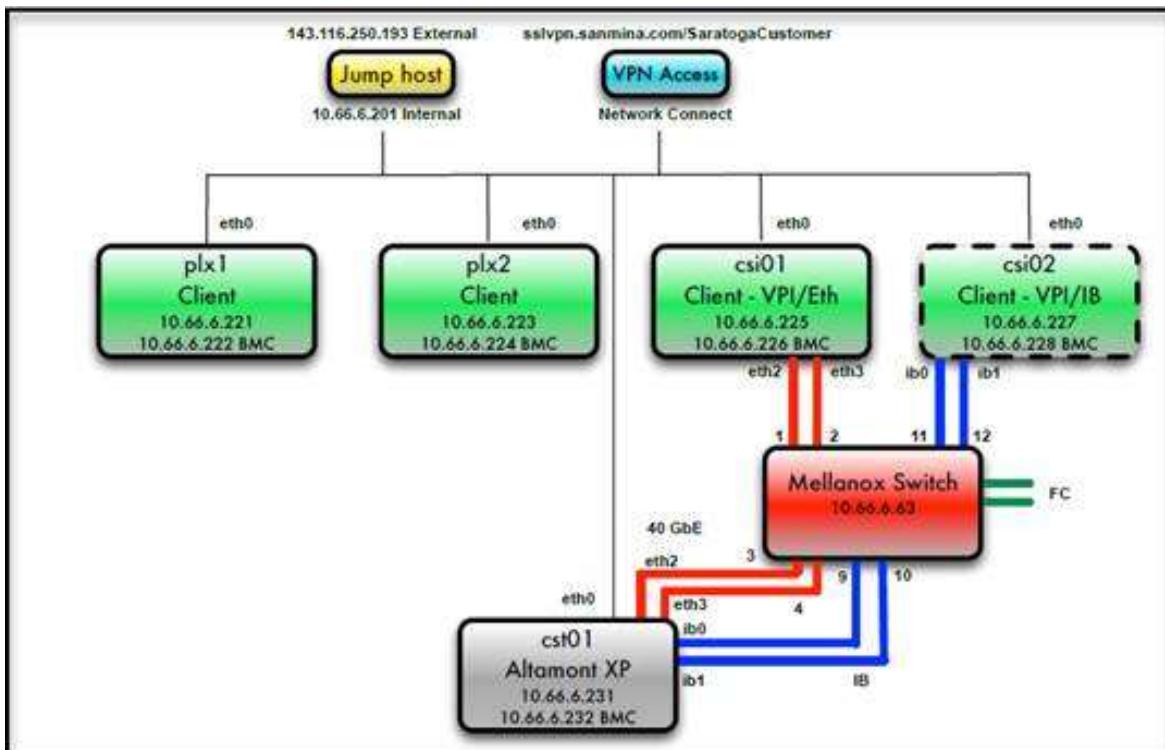
- Fast, light weight partially multi-threaded.
- Detects packet drops which result in IO Errors (No retransmission)
- Communicates IOs of larger block size by splitting them in smaller one.
- This protocol uses redirection block device to redirect IO requests from secondary controller to the primary controller.
- Uses NTB as communication medium
- Communication between the two controllers is via an Intel Non Transparent Bridge (NTB) pair.



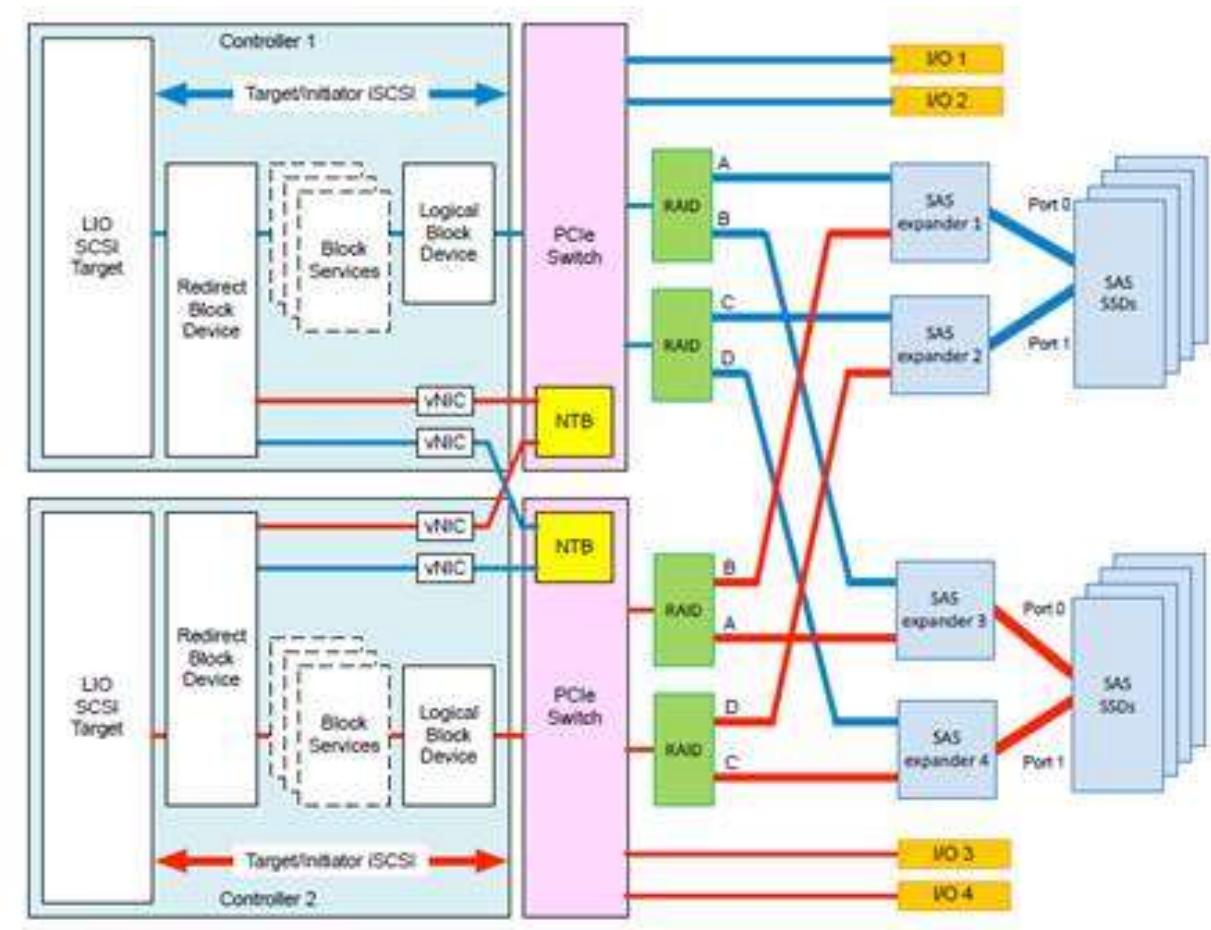
Solution

- Calsoft team with Linux Kernel driver and Networking expertise implemented very light weight, very fast Layer2 protocol for intra-controller cache mirroring over 40Gbps Intel's NTB bridge without affecting 300K+ IOPS.
- Design involved solutions to challenges of packet dropped at high speed, exception handling and simple but effective segmentation and reassembly of Block IOs over Jumbo Packets.
- Minimalist but effective device stack manipulation during failed, resync and fail-over scenarios -- all in data path - with strong test coverage to cover numerous corner cases, including long running IO test with periodic error injections and recovery

Mirroring of SCSI IO



Diag 1: Infrastructure Layout



Diag 2: Architecture

vSphere VADP: Application Consistent Backup and Recovery Solution



Engagement

Calsoft was engaged with the client in developing VMware vSphere Custom Backup with Microsoft Volume Shadow Copy (VSS) for Application Consistent Snapshots.



Benefits

- Overcome performance issues of VMware vSphere for application consistent snapshots during creation, deletion and using snapshots as backups. With VSS, snapshot time was reduced by 60%
- Created application consistent hot backups of a VM using VSS and bypassing the VMware snapshotting mechanism
- Health check for various VSS components, Windows Services and status of client VSS Hardware Provider



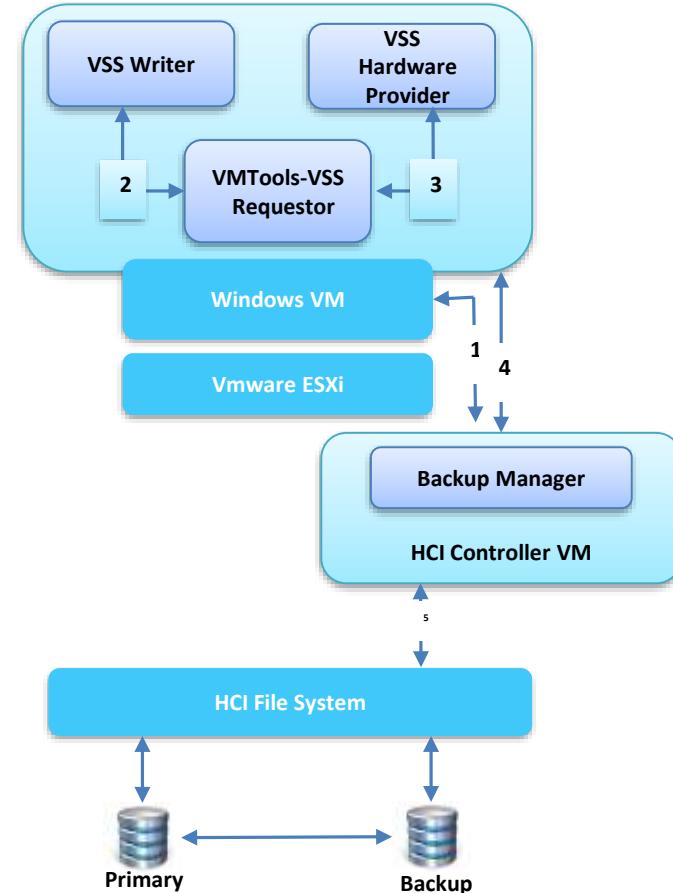
Technology

- C++, Python, Microsoft VSS, VADP, VDDK, RPC, Google Test



Solution

- **POC**
 - A working POC executed in the initial phase of the project
- **Design**
 - Detailed design specifications were documented - High Level and Low Level, Sequence and Component Diagrams, Workflow, etc
- **Development**
 - Developed VMware vSphere Custom Backup with Microsoft Volume Shadow Copy (VSS) for Application Consistent Snapshots
 - Developed Installation Package Bundle
- **Testing**
 - Tested the VMware vSphere Custom Backup and Recovery by automating key workflows



vSphere VADP: Backup Agent for VMware



Engagement

Designing a VMware agent for backup and restore of VMware virtual machines and a backup proxy client virtual appliance.



Benefits

- Backup and Restore of VMware Virtual machines using different supported transport modes (File, NBD/NBDSSL, Scsi Hot Add, SAN)
- Thin as Thin Restore
- Backup and restore of all different disk configurations and VMware environment possible.



Technology

- C, Python
- APIs: Pyvmomi, VDDK, VADP

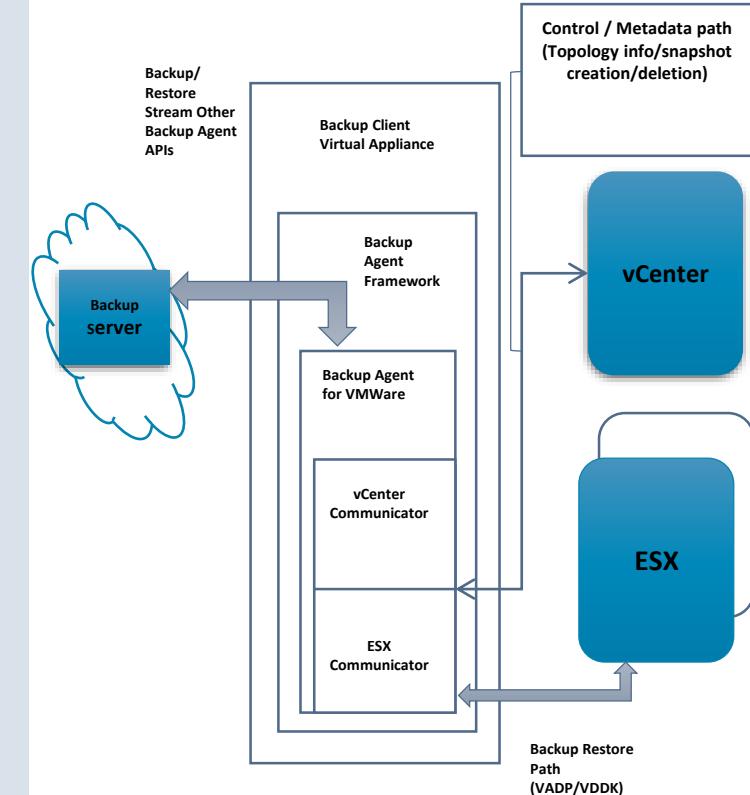


Solution

- Backup Agent which are deployed as a Virtual Appliance that can run in any ESX environment
- Virtual appliance for the purpose of hosting the Backup client in the form of an OVA template
- Integration with VMware ecosystem through Backup Agent interface to perform VM backup and restore

Features

- Application Discovery - Listing of VMs and all related information about the setup & VMs for backup
- What to backup
Listing of items to backup by communicating with vCenter
- How to backup
Get the incremental data and pass on to Backup Server
- How to restore
Get data from Backup Server to restore VM Data.



Data collection framework NetApp OCI & EMC SRM environments



Engagement

Calsoft was engaged with the client for collecting configuration, capacity and performance data from physical and virtual storage devices that are connected to VM's in VMware environment:

- Integrate with EMC SRM to extract information using its Watch4NET API's
- Integrate with NetApp OCI by connecting to its database and extracting information.



Benefits

- An extensible framework to collect information about storage workloads in any virtual environment
- Enhance the client application's ability to optimally route workloads to the correct storage entities.



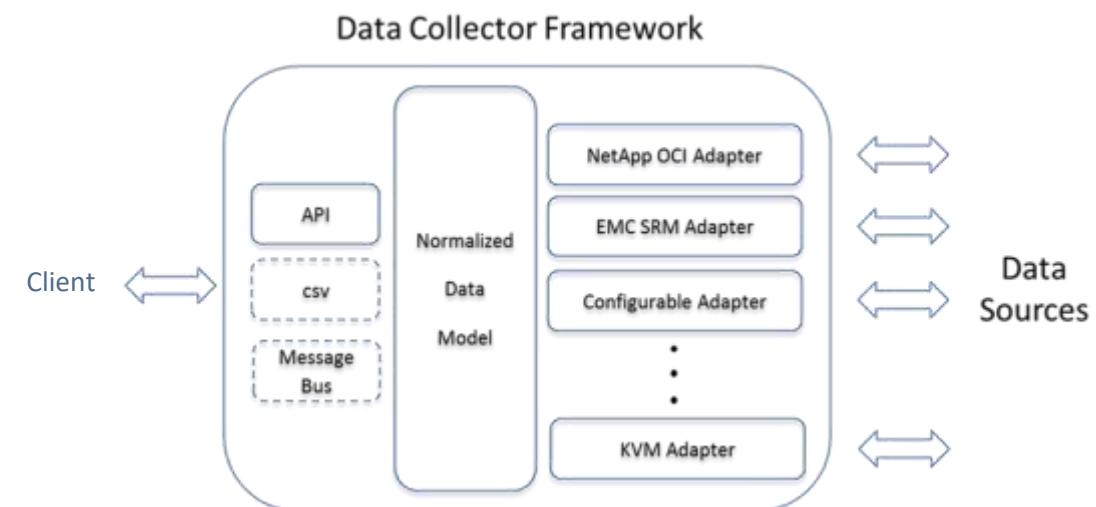
Technology

- Java, SQL



Solution

- Build a generic framework that extracts the information regarding Storage Pools (Aggregates), LUNs, Controllers, Ports and Arrays.
- Build Vendor-specific plug-ins for collection from NetApp OCI and EMC SRM for the built framework
- Configurable plug-in for collection from additional storage sources in the future
- Normalization of vendor-specific storage data
- API to enable the client application to import storage data.



IBM SSD (multipathing)



Engagement

Calsoft was engaged in managing development, test and support of IBM SSD (multipathing) for AIX/ Windows / Linux / Solaris / HPUX.



Benefits

- Outsourcing the L3 support has cost advantage for the customer
- Reduced the product test cycle with test automation.
- Stabilized the product and added new features.
- Stabilized the direct customer support.
- Significantly improved the field defect recognition and resolution time.



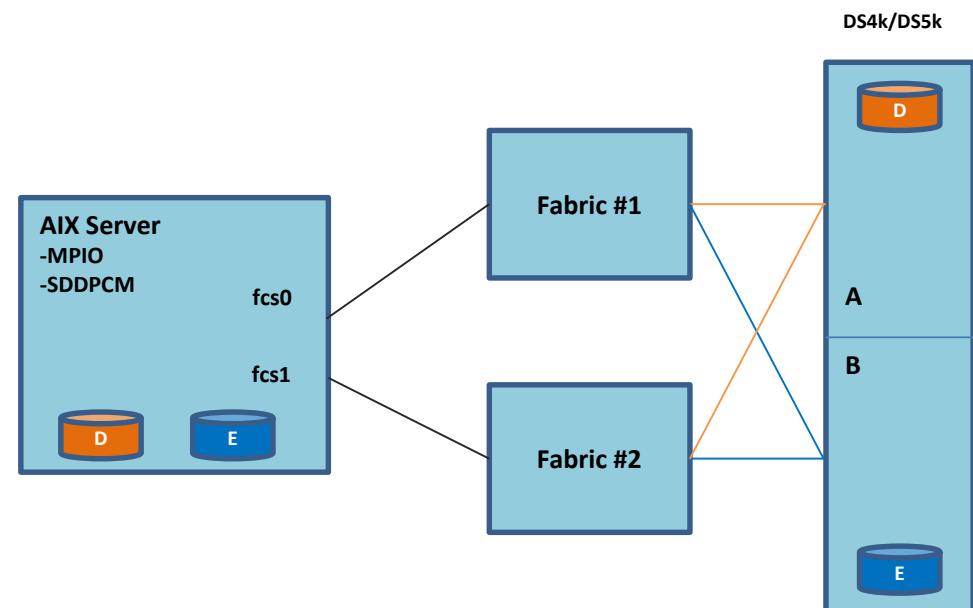
Technology

- SAN Storage, Multipathing, MSCS SCSI 3 PR



Solution

- Live Training of the product from the experts maintaining the product for 10 years to build knowledge and expertise
- 3 months of SLA support reviewed by experienced team in US so that the team gains experience to handle it independently
- Complete ownership of development and Test for the IBM multipathing component for IBM storages like SVC / DS8K / RSSM etc.
- L3 Support for the customers as per IBM SLA's – Supported 100's of customer world-wide - some of them included fortune 100 companies.
- Support for compatibility with newer version of the Operating Systems
- Feature enhancements to support new features added in storage products as per their roadmap
- Implemented automation of test scenarios
- Provided support for 100's of customers world-wide. Some of them included fortune 100 companies.
- Support involved resolving customer issues, handling escalations, providing fixes etc.



Implementing Change Block Tracking driver



Engagement

Calsoft was engaged with the client for implementing Change Block Tracking driver to be used with their appliance that provides services around storage



Benefits

- Less than 2% performance degradation.
- Dynamic upgrade of the kernel module, without loss in tracking.
- Unique identification of trackable objects across reboot.
- Multi threaded approach to handle user requests.



Technology

- C, Linux Kernel, Sockets, XML



Solution

Development

Implemented a CBT driver that can track various block devices and provide bitmaps representing the changed areas over a given time interval.

Design

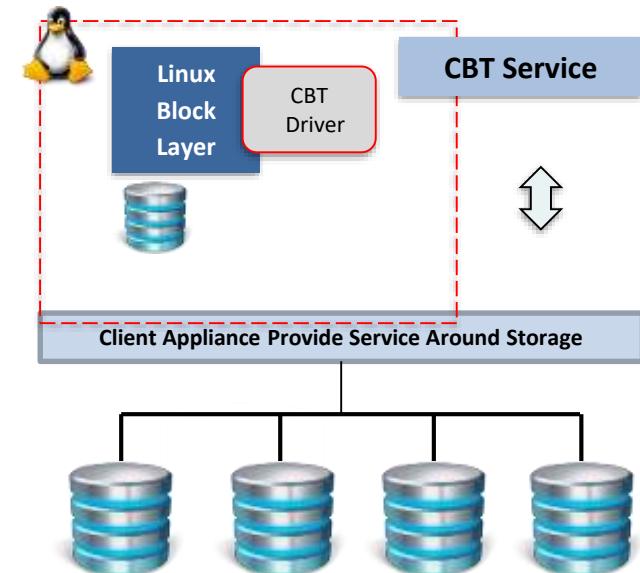
A Kernel hook tracks the data and provides it to user space service that logs into bitmaps. Service also interfaces as a controller to the CBT driver.

Testing

LVMs, iSCSI, RAW etc tested while heavy IO load

Features

- Over 13 CBT control operations like start tracking, stop tracking.
- Two overlapping bitmap support to integrate easily with snapshots.
- XML over socket interface for interaction with service and driver
- Support for tracking across reboot.



Storage schema to optimize video storage



Engagement

Calsoft was engaged with the client to develop a streamable codec based on customer's compression algorithm using open source codec and change the compression logic to use separate compression algorithm. Also, developed applications to encode videos on the server and display them on client side after decoding



Benefits

- Client could verify the compression algorithm with the help of plugin and client server applications.
- Rigorous testing from the team helped to uncover bugs in the compression code, as to make enhancements as well.



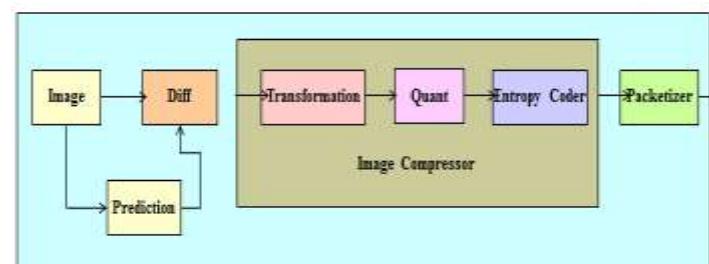
Technology

- C, Linux, Windows, ffmpeg, AVI, H.264

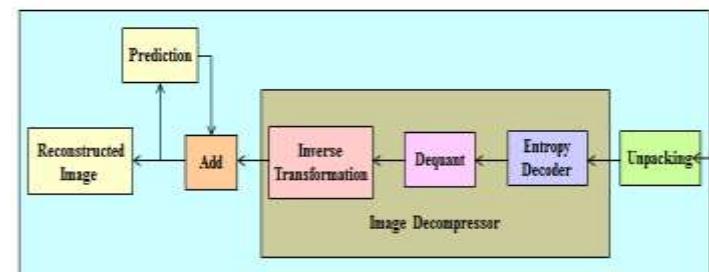


Solution

- Studied open source plugins like open H.264, MJPEG before arriving on to a conclusion to use right tool. i.e. Ffmpeg
- Changed the plugin code to replace image compressing logic to use the compression APIs provided by the customer
- Used VLC/Mplayer to make changes on the client side
- The client side performed the de-compression and sent to motion estimation component
- This component joined multiple macros blocks and reconstructed the images for performing the playback operation.



Video Encoder Based on Squash Compression



Video Decoder Based on Squash Compression

Storage Allocation using HAD



Engagement

Customer required Calsoft to develop automation of storage allocation, zoning and data store creation services using HAD automation engine.



Solution

Calsoft automated service to build a service template for storage allocation. Identified and leveraged existing service template Allocate Fabric Aware Volumes with Configuration Manager for following tasks:

- Create Volumes
- Configure LUN Path
- Configure Zoning

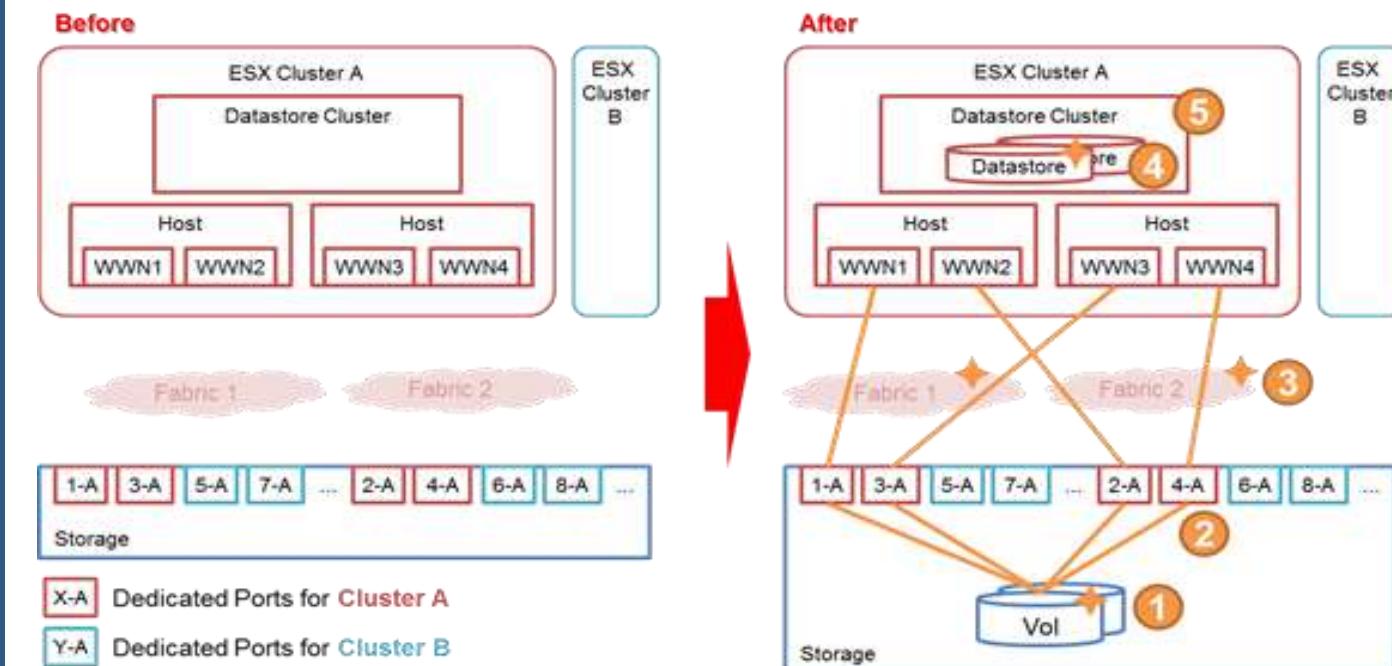
Created new plugin for following tasks:

- Smart port selection
- vSphere Datastore creation
- Add datastore to datastore cluster



Technology

- Python, HAD, Storage, Networking, VMware vSphere SDK



Benefits

The automation bestowed benefits in terms of:

- Reduced overall effort in manually creating resources on storage appliance.
- Eliminate human error



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with its characteristic buildings and a grid of streets. A large, solid teal rectangular graphic is positioned on the right side of the slide, containing the title text.

Success Stories: Converged Infrastructure

Development and Enhancement of Converged Infrastructure Management App

- Enhanced monitoring capability



Engagement

Calsoft was engaged with a Fortune-listed company for the development and enhancement of their Converged Infrastructure management application



Solution

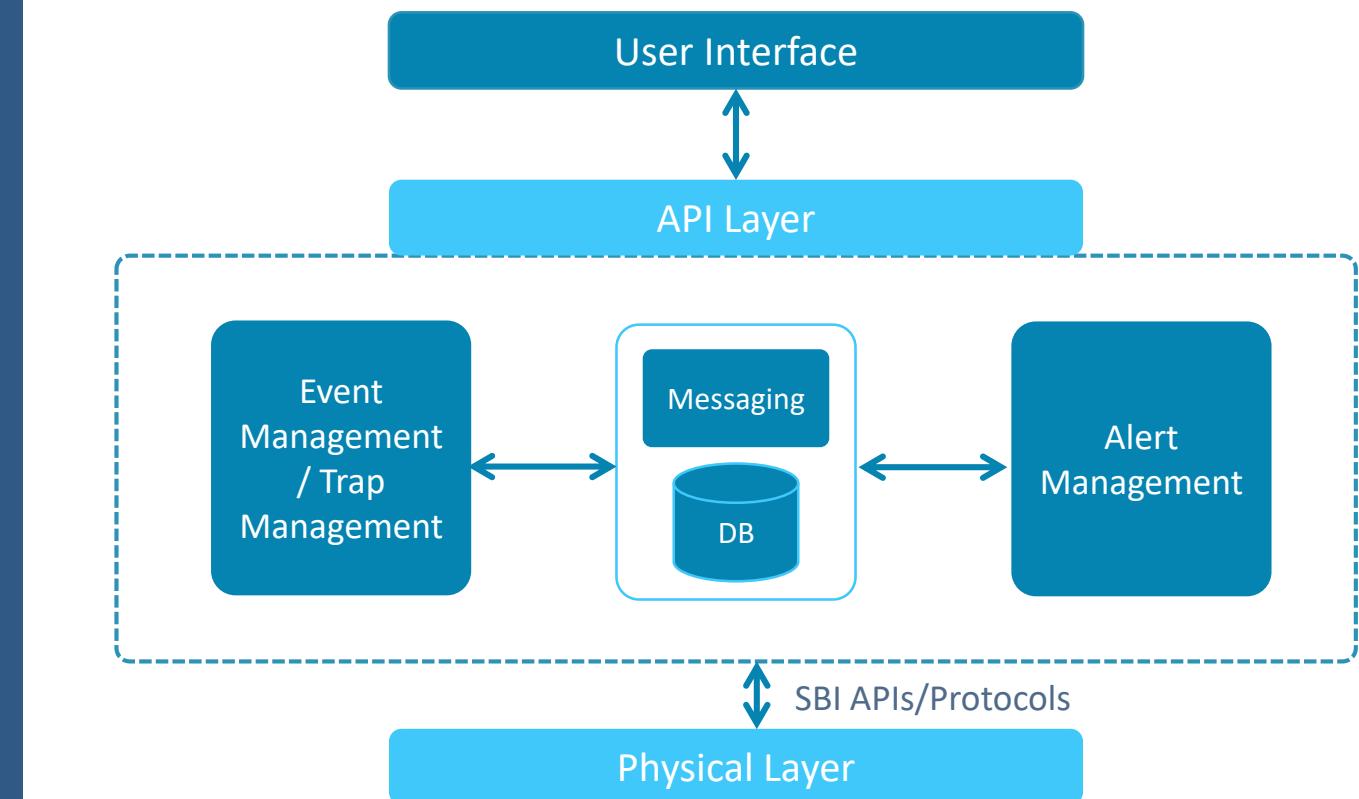
Calsoft helped in enhancing the existing converged infrastructure with the following features:

- Monitoring of reachability and authorization of the various Compute, Network, Storage, and Virtualization components that are a part of the Converged Infrastructure
- Generation of alerts during component discovery or authorization failure in Storage, MDS, Nexus Switches in Network, vCenter in Virtualization
- Upgrades of the underlying infrastructure software components such as Apache and JBoss, library updates such as Apache Commons, Shiro, Angular libraries, Batik XML Util were done, ensuring none of the functionality is broken
- Development and test support for new hardware components of compute and storage



Technology

- Java, Spring, Hibernate, AngularJS, PostgreSQL, RabbitMQ, Jenkins, Unix



Benefits

- Enhanced monitoring capability
- Upgrades of components and libraries to secure and more stable versions
- Support for the latest hardware

SaaS-based Configuration Manager for Converged Infrastructure

- Improved life cycle management with support for automated recommendation of the latest firmware against the interoperability matrix



Engagement

Calsoft is engaged with a leading Converged Infrastructure vendor for the development of a configuration management platform. The goal is to improve the quality of solution deployment and lifecycle management of the converged infrastructure solution.



Solution

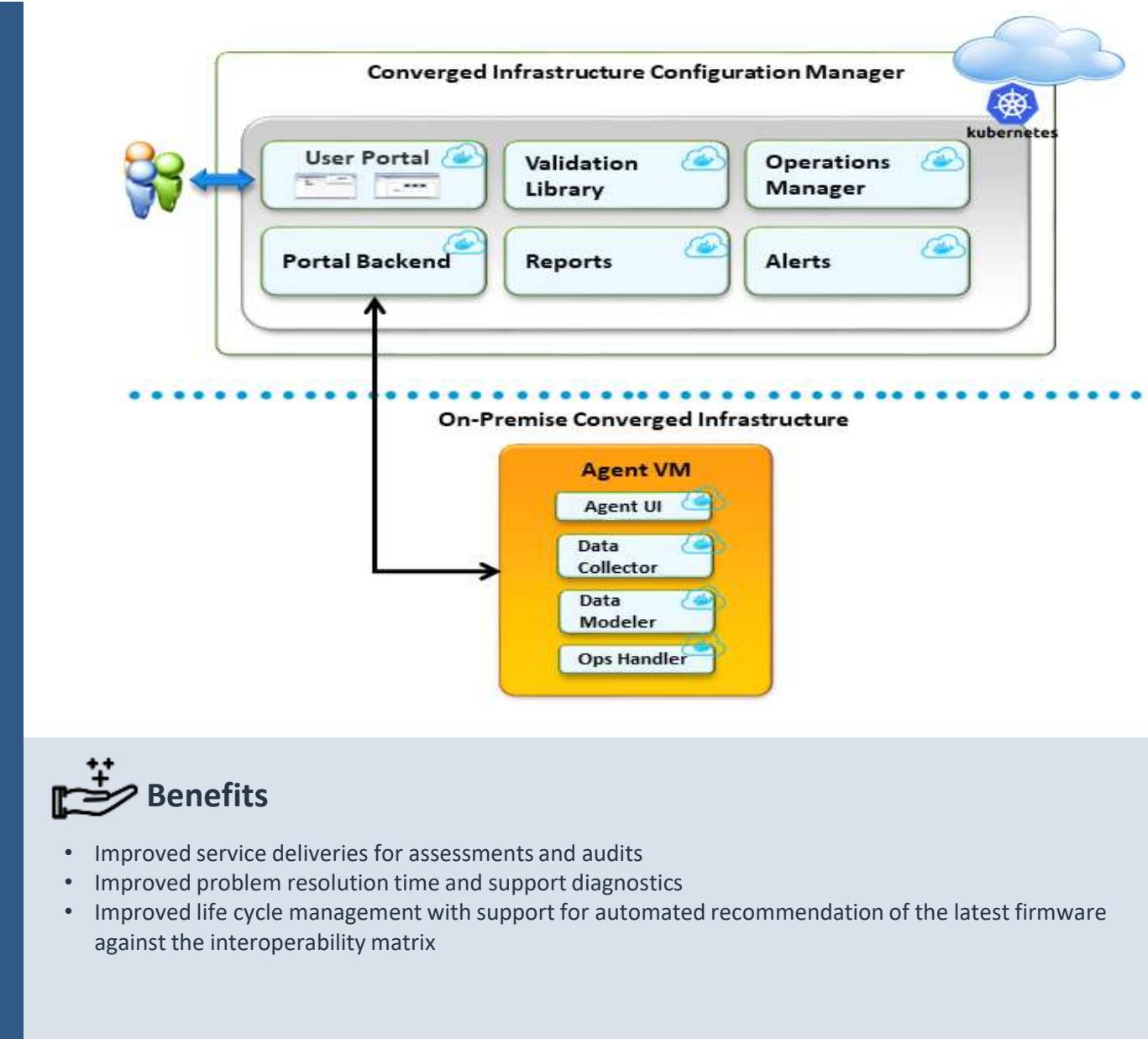
The Configuration Manager was used to validate onsite installation and help address the issues highlighted by it. It was able to run on-demand or after physical equipment changes.

- End-to-end solution orchestrated from cloud to run the CI profile to validate the setup and perform operations in an automated fashion
- Intuitive web user interface
- Multiple input methods
 - Network
 - Auto-support
 - Serial
- Analysis and validation support
 - Storage checks
 - Network switch(es) checks
 - UCS server checks
 - Interoperability checks
- Multi-format report with support for individual/merged reports
- Dashboard support
 - Configuration management
 - Validation rules
 - Lifecycle management



Technology

- Python 3.5, asyncio, Ansible, AWS, Docker, Proprietary Storage APIs, Nexus and MDS switches APIs, UCSM, Angular-4, HTML5



Converged Infrastructure Configuration Manager



Engagement

Calsoft is engaged with a leading Converged Infrastructure vendor in development of a configuration management platform. The goal is to improve the quality of solution deployment and lifecycle management of the converged infrastructure solution.



Benefits

- Improve service deliveries for assessments and audits.
- Improve problem resolution time and support diagnostics.
- Improve life cycle management with support for automated recommendation of the latest firmware against the interoperability matrix.



Technology

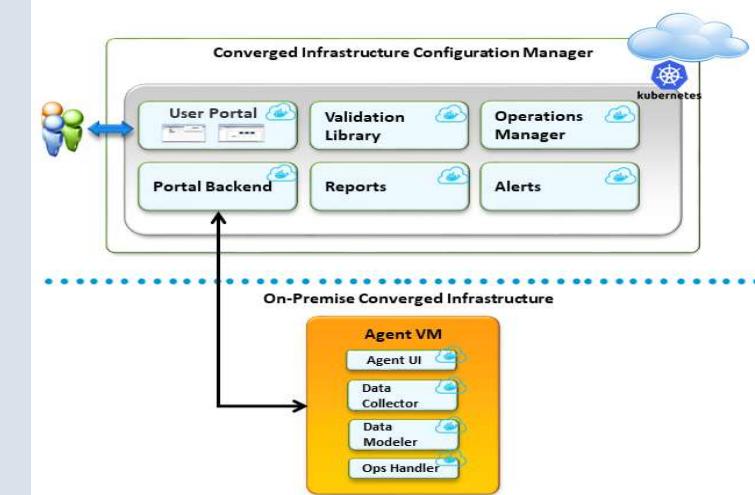
- Python 3.5, asyncio, Ansible, Docker, Proprietary Storage APIs, Nexus and MDS switches APIs, UCSM, Angular-4, HTML5 etc.



Solution

Configuration Manager would be used to validate the Onsite Installation and help addressing the issues highlighted by it. It would be able to run on-demand or after physical equipment changes.

- End to End solution orchestrated from cloud to run the CI profile to validate the setup and perform operations in an automated fashion.
- Intuitive web user interface.
- Multiple input methods
 - Network
 - Autosupport
 - Serial
- Analysis and Validation support
 - Storage checks
 - Network switch(s) checks
 - UCS server checks
 - Interoperability checks
- Multi-format report with support to individual/merged reports
- Dashboard support
 - Configuration management
 - Validation rules
 - Life cycle management



Web UI for Converged Infrastructure Configuration Manager



Engagement

Calsoft is engaged with a leading converged infrastructure client to develop a new age web user interface for their CI configuration manager tool.

- Ability to monitor status of the infrastructure with detailed data
- Ability to navigate the complex hierarchies of the entities
- Visual representation of the infrastructure
- Role based accesses to the information



Benefits

- Ease of visualizing complex infrastructure
- Access control to the information
- Ease of traversing complex hierarchies of data with various data representations.



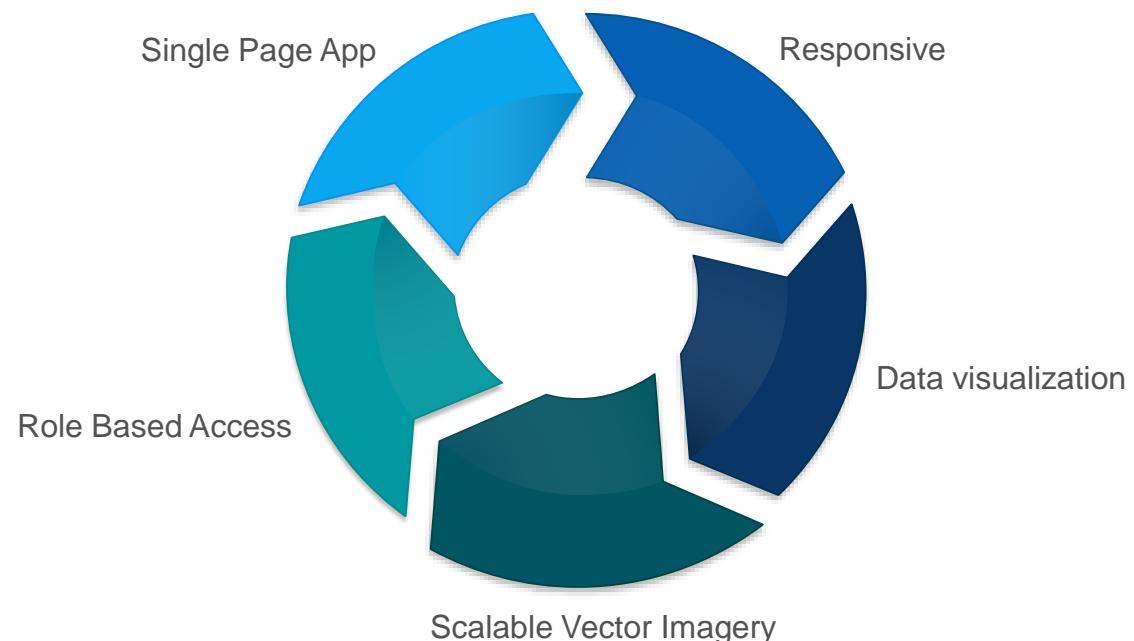
Technology

- Development : AngularJS, Bootstrap, SASS, D3, PrimeNG, Karma
- Build management : Bitbucket, Jenkins
- Designs : Userflow, Bohemian Sketch App , Invison



Solution

- Complete ownership of Design and development of the solution
- SPA application build with Angular for high response time.
- Web based solution with emphasis on responsive design
- Data visualization in multiple formats like tables, charts and scalable vector imagery.
- Better navigation of complex objects with nested tabular structures .
- Support role based access control with multilevel authorization



Systems Testing and Validation of Configuration Manager



Engagement

Calsoft was engaged with the client for Integration, Functional and End to End testing of Converged Infrastructure Manager product. The engagement underpinned:

- Testing with optimized combination of CI devices with different configurations
- Validating conformance with industry wide standards for storage protocols and topology
- Meeting product release deadline
- GUI testing to meet UX requirements



Benefits

- Full proof Converged Infrastructure
- Quality testing ensured defect free product
- Decreased testing time
- Improved time to market



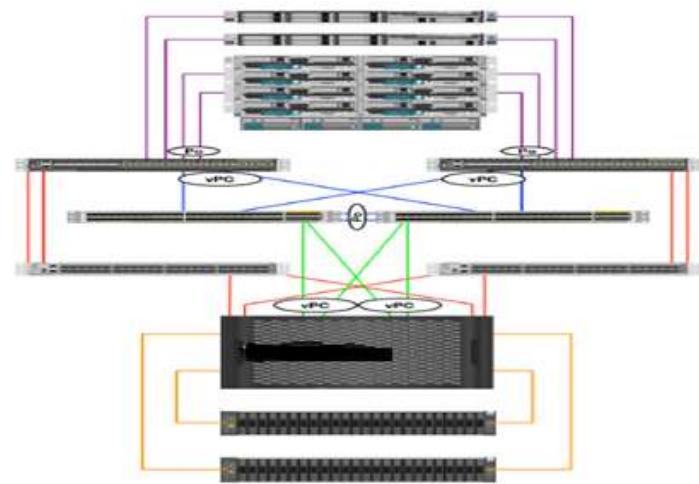
Technology

- Storage Protocols – iSCSI, FC, FCoE
- Languages - Python
- Tech: NFS, REST, UCS, Python, Robot, Selenium



Solution

- Calsoft staffed its best resources with Storage, Virtualization and Networking domain expertise.
- Manual System Testing of Converged Infrastructure involving storage protocols, virtualization, compute & management UI, etc.
- Areas of testing
 - Functional testing with QoS standards
 - Cls with FC, FCoE, iSCSI storage
 - Cls with Different Virtualization, Compute and Storage
 - Cls with different network switches like Nexus and MDS
 - Create different Converged Infrastructure scenarios
 - Develop, implement and execute test plans as per product specifications
 - Root Cause analysis of defects
- Design and develop a Robot and Python selenium based test automation framework to gradually reduce the dependency on manual testing.



Sustenance of Converged Infrastructure Manager

Engagement

Calsoft was engaged with the leading converged infrastructure vendor for the sustenance of converged infrastructure manager.

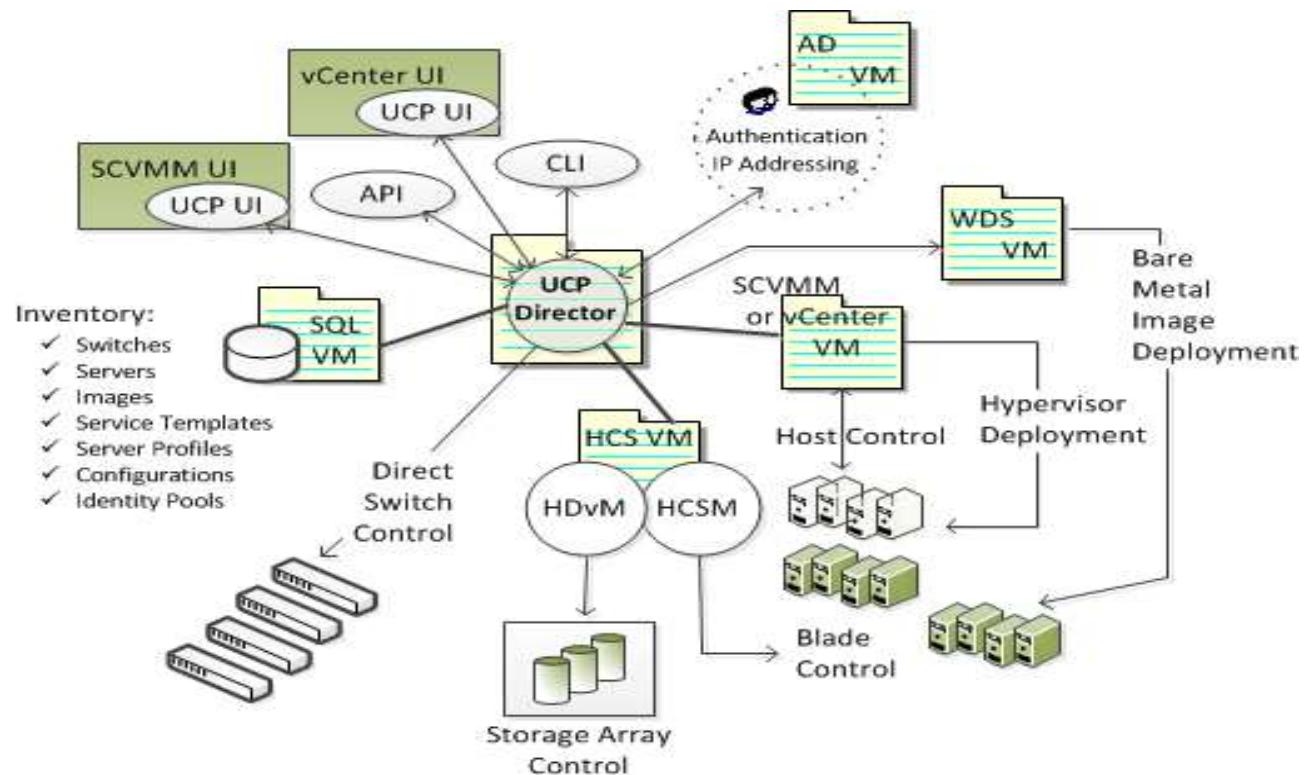
Solution

Calsoft helped the customer in sustenance of their converged infrastructure abd the engagement underpinned:

- End to end engineering ownership
- Resolve engineering escalations
- Lab infrastructure management
- Total 4 successful Hotfix released in last 1.5 years
- Resolved ~174 Tickets (Engineering escalations) so far (P1 : 11, P2 : 65 and P3 : 97)
- Developed and delivered more than 20 vRO workflows for traditional and advanced CI managers
- Release of Hotfixes which include the solutions for common issues reported by the customers
- Added support for TLS v1.1, v 1.2 and v1.3
- Added support for VMFS6 file system for the virtual machine data stores
- Fixed some of the major issues in the existing VRO workflows

Technology

- C#, MVC, WCF, AJAX, PowerShell, Microsoft SQL, WiX 3.7, Windows



Benefits

- Decrease in number of escalation
- Keeping the product up-to-date by upgrading the firmware and software versions of the components of CI manager
- Enabled the customer to abide the security policies of their organization

Cisco HyperFlex vCenter Plugin

Engagement

Calsoft has engaged with the customer who is offering CI/HCI solution. To simplify an end user/administrator's day-to-day tasks local vCenter plugin for CI/HCI solution was created. Since VMware has deprecated the local plugin, customer's customers are not able to use the vCenter plugin in latest releases of vSphere.

Calsoft engaged with customer to migrate local plugin to remote plugin and assist in certification of the remote plugin with VMware.

Benefits

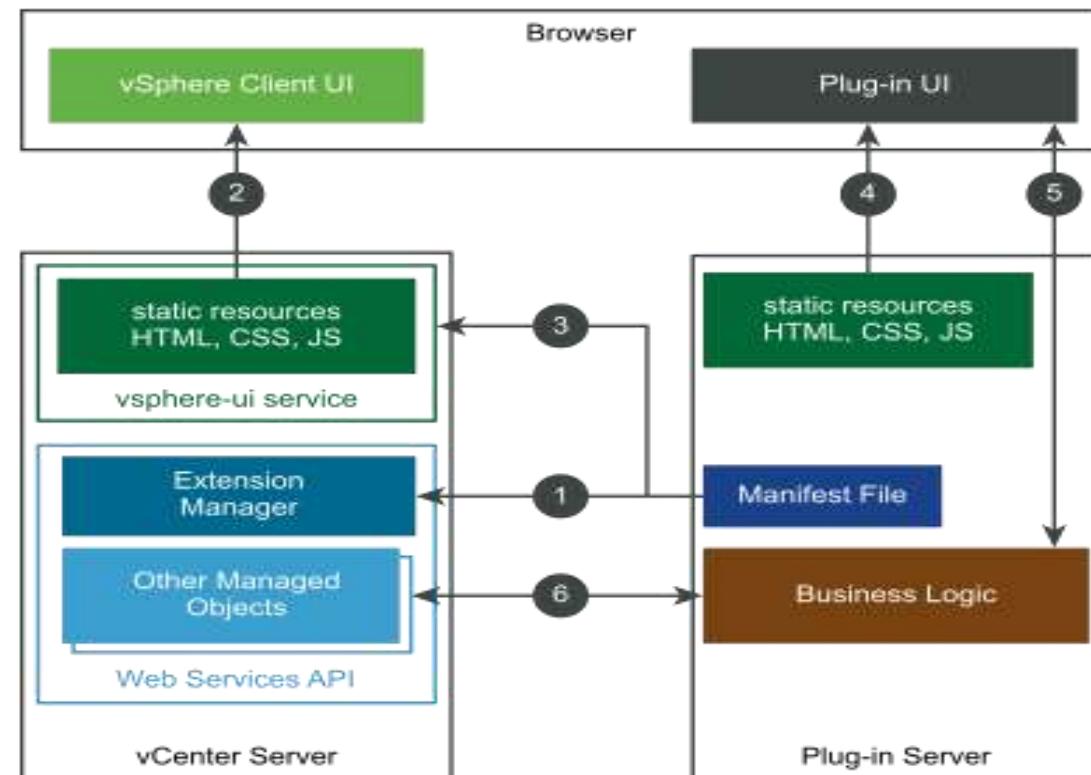
- Compatible with latest vSphere releases.
- Ease of vCenter and plugin upgrade
- Increased security and performance
- Supporting multiple instances and versions

Technology

- Springboot, Clarity Framework, IntelliJ IDE, VS Code, Maven, Jenkins
- Docker, Angular, Gradle, Debian, Shell Script

Solution

- Analyze the existing local plugin implementation and backend communication
- Upgrade the plugin UI and backend technology stacks as per VMware recommendations
- Upgrade the UI and backend code to support new communication path as per remote plugin architecture
- Validate the remote plugin functionality
- Execute VMware certification tests, share test reports, bug fixing etc.





The background of the slide features a soft-focus photograph of a city skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) prominent in the center. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there is a large, solid teal rectangular area that serves as a backdrop for the title text.

Success Stories: Data Security

Subscription-based Limits in SaaSified DP Solution



Engagement

- Calsoft helped a multi-tenant DP solution provider to validate the usage of an API gateway like APIGEE for applying subscription/license-based limits to its Data Protection APIs.



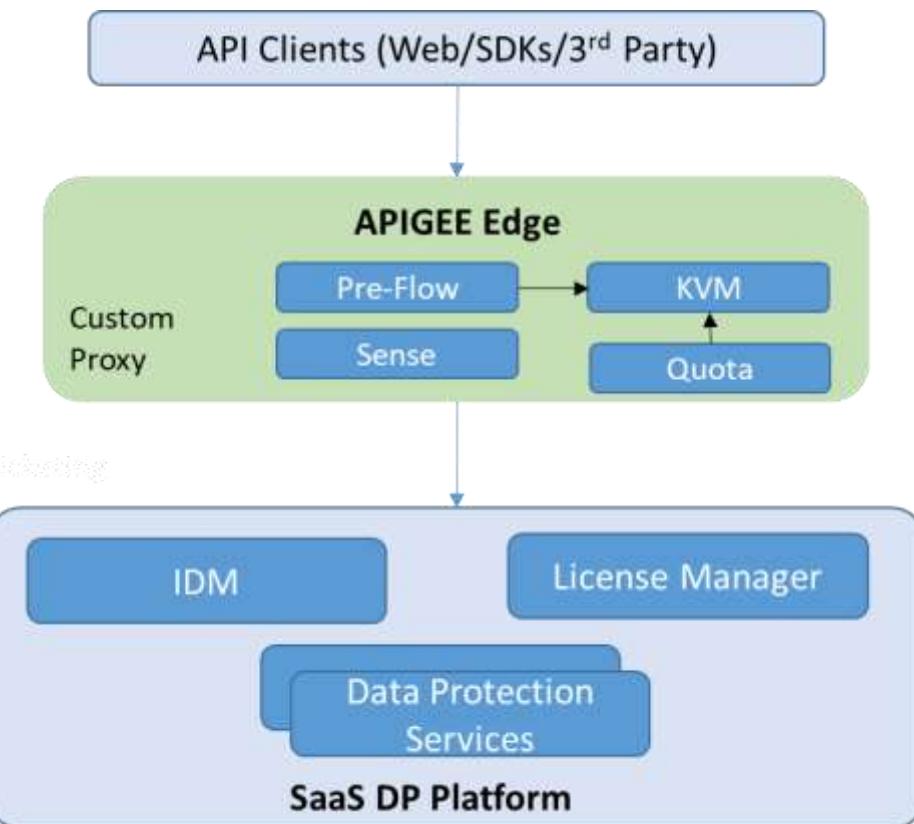
Solution

- Analyzed the DP APIs and conditions required for limiting their usage
- Analyzed the usage of APIGEE for applying dynamic limits per tenant
- Developed a new API Proxy with custom flows and Quota limit in APIGEE
- Validated the usage limitations for APIs
- Maintained the proxy across API version changes



Technology

- JS, APIGEE Development Portal, REST APIs, etc.



Benefits

- Externalized logic for applying limits to API users; cleaner implementation
- Externalized API security concerns
- Ready-to-use API analytics for understanding the feature usage pattern across customers

SED Encryption Solution



Engagement

Calsoft was engaged with the client for SED Encryption Solution. The engagement underpinned:

- Performing authentication of 100s self encrypting drives automatically without user intervention
- Providing high secure solution for SED authentication at enterprise level



Benefits

- Client attained high secure solution with easy deployment
- Reduction in password interception



Technology

- C, SCSI Reference manual, Windows Active Directory, SSL, Kerberos

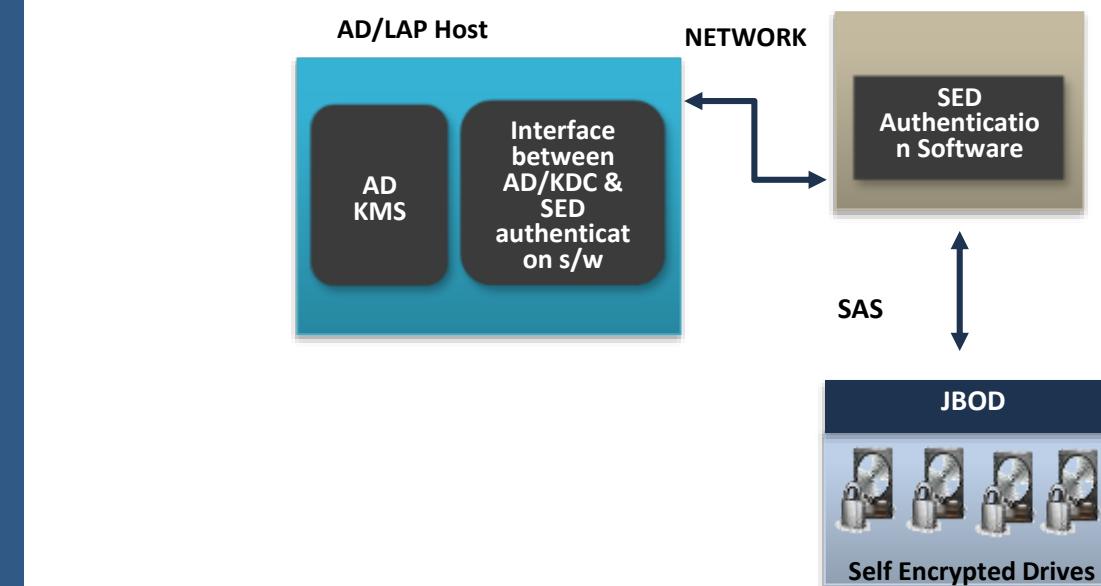


Solution

- Ported to Linux platform and fixed bugs in Seagate SED tool
- Developed a software application to communicate with key management server to access, retrieve and store the password(keys) to unlock drives

Functionality

- Centralized handling and storage of passwords
- Enhanced scalability in multi-drive scenarios
- Addition of drives can be handled automatically without user intervention



File System Encryption



Engagement

Calsoft was engaged with the client for File System Encryption. The engagement underpinned:

- Developing a solution to add crypto-security to distributed file system



Benefits

- Client attained high secure solution with easy deployment
- Every file is now protected individually



Technology

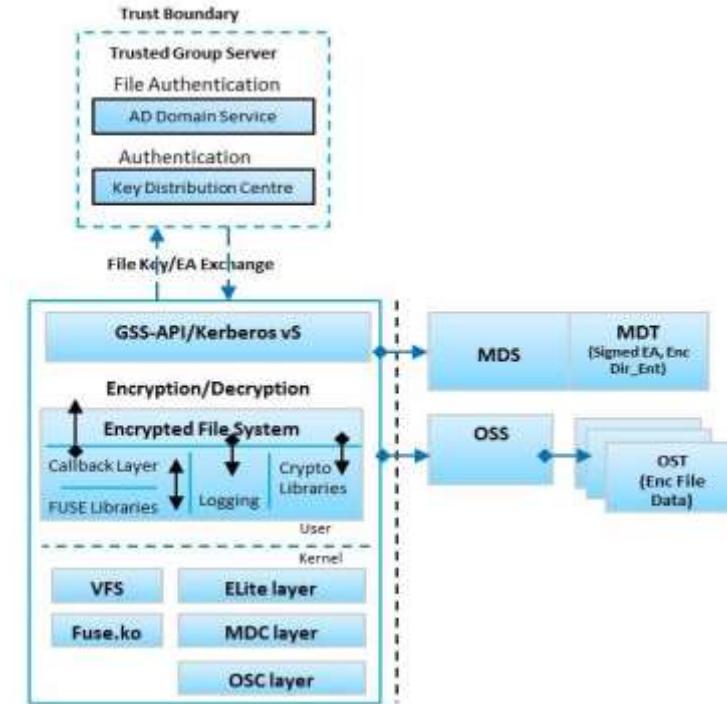
- C, SCSI Reference manual, Windows Active, Directory, SSL, Kerberos



Solution

- Support for per file unique encryption key along with salted keys per block
- Built mechanism to centrally manage keys and secure exchange of keys over wire

High Level Architecture



Storage Provisioning using Puppet



Engagement

The engagement underpinned automation of storage resources.

- The project involved automation of volume\host\connection creation on client's appliance.
- Future development involves volume snapshot\revert, Protection group, HostGroup support.



Benefits

The automation bestowed benefits in terms of:

- Reduced overall effort in manually creating resources on storage appliance.
- Help in continuous integration and deployment under DevOps.



Technology

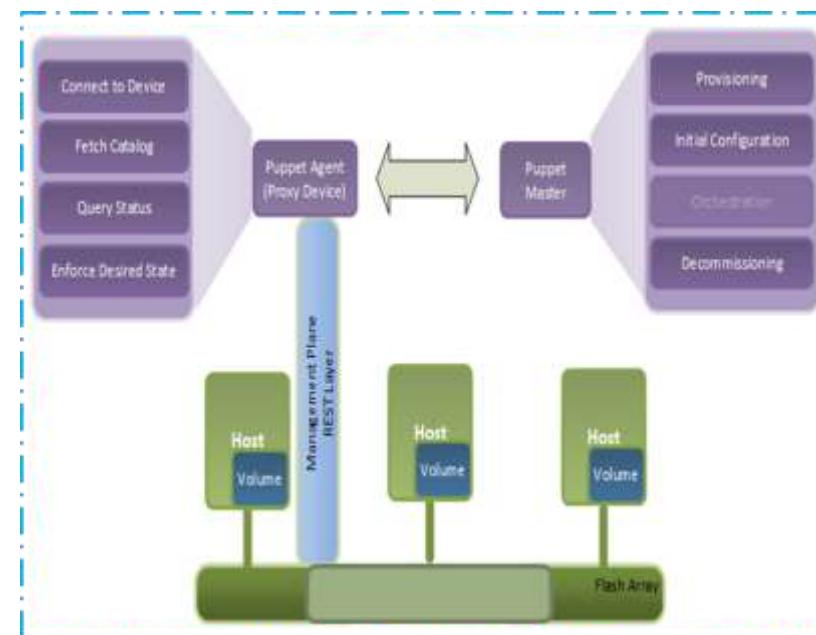
- Puppet 4.8.1+ , client' storage box version 4.7, client' storage box version REST APIs (1.6v) + Ruby 2.x



Solution

Calsoft helped client with:

- Writing Puppet solution to provision Volume with increasing number of sizes.
- Writing Puppet solution to provision Hosts with wwn and iqn support
- Writing Puppet solution to provision Connection between Volume and Host.
- Provided solution in all the possible 3 ways i.e. Device , Agent and Apply ways



Policy Enforcement using Contiv for Docker Services



Engagement

Calsoft is working on network policy enforcement in multi-host docker environment. The docker environment is setup for running microservices.



Benefits

The contiv network policy enforcement brings in the required security in the docker environment running various applications



Technology

- OS – Linux
- Language – Python
- Tools – Contiv, docker, docker swarm, vagrant, perf

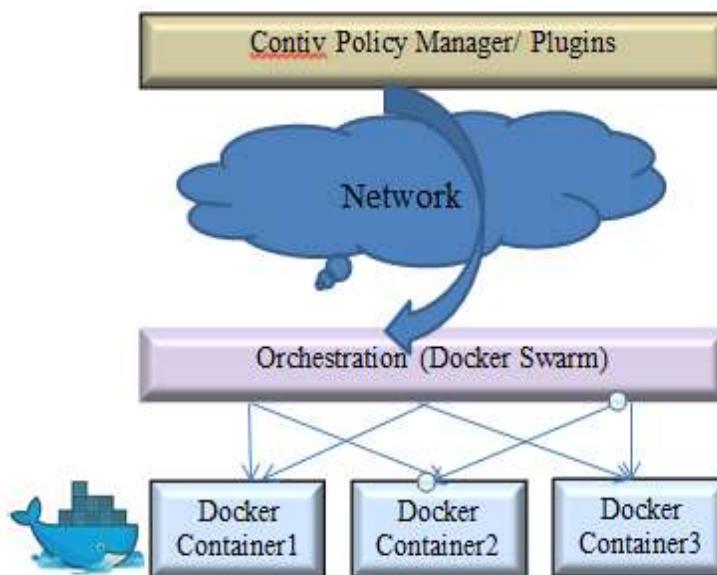


Solution

- Services running inside docker containers are orchestrated using Docker swarm cluster manager.
- Contiv is installed and configured to provide various network policies within various containers which are running as part of microservices.
- The network policies are added manually using Contiv console.

Calsoft's contribution

- Understanding the functional building blocks of application running in microservices environment.
- Understanding the network policy enforcement requirement for the application blocks.
- Install and configure Contiv on top of docker cluster environment.
- Create docker containers with client services, applying and testing the network policy in the context of Contiv.



Data protection of Microsoft Hyper-V platform



Engagement

Plugin for Hyper-V uses a web-based user interface and a centralized way for configuring backup and restore policies for Windows Hyper-V. Key Features:

- Full backup of VMs for all supported platforms of Hyper-v
- Incremental and differential backup only for Windows server 2016 VMs
- Restore, File level recovery and Power On VM after restore
- Include/exclude based on VM name patterns
- Hyper-V clustering, SCVMM support and Instant recovery



Benefits

- Data consistent backups using VSS and RCT
- Shorten backup windows and improve device usage



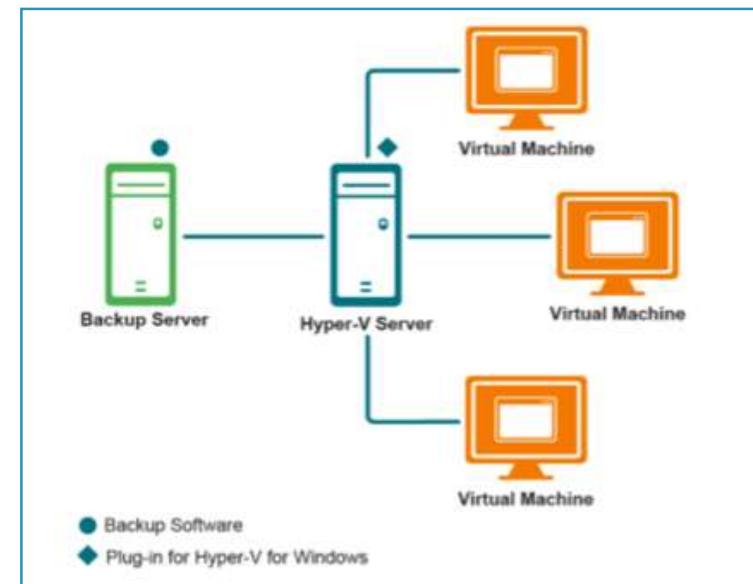
Technology

- Windows
- C/C++
- VSS/RCT



Solution

- Plugin uses the PowerShell to get the VM list from Hyper-V
- Plugin takes image level VM backup by mounting VM vhd/vhdx files
- Plugin uses the RCT feature of Windows 2016 to take incremental/differential backups
- UI option to power on VM post restore. It runs the PowerShell command to power on VM



Integration of Software Defined Storage for Data Protection Software



Engagement

Calsoft was engaged to integrate client's Software Defined Storage (SDS) with their Data Protection Software.

- Develop and modify Custom SDS Plugin used for communication between Backup Software and SDS
- Show all Statistics for new SDS on Backup Software User Interface.
- Provide data migration solution to move existing backups from Old(EOL) to new Storage Repository.



Benefits

- New SDS added best in class data de-duplication capability to Client's Data Protection Software
- Storage agnostic data protection solution
- Easy migration from existing storage repositories to new SDS.



Technology

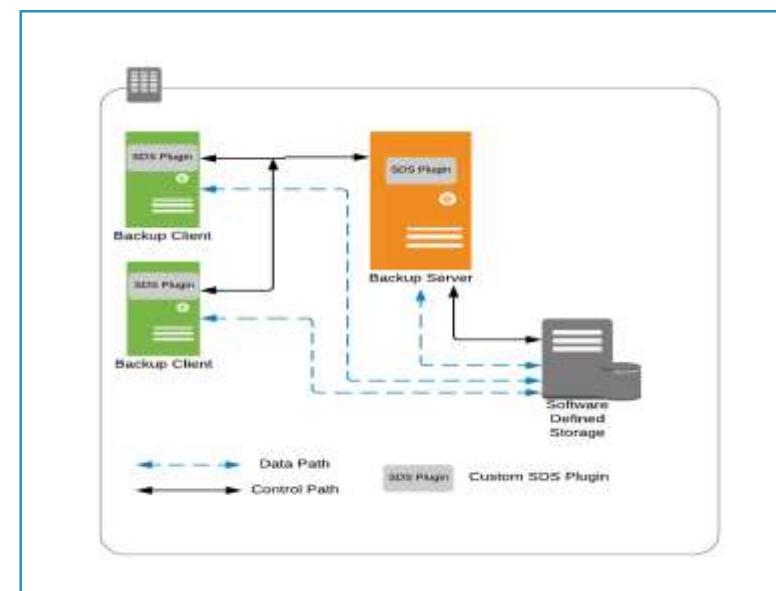
- Software Defined Storage, C/C++



Solution

Calsoft Integrated Client's new SDS with their Data Protection Software.

- Provided lean integration with No impact on existing Software repositories.
- Solutions supports multiple parallel backup/restore jobs across different networks
- Implemented efficient Data migration utility.
- Display and improve all statistics for new SDS on Backup Software UI.
- Improvement in Backup Software WebUI workflow and performance for managing different storage repositories.
- Extending SDS Plugin to new platform like HP-UX and AIX.
- Added support for NDMP backup of Storage filers to new SDS.



Active Directory Integration for Windows Backup server



Engagement

Calsoft is engaged with a client to Active Directory Integration with their Data protection software. Following are the objectives of the engagement.

- Perform user management using central user database i.e. Active Directory
- Login into software using AD credentials using pass-through authentication.
- Restrict AD users to being able to restore only and limit which machines and backup sets they have access to, on the basis of AD privileges.



Benefits

- User management is performed using central user database.
- No need to create multiple users locally for respective domain users.
- User privileges are managed using AD group membership.



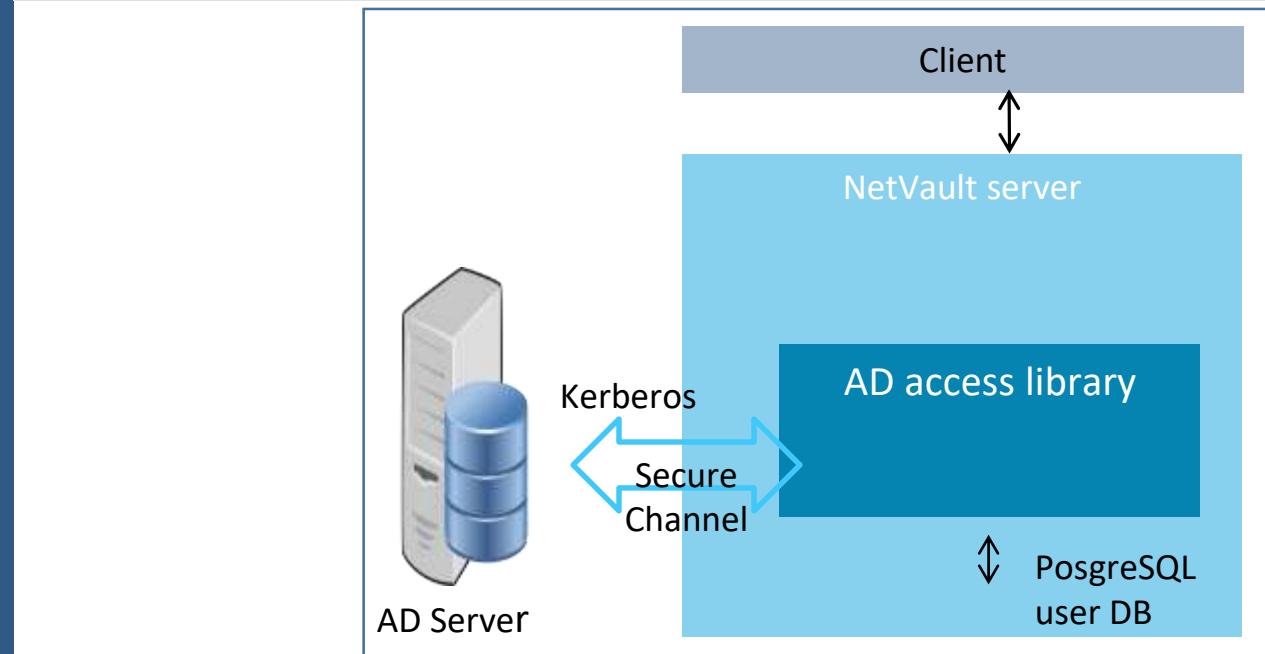
Technology

- C, C++, Windows



Solution

- Authentication using kerberos protocol and fall-back to NTLM protocol over secure channel.
- look-up active directory database to fetch AD users details and store them locally.
- Assign software privileges to AD users using their AD group membership.
- Add AD user into local database.





Engagement

Calsoft is engaged with a client to Linux LDAP Integration for their Data protection software. Following are the objectives of the engagement.

- Perform user management using central user databases i.e. OpenLDAP, Active Directory, Samba DC
- Login into software using domain credentials using pass-through authentication.
- Restrict AD users to being able to restore only and limit which machines and backup sets they have access to, on the basis of domain privileges.



Benefits

- User management is performed using various central databases like Windows AD, OpenLDAP, Samba DC.
- User privileges are managed using AD group membership.



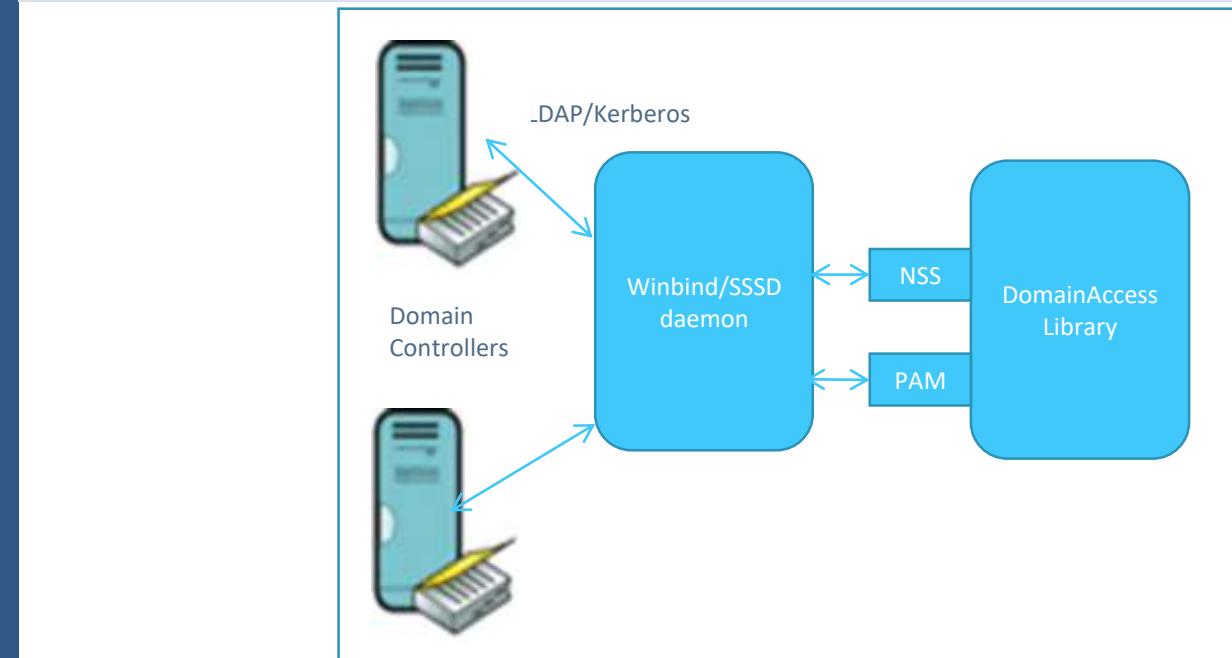
Technology

- C, C++, Linux, windows



Solution

- Authentication using kerberos/LDAP protocol over secure channel.
- Pluggable Authentication Module (PAM) integrated with System Security Service Daemon (SSSD) or Samba Winbind daemon for authentication.
- Name server switch (NSS) daemon integrated with SSSD or Winbind to look-up active directory database to fetch AD users details and store them locally.
- Assign software privileges to AD users using their AD group membership.
- Add AD user into local database.



NetApp Filer backup to custom SDS



Engagement

Calsoft was engaged to support NetApp Filer backup to customer's Software Defined Storage (SDS) using their Data Protection Software.

- Develop and modify custom NDMP Plugin to execute Backup/Restore workflows.
- Plugin orchestrate data movement. It monitors and reports Backup/Restore progress.
- Support concurrent Backup/Restore from multiple filers to multiple SDS



Benefits

- Customers can now backup filer data to faster, efficient Software Defined Storage.
- Backed up data can be easily moved to cloud based on retention policies.



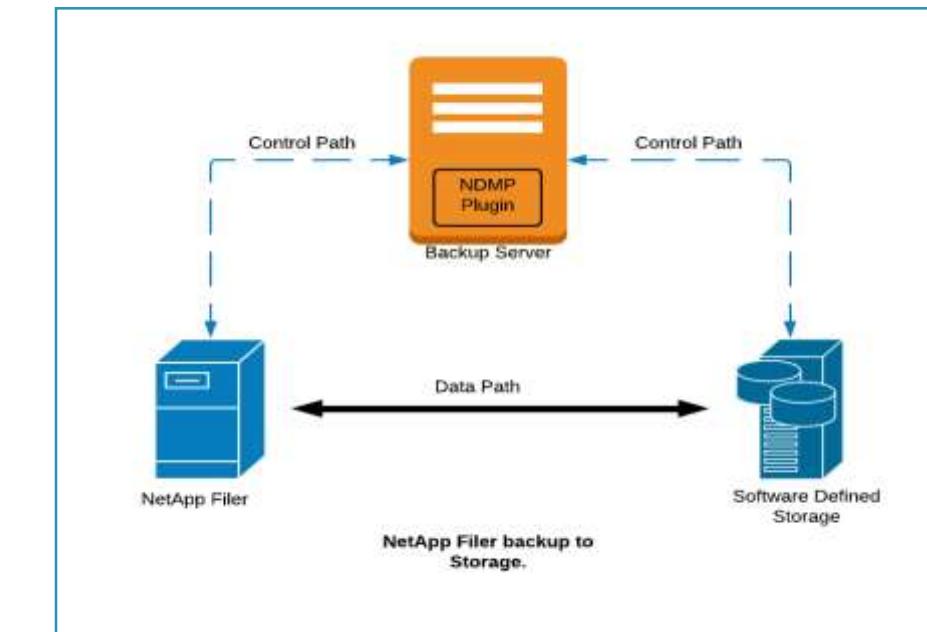
Technology

- Software Defined Storage, NDMP, C/C++



Solution

- Solution provided orchestration and monitoring capabilities for NDMP Backup/Restore workflows.
- Solution supports multiple parallel Backup/Restore jobs across different networks.
- Display and improve all statistics for NDMP Backup/Restore to/from custom SDS using Backup Software UI.
- No impact on existing SDS functionalities and NDMP workflows.



Storage Operations Automation



Engagement

Calsoft engaged with the client in developing PowerShell based client SDK for managing complex storage operations of HCI solution. The SDK involved developing atomic commandlets to cover the following

- Storage configuration
- Data protection
- Storage monitoring



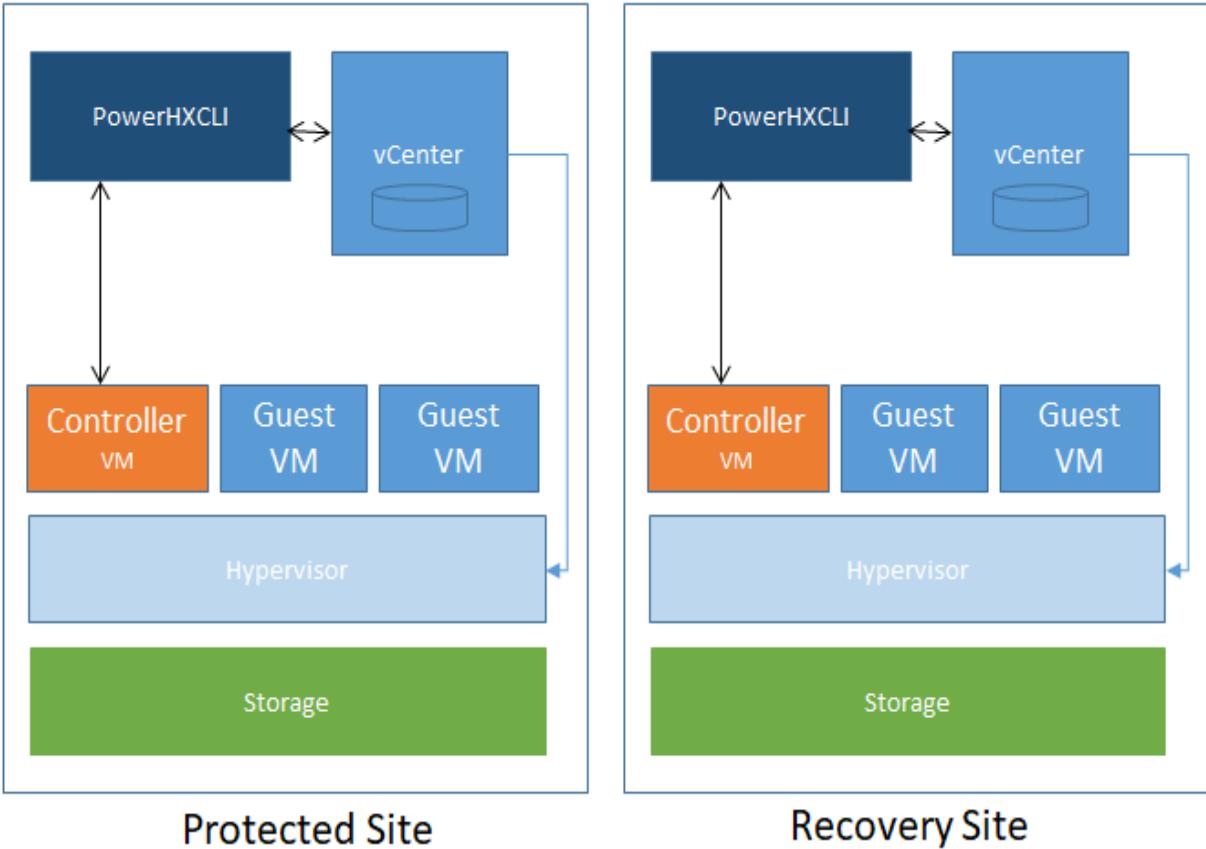
Solution

- Ease of management with commandlets which abstract storage API complexities
- Ease of scripting storage operations with higher level orchestrators
- These cmdlets greatly expedite admin tasks required for the DR by interacting with multiple controller in same session



Technology

- C#, .NET, PowerShell scripting, Swagger, Rest APIs



Benefits

- Calsoft analyzed available storage APIs to build higher level commandlet definitions
- Created commandlets with simpler definitions hiding storage API complexities
- Uniform error codes across all operations for ease of scripting
- Asynchronous APIs to handle long running operations
- Stateless commandlets
- Automated testing suite for all commandlets



Success Stories: SSD



VCS agent to monitor SSD caching



Engagement

Calsoft was engaged with the client for monitoring SSD caching by VCS agent . The engagement underpinned:

- Monitoring caching functionality of SSD's in a VCS cluster environment



Benefits

- Client can now use VCS for checking status of SSD cache in a clustered environment
- VCS agent can enable or disable cache for use by applications
- VCS agent can help to monitor enterprise applications deployed on VCS cluster environments



Technology

- Language: Perl, Technology: SSD, Flash, Caching (Direct cache)
- OS – RHEL Linux 5, RHEL Linux 6

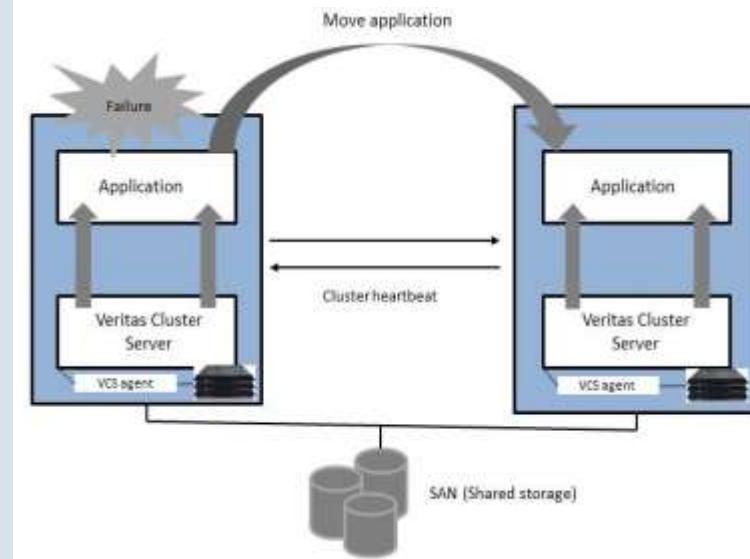


Solution

- Designed and deployed a VCS agent to monitor caching services in a VCS 6.0 cluster environment
- Agent was deployed and tested in Perl and BASH
- Provided design documents, test plans and published test results
- Provided an Installation and Configuration guide
- Provided Intermediate code drops with enhancements requested by customer
- Demo of the solution was shown multiple time

Features

- Install and uninstall scripts
- Implement VCS entry points
 - Open
 - Online
 - Offline
 - Monitor
 - Clean
- VCS agent is supported on RHEL5 and RHEL6 platforms



Implementation of Block Translational Layer (BTL)



Engagement

Calsoft was engaged with the client in implementing BTL for enhanced SSD performance removing the following SSD pain areas:

- Random writes degrade SSD's and fragment their internal FTL's
- Random write speeds are order of magnitude less than sequential



Benefits

- Improved SSD performance
- Extended SSD life
- Lowered cost by allowing usage of less reliable SSD's



Technology

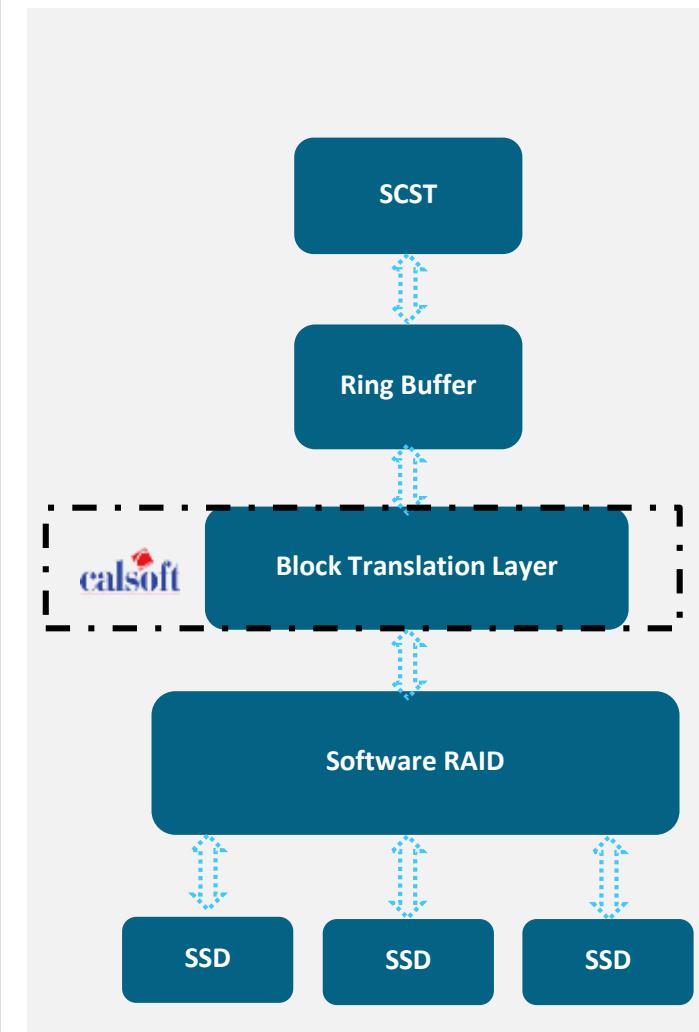
- Languages: C , OS: Linux



Solution

- Implemented array wide block translation layer
- Translates random workload into a sequential workload to SSD's
- Added de-duplication and compression
- Strong error correction allowing usage of lower grade SSD's

High Level Architecture



Ring Buffer Implementation (SSD)



Engagement

Calsoft was engaged with the client for ring buffer implementation. The engagement underpinned:

- Reducing disk contention and access times
- Improving disk I/O Performance
- Staging the data in case of power failure



Benefits

- Improved data protection in power failures
- Consistent performance as a result of linear offset write operations as compared with random offset write operation



Technology

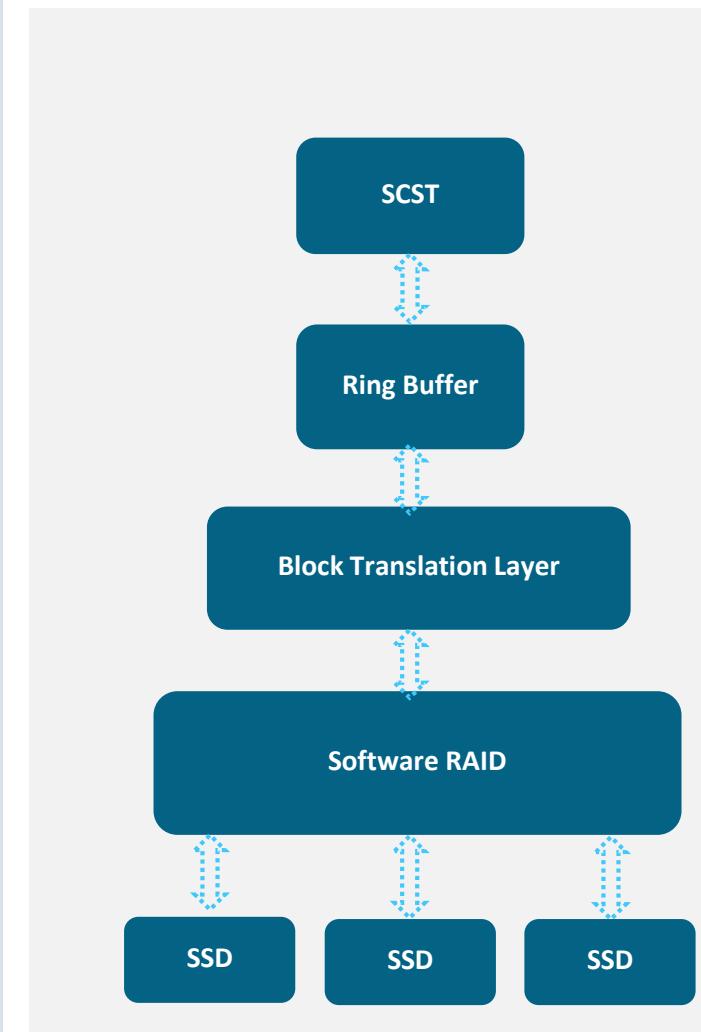
- Languages: C ,OS: Linux



Solution

- Used Viking flash device to store ring buffer
- Designed and implemented device mapper target kernel module
- Designed and implemented boot time replay module to replay the data into the BTL

High Level Architecture





Engagement

Calsoft was engaged with the client for PCIe - Storage Accelerator Enhancement
The engagement underpinned:

- Designing and implementing Windows drivers for storage accelerator product
- Elimination of I/O bottleneck in Windows environment (Hyper-V and Non Hyper-V)
- Supporting file filter, block level I/O acceleration and PCIe driver on Windows



Benefits

- Designed as a turnkey "appliance-on-a-card" that fits seamlessly into all commercially available NAS servers
- **For End Customers-**
 - Reduced storage capital costs
 - Lowering storage disk and CPU overhead



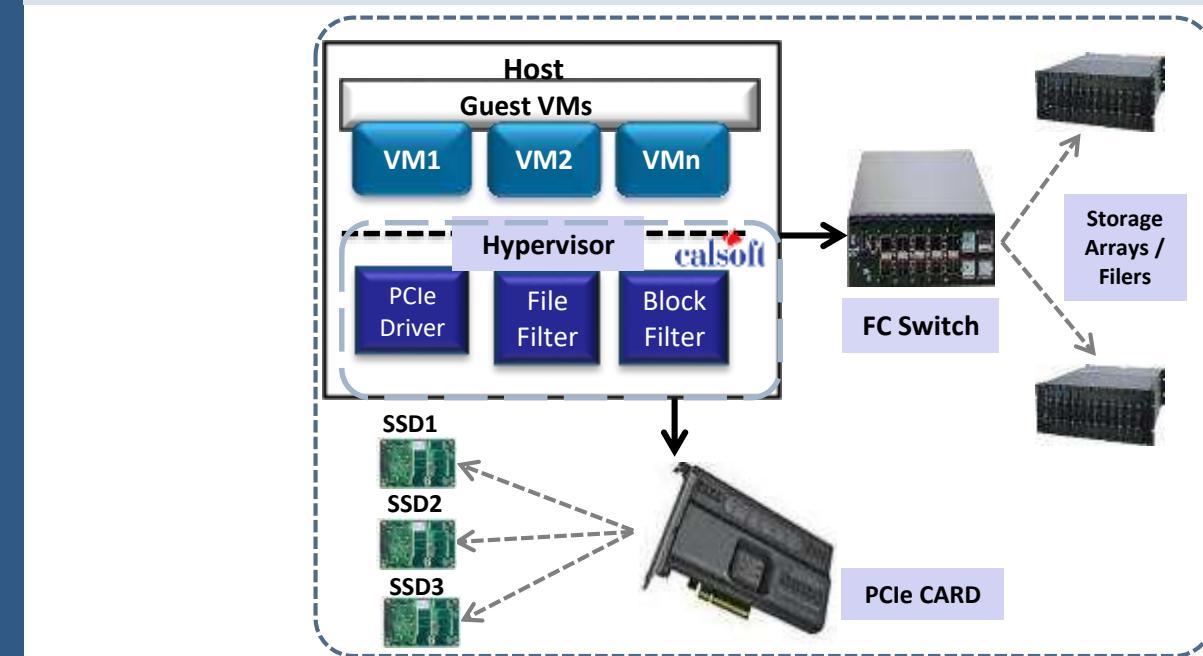
Technology

- C, C++, WDK, Storage and PCIe Drivers



Solution

- Designed and developed PCIe driver, block and file filters
- Improved burst random I/O performance for 3X – 11X reads and 4.5X – 13X in writes depending on the I/O size
- Enhanced I/O performance in virtualized environments with hypervisors and multiple guest operating systems
- Reduced I/O latency by 18X
- Designed OS independent solution



Flocker Storage Driver



Engagement

Calsoft was engaged with the client for developing Flocker Storage driver K2 SAN



Solution

- Custom built Flocker storage driver need to be developed by storage vendors, so that customer's storage hardware can be used for Flocker dataset. In order to enable client's flash storage to be consumed by Flocker, a Flocker storage driver needs to be developed which will accept storage commands from Flocker ctl and execute them on K2 over REST.



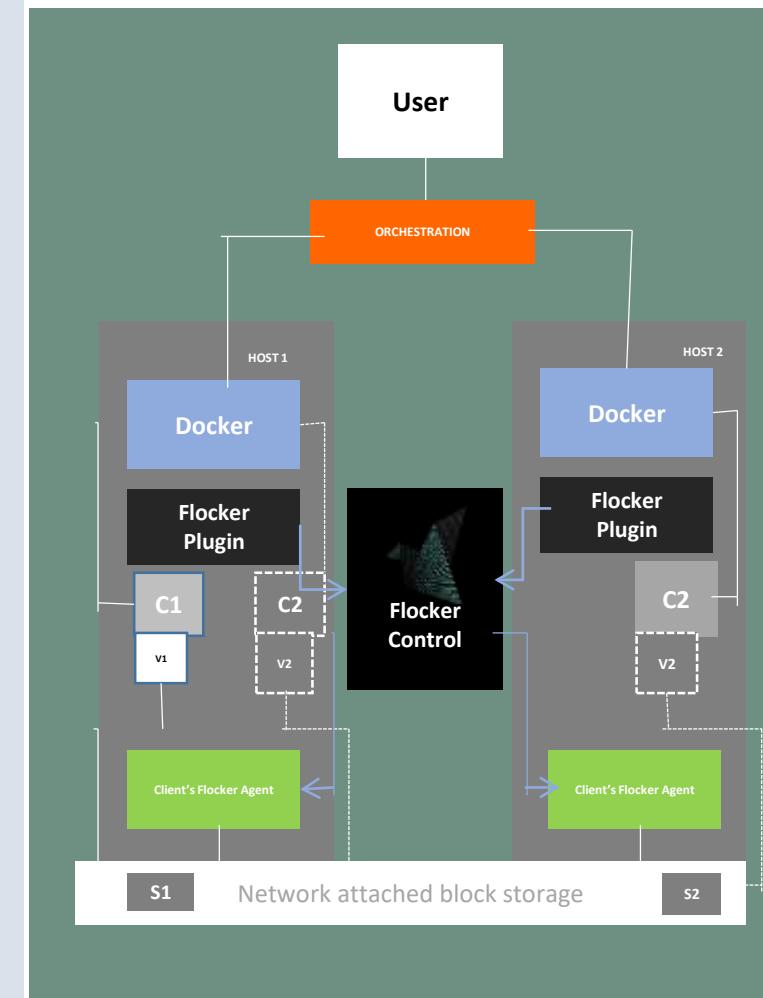
Benefits

- Understanding of Docker
- Understanding of Flocker
- Understanding of K2 SAN



Technology

- Docker, Flocker, Python, Linux CentOS 7





Engagement

Add support for other RAIDs



Technology

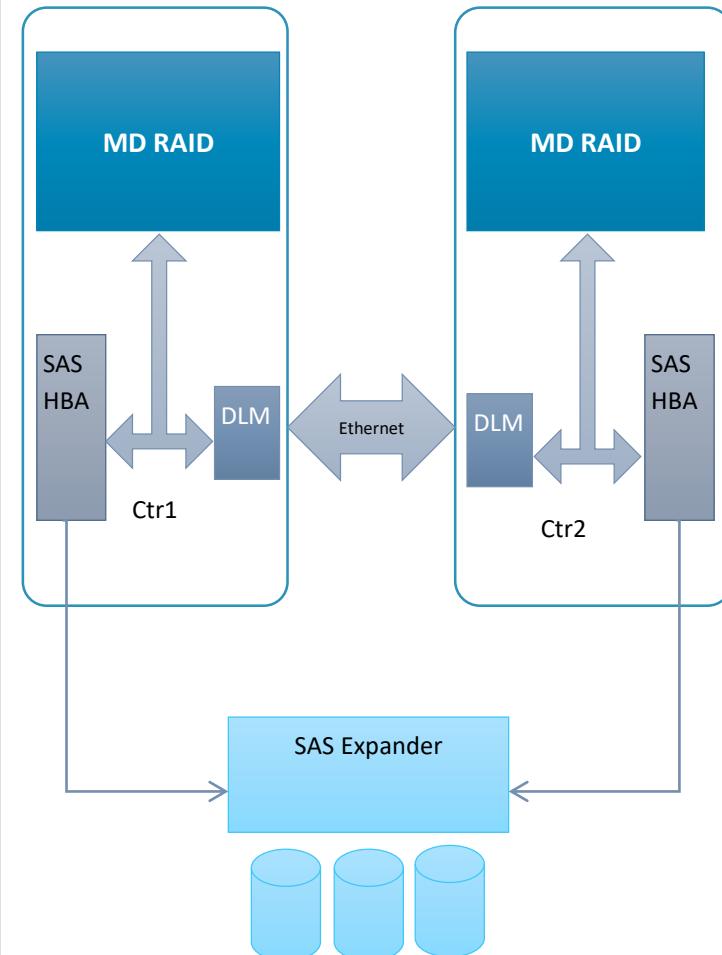
- C, Linux Kernel & User, MDRAID, Python



Overview

- Cluster MD is a shared-device RAID for a cluster.
- RAID is created on one of the nodes in the cluster and shared between other nodes in the cluster.
- The state of RAID remains same across nodes.
- Distributed Lock Manager used for Clustering
- Persistent ownership bitmap to track IO on different nodes – protected by DLM lock
- On failure, ownership is taken over by one of the surviving node. The Bitmap is synced/merged
- Current support for RAID1, needs bug fixing

Architecture





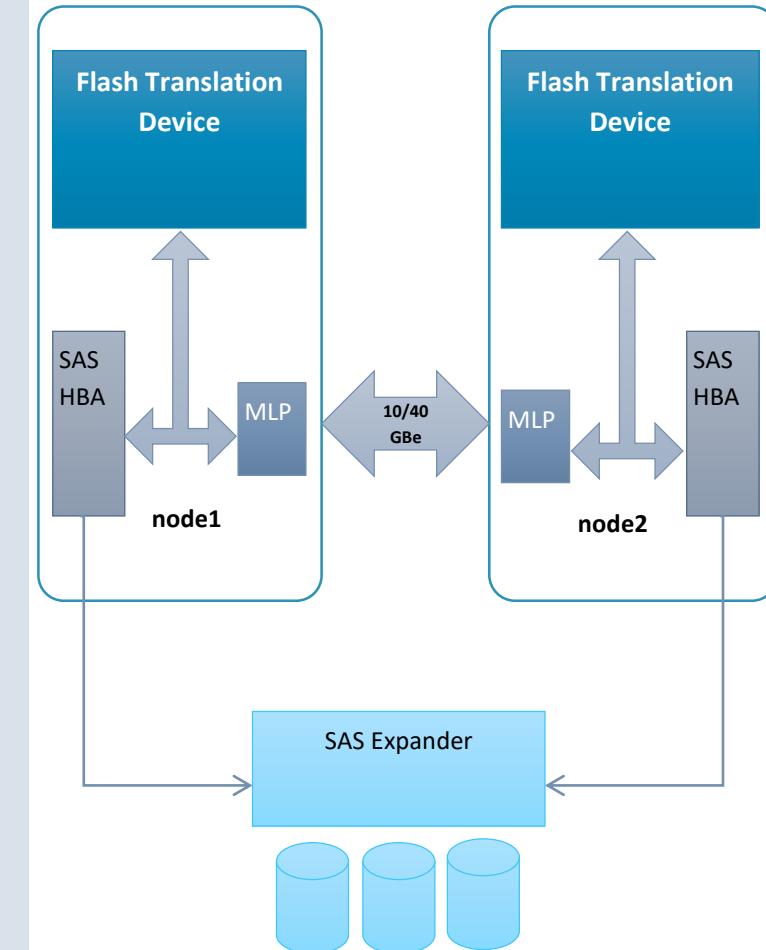
Technology

- C, Linux Kernel & User, MDRAID, Python



Overview

- Dual headed controller running in Active Standby mode,
 - 10 GB point-to-point Ethernet connectivity
 - Shared flash drives via SAS expander
- Active Node mounted RAID in RW mode while Standby did in Read only mode
- All the data and metadata updates were mirrored to standby through proprietary mirroring protocol over Ethernet
- Standby node joined the cluster through recovery
- Failover – Standby detects failure of Active node using heart-beat mechanism and takes over the IO
- Managed failover – graceful role reversal of the nodes



Feature enhancement and OS platform maintenance of Cloud Storage Linux product



Engagement

Calsoft was working as an their extended engineering team to support/maintain Linux side of hybrid cloud storage product



Benefits

- Increased productivity and reduced cost
- Performance improvement of customer's hybrid cloud storage product
- Reduction in build and test cycle times



Technology

- C, Perl, Python, SAS, Linux kernel



Solution

Maintenance

- Maintained Linux kernel drivers provided by customer into their hybrid cloud storage product.
- Investigated and fixed kernel crash/panics.
- Enhanced, maintained and fixed bugs to their build procedures and scripts.

Automation

- Project included improvement and feature additions into customer's world test framework. World test is automated test tool being written in shell programming.

Software Reference Distribution (SRD)

- Performed enhancements, feature additions and maintenance of PMC SCSI low level linux kernel driver as per customer's SRD (Software Reference distribution)
- Maintained customer specific PLX NTB driver.
- Enhancements in PMC SAS driver.

AWS Direct Connect integration with Storage Array



Engagement

Calsoft was engaged with a storage Original Equipment Manufacturer (OEM) to integrate its storage array in AWS cloud through AWS Direct Connect. The engagement involved deriving the network approach, commission the storage array integration & generate a best-practices guide.



Benefits

- The client was able to showcase the integration of its storage product in public cloud & highlight competitive advantage of having high performing storage array in cloud.



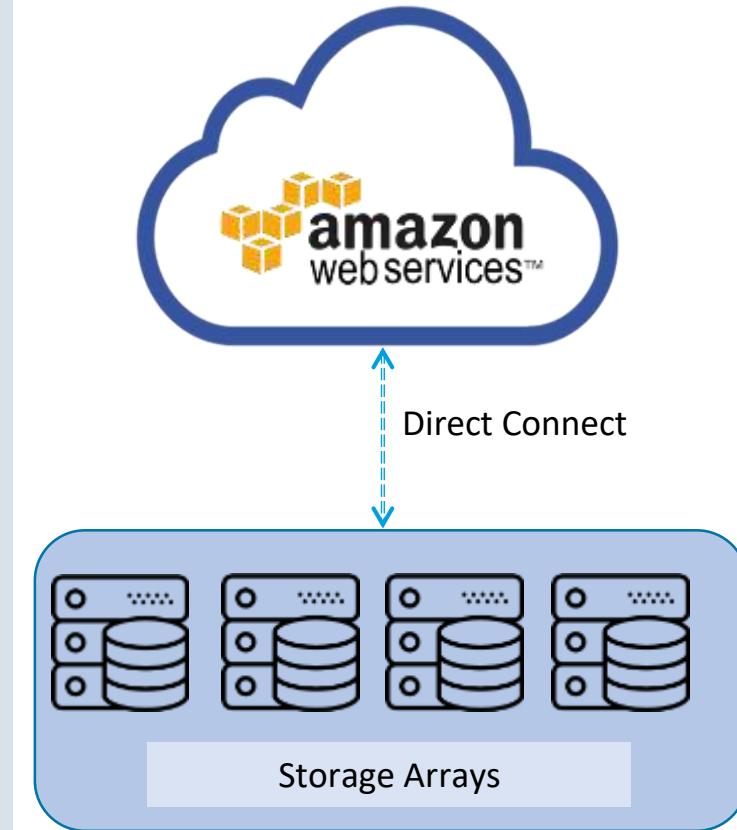
Technology

- AWS Networking, Python, Windows Management framework (WMF), iSCSI protocol, Powershell



Solution

- Calsoft team devised an architecture involving offerings of AWS Networking & cloud exchange co-location site Equinix Cloud Exchange (ECX).
- Components used
 - International Business Exchange (IBX)
 - Virtual Private Cloud (VPC)
 - Private & Public subnet
 - Route table
 - Customer Gateway
 - Virtual Private Gateways
- iSCSI connectivity was established from EC2 instance on AWS cloud to storage array in co-location site
- Automation scripts were developed to automate the network initialization & connectivity, configuration of storage array, launch of EC2 instances & configuration of iSCSI between EC2 & storage array.
- Performance benchmarking was done to showcase enhanced IO bandwidth.



Colocation Site



Success Stories: User Interface

Custom SOC Dashboard through Splunk

- Better analysis and improved efficiency of customer's infrastructure



Engagement

- Calsoft was engaged with a leading Telecom Service Provider, among the top 3 in the country of operation, for developing a solution to display multiple dashboards for improved security analysis and utility.



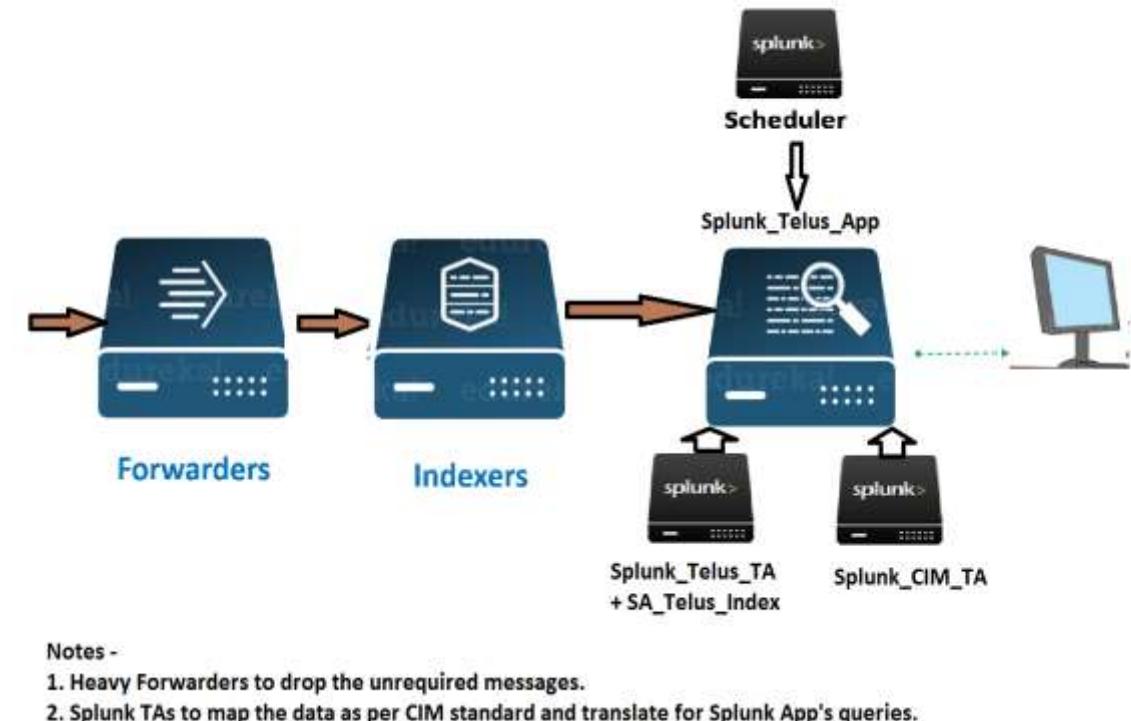
Solution

- Built customized dashboards using Splunk editor and Splunk web
- Built a custom Technology Adaptor (TA) that converts log strings and tagged it with event identification
- Developed a custom Splunk application for visualizing different customized dashboards
- Built a scheduler for scheduling tasks
- Used the inbuilt Splunk CIM TA to utilize common CIM functionalities
- For better efficiency, Calsoft suggested using a heavy forwarder to eliminate redundant logs from the incoming streams



Technology

- Splunk Editor, Splunk Web, HTML, CSS, JavaScript, XML



Benefits

- The customer was able to get actionable insights by using dashboards created through Calsoft's solution
- Better analysis and improved efficiency of customer's infrastructure

End User Computing-OS Optimization Tool



Engagement

Calsoft was engaged with the client to automate the optimization procedure for Windows operating systems based on the benchmarks provided by customer



Benefits

- Quickly apply optimization on Win OS on a single click
- Creation of user-defined templates allowing to create custom optimization parameters for various operating systems



Technology

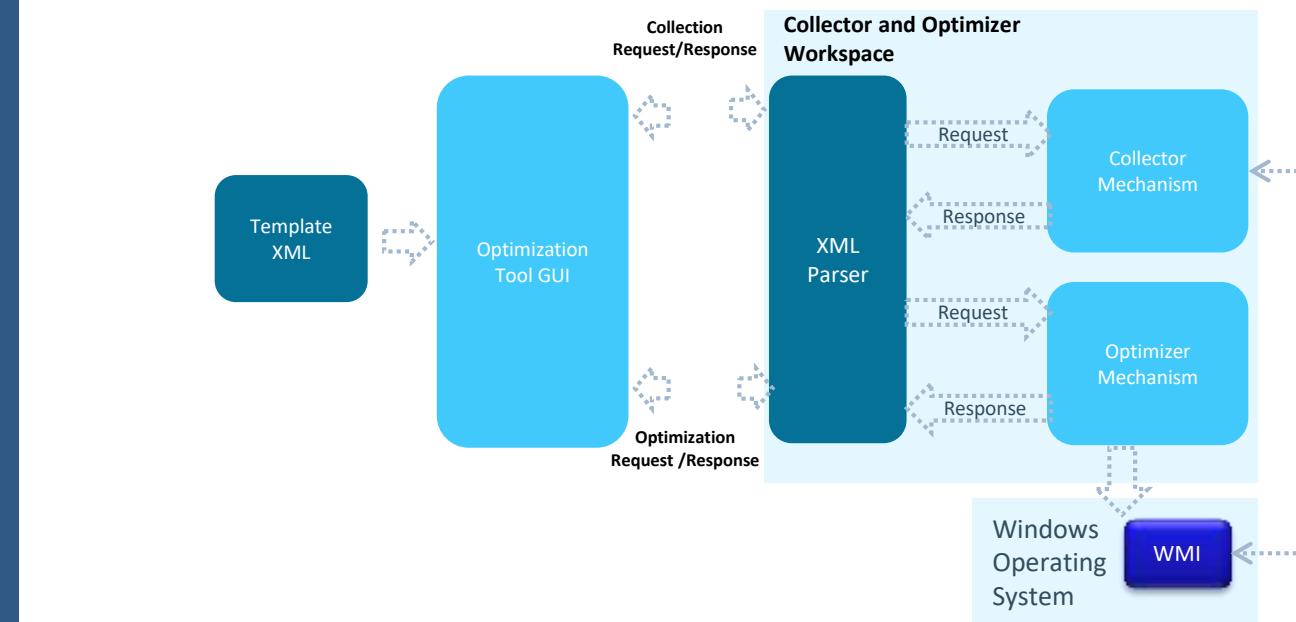
- C#, WPF, Collection & optimization mechanism using WMI



Solution

Calsoft developed a 'user-friendly GUI' to initiate OS analysis and based on the results invoke relevant optimizations using WMI.

- Collect operating system parameters using WMI
- Analyze collected parameters against those provided in benchmarks
- Apply optimization as per selection provided by the user using WMI/Win32 methods



UI Plug-in and module implementation



Engagement

Calsoft was engaged with the client for UI Plug-in and module implementation. The engagement underpinned:

- Adding Network Performance Monitoring and Reporting features to GUI
- Provisioning Role-based access control (RBAC)



Benefits

- Increased visibility of virtual appliance
- Secured virtualization management
- Enabled authorization and access control



Technology

- JAVA, Open Source Technologies



Solution

- Implemented UI plug-ins that provides Network Performance Monitoring and Reporting capabilities to GUI
- Implemented Modules that gathers Performance statistics from the Virtual Appliance
- Implemented graphics reporting and PDF report generation modules



Development of GUI Interface



Engagement

Calsoft was engaged with the client for Development of GUI Interface. The engagement underpinned:

- Providing Single control point for all I/O devices
- Development of Standard interfaces for easy integration with third party tools
- Provisioning Virtual devices instantly
- Allocation of Dynamic Bandwidth



Solution

- Developed server side Management Console Server
- Developed three interfaces, a web-based GUI, SOAP/CLI APIs for management, monitoring, control and troubleshooting



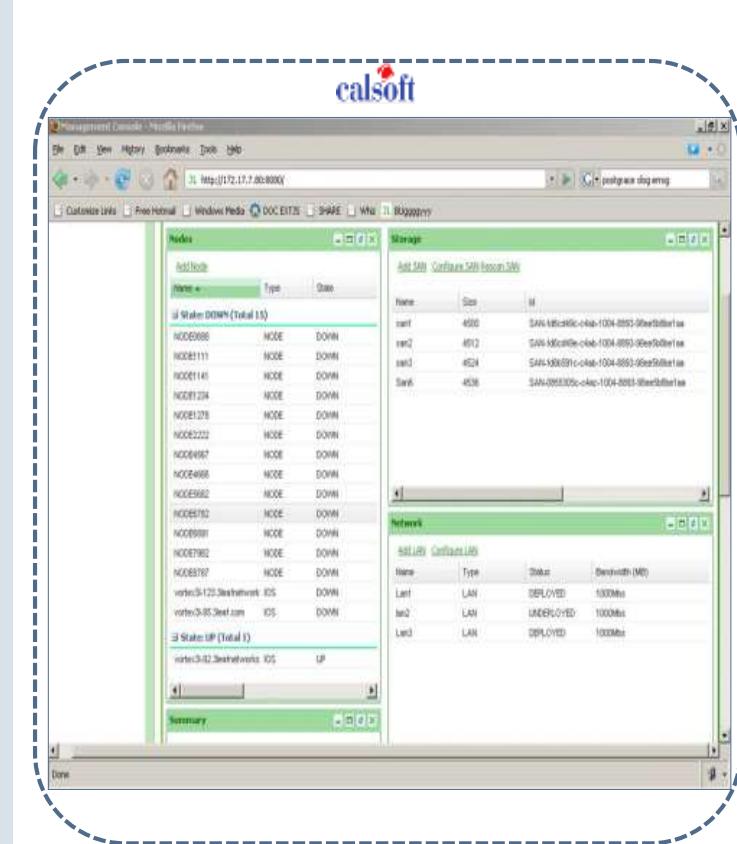
Benefits

- Single control pane for all IO devices



Technology

- ESX, nPIV, OS: Windows,Linux



Appliance Management Interface



Engagement

Calsoft was engaged with the client for managing appliance interface. The engagement underpinned:

- Resolving unavailability of web interface to manage de-dupe appliance
- Dealing with Lack of in-house Web and UI expertise



Benefits

- Unified management of appliance
- Easy Integration with third-party ecosystem



Technology

- Frontend: HTML5, JQuery, AngularJS, D3/NVD3.js, Languages: Python, WEB-SERVER: Apache, uWSGI



Solution

Calsoft designed and developed REST APIs over CLI as a web interface as well as Management UI

Key features:

- Third-Party App Integration (Restful APIs)
- Seamless monitoring and management of appliance(UI)
- High powered de-duplication & compression capabilities



Engagement

- SAAS-based solution to deploy ,install and monitor OpenStack services on Client-UCS platform.
- RBAC support
- Dockerized web user -interface to list, manage and monitor available OpenStack YAML Blueprints for deployment.
- Single pane of glass view for OpenStack deployment pre/post install process.



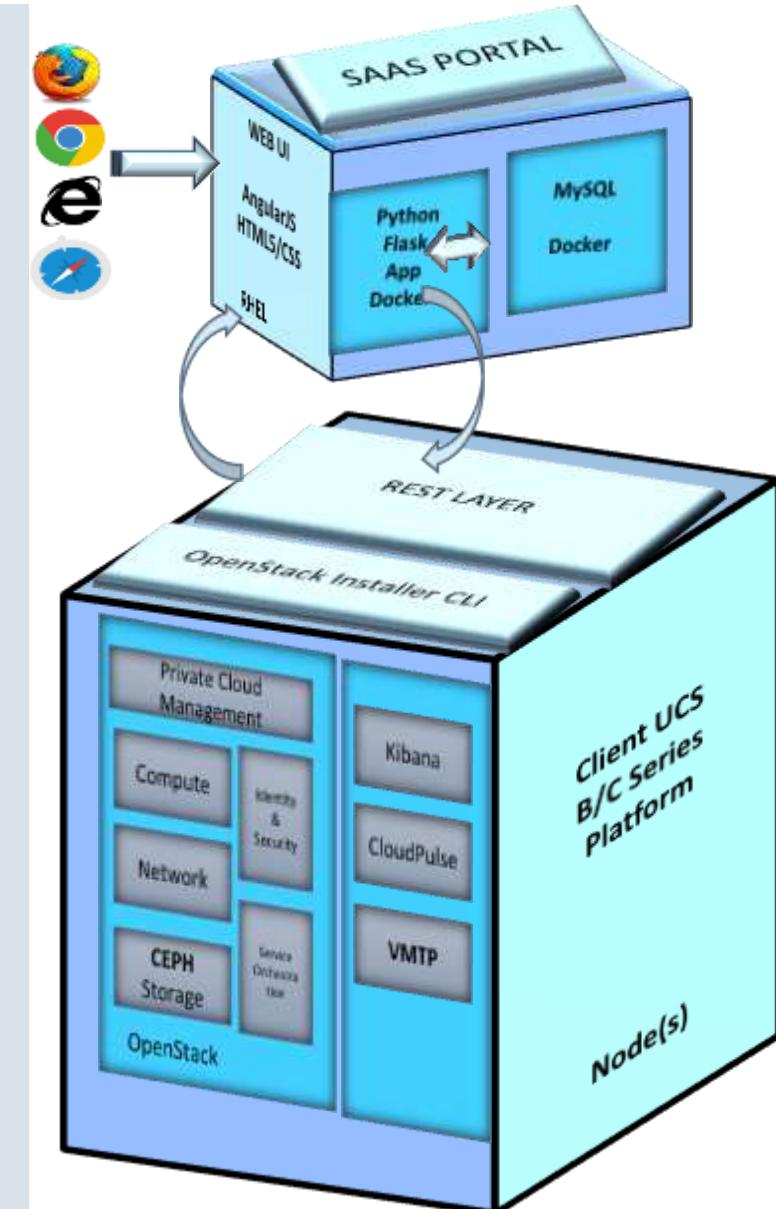
Technology

- RHEL, Docker, Python, Flask, MySQL,AngularJS,
- Client UCS OpenStack Installer



Solution

- Integrated with Client's REST based OpenStack Installer.
- Dockerized Python-Flask backend for UI.
- Dockerized MySQL as application data-store
- Application handles RBAC with support for multi tenancy
- Simple, minimalistic, responsive UI design using AngularJS,HTML5.
- Base Image – RHEL with Client OpenStack packages installed on it.
- User Interface to facilitate creation of YAML configuration blueprints and initiate the deployment process.





Engagement

Calsoft was engaged with the client for developing GUI automation which is integrated with existing CLI automation

- Test Case written only once
- Interface flag – CLI/GUI determines mode of execution
- Uniform logging and error handling across CLI and GUI



Benefits

- Customer's vision of write Test Case once and execute through multiple interfaces fulfilled
- Boosted product release confidence as the product functionality is tested through customer exposed interface - GUI



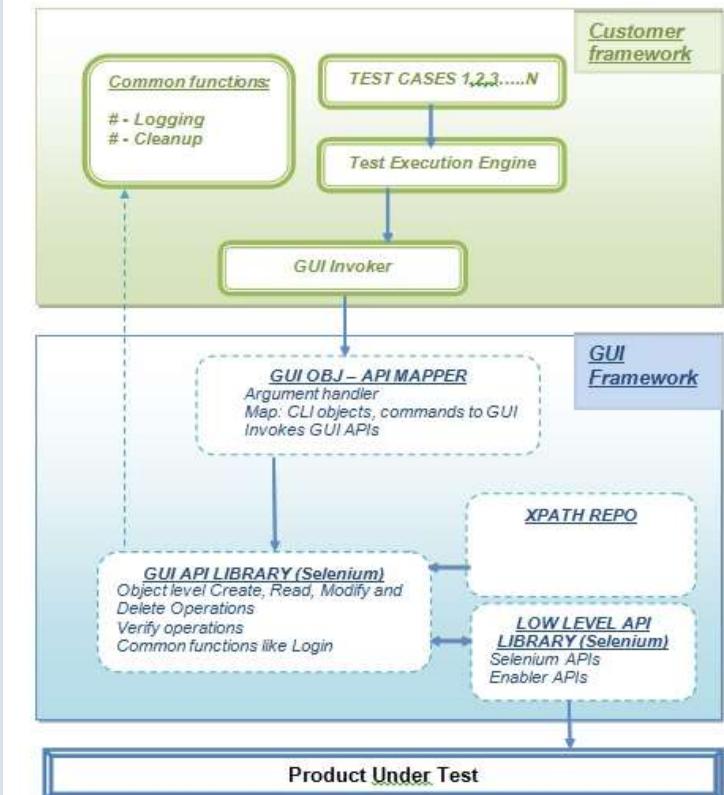
Technology

- Python, Selenium



Solution

- Developed the CLI-GUI Object mapper serving
 - Object level mapping
 - Operation mapping – CRUD
 - Accepting arguments
- Built the GUI APIs for CRUD operations
 - Efficiency by re-usable low level API libraries
 - Improved reliability by proper checks and variable timeouts
 - Improved stability by deploying a variety of techniques to handle dynamic xpaths
- Adhered to existing logging and error handling



Docker Monitoring Tool



Engagement

The goal of this project was to enable monitoring and manipulation of Docker containers via a web UI.



Benefits

- Provided API level interface to Docker monitoring for high-level applications to use the historical data
- Made Docker monitoring data persistent which further helps monitoring tools in analytics



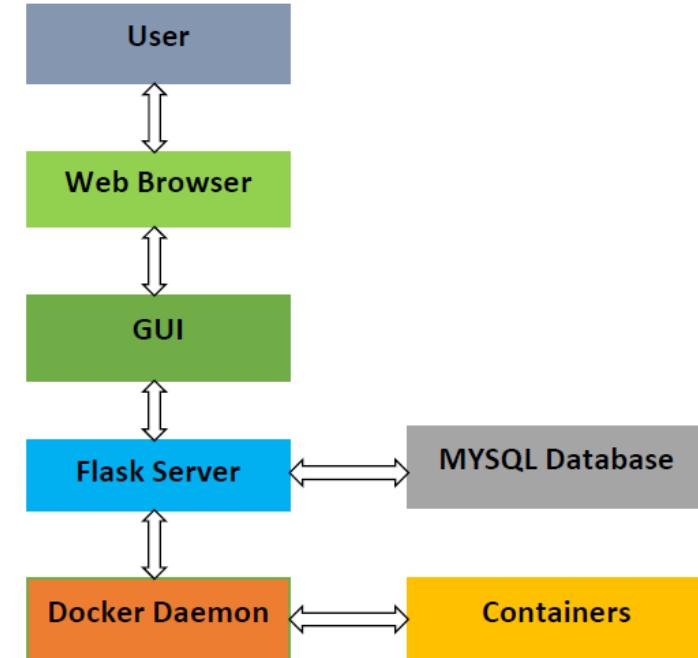
Technology

- Docker, Python, REST, HTML5.0, CSS3, jQuery, MySQL



Solution

- A Python based client library was used to communicate with Docker daemon(s)
- Information about running containers (CPU, memory, networking) was polled and recorded in a MySQL database
- A Python based REST server was implemented to expose APIs to retrieve stored information and/or execute action commands
- Information was sent to/retrieved from the server using AJAX calls and displayed using HTML 5.0, CSS3 and jQuery



GUI Test Automation for Converged Infrastructure



Engagement

Calsoft was engaged with customer for development of GUI Automation framework and test case script development to enable automated testing of the Product GUI. Highlights:

- Understanding test cases, writing test scripts and testing the same
- Selenium understanding and solutions for issues unique to product GUI



Benefits

- Variety of techniques to locate various objects made the GUI Automation stable across various releases and builds
- Auto-generation technique helped in rapid development
- Customer appreciated the expertise and flexibility demonstrated by Calsoft in evaluating the various automation approaches.



Technology

- Languages: Python
- Frameworks: Customer Automation Framework
- Tools/Libraries: Selenium
- OS: Linux



Solution

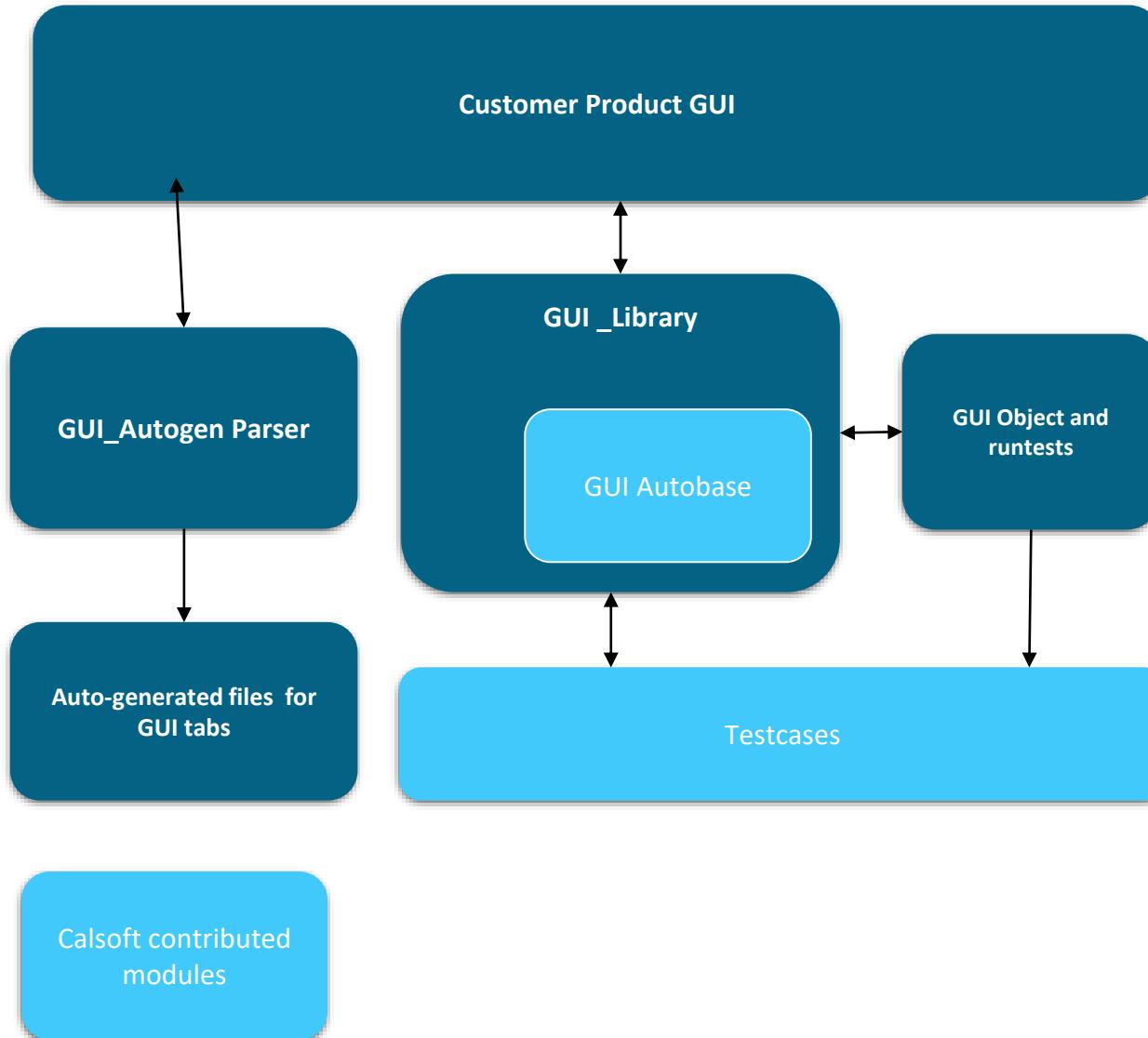
Features:

- Assisted Customer in making GUI automation framework stable by filing bugs on the framework and fixing them too.
- For GUI Automation, evaluated multiple approaches with customer and standardized auto-generation technique to generate GUI Automation code based on the page layout and objects
- Automated test cases and executed the scripts and suite
- Brainstormed and worked on solutions for various Customer GUI product specific issues during test case executions
- Conformed to the stringent code review and code integration processes

Functionality:

- Test cases automated for
 - LDAP, RADIUS, TACACS, LOCAL, Multi Auth, User Session
 - Scriptable-vMedia, Common-FI-Info, IB Management, VLAN, User defined Zoning
 - NI Ports, Fabric Interconnects

GUI Test Automation for Converged Infrastructure





Engagement

Calsoft was engaged with VMware for development of ROI TCO calculator. The engagement underpinned:

- Improve calculation logic in existing ROI Calculator.
- Collect additional inputs from users to enhance analysis accuracy.
- Improve user experience by adding new functionalities



Benefits

- ROI Calculator helps user for estimating the economic value of implementing End User Computing solutions for their business.
- The calculator is highly configurable and allows user to estimate the Capital Expenses, Operating Expenses, and Downtime (Opportunity Cost).



Technology

- Languages: Java, JQuery,CSS,HTML, Frameworks: Spring, Hibernate, Tools/Libraries: Apache Tomcat 7.0 , Maven, Docx4j, OS: Windows/Linux

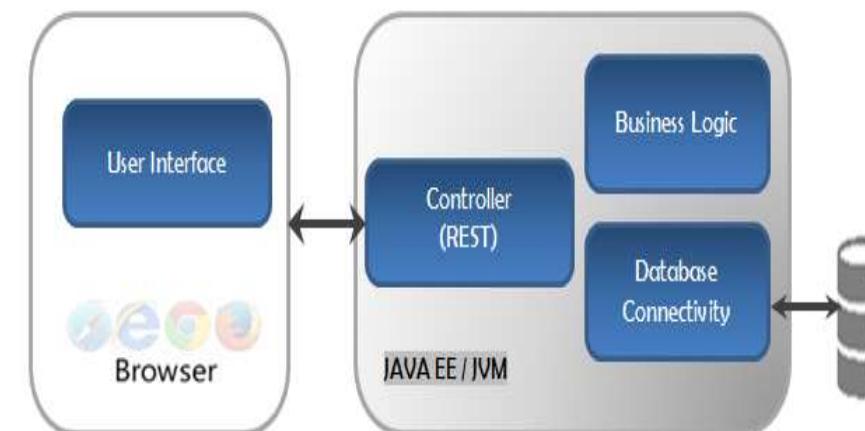


Solution

- Designed and developed highly configurable ROI Calculator

Features :

- Enhancement in existing calculation logic.
- Provisioning new home screen to select different VMWare products.
- Save the current analysis and upload it back feature to populate all the input fields.
- Support for the Health Care Savings feature.
- ROI graph based on calculation summary.
- Integration with enhanced VMWare tracking libraries for user behavior analysis.



Engagement

Calsoft engaged with the customer for enhancing the existing UI of their SDN application.

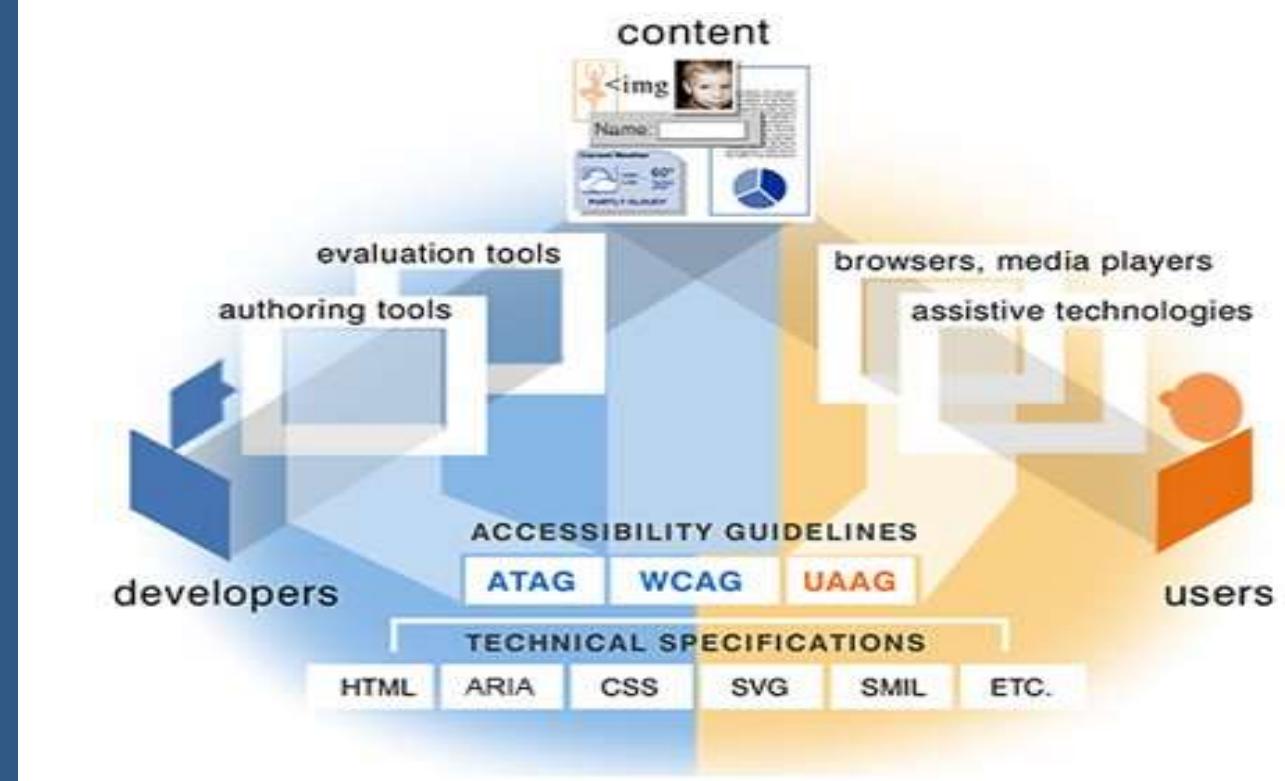
Solution

Calsoft helped the customer with UI enhancement for their SDN application and the engagement underpinned:

- Made Application Web Accessible with mid-range compliant as VPAT document
- Migrated application from Backbone to React JS
- Bug fixing
- Provision of keyboard support by arranging HTML elements in an appropriate order
- Based on WCAG guidelines, converted all the actionable div components to a button.
- Helped to replace non-native actionable HTML elements with native HTML elements to achieve accessibility. Used proper H1-H6 tags
- Provided appropriate roles to the HTML elements
- Appropriate color combinations to maintain color contrast and icons
- Implemented unit test cases using Jest and achieved more than 85% coverage
- Provided right set of aria-label text on the UI component

Technology

- HTML, JAVASCRIPT, SCSS
- REACT JS, REDUX, BACKBONE JS, JQUERY
- GIT for Version Control System
- JIRA
- Jenkins Automation Server



Benefits

- Better performance
- AA compliant application

Infrastructure Dashboard for issue identification

Engagement

Calsoft was engaged with the customer to develop dashboard to highlight metrics for identifying issues inside an infrastructure involving different partners for:

- Networking
- Server Hosting
- Business applications

Solution

Calsoft helped the customer to develop dashboard which captures performance metrics of all the different components and displays it on a single pane of glass, correlating them as much as possible.

Below are the metrics which were included in dashboard:

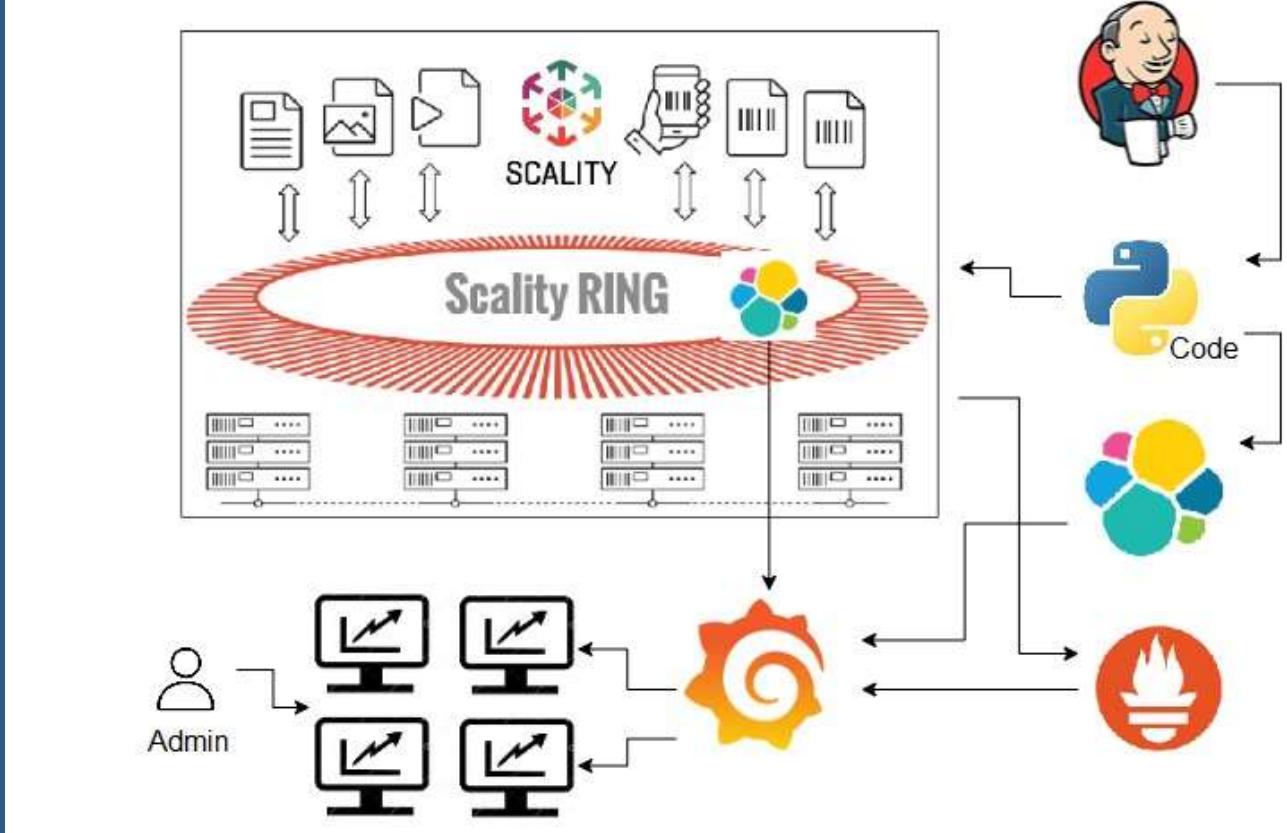
- Number of objects / buckets in a object storage infra (Scality)
- Performance pointers such as throughput, bandwidth, latency
- Replication statistics between sites
- Delete marker metrics between sites
- Node health such as – CPU, RAM, NIC consumption

Additional features :

- Alerting mechanism directly from dashboard
- Jenkins integration for individual KPIs
- Event mapping due to time range databases used in solution

Technology

Elastic, Grafana, mysql, Python, AWS cli, Jenkins, Prometheus



Benefits

- Customer can focus on individual KPI
- Customer can correlate points between KPIs such as replication queue vs node performance
- Alerting out of the box – integrated with Service Now APIs for ticket
- Easy to manage as uses industry accepted tools such as Elastic, Jenkins, Grafana, Prometheus

Data Collector Agent Development

Engagement

Calsoft was engaged with the customer for developing end-to-end solution for VDC agent component which sit on the customer data center and helps in collecting and publishing inventories and performance metrics in client cloud instance.

Solution

Calsoft helped the customer in developing UI and backend solution which will be packaged as OVA appliance.

The engagement underpinned:

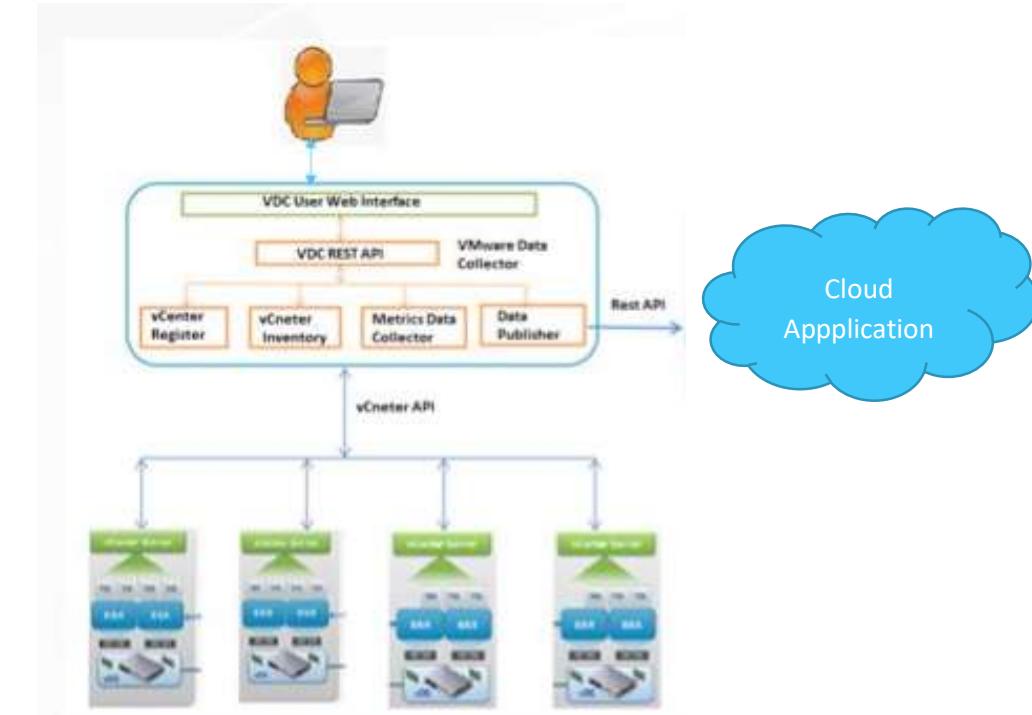
Once the OVA is deployed on Customer data center, user can access the UI from web browser and register the vCenter to VDC agent and schedule the Job which run on schedule time and collect and publish the data on Cloud instance. Below are the entities which VDC agent target to collect the information and performance metrics.

- VCenter
- Datacenter
- Cluster
- Host
- VMs
- vSwitch
- Datastore

Calsoft also worked on to support the upgrade functionality of package and provide the appliance as OVA.

Technology

- Springboot, Java, Shell Script, Clarity UI framework



Benefits

- Better UI
- Better user experience



Success Stories: Porting

McAfee Embedded Control Implementation for ARM 32 Based Gateway Platform



Engagement

Calsoft is engaged with McAfee for engineering the porting process. The engagement underpinned:

- Building the MEC for ARM 32 based embedded platform.
- Debugging the kernel module for any ARM-32 incompatible ABI's.
- Supporting new features on MEC for new ARM 32 platform.



Solution

- Enabling the MEC for ARM-32 platform and enabling the mcafee endpoint security, which can work on epo and non-epo setups both.
- McAfee Embedded Control protects embedded systems from both known and zero-day vulnerabilities and reduces the need to immediately provide patch updates. In fact, many manufacturers rely on the control afforded by McAfee Embedded Control to limit system updates to a quarterly or even biannual basis, greatly reducing the overhead and stress of multiple version support.
- The whitelisting nature of this security technology blocks unwanted changes and executables to the system, preventing security control workarounds. If an application or process isn't on the list, it can't run. It's as simple as that. For authorized executables, McAfee Embedded Control provides memory protection, mitigating associated exploit risks.
- Using McAfee solutions from McAfee, manufacturers benefit from reduced support costs, enhanced security in their products, and the ability to develop services that give them distinct market advantages.



Technology

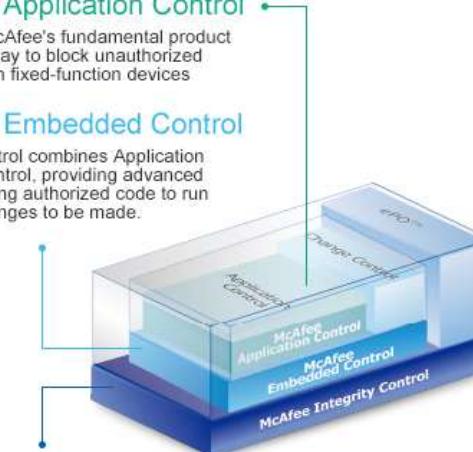
- Languages: C / Shell Programming ,
- OS: Montavista Linux – Kernel 2.6.32

level 1- McAfee Application Control

Application Control is McAfee's fundamental product to provide an effective way to block unauthorized applications and code on fixed-function devices

level 2- McAfee Embedded Control

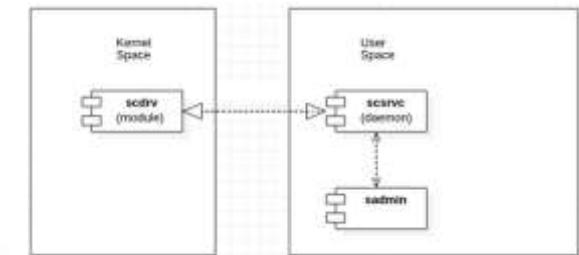
McAfee Embedded Control combines Application Control and Change Control, providing advanced protection by only allowing authorized code to run and only authorized changes to be made.



level 3- McAfee Integrity Control

McAfee Integrity Control combines McAfee Embedded Control and McAfee ePolicy Orchestrator® providing integrated audit and compliance reports to help satisfy multiple compliance regulations.

MEC General Architecture



Benefits

Calsoft's services helped realize following benefits to customer:

- Hands-on Linux Montavista OS development support.
- Debugging support to develop the MEC for ARM-32 based solution.
- End-to-end Montavista Linux OS - MEC testing support.
- Long term sustainence activities for some of the released products.
- Experienced kernel resources who can drive with minimal support

Gateway software for an IP over Radio Networks for SCADA for First responders

Engagement

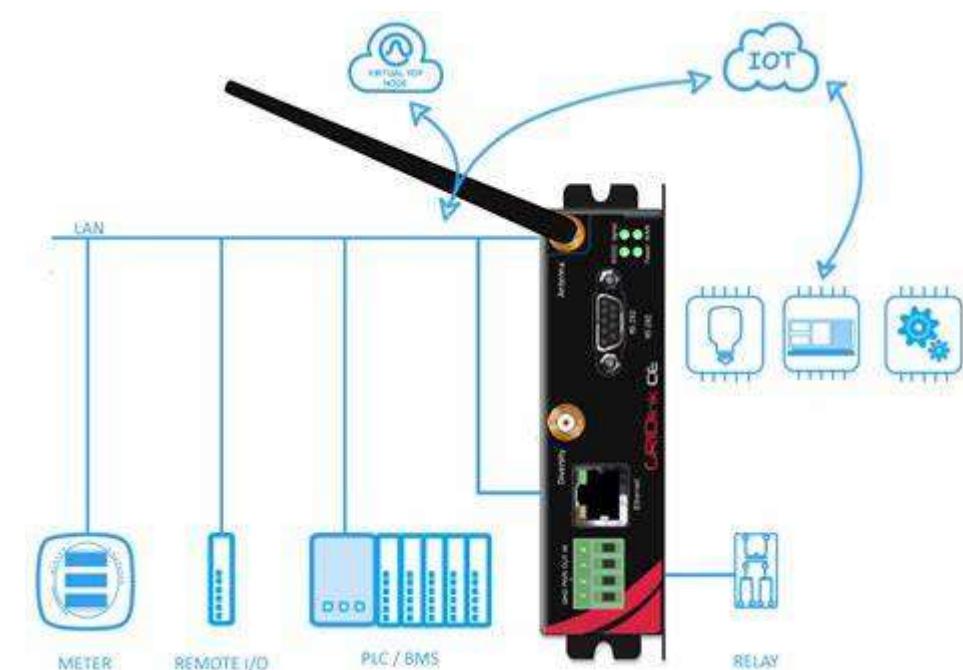
Gateway software development for SCADA operation on customized Hardware based on ARM processors and Linux OS.

Solution

Solution involved IP based on radio network for first responders. Solution is based on SCADA at the application layer.

- Cross compilation support
- Full stack development
- System software development
- Scalability support for 10k active connections epoll to replace pselect.
- Support for nand flash supplied by OEM manufactures to integrate with arm-based data terminal platforms.
- Supported protocols are IEC-101, IEC-104, DNP3 and Modbus-RTU/TCP.

It also features transparent IP communication.



Benefits

- Large number of RTUs were supported which is useful for Utility like implementation.
- LAN side integration with real time buses

WLAN AP Host Development for a Semiconductor Company



Customer

Customer is a Wireless Chipset leader . Customer wanted to develop a reference software for Wireless router for 802.11 a/b/g/n/ac. Ethernet connections were on the WAN side. Calsoft's engineer has developed the solution for the customer.



Solutions

- We have used a standard reference driver and stack for protocol translation from ethernet to Wifi.
 - Enabled interrupts in the host driver for data path.
 - Worked on fixing the clock work issues.
 - Debugging and fixing customer issues.
 - Support on internal releases and fixing all internal bugs and kernel crashes.
 - Worked on Emulation platform to validate the basic features like ping and iperf.



Technology

- Platform: Linux Kernel



Challenges

- Power management
- Fixing the customer related issues

Monitoring and Management through Wireless Mesh Devices



Customer

Customer has a Network server device used for cloud management of Wireless Mesh devices. The Mesh devices can have a cloud level configuration for network parameters. This device offers configuration options through GUI, telnet, SSH. Device monitoring and management are based on SNMP.



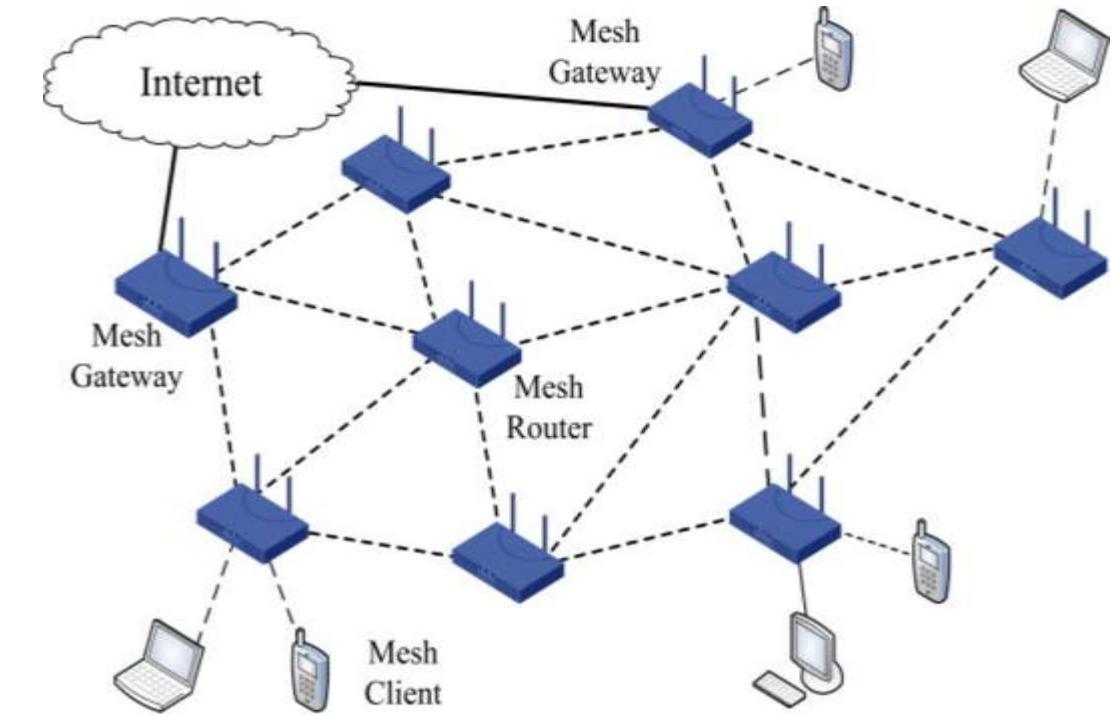
Solutions

- SNMP back-end implementation.
- Cross compiled tools like busybox, net-snmp5.4.1 for PowerPC.
- Worked on Linux IPC for posix multithreading.
- Developed client server model using socket programming.
- Debugging using GDB.
- Resolving Memory leaks and Kernel crashes
- Bug/Defect fixing.



Technology

- Platform: Linux Kernel



Challenges

- Power management
- Fixing the customer related issues

Cloud Stack Re-architecture, Segregation and Data Migration



Engagement

- Calsoft is involved with a Cloud platform to segregate and migrate the cloud infrastructure according to regions within AWS. Complete traffic, data segregation and stack isolation per region is the requirement as customer wants to segregate the stack based on the regions it serves (for independent evolution of the product features).



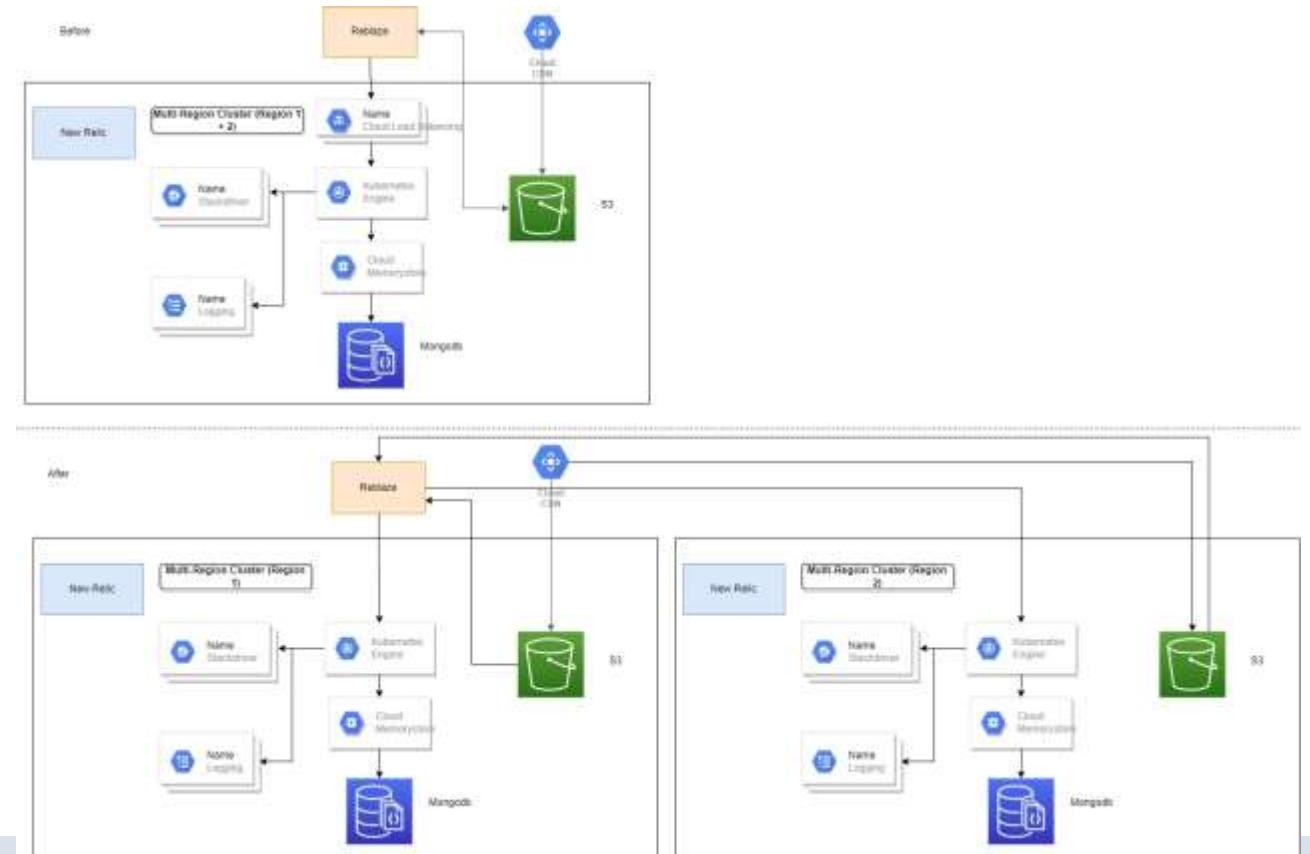
Solution

- Calsoft is involved to
 - Designing the architecture for traffic segregation
 - Application transformation for each region considering local compliance and laws.
 - Transforming the data and migrating to new region
 - UI/UX redesign and development
 - Testing and Support of the multi cluster multi region stack.



Technology

- AWS, New Relic, Reblaze, AWS S3, ReactJS, Java, Ruby on Rails, Docker, ELK Stack, MongoDB, Redis



Benefits

- Lower latency and better end user experience.
- Better compliance to local government laws and regulations.
- Better code manageability and future upgrade to region specific requirements

Porting Drivers to ESX VMkernel



Engagement

Calsoft was engaged with the client for porting drivers to ESX VMkernel. The engagement underpinned:

- Increasing utilization and availability of data center resources
- Providing dynamic bandwidth allocation



Benefits

- Availability of client product on ESX platform
- Work bandwidth
- Reduced capital and operating expenses
- Increased scalability, flexibility and resource utilization



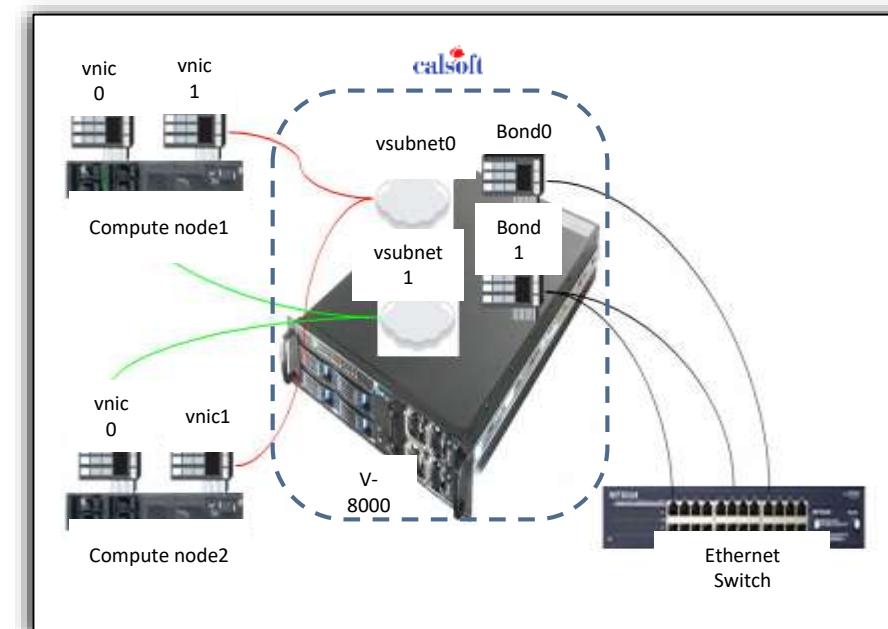
Technology

- VMware ESX (VMkernel), OS: Windows, Linux



Solution

- Ported client modules on 32bit architecture
- Designed and developed SNMP-MIB and SNMP agents
- Ported 2.6 client drivers to 2.4 compatibility and ported those drivers to VMkernel



Porting, Implementation and Automation of OpenSSL



Engagement

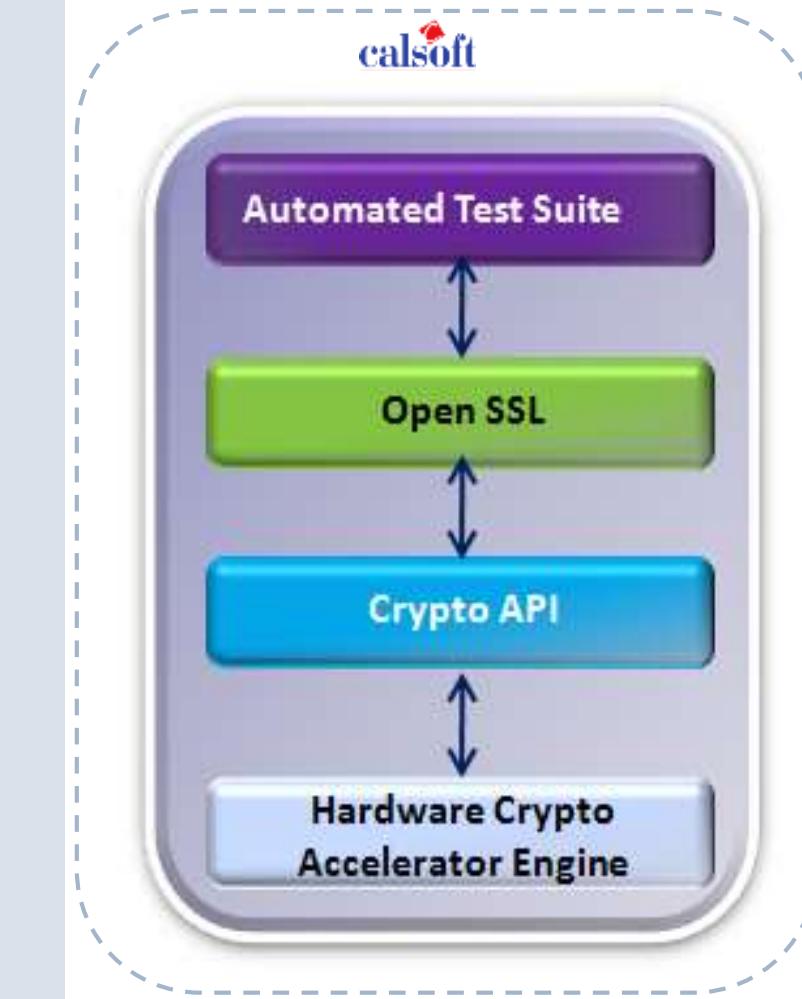
Calsoft was engaged with the client for Porting, Implementing and Automating OpenSSL . The engagement underpinned:

- Integration of OpenSSL with Hardware Crypto Accelerator
- Quality Assurance of OpenSSL integration with accelerator



Solution

- Ported OpenSSL port to customer's crypto engine
- Implemented asynchronous execution and automated test cases for testing various crypto operations
- Implemented standard Linux kernel crypto driver for customer's crypto accelerator



Benefits

- Improved performance of OpenSSL
- Significantly reduced testing time
- Quicker release cycle



Technology

- VMware ESX (VMkernel), OS: Windows, Linux



Engagement

Calsoft was engaged with the client for engineering the porting process. The engagement underpinned:

- Porting existing antivirus product (MIS, MFP and VISS) to latest Mac OS X 10.8
- Understanding and implementing the installer for Mac OS X 10.8
- Branding and testing the system for Verizon and others



Benefits

Calsoft's Mac OS X 10.8 porting services helped realize following benefits to customer:

- Hands-on Mac OS X development support
- Privileged use of Apple certificates in code and installer signing
- End-to-end Mac OS X testing support



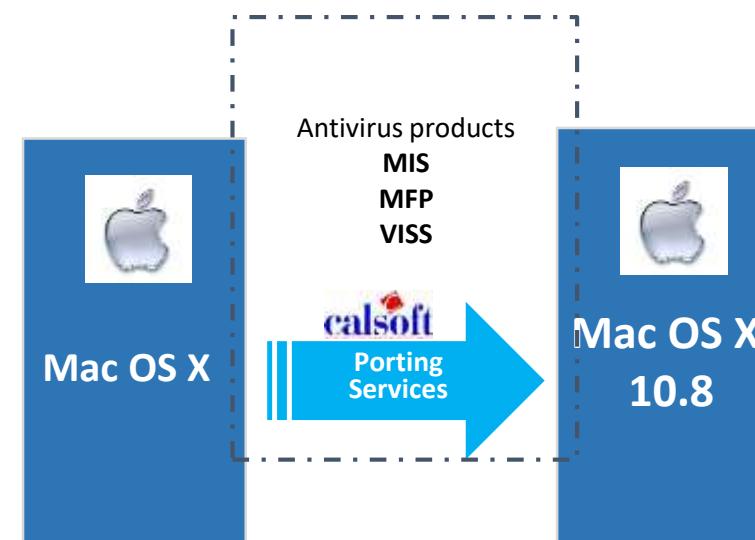
Technology

- Languages: C / Shell Programming ,
- OS: MAC OS X 11.7 (Lion), 11.8 (Mountain Lion)



Solution

- Porting of each component of installer with Apple Developer Certificate
- Timely and successful resolving of issues resulting from new OS
- Modification in installer scripts
- Modification in code-signing process at client's end



Porting of Linux distributions and kernel versions for NAS box



Engagement

Calsoft was engaged with the client for Porting of Linux distributions and kernel versions for NAS box. The engagement underpinned:

- Making available NAS box on variety of Linux distributions with various kernel versions
- Not loosing focus on current feature development
- Work while porting product to various Linux distributions



Benefits

- Increased project flexibility
- Performance improvement with enhanced product features



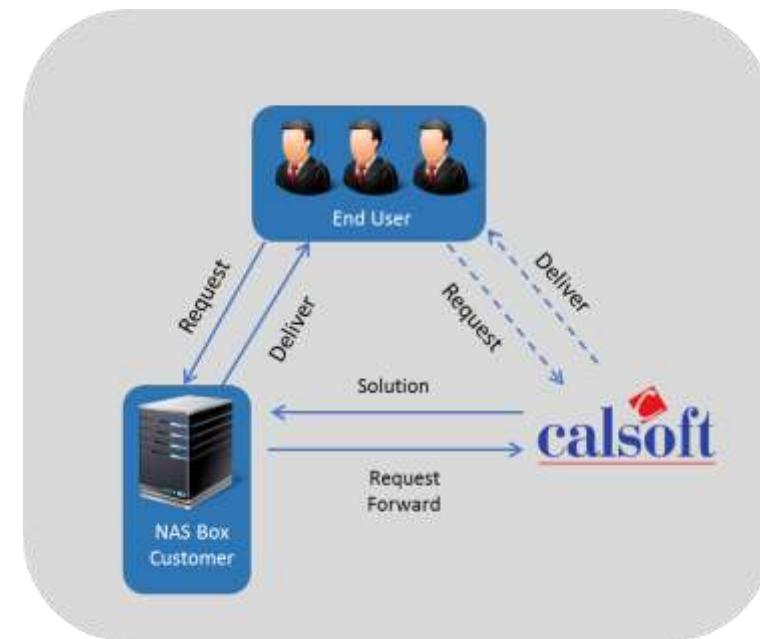
Technology

- Project Tools : Perforce, Cons, Bugzilla, Testzilla
- Language : C , OS : Linux



Solution

- Ported kernel module to new combination of platform(s) (Linux, Distro and Architecture) and kernel on Customers products
- Also added built support to new platform and reviewed code changes
- We looked at all new incoming custom-port requests and accept them to the NewPorts Work Queue



Porting (Linux to Windows)



Engagement

Calsoft was engaged with the client for Porting Linux to Windows. The engagement underpinned dealing with:

- Unavailability of de-dup product on Windows
- Lack of in-house Windows expertise
- Architectural differences between Windows and Linux OS
- System programming paradigm differences in Windows against Linux



Benefits

- Eliminated redundant backup data
- Immediate recovery with reduced cost



Technology

- Languages: C programming (Win32 API)

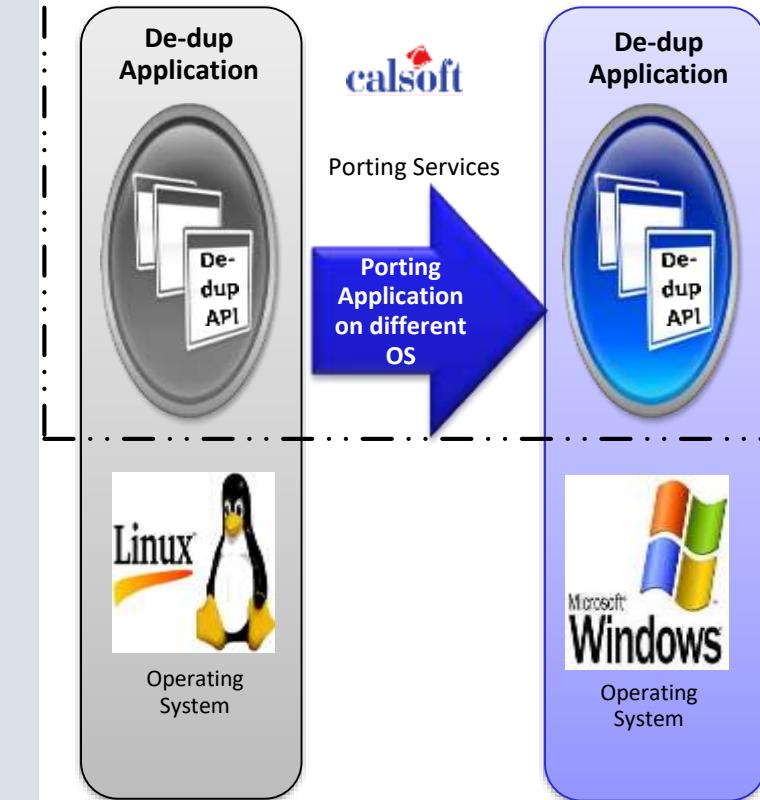


Solution

Calsoft enabled **de-duplication SDK (on Linux)** to provide exactly same set of features on Windows:

Key features:

- Scan random user data for de-duplication and provide comprehensive report
- 3rd party Windows based application can consume the ported library and plug in de-duplication capability





Engagement

Calsoft's engagement with the client underpinned:

- Assisting the client team as an ideal offshore partner
- Provide substantial value adding to their software product development



Solution

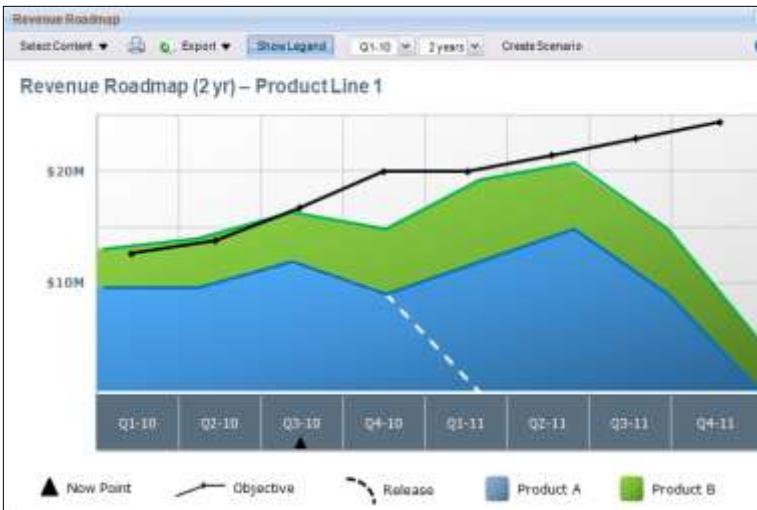
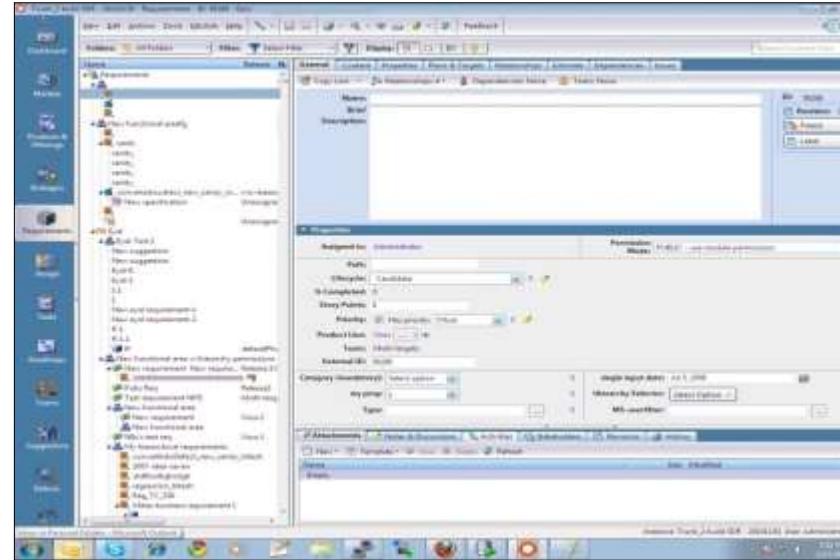
- Provided our best resources immediately after the project kick off
- Hired quality resources specifically to meet our customer's requirements
- Helped them in setting up and run their India Development Center
- Provided resources having expertise on JMETER, JUNIT and "Ruby on Rails"
- Hired resources who have worked on technologies like Web2.0 (AJAX), J2EE, Core-Java, JSF, Hibernate
- Spring framework, ETL, Databases (Oracle 10/11g) and JIRA
- Worked on feature development, automation suites (using JMeter, JUnit) and integration module for integration between Ideas (on Ruby) and Requirements product lines



Technology

- Ruby on Rails, REST, Java (J2EE), SOAP, Web-Services, Oracle

Snapshot Solution Screenshots





Engagement

Calsoft was engaged with the client for porting of their system bundle for specific hardware to the newer kernel:

- Client builds system images for different hardware platforms from common code base. These are based on third party kernels modified further by Client.
- Since third party kernel support(WRL3) was terminated, Client wanted to port entire image to the new kernel(WRL7) available from the same third party.



Benefits

- Built document which details out complete procedure from checking out the source code to building the system image.
- Hands-on complex client build environment in very short duration and with very little available documentation.



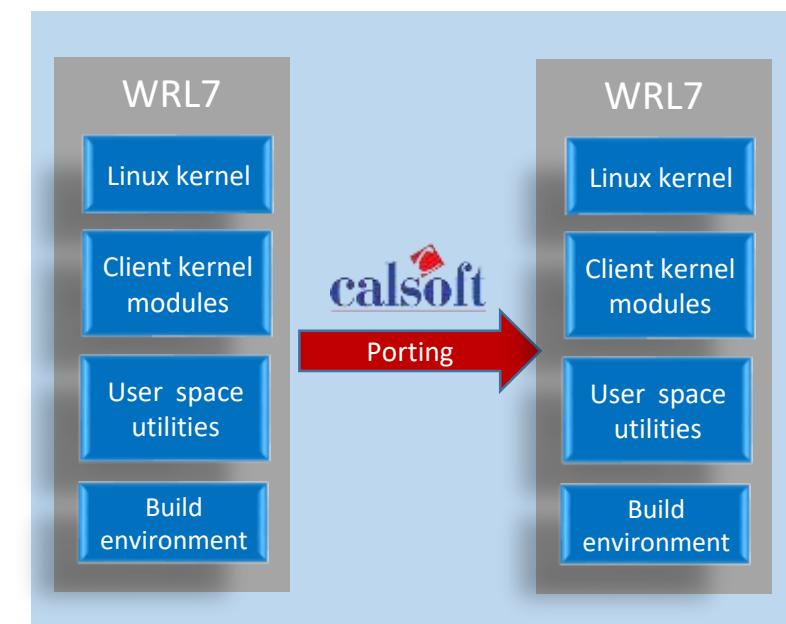
Technology

- Languages: C, C++, OS: Linux



Solution

- Identified complete build procedure which involved understanding client specific tool chain, environment setting & various other component dependencies.
- Porting all the changes as per the new kernel requirements.
- Adapting to the new build procedure defined by the client apart from the porting efforts.
- Fix issues in the user space components as well which were affected by the changed kernel and new build procedure.



FI upgrade to Wind river Linux kernel 7



Engagement

Calsoft was engaged with client to port FI kernel from wind river Linux 3 to wind river Linux 7.



Benefits

- Since WRL3 was EOL upgraded FI to WRL7 which includes more security features.
- Support for 64 bit Architecture.



Technology

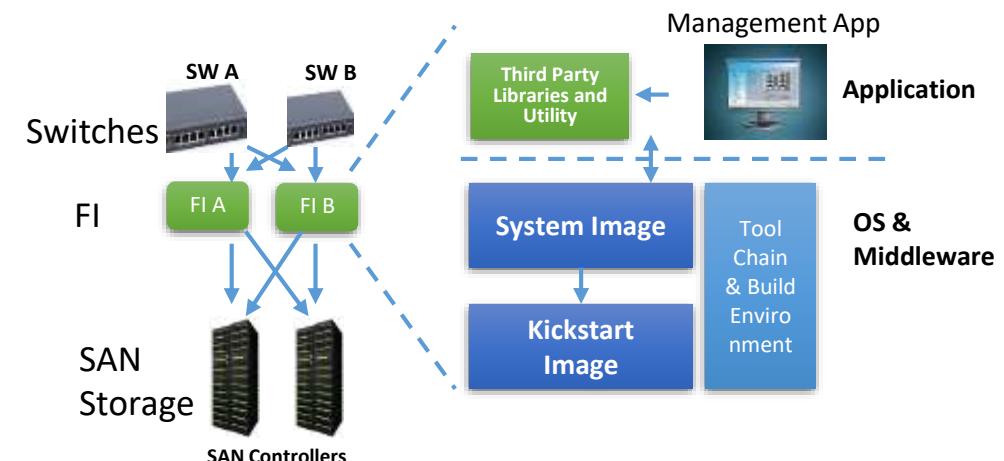
- Wind river toolchain, VBE, gdb/kgdb, C, Kernel modules and drivers



Solution

Feature Development

- Upgrade toolchain, build environment and compiler.
- Porting all klm from WRL3 to WRL7.
- System and kickstart image bringup.
- User space components to be made compatible with kernel space.
- Common source tree and build environment to build WRL3 and WRL7.
- Upgrade/Integration of UCS libraries.
- Proposed Analysis and design to port kernel to 64 bit OS.
- Analysis and design for 64 bit OS and 32 bit user space.



Fl upgrade to Wind river Linux Toolchain and build environment



Engagement

Calsoft was engaged with client to configure toolchain and build environment



Benefits

- Since WRL3 was EOL added support for WRL7 toolchain
- Support for 64 bit Architecture.
- WRL7 toolchain is updated with newer libc which has fixes for vulnerabilities.



Technology

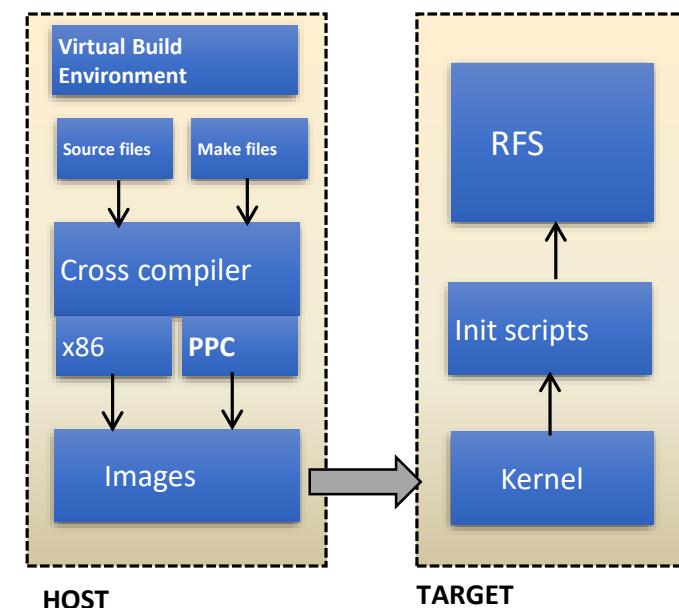
- Wind river toolchain, VBE, bash scripts.



Solution

Feature Development

- Analyze and understand wind river Linux toolchain and cross compiler.
- Update architecture specific files based on cross compiler architecture.
- Update Makefile and environment to build for both WRL3 and WRL7
- Configure Base package for system libraries and utilities.
- Configure kgdb for WRL7 Linux kernel.
- Modify init scripts to support WRL7 base package/RFS.





The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) visible. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there's a solid teal rectangular area containing the main title text.

Success Stories: QA and Testing

QA Dashboard using ELK



Engagement

- Calsoft is engaged with the customer to help them develop QA dashboard to track QA progress across multiple products & product versions



Solution

Customer wanted to have different views for different teams and management team. Calsoft developed the system to collect Test Results and create variety of dashboards matching the needs of each team.

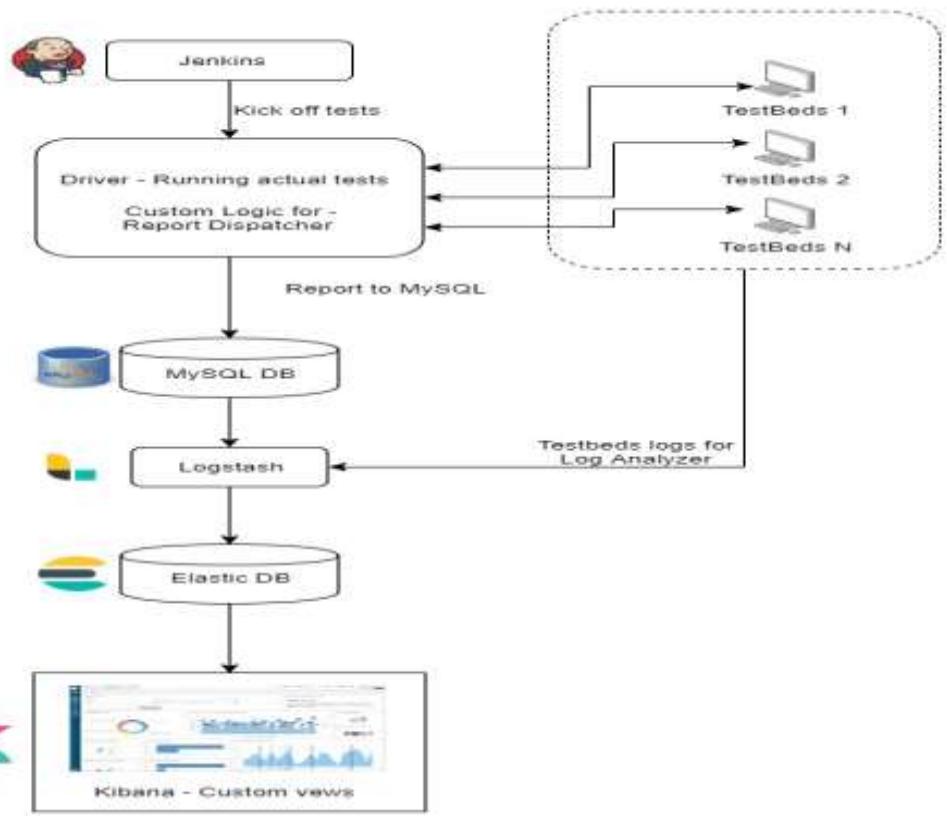
The solution highlights:

- Achieved **real time analysis** of data on dashboard because of real-time indexing of data through Logstash pipeline from MySQL to Elasticsearch
- Elastic Stacks **TLS security, RBAC and clustering features** had added advantage over from the scratch development on Flask
- Kibana dashboard features like **filtering, aggregation and various data visualizations options**
- All front end development using **Kibana for dashboarding**



Technology

- Python, ELK stack, MySQL, Ruby



Benefit

Complete ownership in design, development, deployment and support for the complex QA dashboard

Content Pack Verification Test Automation

Engagement

Calsoft was engaged with the customer in developing a test automation framework to verify content packs of their log analytics tool.

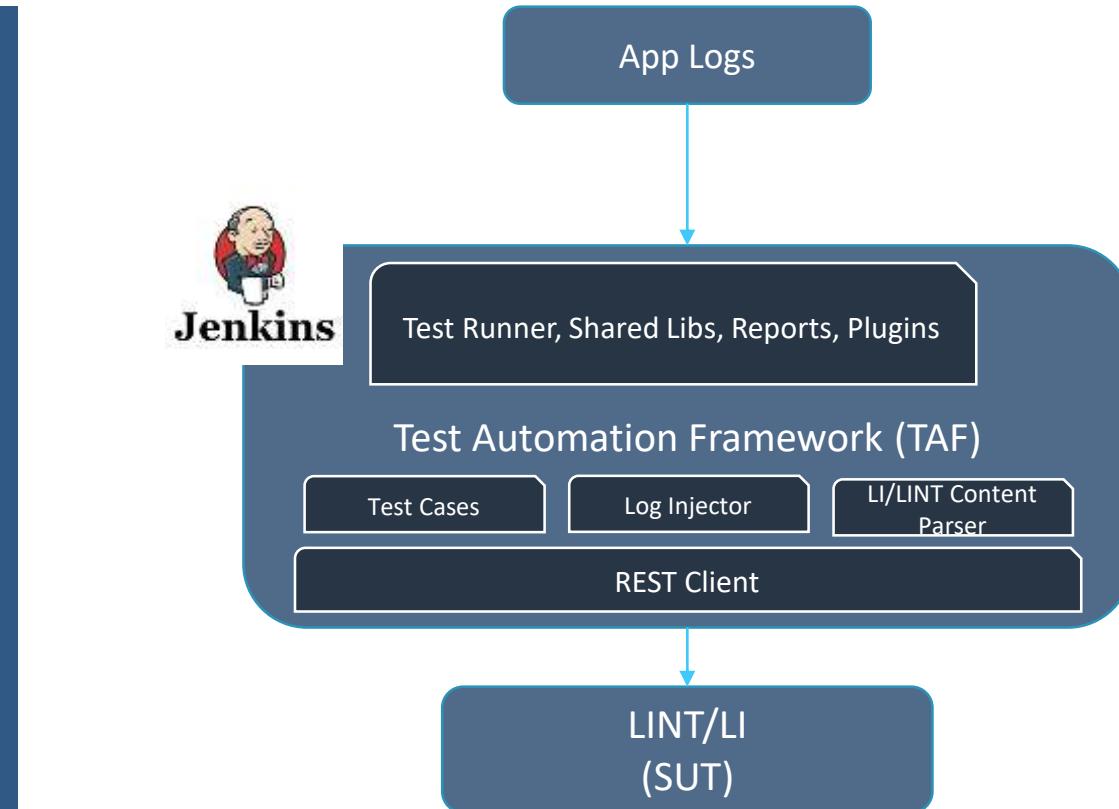
Solution

Calsoft helped the customer in building test automation framework and the engagement underpinned:

- Deployed supported applications and generated log bundles.
- Tested & verified the functionality of content packs.
- Automated existing test cases using newly developed framework
- Ensured verification of application specific Content Packs for the information they produce on dashboards, alerts and queries.
- Identified test gaps and created new test cases wherever required.
- Identified and proposed gaps in content packs based on extensive logs generated out of respective applications.

Technology

- Python, Java, Jira, AWS



Benefits

- Better performance cause of test automation framework
- Bug fixing

Calsoft's iSCSI Protocol Conformance Test Suite



Engagement

Calsoft was engaged with the client in implementing iSCSI Protocol Conformance test suite. The engagement underpinned:

- Ensuring robust target implementation.
- Ensuring target works with iSCSI initiators on different platforms



Benefits

- Ability to test any “iSCSI target implementation”
- Possible to integrate the compliance test suite into customer’s existing test suite
- Accurate discovery of iSCSI target bugs and identifying regressions
- Thin initiator that is easy to deploy on any Linux box



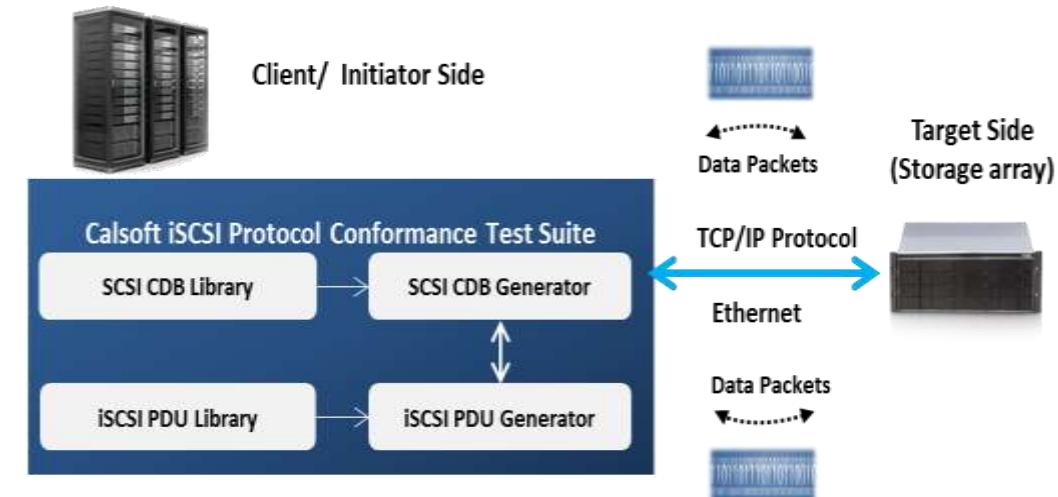
Technology

- Language – C, LIO and SCST as Storage Stack, Domain - SAN Storage



Solution

- Enabled a demo version of the iSCSI protocol conformance test suite (50+) test cases that the client found very useful with reference to the mechanism and, easy to use while testing their target with test suite.
- Implemented Phase1 of the test suite to enable rigorous usage to test their TGT based target implementation.
- Calsoft’s product support team provided prompt responses to customer queries and gave quick turn-around to solve script issues whenever applicable.



Snapshot Solution Screenshot - 1

Secure Application Switch

Tue Dec 07 2010 07:11 PM IST

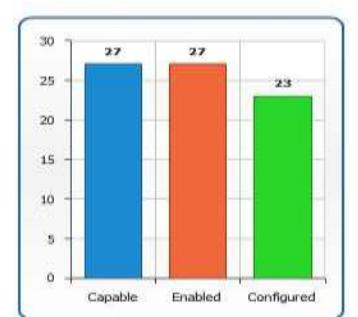
SAX Management SAX Devices Job Management

Getting Started How May I Assist You?

Alerts

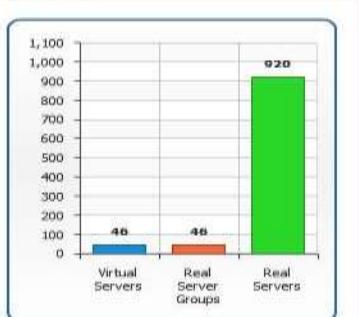
Message	Time	Type
Discovered 40 Real Server(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered 2 Real Server Group(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered 2 Virtual Server(s) on SAX device: 4.4.4.83	2010-12-07 19:07:03.0	INFO
Discovered SAX device: 4.4.4.83(4.4.4.83),	2010-12-07 19:07:02.0	INFO
Discovered 40 Real Server(s) on SAX device: 4.4.4.78	2010-12-07 19:06:41.0	INFO
Discovered 2 Real Server Group(s) on SAX device: 4.4.4.78	2010-12-07 19:06:41.0	INFO

SAX Devices



Category	Count
Capable	27
Enabled	27
Configured	23

SAX Objects



Object Type	Count
Virtual Servers	46
Real Server Groups	46
Real Servers	920

Virtual Servers

Top 5 based on throughput

- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs01(46.46.46.46)

Top 5 based on connections per second

- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs02(117.116.115.4)
- vs02(117.116.115.4)

Top 5 based on # of connections

- vs02(117.116.115.4)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)

Top 5 based on SSL TPS

- vs02(117.116.115.4)
- vs02(117.116.115.4)
- vs01(46.46.46.46)
- vs01(46.46.46.46)
- vs01(46.46.46.46)

Show Getting Started on Startup

Help About

Storage Controller Testing



Engagement

Calsoft was engaged with the client for storage controller testing. The engagement underpinned:

- Testing the storage performance using simulation workloads within a short span of time
- Dealing with lack of in-house automation testing expertise



Benefits

- High quality automation testing with low cost
- Significantly reduced testing time with parallel test case execution
- Dynamic Wait Control provided access to data from cloud



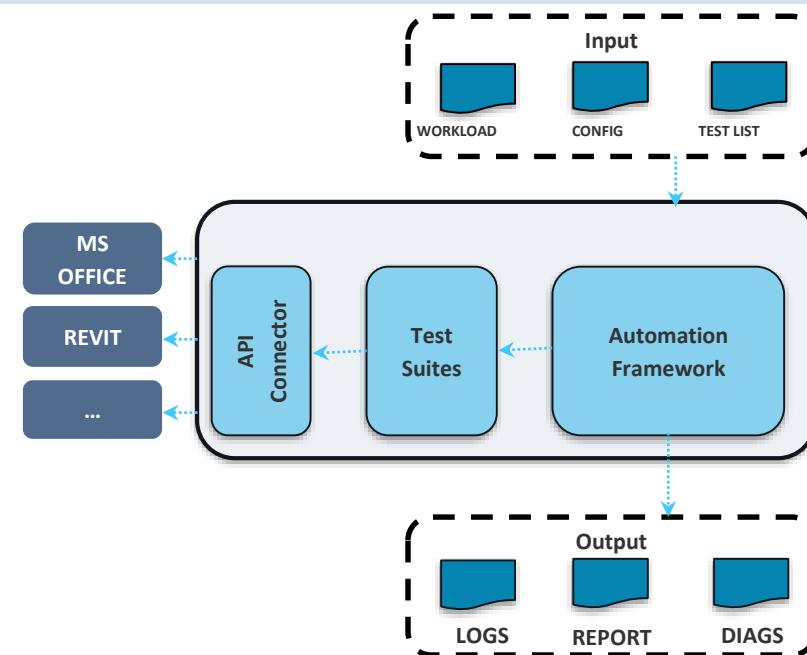
Technology

- Platform: Windows
- Language: C# .NET
- Application Specific COM APIs, Win32 APIs



Solution

- Created a test framework and test cases for MS Office, REVIT and integrated the same with the nightly build and smoke infrastructure which aid in development, quick testing, & identifying regression issues, etc.
- Developed an Automation Test Suite which leverages MS Application Programmatic Interfaces (APIs) and triggers them with various use cases such as conflicting read/writes, opens, deletions etc.



VMware Certification Testing for Unified Storage Appliance



Engagement

Calsoft was engaged with the client for VMware Certification Testing for Unified Storage Appliance. The engagement underpinned:

- Solving issues faced by the client due to changes made by VMware in ESXi 5 while certifying their products, and making them workable with vSphere 5
- Running S/W iSCSI certification and impart training in FC certification for their unified storage appliance



Benefits

- In-house testing on storage appliance helped in mitigating infrastructure availability issues
- Certification testing ensured unsurpassed performance of unified storage appliance



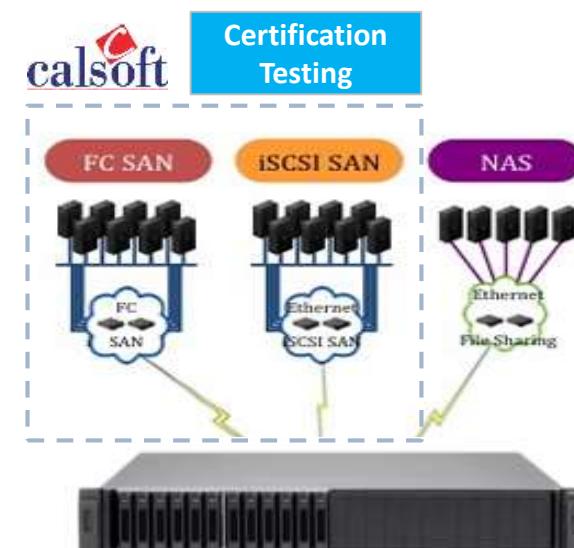
Technology

- Platform: Vmware ESXi
- Protocol – iSCSI, FC



Solution

- Calsoft performed S/W iSCSI & FC certification for customer's unified storage appliance using VMware Workbench version 2.0.
- Details include:
 - Number of test cases for S/W iSCSI = 26
 - Number of test cases FC = 40



Unified Storage Appliance

CIFS/SMB Compliance Test Automation Suite



Engagement

Calsoft was engaged with the client for developing CIFS/SMB Compliance Test Automation Suite . The engagement underpinned:

- Spotting Bugs in CIFS stack running for non-MS CIFS client implementations
- Implementing complex SMB2, 2.1, 2.2/3 protocols
- Handling multiple parameters that made test matrix very huge



Benefits

- Successfully created conformance suite for SMB2, 2.1, 2.2/3.0
- Augmented SMB expertise offshore in cost effective manner
- Ensured thorough testing for SUT with OAT tools
- Achieved compliance to Win 2008 R2 server



Technology

- Protocols- MS-SMB2 spec published by Microsoft, Ubuntu Linux, Python 2.7, Wireshark, Win2k8



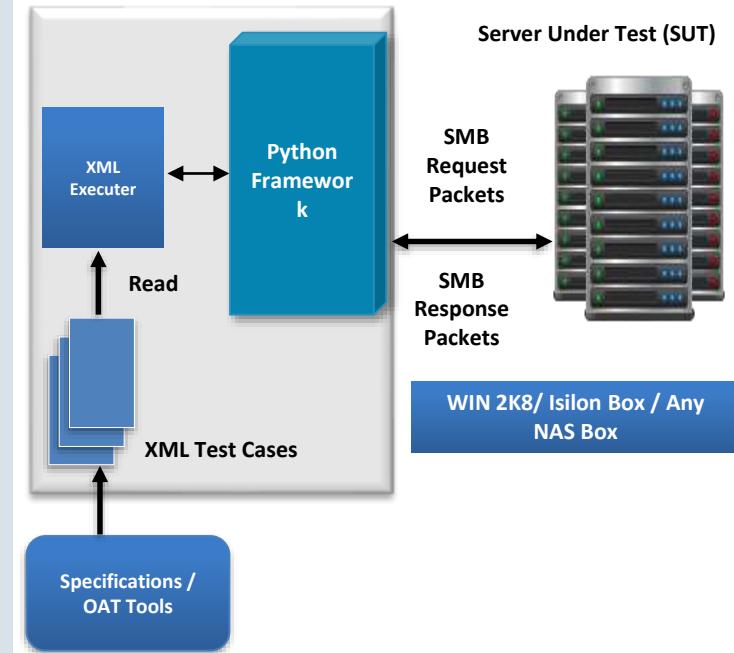
Solution

Calsoft tweaked the existing Python based automation suite to address TC's with Orthogonal Array Testing (OAT) method. We built a team with SMB expertise.

Key Features:

- Automation of TC's using data driven testing
- TC's are in XML format, ensuring easy readability, modification
- TC's creation using OAT methodology
- OAT tools helped in detailed coverage and reduced time to test

High Level Architecture





Engagement

Calsoft was engaged with the client for managing the SSD devices using SMI-S compliant CIM servers



Benefits

- SSD devices can be managed using SMI-S compliant CIM servers
- SSD devices can be managed using IBM System Director



Technology

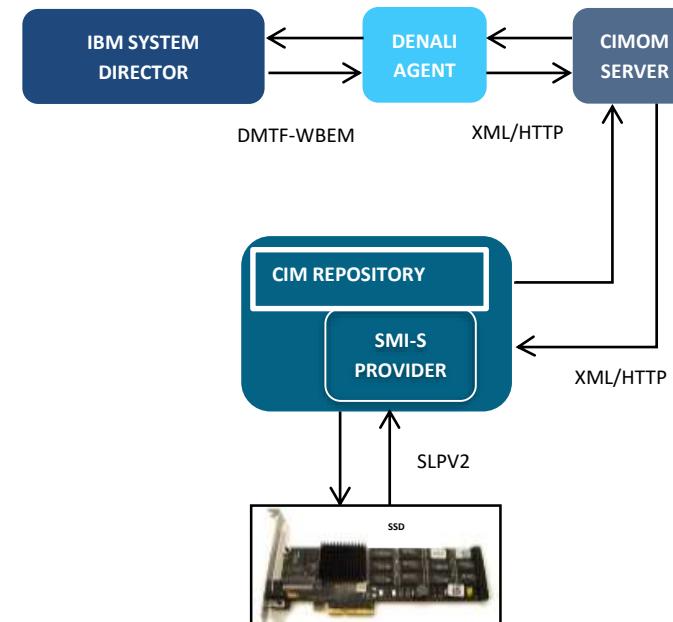
- Python



Solution

Automation test suite using IBM Denali agent CLI for following platforms

- Windows
- SLES
- RHEL





Engagement

Calsoft was engaged with the client for developing GUI and testing SSD/Flash drive. The engagement underpinned:

- Elimination of I/O bottleneck in virtualized environment
- Configuring and managing Host and VM Guest OS remotely for caching
- Making the GUI more user friendly



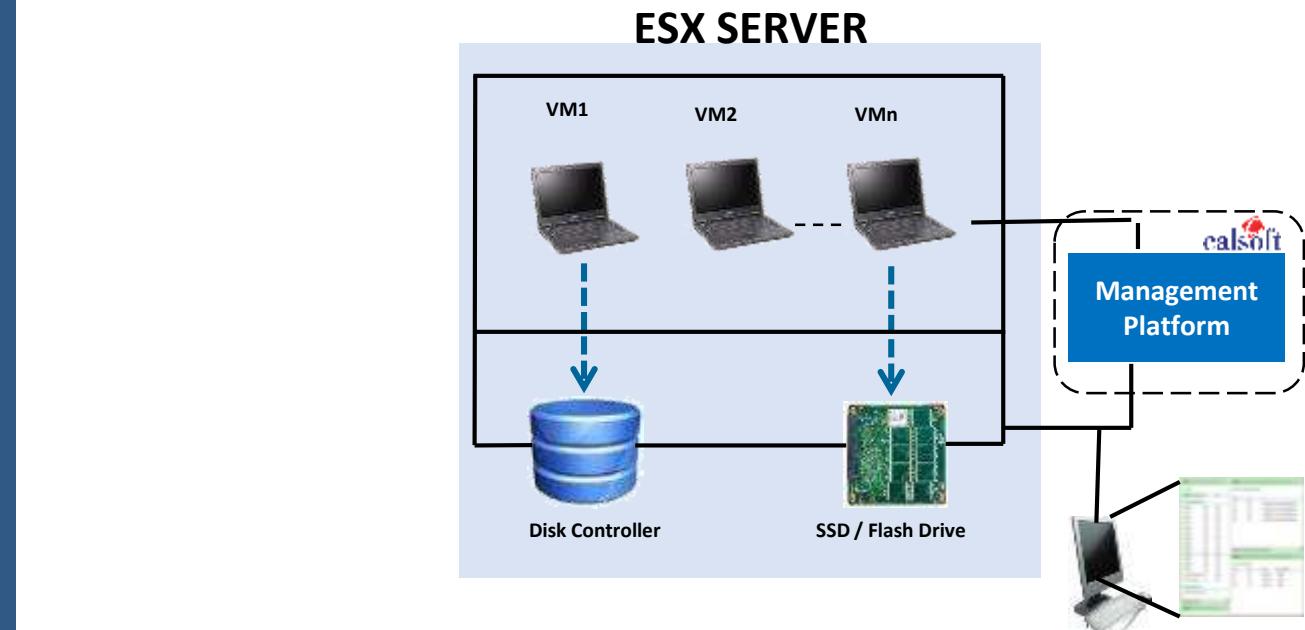
Benefits

- Increased utilization and maintenance
- Increased productivity and reduced cost
- Performance improvement with more user friendly GUI console



Solution

- Deployed, configured and managed Host and VM Guest OS remotely for caching
- Developed a user friendly GUI which controls SSD/Flash driver, disk controller, and VMs
- Collected stats from Host and VM Guest OS remotely and displayed it on a performance graph
- Covered the entire gamut of testing scenarios including -
 - Functional testing
 - Regression testing
 - Usability and testing
 - Integration testing
- Ensured seamless integration of hardware and firmware with bug free driver
- Evaluated, built and implemented a utility to automate testing of the customer's product



Integration Test of Open vSwitch on Hypervisor



Engagement

Calsoft was engaged with the client for integration testing of Open vSwitch on Hypervisor. The engagement underpinned:

- Creation of wrapper API to manage VM/Networks on OpenStack and tie up those servers using quantum network API
- Performing OVS database verification as per hypervisor VM/Networking usage states using Data Driven approach



Benefits

- OVS is supported by different Linux based Hypervisor platforms
- Calsoft's contribution on the automated test suite helped verification of Hypervisor operations with OVS
- Helps product to be certified with particular Hypervisor



Technology

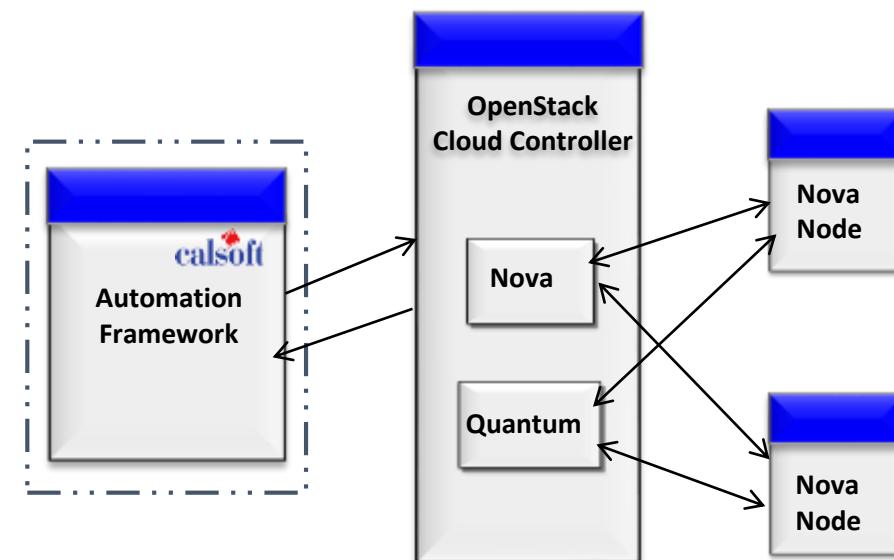
- Language – Python
- Operating System – Linux DEBIAN, OpenStack
- Folsom



Solution

Calsoft provides solutions with the following features:

- Verify functionality of OVS on different Hypervisors
- Leveraged Python – nova client and Quantum Client
- Automated spin-up of Hypervisor (with dynamic configuration) on OpenStack based cloud environment
- OVS Integration test with different hypervisors platform



Regression & Feature Testing for Near Line Storage Solution



Engagement

Calsoft was engaged with the client for regression & feature testing of Near Line Storage Solution. The engagement underpinned:

- Optimizing speed of testing process
- Reducing test cycle times
- Dealing with lack of technical resources with strong expertise on NAS protocols as well in Backup/Restore domain



Benefits

- Successfully executed 2000 test cases in a span of 4.5 months
- Identified and solved critical issues in
 - Implementation of new NAS Protocol Accelerator feature
 - Regression functionality testing of legacy features



Technology

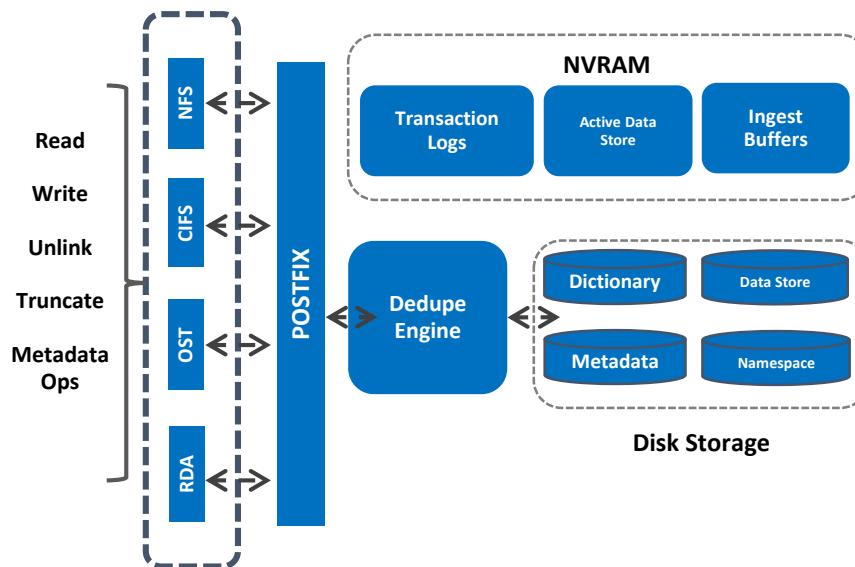
- Automation using Shell scripts (Linux) & PowerShell (Windows)
- NFS v3 & SMB/CIFS protocols



Solution

Calsoft provided ready to deploy set of testers to test **regression functionality** as part of test delivery:

- Testing vendor's implementation of Symantec OST plug-in for Symantec BackupExec & Netbackup products on Windows & Linux Platforms
- Testing vendor's implementation of client plug-in for client on Windows & Linux platforms
- NAS Protocols and use of various IO ingestion tools available from LTP & Open source community
- Testing client side de-dup functionality on top of CIFS & NFS Protocol





Engagement

Calsoft was engaged with the client for NAS box testing. The engagement underpinned:

- Expansion of QA team in short period without compromising on quality and time
- Performing quality testing with short documentation available



Benefits

- Improved product quality
- Testing ensured bug free product
- Accelerated product life cycle



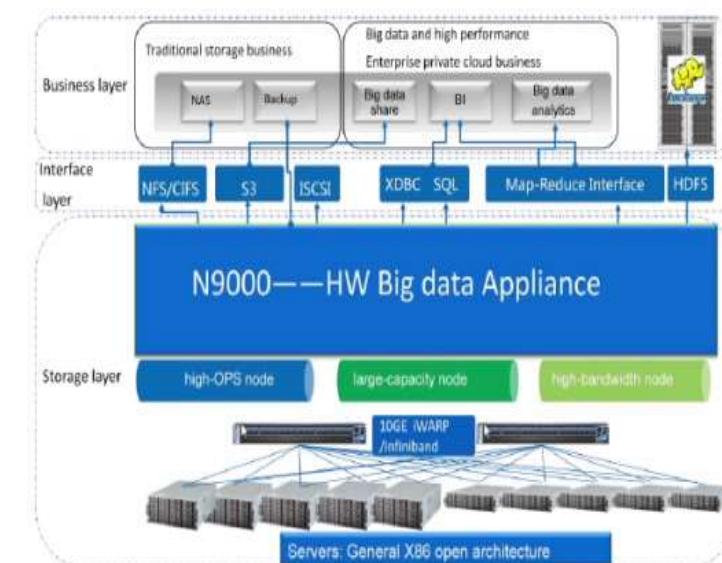
Technology

- Filesystem,NFS,SMB Language- Python
- Project tools & application Wireshark,TCPdump.lozone,lometer,Atlock Platform- Linux, Windows



Solution

- Designed test plans & executed test cases for NFS and CIFS covering Configuration, ACL, File Locking, Error Handling and Error Injection
- Written test cases on Authentication module covering possible scenarios in NTLM, Kerberos, AD, NIS and LDAP environment
- Automated test cases on “File Locking” using home grown tool and framework
- Performed functional testing of NAS Storage in standalone and cluster configurations in failover and load\ balancing scenarios
- Performed compatibility and Interoperability testing with different versions of SMB, NFS



Engagement

Calsoft was engaged with the client for Testing Automation framework to simplify and speed up release process of their product.

Benefits

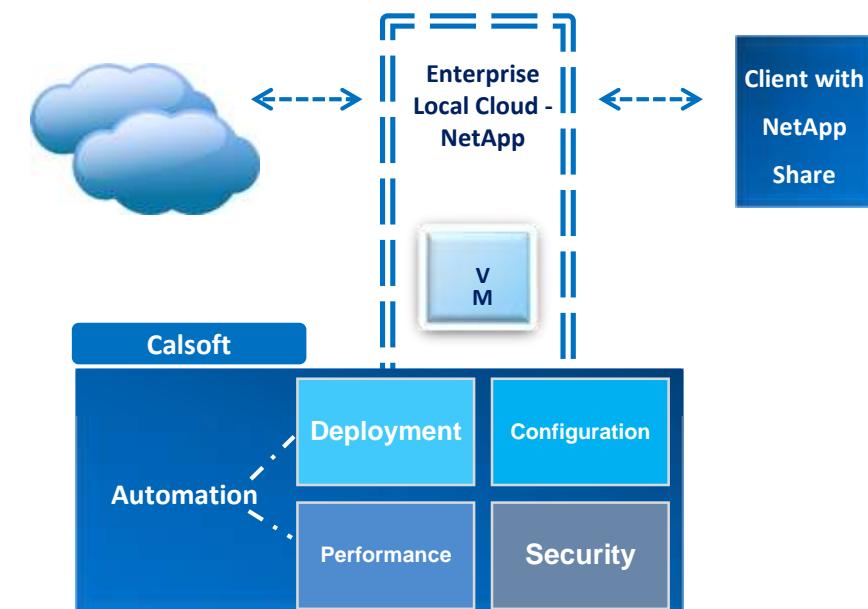
- Reduced deployment time
- Reduced configuration time
- Improved test coverage for modules
- Performed successful Stress/Load testing for product

Technology

- Python

Solution

- Deployment Automation
 - Deployed VM on ESX
- Configuration Automation
 - Configured VM (join domain, join NetApp filer , join to cloud account)
- Performance Testing Automation
 - Tested framework for performance – Input/output operations
- Security Testing Automation
 - Configured ACL test framework for ACL/Group ACL testing



Functional Testing



Engagement

Calsoft was engaged with the client for performing functional testing within a short span of time



Benefits

Fast turnaround resulted in high efficiency and productivity

- Addressed 360 defects in 3 months
- Unveiled 30 enhancement defects
- Regressed 340 defects



Technology

- SAN – iSCSI, Snapshot & Clones
- NAS – NFS V3, Snapshot & Clones



Solution

Designed & executed

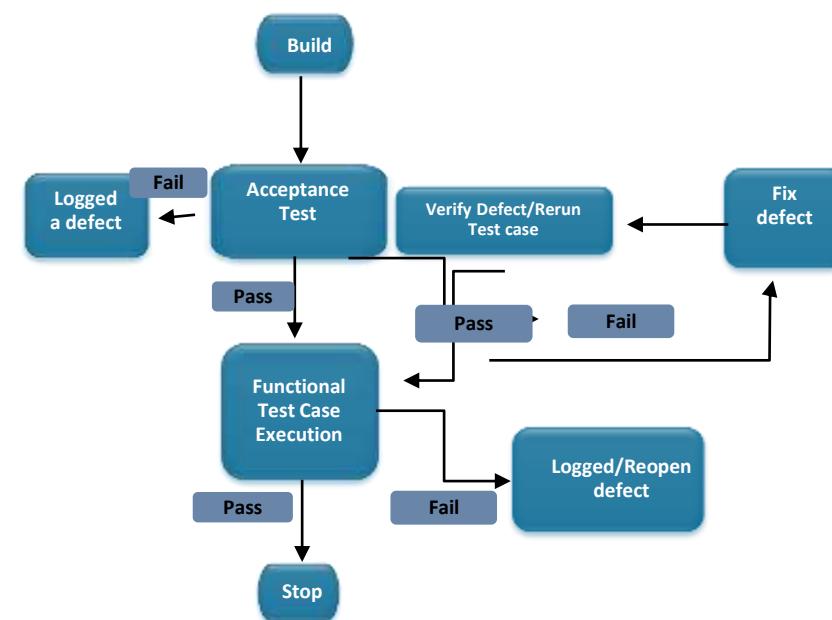
- 1048 tests in system
- 591 tests in SAN
- 564 tests in NAS

Developed Functional test cases for :

- NAS (NFS, FS, Snapshot)
- SAN (iSCSI, Clones, Groups, Pools, Snapshot, Maps, CG)
- System (Networking, Security, Alarms, events, statistics,
- Audit logs, Ports, LED, Compression, MIB, VLAN)

Performed following tests:

- Acceptance Test : Cover Sanity test for major features
- Concurrency Test : Stability of NFS and iSCSI Protocol test
- Connectathon Test : NFS Protocol Conformance test
- Regression Test : Defect verification & test rerun



Regression and Application Testing for High End NAS Server



Engagement

Calsoft was engaged with the client for resolving the issue of Reduced productivity and efficiency due to untested server software



Benefits

- Immediate project kick off
- Significant reduction in testing time
- Accelerated product life cycle



Technology

- NFS, SMB, iSCSI, NDMP, Linux

Customer Testimonial

"Calsoft demonstrated a very flexible and responsive approach in our product development needs. Calsoft was able to put together a good team with very little attrition throughout; consistently track and monitor progress to make sure that we achieved high productivity during this engagement"

Director Engineering - Client



Solution

- Developed & executed featured test plan
- Wrote new test plans for CIFS and NFS (Mixed Mode Security, Multiprotocol Locking)
- Performed iSCSI compatibility testing
- Did feature regression for new & service releases
- Performed inter-operability testing, involving interoperability with MS Exchange, VERITAS Backup & other real world applications
- Performed UI, Integration, Sustainability testing (Cluster aging), NFS and CIFS, NIS and DNS testing

Regression and Application Testing

Test Planning

Test Case Development

iSCSI compatibility Testing

Interoperability Testing

User Interface Testing

Testing and Validation of WAN optimization tool



Engagement

Calsoft was engaged with the client for testing and Validating WAN optimization tool. The engagement underpinned:

- Productivity challenges due to inefficient and untested product
- Finding expertise and skilled resources in niche WAN optimization area
- Meeting product release deadline



Benefits

- Quality testing ensured; defect free product
- Immediate project kick off
- Decreased testing time
- Improved time to market



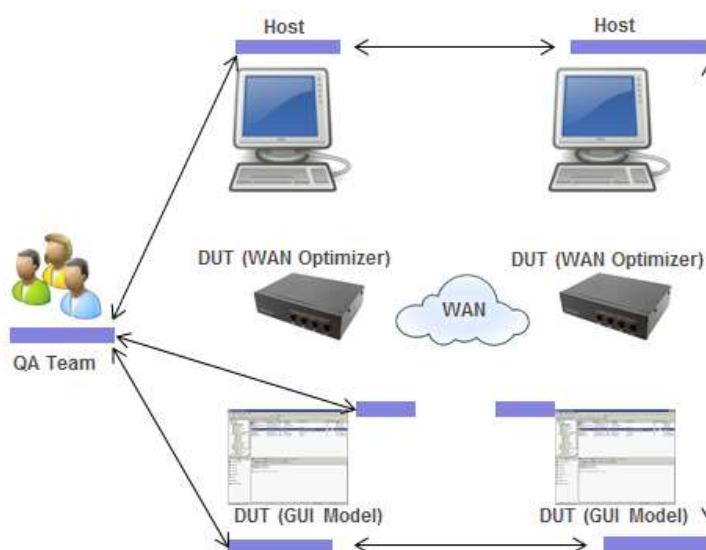
Technology

- Linux Platform – SDN
- Languages - Python
- Tech: NFS, CIFS, MS Exchange, SAMBA



Solution

- Calsoft staffed its best resources with Networking domain expertise
- Manual system testing of network solution involving protocols, backup/restore & management UI, etc.
- Areas of testing
 - Data De-duplication
 - TCP acceleration
 - WAN optimization
 - Application layer protocols
- Calsoft went beyond the scope of the work to help its client
 - Create different customer Network scenarios
 - Develop, implement and execute test plans as per product specifications
 - Root Cause analysis of defects
 - Design and develop a test automation framework



Shell command line validation test suite (STS)



Engagement

Calsoft was engaged with the client for defining & developing Python framework which had 134 different modules with two interfaces, shell and command line.

The engagement underpinned:

- Designing a solution that validates the command line switches
- Developing highly scalable framework with user friendly interface



Benefits

- Automated bug reporting ensured
- Centralized overview of development requests and bug improvements
- Test suite was also helpful as benchmarking tool



Technology

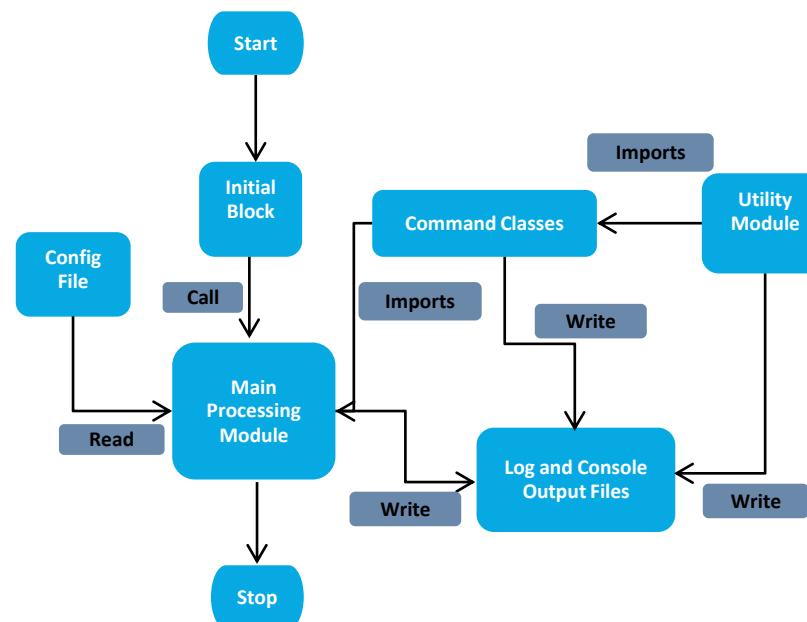
- Python 2.7, Shell as a Wrapper



Solution

Key Features

- Cover all 53 existing commands and all switches
- Plugin architecture with no connection with any xUnit derivatives
- Vault feature (captured all failures) with 4 configurable mail options
- Paramiko and Pexpect for SSH based communication
- Design Framework has branches like Kitchen Sink, Boundary and Run To Fail



Cloud Migration/Cloning Testing



Engagement

- Calsoft was engaged with the client for cloud migration/cloning testing. The engagement underpinned:
- Expanding QA team with Cloud, Backup/Recovery, Networking & Virtualization expertise in short period without compromising on quality and time
- Performing quality testing with short documentation available



Benefits

- Multiple critical bugs removed in Production as well as Staging environments
- Product life cycle accelerated



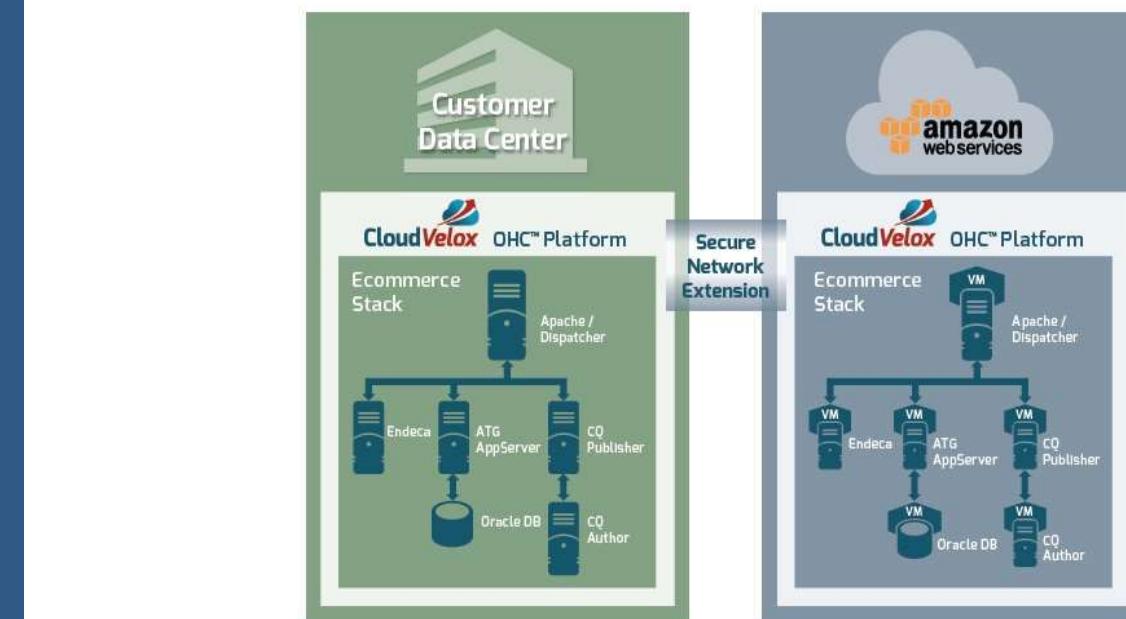
Technology

- OS Platform- Windows 2k8, 2k12, 2k12R2
- Hypervisor Platform – ESX, Hyper-V
- Cloud Platform – Amazon, Azure
- Applications – Exchange, SharePoint Cluster,
- Project tools & application - Wireshark



Solution

- Designed test plans, test setups & executed test cases for Cloud Migration & Cloning on AWS & Azure
- Written test cases on customer scenarios including functionality, performance, stability, usability and negative scenarios
- Installed & tested real world applications like Exchange, SharePoint Cluster, JIRA, Redmine, etc. with Windows Domain environment
- Suggested Product Improvement ideas based on testing experience on this & similar other products



Development of Automation Framework and Test Automation



Engagement

Calsoft was engaged with client to develop Functional Test Automation Framework (F-TAF) based on a Behavior Driven Development (BDD) methodology.



Benefits

- Client had unified framework to test all interfaces of the product.
- Provision of non complex Scalable and Modular architecture which can easily add support for future product testing.



Technology

- Java, Cucumber, Unix, Windows, Jenkins, 3rd party utility libraries



Solution

Development

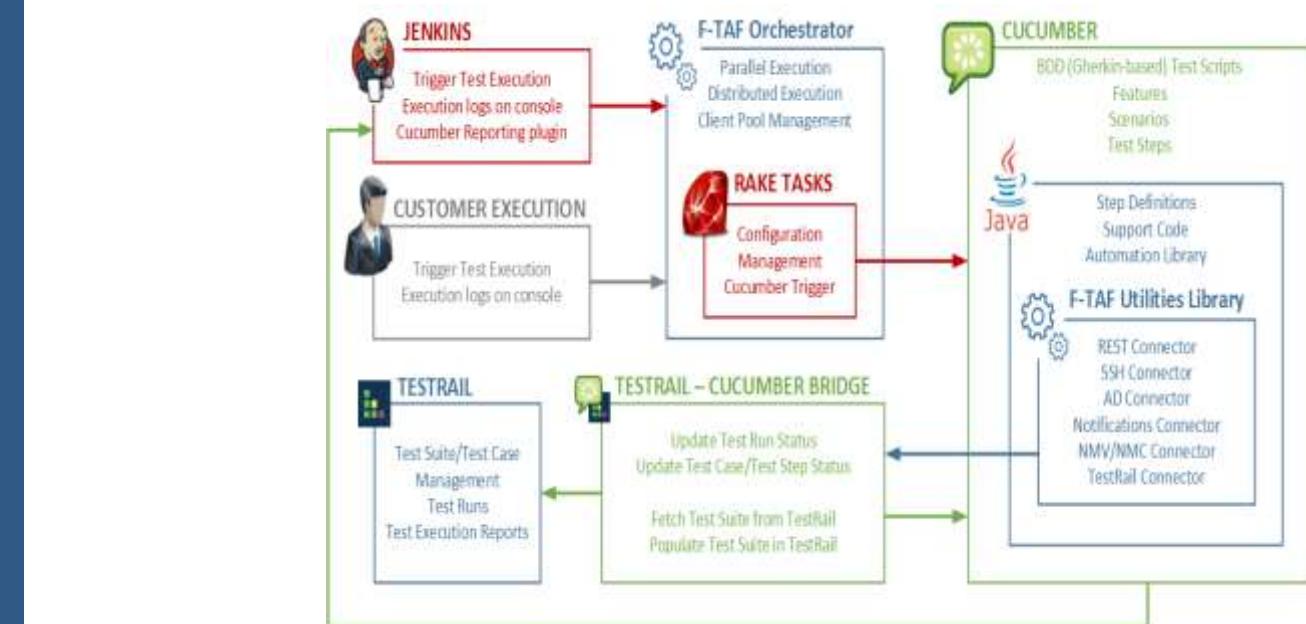
Developed F-TAF, a test automation framework which is based on a BDD principal and uses 'Cucumber' an existing BDD tool at its core.

Test Automation

Tests automated are to validate product's CLI, GUI and REST APIs for their functional as well as non-functional type of testing.

Features

- Unified framework to validate product's CLI, GUI, REST APIs.
- Integrated with test management suite "TestRail" for automatic updation of test cases.
- Integrated with "Jenkins" for a continuous Build & Test environment.





Engagement

Calsoft was engaged with the client for developing test automation for Aptos product functionality.



Benefits

- Enabled automation testing for Aptos product functionality, thus lead to quality product delivery to Aptos clients.
- Provision of smoke test automation which can be plugged in for any Aptos build for quick functionality testing.
- Enhanced application / process verification using WMI.



Technology

- Python 2.7, VMware Horizon Client, WMI, Desk Virtualization



Solution

Development

- Developed core rest APIs for Aptos product test automation.
- Developed test automation scripts for Aptos product functional, smoke and unit testing.
- Developed WMI (Windows management instrumentations) classes in python for verification of process at Aptos server / remote machines.

Features

- Light weighted , Plug and play APIs.
- Enable WMI remote functionality for Aptos.
- Better process /application verification using WMI.
- Logging enhancements.



Storage Performance testing



Engagement

Calsoft was engaged with the client to undertake storage performance testing. The engagement underpinned:

- Working efficiently even though there was no N/W access between Calsoft & Client lab N/W. Our client's Infrastructure issues access to required web sites was blocked due to security policy
- Dealing with lack of skilled resources, Technical Know-How & Performance Test Result Analysis skills
- Providing application knowledge e.g. Oracle Database, Tuning of O/S, Application etc.



Benefits

- Client can generate performance report for new FlashSoft Versions & latest Dell servers for Linux & Windows while simultaneously focusing on it's company's performance Vision, mission, goals & on complex assignments.
- Client can now completely utilize limited infrastructure & available latest test servers due to 24 by 7 work structure.



Technology

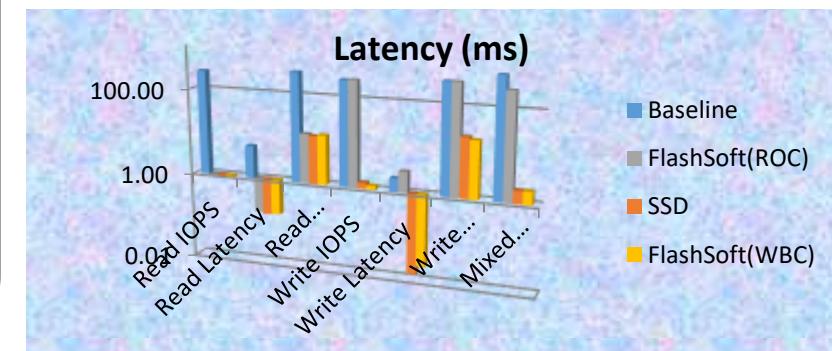
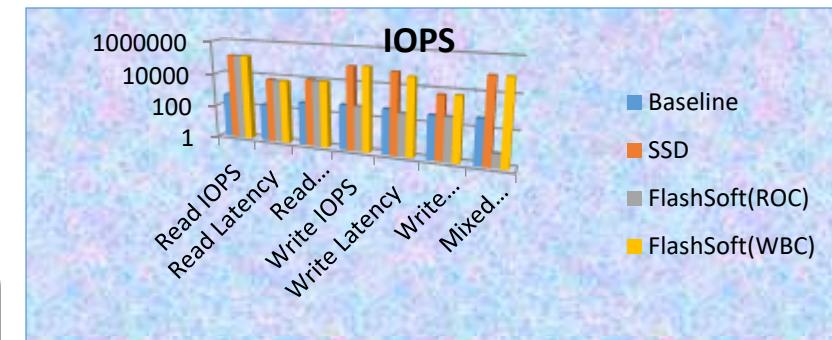
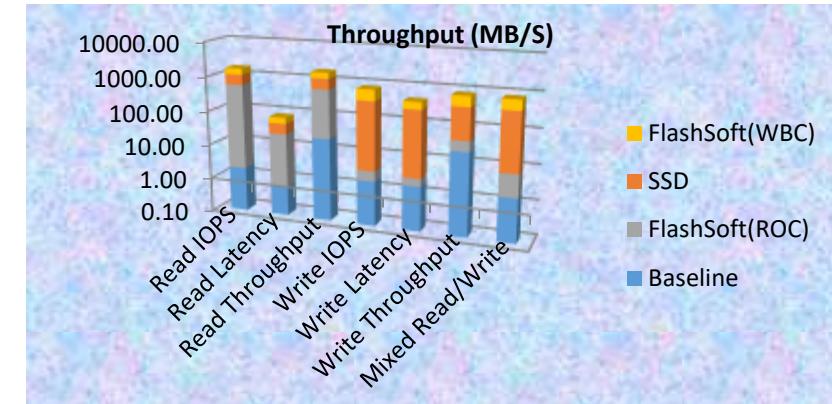
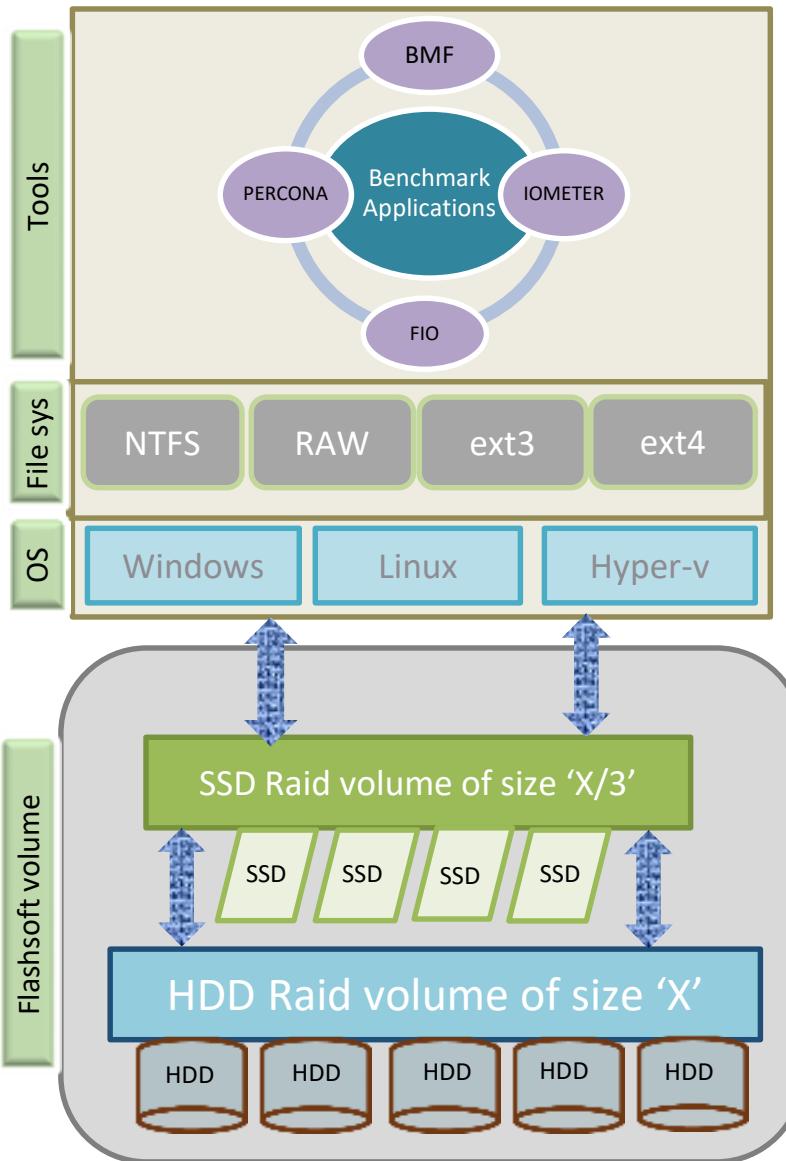
- Tools: FIO, Iometer, Benchmark Factory, Percona TPC-C
- Application: MS SQL Server, Oracle
- O/S: Hyper-V, Bare Metal Machine-Linux, Windows.
- Caching Softwares: FlashSoft, IoTurbine
- Test Bed Configuration: DAS, SAN
- Solid State Disk(SSD), Hard disk drive(HDD), Raid 10, 5 etc.



Solution

- Setup of offshore-Storage Performance Test Team.
- Offshore expertise in Simpler, Repetitive Performance testing for HDD, SSD & Caching S/W product for different test bed configuration
- Analysis of Performance Benchmark test Results
- New Performance tool exploration for Databases, Usage-Procedure definition, stats collection with baseline & with Caching S/W.
- Performance stats generation –
 - Latest Dell Servers.
 - Latest Caching S/W Product.
 - Contribution in Decision making of different Hardware, Caching products.

Storage Performance testing



QA & Automation of SDN Product

Engagement

Calsoft was engaged with the client for Feature Testing of their Software Defined Networking (SDN) product in OpenStack & VMware environments.

Benefits

- Calsoft have been able to provide the wide range of skillsets e.g. System Administration, DevOps, QA, Automation, Scripting etc. necessary for executing this project in a team of 4 engineers
- This was made possible because of in-house expertise available with Calsoft for Cloud, DevOps , QA and SDN domain.

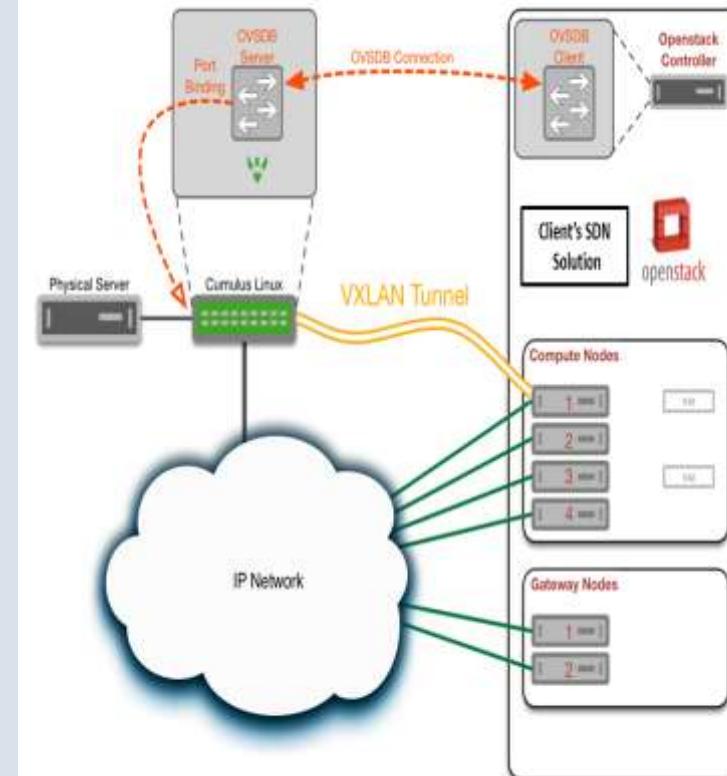
Technology

- OpenStack, SDN, L2/L3 Networking, VXLAN, BGP, Nagios, Git, Jenkins, Vagrant, VirtualBox, Shell Scripts, Ansible playbooks, Ubuntu, CentOS, SLES Operating systems

Solution

- Created a new feature test plans & expanded existing test plans
- Designed & built test environments having Openstack Cloud and the client's SDN product with different OS versions
- Ran test cases manually and then automated major chunk of it
- Conducted Test case management and Bug reporting to the client for each release cycle
- The team followed Agile methodology

Customer's product + OpenStack – Logical Architecture



Scalability testing of client's SDN product



Engagement

Calsoft was engaged with the client in conducting Scalability testing of their SDN product. The aim was to test & identify the port scale that their software product could support for the soft bridge & the router.



Benefits

- Developed automated scripts for creating large environment for scalability testing.
- Client benefitted from the fact that we Logged critical scalability defects.



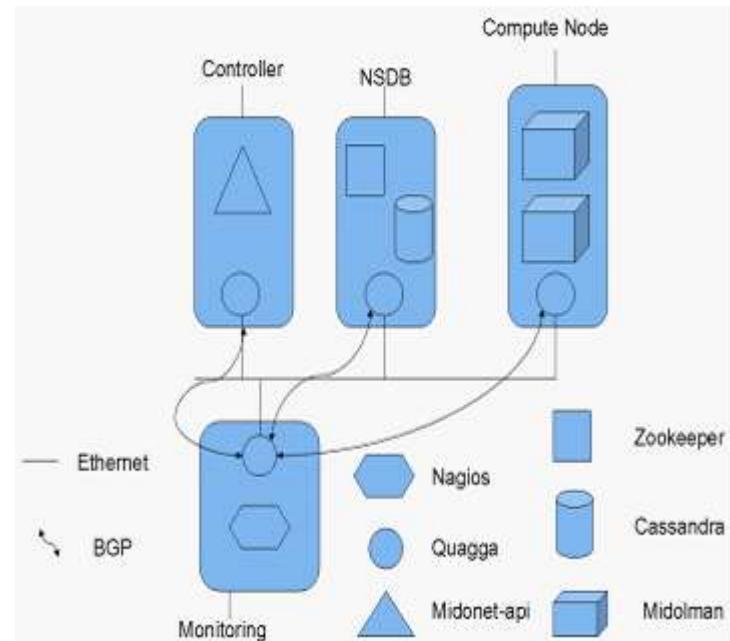
Technology

- Docker, Container, NW namespaces, Ganglia and Nagios monitoring tool, iperf and quagga networking tool



Solution

- Designed and developed networking topologies to do the scalability testing of the SDN product.
- Developed automated scripts for environment creation and networking topology deployment.
- Developed scripts for deployment of monitoring tool to monitor the compute resource.
- User guide for end user to install, configure and test the product using automated scripts



Manual QA for File Sync & Share product



Engagement

Calsoft was engaged with the client to start with Manual testing for file sync and share product, especially the new features (on different platforms).



Benefits

- End-to-End testing of the product
- Enhancement to existing test plan
- Focused testing on the new features to be at the competitive edge
- Suggestions on product improvements
- Suggestions with solutions on Code Coverage & Automation
- Clientside QA team was relieved of product testing & move their focus on their partners/customer support cases



Technology

- C++ , SQLite databases, PostgreSQL database, 256-bit AES (Advance Encryption Standard), TLS (SSL) protocol , TCP/IP
- Platforms : Windows, Linux, OSX, iOS
- Mobile App Support : Apple iOS 2.4+, Android 2+,Windows Phone



Solution

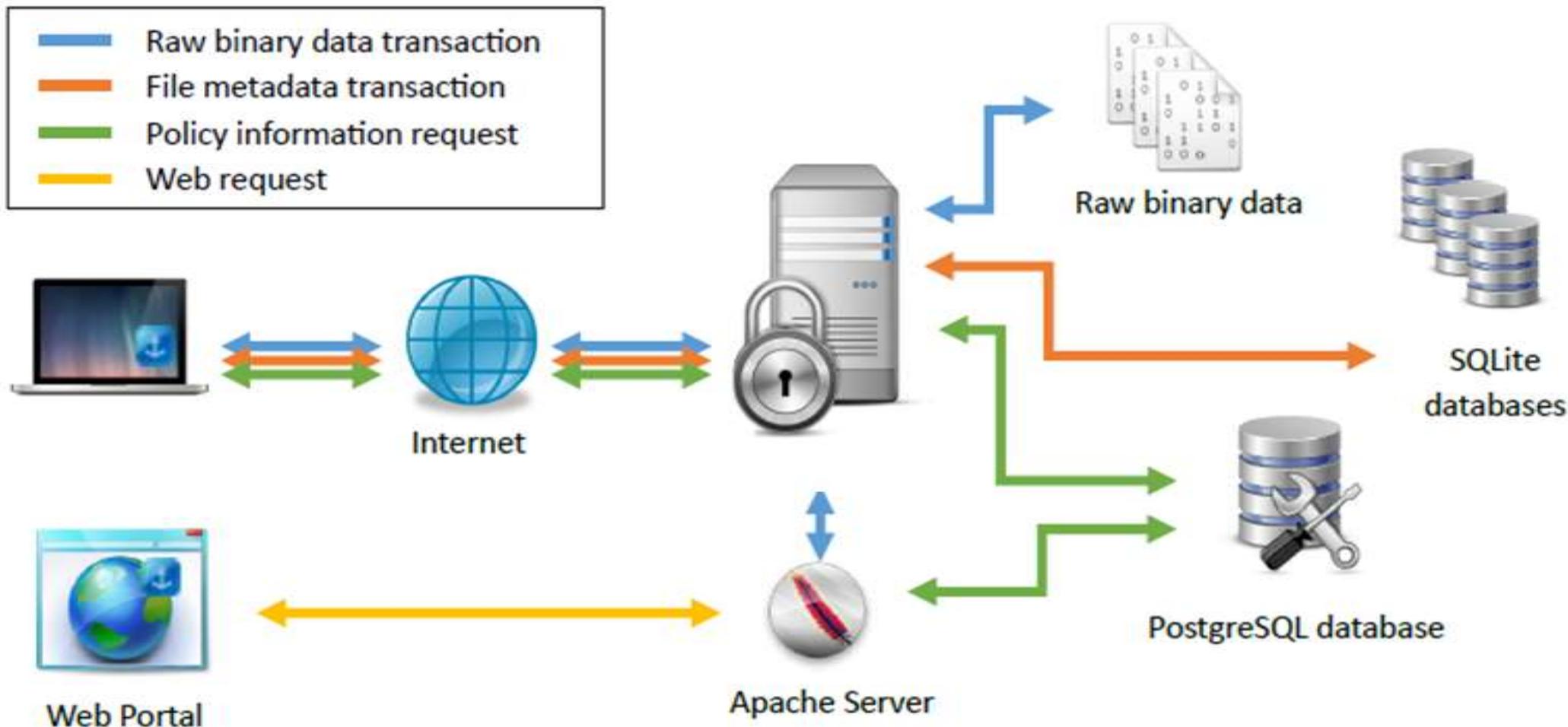
Testing Strategy :

- Complete ownership of the feature testing
- Various lab setups per feature (as required)
- Building entire Test plan creation for new features
- Internal and external reviews and audits
- Test case identification from their existing suite and test execution
- Testing in local environments and private cloud systems
- Propose new processes for testing and management tool (JIRA, TestRail)
- Release Documentation review by QA
- Follow agile and track milestones as per sprints
- Automated REST API test cases using Python

Features delivered & other:

- Lan_Sync, Selective_Sync, Hydration, Web Preview and other minor customer requests
- Feature testing and Regression testing for all subsequent patch and major releases.

Manual QA for File Sync & Share product



UCS Storage Certification Tool



Engagement

Calsoft was engaged with the client for developing Automation Tool to certify Interoperability of UCS system with Third Party Storage

- Stand Alone CLI based
- Runs on any Linux Flavor OS with no dependency



Benefits

- Man hours saved with Pre-Validation and Test Case Automation
- Avoids to & fro communication between Cisco and third party vendor due to detailed logging and reporting mechanism



Technology

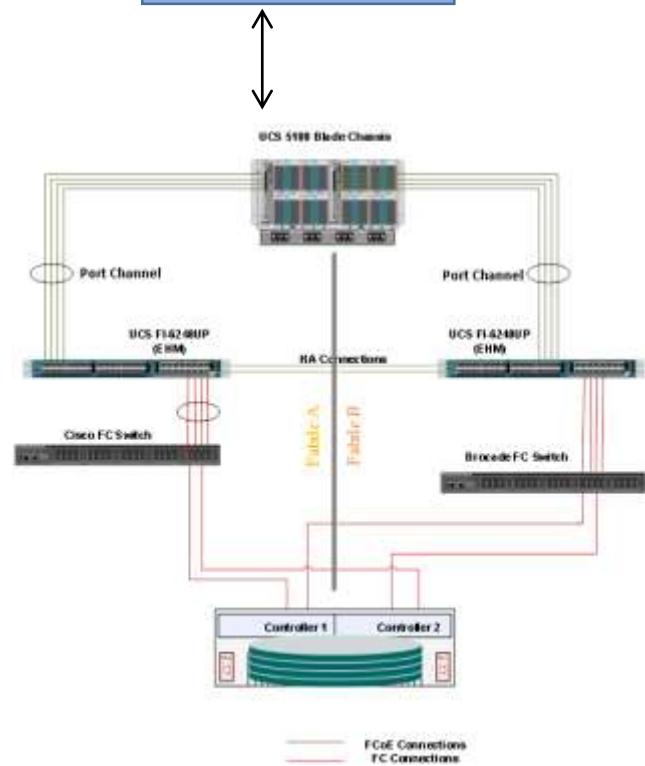
- Python, UCS Python SDK



Solution

- Reused Invicta based Automation framework
- User Interactive
- Just 2 easy step to Run
- Five Phases of the Tool workflow:
 - Input from User for Credentials of System
 - Pre-Validation of System
 - Data Collection from System in XML
 - Running Automated Test Case
 - Detailed Logging and Reporting Mechanism

UCS Storage Tool



Performance Testing of VDI infrastructure



Engagement

Performance testing of VDI infrastructure with and without vendor storage optimization solution.

Using metrics ascertain the increase in the number of virtual desktops supported with and without vendor's storage optimization solution.



Benefits

- Calsoft helped the vendor demonstrate the effectiveness of the storage optimization in terms of increased number of virtual desktops supported.



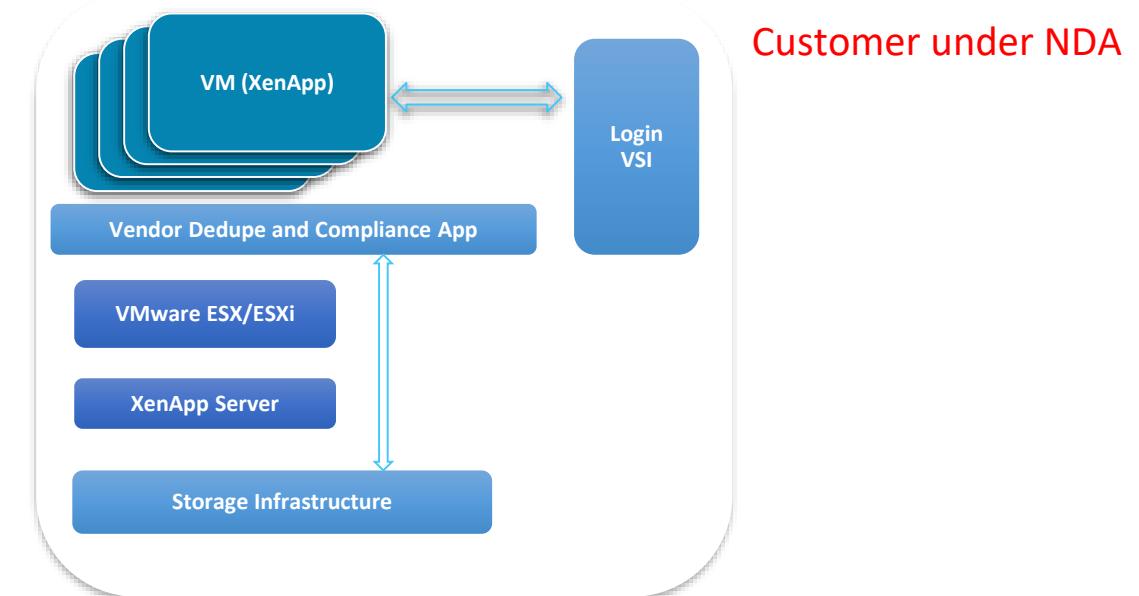
Technology

- XenApp Server, Login VSI,
- VMware ESX



Solution

- Calsoft QA created test-bed setup based on Login VSI test tool for VDI.
- The environment consisted of virtual desktops running on multiple ESX hypervisors. Each VM had a XenApp installed.
- Calsoft QA created test scenarios simulating MS Office workloads using Login VSI and automation scripts.



Development and Testing – Volume CBT solution



Engagement

Calsoft was engaged with the client for developing a Change Block Tracking solution for windows volumes.



Benefits

- With CBT, agent can now take incremental backup of volumes.
- Overall backup time is reduced as compare to non-CBT backups.
- Reduce storage consumption at backup server by storing only modified data.



Technology

- C, C++, KMDF, VSS, XML, InstallShield



Solution

Design

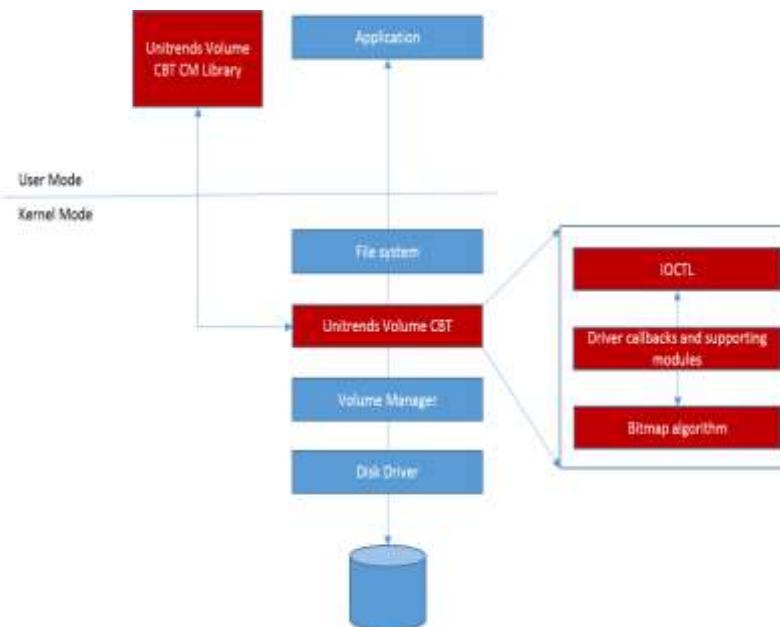
- Detailed design specifications were documented - High Level, Sequence and Component Diagrams, Workflow, use cases etc.

Development

- Developed following components for volume CBT feature.
- Windows driver to monitor and record IOs on volumes present on windows system.
- Public interfaces to integrate with client's backup application.
- CBT Installer using InstallShield.
- Wrote customized test tools to test various scenarios.

Testing

- Developed UT for every module.
- Performed standalone CBT testing using custom written tools and scripts.
- Performed data integrity testing using VSS snapshot mechanism.



Functional, Regression and Automation Testing for SDS



Engagement

Calsoft was engaged with client for assuring them with quality and providing automation services.



Benefits

- Immediate project kick off
- Significant reduction in testing time
- Accelerated product life cycle
- Improved product quality



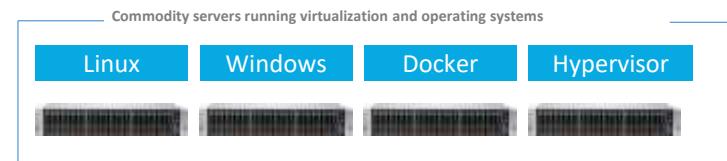
Technology

- OS – Linux
- iSCSI, NFS, Swift, AWS S3, KVM, VMware, pyvmomi, Linux, python, Docker & Windows

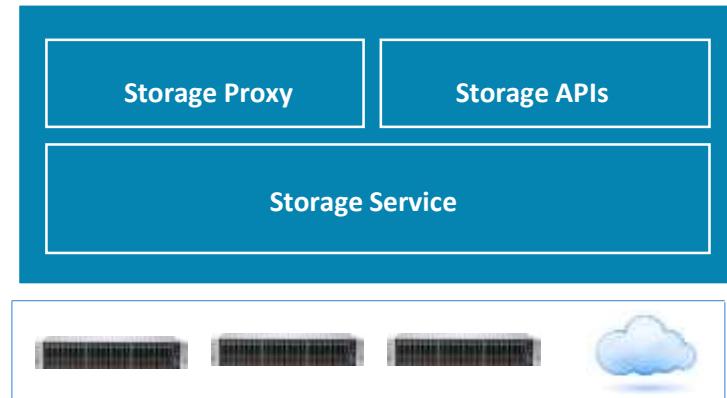


Solution

- Developed & executed feature test plans
- Developed new tests for NFS, iSCSI, ObjectStore & System features.
- Performed functional iSCSI, NFS, Swift and AWS S3, Dedup, compression, re-replication, pool migration , Block & meta caching & other features testing
- Performed features regression for new & old releases
- Performed inter-operability testing, which included KVM, VMWare, OpenStack and AWS S3 applications
- Performed automation for VMWare operations and Functional tests of iSCSI , NFS and ObjectStore



Distributed Storage



Workflow Automation Framework



Engagement

Calsoft is engaged with the client in developing core functions to support Workflow Automation.

Calsoft engineers augmented the existing Workflow Automation Framework Team of the client.



Benefits

- Improve turnaround time for deployment and configuration.
- Improve efficiency by provisioning pre-deploy validations.
- Support run-level remediation methods to revert faulty actions



Technology

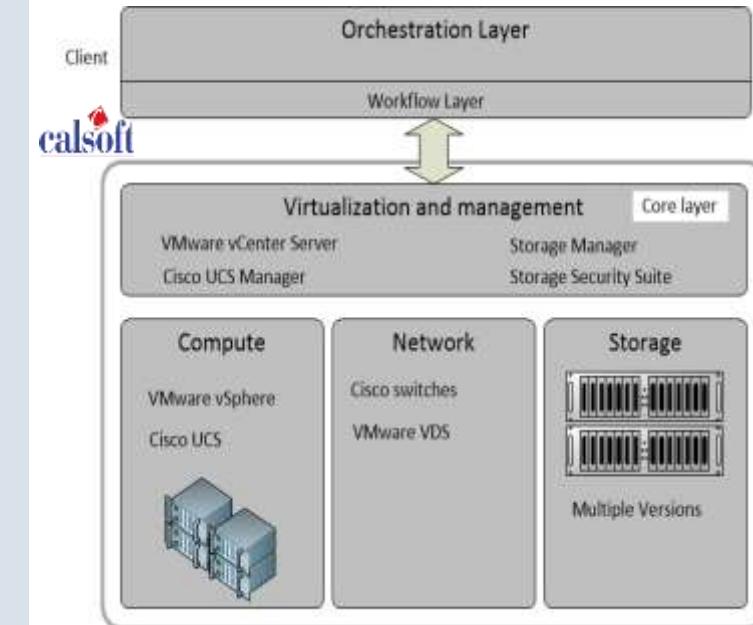
- Python, CIMC SDK, CIMC CLI using paramiko, pyvmomi, Storage APIs



Solution

Understand the product and develop the core layer to support the automated workflows comprised of the following components

- Storage (2 versions)
 - Storage setup and management
 - Creating Virtual Pools
 - Auto-Tiering Configuration (Creation/Deletion/Scheduling)
 - Creating FAST Cache
 - Performance monitoring
- Virtualization (ESXi 5.5/6.0):
 - Host, vMotion and other advanced(security) configuration
 - Datacenter,Datastore operations
 - VMware Distributed Virtual switch 5.5/6.0(VDS) mgmt.
- Networking (UCS Blade):
 - Configuring CIMC,updating CIMC firmware
 - Creating Virtual Drive and Configuring RAID through CIMC
 - Configureing Network settings,SNMP,NTP,DNS
- Cisco Switches (Nexus 1000V)
 - Configurations





Engagement

Everyone wants to know whether their application can handle the predicted level of traffic, to measure performance and verify stability. However,

- Scalability can be extremely expensive, not only the cost of entire systems such as servers, but their regular maintenance as well
- Limitations of Virtual Machine as it takes up a lot of system resources by running not just a full copy of an operating system, but a virtual copy of all the hardware that the operating system needs to run



Benefits

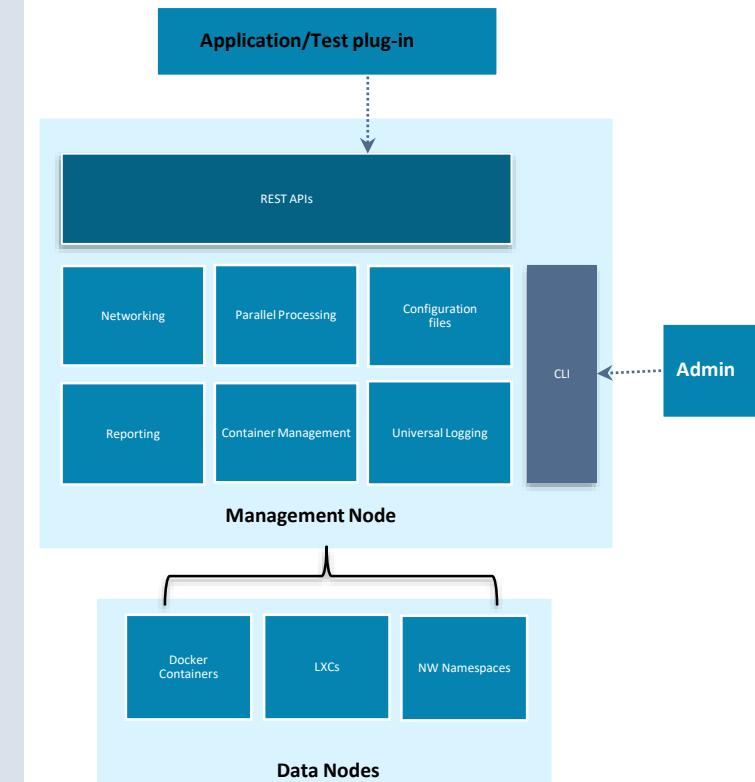
- Improved and rapid scalability anywhere from 10 to 100 times that of traditional VM environments
- Provides real time monitoring of test execution, flexibility and ease with the help of REST and CLI interface
- Ensures speed, agility and portability with the help of containerization



Solution

Calsoft can help customer by providing Scalability Test Framework which leverages containerized virtualization to ease testing of complex scalability scenarios,

- Any application can interact with this framework using REST APIs to manage the task assignment as per the test intend and monitor its performance.
- Framework handles parallel task execution across numerous containers and grouping facility to run specific task on particular group of containers along with universal logging mechanism
- All the information and functionalities like shutting down specific container or group of containers, spawning new containers at runtime or rebuilding the setup are available via REST interface
- Role Based Access Control support, so that high priority users get the setup access and save the in-progress test cycle from getting hampered by different users
- NW Namespaces, LXC and Windows Containers support





Engagement

Calsoft was engaged with the client to design and develop automation framework for file-level storage(NFS,SMB) and block-level (iSCSI) along with Virtualization (VMware, VAAI) for a unified software defined storage solution and support for manual testing.



Benefits

- Automation framework that runs the NFS, iSCSI, VMware test cases on nightly builds.
- Support for manual testing for NFS v3 and v4, VMware (NFS and iSCSI), VAAI and SMB feature.



Technology

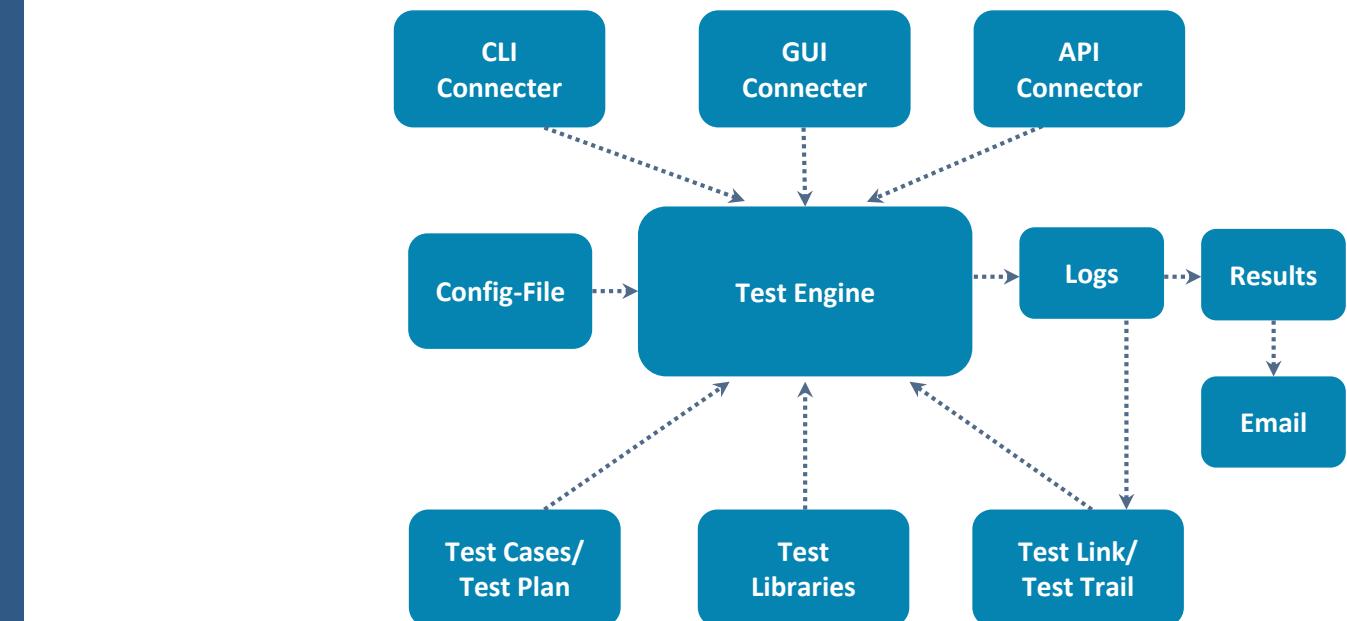
- Technologies/Tools: Behave, TestRail
- Programming Languages: Python 2.7+
- OS: Rhel 7.0, Ubuntu 14.04, Centos 6.8, windows 2012 R2
- Domain: Storage + Virtualization
- Programming Concepts: RPC, Twisted Server, Multi-threading, Concurrency
- IO Tools: FIO, Vdbench Behave, TestRail



Solution

Calsoft designed and developed a Generalized System Test Automation Framework which helped Customers for:

- **Configuration:** Only one configuration file maintained throughout
- Ease of understanding: All test cases are written in Gherkin language which a non-programmer can also understand
- **Reporting:** TestRail GUI for reports
- **Logging:** Separate log file for each test case, ease to debug
- **Re-usability:** New user just needs to add a test case in the TestRail and edit the steps file, if needed
- **Scalability:** Highly scalable framework and can be used for Functional testing, System and Concurrent testing etc.



Enterprise Cloud Infrastructure: Design & Validation



Engagement

- Validate VMware based IaaS (Stellar) for SAP HANA workloads
- Validate the IaaS solution for
 - High availability
 - Manageability
 - Monitoring



Benefits

- Compare the VMware IaaS availability, manageability and monitoring capabilities with other SAP IaaS solutions
- Publish the results to SAP line of business



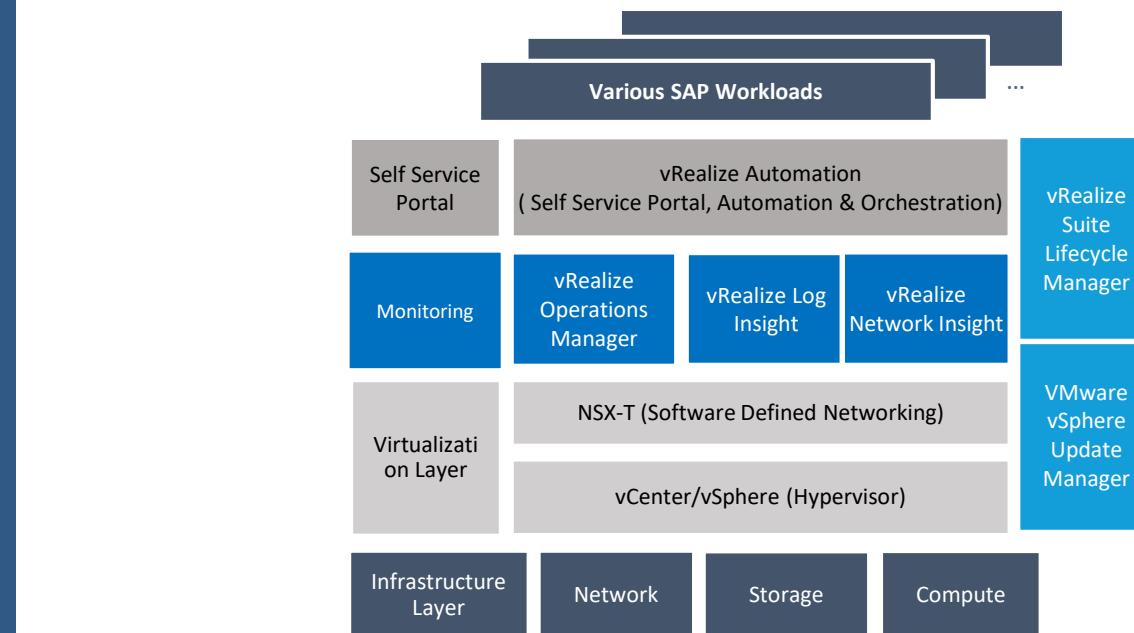
Technology

- SAP HANA workloads, vRA/vRO, vROPs, vRLi, vRNi, NSX-T, vSphere, Compute servers, NFS storage, L2/L3 Networking, Python



Solution

- Review the VMware infrastructure architecture
- Work with SAP partners to rack & stack the compute, network and storage servers at SAP datacentre
- Create test plan to validate the IaaS
- Deploy and configure SAP workloads on IaaS
- Build test automation framework
- Automate stress testing of IaaS
- Test execution and reporting



Chaos Engineering for a Leading Enterprise Cloud Provider



Engagement

Calsoft collaborated with a leading enterprise cloud vendor to validate their VMWare based Enterprise Cloud for HANA workloads that measures and publishes resiliency, availability, performance, ease of RCA



Benefits

- Given Direct Visibilities to the results for the respective lines of business, and Executives
- Established a comparative framework for cloud resiliency with other enterprise cloud vendors



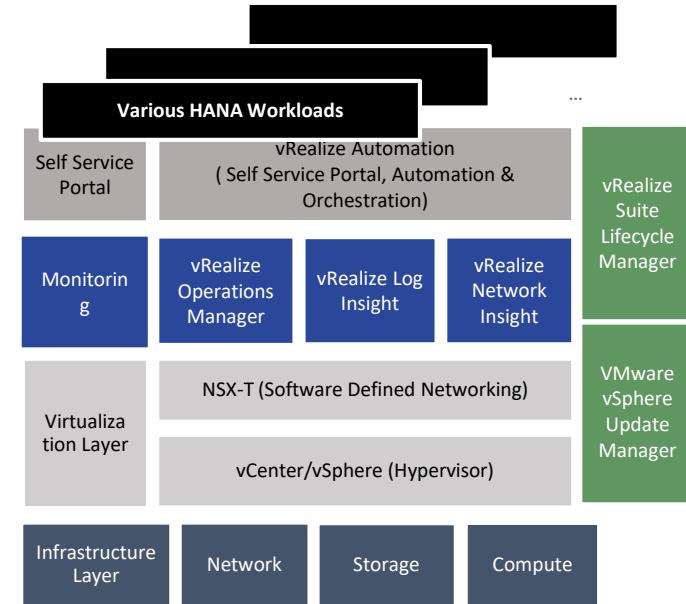
Technology

Python, Chaos Engineering, HANA, DB benchmarking tools, vRA/vRO, vROPs, vRLi, vRNI, NSX-T, vSphere, Compute servers, NFS storage, L2/L3 Networking



Solution

- As part of the engagement Calsoft swiftly took actions on
- Understanding the customer's enterprise cloud architecture
- Gathered the information about top 50 failures reported by customer
- Mapped the failures to faults
- Designed & Developed Chaos Engineering framework
- Automate test environment and deployment workflow
- Executed the test and Publish Results
- Lab activities
- RSM





Engagement

- Create test automation framework to validate any storage solution
- Automate error simulation and error reset to induce storage failure scenarios



Benefits

- Automated error injection to validate the high availability of storage and performance impact due to failures
- Create chaos in any datacentre by inducing random errors at random time in storage. This will help in validating the robustness



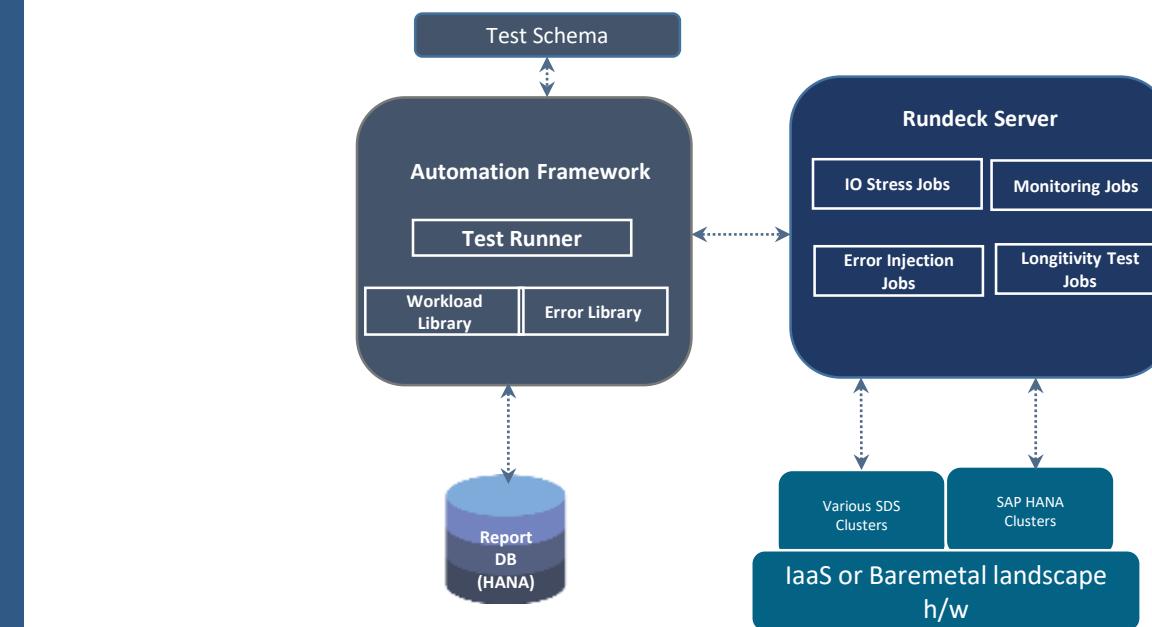
Technology

- Python, rundeck jobs, Storage, SAP workloads, semi-chaotic error injection, plotting long running jobs



Solution

- Understand SAP requirement for test automation framework
- Design the test automation framework
- Use rundeck server for remote jobs execution and monitoring
- Generic YAML driven test definition file to create test cases
- Run, monitor SAP test workloads from framework
- Store the test results in HANA DB, process for plotting
- Support Performance and stress mode for testing



Unified, Behavior Driven Testing of Enterprise Object Store



Engagement

- Calsoft was engaged with an enterprise object store in developing Functional & System Test Automation Framework based on a Behavior Driven Testing (BDT) methodology.



Benefits

- Using BDD/T, enabled strong collaboration in all involved parties due to use of ubiquitous language in defining requirements, use stories and test cases.
- Improved traceability of requirements throughout the BA, Dev, Test & Release Engineering groups.
- Use of proven open-sourced technologies cut the framework cost significantly which otherwise would be required for commercial tools.



Technology

- Python, Behave, Unix, Jenkins, Docker, Kubernetes, Locust, Selenium Grid, awscli, s3cmd



Solution

Development

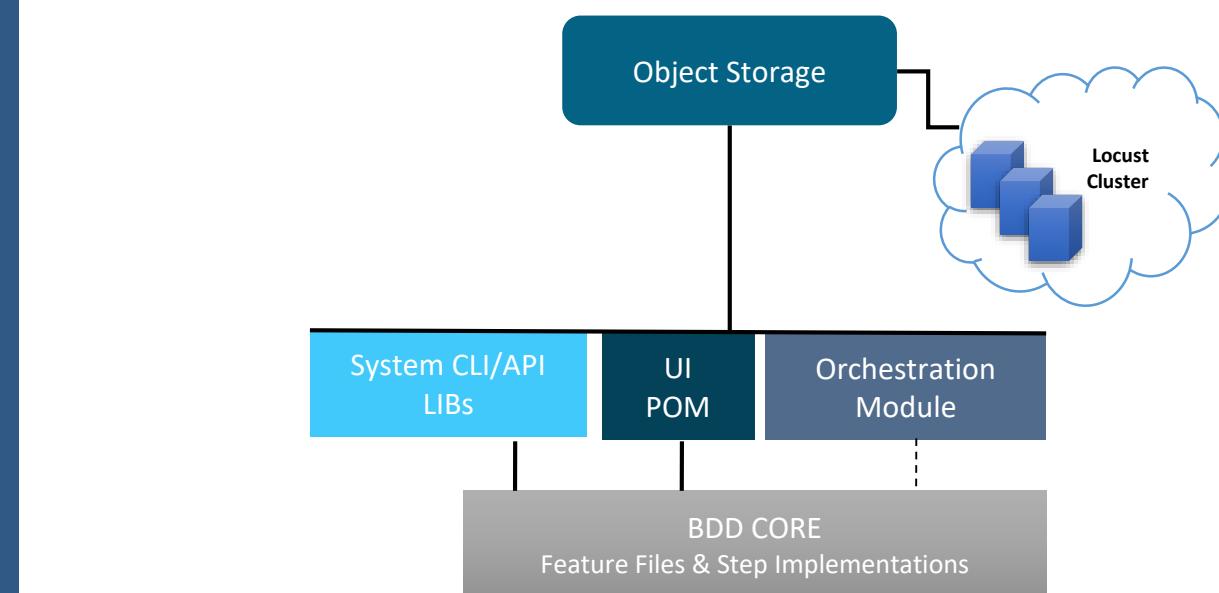
- Developed a unified test automation framework based on BDT principals which simplified the goal of achieving uniformity in feature specification traceability.

Test Automation

- Tests automated are to validate product's REST API, GUI for their functional as well as system type of testing.

Features

- Unified framework to validate product's API, GUI across various OS, Browser platforms.
- POM enables re-usability
- Integration with "Jenkins" for CI-CD-CT.
- Integrated Orchestration module to validate product scalability in terms of bucket, objects and connections.



DMTF-Redfish validations for HCI vendor



Engagement

Calsoft was engaged with a HCI vendor to test and validate compliance of their System Management API against Redfish API standards. Redfish Compliance enables HCI vendors to upsell their wares to Data Center companies



Benefits

- The client was able to showcase Redfish API standard compliance for HCI appliance management interface. Feature gaps and non compliance observations were reported for customer action.



Technology

- Redfish v1.0 Python, REST API, JSON



Solution

1. Discovery & Analysis

List down complete set of API calls and feature sets provided by HCI appliance interface

Create a matrix of supported API calls, with input & expected output

2. Create test cases against each functionality of HCI's System Management capabilities

Retrieval of IPMI type of data – Asset info, serial numbers etc.

Retrieval of health status – Temperature sensors, fan speeds, power supply, consumption & thresholds
Retrieval of basic I/O data – NIC/MAC addresses, storage drive status/fault reporting etc.

Discovery of system topology and service endpoints
Compliance against session based HTTPS enabled communications

Perform common actions – power cycle, shutdowns, boot order selection etc.

Event log and notifications – Accessing logs & notifications

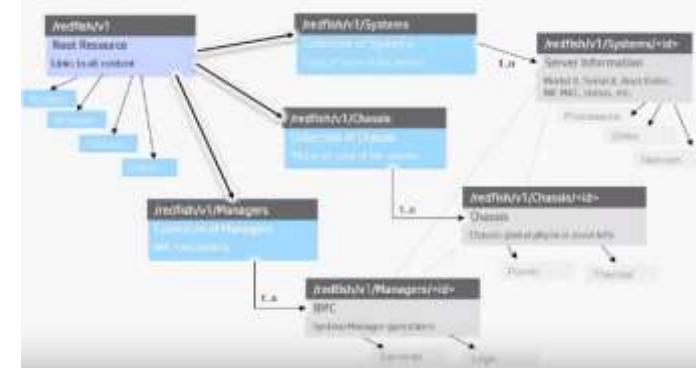
Remote management using BMC – network & user configurations etc.

3. Run test cases with a combination of manual and automated testing

Unattended test automation of selected test cases

Manual test execution for validations against expected behavior and Redfish standards

Resource map (highlights)



Hyper Converged Infrastructure (Appliance)

SNIA-Swordfish validations for Storage Array vendor



Engagement

Calsoft was engaged with storage array vendor to test and validate compliance of their Storage System Management API against Swordfish API standards. These standards are storage specific extension of DMTF Redfish, and are promoted by SNIA



Benefits

- The client was able to showcase Swordfish API standard compliance for storage appliance management interface. Feature gaps and non compliance observations were reported for customer action.



Technology

- Swordfish v1.0.6 Python, REST API, JSON



Solution

1. Discovery & Analysis

List down complete set of API calls and feature sets provided by Storage Array appliance interface
Create a matrix of supported API calls, with input & expected output

2. Create test cases against each functionality of arrays' System Management capabilities

IPMI type of queries for asset info – System, Chassis, model number etc.

Class of Service type of storage management – Block, File, Object and replications

Block storage management – Volumes, Pools/groups and service end points

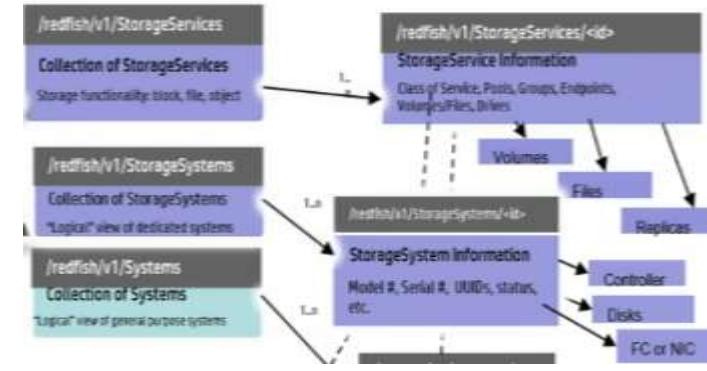
File storage management – File systems, pools/groups and service end points

Capacity management – Thresholds, trigger notifications and actions

Swordfish profile compliance – Basic support, Replications, EnergyStar certified etc.

3. Run test cases with a combination of manual and automated testing

Unattended test automation of selected test cases
Manual test execution for validations against expected behavior and Swordfish API specifications



Storage Array

DMTF-SMASH conformance Dev & QA for Server Hardware vendor



Engagement

Engagement underpinned Dev & QA of Server's System Management API for conformance with SMASH standards. DMTF-SMASH is a set of semantics, protocols & profiles that enables interoperability of Data Center resources.



Benefits

- The client was able to showcase SMASH API standard conformance for server hardware's appliance management interface. Feature gaps and non conformance observations were reported for customer action.



Technology

- SMASH v1.0. Python, REST API, JSON



Solution

1. Discovery & Analysis

List down all API (web services & Command Line) calls of Server management interface

Create a matrix of supported API calls, with mandatory & optional features, input & expected output

2. Development & QA against each functionality of server' System Management capabilities & SMASH conformance criteria

Design & development of Web Services & Command Line APIs for additional features.

Regression testing & bug fixes in existing APIs. Below mentioned areas were covered.

Mandatory Profile requirements [Base Server, Service Processor & Modular System profiles]

Base Server [Fan, power supply & system power state – Basic conformance]

Service Processor[UAM, boot control, DHCP & DNS clients, Ethernet ports, software inventory..]

Modular System [Sensor, cooling, power domains etc.]

Mandatory Protocol Requirements –[Web services & Command Line Protocol]

Web Services [System Management Web Services, transfer, state change etc.]

Command Line Protocol [SSH, Telnet]

Conditional Specification requirements [Profile requirements & protocol requirements]

Security Implementation requirements [Secure communications]

Cryptographic method implementation

Authentication mechanism & Roles + Authorization

User account management etc.

Discovery Requirements

Network endpoint discovery

Access point discovery for web services management

3. Conformance testing and validations - combination of manual and automated testing



Citrix and VMware Certification



Engagement

- Calsoft was engaged by the customer for providing Citrix and VMware certification services.



Solution

Calsoft helped the customer in getting Citrix XenApp, XenDesktop certification, and VMware Thin client certification. The certification was carried out for:

- XenApp and XenDesktop version 7.15LTSR Cu3
- VMware Blast with VMware Horizon 7

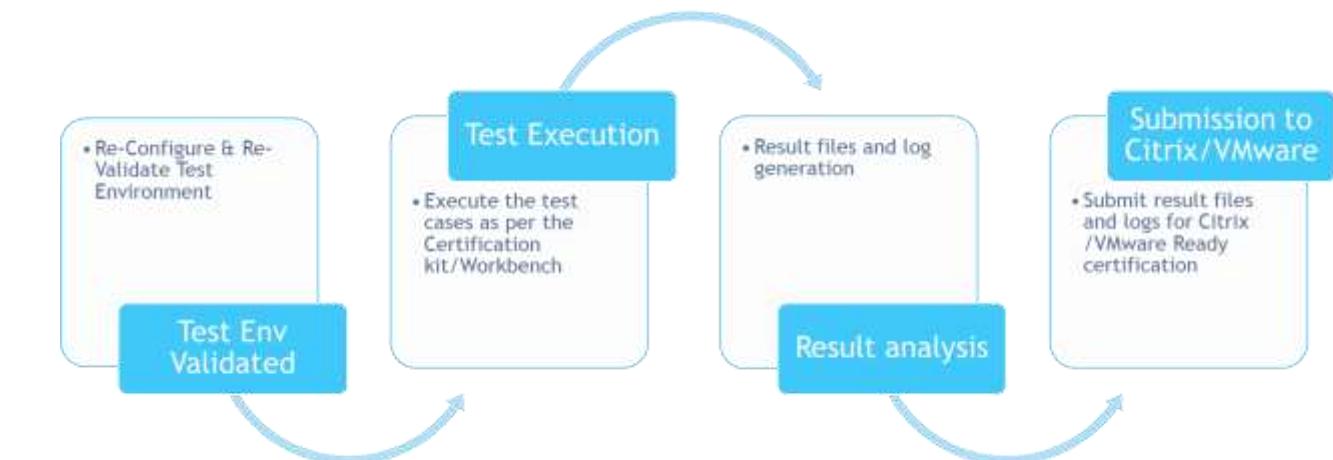
The engagement underpinned:

- Configuring test setup/test-bed/test harness, in case of any specific test-setup, specific test failures
- Executing test cases as per Citrix certification kit and VMware certification guide
- Analyzing test failures, making changes, and re-executing the tests
- Submitting logs, test results to Citrix and VMware
- Assisting the customer in responding to queries raised by Citrix and VMware regarding the certification



Technology

- XenApp and XenDesktop, VMware Horizon, VMware Blast, AD Server, hypervisor , SQL Server



Benefits

- Integration with Citrix and VMware environment
- Keeping the products up-to-date with technology and features
- Faster time-to-market
- Better market value



Engagement

- Calsoft was engaged by the customer for providing Citrix certification services.



Solution

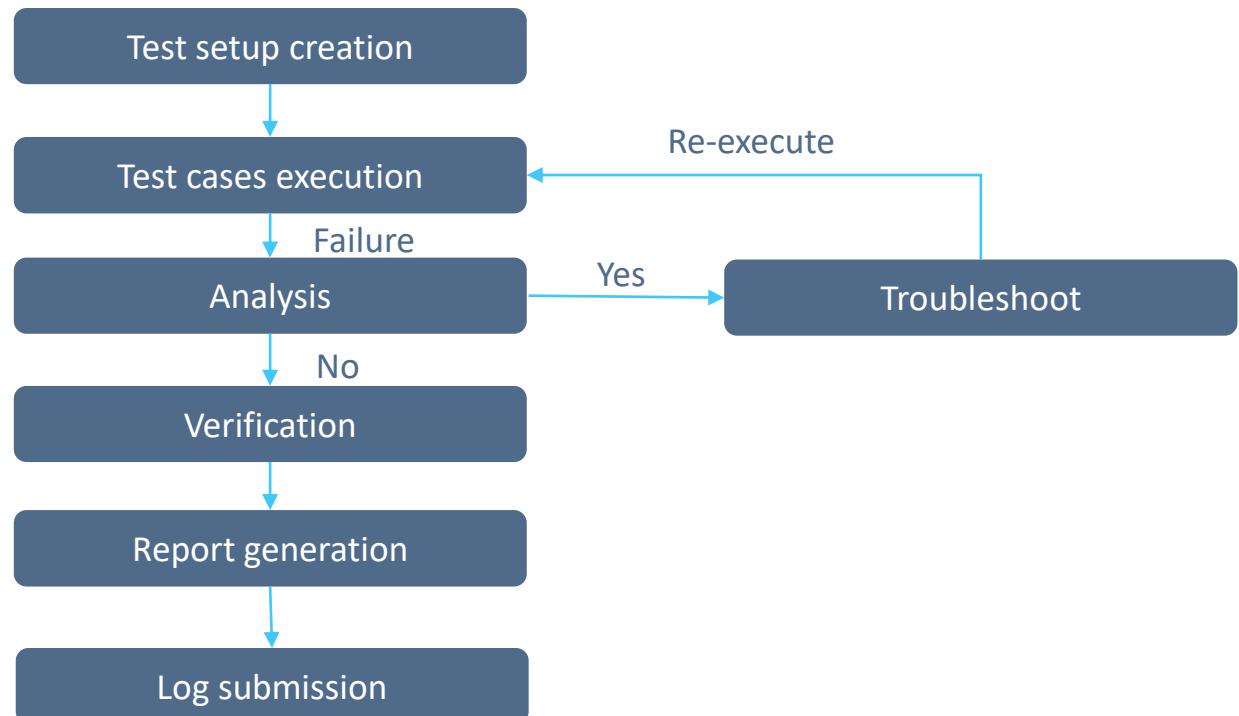
Calsoft helped the customer in getting Citrix XenApp and XenDesktop certification for their desktop application. The engagement underpinned:

- Certification for XenApp and XenDesktop version 7.15/7.18
- Creating the test setup
- Executing the test cases as per Citrix certification kit
- Analyzing and troubleshooting test failures, making changes in case of failure, and re-executing the tests
- Submitting logs to Citrix
- Assisting the customer to respond to queries raised by Citrix
- Citrix XenApp and XenDesktop certification with Major and Minor releases in sequential manner



Technology

- XenApp and XenDesktop version 7.15/7.18, Windows Server



Benefits

- Integration with Citrix environment
- Keeping the products up-to-date with technology and features
- Better market value

QA for VMware Plug-in of Data Protection Product



Engagement

- Calsoft was engaged by the customer for feature testing of their VMware plug-in for data protection product in VMware environments.



Solution

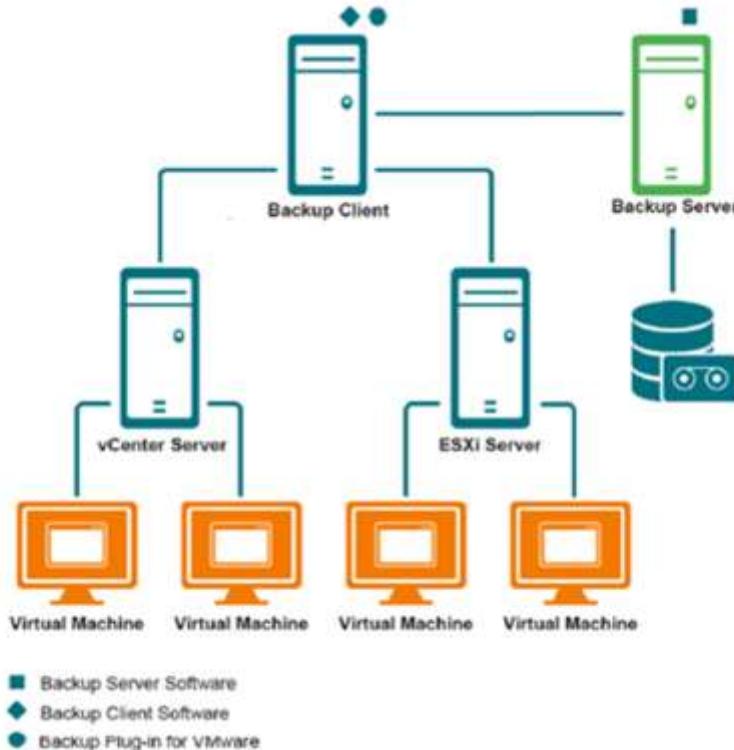
Calsoft helped the customer with QA services and the engagement underpinned:

- Creating new feature test plans & expanding existing test plans
- Designing and building test environments having vSphere infrastructure and the client's data protection product with different backup proxy OS versions
- Running test cases manually for various test beds
- Conducting test case management and bug reporting for the customer for each release cycle
- Making the VMware plug-in more robust



Technology

- Windows, Linux
- C, C++
- VDDK and vSphere Management API
- vSphere infrastructure



Benefits

- Improved quality
- Better management
- Bug-free product



Engagement

- Calsoft was engaged by the customer for providing QA services and comparing their file-engine implementation with third-party arrays.



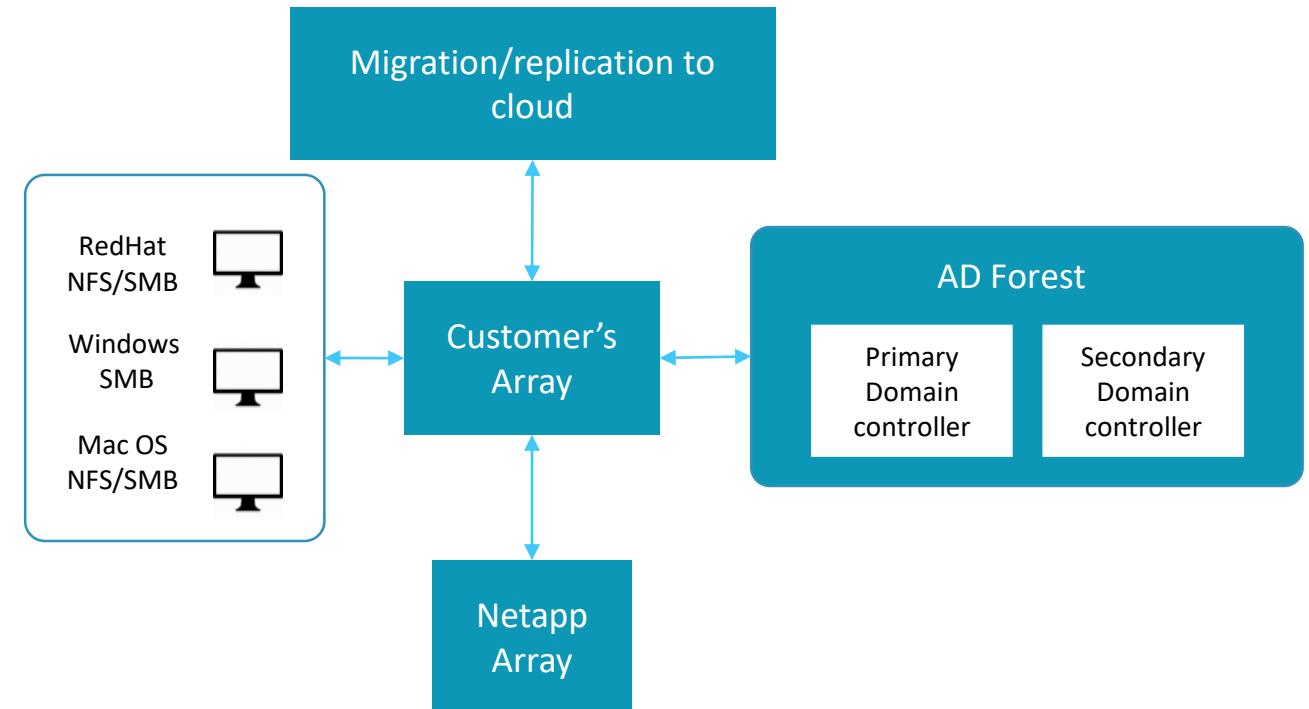
Solution

- Calsoft helped the customer with a QA offering and the engagement underpinned:
- Developed and automated test cases in the following areas.
 - Mixed-Mode Security, Multi-protocol locking
 - Data Integrity, Data Migration & Compatibility
 - Home Directory, Workload Testing & Solution Deployment
 - Developed automation framework using Python & Pytest
 - Leveraged pike automation framework built by Calsoft for comparative testing
 - Compared the customer's file-engine implementation with third-party arrays & provided a conformance index
 - Performed regression, stress & scale testing



Technology

- Python, PowerShell, Active Directory, Windows, Linux
- Protocols: SMB 3.0, SMB 3.1, NFSv3, NFS v4
- Pike automation framework



Benefits

The customer achieved:

- Comparative testing results against third-party array (ONTap Select 9.7) for NFS v3, v4 & SMB 3.0, 3.1 protocols
- Test results for boundary & limits for their V1 release for File-engine implementation

Plug-in Development & QA for Backup Product



Engagement

- Calsoft was engaged by the customer for developing a plug-in and providing QA services for their backup product.



Solution

The engagement underpinned:

Development:

- Developed code to protect the OpenStack environment using OpenStack APIs
- End-to-end productization of Global Admin Feature

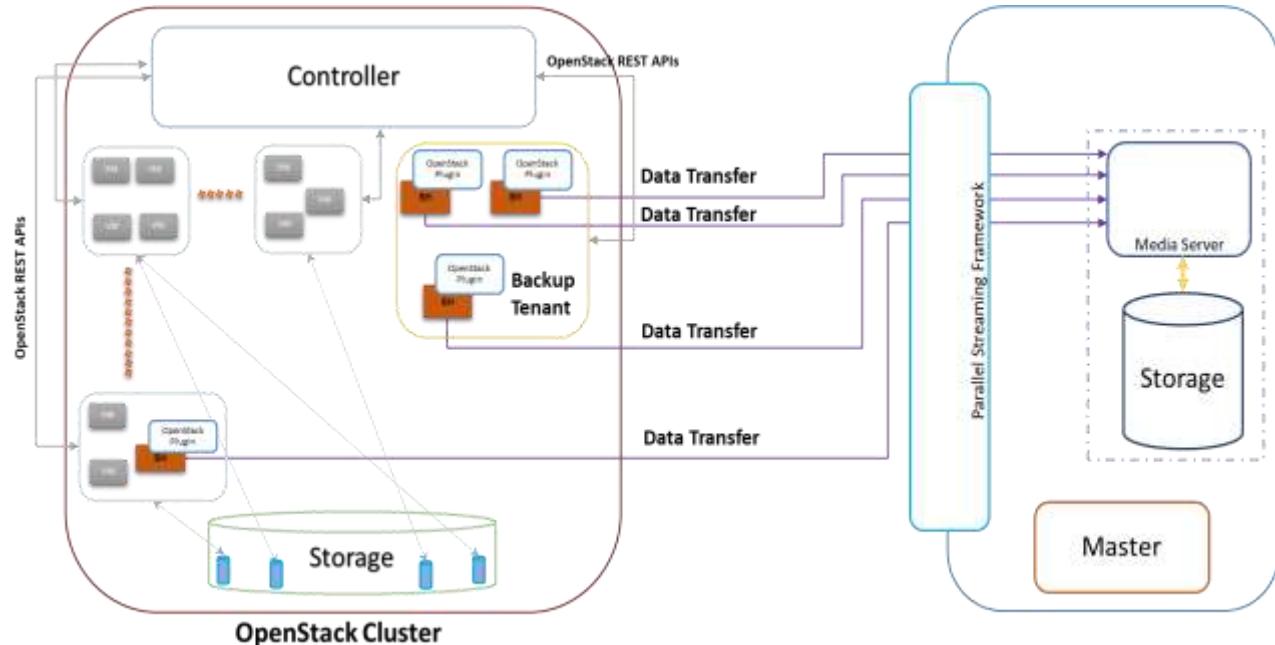
QA:

- Conducted testing in plug-in for OpenStack "Q" and "M" release
- QA validated features for automatic replication, disaster recovery, etc.
- QA Automated OpenStack server deployment and verifying backup restore using automation suite
- Scripts to automate development testing
- Performed testing such as:
 - System testing
 - Hardening testing and Exploratory testing
 - Sanity and Regression testing for features on varying platforms



Technology

- C++, Perl, REST API, Python



Benefits

- Improved go-to-market
- Reduction in cost

Development and QA for object storage

Scaled solution to combine multiple object storage appliances



Engagement

- Calsoft was engaged with a leading storage company in providing development and manual and automation QA for their object storage.



Technology

- Python, Avocado, Locust, S3bench, Cosbench
- Jenkins, AWS Node JS + Express JS Web-Sockets (Push Alerts), Python
- Java, C/C++, Corosync Pacemaker Database, ElasticSearch



Solution

The engagement underpinned:

Development:

- Development of a monitoring tool
- Development of a manageability tool
- Development of S3-compatible operations

QA:

- End-to-end functional testing
- System testing
- Performance testing
- Load testing for on-premises object storage
- Automation of test workflows and CI/CD pipeline for continuous testing



Benefits

- Easy management of object storage appliance
- Scaled solution to combine multiple object storage appliances
- Standard, efficient, secure way of movement of data
- Better automation coverage helped in continuous testing
- Manual workflow validation helped in effective and optimized automation efforts
- Methods such as all-pair and orthogonal testing were implemented to achieve best possible coverage

QA for Object Storage

- End-to-end functional, system, performance, and load testing



Engagement

- Calsoft was engaged with the customer to provide manual and automation QA for their object storage.



Solution

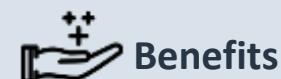
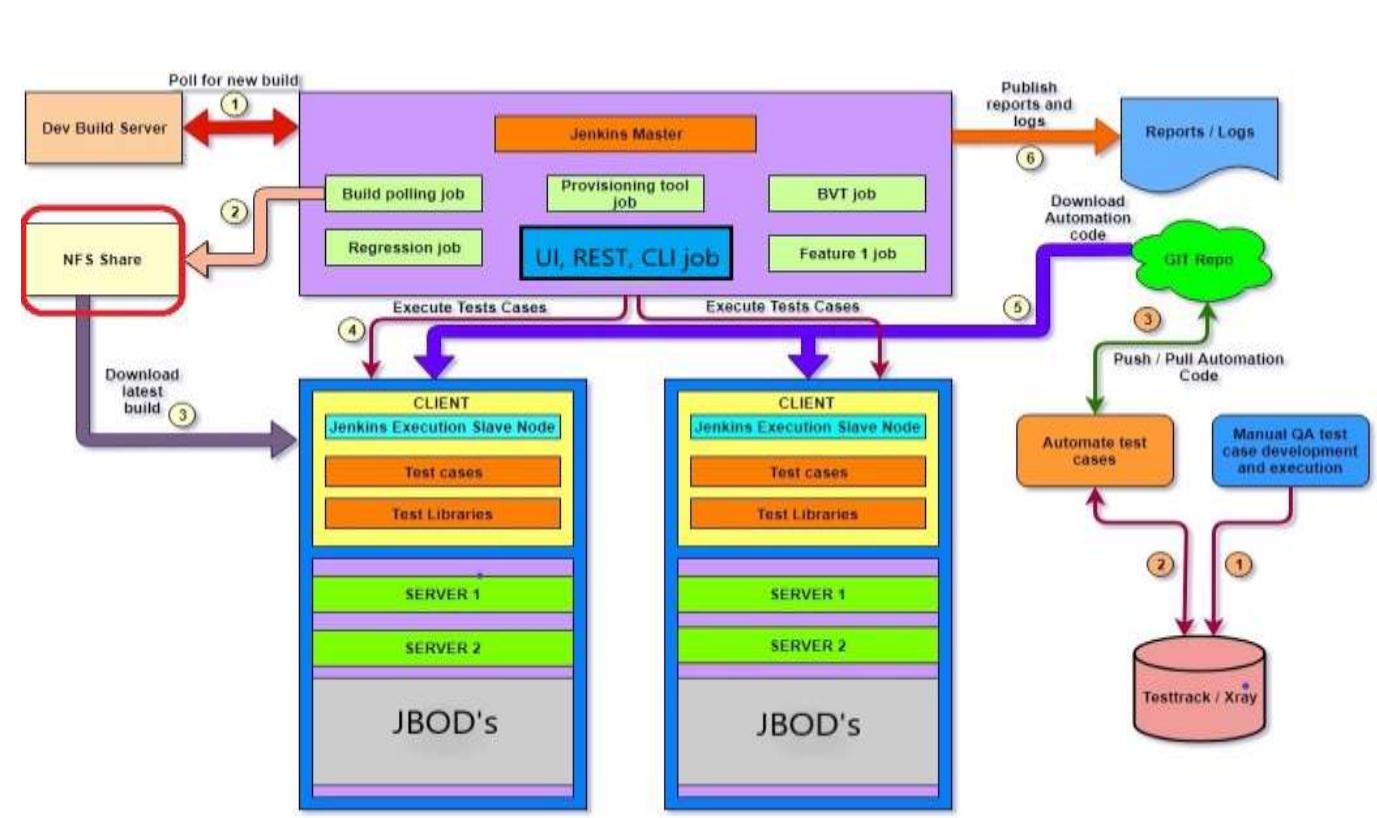
Calsoft helped the customer with end-to-end functional, system, performance, and load testing for on-premises object storage. The engagement underpinned:

- Manual test scenario development and testing for components such as Provisioning, S3, RAS, CSM
- Automation of test workflows and CI/CD pipeline for continuous testing
- Continuous testing alongside the active workload
- Risk-based testing around high-risk and impact areas and targeting those for test execution
- Data-oriented coverage: tests with a combination of input values
- Full-scale performance, load, stress, and scale testing
- Soak testing to uncover stability, data, and operational correctness issues in “long-running” workflows



Technology

Python, Avocado, Locust, S3bench, Cosbench, Jenkins, AWS CLI, AWS S3



- ## Benefits
- Better automation coverage helped in continuous testing
 - Manual workflow validation aided effective and optimized automation efforts
 - Methods such as all-pair and orthogonal testing were implemented to achieve best possible coverage

Feature Enhancement & Bug Fixing for Caching Product

Engagement

- Calsoft was engaged by the customer for feature enhancement of their caching product.

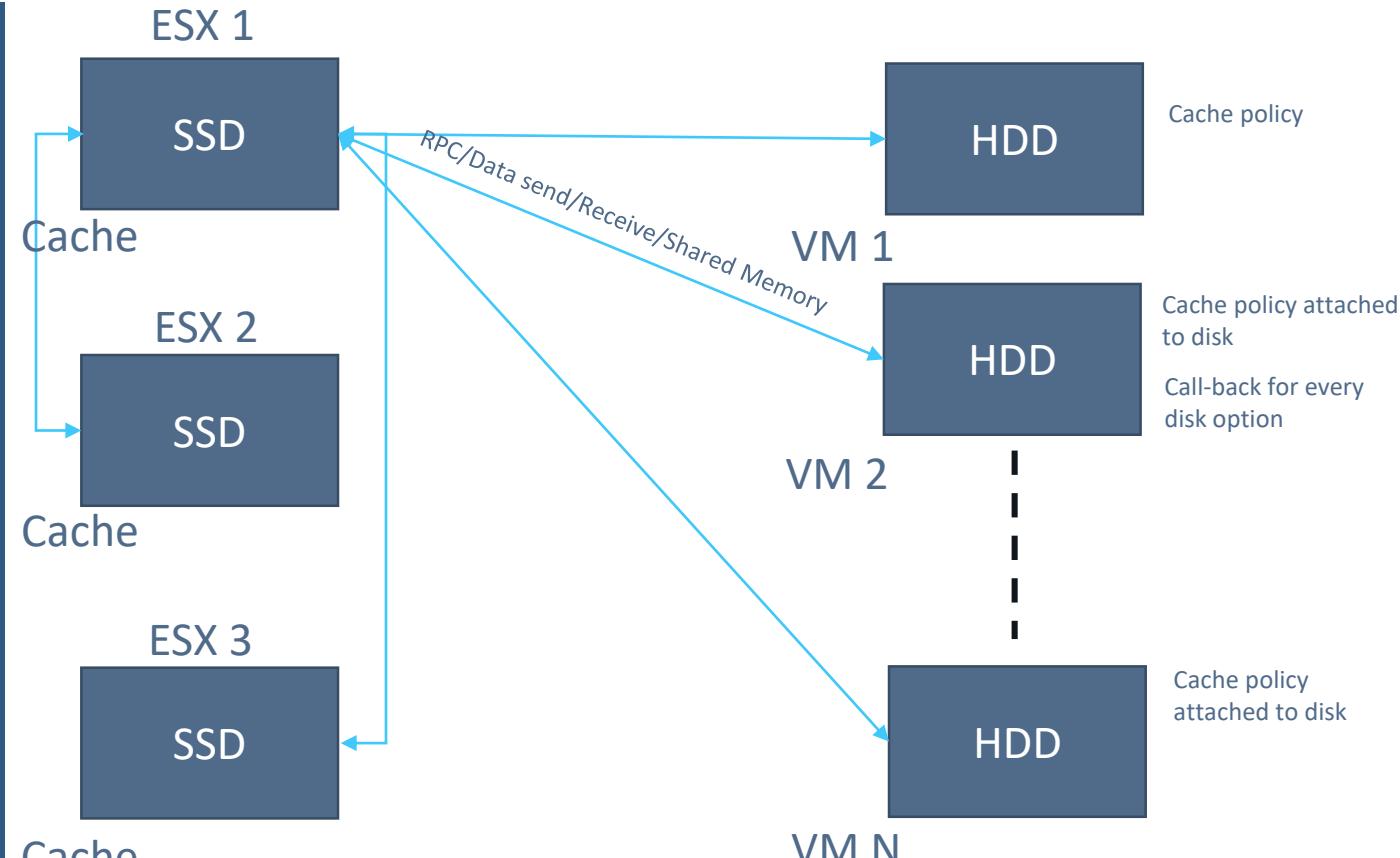
Solution

The engagement underpinned:

- Designing features to support large connections.
- Implementing threadpool at Daemon/ESX side to handle/process multiple connections from VMs.
- Porting the callback functions that are called on every disk operation to a Hybrid cloud product.
- Resolved:
 - Snapshot issues
 - VM migration
 - Data migration
 - VMware certification issues
 - Memory leak issues. This was a part of the deployment process of product at the customer's end.
- Helped in stabilizing the product by resolving issues in sanity, regressions.

Technology

- C, C++, Python, Shell Scripts, PowerShell, Linux



Benefits

- Better performance
- Seamless working

Install, Upgrade & Patch Management for HCI



Engagement

- Calsoft developed a cloud based multi-tenant system offering for HCI deployment and upgrade
- Supported complete system discovery & deployment (both Green field and Brown field)
- Supported multi-hypervisor deployment for EDGE, standard UCSM servers, and Cisco SD-WAN



Benefits

- One-click installation and upgrade ability from both Cloud-based & on-premises installer
- Multi Hypervisor support like VMware ESXi and Microsoft Hyper-V
- HCI deployment on EDGE, Standard and SD-WAN Infra
- Combined upgrade of UCSM firmware, Cluster, and Hypervisor OS on a single click
- Both installation and upgrade were dynamic workflows that could be customized as per user requirement
- Workflow could be paused/resumed and had task-level retry



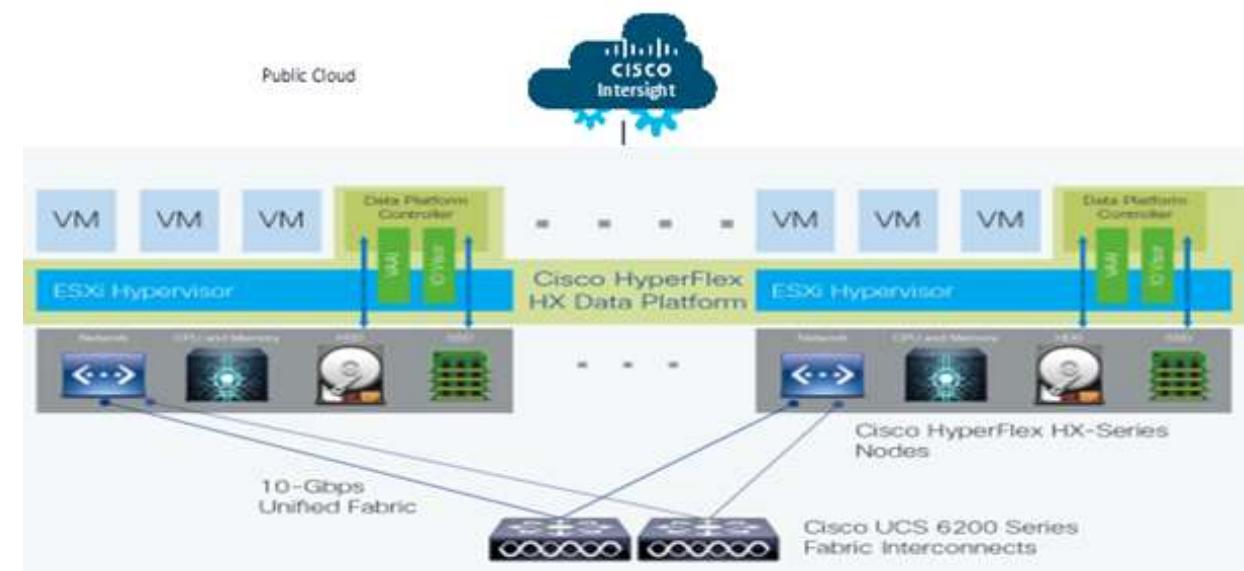
Technology

- Kubernetes, GoLang, Scala, Python 3.x, Ansible 2.9 and Power Shell, React JS



Solution

- Workflow-based deployment to support multi-hypervisor and various infrastructures like EDGE, Standard UCS server, and SD-WAN
- A multi-hypervisor and multi-deployment service that configured the UCS servers, OS installation, Configure IP, and hypervisor OS as per requirement
- An upgrade service that could upgrade multi-cluster with UCSM firmware and Hypervisor OS all at the same time
- Provided REST APIs for deployment and upgrade and could be monitored through TASK
- Support VMware ESXi 6.0 – 7.0 and Microsoft Hyper-V 2012-19
- Workflows could be dynamically plugged with other workflows for the required deployment
- Supported expansion for clusters by adding new servers to the existing cluster



Scale & Responsiveness Validation of Enterprise Object Store



Engagement

Calsoft was engaged with the customer to Perform Scale and Responsiveness testing of the enterprise object storage platform.



Calsoft helped the customer in developing a test framework and the engagement underpinned:

- Developed a performance test framework which is based on Microservices architecture.
- The framework is integrated with the BDT based functional test framework for better orchestration and reporting.

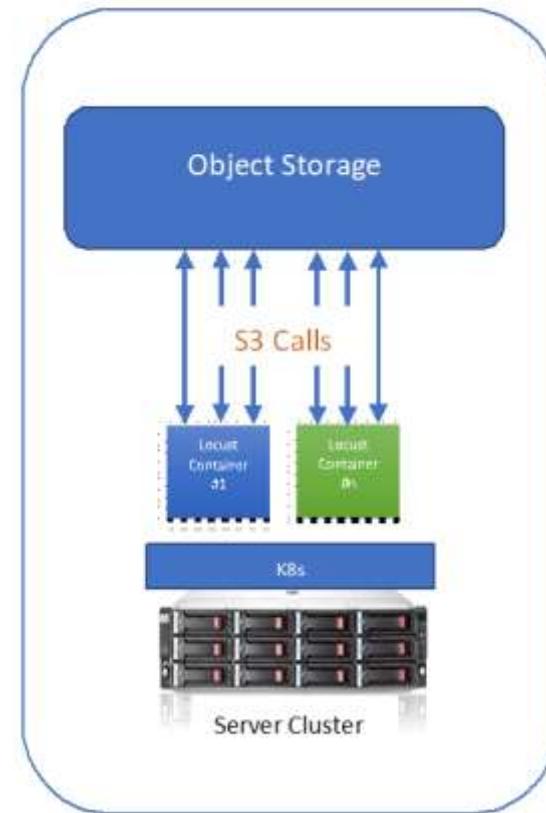
Features

- Integration with "Jenkins" for CI-CD-CT.
- Integrated Orchestration module to validate product scalability in terms of bucket, objects and connections.



Technology

Python, Behave, Unix, Jenkins, Docker, Kubernetes, Locust



Benefits

- Better scalability at minimal cost
- Seamless scale-up and scale-down of the containers
- Use of proven open-sourced technologies cut the framework cost significantly which otherwise would be required for commercial tools.

Performance Testing of Object Storage Product



Engagement

- Calsoft was engaged with the customer to performance benchmarking of their object storage platform.



Solution

Calsoft helped the customer with augmenting the functional test automation framework with performance validation module:

- Support for variety of S3 workload generation tools; including S3Bench, COSBench.
- Full-scale performance, load, stress, and scale testing capabilities.
- Orchestration module to handle workload across multiple physical or virtual servers.
- Integration with CI/CD platform for continuous performance testing.
- Soak testing to uncover stability, data, and operational correctness issues in “long-running” workflows.



Technology

Python, Avocado, Locust, S3bench, Cosbench, Jenkins, AWS CLI, AWS S3

Automation Framework

Workload Orchestrator Module

S3 Clients

S3 Calls

S3 Compatible Object Storage



Benefits

- Configuration driven test approach helped with testing across various workload patterns.
- Integration with existing automation framework, reduced the management overhead of tools.

Customer under NDA

Storage Controller Testing

Engagement

Calsoft was engaged with the client for storage controller testing for MS Office Workload Characterization

Solution

Calsoft helped the customer for testing their storage controller and the engagement underpinned:

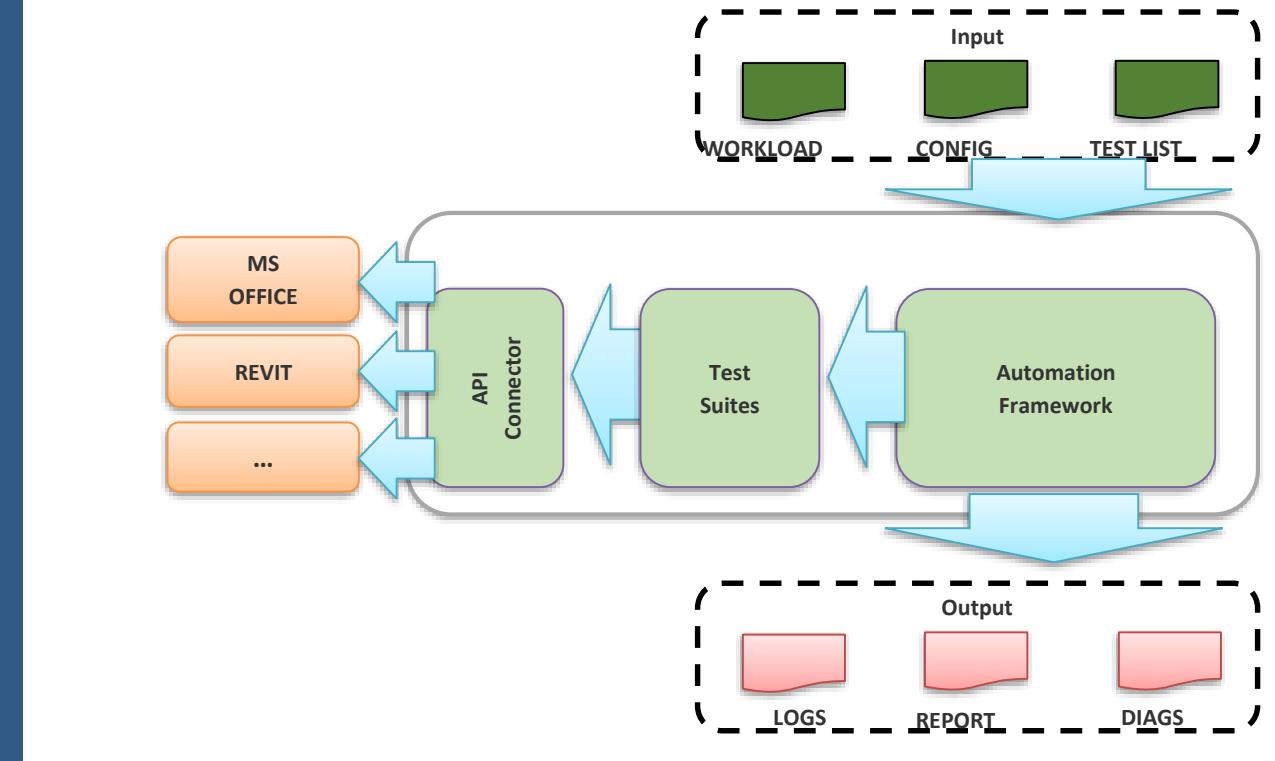
- Testing the storage performance using simulation workloads
- Created a test framework and test cases for MS Office, REVIT
- Integrated the same with the nightly build and smoke infrastructure which aid in development, quick testing, & identifying regression issues, etc.
- Developed an Automation Test Suite which leverages MS Application Programmatic Interfaces (APIs) and triggers them with various use cases such as conflicting read/writes, opens, deletions etc.

Technology

Platform: Windows

Language: C# .NET

Application Specific COM APIs, Win32 APIs



Benefits

- High quality automation testing with low cost
- Significantly reduced testing time with parallel test case execution
- Dynamic Wait Control provided access to data from cloud

Customer under NDA

Scale & Responsiveness Validation of Enterprise Object Store



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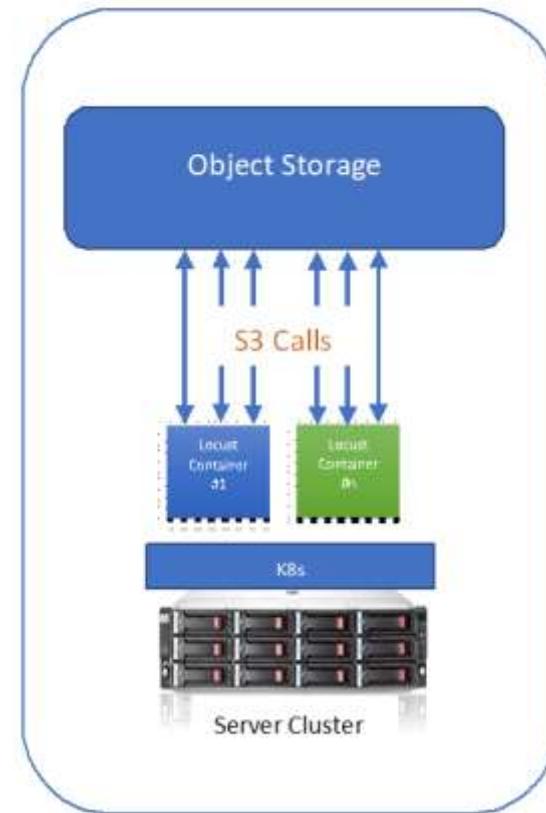
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Performance Testing of SMB Storage Platform



Engagement

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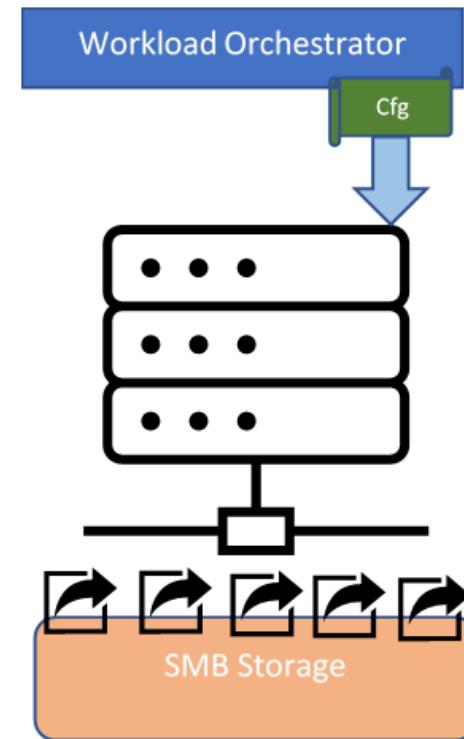
Solution

Calsoft helped the customer developing performance test automation framework:

- Uses open sourced PySMB library to generate client-side SMB requests.
- Configuration driven test execution, which maintains changes at central place.
- Test environment consisted of ADS deployments for authentication/authorization.
- Matrices such as Throughput, R/W rate, IOPs, Latency etc. were captured along with system resource utilization to measure the performance.



Python, PySMB, ADS, Linux



Benefits

- Configuration driven test approach helped with testing across various workload patterns.
- Integration with existing automation framework, reduced the management overhead of tools.

Customer under NDA

Performance Testing of VDI infrastructure



Engagement

Calsoft was engaged with the customer to carry out performance testing for their VDI infrastructure.



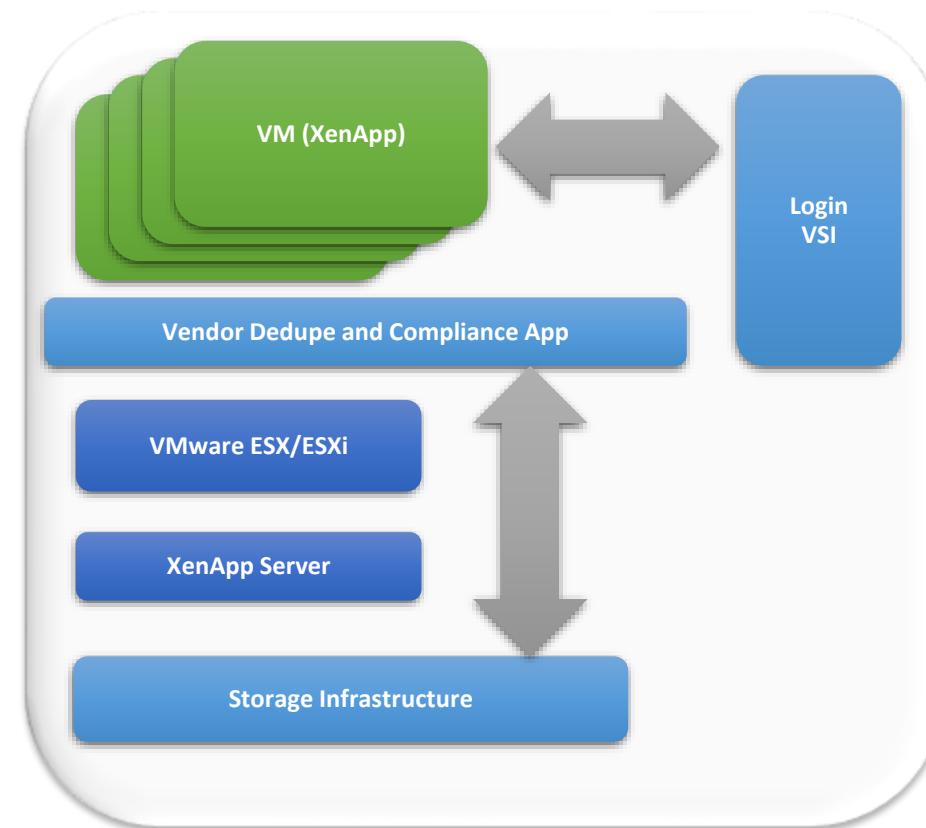
Solution

Calsoft helped the customer in performance testing and the engagement underpinned

- Performance testing of VDI infrastructure with and without vendor storage optimization solution.
- Using metrics ascertain the increase in the number of virtual desktops supported with and without vendor's storage optimization solution.
- Created test-bed setup based on Login VSI test tool for VDI.
- Created test scenarios simulating MS Office workloads using Login VSI and automation scripts. The environment consisted of virtual desktops running on multiple ESX hypervisors. Each VM had a XenApp installed.



XenApp Server, Login VSI,
VMware ESX



Benefits

- Calsoft helped the vendor demonstrate the effectiveness of the storage optimization in terms of increased number of virtual desktops supported.

Customer under NDA

Performance Testing of Microservices Based Data Visualization Platform

Engagement

Calsoft was engaged with the client for development & testing of a cloud based management platform that provides insights and analytics information driven from telemetry data coming from on-premise Backup/Recovery Appliance. Part of the requirement was also do the performance benchmarking of this microservices based, cloud native solution.

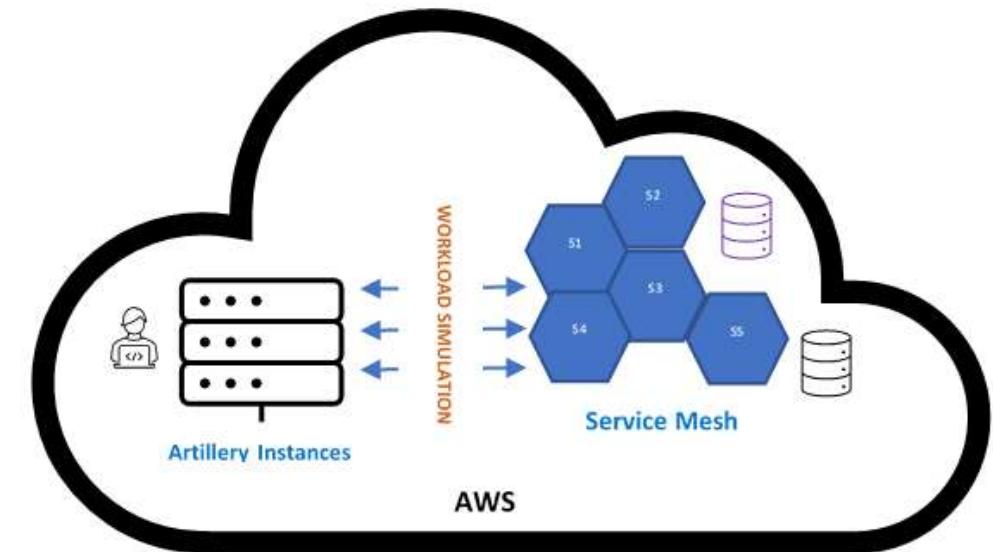
Solution

Calsoft helped the customer in design & development of a micro-services based multi-tenant portal. Calsoft worked on designing the UX, UI and backend for various services of portal. Primarily Calsoft worked on designing the search and Analytics Dashboard services. In addition to the development, Calsoft team was also responsible for performance and scale testing of the implementation.

- Creation of detailed performance testing strategy, framework design and test plan
- Framework/Tool identification, deployment and design of workload patterns
- Performance baselining and benchmarking capturing matrices such as latency, transactions/sec, concurrent sessions etc.

Technology

- JavaScript, Artillery, AWS, Proprietary workload generators to mimic appliances, Grafana for visualization, influxdb for TDS



Benefits

- Highly configurable framework with options to simulate production workload patterns.
- Built-in support for virtual users, allows to simulate source appliances at scale.
- Integration with CI/CD platform enables continuous testing on all stable builds.
- Framework integrated with data visualization platforms helps making informed decisions.

Performance Testing of Network Visualization Platform



Engagement

- Calsoft was engaged with the client for Network Performance testing. The engagement underpinned:
 - Testing the client software/application network performance using traffic generation tools with different packet size.
 - Automated end to end process scratch from environment bring up, system configuration, generate and validate the traffic to check the network performance.



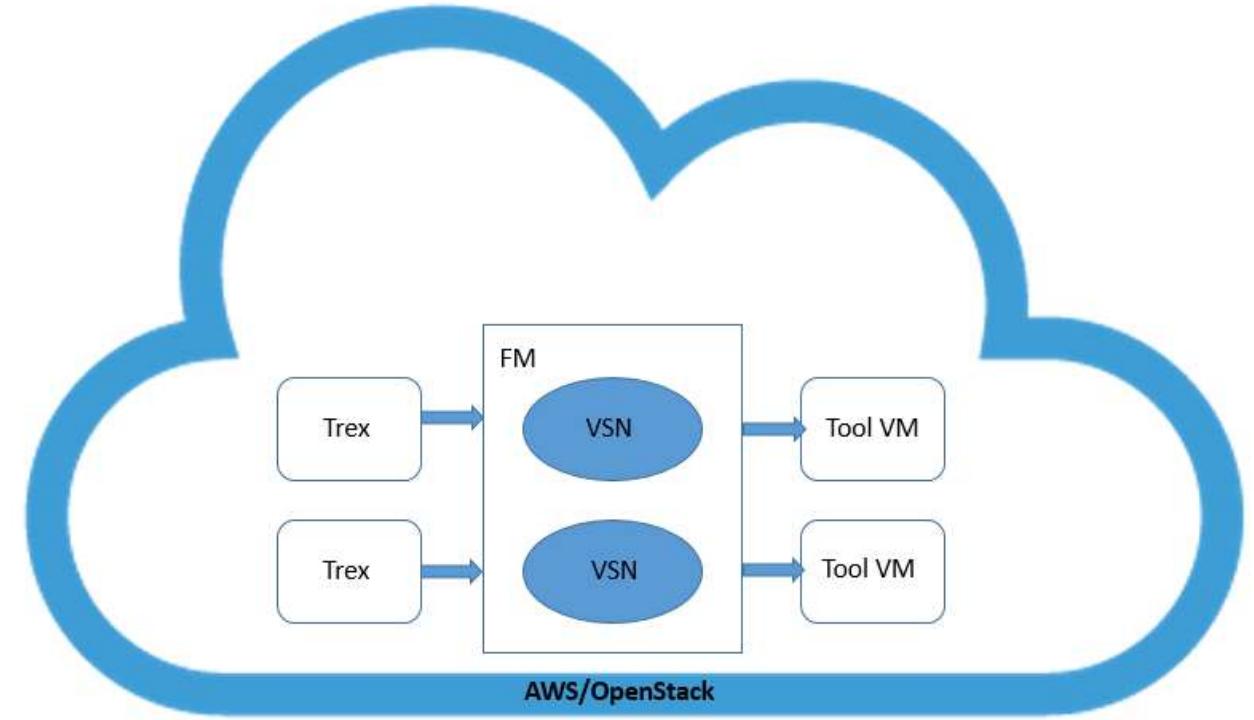
Solution

- Calsoft QA created test-bed setup based on different cloud platforms.
- The environment consisted of OpenStack and AWS instances with virtual/physical traffic generator.
- Calsoft QA created test scenarios and end to end automation scripts.



Technology

- Platform : OpenStack (MicroStack, DevStack, RHOSP) and AWS
- Traffic generator :Trex, vSpirent, Xena
- Language : Python
- Environment bring-up Tool : Terraform



Benefits

- Calsoft helped the vendor create the environment in Cloud, measure and enhance the network performance of their application.

Customer under NDA

Performance Baseline For Edge



Engagement

- Calsoft is engaged with the client for testing various aspects of their Distributed Storage solution for the Edge Platform. The solution was to come up with baselining the performance of the edge system. The aim for setting the benchmark is to test the setup against loads and determine the threshold of the system, these benchmarks being
 - quantifiable
 - repeatable.



Benefits

- Better user experience
- Better competition to other products in the segment
- Adherence to compliance and best practices
- Better visualization represented by the graphs for various customized combinations of the stats captured



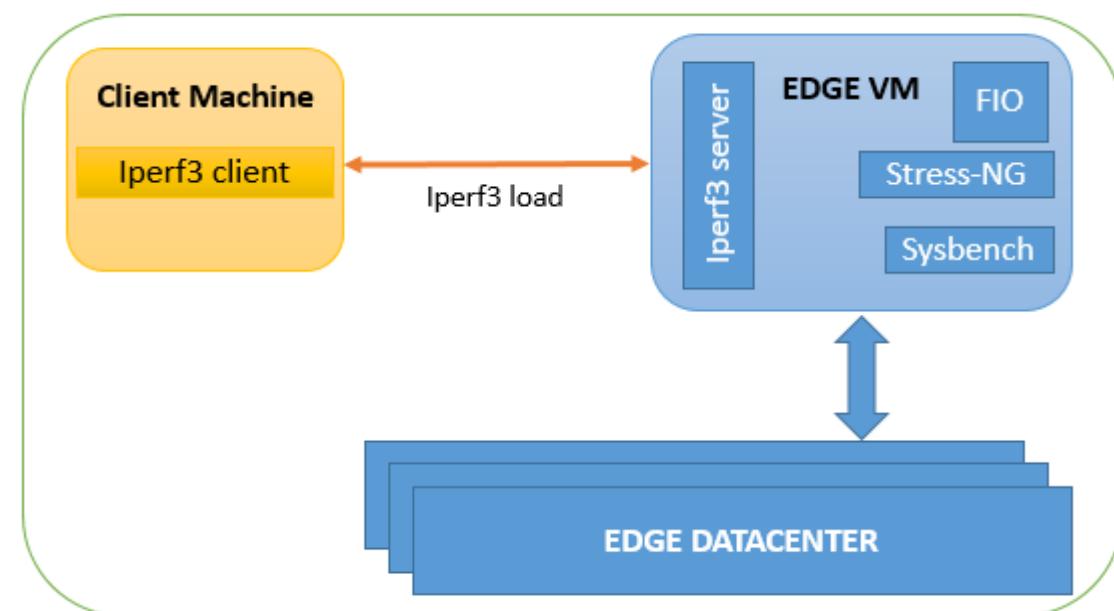
Technology and Tools stack

- Python – Scripts to coordinate with various tools and capture the stats
- Python - matplotlib used extensively for graphs
- FIO [Data IO]
- Iperf3 [Networking]
- Sysbench [Compute]
- Stress-NG [Compute]



Solution

- Calsoft created Scripts to capture the stats from the tools for various combinations
- Storage Baselining
 - FIO -- Capture extensive stats including iostat output for various workloads like seq RW, rand RW etc.
 - Graphs - Considering combinations of io_size, jobs, block size, KB-read/s, KB-write/s etc.
- Network Baselining
 - iperf3 - Capture the stats for various block sizes
 - Graphs – Capture CPU, Throughput
- Compute Baselining
 - Sysbench – Capture Memory and CPU stats
 - Graphs – CPU, memory graphs
 - Stress-NG – Stress Memory and CPU , bogops
 - Graphs – CPU and memory



Performance Testing of Web Application



Engagement

Calsoft was engaged with the client for Web Application Performance testing.

The engagement underpinned:

- Testing the client web application performance using performance tool under different load and stress conditions.
- Automated regular scheduled job to execute the performance test and benchmarking the measured performance.



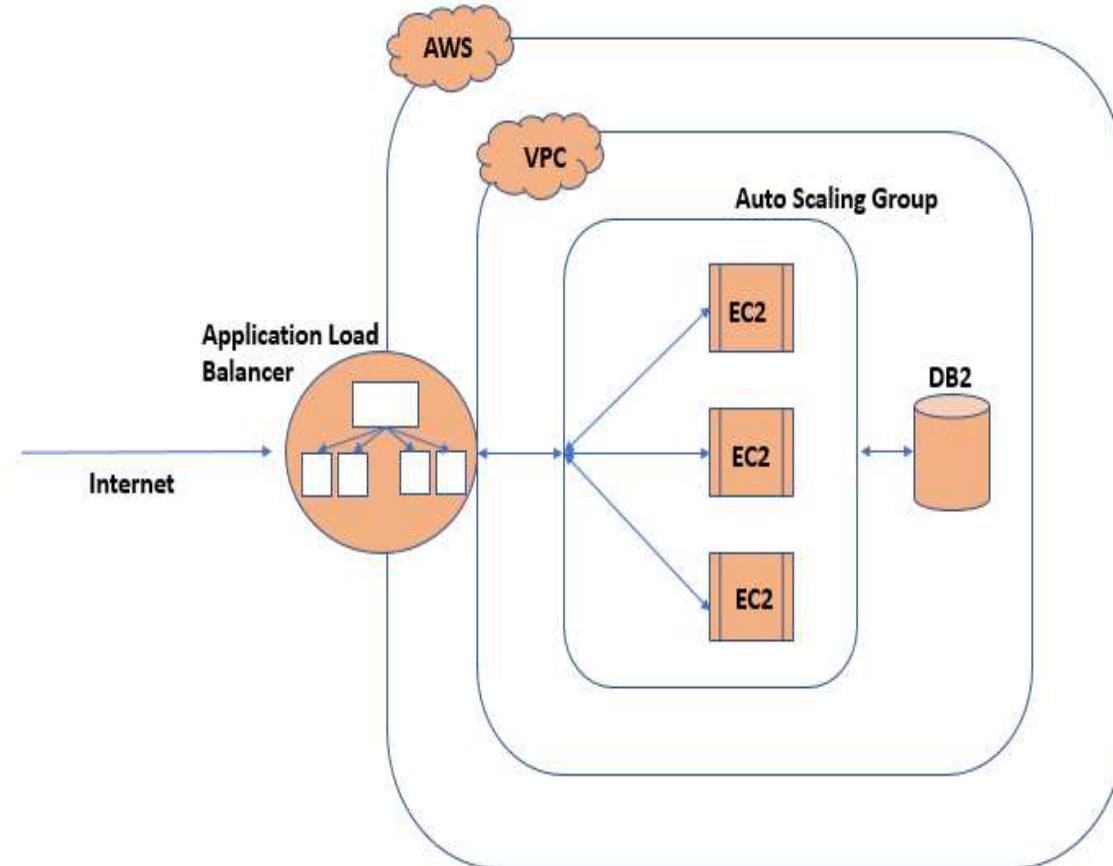
Solution

- Calsoft QA created test-bed setup based under preproduction conditions.
- The environment consisted of EC2 instances, DB2, VPC, ASG, ALB in AWS environment.
- Using default DB optimization tools we measure the performance of a database and help tuning.
- Calsoft QA created automation scripts and added to CI/CD pipeline.
- Graphical Report/Charts is generated to display major trends and issues.



Technology

- Performance Testing Tools: Jmeter
- DB Testing Tools: ADDM
- Network Tools: NetLimiter
- Log Analyser Tool: Splunk
- Language: Java, Python, Jenkins



Benefits

- Calsoft helped the vendor to measure and enhance the performance of Web Application.

Customer under NDA

MicroServices Security platform



Engagement

Calsoft was engaged with the client to develop Microservices security product and application for stress testing the product. The engagement included:

- Development of Istio-like Security product
- Development of microservices application
- Complete feature verification of the customer platform.
- Deploy microservices application and run load, performance & stress tests.



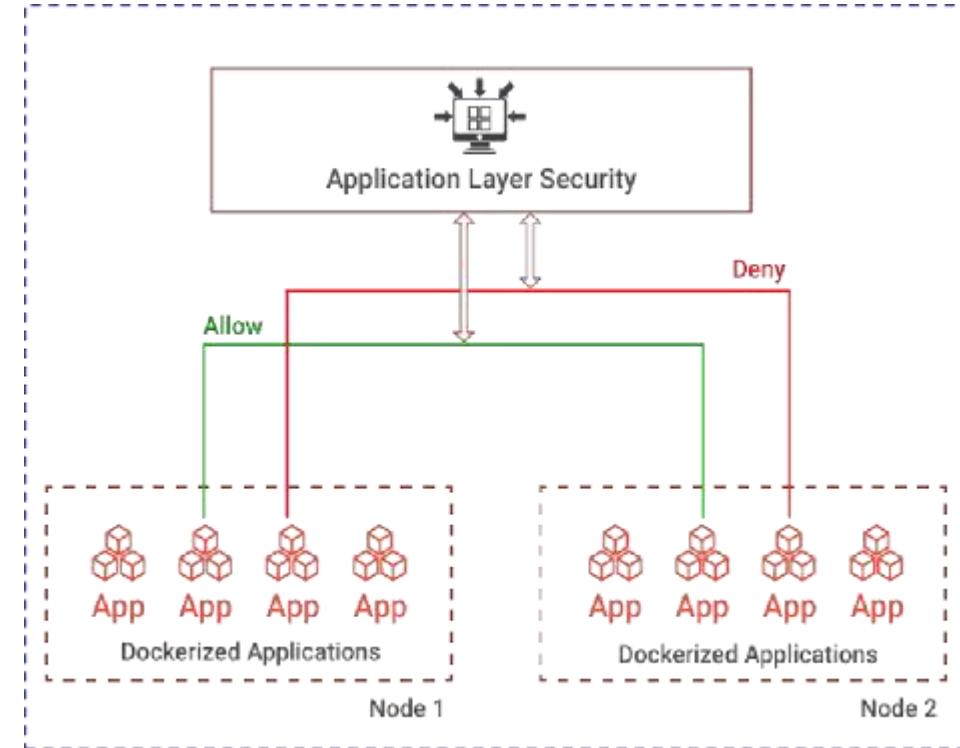
Solution

- Developed the security platform, specifically added application-awareness features for the filtering
- Developed a 3-tier python based microservices application which will be deployed to test customer platform.
- Created a cluster setup using mesos, marathon which will be used to deploy any client server application or microservices based application
- Deployed the cluster in Microsoft Azure cloud platform along with microservices application.
- Automated & executed load and stress tests to make sure client security platform is robust and works as per expectation.



Technology

Docker, Containers, Microservices, GO,python, Azure, mesos, marathon, kafka, cluster framework.



Benefits

- Continuous testing of customer platform during their development cycle helped them.
- Improved security, robustness and scalability.

Performance Testing of VDI infrastructure



Engagement

- Performance testing of VDI infrastructure with and without vendor storage optimization solution.
- Using metrics ascertain the increase in the number of virtual desktops supported with and without vendor's storage optimization solution.



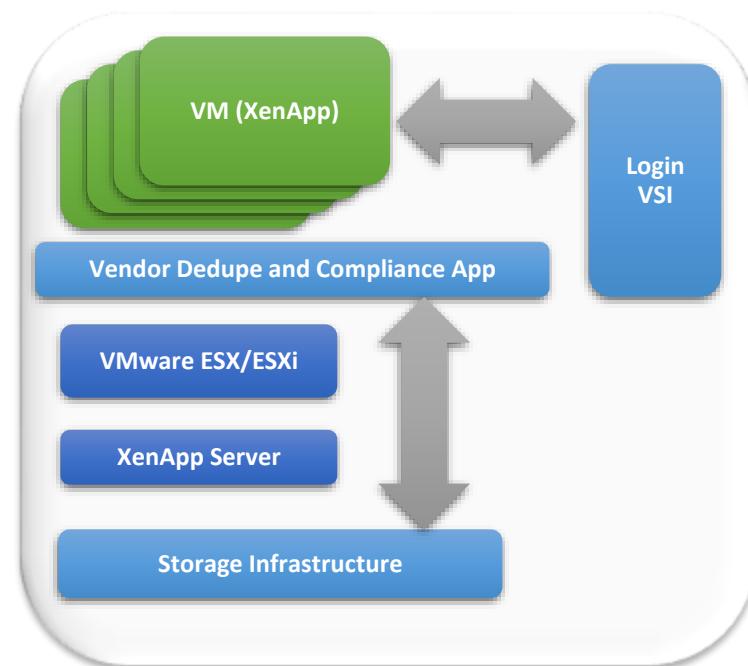
Solution

- Calsoft QA created test-bed setup based on Login VSI test tool for VDI.
- The environment consisted of virtual desktops running on multiple ESX hypervisors. Each VM had a XenApp installed.
- Calsoft QA created test scenarios simulating MS Office workloads using Login VSI and automation scripts.



Technology

- XenApp Server, Login VSI,
- VMware ESX



Benefits

- Calsoft helped the vendor demonstrate the effectiveness of the storage optimization in terms of increased number of virtual desktops supported.

Customer under NDA

Performance Testing of Object Storage Product



Engagement

- Calsoft was engaged with the customer to performance benchmarking of their object storage platform.



Solution

Calsoft helped the customer with augmenting the functional test automation framework with performance validation module:

- Support for variety of S3 workload generation tools; including S3Bench, COSBench.
- Full-scale performance, load, stress, and scale testing capabilities.
- Orchestration module to handle workload across multiple physical or virtual servers.
- Integration with CI/CD platform for continuous performance testing.
- Soak testing to uncover stability, data, and operational correctness issues in “long-running” workflows.



Technology

Python, Avocado, Locust, S3bench, Cosbench, Jenkins, AWS CLI, AWS S3

Automation Framework

Workload Orchestrator Module

S3 Clients

S3 Calls

S3 Compatible Object Storage



Benefits

- Configuration driven test approach helped with testing across various workload patterns.
- Integration with existing automation framework, reduced the management overhead of tools.

Customer under NDA

OVS-DPDK Offload & Performance Benchmarking



Engagement

Calsoft is designing & developing a reference K8S dataplane offloading solution for the customer. The engagement involves core development as well as performance benchmarking at each step.



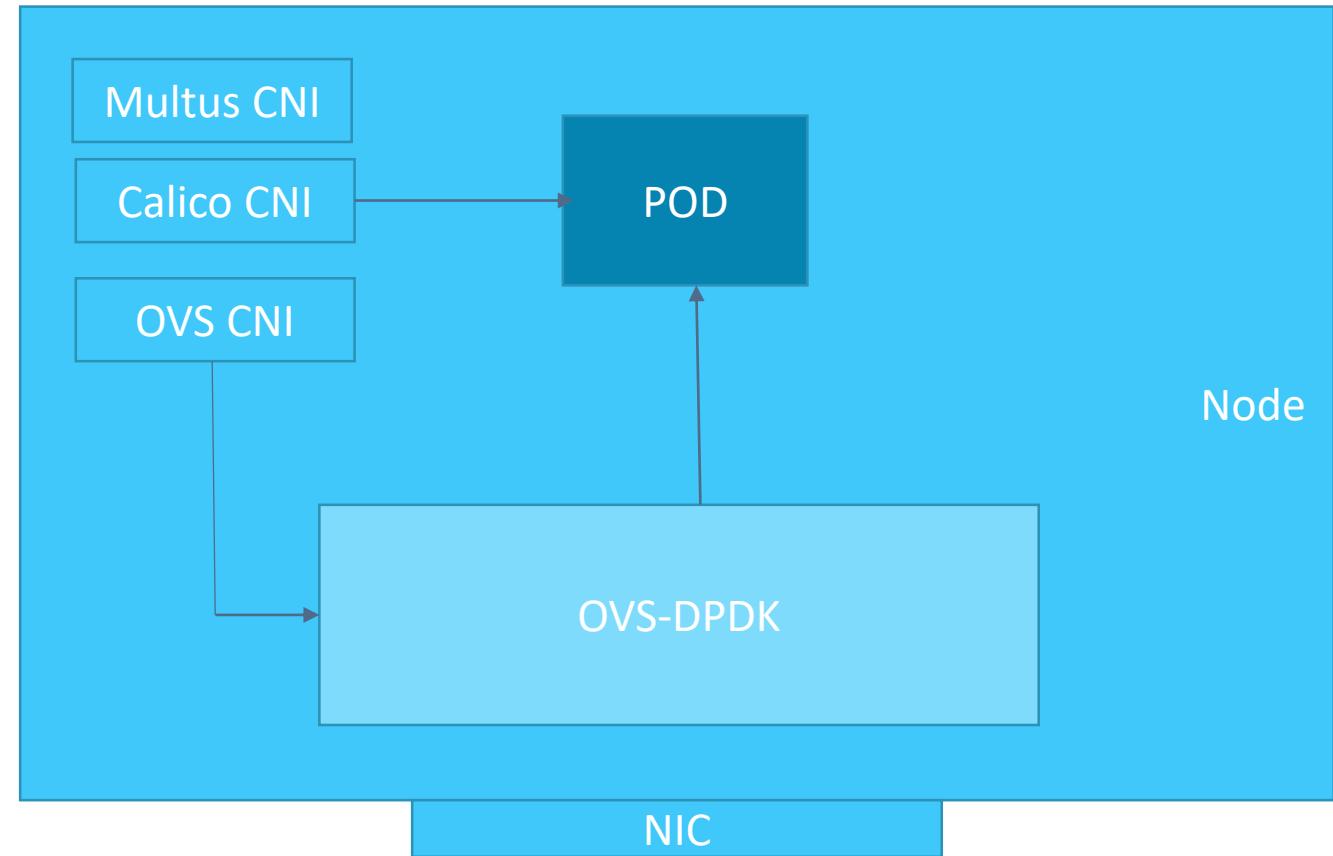
Solution

- Calsoft built a team of data plane engineers to design and develop the solution
- The first step is to deploy K8S with nodes having separate datapath interface via Multus
- The datapath is OVS-DPDK with virtio plumbed into the container
- The performance benchmarking is done using TestPMD with sample DPDK forwarder POD
- The OVS-DPDK is now being migrated to the NIC for performance enhancement



Technology

Kubernetes, OVS-DPDK, Golang, Multus, Calico, etc.



Benefits

- The solution will help improve the Kubernetes performance and enable CNF development
- Customer benefitted with Calsoft's deep Networking and Kubernetes expertise



Engagement

- Calsoft is engaged with a client for deployment of cloudera platform, zaloni data lake and cardinality analytics on top of customer NFVi layer.
- The engagement includes:
- Deploying NFV infrastructure and validating customer use cases on top of the infrastructure.
- Testing, validation of use cases and benchmarking the performance numbers to create the report.



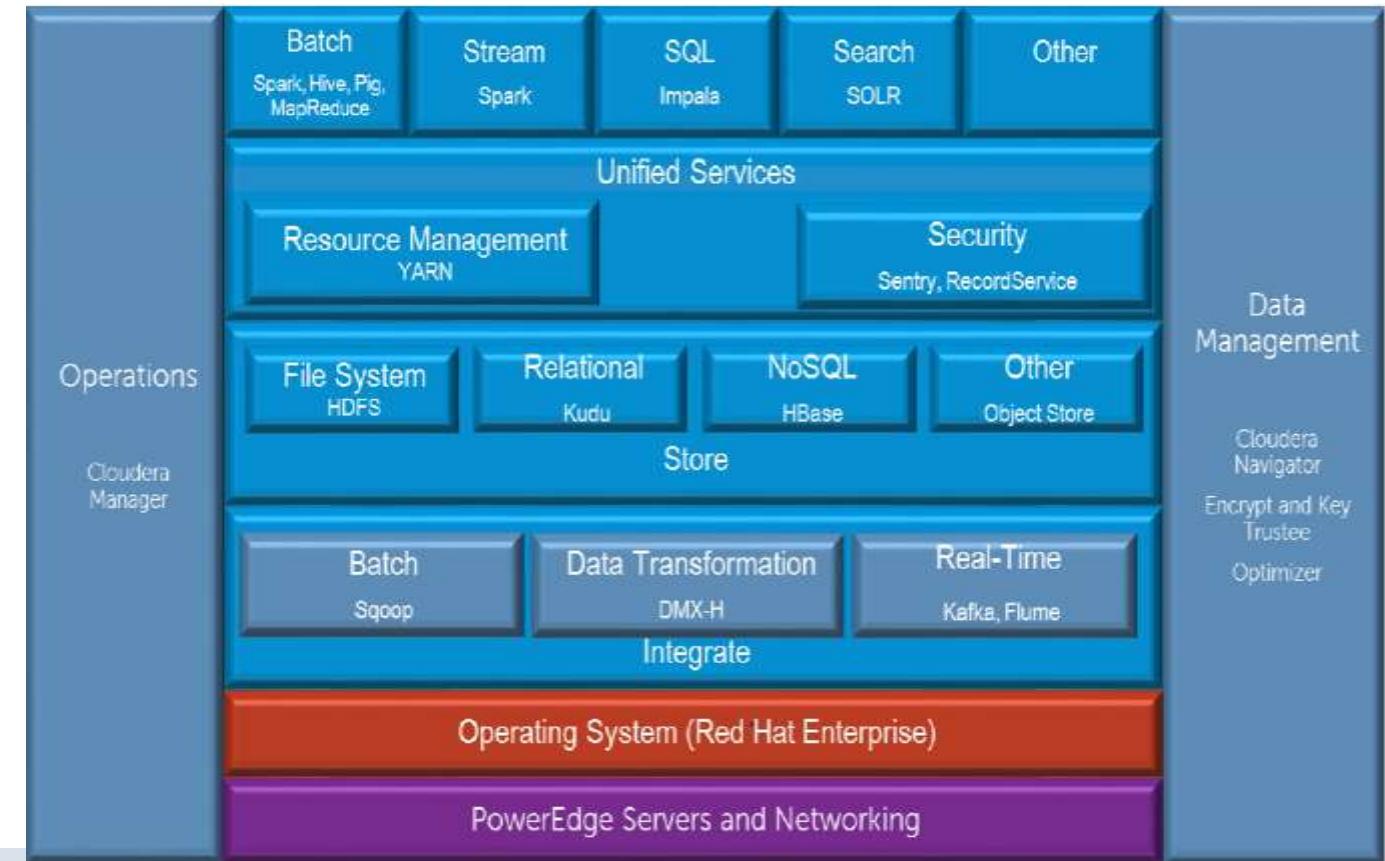
Solution

- Deployed cloudera CDH platform which includes key components like spark, hive, hadoop, yarn, kafka etc .
- Deployed data lake from Zaloni on top of the cloudera infrastructure and applied analytics from cardinality.
- The platform supports batch, stream data processing, SQL query, data searching and scalable data lake.
- Created telecom use cases specific tests based on cardinality analytics features. These use cases include improving customer experience, network utilization, creating incentives for subscribers, optimizing network usage.
- Validation of the use cases and performance benchmarking is in progress.



Technology

- TDA, Zaloni, Cardinality, Cloudera Manager,
- Kafka, Kudu, hadoop, HDFS, spark, hive, Yarn



Benefits

- Verified analytics, based sample use cases in big data deployment.
- Created a platform for optimizing and improving the telecom network.

Storage Performance For vCloud Air



Engagement

Calsoft was engaged with the client to run performance benchmarking against different storage profiles made available in vCloud Air

- Tiered Storage
- All-flash Storage
- Bulk storage with Write-back caching



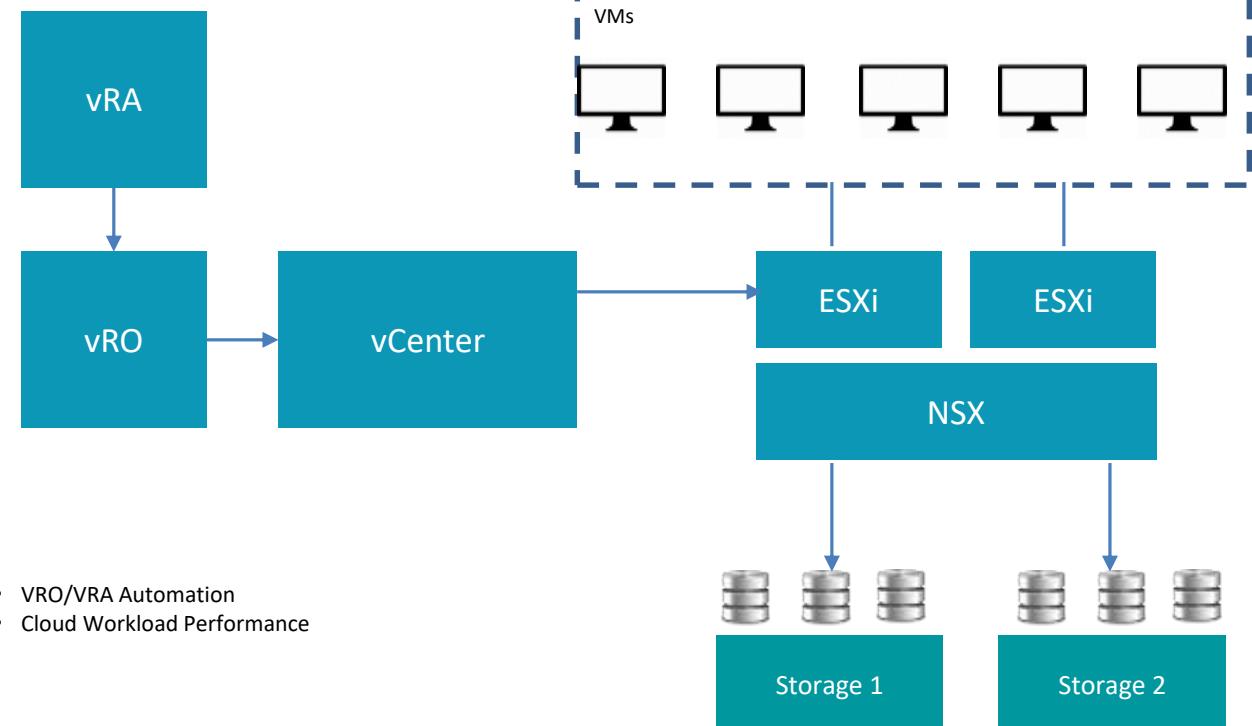
Solution

- Calsoft came up with the strategy, workload & test plan to run the performance benchmarking
- Following workloads were created & tested against
 - File Server
 - SQL
 - Exchange
- Multiple test runs were done with tuning and performance fixes for the final reporting
- Reports were converted to whitepapers and submitted to customer with detailed observations
- Calsoft also delivered the requisite automation (vRO/vRA) for storage integration



Technology

Dell Compellant, ESXi, vCenter, FIO, SQLBench, JetStress, etc.



Benefits

- Independent performance benchmarking delivered
- Calsoft team worked without needing any guidance from the customer team
- Some critical issues were found & reported which helped customer improve the product (e.g. performance hit due to snapshot process, etc.)

Storage Controller Testing for MS Office Workload Characterization



Engagement

Calsoft was engaged with the client for storage controller testing. The engagement underpinned:

- Testing the storage performance using simulation workloads within a short span of time
- Dealing with lack of in-house automation testing expertise



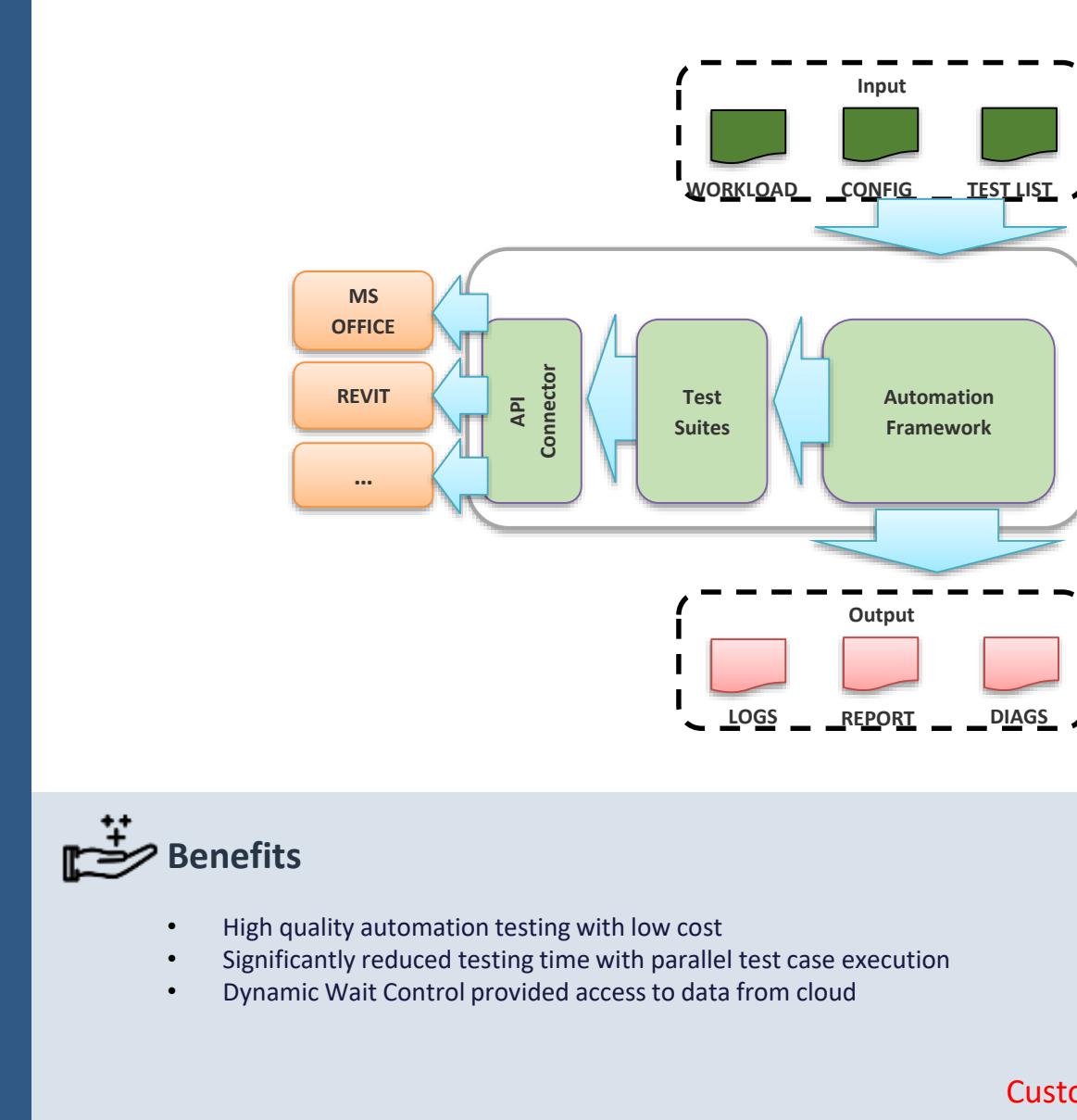
Solution

- Created a test framework and test cases for MS Office, REVIT and integrated the same with the nightly build and smoke infrastructure which aid in development, quick testing, & identifying regression issues, etc.
- Developed an Automation Test Suite which leverages MS Application Programmatic Interfaces (APIs) and triggers them with various use cases such as conflicting read/writes, opens, deletions etc.



Technology

- Platform: Windows
- Language: C# .NET
- Application Specific COM APIs, Win32 APIs



Benefits

- High quality automation testing with low cost
- Significantly reduced testing time with parallel test case execution
- Dynamic Wait Control provided access to data from cloud

Customer under NDA

Performance Testing of SMB Storage Platform



Engagement

- Calsoft was engaged with the customer to performance benchmarking of their SMB storage platform.



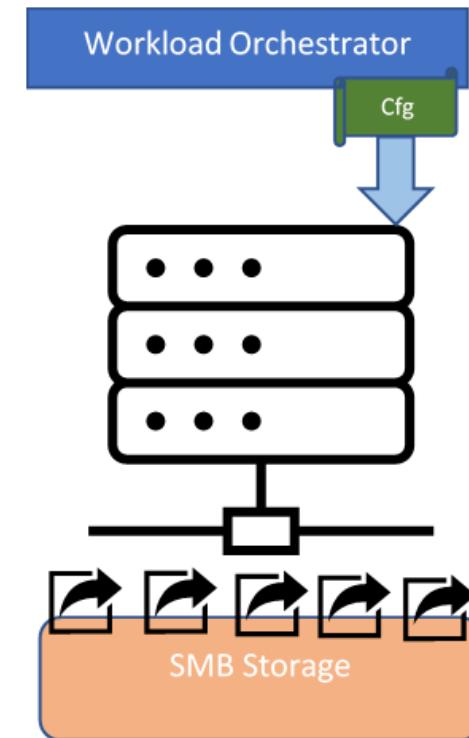
Solution

Calsoft helped the customer developing performance test automation framework:

- Uses open sourced PySMB library to generate client-side SMB requests.
- Configuration driven test execution, which maintains changes at central place.
- Test environment consisted of ADS deployments for authentication/authorization.
- Metrics such as Throughput, R/W rate, IOPs, Latency etc. were captured along with system resource utilization to measure the performance.



Python, PySMB, ADS, Linux



Benefits

- Configuration driven test approach helped with testing across various workload patterns.
- Integration with existing automation framework, reduced the management overhead of tools.

Customer under NDA

Scale & Performance Validation of Enterprise Object Store



Engagement

Perform Scale and Responsiveness testing of the enterprise object storage platform.



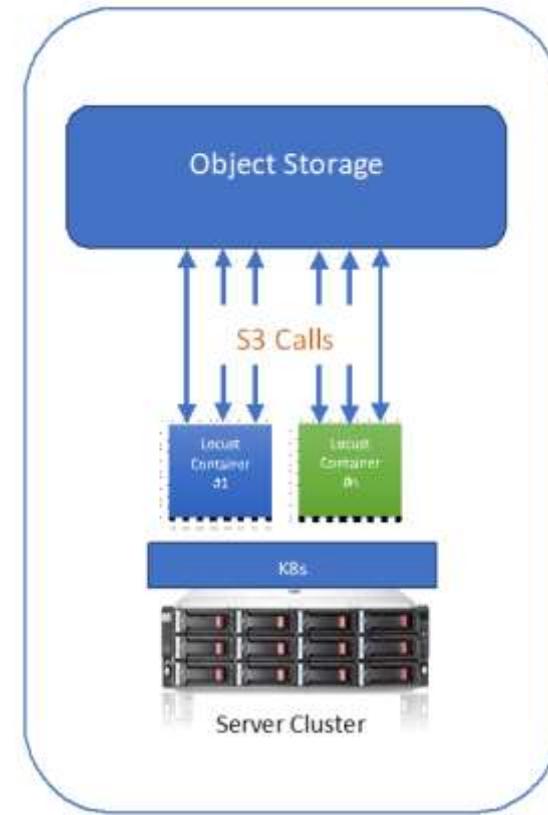
Solution

- To achieve the required scale, yet keeping the hardware cost minimal, the framework developed using container technology.
- Kubernetes is used as a container orchestration tool, which helped seamless scale-up and scale-down of the containers based on workload requirements.
- Use of proven open-sourced technologies cut the framework cost significantly which otherwise would be required for commercial tools.



Technology

Python, Behave, Unix, Jenkins, Docker, Kubernetes, Locust



Benefits

Developed a performance test framework which is based on Microservices architecture. The framework is integrated with the BDT based functional test framework for better orchestration and reporting. Features

- Integration with “Jenkins” for CI-CD-CT.
- Integrated Orchestration module to validate product scalability in terms of bucket, objects and connections.

Customer under NDA

Development and QA for object storage

Scaled solution to combine multiple object storage appliances



Engagement

Calsoft was engaged with a leading storage company in providing development and manual and automation QA for their object storage.



Technology

- Python, Avocado, Locust, S3bench, Cosbench
- Jenkins, AWS Node JS + Express JS Web-Sockets (Push Alerts), Python
- Java, C/C++, Corosync Pacemaker Database, ElasticSearch



Solution

- The engagement underpinned:

Development:

- Development of a monitoring tool
- Development of a manageability tool
- Development of S3-compatible operations

QA:

- End-to-end functional testing
- System testing
- Performance testing
- Load testing for on-premises object storage
- Automation of test workflows and CI/CD pipeline for continuous testing



Benefits

- Easy management of object storage appliance
- Scaled solution to combine multiple object storage appliances
- Standard, efficient, secure way of movement of data
- Better automation coverage helped in continuous testing
- Manual workflow validation helped in effective and optimized automation efforts
- Methods such as all-pair and orthogonal testing were implemented to achieve best possible coverage

CP Headless Testing and Platform First Testing



Engagement

- Commerce Platform API testing was dependent upon Client UI like Dell Sales Application (offline flow), Dell.com, Premier plus.
- There was no integration in testing of the whole CP flow (from rendering products to order placement).
- Products teams within CP were not collaborating for testing.



Benefits

- End to end fully automated validations.
- Reduced Platform's war room participation drastically.
- 100% of product teams at Commerce Platform follow Test Before Dev with an average 80% maturity.
- 90% reduction in Commerce Platform related code defects.
- Instrumental in decoupling Commerce Platform from block releases.
- Key North Star programs like GOP, SVP, OMOD & Convergence have been included in Headless Test suite with regression test coverage greater than 80%.



Technology

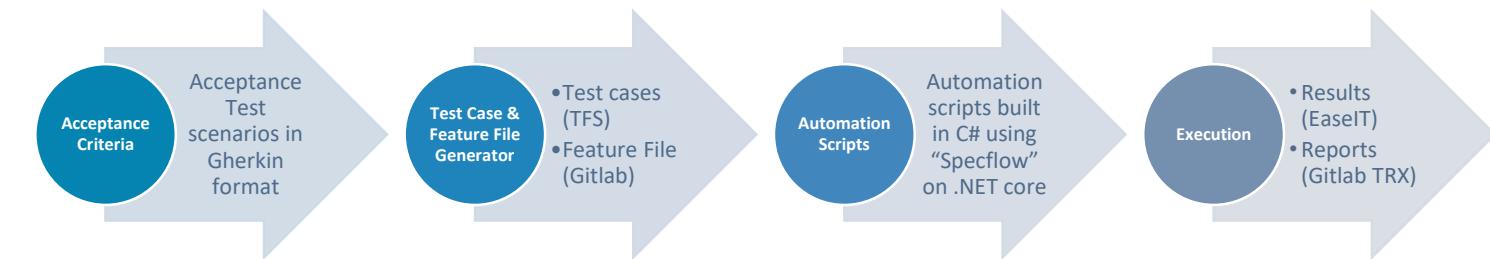
- Testing Suite : C#, ASP .NET Core app, Specflow, Swagger APIs,
- Front End Dev : Angular, Angular Material , HTML, CSS, JS, Bootstrap
- DevOps: Gitlab CI/CD
- Other Tools: Microsoft TFS, Confluence, MS Excel, ConfigService Test Client, etc



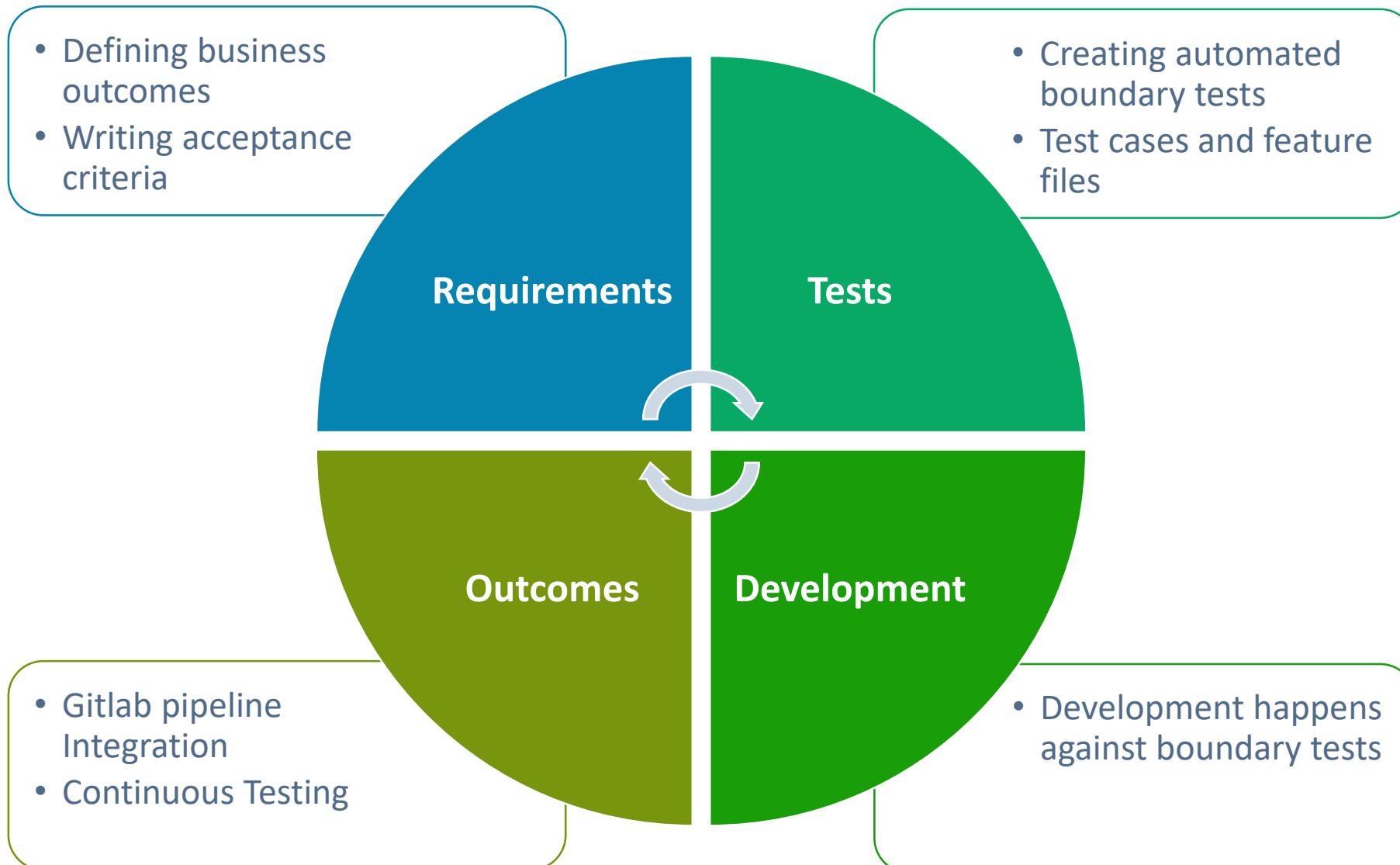
Solution

- Headless Testing automated Commerce Platform API testing in a completely Headless Fashion.
- It validates the changes in Commerce Platform APIs without depending on the clients.
- Testing pipeline is integrated in Gitlab.
- Tests are integrated with Development pipeline too (pipeline triggers when prod teams deploy changes).
- Drives 'Test Before Dev' initiative across CP while monitoring the adoption of it via Maturity Assessment tool.
- Maintenance of Headless Testing Suite includes:
 - Creating Test Cases for new countries being onboarded to a new flow (in downstream apps) in Commerce Platform.
 - Creating Test Cases for new types of products and uncovered scenarios in Headless Test Suite, data setup on database.
 - Gitlab Pipeline failures analysis, debugging defect, fixing data related defects in the code and database.
 - Documentation on per pipeline run basis and on confluence.
- Developing a UI for Event Based Testing -> which is the part of the future project -> Platform First Testing

Headless testing Process Overview



Development Cycle across Product Teams in Commerce Platform





Engagement

- Calsoft is engaged with compute SW CoE Testing and Automation
- OS Certification scope involves test bed setup and kit-based manual test execution configuring the Test bed setup with CPU, memory, storage and network cards, PSU, HDD etc.
- The OS certification process involves rigorous testing and validation of the operating system on HPE server platforms
- Testing is performed leveraging the tools provided by OS vendors to conduct various tests and assessments during the OS certification process.



Benefits

- OS certification with HPE ensures that the operating system is fully compatible with HPE server hardware, firmware, and management tools.
- Ensures that the combination of the operating system and server hardware functions reliably, minimizing system crashes, errors, and downtime.



Technology

- Operating Systems (VMware, Windows, RHEL, SLES and Ubuntu) and
- Systems domain knowledge (Servers, Storage and Networking)
- OS Certifications (HLK, VMware VIVA/workbench, rhcert, SUSE Yes Cert kit, Ubuntu Cert kit)
- Automation scripts using Python, PowerShell, Selenium and Ansible, Jenkins that supports CI/CD and Framework design (BDD or Robogalaxy or similar)
- Spira, ALM, Jira, bluebird, Github



Solution

- Calsoft team collaborates with HPE team to understand the plan and configuration required for each certification.
- Establish a dedicated test environment with HPE server hardware and necessary networking infrastructure. Install and configure the base operating system on the test servers.
- Verify that the OS can be successfully installed, recognized, and function properly on HPE servers.
- Assess the performance of the operating system on HPE servers under different workloads and network conditions.
- Generate logs and send them to the HPE team for review and approval
- Engage in collaboration and communication with HPE team to address any identified issues and retest as and when required.
- Once the operating system meets all the certification criteria and passes all the required tests, the WU is marked as done in Jira.



Mellanox, Broadcom, Marvel

SPOT- QA Engagement



Engagement

The aim of QA team is to deliver quality SPOT product, in an agile way.



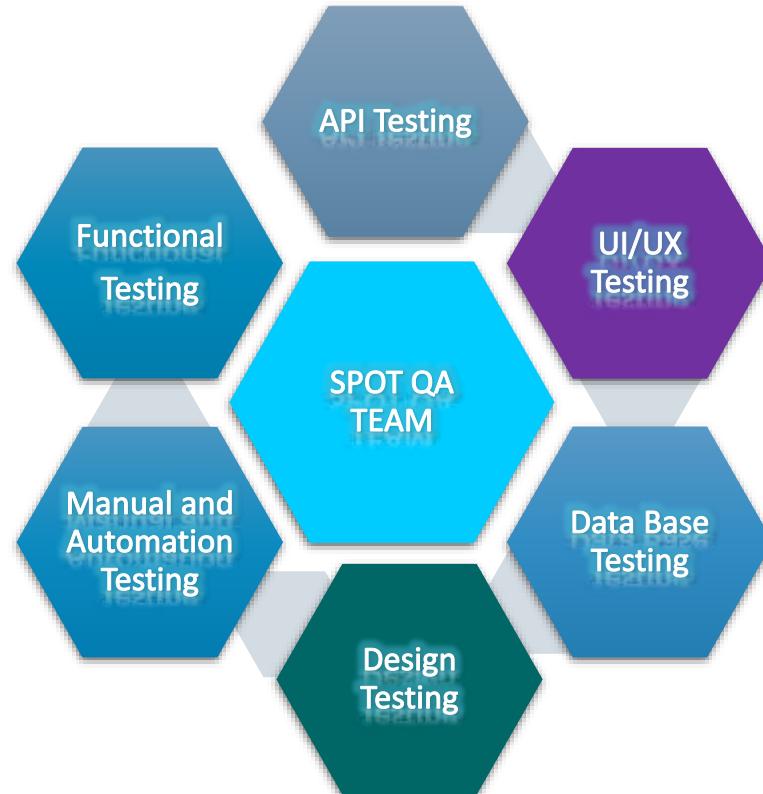
Solution

1. We are involved in end to end testing of new features (User Stories)
2. Support to external stake holders for better usability of the product
3. Monitoring job failures for different catalogs.
4. Validation of Regression test cases (Pre and Post Prod deployment)
5. Alternate day, execute Smoke Suite.
6. Automated all the Smoke test cases.



Technology

- AI/ML
- Dot Net
- Gitlab for code management
- Microsoft SQL server
- Postgress



Benefits

1. We have filed ~900 defects which helped to bring better quality.
2. We have written ~450 test cases.
3. We are testing a critical feature Client Peripheral which add value to SPOT application.
4. Automated test cases reduced manual execution efforts.
5. User raised issues are less in number.
6. Creating documentation for complex features.
7. Understanding calculation brought up defects at early stage of the feature implementation



Success Stories: Security



End-point Security Agent for Solaris and AIX



Engagement

Calsoft is engaged with the client for development of End-point security agent on Solaris and AIX.

- End-point Agent is a lightweight software agent that is installed in the OS of any server, VM or container.
- It collects telemetry and programs the native stateful firewall in the host (iptables, ipfilters, windows filtering platform)



Benefits

- Calsoft is working on the complete solution for product development of End-point agent for Solaris and AIX.
- Available expertise around the OS platforms & the native firewall stack, helped the customer in time-to-market



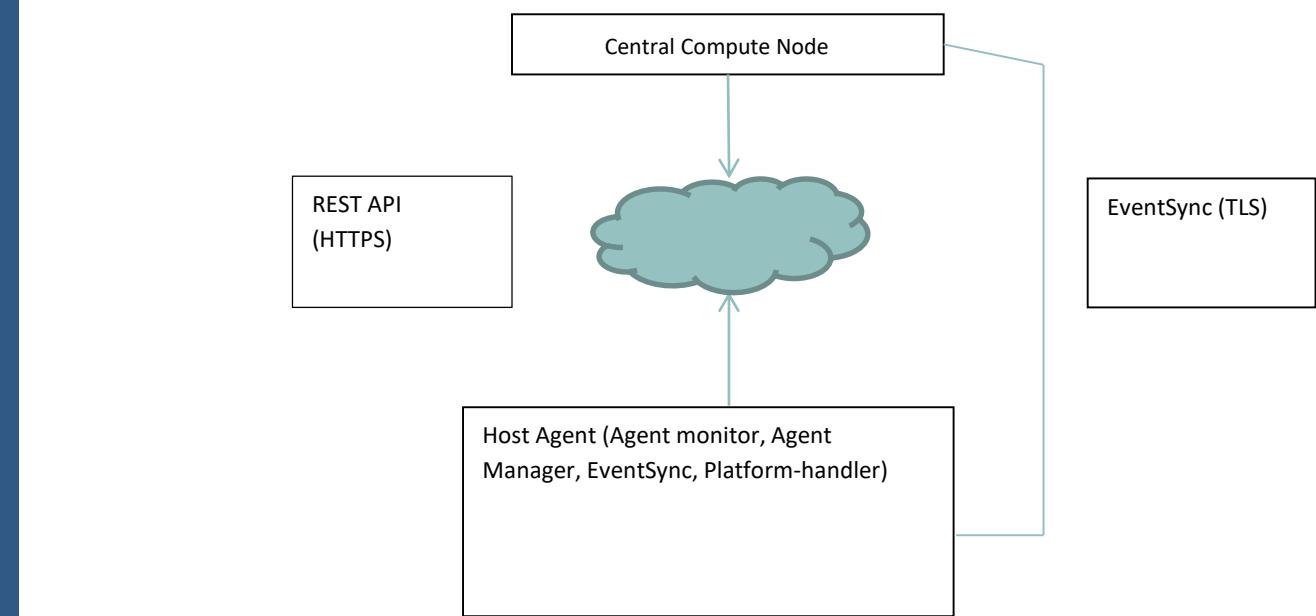
Technology

- C++, Shell Script, Solaris 11.2 and AIX 6.1,7.1
- Tools : Git, stash, Jira, Iperf, Ostinato, TcpDump, Ipfilter, AIX/Solaris native compilers



Solution

- End-point agent is developed in C++ to communicate with central Policy Compute Engine, receives firewall policy in JSON format using REST APIs, translates it into native firewall rules (ipfilters) and applies them.
- It supports actor-only mode, where only the ippool's content is changed.
- Atomicity of firewall rules is ensured while changing firewall policy and in actor-only mode.
- Test environment created to capture latency, throughput and loading time of ipfilter rules using End-point Agent.



Malicious traffic generator for Snort IPS



Engagement

Calsoft was engaged with a client to develop components for their gateway product targeted for small office/home usage (SOHO). As part of validating the Intrusion Prevention System (IPS), a malicious traffic generator was developed.



Benefits

- The testing and validation of IPS was successfully done through malicious traffic generator.



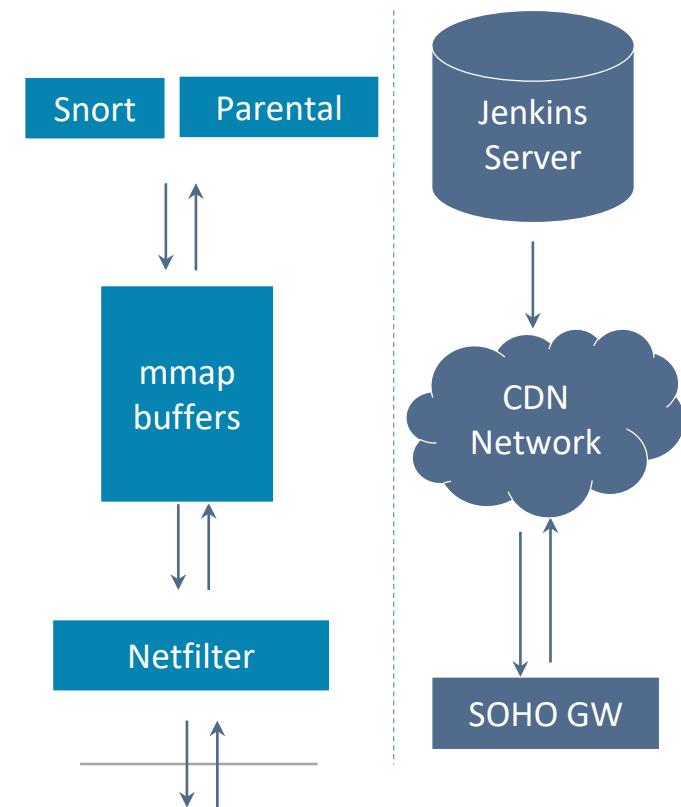
Technology

- C++, Networking, Netfilter, IPS, SNORT, Linux



Solution

- As part of development engagement for a SOHO gateway product, Calsoft integrated an open source IPS, snort, in the product.
- The basic testing of IPS was done using simple rules of static nature, based on protocols like TCP, UDP, ICMP, specific IP addresses and combination of 5 tuples.
- For advanced testing, a malicious traffic generator tool was developed, to generate traffic based on signatures used by snort.
- The tool used signature id as input, and based on structure of the signature, it crafted network packets using raw sockets.
- The tool was versatile to generate malicious traffic of 3000+ signatures and incorporated numerous options of snort rule set like content, depth, offset, within and several http based options.



Development of SOHO gateway



Engagement

Calsoft was engaged with a client to develop components for their gateway product targeted for small office/home usage (SOHO). Calsoft developed their firmware upgrade module, parental control module & ported intrusion prevention system.



Benefits

- The client was able to showcase the firmware upgrade feature as a one-of-a-kind feature for that segment. Development of all modules were done on time and with desired quality.



Technology

- C++, Networking, Netfilter, IPS, SNORT, Angular JS, HTML, CSS, Linux, Jenkins



Solution

1. Firmware Upgrade

- The firmware upgrade module was developed to support the requirement of pushing firmware upgrade 'over-the-air'.
- The mechanism involved developing a framework for backup & restore of configuration and a failsafe mechanism to upgrade firmware. A platform to deliver upgrade package was developed using Jenkins, to facilitate development as well as act as package delivery server.

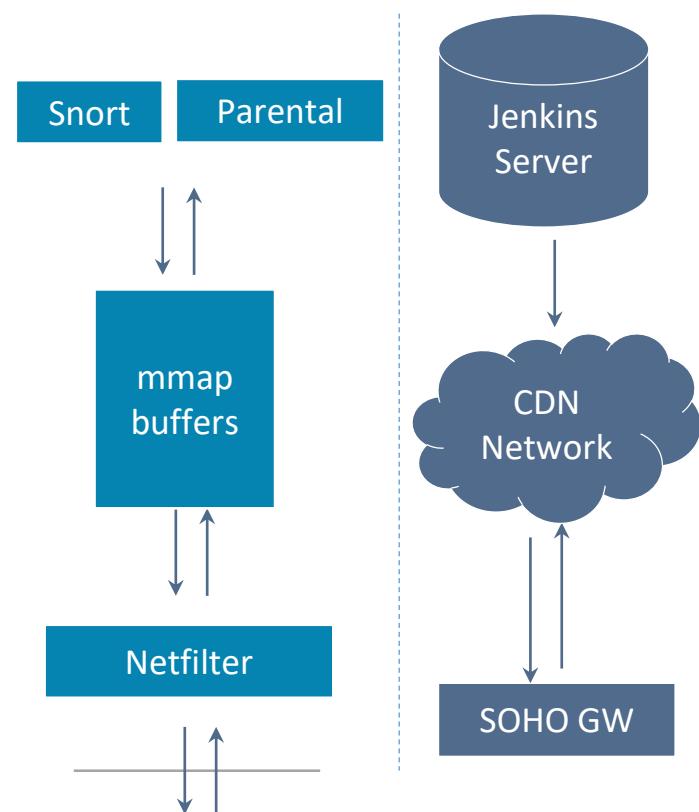
2. Parental control

- An ACL engine was developed to validate requests based on time, type and destination of request. Netfilter hooks were used to trap the requests and packets were allowed/dropped, based on configurations

3. Intrusion prevention system (IPS) .

- SNORT was ported on the gateway and was integrated with netfilter hooks & packet handling library. A mechanism to fetch signature updates was developed.

All modules also involved development of multilingual responsive UI in the product, as well as portal for end-customer to get upgrade packages.



Development of Central Security Engine



Engagement

Calsoft was engaged with the client as their engineering development partner. The engagement underpinned

- Developing end-to-end on-prem Central Security Engine to manage the large scale Anti-virus agents in the network
- This involved developing Microservices based design, implementation and validation



Benefits

- Played key role in designing the product for high scalability
- Provided flexible test structure to achieve all milestones in-time



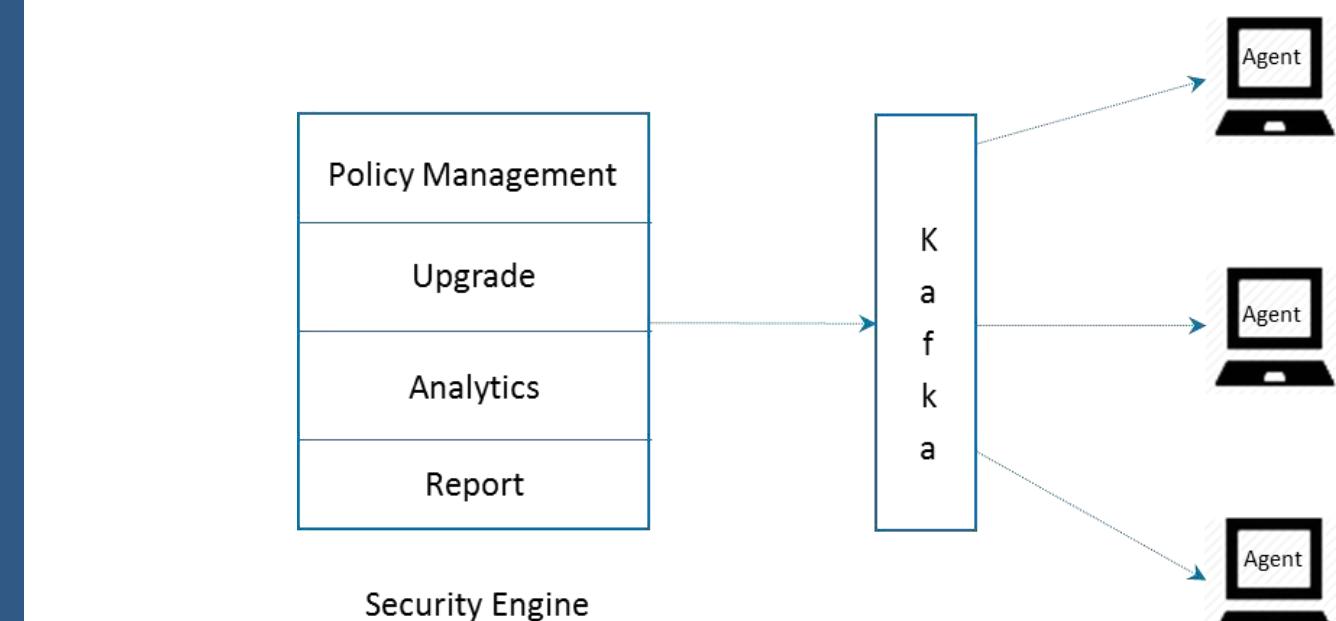
Technology

- JAVA, Angular, Kafka, Python



Solution

- Developed Microservices based solution to implement various platform features like Policy Engine, Configuration module, Upgrade module, Reporting Module and Analytics Module.
- Developed the Kafka based communication channel for Central Engine to communicate with thousands of remote agents
- Implemented the product with CI/CD pipelines and followed Agile based methodologies
- Developed Test Plan and Test Automation
- Performance and Scale Testing to support 25000 nodes



Development of Cloud-based SDP Product



Engagement

Calsoft was engaged with the client as their engineering development partner. The engagement underpinned

- Developing end-to-end on-prem Central Security Engine to manage the large scale Anti-virus agents in the network
- This involved developing Microservices based design, implementation and validation



Benefits

- Designed and developed features independently
- Identified performance and scalability issues in the existing design and help refining it



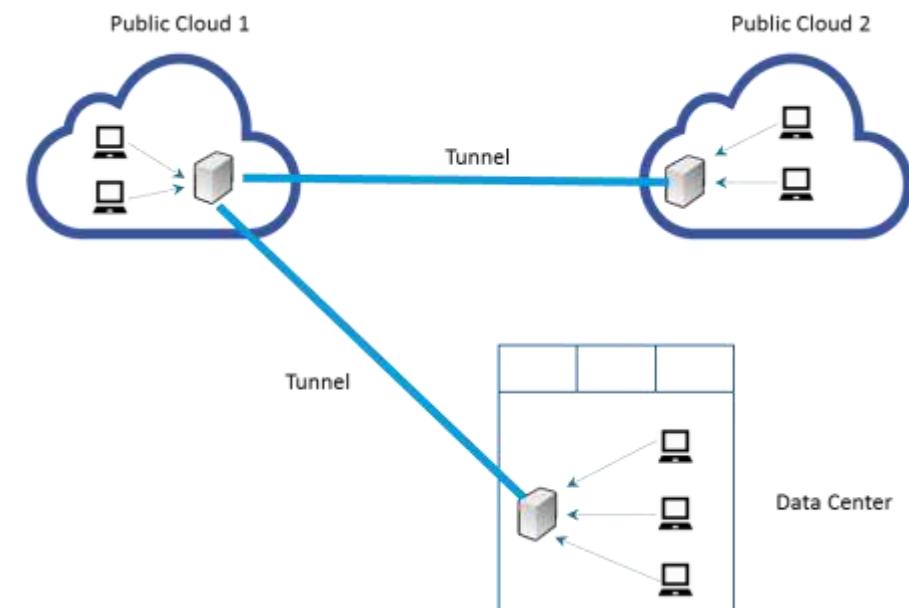
Technology

- JAVA, Angular, Kafka, Python



Solution

- Developed features in the SDP product to create secure tunnels between SDP Gateways
- Developed features related to multi-tenancy, User Interface, etc.
- Implemented Cloud enablement for ease of onboarding new customers
- Implemented the product with CI/CD pipelines and followed Agile based methodologies
- Developed Test Plan and Test Automation





Engagement

The client's product secures access through gateway security products for access from any source. Calsoft is engaged with the client for providing a solution to integrate its product on AWS for customer onboarding.



Benefits

- Client's product was integrated in AWS ecosystem, which increased the scope of product penetration



Technology

- AWS, Firewalls, Gateway, VPC, JAVA, REST, Angular, CSS



Solution

- Created a portal to incorporate AWS credentials of client's end customer
- Client's admin grants access to new customer
- Customer can now use client's product in its Virtual Private Cloud and configure gateway for secure access
- Developed new User Interface for customer onboarding
- Added backend module in Java to expand the feature of AWS
- Manual QA for developed solution

Step 1

New customer visits the Customer Onboarding Portal and fills-in a simple form with name, email ID, password, etc.



Step 2

Cloud Admin onboard the customer with existing internal portal and create customer specific portal.



Step 3

Customer admit logs-in to the Customer Portal and keys-in AWS account details apart from other tasks



Step 4

Admin can now see all VPCs and facility to select a VPC and deploy or delete InstaSafe GW at a click of a button

Development And Testing of Network Forensics Software



Engagement

Calsoft was engaged with the client for developing and testing network forensics software. The engagement underpinned:

- Scaling of skilled engineering resources primarily in
 - Low level systems programming
 - Networking domain
- Dealing with lack of testing resources and automation of test scenarios in the network forensic area



Benefits

- Improved Performance with enhanced product features
- Client was able to achieve faster time to market



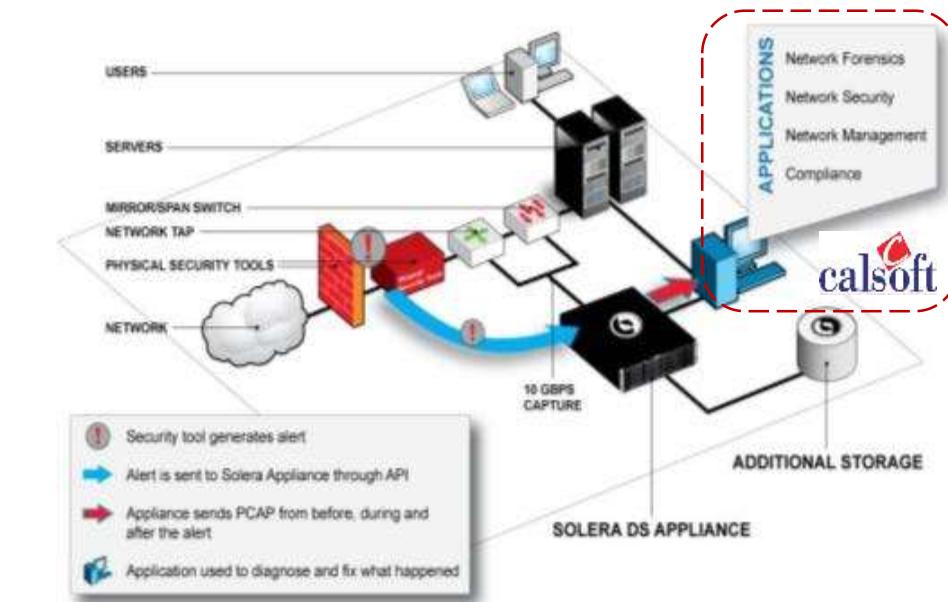
Technology

- Domains: Networking, File Systems, Storage
- OS: Optimized Linux OS (Red Hat)



Solution

- Setup a **ODC team of 30+** skilled networking engineers
- Development and testing of network forensics software
- Software Feature enhancements –
 - Folder-based filtering
 - Generic PCAP related features
 - BHO based browser plug-ins
- Implemented automation of test scenarios
 - Fixed quality related issues



Containerized Application Code Security



Engagement

With evolution of cloud native application deployment into containers, security of complete software stack running inside container has become tremendously important.

- Calsoft is engaged with a client to perform analysis and scanning of containerized application software for vulnerability assessment and security checks at source code level.



Benefits

- Vulnerability assessment and scanning helped the client to perform security audit of the containerized apps.
- Scanned images were deployed in all the client projects involving the container technology.



Technology

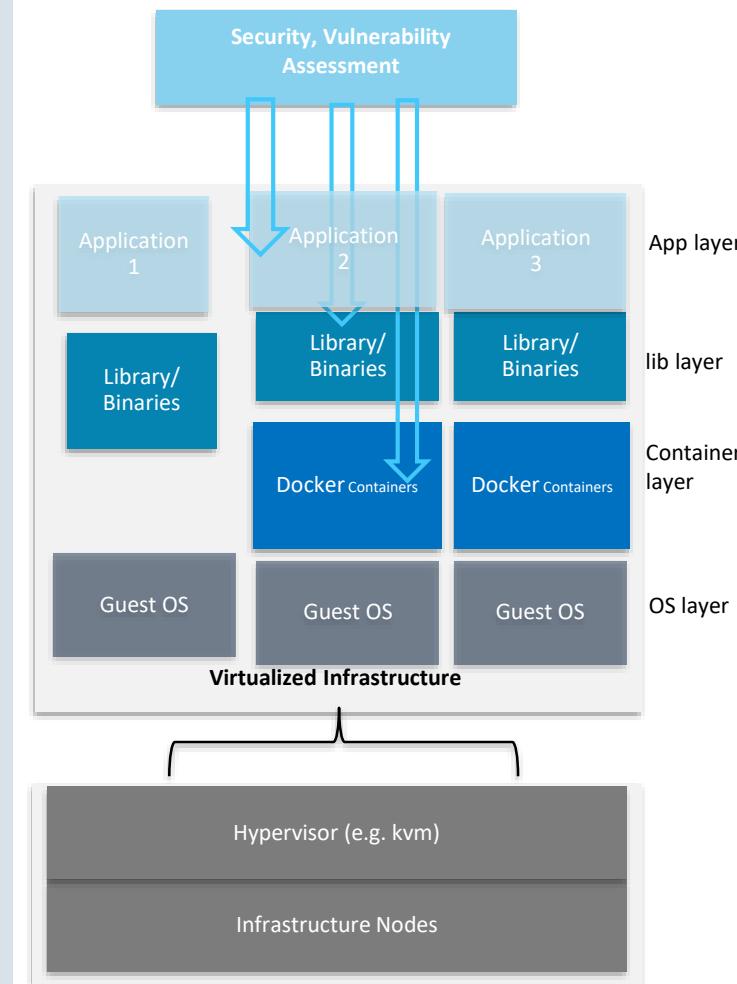
- Docker, Containers, DTR, Aqua microscanner, C, make, patch



Solution

Calsoft is helping customer to provide following aspects of the solution.

- Analyze the code for the reported issues till the code level and see if the issue can be resolved without affecting the business logic of the code
- Check if the reported issue is a false-positive or not.
- For third party library issues, check if there are updated version of the libraries which provide the fixes for the reported issue. Verify the same with updated library version
- Support docker image scanning using tools like docker trusted registry.



Test tools for MicroServices Security platform



Engagement

Calsoft was engaged with the client to develop microservices application for stress testing their Security platform. The engagement included:

- Development of microservices application
- Complete feature verification of the customer platform.
- Deploy microservices application and run load, stress tests.



Benefits

- Continuous testing of customer platform during their development cycle helped them.
- Improved security, robustness and scalability.



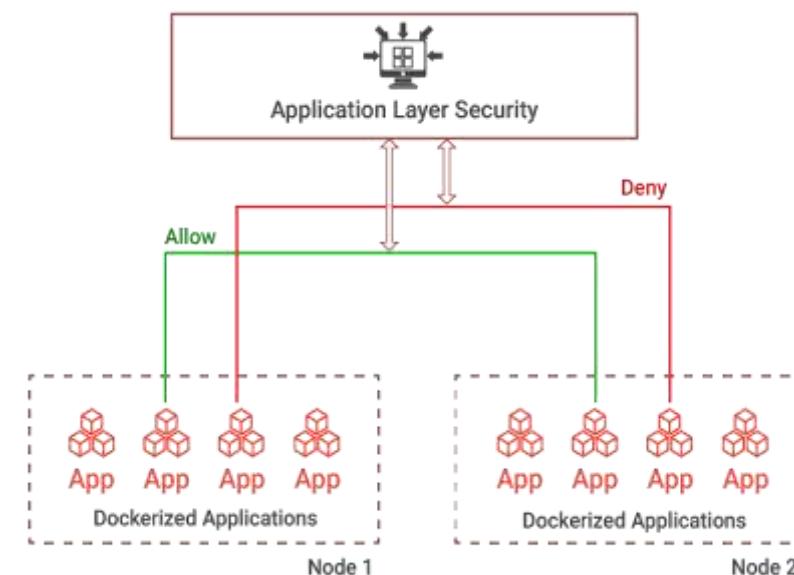
Technology

- Docker, Containers, microservices, python, Azure, mesos, marathon, kafka, cluster framework.



Solution

- Developed a 3-tier python based microservices application which will be deployed to test customer platform.
- Created a cluster setup using mesos, marathon which will be used to deploy any client server application or microservices based application
- Deployed the cluster in Microsoft Azure cloud platform along with microservices application.
- Executed load and stress tests to make sure client security platform is robust and works as per expectation.
- Automated the complete test suite in on-prem cluster environment as well as on cloud.



QA Automation for Network Security product



Engagement

Calsoft was engaged with a Network Security vendor for automation of Functional & Non Functional testing of its product portfolio. The project was aimed at Feature specific verification for planned releases and frequent compatibility testing for dependent components



Benefits

- Turnaround time drastically reduced for QA cycles with no loss in quality
- Major issues identified and fixed before shipping, as testing scope increased
- Vast amount of troubleshooting data handy for benchmarking & documentation



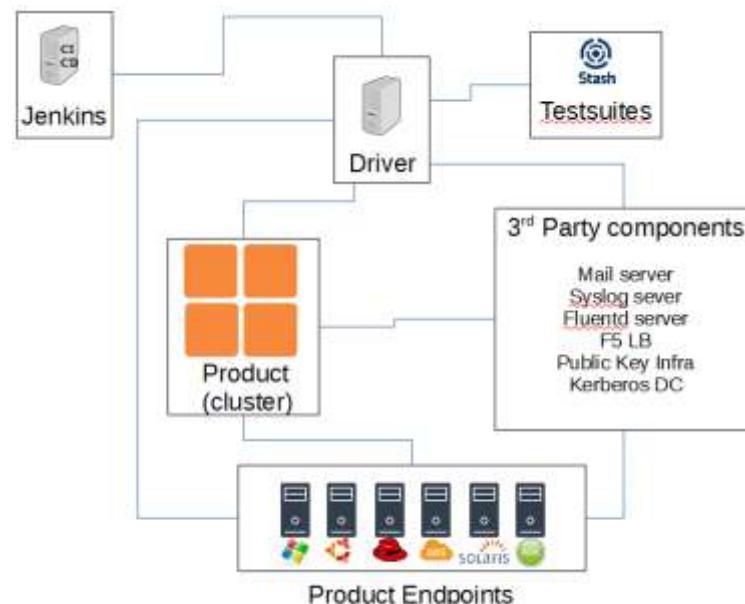
Technology

- Firewalls – IPtables, IPfilter, WFP
- Languages – ruby, python, shell scripting, ansible
- Virtualization – ESXI, Hyper V, EC2 instances
- Tools – openssh toolkit, Jenkins, traffic generators



Solution

- Identified & automated test cases for a plethora of supported & beta features, with an enormous verification scope for increased coverage
- Deployed & maintained complex infrastructure to simulate functionality
- Integrated testing results with effective reporting to enable CI/CD
- Developed dynamic test cases to run with an increased number of endpoints
- Created test cases for product interactions with 3rd party components such as – SMTP, syslog, fluentd, F5 LB, Kerberos, PKI, SAML, radius, anti-virus software
- Implemented automation framework in multiple tiers using ruby for maintainability and feature enhancement while following Agile processes





Engagement

Calsoft is engaged with the client for providing a solution of NSX integration with Micro-Segmentation product. It aims at getting security policies from Central Policy Engine and translate into NSX specific rules for target VMs and hosts.



Benefits

- Client was able to integrated its product in NSX Ecosystem, which helped in getting inroads into VMware datacenters



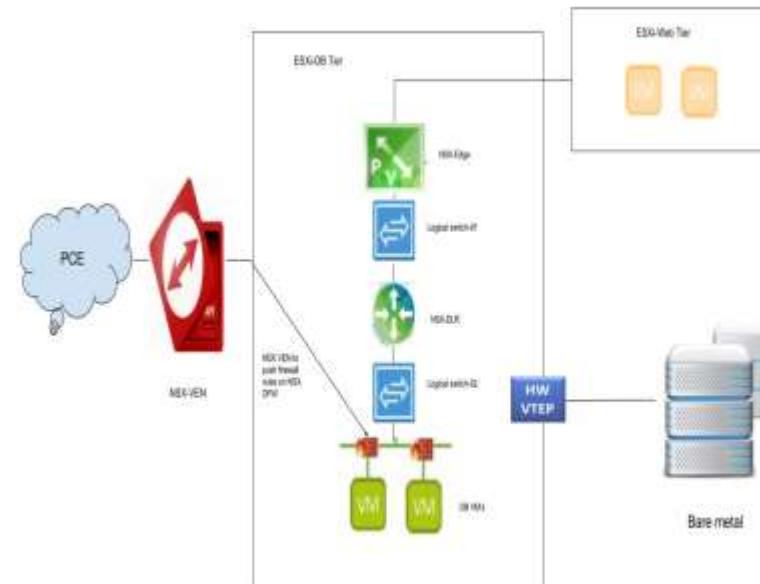
Technology

- NSX, Firewalls, JAVA, REST, Automation



Solution

- Built an independent app running outside the Central Policy Engine
- Implemented NSX- PCE interface to receive the security enforcement policy from CPE in JSON format
- The NSX Agent receives the security policy from PCE, parse it & apply equivalent rules in NSX Distributed Firewall (DFW).
- The NSX Agent applies DFW policy rules for East-West as well as North-South traffic from NSX VM(s) perspective, generate logs as necessary, and update NSX Dashboards for changes
- Reporting possible areas of blind spots due to usage of DFW, for e.g. NAT, LBaaS, VPNaas, etc
- Basic QA Automation, targeted towards certification



QA of SOHO gateway



Engagement

Calsoft's engineers were engaged in QA team for a gateway product targeted for small office/home usage (SOHO). They were involved in manual testing and developed automation framework.



Benefits

- The QA team complemented the development efforts of the client and acted as partner in delivering the product.



Technology

- Python, Networking, Routing, DNS, DHCP, Ethernet, Wifi, Linux, Spirent, Firmware, Firewall



Solution

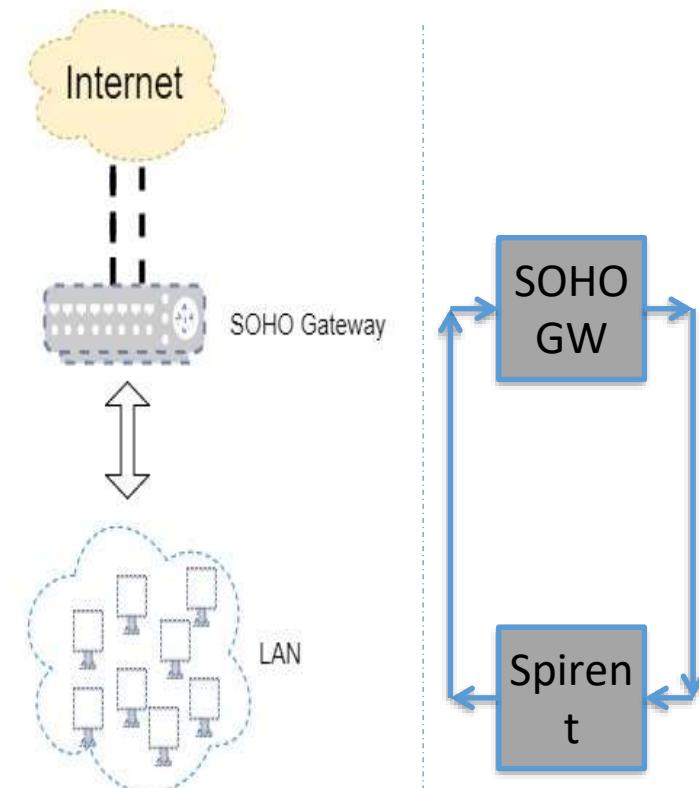
Test areas included

- Network interfaces – Ethernet, Wifi, Bond, Aliases, LAN, WAN, Dialup, DHCP
- DNS – Static, Dynamic
- Routing – Static, policy based
- Firewall – Allow/Deny rules based on 5 tuples, interzone configurations.
- Firmware upgrade
- Application testing for Mail protection, IPS, Parental control, SSL VPN.
- Report generation
- UI test & validation

Calsoft developed the automation framework in Python, based on Rest APIs.

The automation was integrated with Jenkins to trigger build acceptance test as well as sanity test of untouched features.

Performance & benchmarking tests included stress test of the gateway using Spirent machines, tweaking Linux parameters to improve performance and generating datasheets for different models.



Development & Testing of Enforcement Node Software



Engagement

Calsoft was engaged with the client as their testing partner for their continuously evolving cloud and data center security product. The engagement underpinned:

- Dealing with deployment of complex ORACLE RAC setups with variations in ORACLE RAC deployment architecture.
- Development of client side product to extend support on new OS Families – Sparc, Solaris & AIX
- Performing quality testing on customer facing enforcement node software.
- Testing all the variations without any automation suite.



Benefits

- Improved Performance with enhanced product features
- Client was able to extend product compatibility on new Operating Systems.
- Client was able to achieve faster time to market



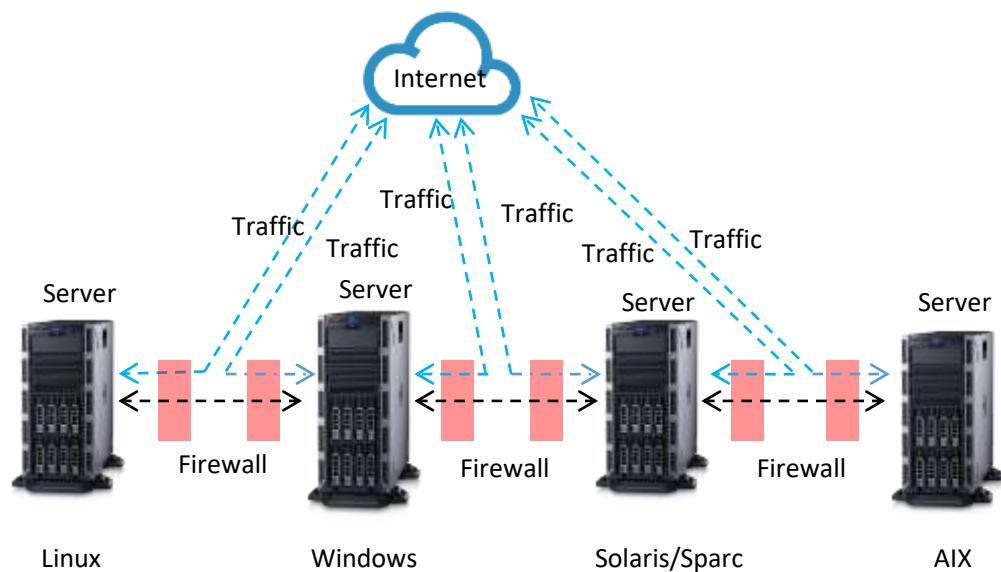
Technology

- Domains: Networking, Cloud Computing



Solution

- Deploy ORACLE RAC setup in on-premises network & Identifying affected functionalities of ORACLE RAC with and without client product installed.
- Creating various network scenarios with multiple OS families - Windows, Linux, Solaris\Sparc, AIX.
- Analyzing firewall rules required for all possible scenarios to deduce methods for providing robust security
- Perform quality testing on product compatibility with widely used enterprise products such as Microsoft Exchange, SCCM, SCOM, FCM, SharePoint, AD, RDP, Citrix XenDesktop, Antivirus software - Kaspersky, MacAfee, TrendMicro, Symantec
- Performed manual testing of complex network scenarios :
 - Identified multiple corner cases and scenario specific issues.
 - Fixed critical quality related issues.



Quality Assurance for a Data Center Security Product



Engagement

Calsoft was engaged with the customer that is a highly regarded start-up company with innovative product in data center & enterprise security in testing the Windows version of their product.



Benefits

- Reduced time-to-market
- Improved product quality by making the product bug free
- Built support matrix of the product with various window applications



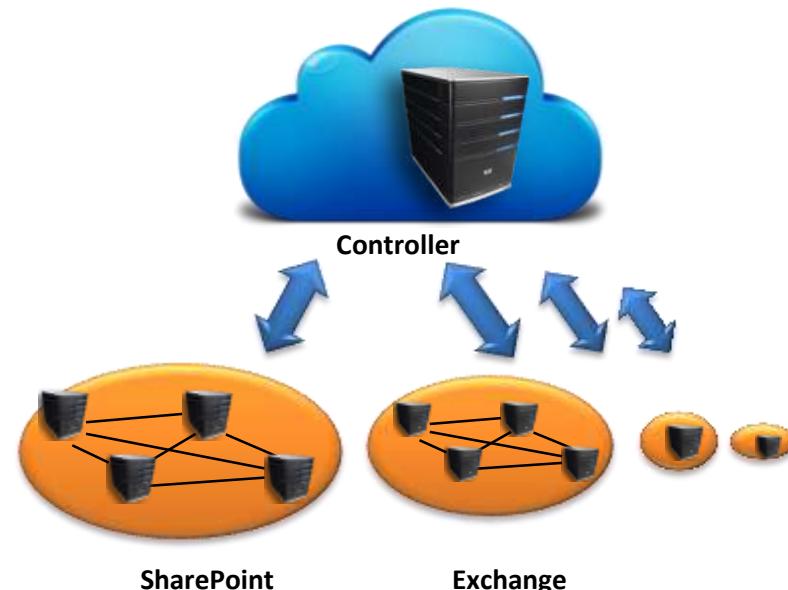
Technology

- Networking, Security, Windows Filtering Platform (WFP), Sharepoint, Exchange, SQL cluster, HA, Remote Desktop Services, Dynamic CRM



Solution

- Designed & developed the test plan from scratch
- Built various windows application topologies like Sharepoint, Exchange, Dynamic CRM across the hypervisors
- Executed tests which includes functionality testing of the product for these deployments, admin security rules, etc.



SELinux Security for Policy Compute Engine



Engagement

Calsoft was engaged with a micro-segmentation security company which has a Policy compute engine (PCE) which is used to distribute policies to various infrastructure nodes or virtual machines running in a data centre. Calsoft worked on safeguarding the PCE using SELinux access control mechanism.



Benefits

- Guarding against un-authorized access
- Built-in security of SELinux added to policy Engine
- Level of security to guard against security flaws.



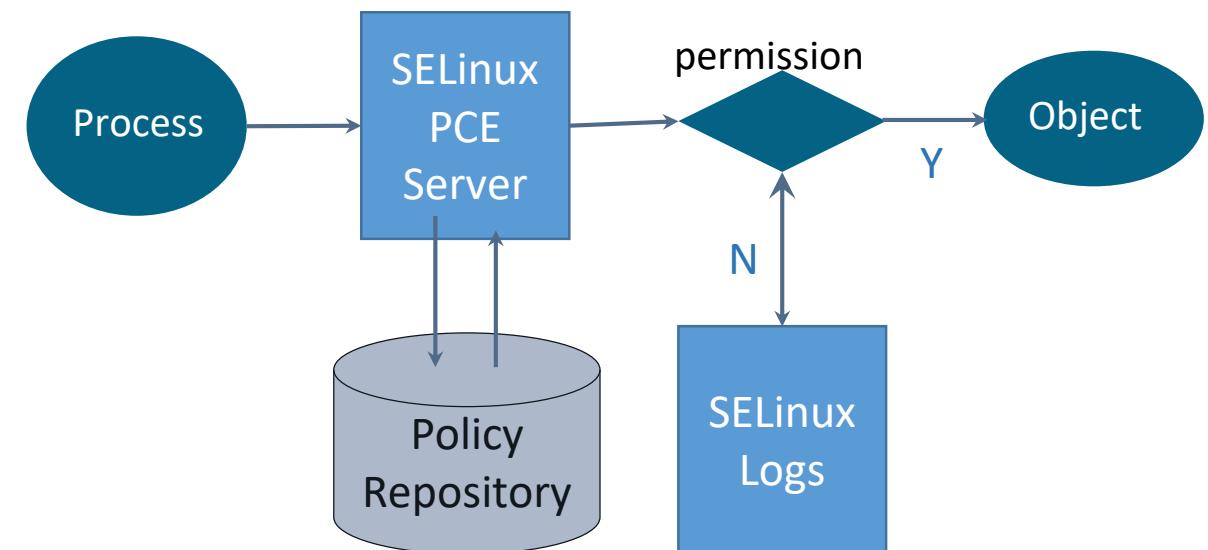
Technology

- OS – Linux (CentOS, RHEL)
- Language – C, C++, Python
- Tech – IPTables, SELinux policies



Solution

- For every PCE process
 - Perform a process audit about which resources are needed by the process.
 - The resource requirement would be during process startup, lifetime or during exit
 - Translate the audit results into enforcement files and compile into policy files.
 - Apply the policies to the SELinux security context.
 - Verify the functionality of PCE process.
 - In case there is a failure, restart the process audit to find the missing accesses.



Development of TR-69-based SOHO Gateway



Engagement

Calsoft developed components for the customer's DSL/FTTH Triple Play gateway product targeted for small office/home usage (SOHO). Calsoft developed their modules like Router, firmware upgrade, parental control module, IDS, Wireless, etc. The team was also involved in testing the overall SOHO software for Triple Play, including IPTV (IGMP) & VoIP (SIP).



Benefits

- The customer was able to deliver the SOHO gateway to the potential end customers in record time
- The Remote Management using TR-69 enabled the service providers to deploy the devices in the field quickly



Technology

- C/C++, Networking, Netfilter, IPS, SNORT, TR-69, TR-98, TR-104, TR-68, XML, Angular JS, HTML, CSS, Linux, Jenkins, CDRouter, ACS, WiFi, VoIP, SIP, IGMP, ADSL, DHCP, PPPoE, PPPoA, etc.



Solution

1. Firmware Upgrade

- The firmware upgrade module was developed to support the requirement of pushing firmware upgrade 'over-the-air'
- The mechanism involved developing a framework for backup & restore of configuration and a failsafe mechanism to upgrade the firmware. A platform to deliver upgrade package was developed using Jenkins, to facilitate development as well as to act as package delivery server.

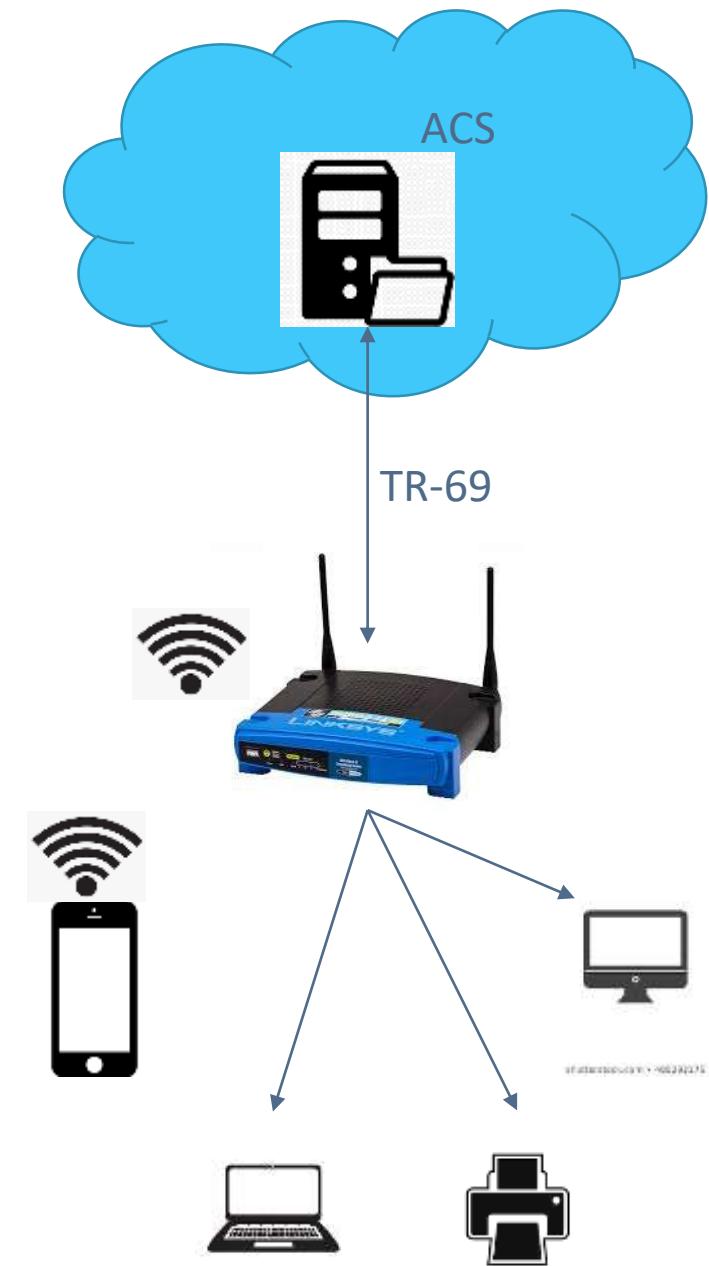
2. Parental Control

- An ACL engine was developed to validate requests based on the time, type, and destination of a request. Netfilter hooks were used to trap the requests and packets were allowed/dropped, based on configurations

3. Intrusion Prevention System (IPS)

- SNORT was ported on the gateway and integrated with Netfilter hooks & packet handling library. A mechanism to fetch signature updates was developed

All modules also involved the development of corresponding TR-69 defined models and standards.



Multi-User Virtual Security

Engagement

Calsoft developed a virtual security consultant application for the customer.

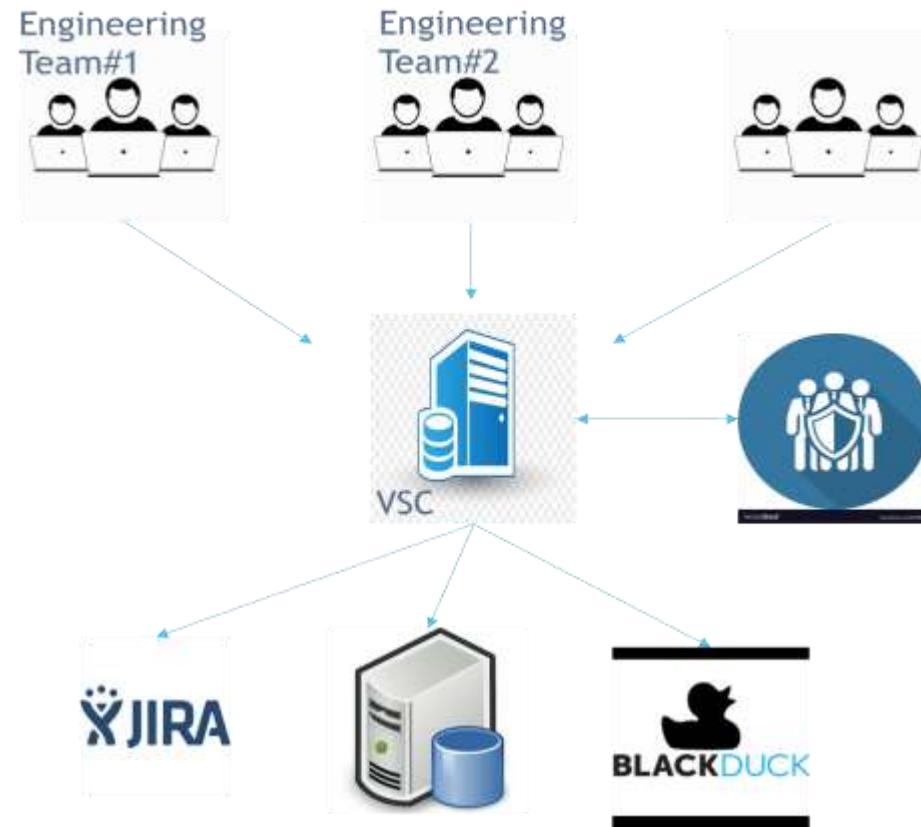
Solution

The engagement underpinned:

- Calsoft owned the design, delivery, and product support aspects
- Worked like a partner, helping the Central Security team to create awareness about the portal and its usage, helping the penetration of the product
- Built a 3-tier architecture-based web app providing future extension possibilities
- JAVA backend for UI and simple, user friendly, responsive UI design using AngularJS, HTML5
- UI to facilitate project onboarding, compliance questionnaire, project tracking from SDL perspective, workflow management, SDL compliance dashboards, and integrations with external security tools

Technology

- JAVA, AngularJS, HTML5, SDL, AD, Black Duck, Nessus, PowerBI



Benefits

- Better manageability
- Better usability

Third-party Integrations for Cybersecurity



Engagement

Calsoft was engaged by the customer for integration with a third-party vendor to provide organization and industry-specific datasets across their platform.



Solution

Calsoft helped the customer in integrating with third party vendor, which helps in producing a broad spectrum of meaningful cyber risk data, allowing third parties and customers to understand the full cyber risk picture associated with their business relationships. The project was executed in 2 phases each for integration with two vendors. The engagement underpinned:

Calsoft developed microservices, which possessed:

- GraphQL queries (API endpoints) for front end to fetch the required data from the cache (DynamoDB)
- Adaptors & service functions, which include business flow of the application, like calling dynamoDB, methods like get/update etc.
- An HTTP client, which connects APIs and returns responses
- Kubernetes cron job, which downloads a zip file containing company data and loads it into dynamoDB on a daily basis
- Unit test coverage
- UI development: developed widgets



Technology

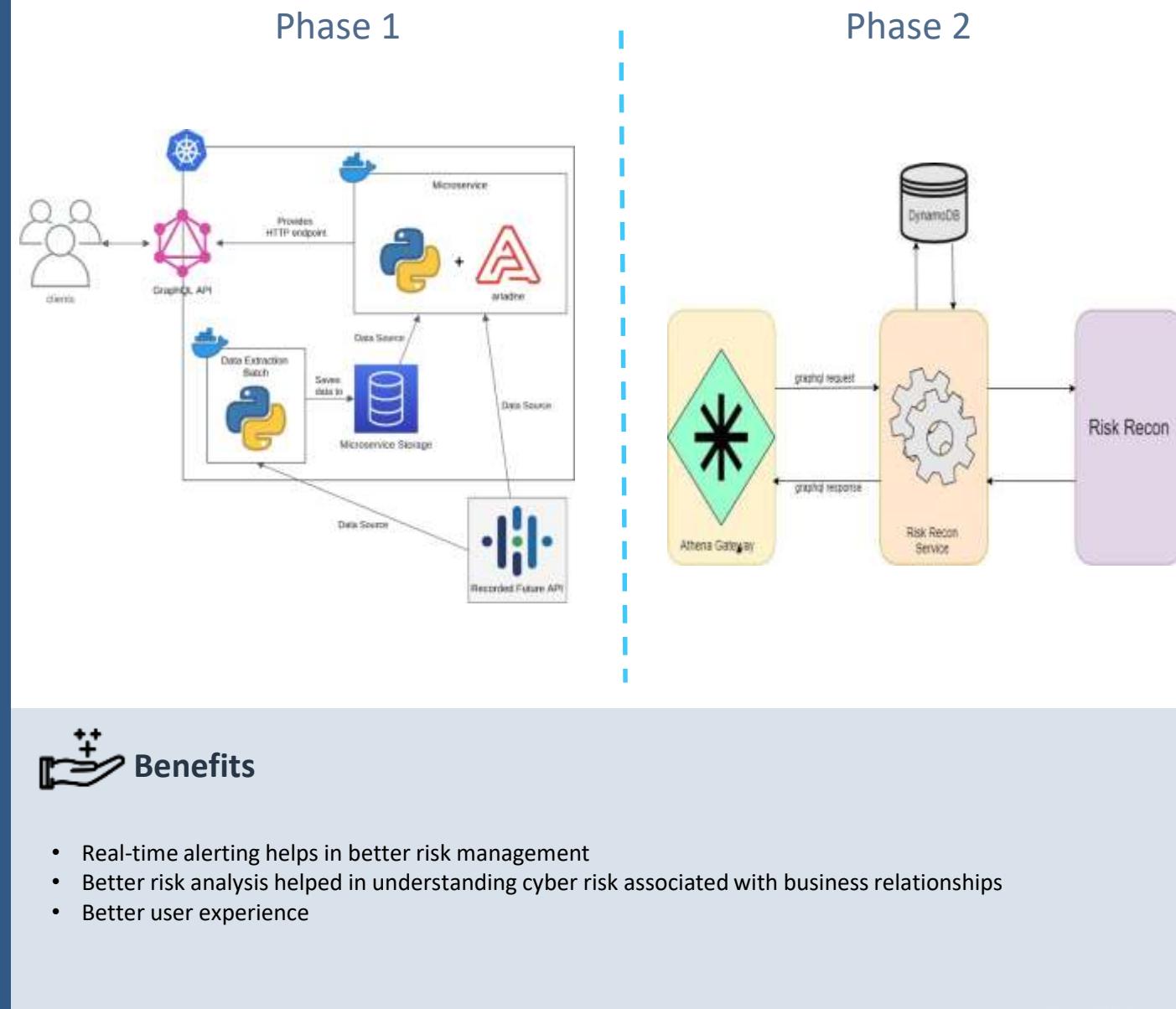
Python with starlette frameworks

Database: DynamoDB

Graphql queries

Architectural standards - Cosmic Python

React with Typescript, HTML, CSS



VAPT for Global Independent Software Vendor



Engagement

- Calsoft was engaged with a global independent software vendor (ISV) providing software solutions in data center domain across continents
- Calsoft conducted detailed Vulnerability Assessment and Penetration testing on global sites in Europe, USA and Asia, and on CDN endpoints across the globe



Benefits

- Based on the report, the ISV was able to plug the security holes and improve the defense on the security attack surface
- Through the certification, it was able to instill confidence in their end-customers



Technology

- Tools - Bile-Suite, Achilles, Nmap, NetworkMapper, Saint, Metasploit, Nipper, etc
- Python



Solution

- Calsoft started with conducting an internal testing of network infrastructure, assets like servers, storage devices and security devices
- An external test was launched on the firewalls across all offices of the ISV
- A series of tests were undertaken to test the device response on password brute force attacks spware and malware download attack and download of files marked as virus and malicious as per anti-virus software
- A distributed denial of service attack was executed on busy CDN endpoints
- A detailed hacking attempt was made to ensure that the security perimeter works as expected and the services meant for end-customers are up and working, with no data breach and loss
- Reports were generated, citing the detected security loopholes and possible solutions to fix the defects

VAPT
Test
Suite





Engagement

- Calsoft was engaged with a global health care provider for conducting VAPT on its digital assets and data of its end-customer collected as part of business operations



Benefits

- The VAPT tests, followed by QA validations, helped the client to secure the digital assets, infrastructure and data
- It helped in ensuring compliance with government regulations, pertaining to privacy of patient's data



Technology

- Tools - SpiderFoot, W3af, Saint ,Inguma, Metasploit, Pixy, Fgdup, Lynix, Foundstone
- Python



Solution

- Through increase in digital footprint, the healthcare industry saw paradigm shift in maintaining patient health records and day-to-day operations of complete patient lifecycle management
- In this light, Calsoft engaged with the healthcare provider to secure its infrastructure and data from malicious activities
- Calsoft conducted a 360 degree VAPT analysis of its infrastructure and data surface
- Provided guidance and explanation at various stages of VAPT
- Multiple vulnerabilities were identified, including cross site scripting and SQL injection loopholes
- The vulnerabilities were fixed and a detailed penetration test followed to ensure the attack surface is sufficiently covered



Engagement

Customer was developing an innovative security product to secure various Instant Messaging services. The product was geared towards the Enterprise Market as more corporates were adding IM for their internal communication.

The engagement included building, operating & transferring the engineering team for flagship IMManager product.

The BOT was completed with transfer to Symantec who acquired IMLogic.

- **Calsoft methodically built the team based on IMLogic's immediate and future needs in consultation with its management**
- **Calsoft deployed its "A" team as core team to gather the product knowledge, understand roadmap and help build the complete team across functions like Development, QA, Automation, etc.**
- **Calsoft also helped with engineering processes via the PMO helping smooth delivery experience for the existing team's at customer side**
- **Calsoft also spent energy in ensuring culture-fit of the new team with respect to culture & ways IMLogic worked, eventually transferring 35 engineers to Symantec**



Technology

- Linux, C++, Networking, Security, LDAP, IM Protocols, etc.



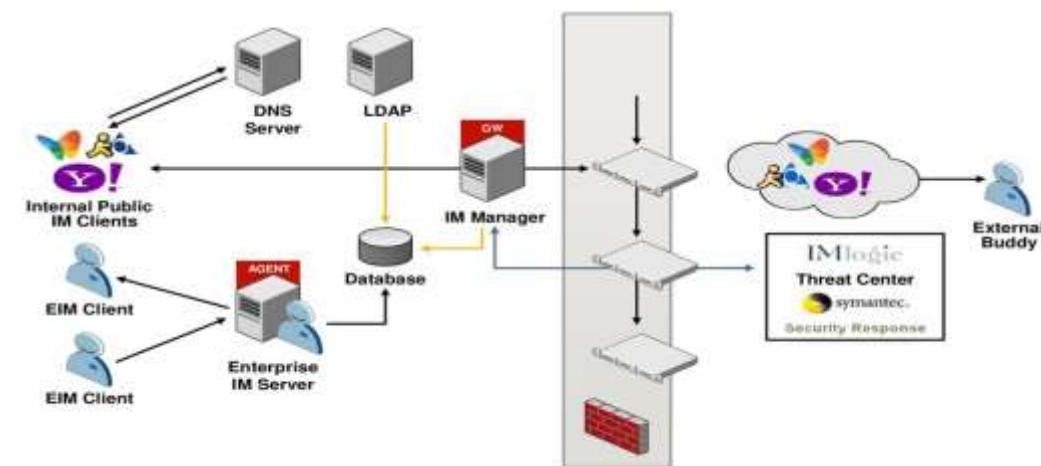
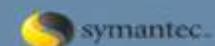
Solution

While Calsoft built the team as per IMLogic needs, the team also delivered critical features in Operate model under Calsoft leadership -

- Designed, implemented and tested IMManager 7.0 feature set
- Added support for protocols like Jabber
- Implemented integration with Domino, and helped in the globalization effort
- We have also added the Linux pass-through capability to IMManager 7.0.
- Ported the IMLogic protocol engine and SDK to Linux
- Added functionality such as protocol support for file transfers over various Enterprise IM protocols

Calsoft contribution enhanced the product & received great market traction. Eventually Symantec acquired the product.

Technical Deployment Architecture



Adaptive User Segmentation (Security and FinTech)

Engagement

One of the very large end-customers of endpoint security product had a use-case of employees connecting to systems with different devices & logins. The end-point security product had no feature for user specific security implementation as it was based on IP-addressing. Our security customer roped us in for consulting on the requirement. Calsoft provided the end to end solution & implementation

Benefits

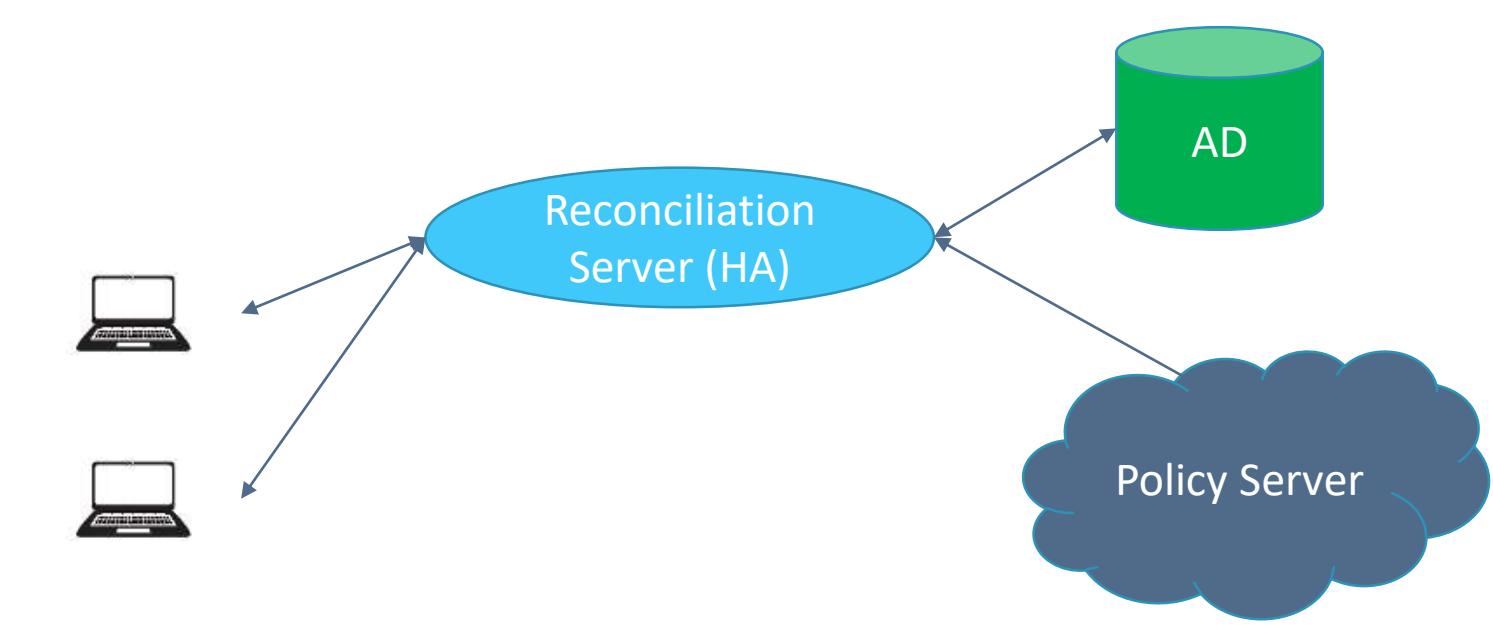
- Innovative solution design for complex problem at scale
- Independent implementation of the solution without consuming core engineering bandwidth on the customer-side
- Through analysis & validation before rolling out the solution at scale

Technology

- C# .Net, Windows, Active Directory, Loadbalancer

Solution

- Based on the problem statement shared by end-customer (a very large global bank), Calsoft came up with potential solution
- With go-ahead on the approach, Calsoft designed the complete solution & different components
- Calsoft developed following components –
 - Windows Client agent – C# .Net & MSI installer
 - Server-side implementation to connect with AD
 - Operational tooling for HA scenario on the server side
 - Complex state management on the server side to ensure zero down time for the end users/employees
- Calsoft team worked closely with Product Management & Field team to roll out the solution with Alpha & Beta releases before GA
- Helped debug the issues in the field & provide solutions
- Created documentation to train end-customer admins



Engagement

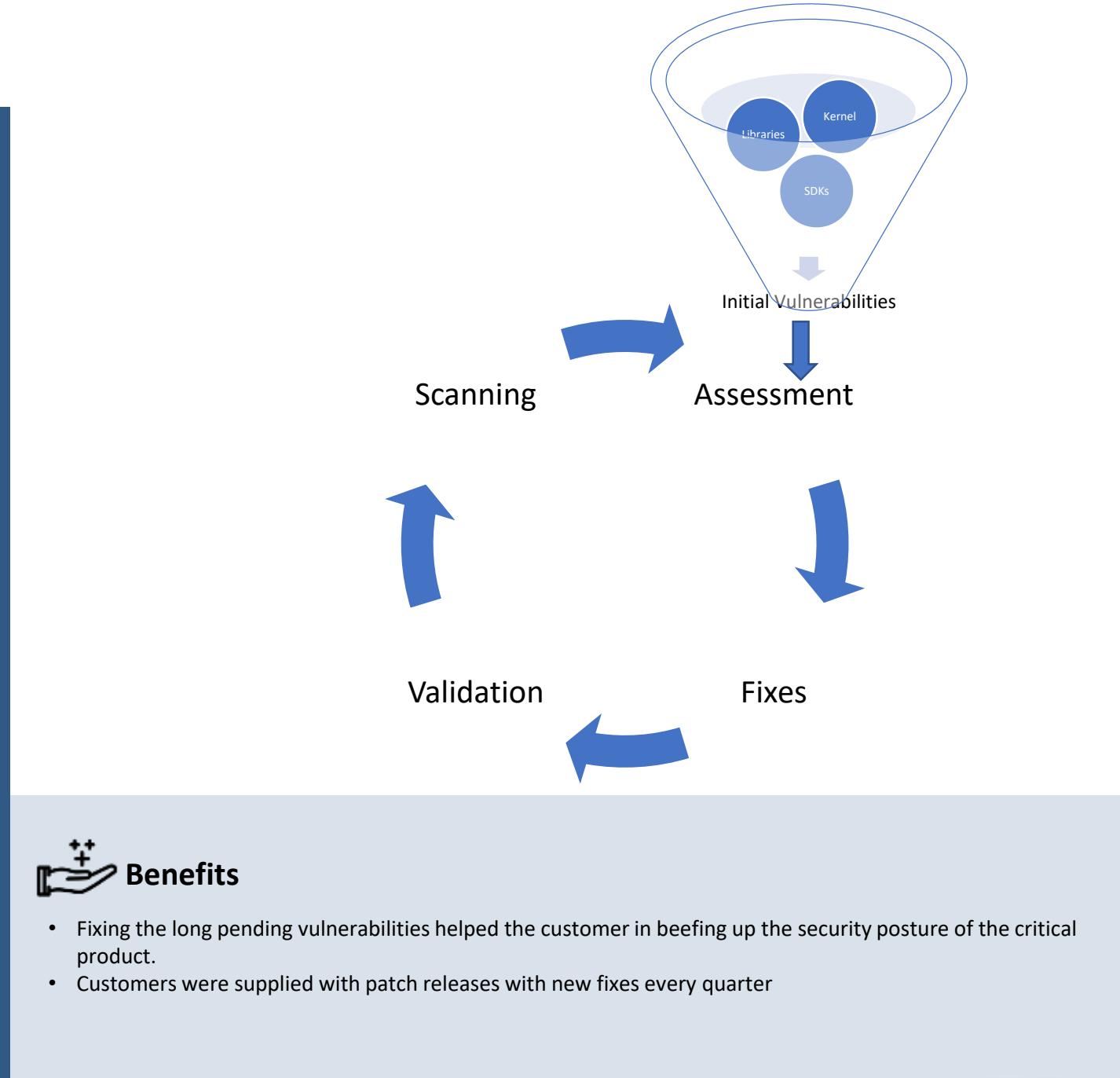
- Calsoft was engaged with a Security Product vendor who was looking at resolving a multi-year security debt in terms of hundreds of vulnerabilities found in its product components
- A dedicated team from Calsoft owned the charter to identify, resolve & validate these vulnerabilities across all components

Solution

- Calsoft executed this as a managed engagement where Calsoft owned the complete responsibility of fixing the old vulnerabilities, identifying the new ones and resolve/validate them
- The team consisted of Systems and Application developers & QA lead by security engineers
- The team went through CVEs, prioritized them and resolved the issues
- QA team was involved in validating the security fixes and ensuring the regression
- Security issues were spread across ~100 libs/SDKs like Linux Kernel, libxml, Python, cURL, Samba, etc.

Technology

C/C++, Python, Sonarqube, etc.



Multi-OS VPN Tunnelling Product Development



Engagement

- Calsoft was engaged to codevelop a multi-OS VPN tunnelling product to proxy the selected business app traffic to nearby proxy. The solution is expected to differentiate & improve the business application traffic compared to nonbusiness traffic.



Benefits

- With its strong OS & VPN technology expertise, Calsoft was able to help this startup customer to implement the functionalities quickly and thereby improve time to market.
- With Calsoft providing development support for UI, user-space and kernel space development, customer could optimize time spent with multiple partners.



Technology

- Windows, Linux, C++, ElectrongJS, VPN, etc.

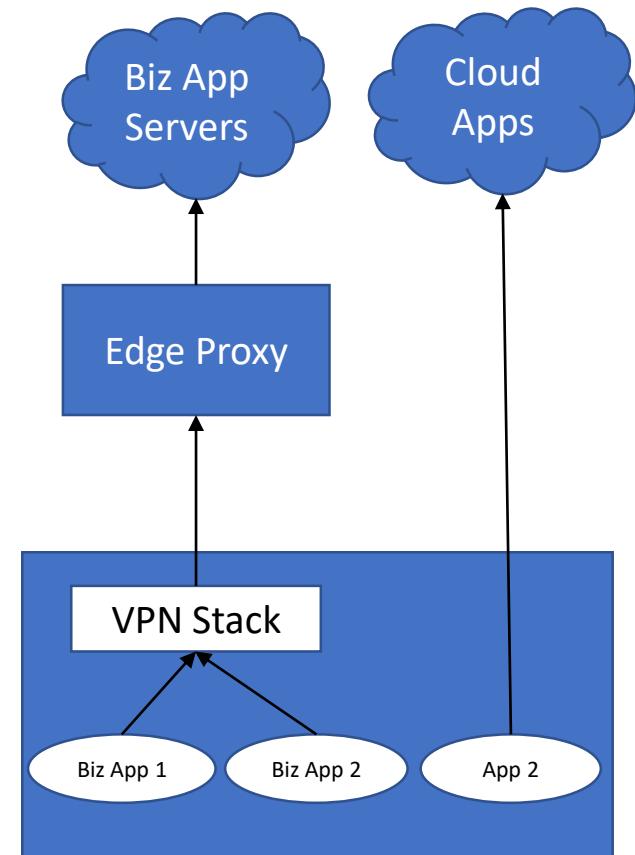


Solution

Calsoft worked with the customer on various aspect of the product as mentioned below -

The key functionalities include

- Multi-OS VPN client application (with UI) enabling customer to configure the VPN client.
- Control and Management plane components which talk to centralized control plane manager. This manager sends the configuration to VPN client on the end point device including policies to select which application traffic needs to be prioritized and sent to the VPN proxy for differentiated improvement.
- Validation of various components.





Customer Requirements

Build an API Gateway Custom Policy which captures the Attribute Headers and Payload from the API Gateway on both the request and response side and send the request to the Universal Log Collector for further discovery and analysis on Cloud Web Application Firewall.



Features Added

- Created the Custom Policy
- Tested the Policy with multiple types of APIs



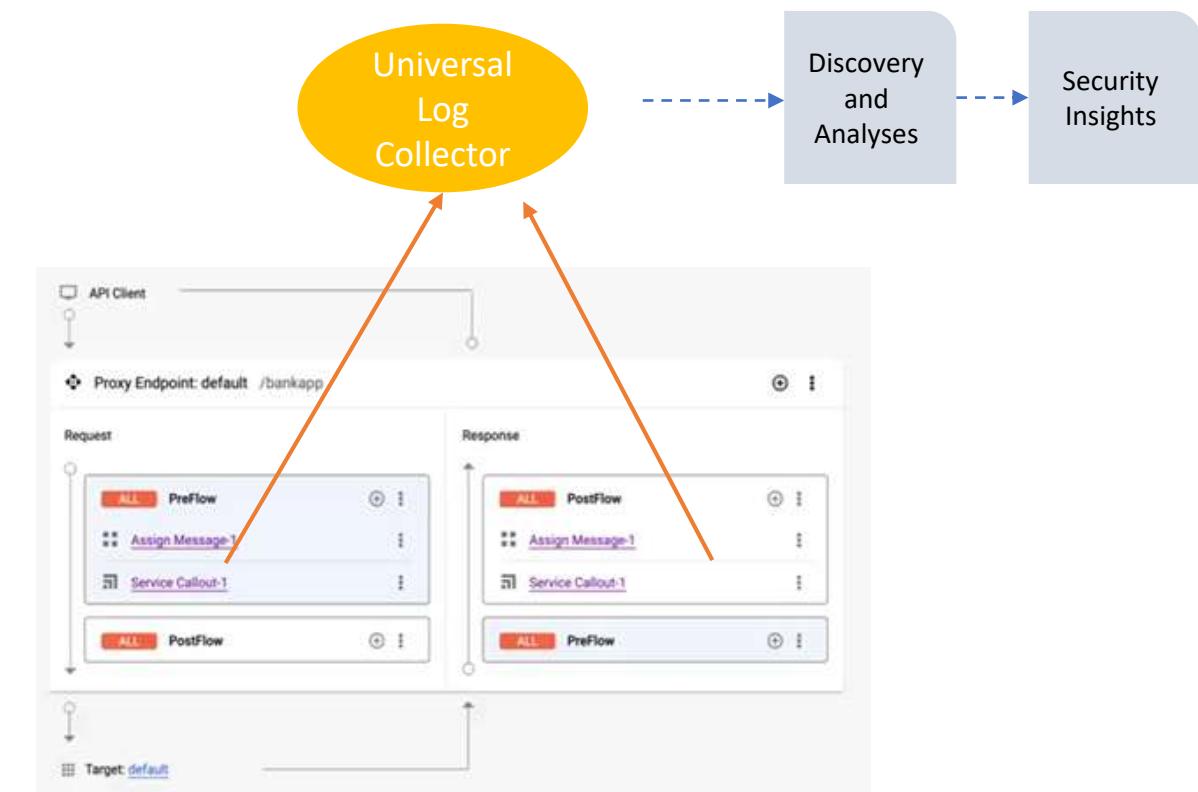
Technology

- APIGEE X
- Google Cloud Project
- APIGEE FLOW and Expression formation in XML
- Python, Visual Studio Code, Postman, Pycharm



Solution

- Created Sample GET and POST Type requests in APIGEE Editor
- Created the APIGEE Custom Policy which captures the Attributes and Payload information from both the request and response side of an API call of API Gateway and sends the HTTP Request out to a Universal Log Collector.
- Created the Universal Log collector simulator in AWS Ubuntu EC2 instance
- Tested the various types of API with the policy.





Customer Requirements

Build an API Gateway Custom Policy which captures the Attribute Headers and Payload from the API Gateway on both the request and response side and send the request to the Universal Log Collector for further discovery and analysis on Cloud Web Application Firewall.



Features Added

- Created the Custom Policy
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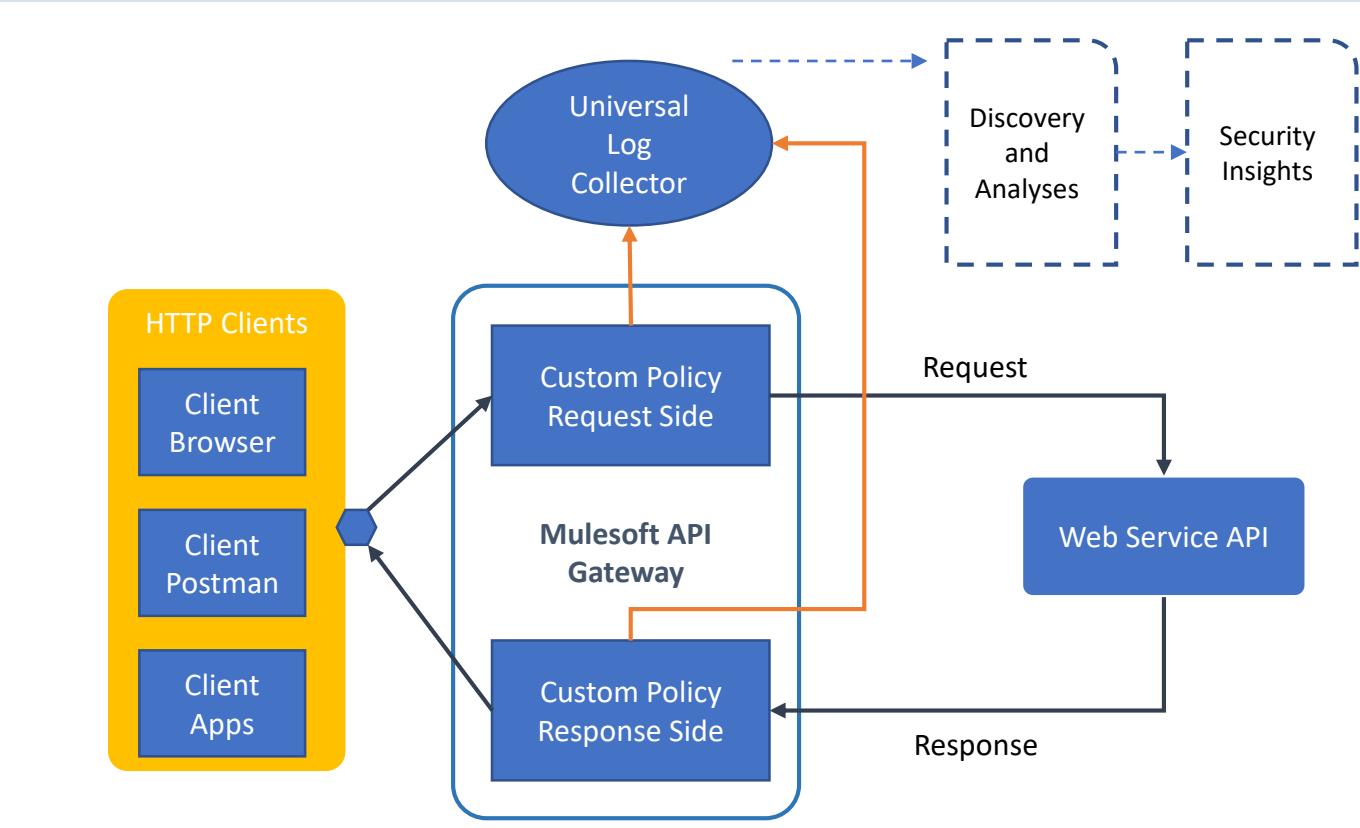
Technology

- Mulesoft Anypoint Platform
- Mulesoft Anypoint Studio
- Mule Expression Language and DataWeave 2.0
- Java, Python, Visual Studio Code, Postman, Eclipse



Solution

- Created Sample GET and POST Type requests in Anypoint Studio and uploaded to Anypoint Cloud Runtime.
- Created the Mulesoft API Gateway Custom Policy which captures the Attributes and Payload information from both the request and response side of an API call at the API Gateway and sends the HTTP Request out to a Universal Log Collector.
- Created the Universal Log collector simulator in Mulesoft
- Created the Universal Log collector simulator in Mulesoft
- Tested the various types of API with the policy.



Engagement

Calsoft is engaged with Ivanti since the beginning of 2020 for their VPN product line like ICS , IZTA, CIE and ICS client. Calsoft is Ivanti's reliable engineering development partner in maintaining and upgrading these products line.

Benefits

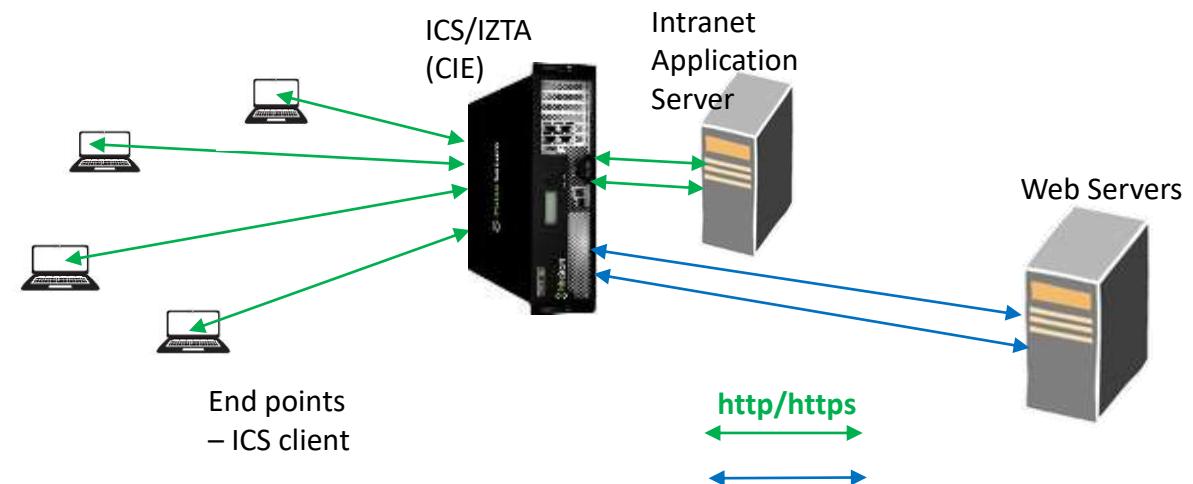
- Flexibility to end user in
- Configuring the split tunneling. – IP based / FQDN based.
- Proxy setting options for client – manual/automatic
- Configuration for exclusion rules
- Continuously meeting the targeted SLA and deadlines from last 2+ years (0 Customer escalation in P0 and P1 category)
- Continuous improvement of the product through major and minor enhancements which in turn reduced the ticket inflow from 2020 to 2022 (Saving ~\$50,000 by reducing yearly cost of one support engineer)

Technology

- Language: C /C++, HTML, JavaScript, PERL scripts, Shell Script, CSS, HTML5
- Linux, Windows, Windows UA, MaC, Chrome OS
- Tools: Visual Studio 2019, xCode

Solution

- Multiple Upgrade and migrations of OpenSSL through abstraction layer to support FIPS customers and non-FIPS customers.
- OpenSSL upgrade from OpenSSL 1.0.2b to OpenSSL1.0.2g to OpenSSL1.1.1 .
- Upgrade FIPS module from 2.0.3 to 2.0.16 with OpenSSL 1.0.2g
- Migration from OpenSSL 1.1.1 to WolfSSL
- Design and upgrade of TLS 1.3 for Ivanti Zero Trust Access Server support
- Design and development of feature "Support for proxy (manual, automatic, preserve client-side proxy) using FQDN based split tunneling" for clients around the globe.
- Resolutions of Customer Escalation Tickets within the SLA set by Ivanti through customized filters in Encryption engine.
- Live debugging in end customer's environment to provide immediate support
- Performance Testing and performance tuning for various OpenSSL versions and algorithms for ICS Client





Engagement

Design and development of Corruption and Risk Detection System (CARDS)



Solution

- Corruption and Risk Detection System (CARDS) will enable pricing, audit, and legal teams to drive compliance, save margin, and influence sales behavior leveraging ML and AI-based solutions.
- CARDS will host multiple use cases targeting Grey market detection and margin optimization, Sales Accountability Behavioral training, Account mismatch, Bid rigging, Public customer identification, Smart Price PO, etc.
- CARDS will produce APIs, which will be integrated into multiple systems while ensuring an active feedback loop



Technology

Angular, GITlab for CI/CD , JIRA, Python, SSIS, Airflow tool, MongoDB

Add flowcharts/diagram here



Benefits

- We are contributing on design and development of Corruption and Risk Detection System (CARDS).
- Data handling using Airflow and SSIS.
- Contributing on completion of requirements and requirement change which is proposed by business team.
- We are fixing the issues raised by QA for better usability of business team.



Success Stories: Edge Computing

Edge App Demo with e2e Network Slicing



Engagement

- Calsoft is engaged by the customer for developing MES Edge platforms starting with some real application and e2e network slicing.



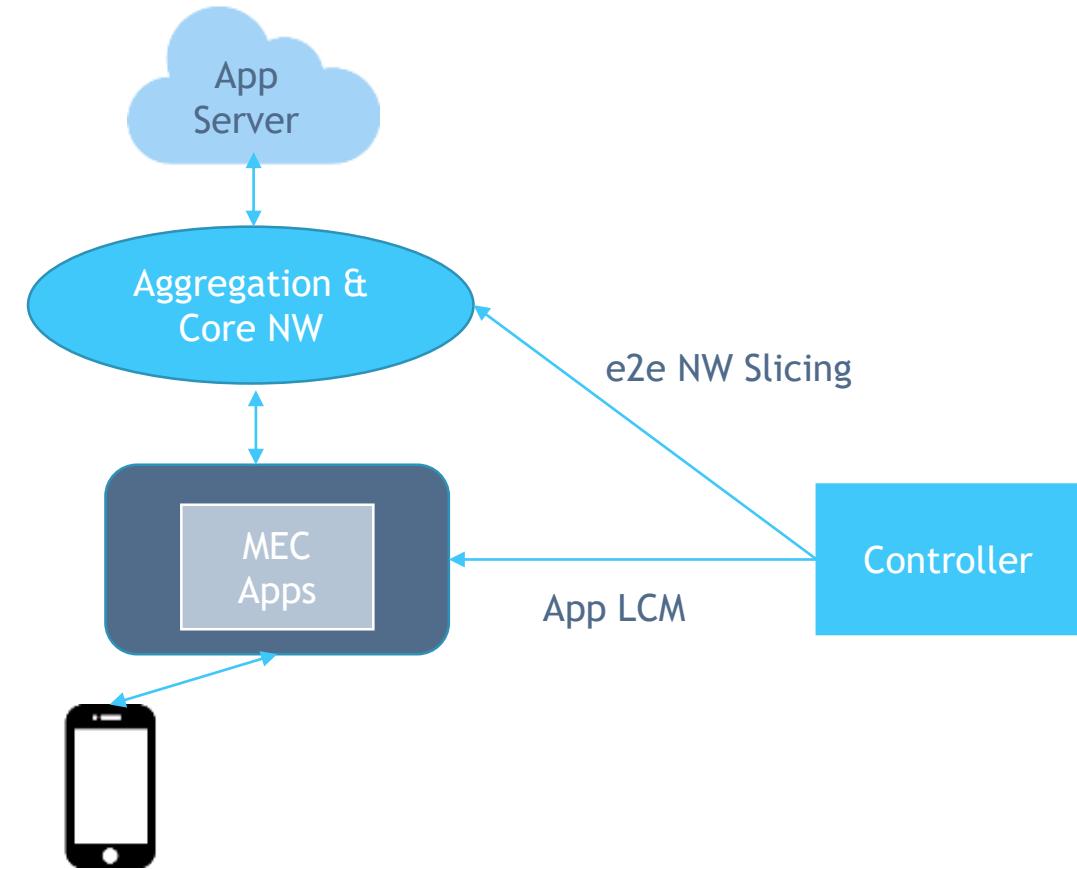
Solution

- Calsoft is working closely with the customer in designing and developing the product, starting with a static demo for its Telco customers
- Designing & developing the Edge platform based on the Akraino blueprint
- Integrating the controller for Application Lifecycle Management
- Integrating the controller for triggering e2e network slicing
- Onboarding an application on the edge and demonstrating the improved service quality with e2e network slicing
- Network is mostly optical and the controller already supports network configuration



Technology

- Akraino, Edge Application, Network Slicing, Golang, Kubernetes



Benefits

- Quick initial go-to market with static POC demo to potential Telco customers
- Calsoft's deep infrastructure expertise augmented the strong network orchestration capabilities of the customer's product to build a new product line

An IOT Application on Top of KubeEdge



Engagement

- Calsoft was engaged by the customer for development and deployment of their application on the KubeEdge cluster. The engagement involved:
 - Setting up a KubeEdge cluster
 - Developing & deploying applications on the KubeEdge cluster for IoT devices



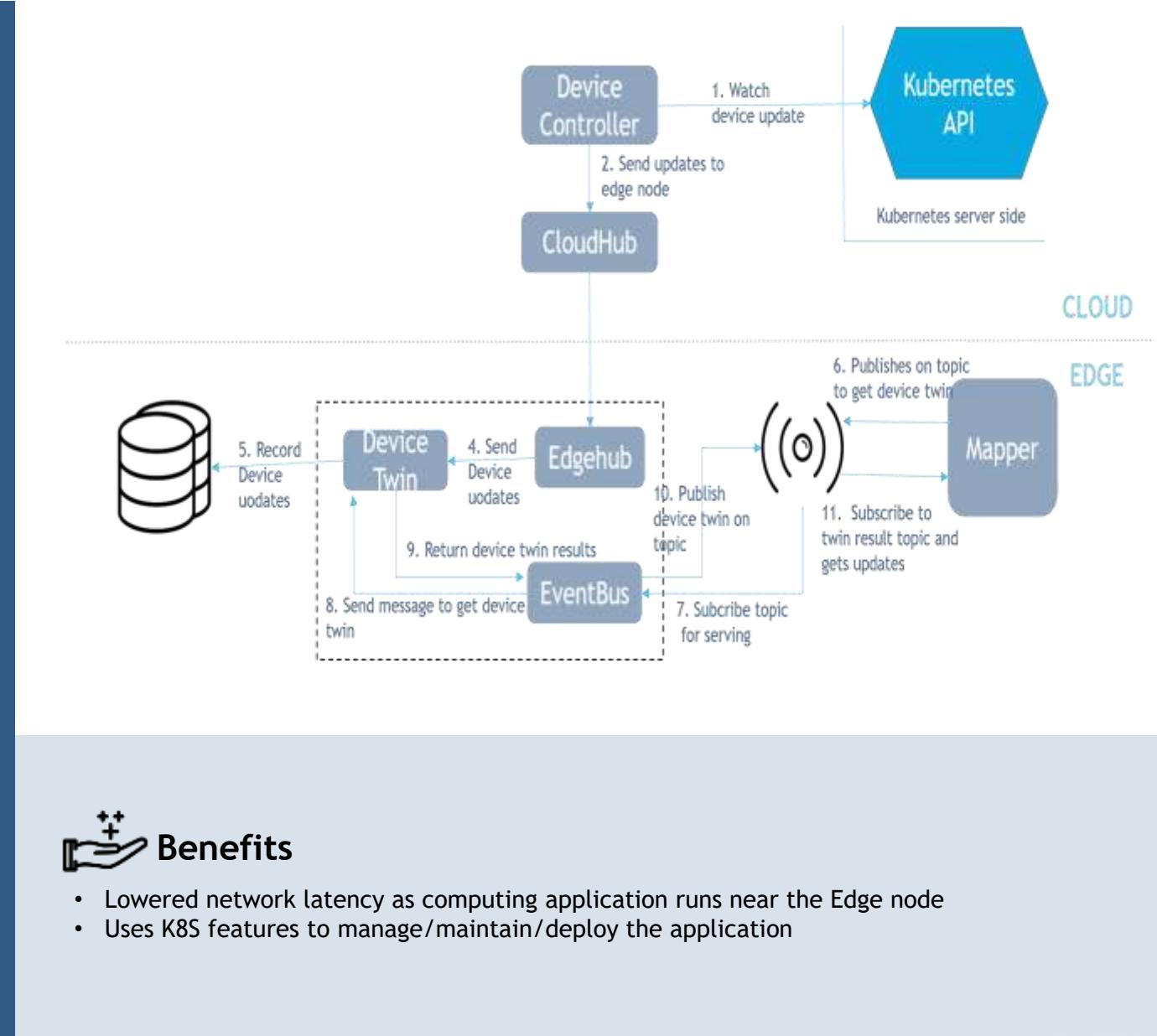
Solution

- Calsoft created a KubeEdge setup with K8S master node on cloud and worker node on edge node; developed and deployed the application on worker node for the edge device.
- **Implementation:**
 - Deployed the 2 components of K8S cluster, master node in cloud and worker node in a server node
 - Developed application that runs on the device and sent subscription message through MQTT server
 - Developed application and deployed on Edge node, which communicates with the device
- **Functionality:**
 - Self-healing
 - Scale up/down as per traffic flow
 - Use of Kubernetes APIs underlying through CRDs for Device and DeviceModel to maintain the desired state



Technology

- Kubernetes, Golang, CRDs



Benefits

- Lowered network latency as computing application runs near the Edge node
- Uses K8S features to manage/maintain/deploy the application

Multi-tier Edge – Ref Architecture Design



Engagement

- Calsoft was engaged by the customer for building an Edge solution with vCloud NFV for Edge 3.2.1. The engagement involved:
- Designing physical network topology based on Reference Architecture
- Manual deployment with respect to topology and Reference Architecture
- Post-validation testing and documentation



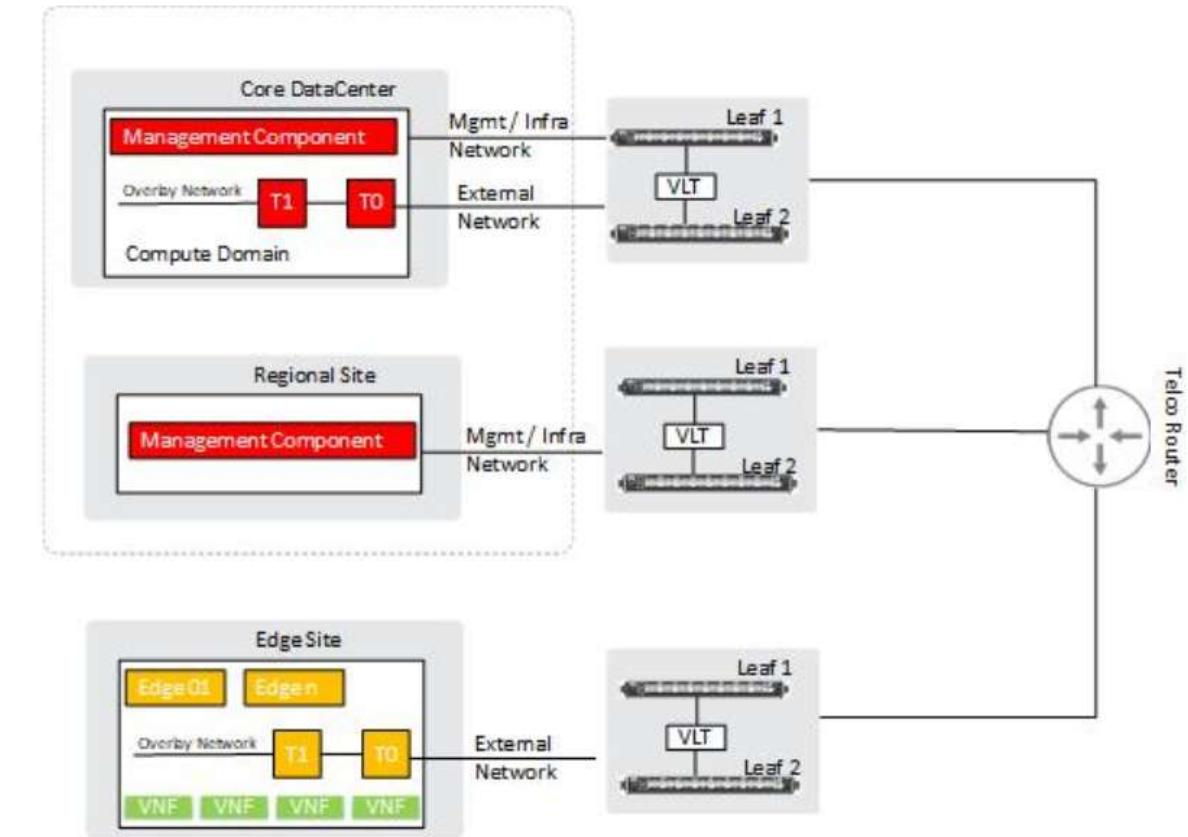
Solution

- Multi-site solution for vCloud NFV environment
- Switch configuration, firmware upgrade, manual deployment of components - ESXi, AD-DNS, NTP, vCenter Server, NSX-T, vROps, Avamar VE, Data Domain, vCD
- Data protection in the environment with Avamar VE and Data Domain
- Multi-site vCD



Technology

- Networking and virtualization
- NSX-T
- Data protection - Avamar VE and Data Domain
- vCD multi-site implementation



Benefits

- Deployment of the entire stack and its validation, post deployment
- Data protection using Avamar VE and Data Domain was done for the first time for NFV environment
- Multi-site vCD implementation helped us gain customer confidence for the overall solution

Edge Controller for Ceph Management



Engagement

- Calsoft is the development partner for a startup providing whitebox networking switches and managed solutions.



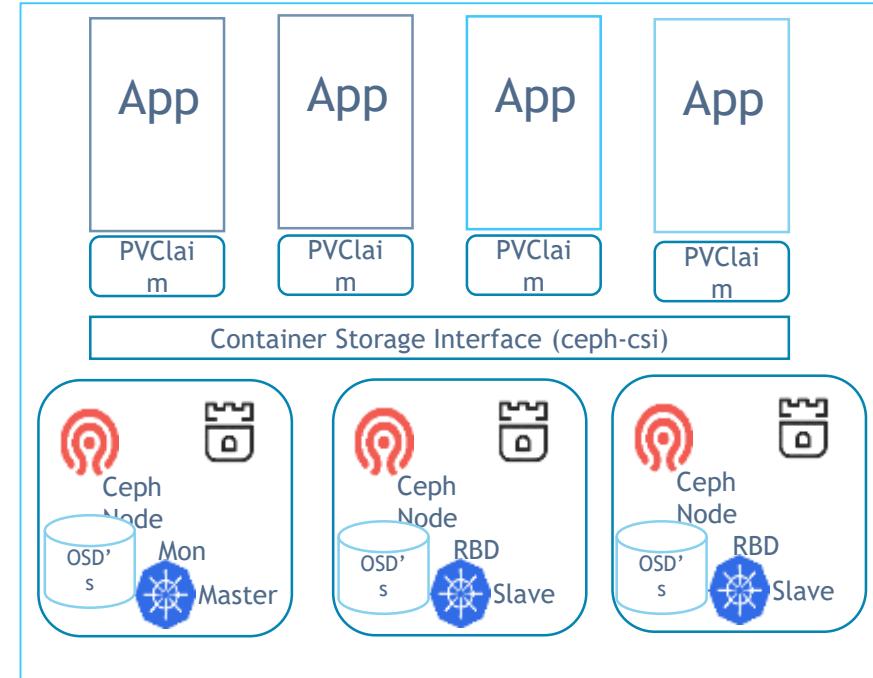
Solution

- The Edge Controller orchestrates, monitors, and controls the Edge infrastructure - which has servers, client whitebox switches, and storage - with Ceph
- The Controller uses Rook internally to enable the Ceph storage system to run on Kubernetes
- The Rook operator container has everything required to bootstrap & monitor the storage cluster
- The Controller with Rook enables users with the below Ceph operations:
 - Automated Ceph cluster deployment
 - Add/remove services like MON, OSD, MDS, MGR, etc.
 - Orchestrate Block and Object storage operations, including provisioning, configuration, monitoring, resource management, etc.
 - Deploy cluster with single network if nodes have limited network interfaces
 - Deploy cluster using separate network interfaces for Ceph public



Technology

- Kubernetes, Ceph, Whitebox switch, Linux, CSI, Golang



Benefits

- Calsoft's rich experience in Kubernetes, Ceph, CSI, Rook helped the customer fast-track product development, with complete reliance of Kubernetes-related tasks on Calsoft

Content Delivery Network in Telco Environment



Engagement

- Calsoft supported a Telecom customer with deployment of their application for delivering multimedia-based contents.



Solution

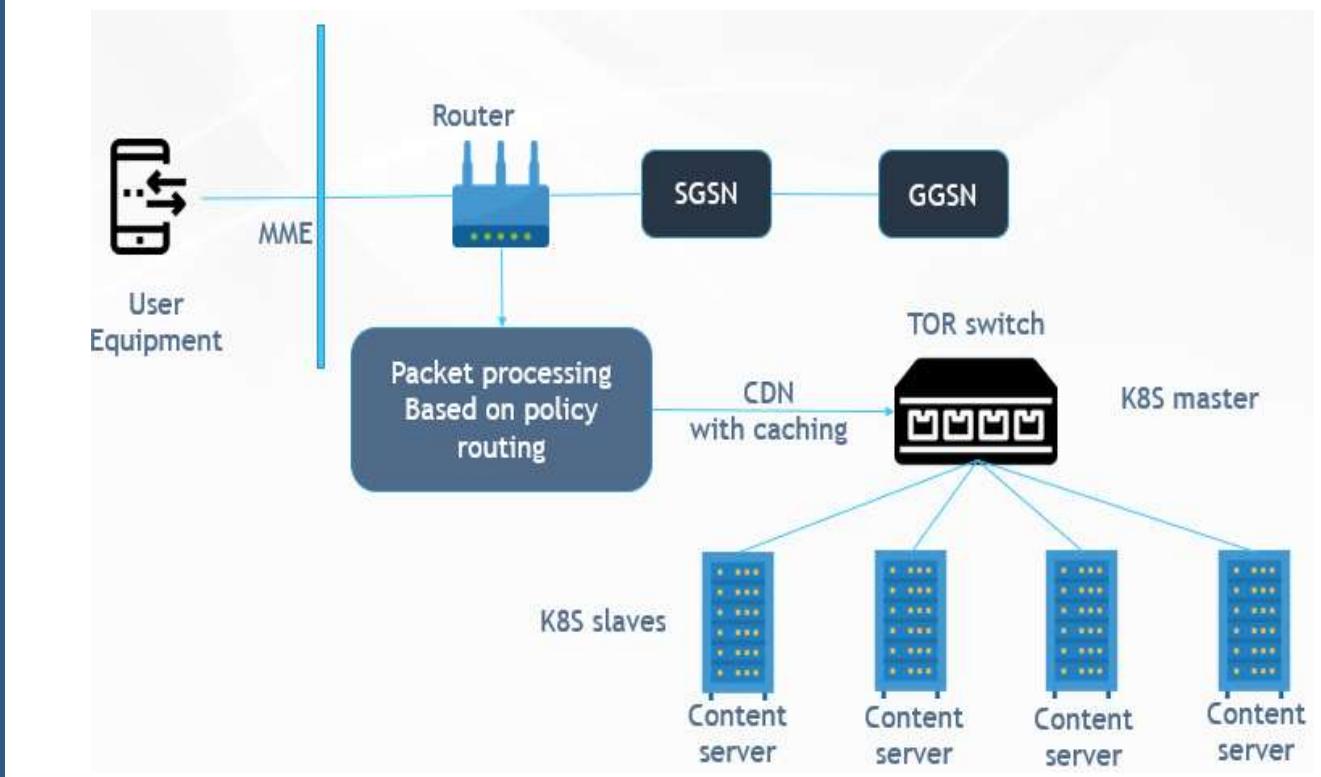
The engagement involved:

- Creation of a Kubernetes setup with master node running on the ToR switch and servers running as worker nodes. The servers hosted the multimedia contents, while the static contents were cached at the ToR edge.
- Implementation:**
 - Created a setup to imitate the LTE architecture comprising MME, GGSN, SGSN
 - Added a packet processing engine for L7 inspection of data requests and diverting the request to CDN appropriately
 - Depending on the nature of the request, the response was delivered by the edge device or further propagated to end servers for fetching the dynamic multimedia contents.
 -
- Functionality:**
 - Application deployment and management
 - Verify delivery of contents with low latency to end users



Technology

- Kubernetes, Golang, ToR switches, LTE architecture



Benefits

- Used caching solution at the ToR switches to deliver static contents to the end devices
- Kubernetes helped in deployment and application orchestration

Edge Computing: Contribution to Akraino Edge Stack



Engagement

Calsoft contributed to the Akraino Edge stack with code enhancements to the Akraino Edge family and created two qcow2 images.



Benefits

- Edge use case (IoT) can be tried out in a couple of hours instead of spending days by using the developed images.



Technology

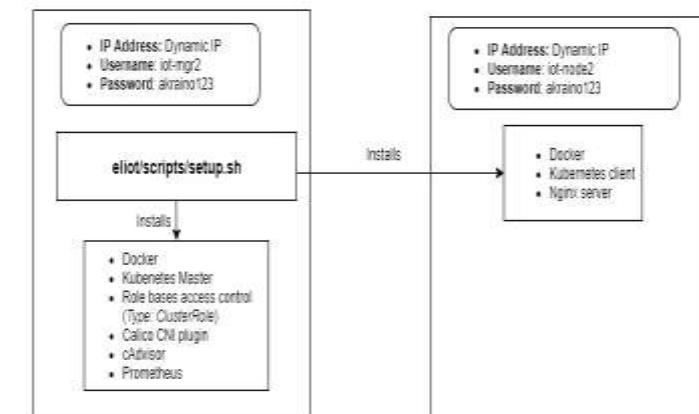
- Language support - Python automation
- Technologies: K8S, cAdvisor
- OS - Linux



Solution

Calsoft's contribution towards Akraino Edge Stack included:

- Made code enhancements to the Akraino Edge family through automation scripts and ready-to-use VM images
- Created two qcow2 images that allow users to create VMs, which can be further used for deployment of ELIOT using Kubernetes
- Worked on the blueprint named 'ELIOT: Edge Lightweight and IoT Blueprint Family'. The ELIOT blueprint intends to create Edge computing setup in two ways:
 - Kubernetes
 - KubeEdge
- Contributed to the creation of a setup using Kubernetes
- Added two files to the main branch, which can be accessed via kubernetes_cleanup.sh and kubernetes_reset.sh
- Automated installation of VMs, which helps bring up ELIOT using a variety of K8S components, including CNI plugins, cAdvisor, Prometheus
- Contribution Links:
 - [Manager Node](#)
 - [Edge Node](#)
 - [Help document](#)



IOT-Manager

IOT-Edge Node

Akraino Contribution: StarlingX Sandbox Environment



Objective

- StarlingX is a complete edge cloud software infrastructure stack focused on: easy deployment, rapid response, low-touch management, and fast recovery. It is based on open-source components such as OpenStack, Kubernetes, OVS-DPDK, and Ceph.
- Calsoft contributed to the community by creating a sandbox environment of StarlingX to experiment and understand the use of the platform.
- In an all-in-one VM image, the user can see the functioning of the StarlingX platform with the open-source components, including an IoT Gateway (EdgeX Foundry).



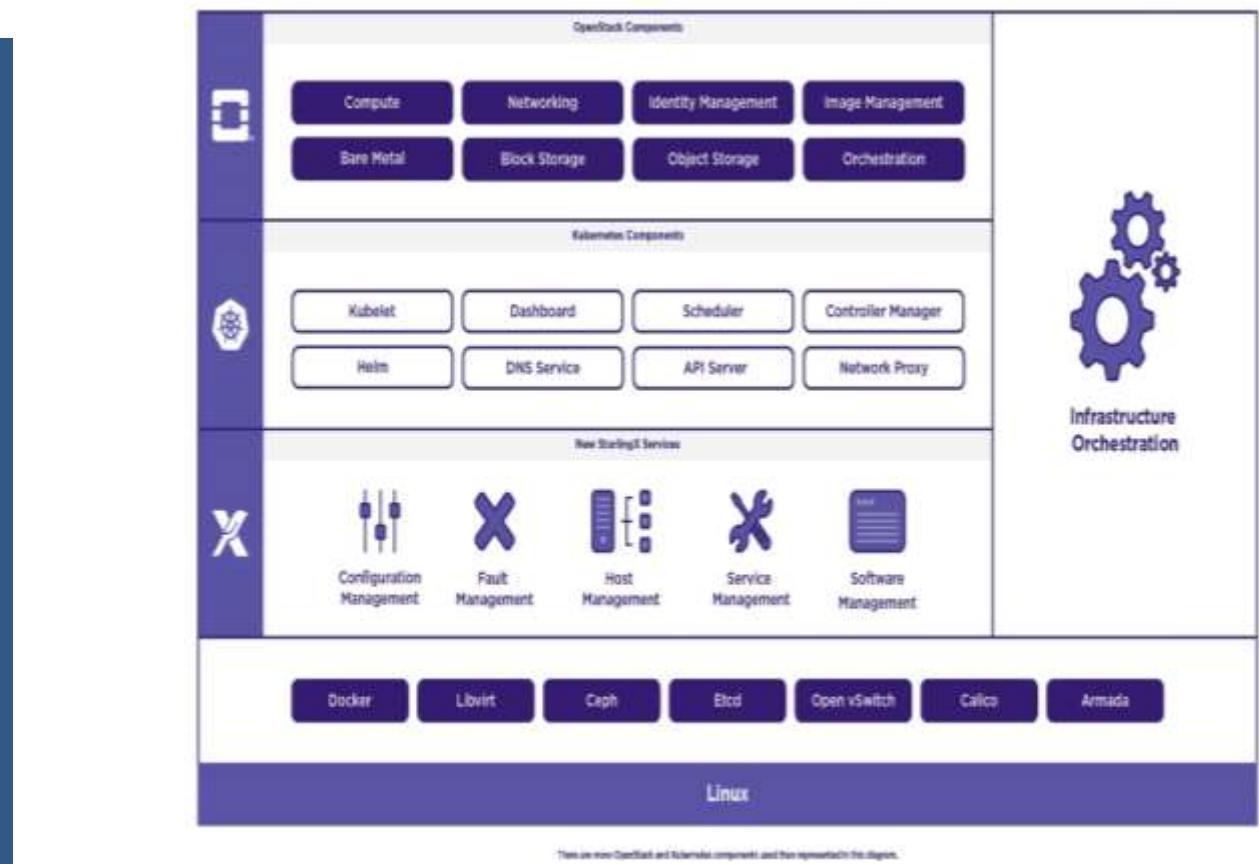
Contribution Links

- **VM Images:**
https://drive.google.com/open?id=1ntQSILp4rg-L_CMQPLCPsvtYdAmQFHfp
- **Setup Doc:**
https://drive.google.com/open?id=1j0IBwKiwwD1Vju9_QltFo1oltMla41x3
- **How to create StarlingX Images Doc:**
https://drive.google.com/open?id=1c2WzC3E_FnoJMfFwADFj1FWOn4Fx8jvw
- **StarlingX OpenDev link:**
<https://review.opendev.org/#/c/692202/>



Technology

- Akraino, Edge, DPDK, Ceph, OpenStack, Kubernetes



Benefits

- Significant reduction in the kick-off time to experience the StarlingX Edge platform with ready-to-use VM images instead of spending days or weeks
- Methodical documentation with easy steps to bring up the StarlingX all-in-one VM

Edge Device Orchestration : Configuration and Monitoring Console



Engagement

Calsoft is engaged with a client for development of an Orchestration platform to configure, monitor and administer the edge devices and servers.

- The engagement includes:
- UI/UX Design
- Development of complete Orchestration Platform (frontend & Backend)
- Testing, validation of the Orchstration platform



Benefits

- Created the platform using micro-service based approach to ensure pluggable and extendable design.
- Allows the DC admin to configure and monitor the nodes at the Edge.



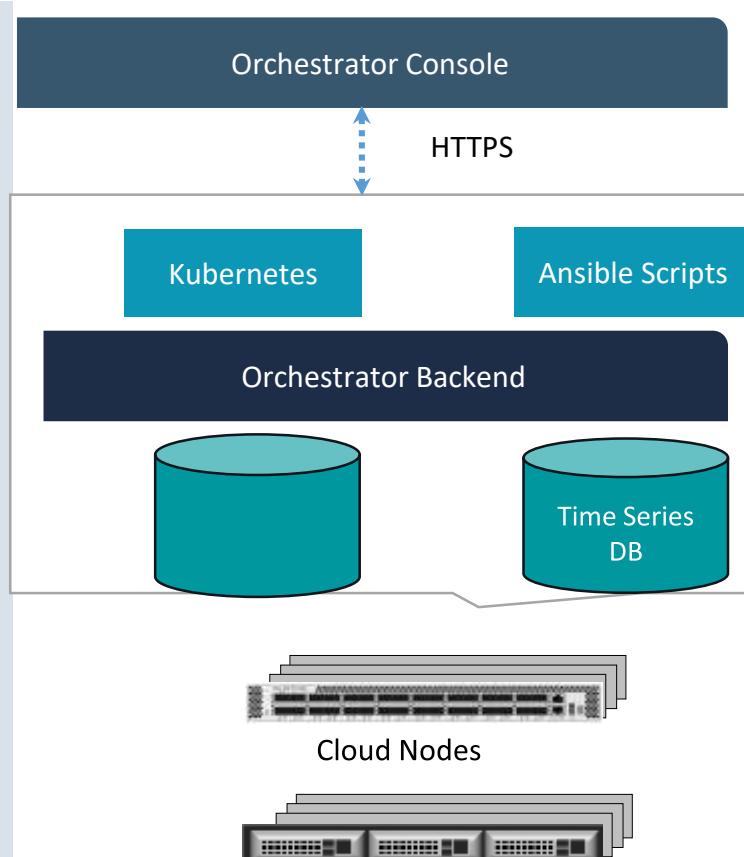
Technology

- Go Lang, React JS, Ansible, Redis, PostgreSQL, Kafka, Parquet, K8S, Prometheus



Solution

- Regular interaction with Product Management to understand the customer use-cases and come up with UI/UX design and wireframes.
- Developing the Orchestration platform, using which the users can create inventory items, configure the edge devices and do performance monitoring of the edge devices.
- The solution includes using open-source libraries and tools as well as developing modules a fresh to cater to the requirements.
- Validation of the use cases and testing the user scenarios as per the requirements..



Edge App Demo with e2e Network Slicing

Engagement

Calsoft developed MES Edge platforms for the customer, starting with some real application and e2e Network Slicing.

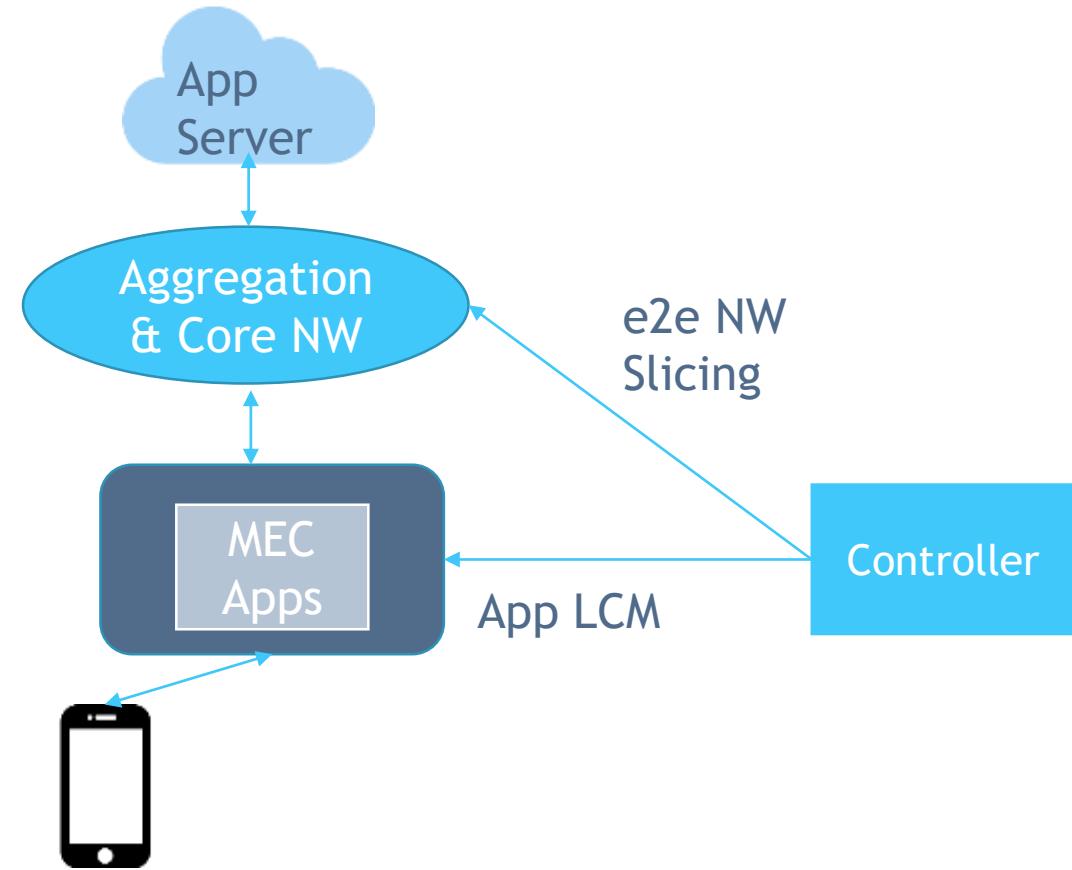
Solution

Calsoft worked closely with the customer in designing and developing the product, starting with a static demo for its Telco customers:

- Designing & developing the edge platform based on Akraino blueprint
- Integration of the controller for Application Lifecycle Management
- Integration of the controller for triggering e2e Network Slicing
- Onboarding an application on the edge and demonstrating the improved service quality with e2e Network Slicing
- Network is mostly optical and the controller already supports configuration of the network

Technology

- Akraino, Edge Application, Network Slicing, Golang, Kubernetes



Benefits

- Quick initial go-to market with static PoC demonstration for potential Telco customers
- Calsoft's deep infrastructure expertise augmented the strong network orchestration capabilities of the customer's product to build a new product line

Edge Computing and Edge AI - MLOPS

Engagement

Calsoft was engaged with the customer to build an Edge AI network to interact with personalized apps, telemetry collector and Cloud applications.

Solution

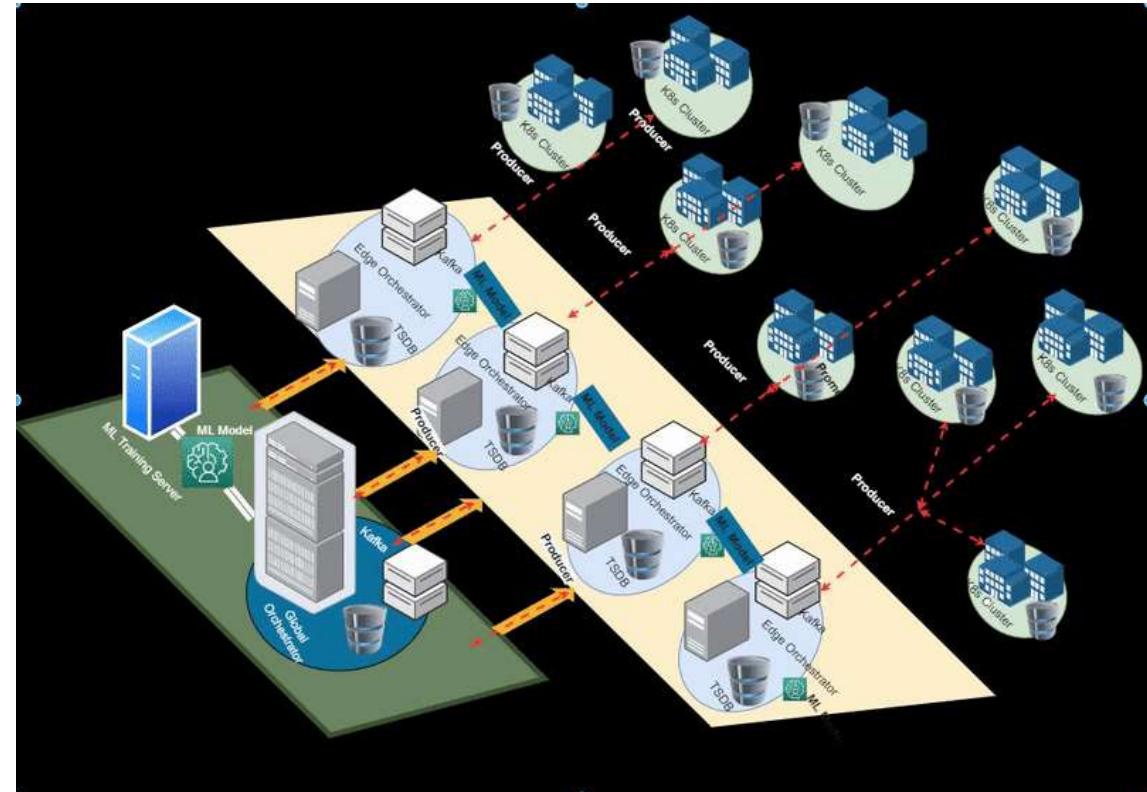
Calsoft helped the customer in building their edge Orchestrator, K8s Clusters , Edge Inferencing system , Machine learning workflow and Data collection pipeline.

The engagement underpinned:

- Automate deployment of infrastructure and applications.
- Design Templates, Policy services, workflow engines, plugin interactions for management of the Clusters.
- Engineered Data Layer: Data Collection flow , Data transformation, ML Training & Deployment, Data Distribution, Edge Inferencing.
- K8s Cluster over the private network based on Policy engine produce the data on the Edge Orchestrator .
- EO apply ETL and push the Data to the Global Orchestrator and also store the data in the time series db.
- Global Orchestrator with this data train the ML model and broadcast those ML models as dockers to the EO.
- EO use these models to do inferencing based on the use cases.

Technology

- Python, K8S, Kafka



Benefits

- Cost saving
- Less TAT
- Real time insights
- Better customer experience



Success Stories: Wireless

Cloud based Wi-Fi controller



Engagement

Calsoft was engaged with the customers for building cloud based Wi-Fi controller for their Wi-Fi infra products. The aim was to build and integrate modules for a scalable Wi-Fi controller to manage the Wi-Fi access points at various user accounts.



Benefits

- Massively scalable WLAN controller
- Zero touch provisioning – Minimal user intervention
- Leverage Wi-Fi user and AP analytics for VAS and performance improvement



Technology

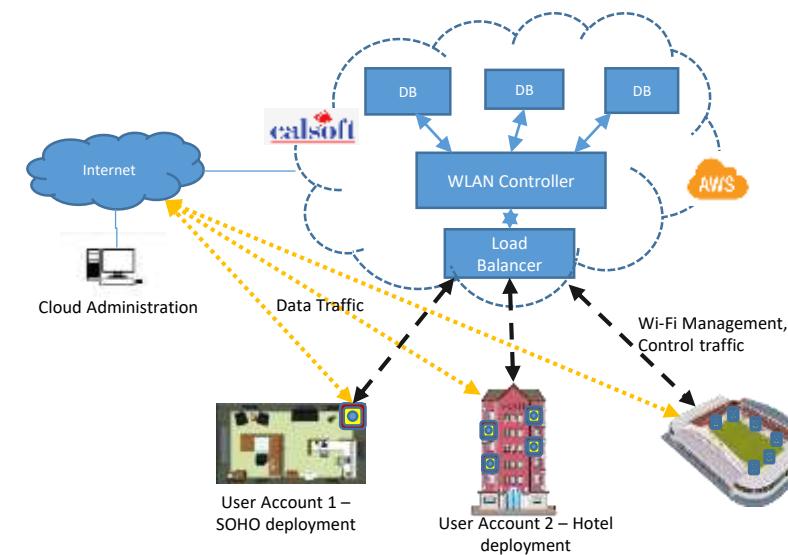
- C, Networking, Wi-Fi, Python, REST APIs, Shell, Linux.



Solution

Calsoft built the cloud based WLAN controller which was in multi tenant mode. All the cloud components including controller application, DB, other modules for provisioning, single sign on were deployed using AWS cloud services. It involved

- Multiple DB instances and a single controller application instance interact with each other
- All the instances could either be VM images or docker containers
- The load balancer module distributed the incoming application, network traffic from the user accounts to the controller application
- Access points deployed in different user accounts communicated with the controller application instances
- The central management system which is managed by the Wi-Fi service providers, helped provision devices, user accounts to the customers and to scale up/down the instances as per requirement





Engagement

Calsoft was engaged with the customers for building an analytics engine for their Wi-Fi infra products. The aim was to build modules for the analytics engine for various Wi-Fi infrastructure platforms to collect, analyze, populate and report various user, system level analytics.



Benefits

- Panoptic view of client's real time activities, Network performance
- Real time analytics for quick troubleshooting and performance improvement
- Considerable reduction in Opex by integration with Big data and ML



Technology

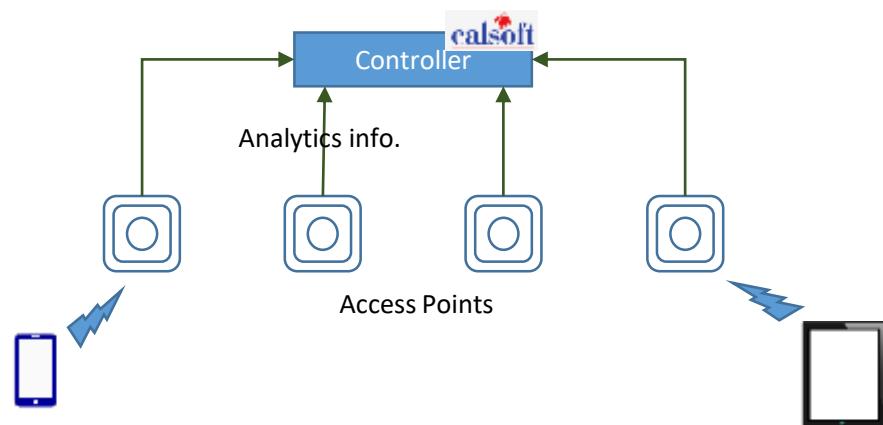
- Networking, Wi-Fi, Python, REST APIs, Shell scripting , ML, BigData.



Solution

APs collected the following real time analytics information and report to controller:

- Client association activity
- Application usage
- Wireless clients' network utilization stats
- AP health parameters - Memory consumption, CPU utilization, load on the device.
- Mechanisms had been added in the APs' firmware to monitor, collect and report the analytics information to the controller at regular intervals
- The controller analysed this information and populated in the form of various charts on the user interface



Wi-Fi AP-STA features : Porting and Integration



Engagement

Calsoft worked with a customer for porting the driver interface for various version of Linux kernel and android OS. Integration of Wi-Fi-direct, Wi-Fi-display features with android stack also took place



Benefits

- Calsoft helped the client to pinpoint issues in the API which were debugged to find issues in the driver as well as Wifi Firmware levels
- Functional and stress testing of the client APIs
- Use of the applications for interop testing during Wifi events



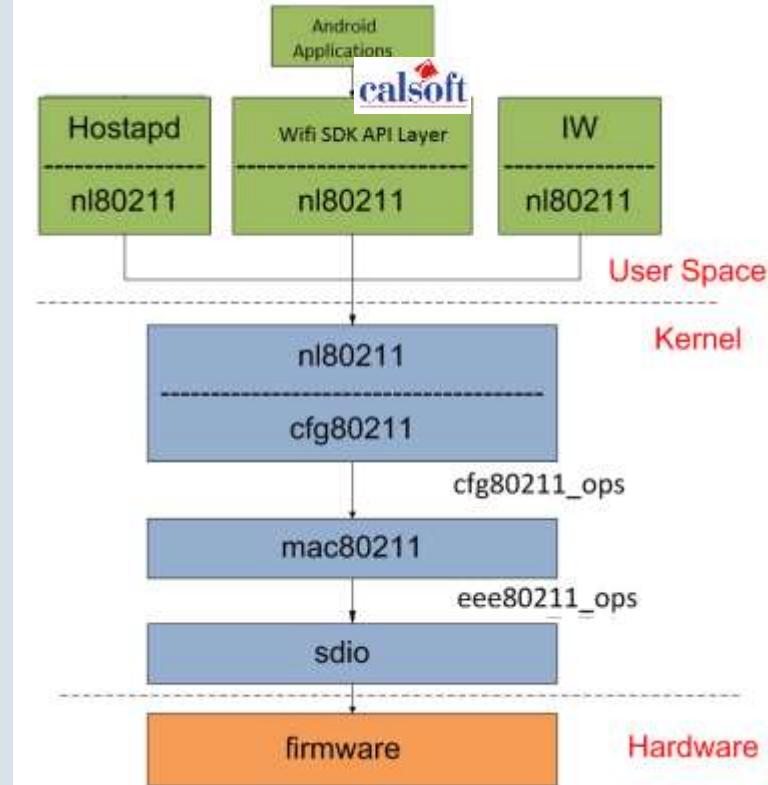
Technology

- Wi-Fi a/b/g/n, C, Linux Drivers, Android development, software API SDK.



Solution

- Studied the Linux kernel/Android OS system APIs and changed the OS layer of the driver code to work across different versions using compiler flags. Added Make file changes to create a common release codebase
- Client chipset supported AP-STA feature involving simultaneous association as well as beaconing functionality in the same RF channel
- Used the API document from the vendor to understand the workflow of new Wifi features like Wifi-Direct, Wifi-Display, Direct AP link setup
- Implemented and tested utility applications to support these features
- Used these application to test the features on a development platform with a embedded wifi card as well as Android platforms on Samsung S3 device



Testing of Wi-Fi Access Points



Engagement

Calsoft engineers were involved in the QA of enterprise grade Wi-Fi access points using manual testing methodologies as well using automation frameworks using Python.



Benefits

- The engagement enabled the customer in rolling out commercial enterprise grade access points in the market



Technology

- Networking, Wi-Fi, Python, Shell, Linux.



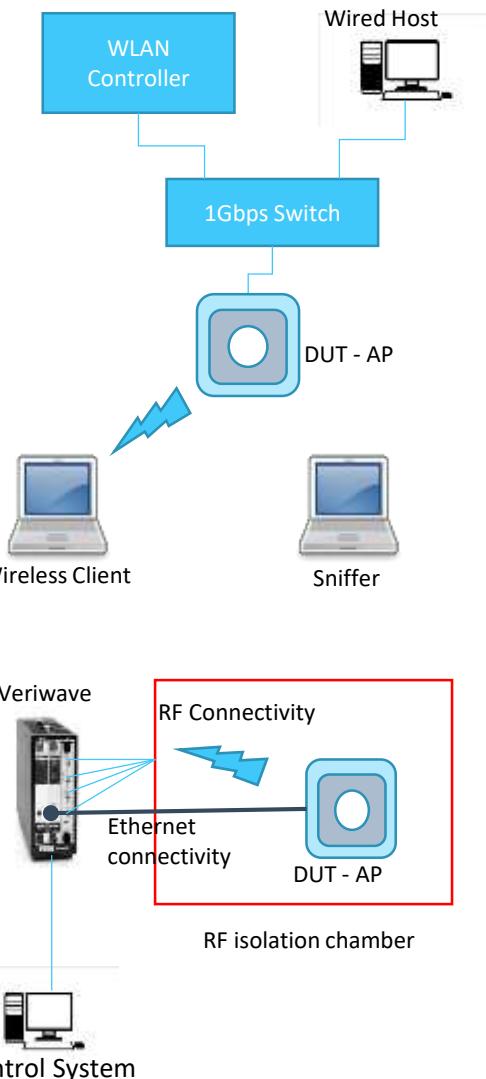
Solution

Test areas included are as follows:

- Prototype tests.
- RF Qualification tests for DFS, support for various Reg. domains.
- APs advertising the configured capabilities.
- Client associations.
- Different security methods.
- Client Roaming tests.
- QOS policies, Per User/SSID upload/download bandwidth limits.
- Other features like Mesh, Hotspot 2.0, 802.11k/v/r.
- Stress, Soak tests to identify any race conditions, memory leaks.
- WiFi Alliance Certification tests such as Wi-Fi CERTIFIED ac, Wi-Fi CERTIFIED n, WMM® (Wi-Fi Multimedia™), Passpoint®, Wi-Fi Protected Setup™, Voice-Enterprise etc...

Calsoft developed the automation framework in Python, based on Rest APIs. The automation was integrated with Jenkins to trigger build acceptance test as well as sanity test of untouched features.

Performance & benchmarking tests using I-perf, Ix-Veriwave, Ix-Chariot, Candela tech-LANForge. Also conducted throughput tests inside the anechoic RF chambers using the above mentioned tools.



Testing of Wi-Fi Stations



Engagement

Calsoft engineers were involved in the QA of enterprise grade Wi-Fi stations using manual testing methodologies as well using automation frameworks.



Benefits

- The engagement enabled the customer in validating access point functionalities against different types of mobile clients.



Technology

- Networking, Wi-Fi, Python, Shell, Linux.



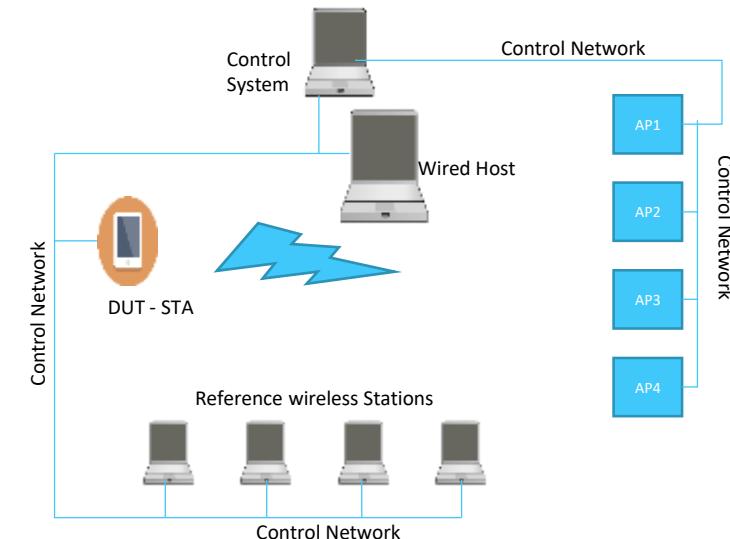
Solution

Test areas included are as follows:

- Client Basic Association Test
- Radio Coverage Association Test
- Radio Strength Test , Radio Interference Test, Radio Scan Test
- Radio Poor Signal Test , Radio Roaming Analysis, DHCP Roaming Analysis
- Application Behavior Testing
- Network WAN Latency Test, Network WAN Load Test, Network WLAN Load Test, Network WLAN QoS Test
- Battery Life Test
- Radio Power Save Operation
- Device Sleep / Hibernation / Screen Lock Behavior
- WiFi Alliance Certification tests such as Wi-Fi CERTIFIED ac, Wi-Fi CERTIFIED n, WMM® (Wi-Fi Multimedia™), Passpoint®, Wi-Fi Protected Setup™, Voice-Enterprise etc...

Calsoft developed the automation framework in Python, based on Rest APIs. The automation was integrated with Jenkins to trigger build acceptance test as well as sanity test of untouched features.

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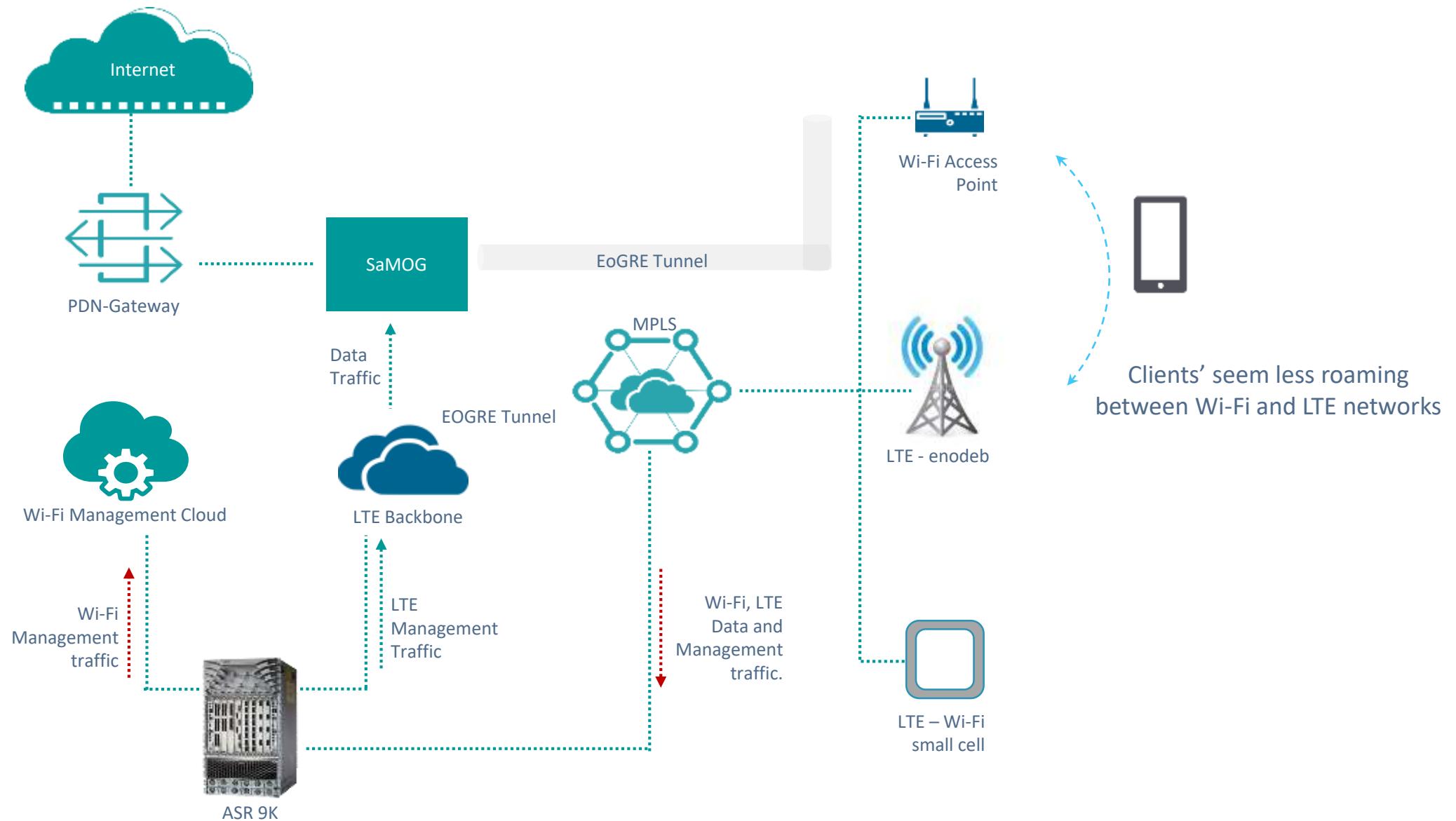




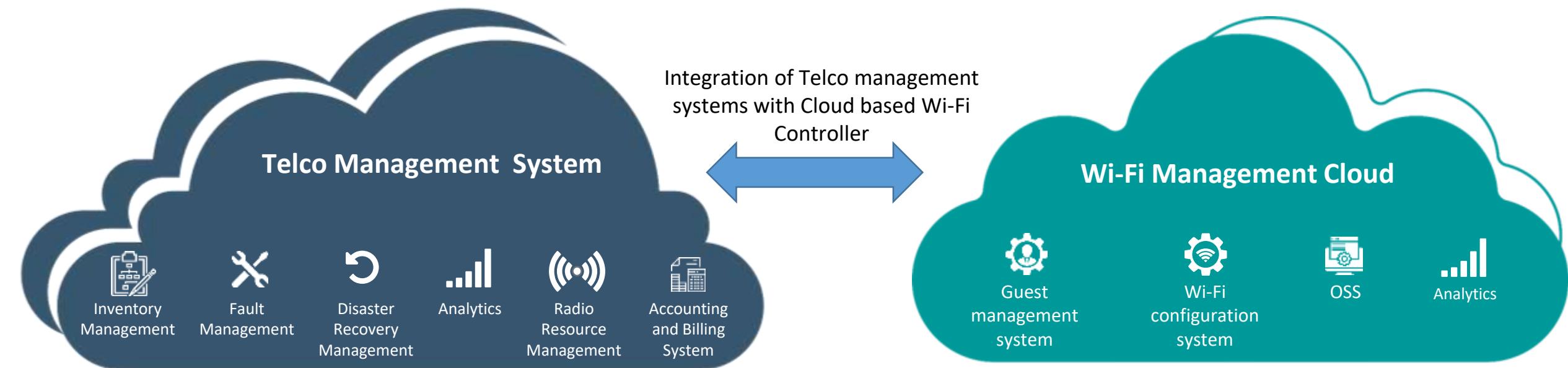
The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and a prominent tower visible against a light sky.

Deployment Stories: (Wireless Engineering)

LTE – Wi-Fi Offload



Integration of Wi-Fi and LTE Management





The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) visible. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there is a solid teal rectangular area containing the main title text.

Success Stories: Build and Release



Build and Release – Success Story I



Engagement

Calsoft helped the client manage the Build and Release cycles for their product carefully sparing time for client teams to handle other development enhancements.



Benefits

- Reduction in build and test cycle times
- Round the clock build support with reduced total cost of ownership



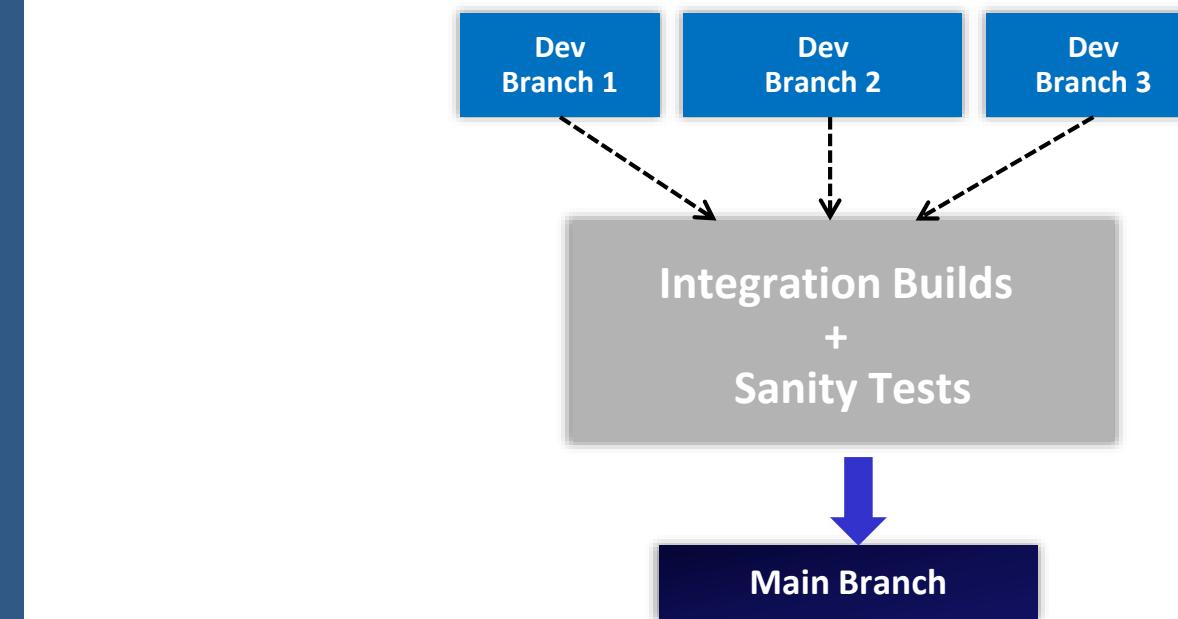
Technology

- PERFORCE, JIRA



Solution

- Calsoft build engineers monitored builds in late nights hours for US time zones – using hardware resources effectively, reduced the build cycles to less than 20 hours (from 36 originally)
- Remote team in India took ownership of building maintenance release enabling engineering teams to focus on future release tasks
- Identified and automated tasks to eliminate manual execution leading to less human errors



Build and Release – Success Story II



Engagement

Calsoft helped the client manage the Build and Release cycles for their product carefully sparing time for client teams to handle other development enhancements.



Benefits

- Fast turnaround resulted in high efficiency and productivity



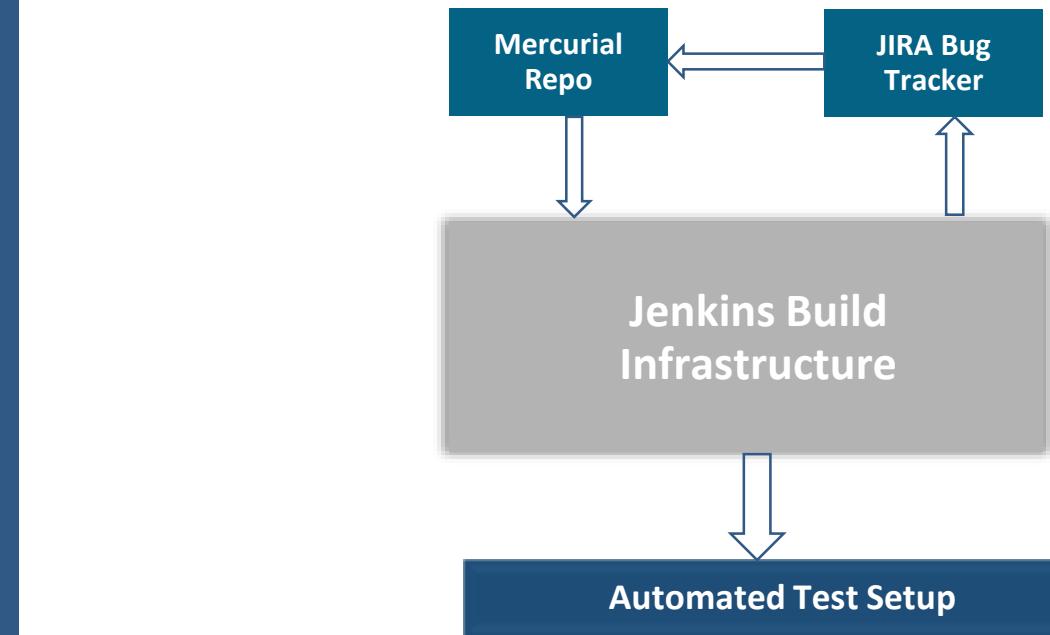
Technology

- Languages: Python



Solution

- Build monitoring by Calsoft build team during resulted in saving a potential loss of one whole day for QA team
- Calsoft team also assisted in Python/ Shell scripting automation tasks to help onsite team to focus on build and release support for ongoing release



Media Codec Development for Compression Algorithm



Engagement

Calsoft was engaged by the customer to validate their high-performance video, image compression algorithm in standard media player application. The high-level tasks were:

- Analysis of media player codec module
- Replace with high performance compression logic



Solution

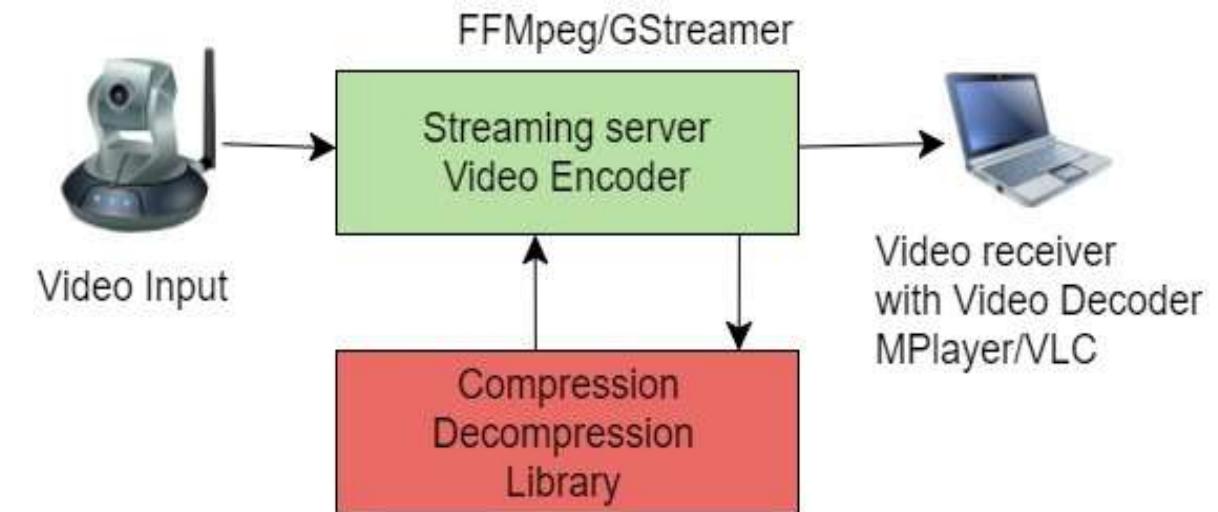
Feature development:

- Analyzed the open-source media library to find the compression, decompression techniques of audio-video, image files
- Replaced the compression logic with the custom logic from the customer
- Compared the performance of the codec with the existing compression logic and new compression algorithm from the customer
- Repeated this exercise with various media libraries and proved that the performance of the new compression algorithm is exceedingly good



Technology

- C++, Linux Programming, H.264, MJPEG, FFmpeg, GStreamer, VLC



Client's compression library integrated with FFMpeg/Gstremer



Benefits

- Verification of compression algorithm with a diverse set of media libraries and applications
- Improvement in the product quality based on performance results
- Increased confidence from the customer in their compression algorithm
- On-time delivery to the customer with scheduled release

MuleSoft Connector Development



Engagement

- Calsoft was engaged by a Storage Array customer to build a MuleSoft connector. Their enterprise customers have dynamic scale applications that need to be automatically scaled up and down, as per demand. This also needs to be tied into business applications.



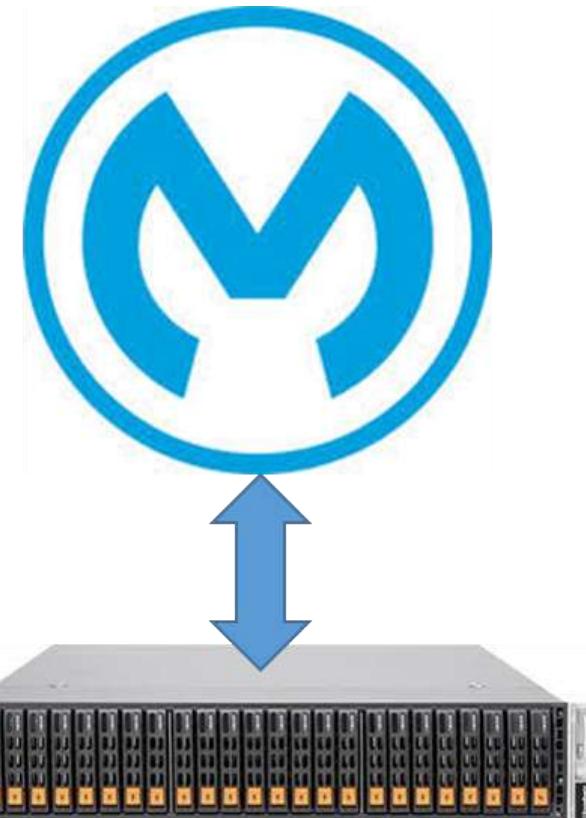
Solution

- The DevOps practices at enterprise organizations use automated workflows to deal with scaling infrastructure needs for automated and error-free operations
- Some of the customers wanted to provision and de-provision the infrastructure like storage on a need basis
- Since some of the enterprises use iPaaS platforms, we built a connector for the customer's storage array
- The MuleSoft application uses the connector to perform operations like Volume Create, Volume Delete, etc.
- The Connector is built by consuming the REST APIs exposed by the Storage Array



Technology

- JAVA, MuleSoft, Anypoint Studio, REST APIs, etc.



Benefits

- Automated provisioning and de-provisioning of storage objects
- Customers could do end-to-end automation instead of manually configuring the storage arrays

Service Provider Data Analytics

- Ready-to-use solution for service provider analytics



Engagement

Calsoft was engaged with a Fortune-listed storage company in developing a ready-to-use solution for service provider analytics. The engagement underpinned:

- Solution deployment
- Automation
- Testing
- Documentation



The engagement underpinned the following:

Deployment:

- Datastore deployment
- Hortonworks Data Platform deployment
- Cardinality ETL, Analytics Engine deployment and integration
- Execution and verification of use cases on cardinality analytics features like operational Intelligence, network utilization, creating incentives for subscribers

Automation:

- Development and testing of Node Deployment Automation tool
- Automation of RAID and VD creation using Python and APIs
- Automation of CentOS deployment, network configuration, creating disk partitions and logical volumes, installing pre-requisites viz. kernel upgrade, generate and copy public and private SSH keys, configure NTP, DNS for Hadoop deployment

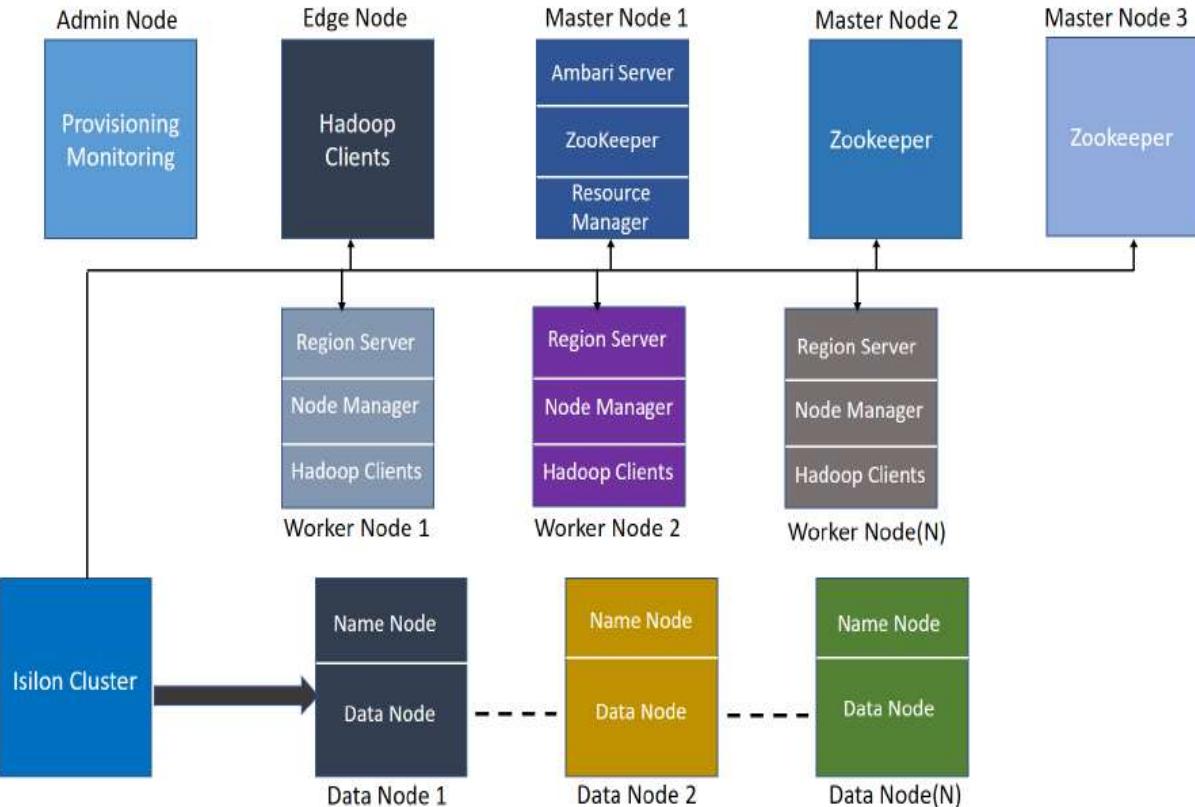
Documentation:

- Reference architecture
- Deployment guide



Technology

- iDRAC – Redfish, RAID, Python; Hadoop – Hortonworks Data Platform, ETL data pipeline; Data Analytics – Cardinality



Benefits

- Successful integration of Hortonworks Data Platform version 2.6.5 and Cardinality Perception Platform version 4.0
- Successful integration of Isilon OneFs 8.1.2 datastore with Hortonworks Data Platform

Manageability and Monitoring Tool for Object Storage

- Easy management of object storage appliance



Engagement

Calsoft is engaged with a leading storage company with multiple projects, including:

- Development of monitoring tool
- Development of manageability tool
- Development of S3-compatible operations



Solution

Calsoft helped the customer in developing a manageability and monitoring tool for their object storage. The engagement underpinned:

Management tool:

Development of a manageability tool to ensure efficient management of all object storage operations on management path using REST API/CLI/GUI.

Functionality:

- Update firmware/software and user management
- Health of hardware and software, and notify user through email and different channels
- S3 manageability operations and GUI

Monitoring tool:

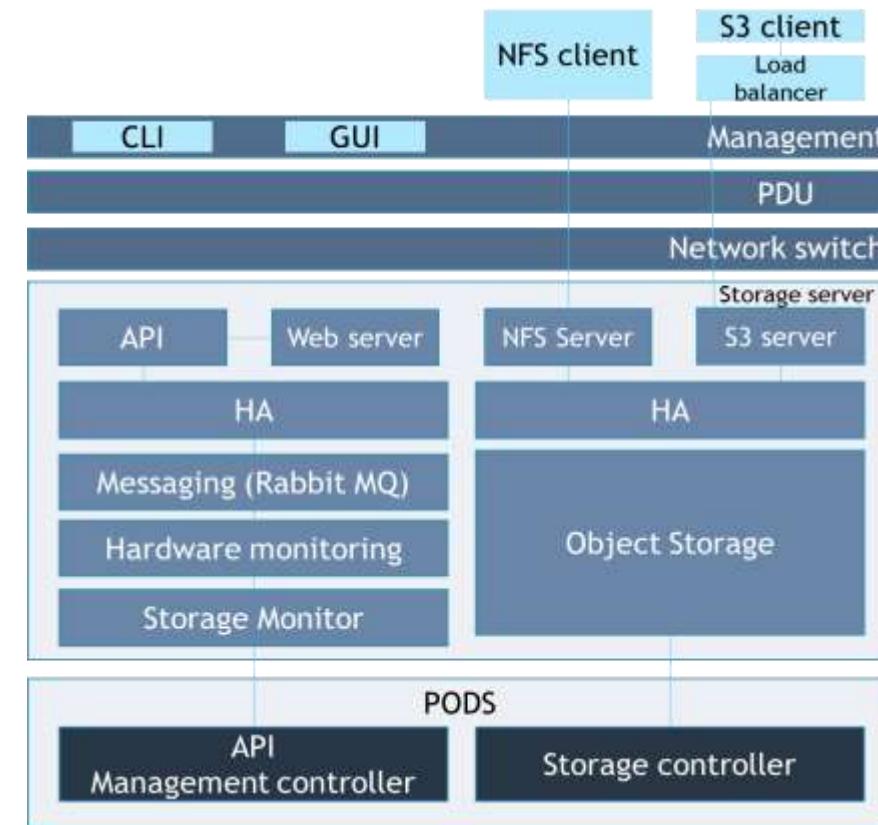
- Monitoring of hardware and software health status
- Monitoring of hardware and notifying consumers
- Health map of the entire system

Development of S3-compatible operations



Technology

- VUE.JS v3, Node JS + Express JS, Python, Java, C/C++, Corosync
- Pacemaker database, ElasticSearch



Benefits

- Easy management of object storage appliance
- Scaled solution to combine multiple object storage appliances
- Standard, efficient, secured way of movement of data

QRadar Integration with Switch through REST APIs

- Extending the log connectivity of the switch across networks and integration with SIEM



Engagement

- Calsoft was engaged with the customer to develop a Python plug-in for integrating switch logs with IBM QRadar SIEM



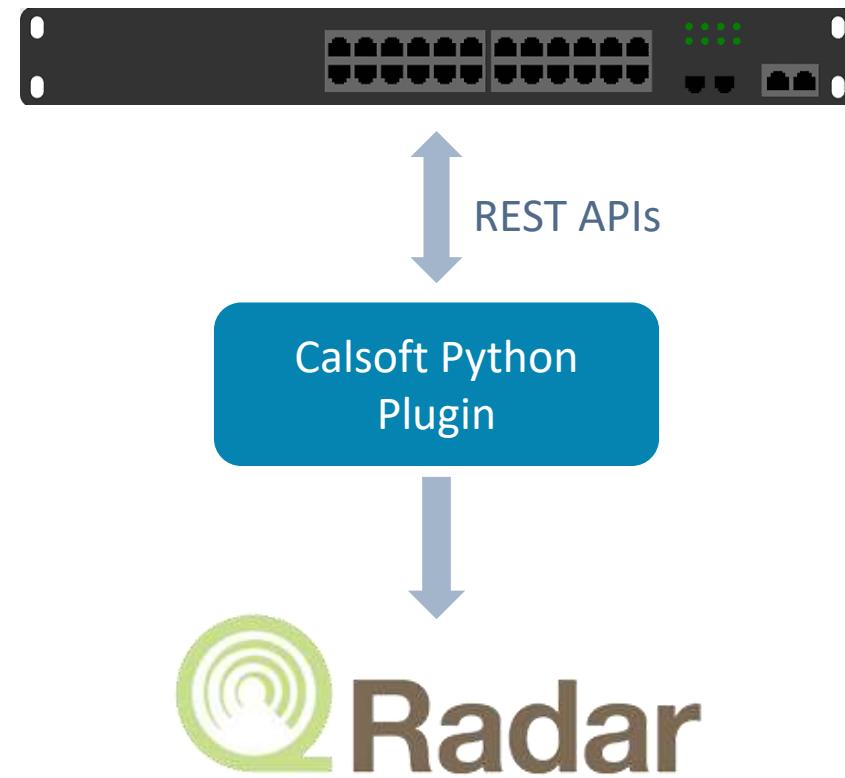
Solution

- The customer's switch product was compatible to push logs to QRadar through syslog. For a specific use case where the switch is not in the same network of QRadar, the logs would not work.
- To make the product work under any network topology, a solution was designed to work on https, accessible across the network.
- Calsoft developed a plug-in in Python to enable the integration through REST APIs.
- The plug-in would access the logs from the switches, using the REST API interfaces through the polling mode.
- It would convert the logs received as JSON objects into IBM's Log Event Extended Format (LEEF) and feed through the syslog route.
- A Device Support Module (DSM) was configured in QRadar to enable the parser of the logs to get the event into QRadar.



Technology

- Python, REST APIs, SIEM



Benefits

- The plug-in helped in extending the log connectivity of the switch across networks and extended the integration with the SIEM

LogRhythm Integration with File Audit Software

- The end customer can rely only on SIEM for the alerts



Engagement

- To integrate the client's File Safety software with LogRhythm's SIEM to push the logs of the File analysis and generate triggers based on breach rules



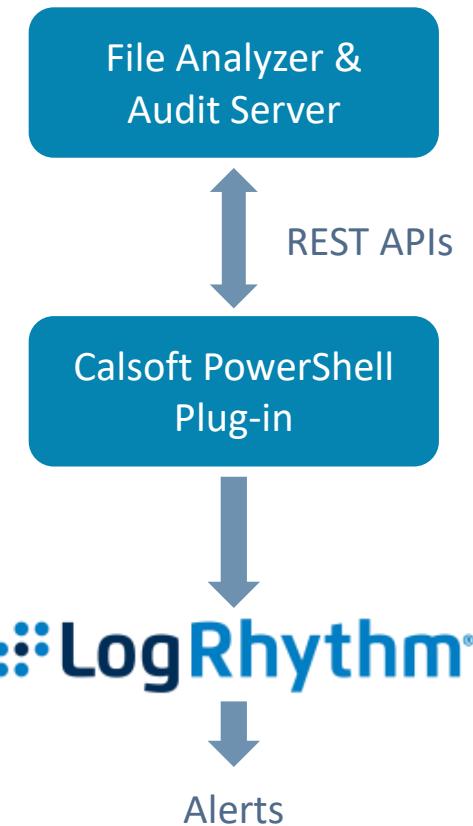
Solution

- The client's product is a file analyzer solution, that acts as a server client deployment to scan the files on the endpoints for vulnerabilities of various types – known viruses and malwares, pirated media and software, unauthorized file access, and corrupted software
- To integrate the logs of the file scans, Calsoft developed a plug-in to extract logs from the solution, make them compatible with LogRhythm, and feed them to generate alerts
- This plug-in was written as a PowerShell script
- It connects with the server of the solution through REST APIs to fetch the logs as per configurations given by the admin
- The fetched logs are normalized and converted to LogRhythm event format, that are fed through syslog
- Based on the rules of SIEM, the alerts are triggered



Technology

- PowerShell, REST APIs, SIEM



Benefits

- This plug-in helps utilize the SIEM installations for file-specific alerts that the client's product generates
- The end customer can rely only on SIEM for the alerts

LogRhythm Integration with File Audit Software

- Automated quick remediation of threats



Engagement

- Calsoft worked on integrating the customer's endpoint security software with LogRhythm's SmartResponse module to push the actions from LogRhythm SOC and mitigate the threats.



Solution

- The customer's product is an endpoint protection solution that blocks or allows IP/Protocol/Port based filtering.
- The access rules are set using a central policy engine and is pushed to thousands of agents running on the server hosts.
- To automate the actions when a threat is detected (based on IP), the SOC engineers wanted to automatically and quickly trigger an action to block the identified malicious source.
- This plug-in was written as a PowerShell script.
- The plug-in connects with the central policy server of the solution through REST APIs to push the access block/allow rules.
- The rules then get pushed to the right set of agents and servers, thereby averting the threat.



Technology

- PowerShell, REST APIs, SIEM

**LogRhythm®**

Alerts

Calsoft PowerShell
Plug-in

REST APIs

Endpoint Security
Product



Benefits

- This plug-in helped automate quick remediation of threats
- The end customer could rely only on SIEM for all the threat/security aspects instead of accessing different product interfaces

LogRhythm Integration with File Audit Software

- Plug-in helped utilize SIEM installations for file-specific alerts that the customer's product generates



Engagement

- Calsoft worked on integrating the customer's file safety software with LogRhythm's SIEM to push the logs of the file analysis and generate triggers based on breach rules.



Solution

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- To integrate the logs of the file scans, a plug-in was developed by Calsoft that extracted logs from the solution, making it compatible with LogRhythm and feeding it to generate alerts.
- This plug-in was written as a PowerShell script.
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- The fetched logs are normalized and converted to LogRhythm event format that are fed through syslog.
- Based on the rules of SIEM, the alerts are triggered.



Technology

- Powershell, REST APIs, SIEM

File Analyser &
Audit Server

REST APIs

Calsoft Powershell
Plugin

LogRhythm®

Alerts



Benefits

- This plug-in helped utilize the SIEM installations for file-specific alerts that the customer's product generates.
- The end customer could rely only on SIEM for the alerts.

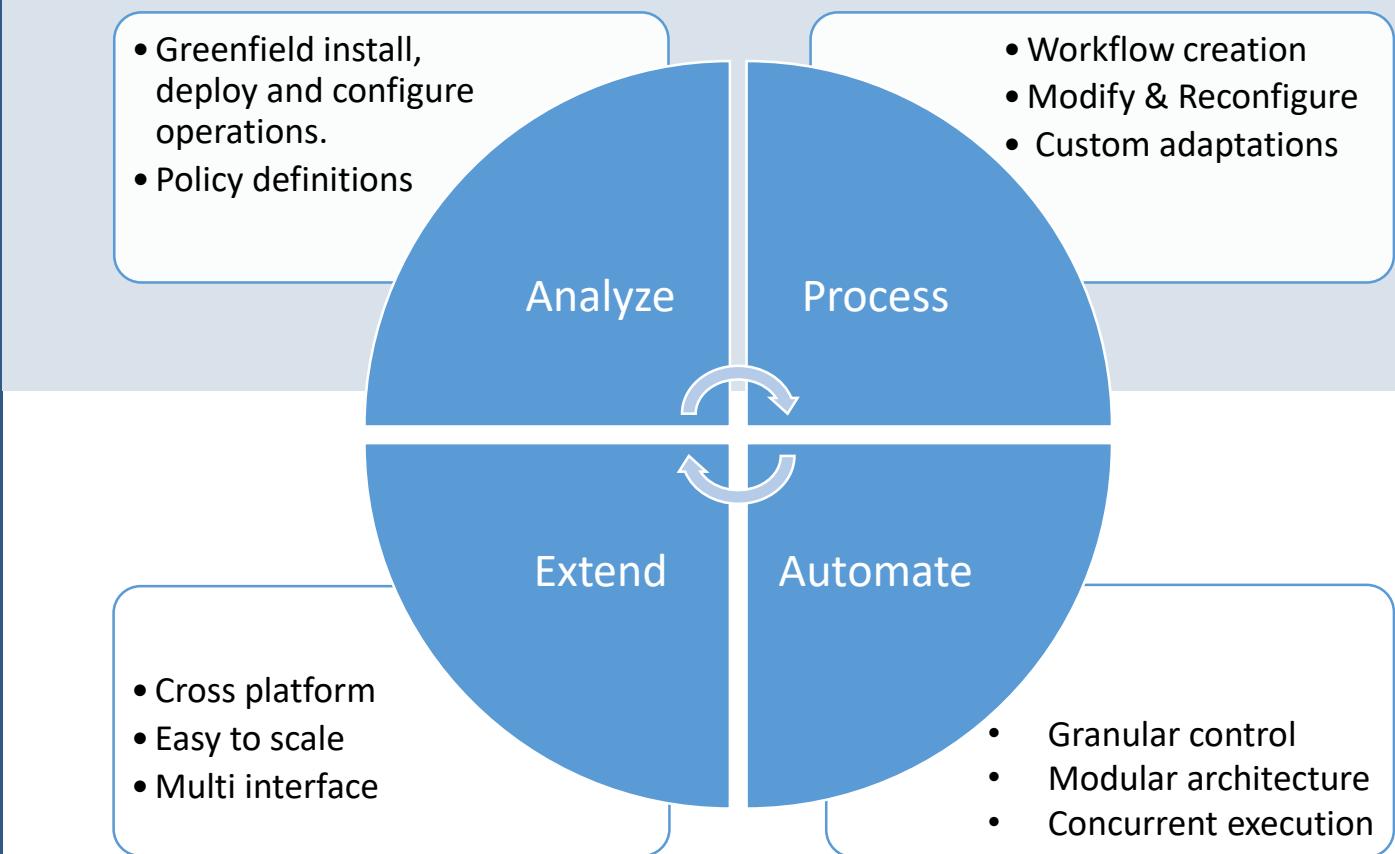


Benefits

- Adaptability and flexibility gives customers a huge competitive advantage.
- Faster turnaround times for offsite/onsite deployments
- Reduced staff skill requirements
- Reduced technical risk -- Core functionalities are developed and ready to use.
- Reduced schedule risk -- Core framework ready to use immediately
- Reduced customized application development schedule and risk
- Clearly defined, documented and tested API's greatly simplifying the add-on development



Solution





Success Stories: Virtualization

VMware vCOPs: Monitoring and Capacity Planning



Engagement

Calsoft was engaged with the client for monitoring and capacity planning by developing VMware vCOPs adaptor. The engagement underpinned:

- Integrating the monitoring and capacity planning for storage appliance in VMware environment
- Providing ability to monitor multiple storage appliances
- Providing resource association between VMware resources and storage appliance



Benefits

- Integration of Monitoring and capacity planning within VMware environment
- Receiving integrated alerts within vCOPs
- Easy monitoring through single Dashboard for multiple storage appliances



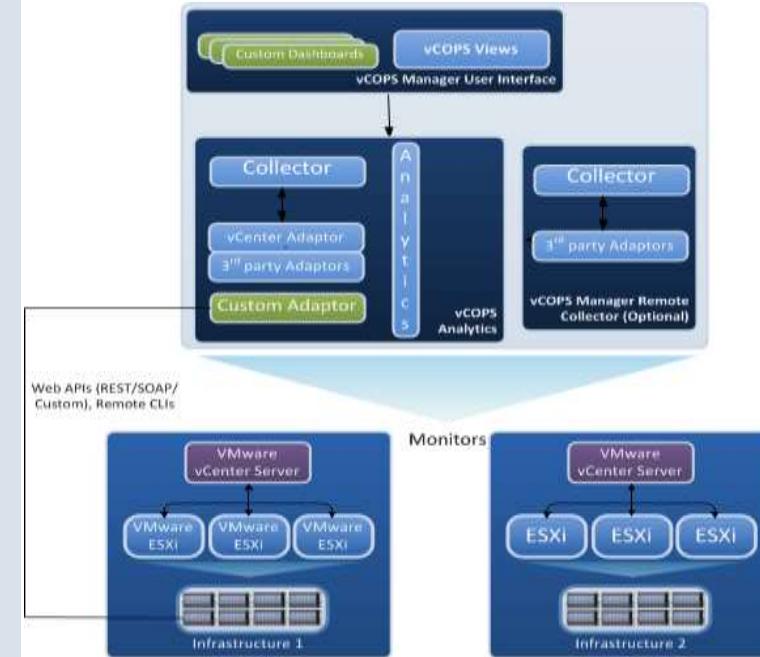
Technology

- Languages: Java, vCOPS SDK, RESTEasy, Ant.
- OS: Windows



Solution

- Developed VMware vCOPs adaptor for monitoring performance, health and capacity of storage appliance
- Provided ability to integrate with multiple storage appliances
- Provided single view to view multiple storage appliances as resources
- Integrated storage level alerts with vCOPs alerts database
- Integrated health badges with custom conditions



VMware vCOPs: Monitoring and Capacity planning dashboard

The screenshot displays the vCenter Operations Manager (vCOPs) interface. The top navigation bar includes links for HOME, DASHBOARDS, REPORTS, ENVIRONMENT, ALERTS, FORENSICS, and ADMIN. The main dashboard features a 'CUSTOM RELATIONSHIP' sidebar with categories like Health, Capacity, Status Filter, and Sort By. A large central area titled 'PERFORMANCE' contains six colored boxes: Capacity (16.12 %, green), Latency (90.19 %, red), Flash Hit Ratio (73.72 %, orange), Availability (17.92 %, green), CPU Usage (48.86 %, yellow), and Health (5.96 %, green). Below this is a 'GRAPH' section with two line charts. The top chart, labeled 'CPU Usage', shows values ranging from 0 to 100 over time on Sep 10, with a peak of 98.67 and a low of 0.46. The bottom chart, labeled 'Health', shows values ranging from 0 to 100 over the same period, with a peak of 99.61 and a low of 2.83. On the right side, there is an 'ALERTS' panel listing three items: 'user2' (VirtualMachine), 'WPSOtherDatacenter_user1' (WPSOther), and 'user1' (WPSOther). The bottom status bar indicates 'Internet | Protected Mode: Off'.



Engagement

Calsoft was engaged with the client for Plugin integration into the vSphere Web Client to monitor day-to-day management of large virtual environments within the vCenter.



Benefits

The client realized the following benefits:

- Single access point for storage & virtualization environment
- Provide convenient user interface for the storage device



Technology

- JAVA 6, Spring, Hibernate, VIM25, Flex, ActionScript

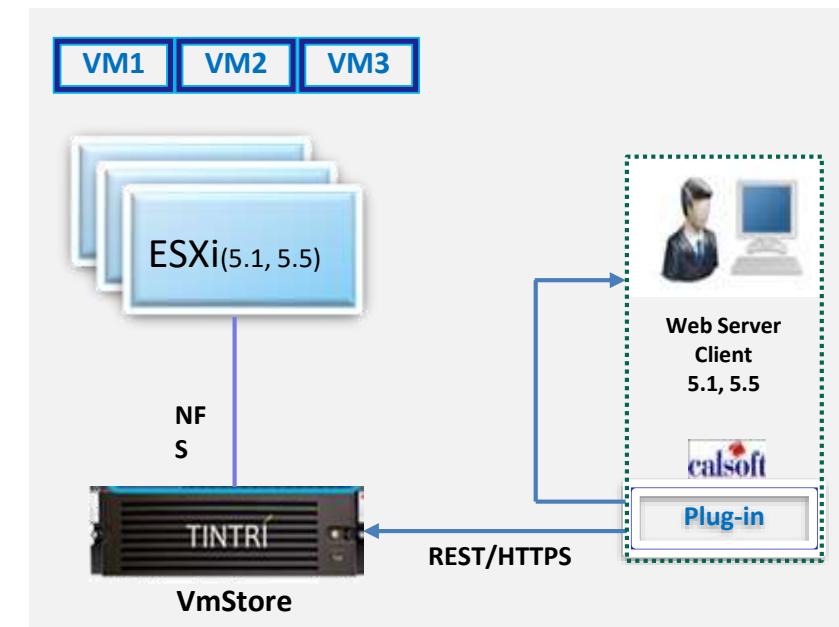


Solution

- Built, implemented and tested vCenter Plug-in extending VMware's objects

Features:

- Install, uninstall, upgrade and repair for the plugin
- Extend VMware's Virtual Machine object to provide performance statistic information
- End to end storage provisioning
- Protect Virtual Machine or Datastore at storage level
- Performed automation of Flex based Web GUI of VMware Web Client Server
- Completed manual testing of plugin supporting vSphere versions 5.1 and 5.5 for Windows and Linux appliances



vCenter Plug-in Development



Engagement

Calsoft was engaged with the client for Building, implementing and supporting vCenter Plug-in tool based on our customer's storage components. The engagement underpinned:

- Managing multiple existing access points
- Communicating between various heterogeneous components (storage and virtualization)
- Addressing insecure data issues
- Tackling the unavailability of integrated platform for the administrator



Benefits

The client realized the following benefits:

- Single access point for storage & virtualization environment
- Ease of use with a snapshot scheduler capability
- Secure data on protected VMs
- Provision of convenient user interface for the storage devices



Technology

- Platform – VMware ESX
- Language – Java



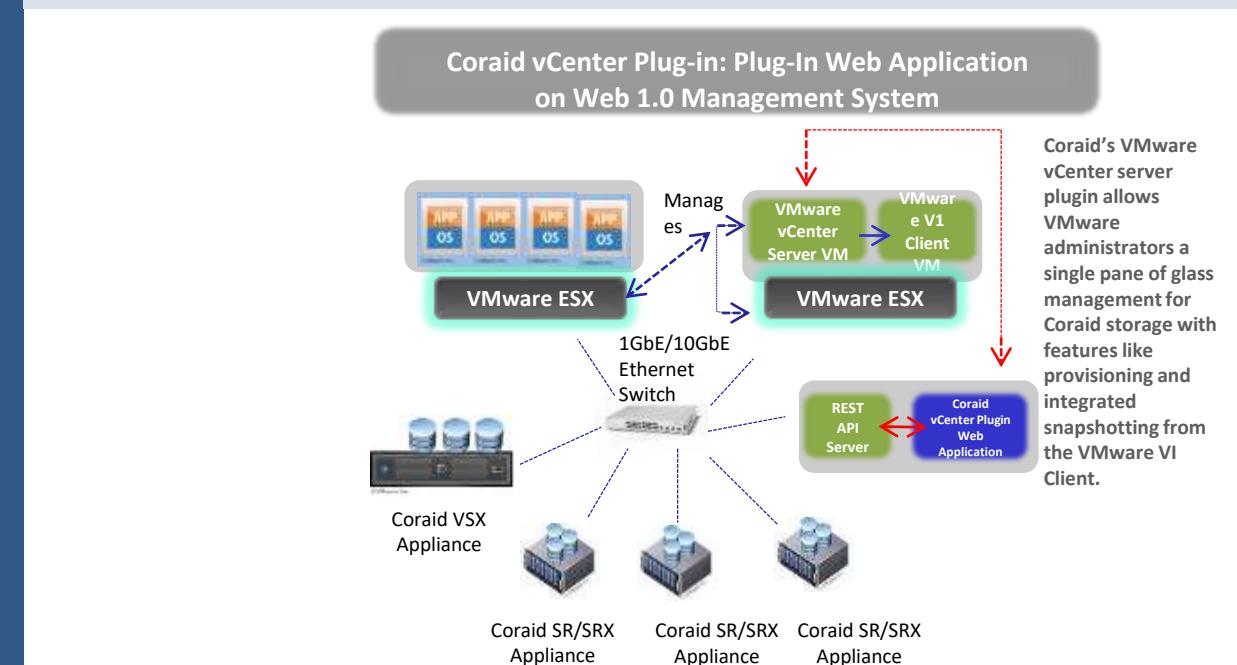
Solution

Features:

- Create, Enumerate and Delete Snapshots for vCenter Objects
- Restore either entire data store or individual VMDK files
- User can schedule snapshot frequency

Features:

- Integrates with Microsoft's VSS service
- Enables the snapshot creation on SAN backend
- Manages snapshots on a Volume Level object
- Restores volumes from earlier snapshots and/or mount snapshots for manual restores



vCenter Plug-in Upgrade to Flex based interface



Engagement

Calsoft was engaged with the client for the upgradation of vCenter Plug-in to Flex based interface. The engagement underpinned:

- Supporting the new VMware vSphere Web Client (VWC) deployment architecture for Customer vCenter Server plugin
- Supporting the new Flex based VWC user interface while keeping backend technology stack intact



Benefits

- Enhanced usability and security with support added for vCenter 5.1
- Backward compatibility with VMware vCenter 5.0 retained



Technology

- Platform VMware ESXi 5.1
- GUI – Flex, Javascript



Solution

Migration of the Customer's VMware vCenter Server Plug-in to support new VMware vSphere 5.1 architecture involved

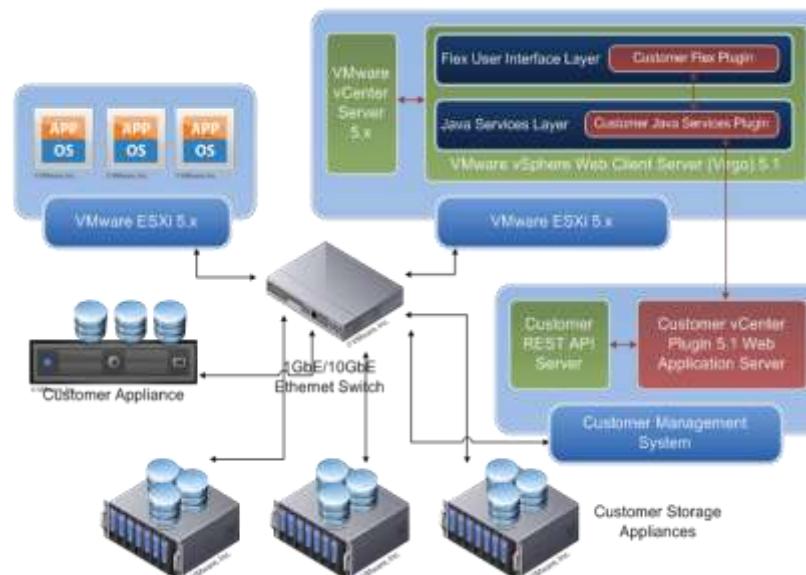
- Modularization of existing plugin application using OSGI framework
- Migration of GUI from EXT-JS/Javascript to Adobe Flex
- Migration to Virgo application server (based VMware's Spring Framework)

Features:

Create, Enumerate and Delete Snapshots for **vCenter Objects**

Restore either entire data store or individual **VMDK files**

User can **schedule snapshot frequency**





Engagement

Calsoft was engaged with the client for the management of client storage from within vCenter



Benefits

- Enabled authorization, access control and BIOS and firmware updates to storage servers from within vCenter



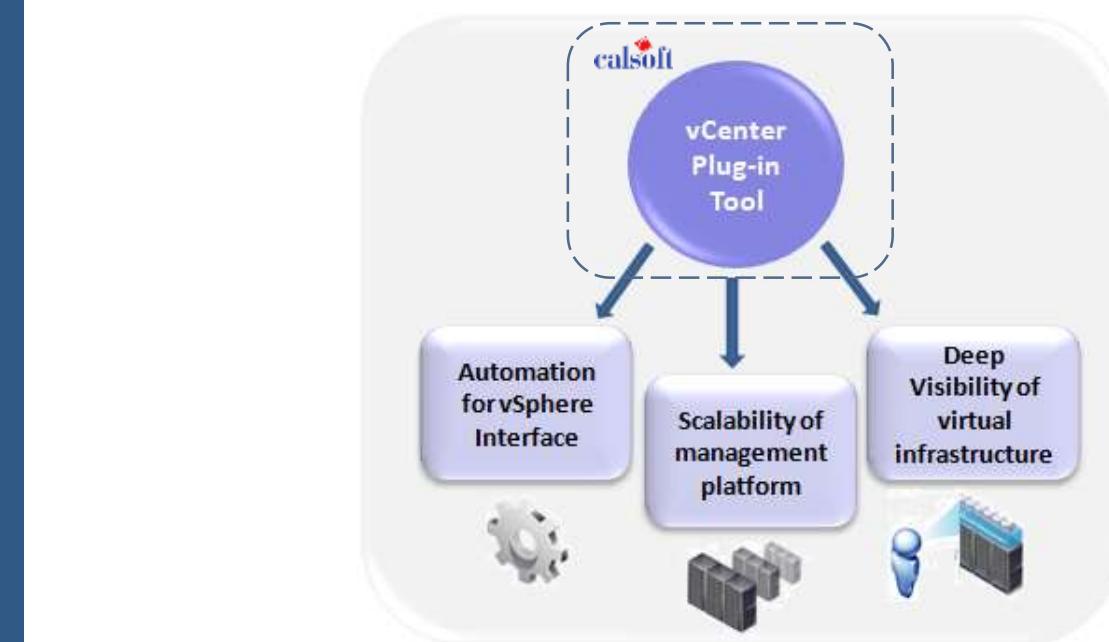
Technology

- ESX (vSphere)
- OS: Windows



Solution

- Created and mapped Highly Available (HA) **Virtual Volume** (VV)
- Mapped and unmapped a **snapshot** VV (SVV)
- Created and deleted snapshot relationship for an existing VV
- Enabled and disabled a snapshot relationship
- Performed a Complete Image (Clone) on a snapshot
- Performed an image update on a snapshot relationship



vCenter Plug-in Development



Engagement

Calsoft was engaged with the client for development of centralized ViSX storage management. The engagement underpinned:

- De-centralized storage management
- Migration of client storage devices without impacting business
- Graphical performance comparison of 8 VMs simultaneously



Benefits

- Better performance with client ViSX
- Easy portability to client Storage
- Single pane of management for client ViSX



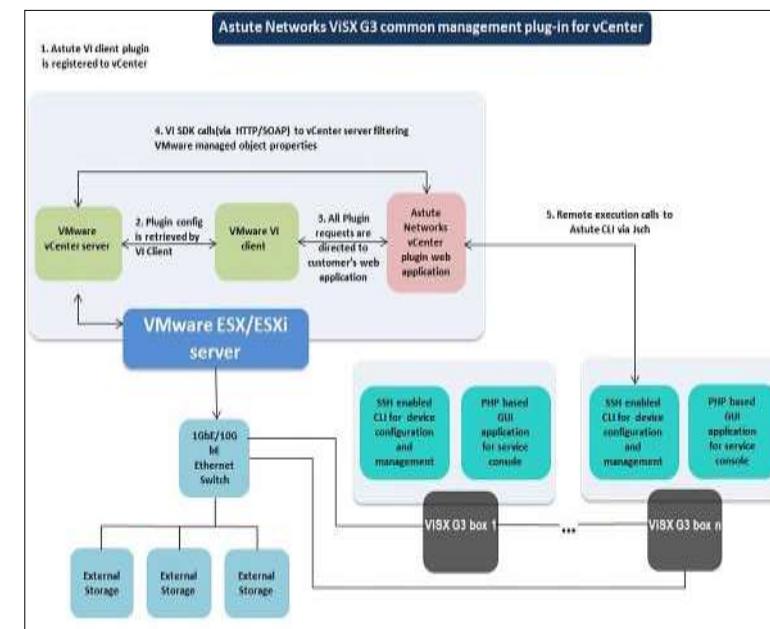
Technology

- Platform VMware ESXi 5.0
- GUI – Flex, Javascript



Solution

- Developed vCenter Plug-in for centralized ViSX storage management with following features -
 - Discover & manage client ViSX storage devices
 - vCenter 5.0 Plug-in context specific representation of client devices
 - Graphical performance comparison with other vendors for real time & historical data
 - Migrate VMs from other storage vendors to client and between different versions of ViSX devices



vCenter Plugin: Private to Public Cloud Migration



Engagement

Calsoft was engaged with the client for development of vCenter Plugin for private to public cloud migration. The engagement underpinned:

- Migrating VMware vDC from private to public cloud from VMware vSphere web client
- Inventory management
- Integration with Multi-tenant solution
- Management of Complex migration workflow



Benefits

- Client now had a single interface to manage VM migration
- Easily compare VM performance in private or public cloud.



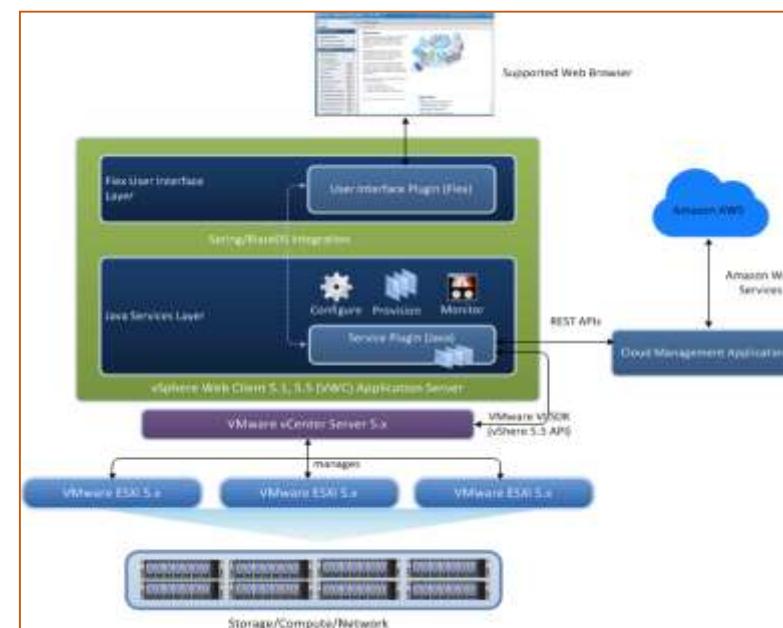
Technology

- Languages: Java, Flex Frameworks: Spring, OSGi
- Tools/Libraries: vSphere 5.5 SDK, Maven.
- OS: Windows/Linux



Solution

- Provided integrated VMware vSphere plugin for ease of management to VMware admin.
- Integrated with Amazon AWS for VM migration
- Tightly integrated views within vSphere Web Client to ease out management operations.





Engagement

Calsoft was engaged with the client for development of SRA for SRM. The engagement underpinned:

- Resolving the inability to undertake third party integration with VMware suite of products
- Providing excellent expertise in building SRA's for storage systems



Benefits

- Enabled Near-zero RPOs
- Automated re-protection of VMs
- Attained simple & cost effective replication
- Facilitated Planned migration, failover and fallback



Technology

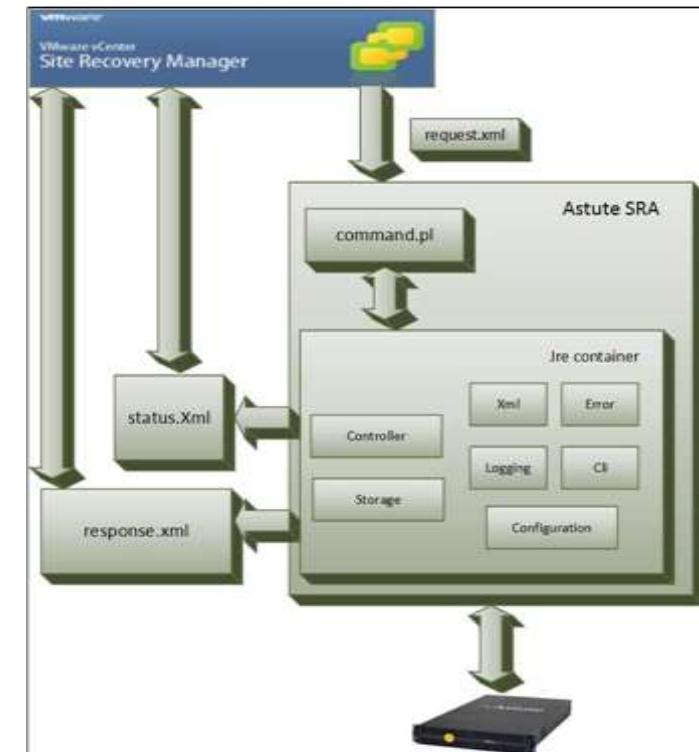
- SRA - Perl Commands.pl
- Storage Interface - JAVA



Solution

Calsoft's experienced team built the SRA's for Storage systems project right from the design to testing phase. The solution involved:

- Development of Storage Replication Adapter(SRA) to automate the failover of a volume from a storage system
- Designing test plans & executing test cases which conform to the official certification test suite from VMWare



End User Computing - File Creator Tool



Engagement

Calsoft was engaged with the client for validating de-duplication engine. The engagement involved validation of user data files in different formats that spanned across numerous VMs



Benefits

- Successfully create different types of unique files on a set of remote machines
- Client could produce pre-determined amount / size of randomly sized files in individual PC, in a large group of PCs



Technology

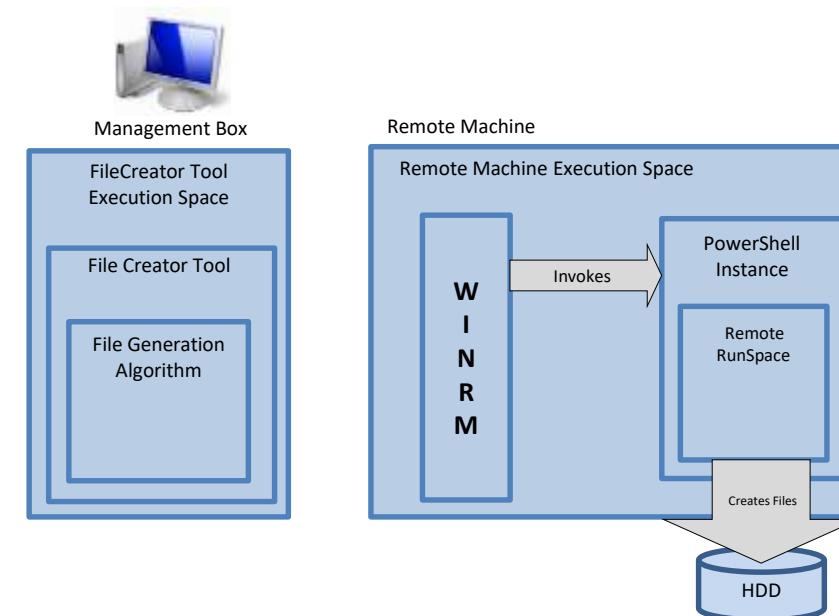
- C#, Windows Powershell, Windows Remote Management



Solution

Calsoft developed a '**console-based**' test automation tool to run in-house developed 'File Generation Algorithm' to perform key operations such as:

- Capture data configuration required for file generation
- Retrieve vCenter inventory details via PowerCLI executed remotely via WinRM
- Initiate a remote Powershell session for data file generation
- Terminate the session and generate report on success/failure over console



Development and Testing System Center Virtual Machine Manager



Engagement

Calsoft was engaged with the client for managing clustered network appliances from within SCVMM.



Benefits

- The Add-in GUI enabled multi-tenancy to cloud-service providers at customer's end
- Enabled unified and centralized management view for all network appliances in a given data center
- Better GUI-enabled control of network agents



Technology

- C#, .NET, WPF, Windows CA,
- Microsoft Network virtualization



Solution

Development

Developed SCVMM add-in using add-in SDK which can trigger various commands to network appliances

Design

Designed a GUI for add-in that provided a uniform view for SCVMM and add-in agents deployed on multiple appliances

Testing

Tested the system against a virtual data center

Features

- Set various parameters for network appliance
- Retrieve various details on network appliance
- High availability of software agent on network appliance
- Logging enhancements



VNX Provisioning Automation



Engagement

Calsoft was engaged with the client for VNX Provisioning Automation. The engagement underpinned:

- Navisphere management from within VI client
- Verification of REST APIs in automated way



Benefits

- Achieved better management and usability
- Quicker release cycle Enabled



Technology

- Java, Jetty Web Server, MySQL, VMware SDK, Ant, Maven, ExtJS, Spring, Hibernate, etc.

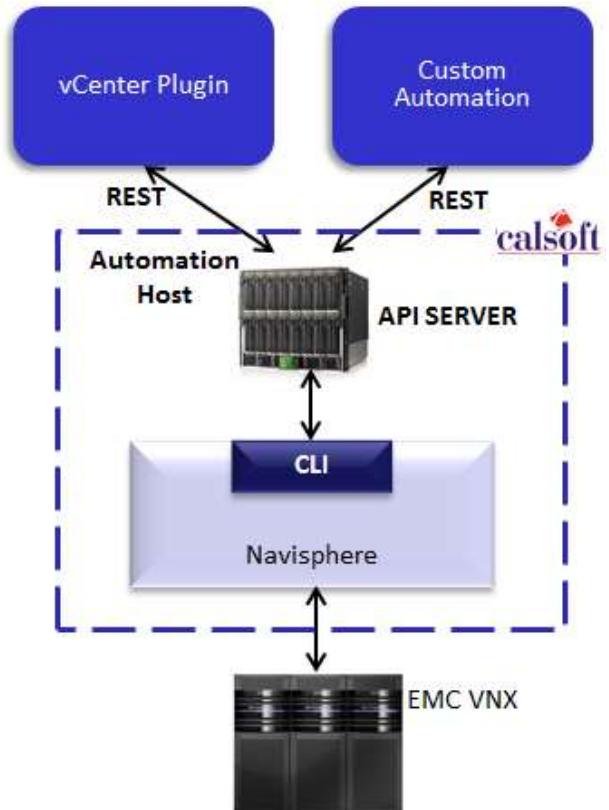


Solution

- Developed vCenter plugin with REST API's as backend that can plug into existing EMC infrastructure
- Developed automation test suite using Jmeter
- Automated REST API testing and Navisphere interface for EMC VNX

Features:

- Data store creation
- storage configuration
- iSCSI adaptor network configuration
- LUN operations
- Host binding to storage using WWN
- Snapshot scheduling
- Restoring snapshot



Implementation of VAAI (SAN)



Engagement

Calsoft was engaged with the client for implementation of VAAI (SAN). The engagement underpinned:

- Storage intensive operations like cloning, zeroing their expensive using traditional storage operations



Benefits

- Reduction of resource overhead in ESX
- Experienced improvement in performance for storage cloning, zeroing etc.
- Saved on CPU cycles, memory and storage fabric bandwidth consumption



Technology

- Platform: Linux
- Language: C

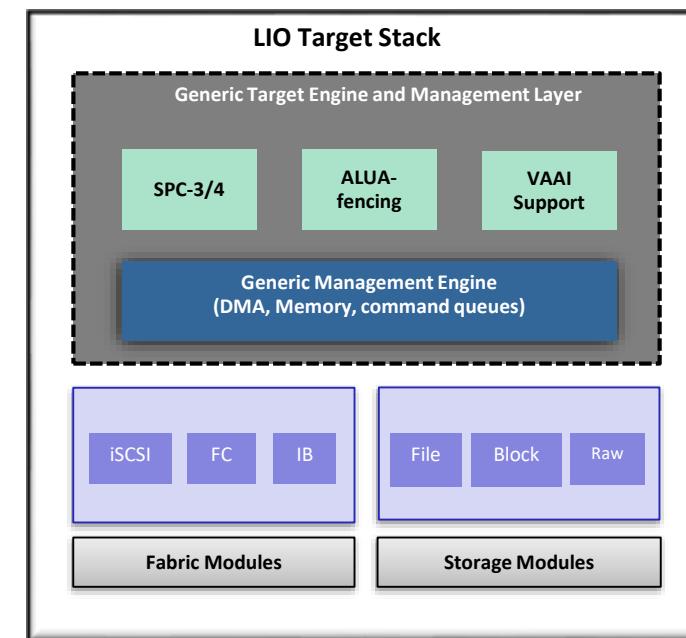


Solution

Implemented VAAI APIs in Linux SCSI Target Stack which supports Flash SSD Devices

Key Features of VAAI:

- HW accelerated Zeroing (WRITE_SAME)
- HW accelerated Copy (EXTENDED COPY)
- HW accelerated Locking (COMPARE and WRITE)
- Thin provisioning through UNMAP
- Receive Copy Operation Parameters (code 84h)



Implementation of VAAI (NAS)



Engagement

Calsoft was engaged with the client for leveraging advanced data movement features offered by storage array such as VM Storage, Thick Provisioning, Cloning and VM deployment



Benefits

- Increased efficiency with quick VM provisioning, VM clone & copy
- Saved ESXi CPU cycles, network bandwidth
- Optimized storage utilization reporting (provisioned vs. used)



Technology

- Languages: C, Python

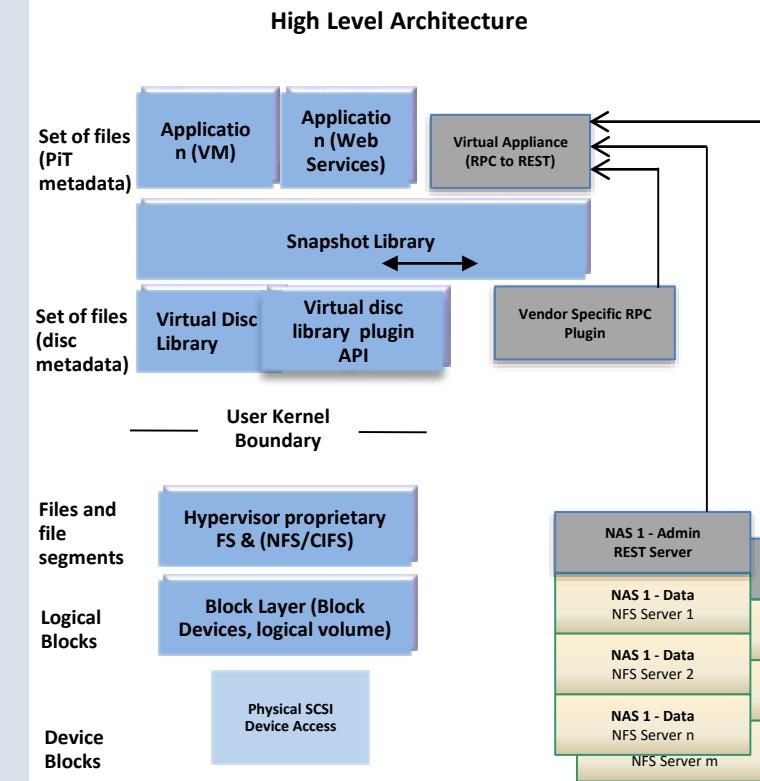


Solution

- Implemented VAAI for NAS environment
- Performed competitive analysis and market surveys

Features

- VAAI includes 3 main features:-
- Space Reservation
- Lazy Clone and Full Clone
- Extended Statistics





Engagement

Calsoft was engaged with the client for leveraging advanced data movement features offered by storage array such as Storage vMotion, cloning and VM deployment



Benefits

- Improvement in performance for some ESX operations by almost 10 times
- Saved on CPU cycles, memory and storage fabric bandwidth consumption



Technology

- Platform: Linux
- Language: C

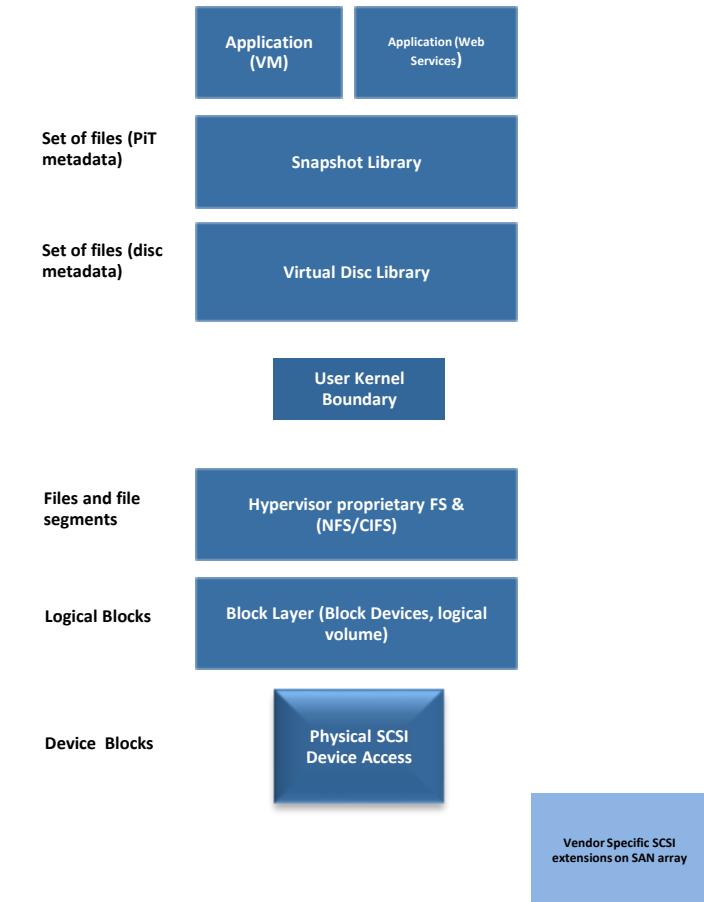


Solution

- Implemented VAAI for SAN environment.
- Performed competitive analysis and market surveys

Features

- VAAI includes 3 main features:-
- HW accelerated Zeroing (WRITE_SAME)
- HW accelerated Copy (EXTENDED COPY)
- HW accelerated Locking (COMPARE and WRITE)



Development of Virtualization Infrastructure (VI) library



Engagement

Calsoft was engaged with the client for development of Virtualization Infrastructure (VI) library. The engagement underpinned:

- Resolving complexities of server management
- Deployment of I/O virtualization switches without any modification to the existing servers or networks in the data center



Benefits

- Reduction in I/O power consumption
- Reduction in capital and operating expenses



Technology

- SUSE Linux
- Enterprise Server (SLES) 10

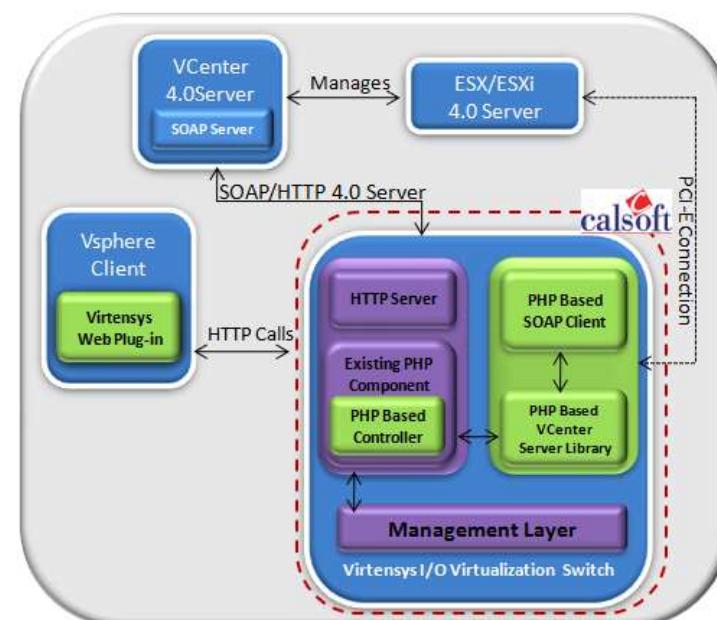


Solution

- Developed a Virtualization Infrastructure (VI) library in C++ for SuSE Linux Enterprise Server 10

Features:

- The library uses gSOAP 2.7.10 toolkit along with VI SDK 4.0 to interface with vCenter/ESX/ESXi 4.0 servers
- Retrieves storage and networking configuration information for VMware ESX/ESXi 4.0 servers
- Retrieves configuration information of hypervisor servers and hosted VMs
- Converts retrieved information to relevant user specific classes
- Designed to be extensible to support variety of hypervisor environments





Engagement

Calsoft was engaged with the client for vitalizing the networking layer. The engagement underpinned:

- Resolving productivity challenges due to inefficient and untested Management Console of a virtualized network layer



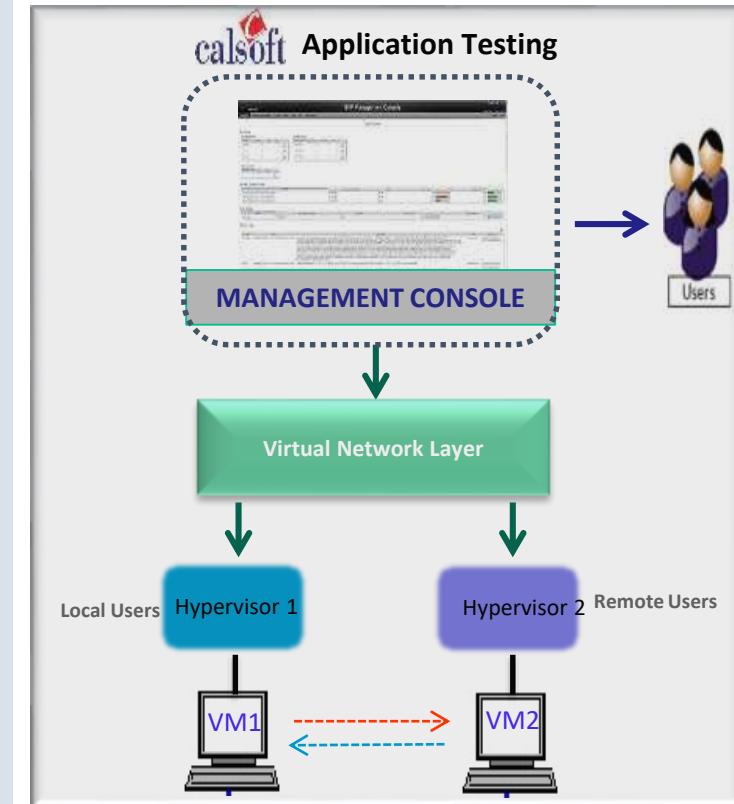
Technology

- UI testing, Functional testing



Solution

- Calsoft provided best resources with Networking and Virtualization domain expertise
- Management Console UI Tested for :
 - Functionality
 - Compatibility testing with different browsers
 - Usability
 - Performance
 - Sanity testing for installer
- Created different customer Network scenarios
- Implemented test cases automation
- Individual test cases were written for each features
- Initiated regression testing on all versions as an ongoing process



Virtualization Lab (Web App) Software Development



Engagement

Calsoft was engaged with the client for developing virtualization lab software. The engagement underpinned:

- Provisioning virtual sandbox on-demand with remote access
- Delivering integrated User management
- Provisioning Role-based access control (RBAC)



Benefits

- Reduction in time lag for setting up a virtualization lab
- Lowered number of physical server required; which led to reduced hardware maintenance cost



Technology

- Languages: Java, C#, Jetty Web Server, MySQL, Hyper-V APIs, XEN SDK, vCloudDirector REST API, VMware SDK, Ant, etc.
- OS: Windows

Customer Testimonial

"I wanted to let you know, how incredible your development team is and how much they have done to help us create an incredible software tool in Virtualization Lab"

Director

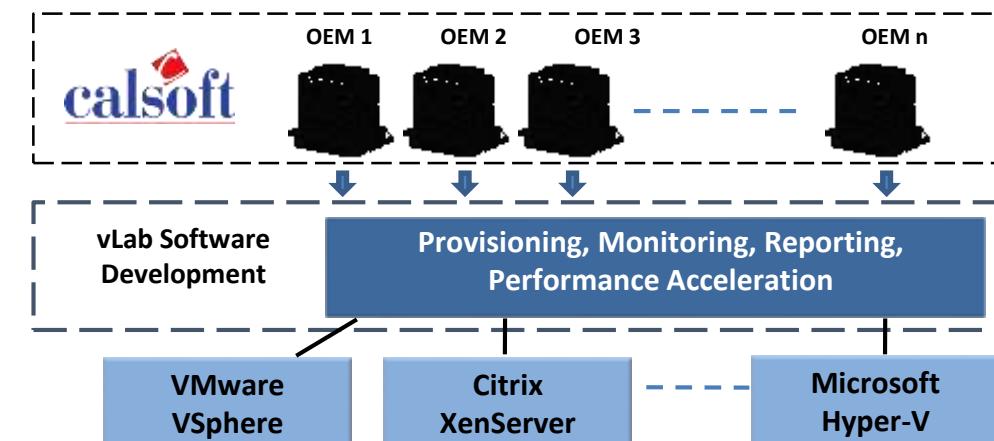


Solution

- Designed and developed a web application

Features:

- Provisioning on-demand labs from available virtual resources
- Consolidation of VMware View, VMware vCloudDirector API
- Integration with Microsoft Active Directory for user management/RBAC
- Monitoring virtual resources - Hyper-V, Citrix XenServer and VMware



Snapshot Solution Screenshot - 1

Welcome Admin - Administrator

Home Forum Support Profile Logout

Lab Administration

- Workspace
- Users
- Technical Support

Performance

Lab Topology

- Overview
- Architecture
- Products
- Security
- Networking

About

- Company
- Contact Us
- Privacy Policy

Home > Support



Email

Your company's assigned business consultants and technical engineers are always available via email to address your questions and/or issues. Response times may vary based upon your company's specific VIRTERA technology lab arrangement/agreement.

Call

Your VIRTERA contact is available by phone to discuss your use of the Technology Lab, to assist you with business and/or technical questions, and to help you make arrangements to plan your solution implementation activities. Availability times vary based on the arrangements made by your company.

Read

Chat

Business consultants and technical engineers are available for real-time on-line chat. Availability varies based on time-zone differences and the arrangements made by your company.

Collaborate

VIRTERA has created a community whereby clients can share their experiences, make recommendations and discuss business and technical issues in a closed forum. Discussions are organized by technology, solutions, vendors and various business areas. Unique in the market place, this area provides a private forum to discuss products without vendor sales pitches.

Learn

Snapshot Solution Screenshot - 2

Welcome Admin - Administrator

Home Forum Support Profile Logout

Lab Administration

Workspace

Users

Technical Support

Performance

Lab Topology

Overview

Architecture

Products

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Networking

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Privacy Policy

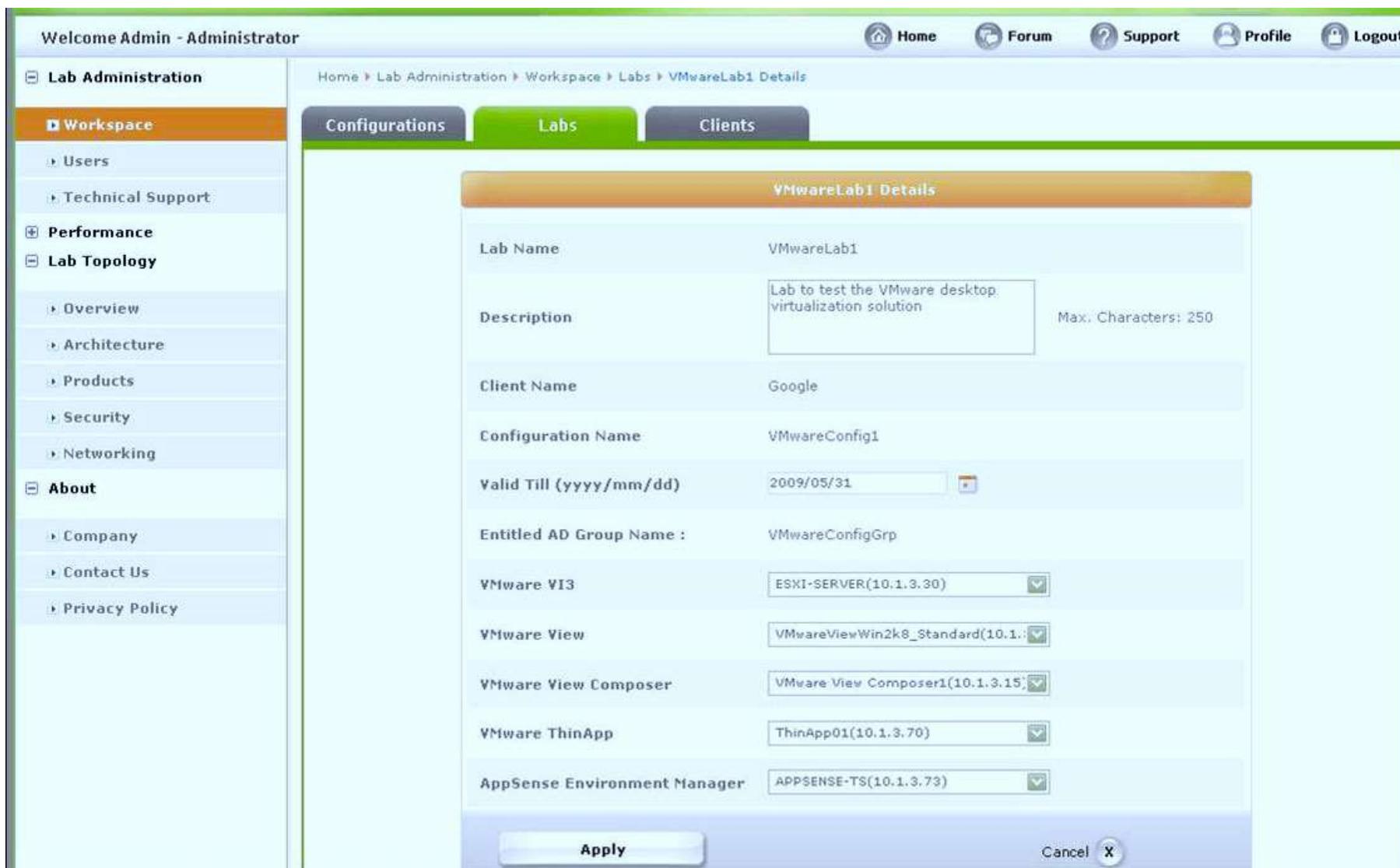
Configurations Labs Clients

VMwareLab1 Details

Lab Name	VMwareLab1
Description	Lab to test the VMware desktop virtualization solution Max. Characters: 250
Client Name	Google
Configuration Name	VMwareConfig1
Valid Till (yyyy/mm/dd)	2009/05/31
Entitled AD Group Name :	VMwareConfigGrp
VMware VI3	ESXI-SERVER(10.1.3.30)
VMware View	VMwareViewWin2k8_Standard(10.1.3.15)
VMware View Composer	VMware View Composer1(10.1.3.15)
VMware ThinApp	ThinApp01(10.1.3.70)
AppSense Environment Manager	APPSENSE-TS(10.1.3.73)

Apply Cancel X

Home > Lab Administration > Workspace > Labs > VMwareLab1 Details



Virtualization Lab Software Development



Engagement

Calsoft was engaged with the client for developing a virtualization lab software. The engagement underpinned:

- Provisioning of an on-demand virtual sandbox with remote VDI access
- Each sandbox can be configured to test and validate various VDI software solutions.



Benefits

- Reduction in time lag for setting up and validating VDI environments
- Lowered number of physical server required; which led to reduced hardware maintenance cost



Technology

- Languages: Java, C#, Jetty Web Server, MySQL, Hyper-V APIs, XEN SDK, vCloudDirector REST API, VMware SDK, Ant, etc.
- OS: Windows

Customer Testimonial

"I wanted to let you know, how incredible your development team is and how much they have done to help us create an incredible software tool in Virtualization Lab"

Director

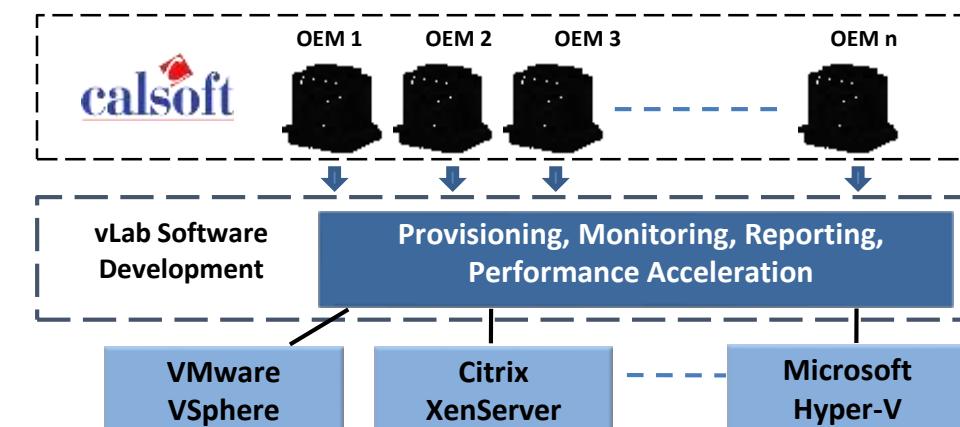


Solution

- Designed and developed the self service portal

Features:

- Provisioning of on-demand labs from user requested virtual resources
- Virtual resources can be chosen from a variety of VDI components like connection brokers, profile managers, storage optimization tools, app virtualization solutions etc.
- Citrix XenDesktop, VMware View, vCloudDirector API
- Involved reverse engineering of View components for lack of APIs
- Integration with Microsoft Active Directory for user management/RBAC
- Monitoring virtual resources - Hyper-V, Citrix XenServer and VMware ESXi



Migration of NSX-MH to NSX-Transformers



Engagement

Calsoft was engaged with the client for Migration of NSX-MH to NSX-Transformers. The engagement underpinned:

- NSX-MH(Multi-Hypervisor) being heavily deployed as SDN controller by many key customers, both in the Non Openstack as well as in the Openstack environment
- Post NSX-MH will be released with additional features NSX-T(Transformer)
- The customers using the NSX-MH SDN controller, who need to migrate to NSX-T or any further versions will gain benefit of the additional features
- Calsoft worked with NSX core engineering for a year in helping them with validation of NSX-T features as well as migration from NSX-MH



Benefits

- Calsoft delivered the solution on time and without any customer tracking and monitoring, meeting all the project challenges and mitigating technical risks involved
- This migration deliverable was very complex and exceedingly risky. This was made possible because of in-house expertise available with Calsoft for SDN, Virtualization and Networking domain



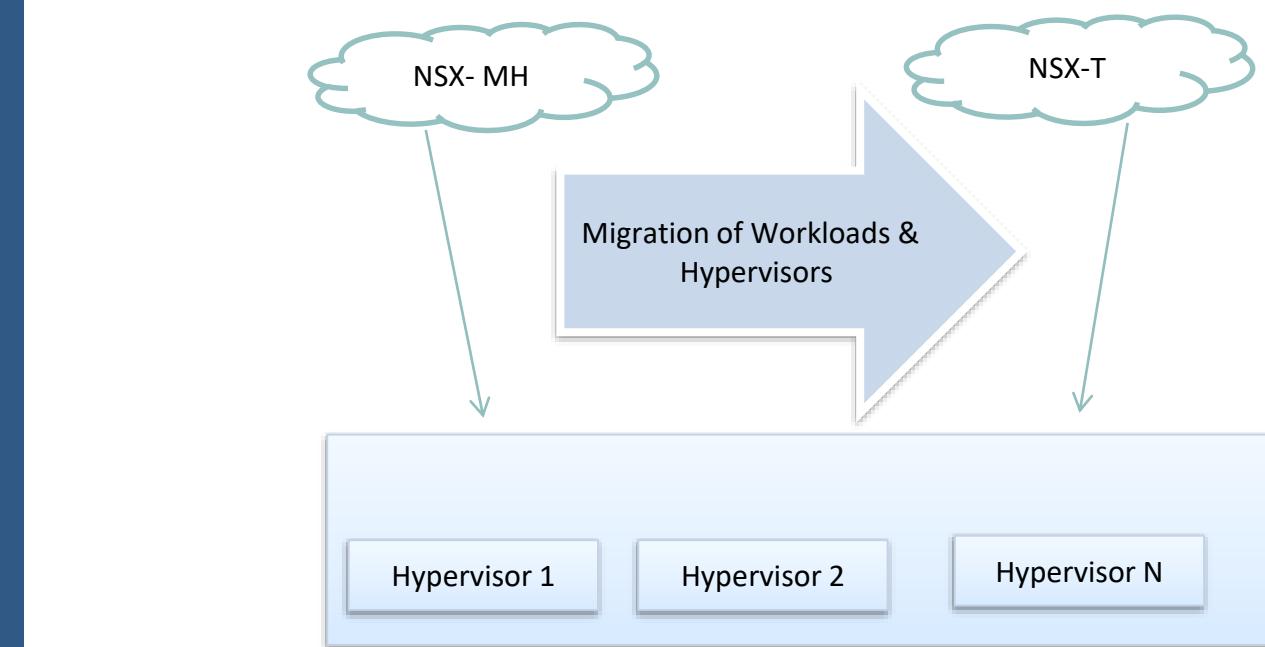
Technology

- SDN, NSX-MH and NSX-T, OpenStack, QoS, Overlay,
- Virtualization – ESX, KVM



Solution

- Provided the migration solution in spite of all the technical risks involved
- Manually created the small and large scale setups with all the L2 /L3 generic and complex topologies
- Applied all the features like QoS, Security Profile, NAT etc. Migrated to NSX-T with no hypervisor reboot, no shutdown of applications and no change of IPs



vCenter Plugin: NSX License Audit Tool



Engagement

Calsoft was engaged with Client for development of vCenter Plugin to enable auditing of NSX Licenses applied in a given deployment.

Highlights:

- Audit report consisting of NSX license information along with its compliance to various NSX services that are enabled on vCenter server.
- Report of Total Usage Vs Licensed Features of NSX.



Benefits

- End user is educated about the most appropriate NSX License to be procured based on his level of Utilization
- VMware could allow its users to use the most appropriate licenses.



Technology

- Languages: Java, Flex Frameworks: Spring, OSGi Tools/Libraries:
- vSphere 6.0 SDK, NSX Manager API's, vCenter Server 6.0, Maven.
- OS: Windows/Linux



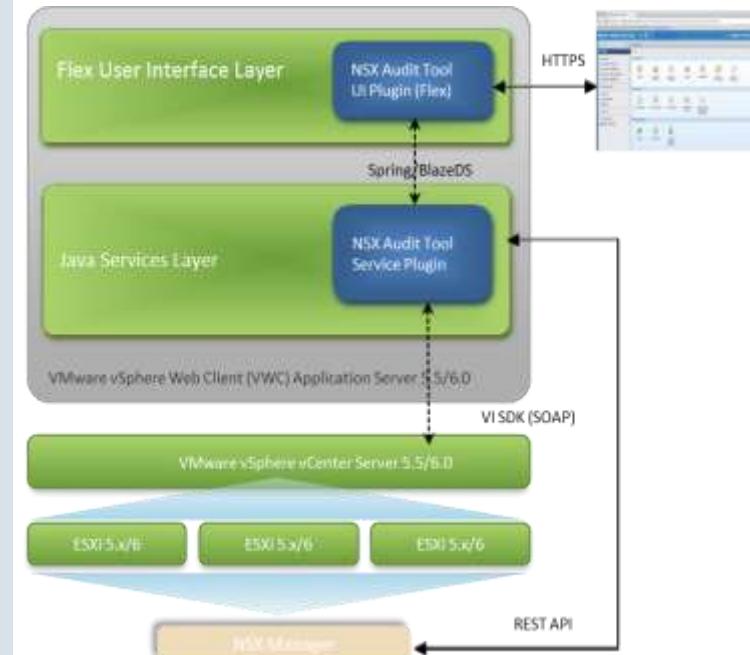
Solution

Features:

- Provided integrated VMware vSphere plugin for ease of administration to VMware, and Network admin.
- Integrated with NSX Manager for gathering License Information
- Tightly integrated with vCenter Server to gather usage information of virtual infrastructure.

Functionality:

- Audit Compliance for:
- Logical Switches, Universal Logical Switches
- Distributed Firewall, Features Utilized - Universal Firewall Rules
- Edge Firewall, Edge Load-balancing
- Distributed Load-balancing





Engagement

Calsoft is engaged with the client for development of Ven agent on Solaris and AIX.

- Virtual Enforcement Node(VEN) is a lightweight software agent that is installed in the OS of any server, VM or container.
- It collects telemetry and programs the native stateful firewall in the host (iptables, ipfilters, windows filtering platform)



Benefits

- Calsoft is working on the complete solution for product development of VEN agent for Solaris and AIX.
- In-house expertise were developed in IPTables, IPFilter, AIX, Solaris.



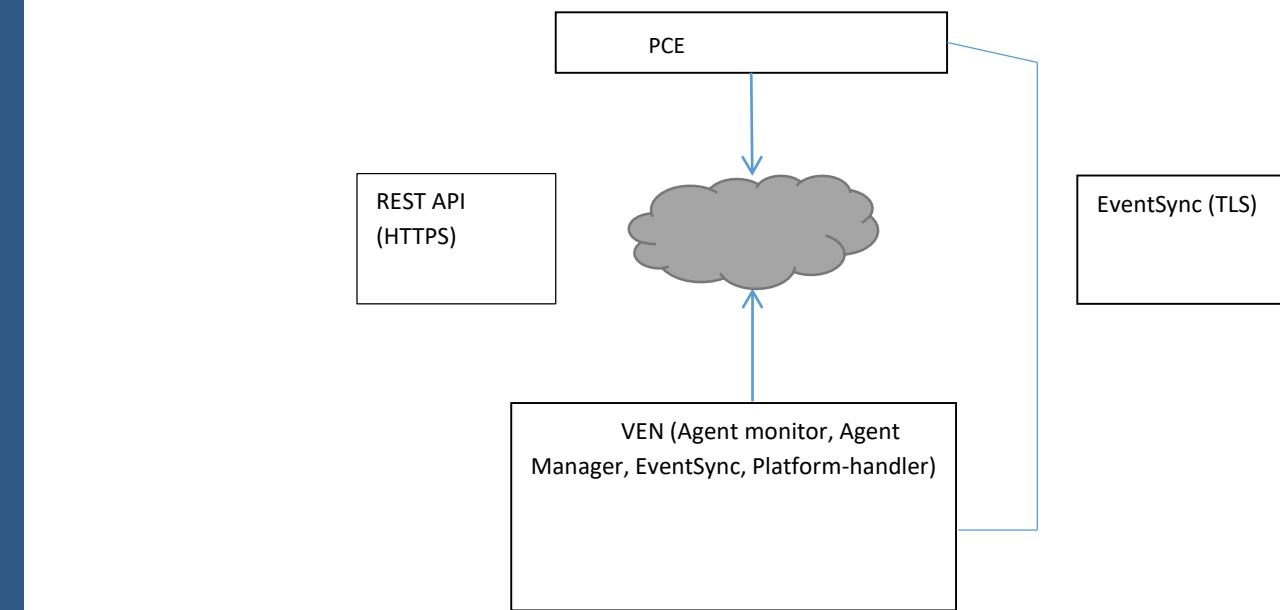
Technology

- C++, Shell Script, Solaris 11.2 and AIX 6.1,7.1
- Tools : Git, stash, Jira, Iperf, Ostinato, TcpDump, Ipfilter, AIX/Solaris native compilers



Solution

- Ven agent is developed in C++ to communicate with PCE(Policy compute engine), receive firewall policy in Json file using REST APIs, translate it into native firewall rules (ipfilters) and apply them.
- Ven support actor-only mode, where only the ippool's content is changed.
- Atomicity of firewall rules is ensured while changing firewall policy and in actor-only mode .
- Test environment created to capture latency, throughput and loading time of ipfilter rules using Ven Agent.



Integration of vRealize Orchestrator with vRealize Automation



Engagement

Calsoft was engaged with the client for integrating vRO workflows with vRA. The engagement underpinned:

- Implementing workflows that integrate with the client software
- Integrate these workflows with vRA.
- Test Resource provisioning using these workflows through vRA.



Benefits

- Cloud providers can integrate client software within their vRA provisioning process.
- Improve efficiency of provisioning of VM's in the virtual cloud.



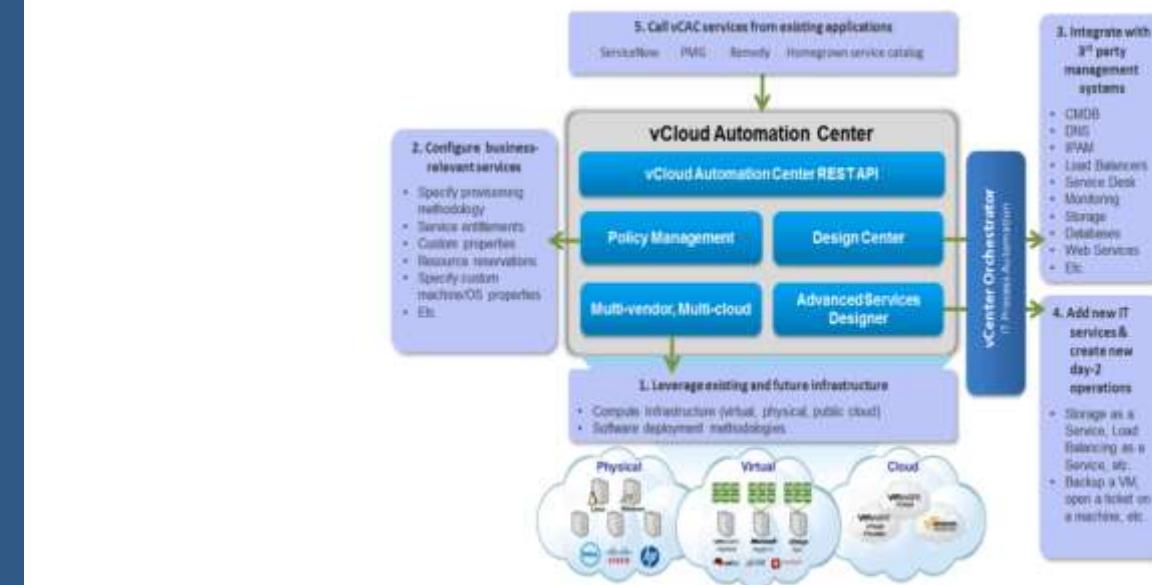
Technology

- VMware vSphere Server, vRA, vRO
- Javascript



Solution

- Implement a POC that uses “State Change Workflows” for vRA to alter the decision for placing VM’s on clusters.
- Implement vRO workflows to update vRA model entities.
- Implement vRO to integrate with Client software through REST plugins in vRO.
- Create custom workflows to integrate with an external database and record information at different stages of the machine life cycle.
- Ensure complete test cycle from designing blueprints to managing the entire lifecycle of VM’s in vRA.



vRO-vRA Solution for Database as a Service



Engagement

Calsoft was engaged with the client for building a solution for

- Rapid deployment of production database copies to be consumed by the developers and testers without affecting the live production database instances.
- Multiple vRO workflows were developed as a part of the solution that are well integrated into vRA's role based access mechanism and entitlement framework.



Benefits

- Developers and Testers can test their application updates on the production quality database instantaneously.
- Customers want to virtualize a database from an existing physical deployment
- Customers want to virtualize a database on a modern x86 operating system (Linux/Windows) from a legacy environment (Solaris).



Technology

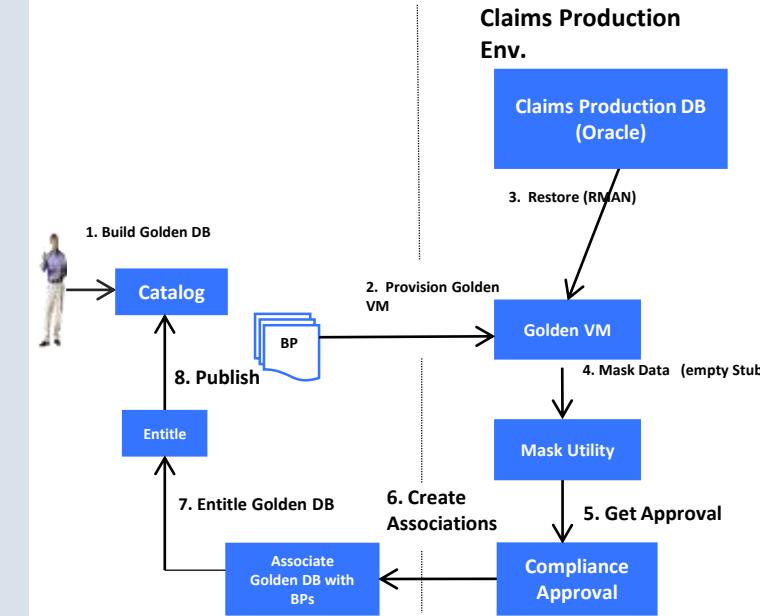
- Scripting languages: JavaScript, Shell Script and Powershell



Solution

The Solution packaged the following workflows:

- Create Services and entitle them to appropriate business group.
- Publish Workflow as a XaaS catalog item to Create Golden DB image.
- Publish a "Data Refresh for Oracle Database 12c" Service Blueprint:
- Implement approval and data masking workflows to be embedded in the restore and refresh db workflows.
- Use linked clones for faster provisioning of database and VM's along with sparing storage simultaneously.





Engagement

Calsoft was engaged with the client for building a vRO plugin for their Storage System.

The plugin consists of high level workflows to carry out common activities such as provisioning storage for a VMware cluster using shared datastores, and "building block" workflows which provide more granular operations such as setting QOS for volumes.



Benefits

- Provision and de-provision virtual machines in minutes.
- Automate storage configuration and provisioning, including automatically assigning storage to VMs.



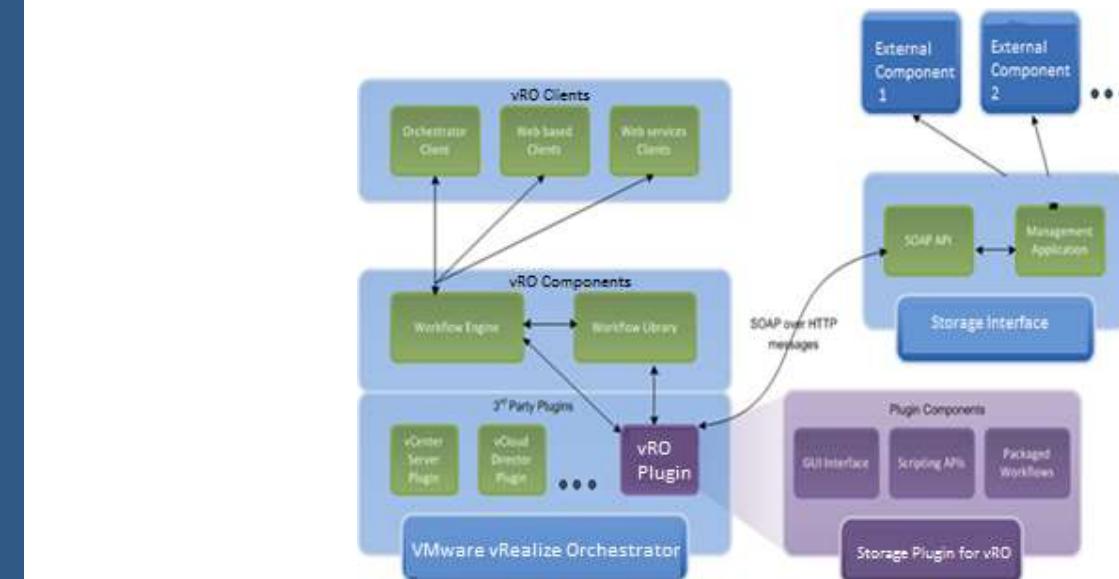
Technology

- Java & JavaScript



Solution

- Present managed objects of the storage system to vRealize Orchestrator inventory
- Provide triggers and events for signal-based workflow execution
- Build wrappers for accessing any Java libraries from the storage vendor
- Build and present own custom scripting objects to vRealize Orchestrator JavaScript
- Packaging workflows and Objects , and, building a vRO Plugin.
- Designing GUI for discovery of storage devices.





Engagement

Calsoft was engaged with the client for developing vCP plugin for SAN Storage Array. The Workflows implemented as a part of plugin are related to:

- Storage Discovery and Inventory
- Storage Provisioning
- Events and Alarms
- Creation of DataStore



Benefits

- Simplify the job of Storage end user by providing the user friendly VCP UI workflows to create storage objects



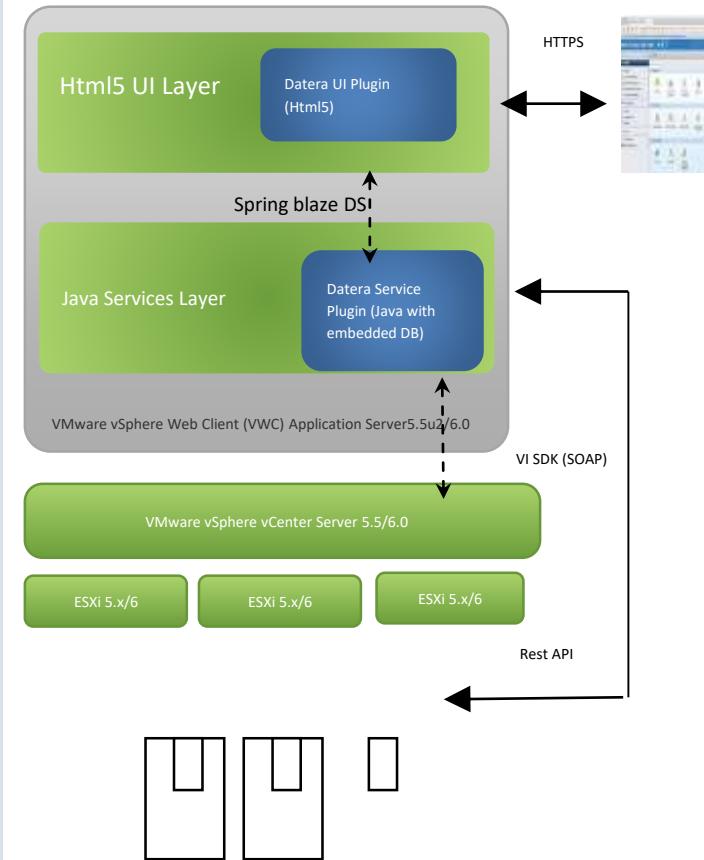
Technology

- vCP, Java, HTML5, CSS, AngularJS, Ajax



Solution

- HTML5/CSS UI Plugin as per the laid out wireframes
- UI Will be responsible for input validation and sending the request to Java Service Layer to perform action requested by user
- Java Service Layer code will call the Storage REST API's to create the storage objects
- Java Service Layer code communicates with the Vmware to add iscsi target, create datastore and for integration with alarm framework.
- REST response is passed on to UI layer to give response to user action





Engagement

Calsoft was engaged with the client for developing vRO plugin for SAN Storage Array. The Workflows implemented as a part of plugin are related to:

- Storage Discovery and Login
- Creation of Initiator and Initiator Groups
- Storage Provisioning
- Creation of DataStore



Benefits

- Simplify the job of Storage end user by creating the storage objects through a simple workflow execution
- Seamless integration with the ESX server to create a datastore through a single workflow



Technology

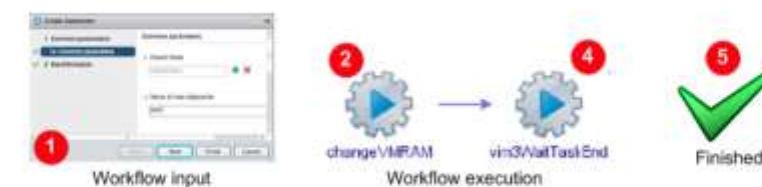
- vRO, Java, Javascript



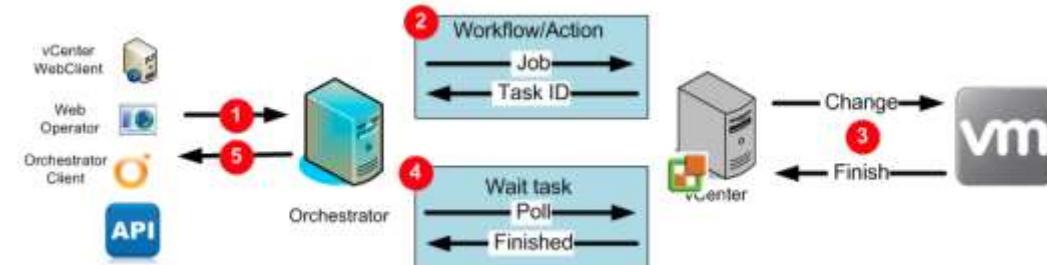
Solution

- Drag and Drop interface to design above mentioned workflows
- Write Javascript code that will take care of user input validation and call the underlying Service Layer Code to perform the specific action requested by the user
- Service Layer code will be to call the Storage REST API's to create the storage objects
- Inventory layout will get updated by fetching the required data from storage after workflow execution.

How the user sees it



How it works





Engagement

Calsoft was engaged with the client for developing vRO plugin for All Flash Array. The Workflows implemented as a part of plugin are related to:

- Create VMFS datastore on new/existing FlashArray volume/snapshot
- Create FlashArray snapshot of VMFS datastore
- Restore VMFS datastore from FlashArray snapshot
- Create/Remove HostGroup from vCenter cluster
- Add/remove datastore from Protection Group
- Delete/Expand VMFS datastore



Benefits

- Simplify the job of Storage end user by creating the storage objects through a simple workflow execution
- Integrates with the VMware ecosystem, providing alternative interface that allows to monitor and manage the client's storage system enhancing better usability
- Greater flexibility in automated server provisioning and operational tasks across VMware



Technology

- vRO, Java, Javascript



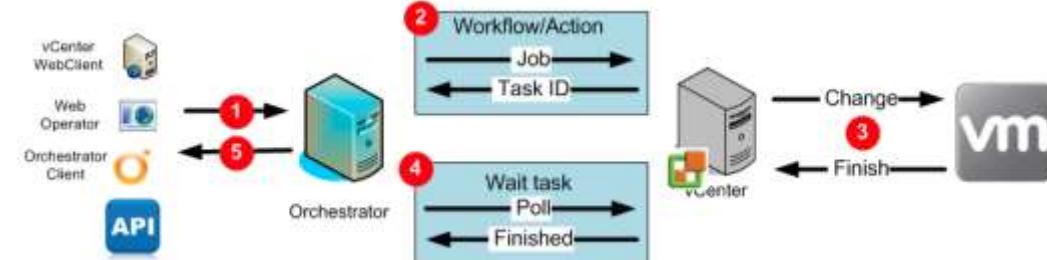
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How the user sees it



How it works





Engagement

Calsoft was engaged with client to assist them by providing a Python based library to automate various tasks in VCE Vblock System 300 involving,

- Advanced Management Pod
- Virtualization
- Storage



Benefits

- Faster turn-around times for onsite deployment
- Automation provides better management of tasks for installation and configuration
- Faster provisioning
- Highly Improved deployment process quality (least error prone to human errors)



Technology

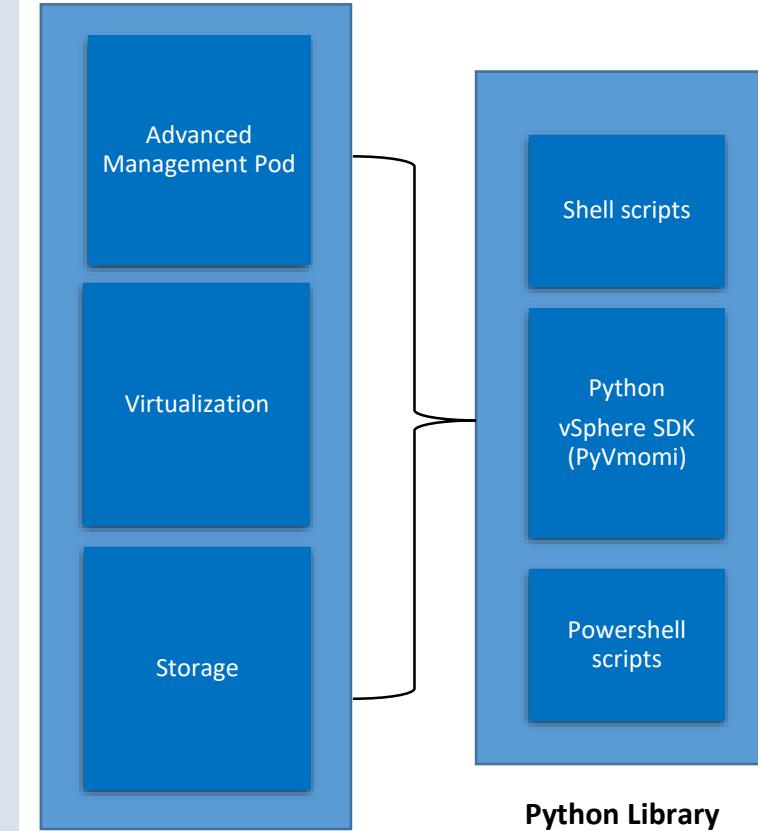
- Python, PyVmomi (vSphere SDK), PowerShell and Shell scripts



Solution

Core Library

- Create tasks corresponding to Logical Build Guide and develop core library with individual functions to facilitate their automation.
- Provide APIs to manage:
 - Storage resources of EMC VNX and VNxe,
 - Virtualization by installing and configuring hypervisors, virtual machines and networks.
 - Advanced Management Pod by configuring C-Series Servers Integrated Management Controller, SNMP and event notifications.
- Example APIs
 - Deploy VM (deploy vcentre server, Platform Service controller)
 - Create VM Kernel port
 - Add host to vcentre
 - Create VM kernel port
 - configure DNS, VNX array, CIFS



Vblock System 300

Python Library
for Automation



Engagement

Calsoft was engaged with client to assist them in Enterprise Hybrid Cloud (EHC) Factory Installation process by,

- Providing an automated way to Deploy, Install and Configure various components in the Enterprise Hybrid Cloud (EHC) Solution: namely vRA, vRO, vROPS, vRB, vRLI, ViPR, ViPR SRM, NSX, vCenter, AD, MSSQL
- Perform unattended/silent installations based on Factory Installation Guide.



Benefits

- Facilitates automation and better management of the error-prone and tedious tasks.
- Ability to execute tasks concurrently.
- Faster turn-around times for onsite deployments.
- High productivity, quality and reliable results leading to faster provisioning.



Technology

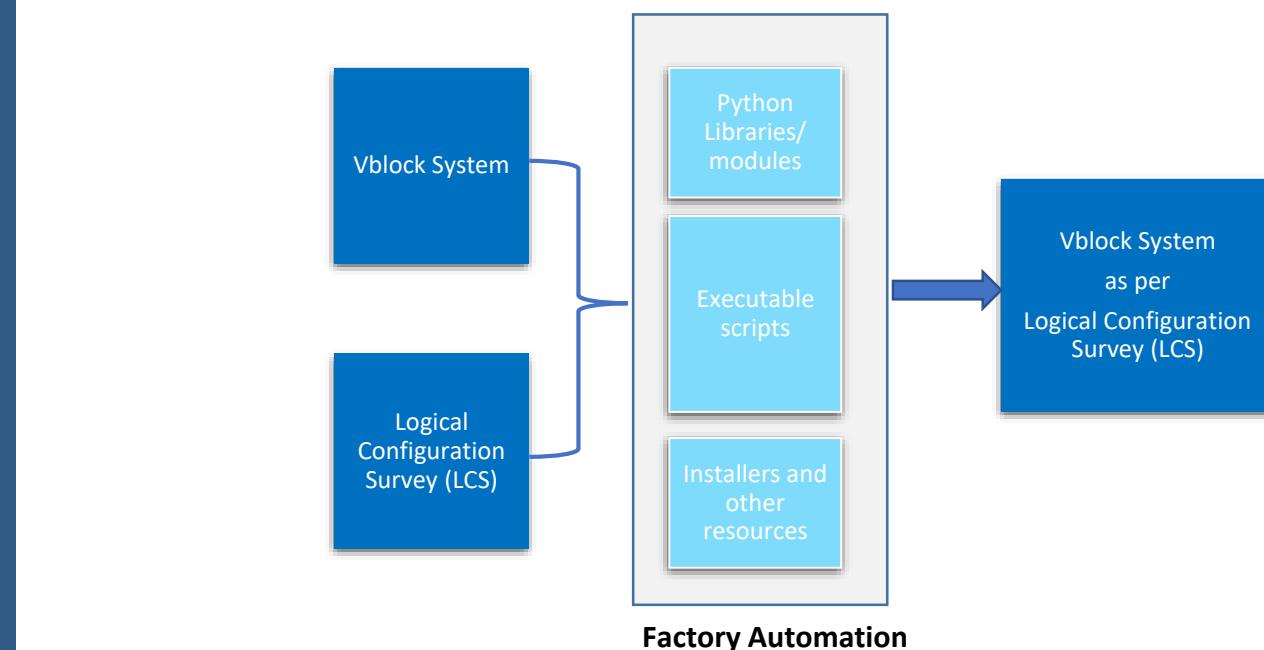
- Python, PyVmomi (vSphere SDK), PowerShell and Shell scripts



Solution

Factory Automation

- Framework oriented multi layered approach
- Create tasks corresponding to the Factory Installation Guide and develop workflows by grouping and joining these tasks.
- Depending on the Logical Configuration Survey (LCS), trigger the execution of the workflows to automate the entire process of Factory Installation.
- Validate the installation process at different occasions, and in case of failures, initiate rollbacks and recoveries.
- Maintain logs generated during the installation process.
- Example work flow
 - Foundation for Enterprise Hybrid Cloud Infrastructure Automation VM
 - Deploying EHC Windows-based management VMs
 - Deploying EHC Linux-based management VMs and vApps
 - Validating Enterprise Hybrid Cloud management VMs deployment





Engagement

Calsoft was engaged with client to develop :

- The Automation Framework to install, configure and deploy EHC Solution components.
- The Core library to automate various install, configure and deploy tasks for following products vRA, vRO, vROPS, vRB, vRLI, ViPR, ViPR SRM, NSX, vCenter, AD, MSSQL
- Leverage automation framework to handle Upgrade workflows in future



Solution

Framework design facilitates:

- CLI tool to configure input data
- Data Access Layer: Rest Interface
- Workflow Layer: Orchestration and Control
- Task Engine: Execution engine
- Core Library: Granular task functions
- Reporting
- Stop, resume or re-execute functionality
- Common Information Model to capture input data
- Core library: APIs for installing and configuring for all the products, including validation for each task
- Example for core library APIs
 - Deploy vRO
 - Initial configuration of vRO
 - Install NSX plug in for vRO
 - Execute EHC foundation main workflow



Benefits

- Extensibility
 - Addition of workflows
 - Handle Upgrade workflows
 - GUI interface over Data access layer
- Concurrency
 - Task execution
 - Parallel framework and core library development
- Data validation during input
- Scalable solution for multi-site environment



Technology

- Python 2.7
- Celery, RabbitMQ
- Pyvmomi,
- PowerShell
- SQLAlchemy

NHC Deploy, Install & Configure Automation (vSphere)



Engagement

Calsoft engaged with client to assist them in:

- Automation of deployment along with pre-installation and post-installation tasks.
- Automation of backup and restore process for storage volumes and virtual machines on vSphere.
- Bug fixing



Benefits

- Automation of the entire process ensures every action is performed efficiently, resulting in high productivity, quality and reliable results.
- All the Information and critical error logs are provided to the NHC Monitoring and Reporting tool, which helps in proactively managing performance and gain visibility across physical and virtual infrastructure.



Technology

- Python, PyVmomi (vSphere SDK), Ansible



Solution

Deployment Automation

Automate the entire process of,

- Configuring NHC Installer Virtual Machine
- Generating alerts in case of critical failures.
- Upgrade process.

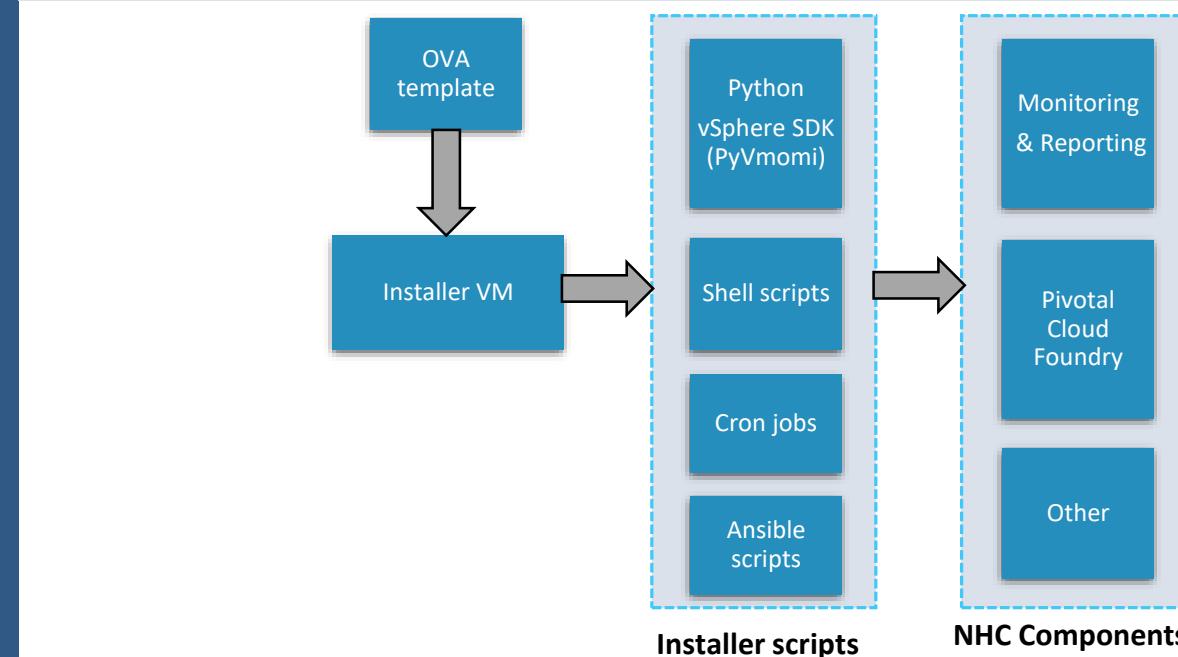
Backup and Restore Automation

Automate the backup and restore process by

- Creating snapshots and clones at regular intervals,
- Restoring virtual machines and storage volumes from snapshot.

Bug Fixing

- Calsoft team have resolved approx. 40 bugs related to installation, reporting and backup.



Engagement

Calsoft was engaged with client to provide ongoing sustaining support for VCE Vision management product adhering to the SLA's as determined by VCE and to develop and test new features as per requirements from time to time towards the VCE Vision product

Benefits

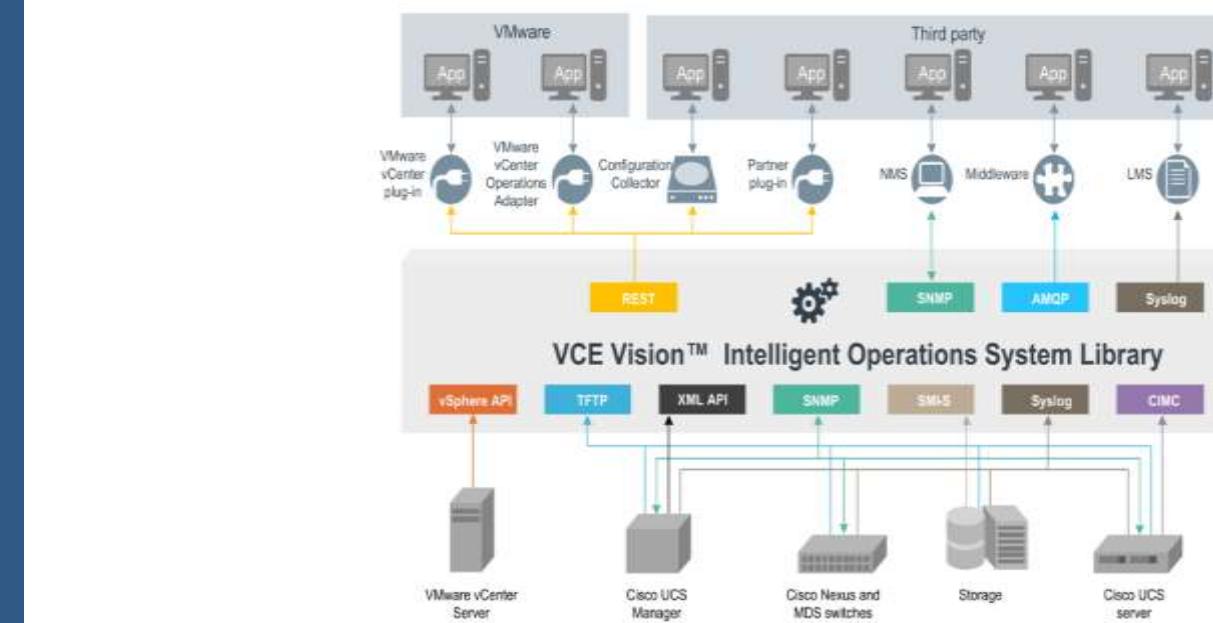
- Ownership of VCE Vision sustenance with dedicated Scrum teams aligned to product owners
- Faster turn around time having distributed teams

Technology

- Java, Spring, Hibernate, Python, Shell Scripting, Angular JS, node.js, Javascript, PostgreSQL, Cassandra, Flexera

Solution

- VCE Vision is a management product that provides a single pane of management for the VCE Vblock and VxBlock systems.
- The key functions of VCE Vision are Configuration, Discovery, Health & Monitoring, Compliance & RCM, Security amongst others.
- The key software components of VCE Vision are System Library, Multi System Management and Multi System Prepositioning amongst others.
- Work involves development, testing, automation towards VCE Vision software.
- 2 scrum teams (each sized 6) are involved. Architect, Scrum Master, Build & Release Engineer, PM provide support to the scrum teams.



Vision Remediation Simulation



Engagement

Calsoft was engaged with client to implement a Remediation process for VCE devices. Remediation could be either downgrade or upgrade of the software/firmware version of various VCE system components as per the RCM version.



Benefits

- Ease the upgrade or downgrade of Complex VCE infrastructure components.
- Automate Remediation workflow
 - Validates if remediation is required.
 - Identify the correct RCM version to remediate.
 - Retrieve the appropriate binaries and credentials
 - Remediate the device.



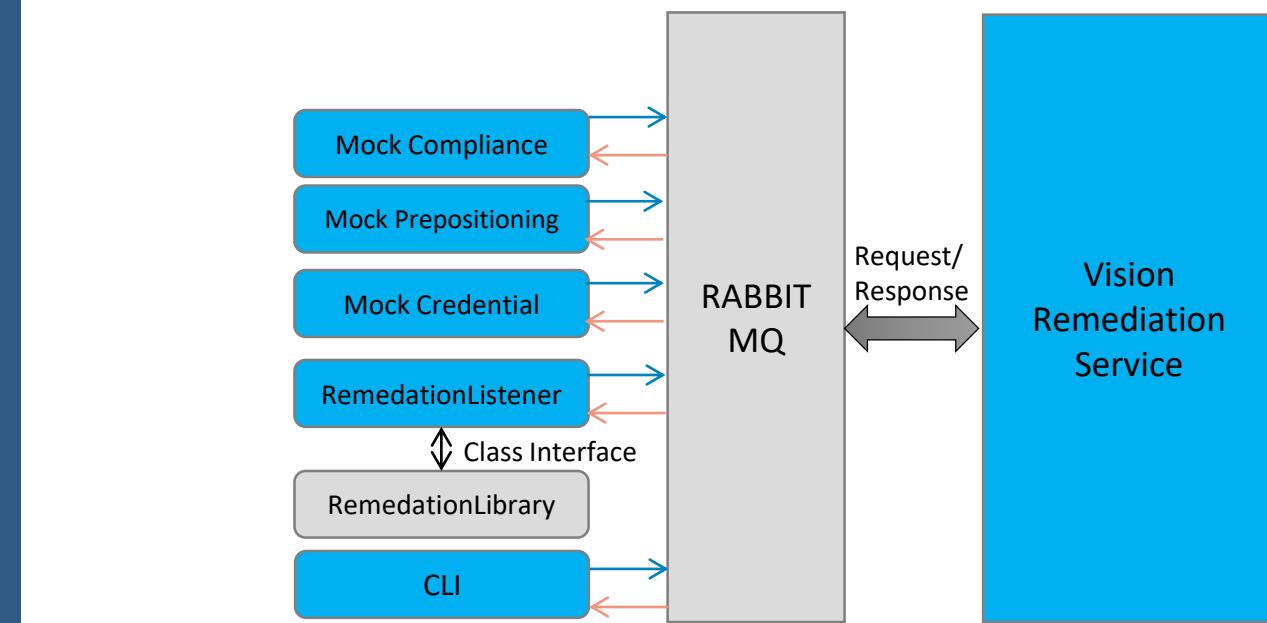
Technology

- CentOS 7.0, RabbitMQ 3.3.5, Python 2.7, Java JDK 1.8, Maven3, Spring-amqp-1.5.6.RELEASE, Spring-boot 1.3.5.RELEASE, Spring-core-4.2.6.RELEASE, Docker



Solution

- Solution comprise of multiple services, performing independent role in Vision remediation process.
- Every service communicate with each other over AMQP protocol. This helps to decouple business logic layers.
- Independent Remediation workflow tasks are developed in Java based Vision Remediation layer.
- These tasks are integrated with Task engine to execute the work flow.
- Python Mock services simulates other VCE modules which take part in Remediation process.
- Result of Remediation process is reported to Task engine over RabbitMQ server.
- Dockerization of the services



Engagement

Calsoft was engaged with client to assist them by providing an automated way to deploy, install and configure various components in the EHC Solution.

Benefits

- Library facilitates automation and better management of the error-prone and tedious tasks.
- Provides granular control over tasks leading to faster provisioning.
- Predefined Workflow Creation
- Faster Provisioning

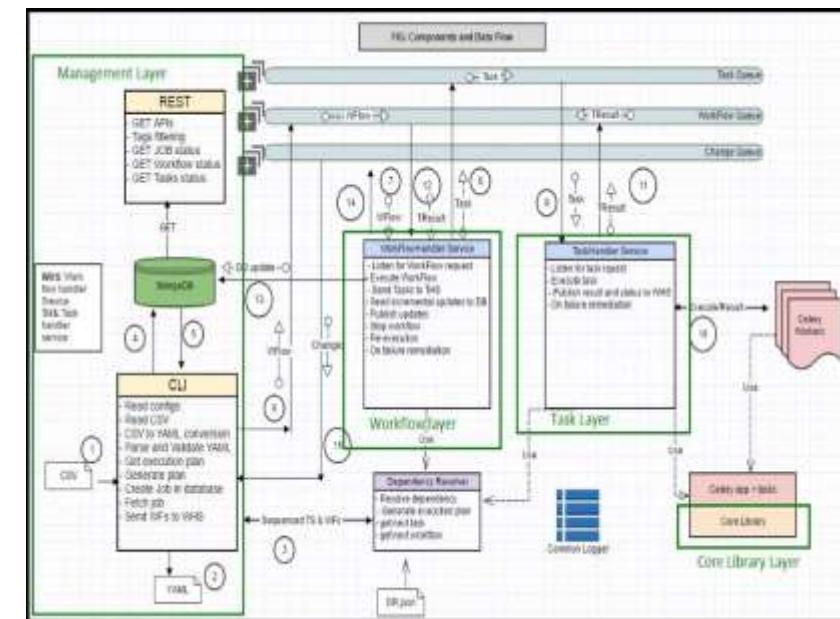
Technology

- Python2.7,RabbitMQ,Celery,Pika,MongoDB,xlrd,requests,paramiko,pyvmomi, powershell,bash

Solution

Solution Approach + Technology Stack

- Framework Multi-Layer approach
- Core Library exposing functions for install, configure or deploy steps
- Creation and Management of Workflows by CLI





Engagement

Simulate the cloud environment to enable load, stress or performance testing



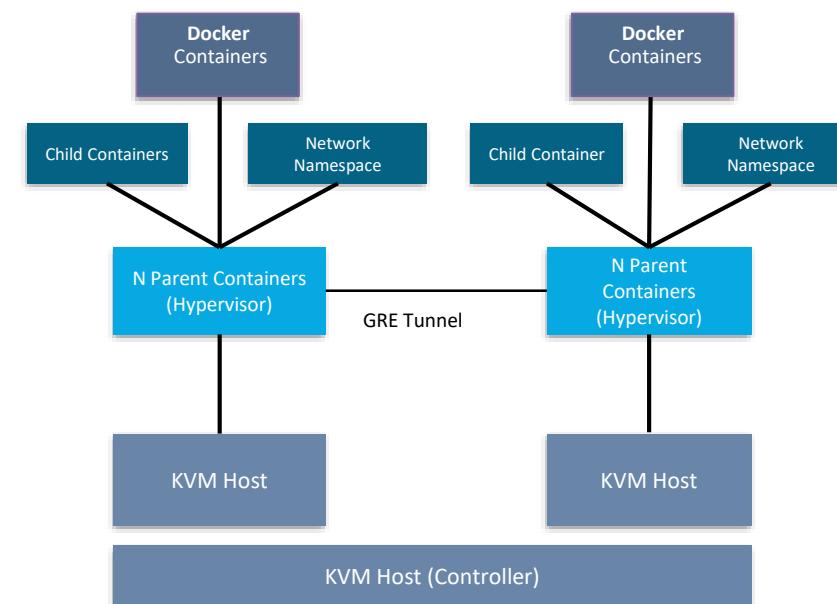
Technology

- Linux, Docker, Network Namespaces, GRE Tunnel, YAML, Python



Solution

- Simulates 1000s of VMs via Child Containers/ Network Namespaces/ Docker containers.
- Simulates hundreds of Hypervisors via Parent Containers.
- Hypervisors will be connected over GRE tunnels, providing full mesh connectivity



VMware vSphere Plugin 5.x/6.x



Engagement

- Deeper integration within vSphere environment
- VM performance management with VM aware storage



Benefits

IaaS Web portal helped realize following benefits to customer:

- Statistical Data visualization of services - usage of disk space, bandwidth, memory and CPU
- Single dashboard to manage, customize and configure linked networks
- Reduced cost of IaaS management



Solution

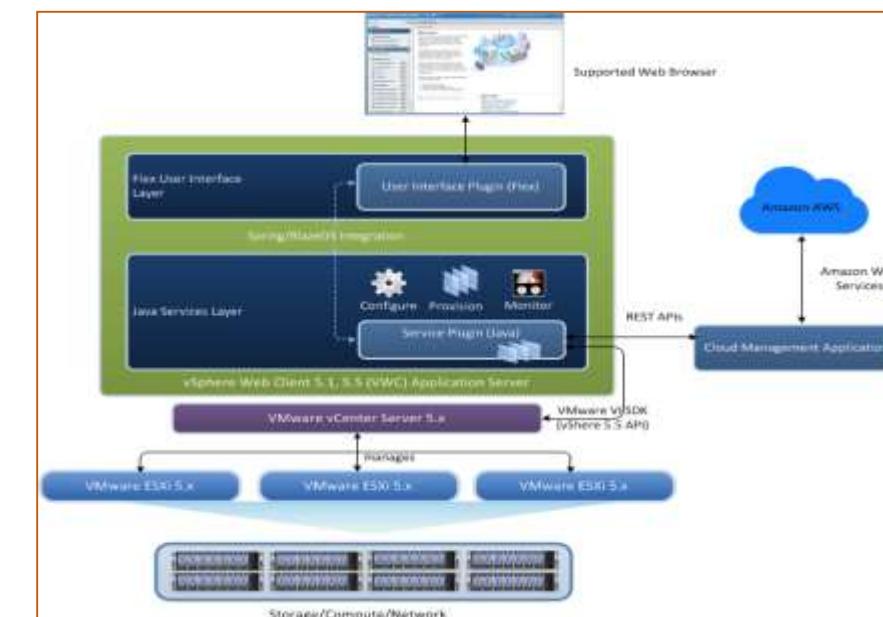
- Built, implemented and tested vCenter Plug-in extending VMware's objects

Features:

- One click install, uninstall, upgrade and repair for the plugin
- Extend VMware's Virtual Machine object to provide performance statistic information
- End to end storage provisioning
- Protect Virtual Machine or Datastore at storage level
- Configure ESXi Hosts with Tintri Best practices

QA Highlights:

- Complete automation of Flex based Web GUI of VMware Web Client Server
- Complete manual testing of plugin supporting vSphere versions 5.1 and 5.5 for Windows and Linux appliances



NSX Manager UI: Feature Development & Bug Fixing



Engagement

Calsoft engaged with client to help them in meeting their release milestones by assisting in:

- Development of high priority features
- Enhancements in existing features
- Bug fixing



Benefits

- Polished UI and enhanced UX for the end users.
- Improvement in product quality.
- Added features for ease of use.
- On time delivery to client for scheduled release.



Technology

- Ext JS (framework), JavaScript, HTML & CSS



Solution

Feature Development

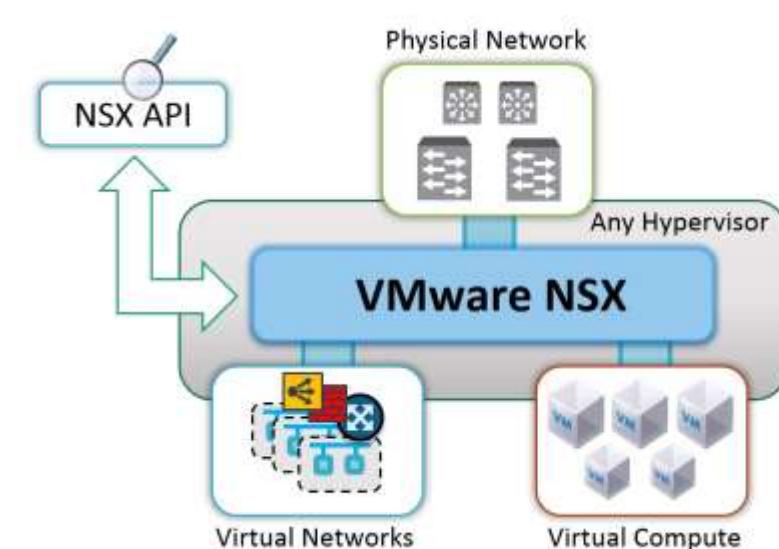
Development of some major features which were critical for upcoming release.

Enhancements

Enhanced user experience by adding various checks and tweaks.

Bug Fixing

After quickly ramping-up on the code base, Calsoft team owned approx 60 bugs and provided the bug fixes.



Network Monitoring Solution



Engagement

Calsoft was engaged with the client for enabling network monitoring of Virtual Machines in vSphere Environment. The engagement underpinned:

- Resolving performance challenges of Network Filter Driver in large infrastructure
- Attaining Product stability
- Simplifying complex testing scenarios



Benefits

- Delivered a robust and stable solution
- Improved performance of Network Filter Driver and Management application



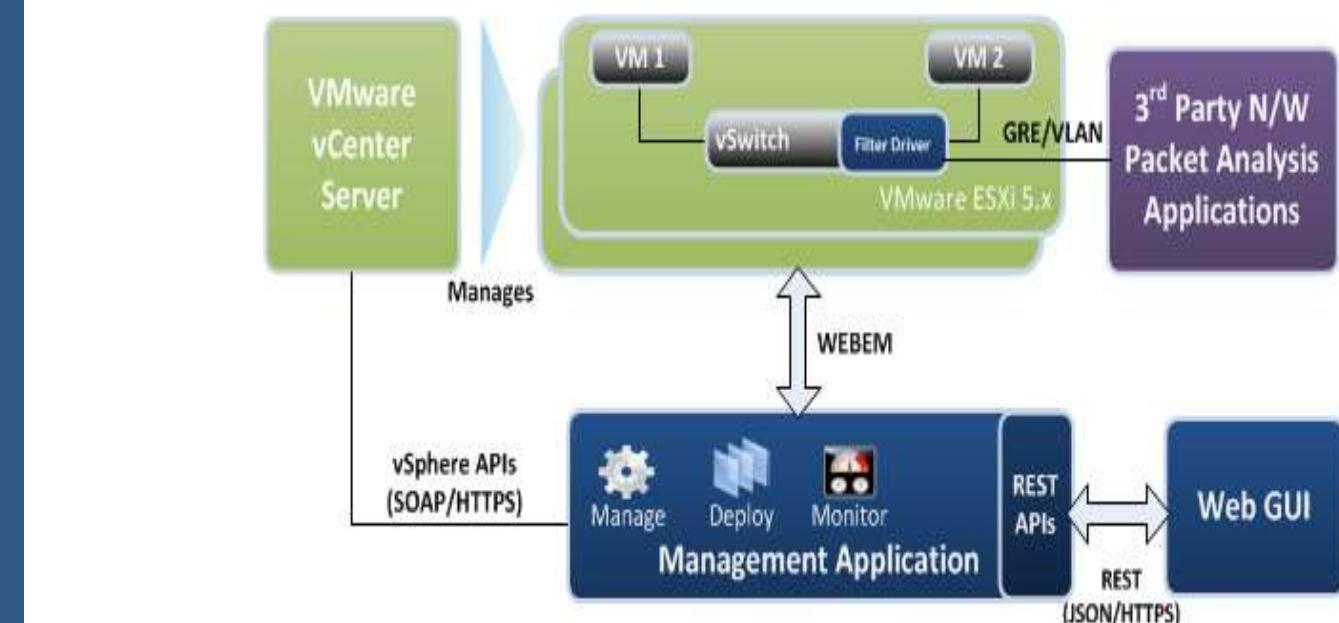
Technology

- Python, Django, HTML, jQuery, CSS3, pywebem, pysphere



Solution

- Calsoft worked with its customer in all the phases of product development life cycle (PDLC) –design, coding and testing.
- Worked on management server to assure robustness
- Worked on Network Filter Driver to assure performance and stability of driver
- Designed and executed test plans for complex business use cases
- Benchmarked the solution for performance



VMware vROPs MP for Monitoring and Capacity Planning



Engagement

Calsoft was engaged with a storage vendor to develop vROPs management pack to meet following challenges

- Monitor large deployment environment with over 50K VMs
- Meet vROPs Performance SLAs
- Representation of large inter-related metrics



Benefits

Improved visibility of Capacity, Efficiency and Risks of Storage

- Periodic performance data collection for over 50K VMs
- Rich Dashboard to provide trending information of IOPS, THROUGHPUT, LATENCY and Alerts of a given Storage Appliance
- Intelligent usage based Alert generation



Technology

- VMware vROPs Adapter framework, JAVA, RESTeasy, Scheduler



Solution

vROPs adapter with capability to monitor storage appliance(s)

- Adapter was developed to meet the scale and SLAs by performing optimized scheduling of data collection
- Intuitive Dashboard to represent contextual information for multiple objects
- Support multiple deployments and versions of vROPs
- Integrated storage level alerts with vROPs alerts database
- Integrated health badges with custom symptoms

Immediate Problems

Future Problems

Opportunities to Optimize





Engagement

- Dockerized web user -interface to list, manage and monitor available OpenStack YAML Blueprints for deployment.
- Docker container to be part of build node's bootstrap process.
- Single pane of glass view for OpenStack deployment pre/post install process.



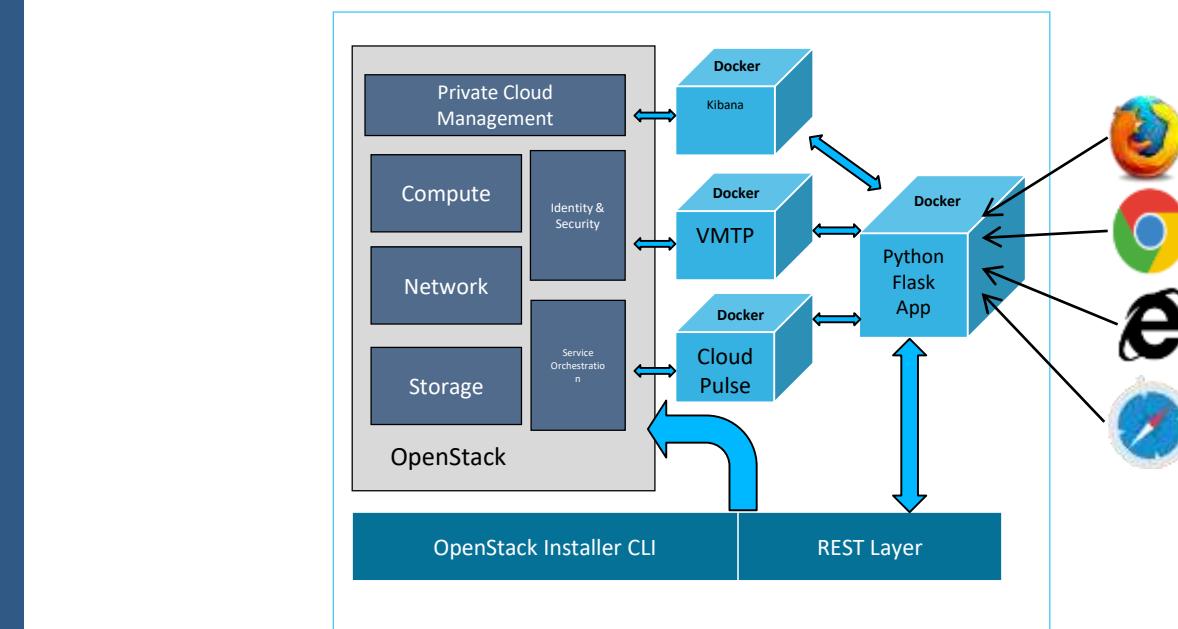
Technology

- RHEL, Docker, Python, Flask, AngularJS, HTML-5 Cisco UCS OpenStack Installer



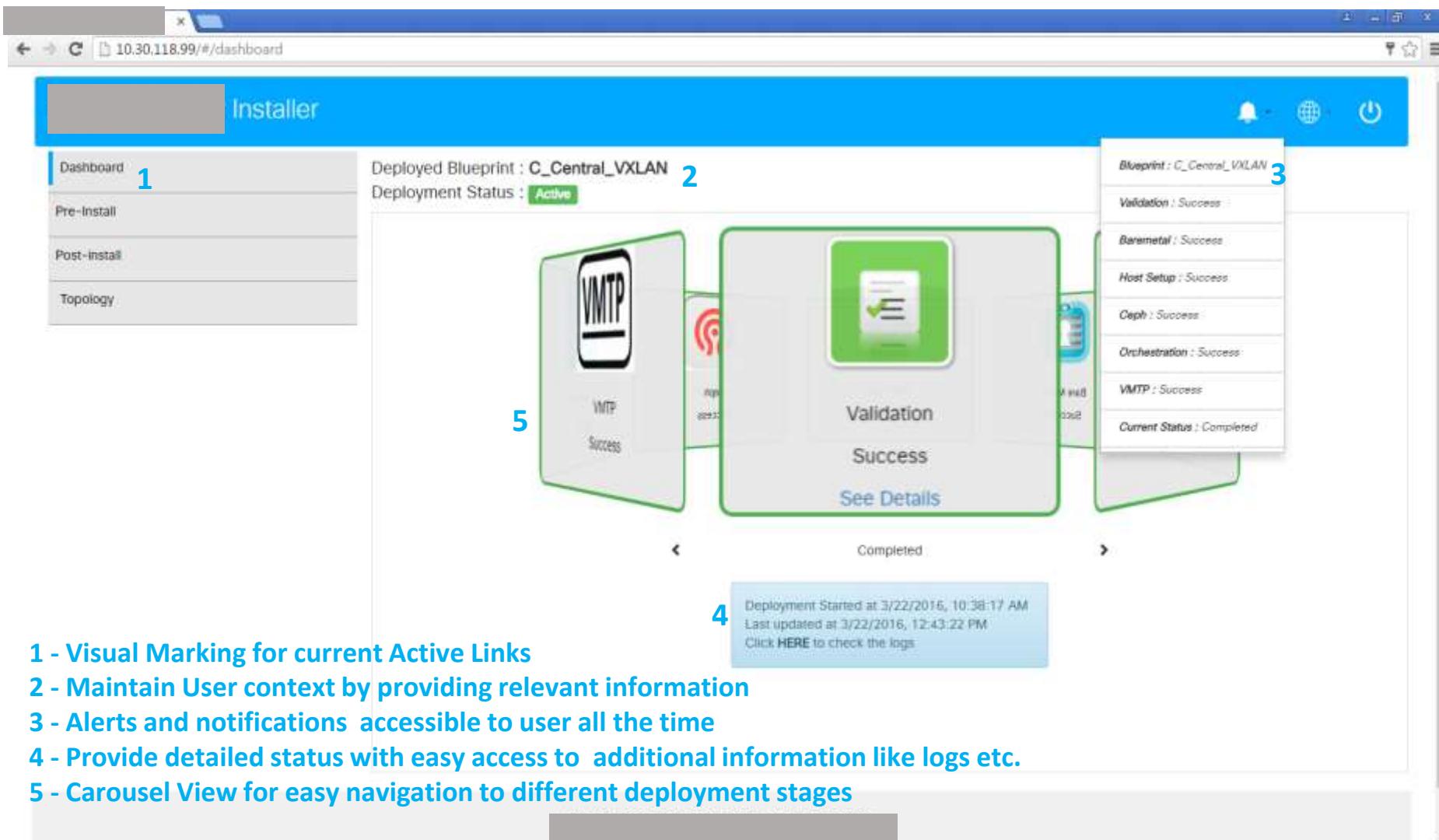
Solution

- Integrated with REST based OpenStack Installer.
- Python-Flask backend for UI.
- Simple, minimalistic, responsive UI design using AngularJS,HTML5.
- Base Image – RHEL with OpenStack packages installed on it.
- User Interface to facilitate creation of YAML configuration blueprints and initiate the deployment process.

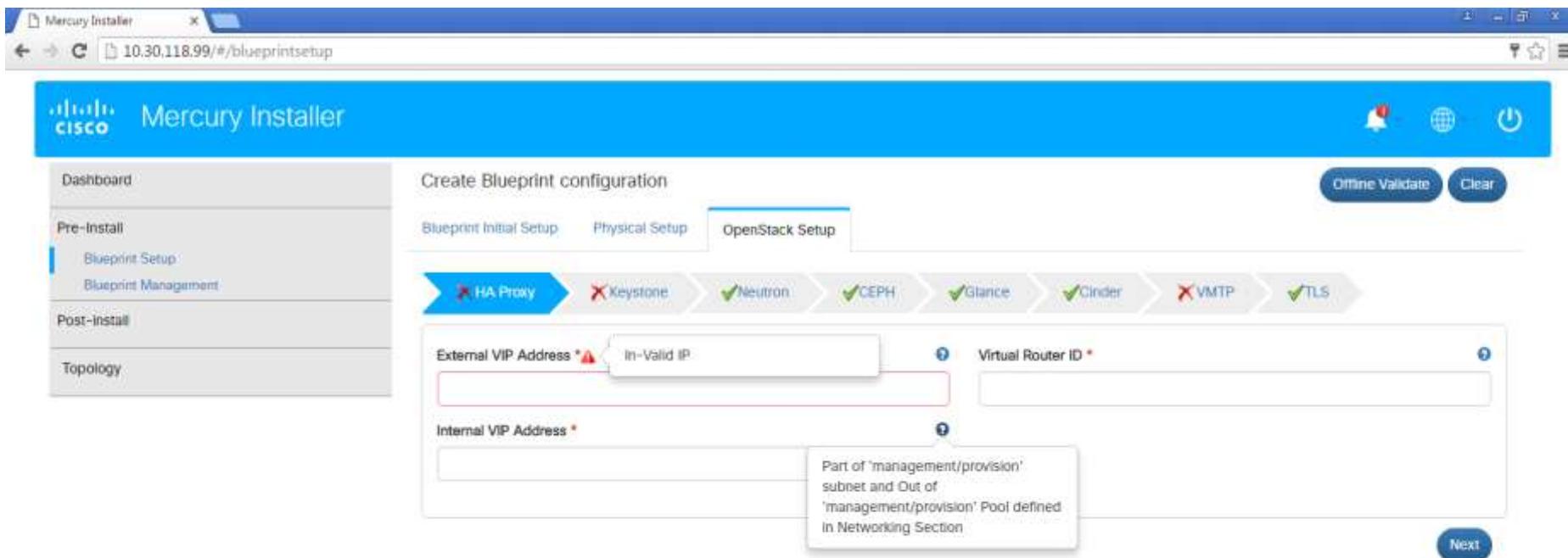


OpenStack Installer GUI

Customer under NDA



Customer under NDA



- 1: Client side validation with user friendly error messages
- 2: Multi-Step Wizard to collect user input in cohesive flow
- 3: Inline help for user to enter proper data
- 4: Marking for required fields
- 5: Indication for missing/invalid input right on the wizard step
- 6: Controls to go to next step



Engagement

Calsoft was engaged with the client for providing XMPP protocol support for an IoT system. The target IoT system had mix of devices and manual endpoints that generated data to be logged.

- XMPP protocol clients are readily available on all platforms including embedded devices as well as high level application platforms
- LIOTA supports mqtt, sockets as protocols between devices and IoTCC. The target devices selected xmpp protocols to communicate.



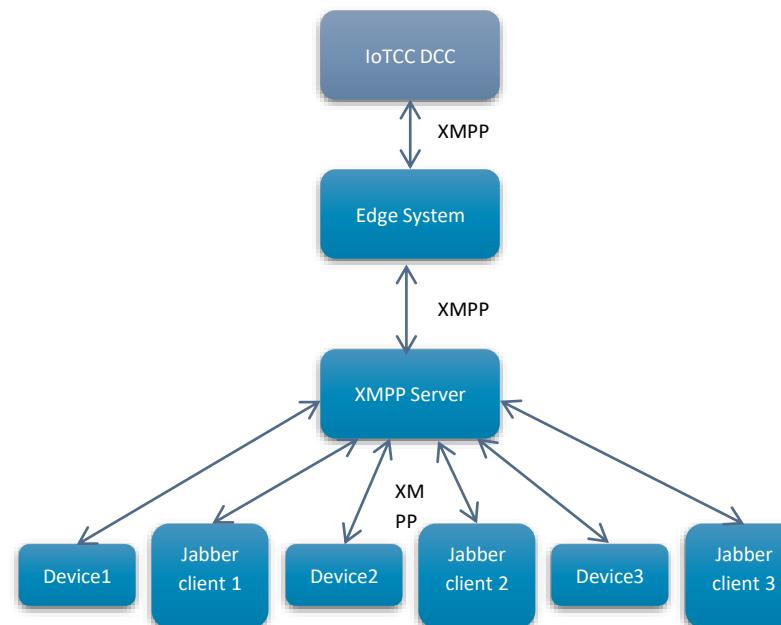
Benefits

- XMPP was already available in datacenter as a way to aggregate data generated from standard chat clients. A mix of IoT devices was seamlessly added in the scheme.
- LIOTA was used to create aggregation agent that would talk with standard jabber clients which could be used to feed data manually, as well as with IoT devices giving a fully integrated IoT platform where part of the data generation could be done manually through standard chat applications.



Solution

- XMPP was implemented as fully supported communication protocols in LIOTA
- XmppDeviceComms class was added in LIOTA to support data collection over XMPP from end IoT devices
- XmppDccComms class was added in LIOTA to support XMPP as a communication protocol between edge system and data center



Testing product functionalities with ORACLE RAC



Engagement

Calsoft was engaged with the client as their testing partner for their continuously evolving cloud and data center security product. The engagement underpinned:

- Verifying functionalities in ORACLE RAC work with client product deployed in the same infrastructure.
- Dealing with deployment of complex ORACLE RAC setups with variations in ORACLE RAC deployment architecture.
- Testing all the variations without any automation suite.



Benefits

- Improved Performance with enhanced product features
- Client was able to achieve faster time to market



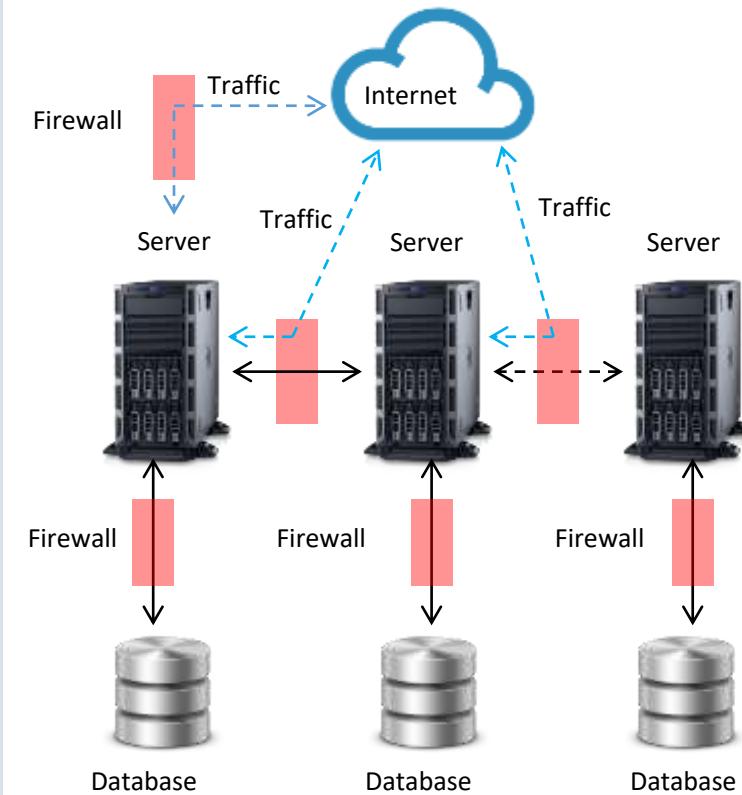
Technology

- Domains: Networking, Cloud Computing



Solution

- Deploy ORACLE RAC setup in on-premises network
- Identifying affected functionalities of ORACLE RAC with and without client product installed.
- Creating multiple variations of network scenarios for RAC setup.
- Analyzing firewall rules required for all possible scenarios to deduce methods for providing robust security to RAC servers
- Performed manual testing of complex network scenarios :
 - Identified multiple corner cases and scenario specific issues.
 - Fixed critical quality related issues.



Service Assurance using vRO Workflows



Engagement

To configure and monitor physical and virtual infrastructure in VMWare ecosystem, using vRO workflows of vCenter & provide fail-safe path connectivity between nodes.



Benefits

- The admin can provision & configure the infrastructure easily in single pane of glass (vSphere web client). With the service assurance enablement, high availability of critical flows can be achieved



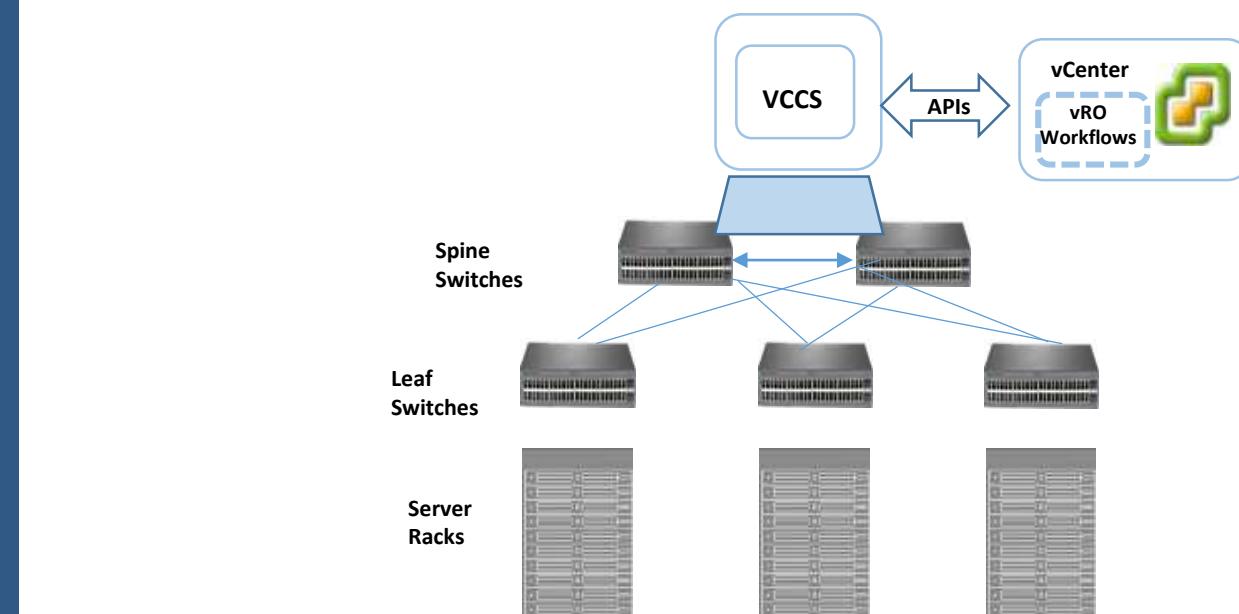
Technology

- vRO, Java, Javascript, REST APIs,



Solution

- vRO workflows were developed to
 - Add and configure switch
 - Provision switch with vRouter, VLAN & related configuration
 - Perform fail-safe path connectivity
- REST APIs of client's switches were used for creating vRO workflows.
- A service, to be deployed on ESXi Server, was developed to monitor the traffic of nodes connected to switches.
- Admin was able to add connections to be provided fail-safe options, that qualify for Service uptime guarantee.
- Such connections were monitored explicitly by the service, and corrective actions were taken, to route traffic



VMware App Volumes BCDR Manager



Engagement

Calsoft was engaged with VMware for designing and developing App Volume BCDR Manager with primary responsibility to replicate and populate App Stack .vmdk and .metadata files.

This replication of .vmdk's were to be performed for

- Business continuity (intra-site)
- Disaster recovery (inter-site) scenarios
- The goal of the BCDR Manager was to replicate and populate App Stack .vmdk files across the primary and failover datacenter instances.



Benefits

- Ease of replication
- Eliminating manual steps involved to enable GSS supported app volumes



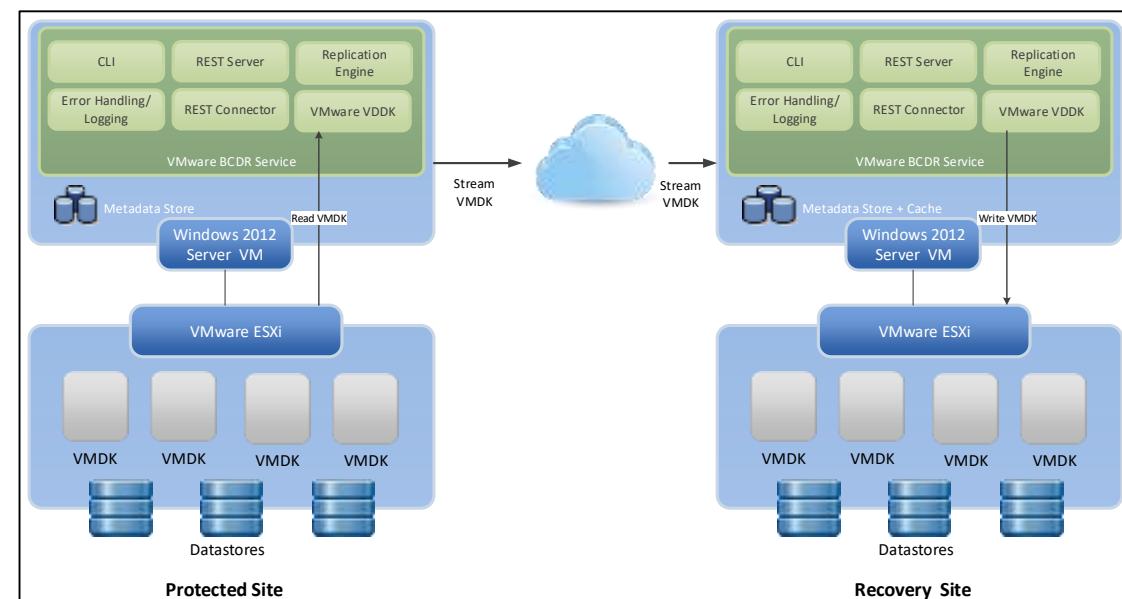
Technology

- Languages: .Net, VMware SDK
- OS: Windows



Solution

- Command-line based tool for configuration
- Detection of existing app stack vmdk and metadata
- On-demand replication based on configured parameters
- Periodic replication using scheduling





Engagement

Calsoft is engaged with client to assist them in Enterprise Hybrid Cloud (EHC) Factory Installation process by,

- Providing an automated way to Deploy, Install and Configure various components in the Enterprise Hybrid Cloud (EHC) Solution.
- Perform unattended/silent installations based on Factory Installation Guide.



Benefits

- Facilitates automation and better management of the error-prone and tedious tasks.
- Ability to execute tasks concurrently.
- Faster turn-around times for onsite deployments.
- High productivity, quality and reliable results leading to faster provisioning.



Technology

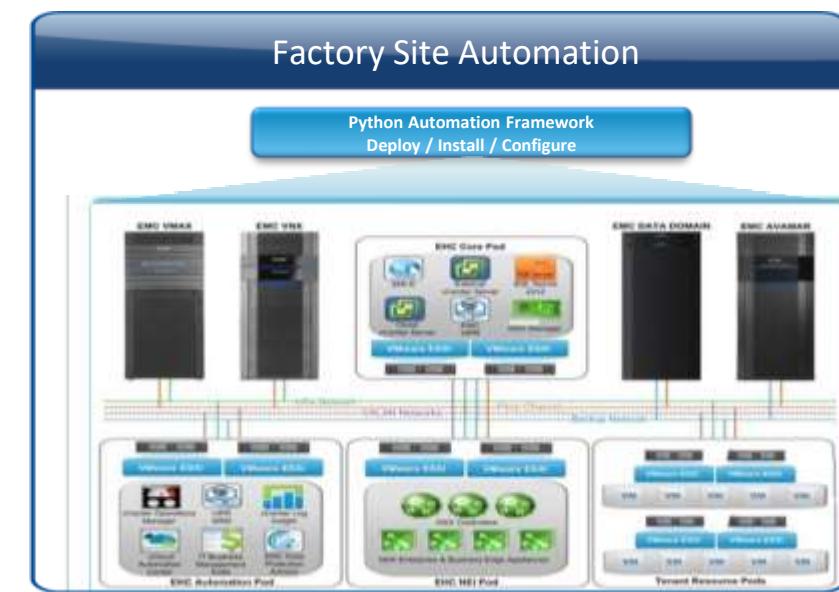
- Python, PyVmomi (vSphere SDK), Powershell and Shell scripts



Solution

Factory Automation

- Create tasks corresponding to the Factory Installation Guide and develop workflows by grouping and joining these tasks.
- Depending on the Logical Configuration Survey (LCS), trigger the execution of the workflows to automate the entire process of Factory Installation.
- Validate the installation process at different occasions, and in case of failures, initiate rollbacks and recoveries.
- Maintain logs generated during the installation process.





Engagement

Develop a generic virtualization plugin to protect Virtual Machines from any hypervisor platform.



Benefits

- Easy to add support for new hypervisor
- All existing common features are applicable to newly added hypervisor
- Reduced testing efforts
- Improve time to market



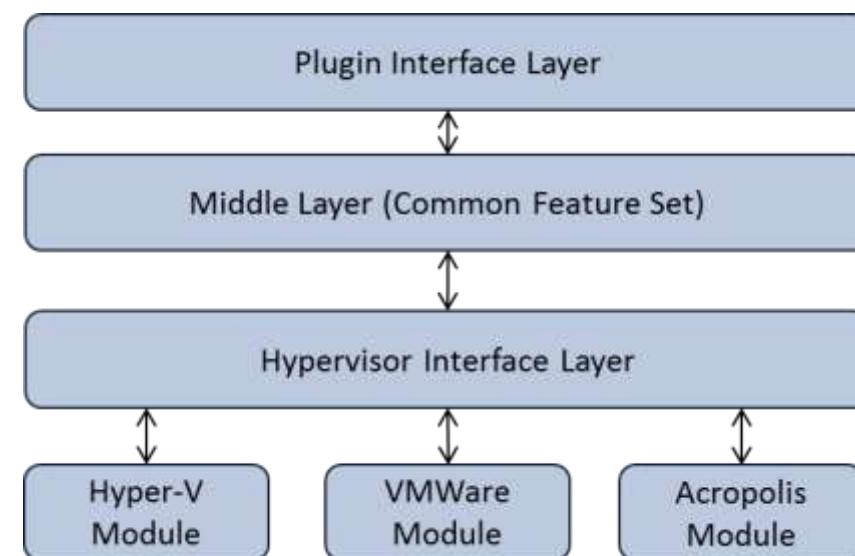
Technology

- C++, PowerShell, VDDK APIs, Hyper-V, VMWare, Acropolis



Solution

- Designed and developed a layered architecture.
- Defined common interfaces for hypervisor platform specific layer.
- Common features like policy management, VM filtering, concurrent restores, etc. are implemented as a middle layer to make them hypervisor agnostic.
- Implemented interface driven design to isolate platform specific implementation.



Phoenix agent development project



Engagement

Calsoft was engaged with the client in designing VMware agent for backup and restoring VMware virtual machines and a backup proxy client virtual appliance.



Benefits

- Client could Backup and Restore VMware Virtual machines using different supported transport modes (File, NBD/NBDSSL, Scsi Hot Add, SAN)
- Thin as Thin Restore was enable
- Client could Backup and restore all different disk configurations and VMware environment possible.



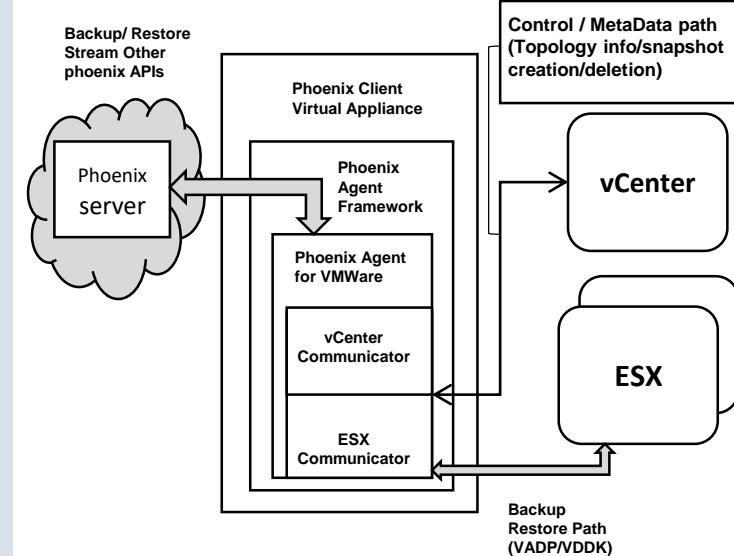
Technology

- C, Python, APIs : Pyvmomi, VDDK, VADP



Solution

- The Phoenix Agent components are deployed as a Virtual Appliance that can run in any ESX environment.
- Calsoft created a virtual appliance for the purpose of hosting the Phoenix client. in the form of an OVA template.
- The Phoenix Agent talks to the VMware ecosystem to perform VM backup and restore.
- Features
- “What to backup” (Listing)- Determine what to back up by communicating with vCenter
- “How to backup” (Actual backup) Get the incremental data to be backed up and pass on to Phoenix Server
- “How to restore” (Actual Restore) Get data from Phoenix Server to restore VM Data.
- “Get details about the application” (Listing of VMs and all related information about the setup and Vms to be backed up)
- Participate in estimation for progress reporting



vCloud Availability Orchestration For vCloud Director



Engagement

Calsoft was engaged with the VMware for building vCloud Availability Orchestration for Cloud DR Service. The Orchestration consists of pre-canned workflows to carry out common DR activities such as Replication Group Creation, DR Runbook/Plan, Migration, Fire-Drill, Planned Failback and Unplanned Failover of VMs and vApps.



Benefits

- Scalable workflows which can automate DR services
- Scheduling of workloads for supported DR activities
- Create custom workflows as per requirements



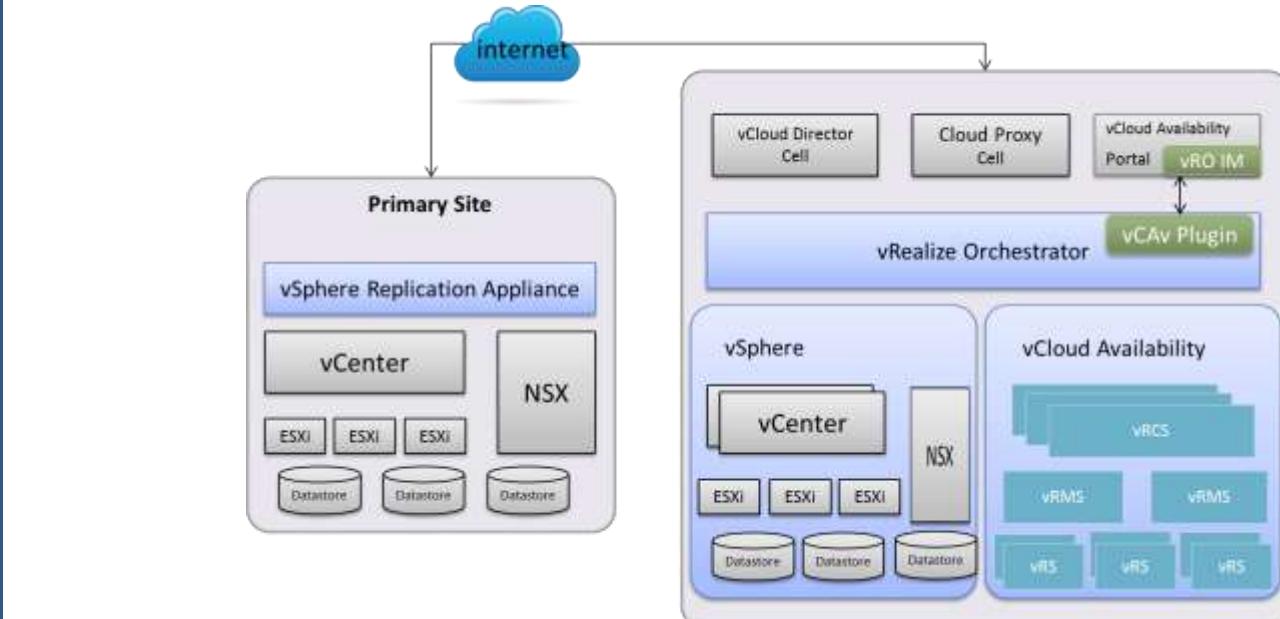
Technology

- Java
- AngularJs , HTML5
- vCloud Director API, DR Agent API, vRO SDK



Solution

- Present vSphere and vCloud Director managed objects as vCAv inventory
- Designing GUI for workflow execution and scheduling
- Provide triggers and events for signal-based workflow execution
- Build wrappers for accessing vRO and vCAv services.
- Build and deploy vCAv plugin to vRealize Orchestrator.



Engagement

Automate the process of Backup/Restore/Refresh on various databases (Oracle , SQL, MySQL) which will eliminate the manual effort and improve cost efficiencies.

Benefits

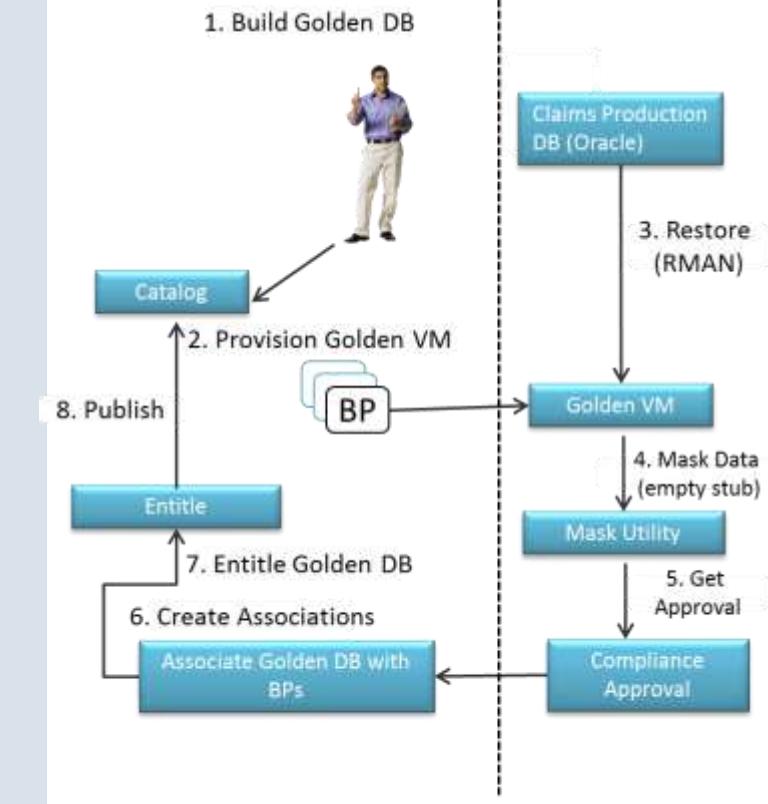
- Automation of time consuming activities.
- Cost saving in Storage
- Resource utilization will be most effectively
- Allow a policy to restrict personnel data and mask it .

Technology

- vRA/vRO 7.0
- Oracle 11g & 12c
- SQL Server 2012 & 2014

Solution

- Prepare vRA/vRO workflows to process business logic to automate restore and refresh Oracle, SQL Server and MySQL database which would contribute towards restoration time saving.
- Blueprint creation will help to prepare similar instances without manual interventions and user can request through catalog item.
- Most common backup options are covered which used in multiple DB environments like Full Backup, Incremental Backup, Differential Backup.



Architecture of Golden DB Restore

vRO plugin development for FlashArray



Engagement

Calsoft is engaged with the client to develop a vRO plugin. The plugin helps in running the workflows and perform multiple operations on storage infrastructure. The engagement underpinned:

- Development of plugin
- Bug fixing
- Certification



Benefits

- Automate storage configuration and provisioning.
- Integrates with the VMware ecosystem, providing alternative interface that allows to monitor and manage the client's storage system enhancing better usability



Technology

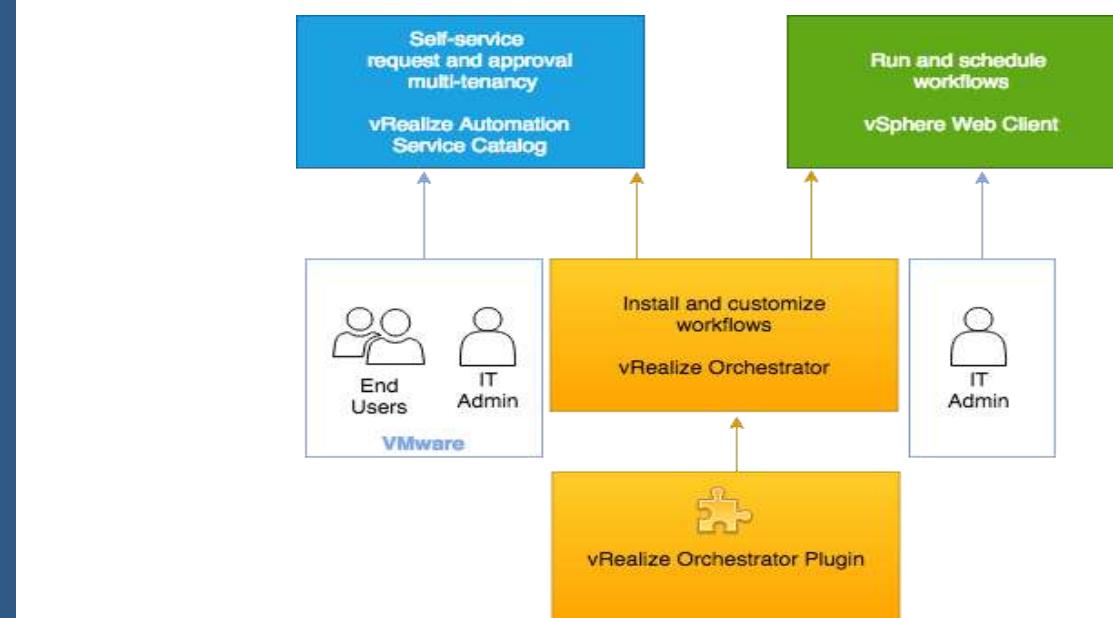
- Java, JavaScript, Maven, VMware vRealize Orchestrator SDK 7.x



Solution

Calsoft helped customer in adding below features in form of workflows, actions, scripts:

- Features
 - POD
 - Volume Group
 - Volume
 - Protection Group
 - Host
 - Flash Array
 - Protocol Endpoint
 - QOS Management
 - Data Protection Management
 - Datastore Provisioning to Policy
 - Restore Management
- Bug fixing raised against vRO plugin version 2.0.0
- Plugin certification for different vRO versions



vROps Management Packs for converged infrastructure



Engagement

Calsoft was engaged with the client to built a vROps management packs for their next generation converged infrastructure. The engagement underpinned:

- Discover and showcase topology relationships across components in converged infrastructure.
- Provide monitoring and alert services based on thresholds.
- Capacity Planning and Trending
- Develop performance optimized MPs so that they don't impact vROps performance



Benefits

- Consistent monitoring of appliances
- Predictive analytics
- Shows Health of resources
- Tracking of interrelated affected resources for resolving issues if any.



Technology

- Java, REST API



Solution

- Built a separate vROps management packs to monitor individual components of converged infrastructure.

Features:

- Correlates data from applications to storage in a unified, easy-to-use management tool that provides control over performance, capacity and configuration with predictive analytics which helps in driving proactive action.
- Provides visibility in terms of capacity, efficiency and risks for various components
- vROps alert lifecycle for custom defined alerts.
- The analytics engine analyses collected metrics and provides self-learning predictive analysis, smart alerts and capacity optimization across virtual and physical stack.
- Shows Topology relationship across components and physical to virtual infrastructure.

Functionality:

- Dashboards for monitoring all resources
- Provides information about health of resources
- Resolution of issue by providing recommendation of possible solution



vCenter Plugin development

Engagement

Calsoft was engaged with the customer in developing vCenter plugin for storage management and get it VMware certified.

Solution

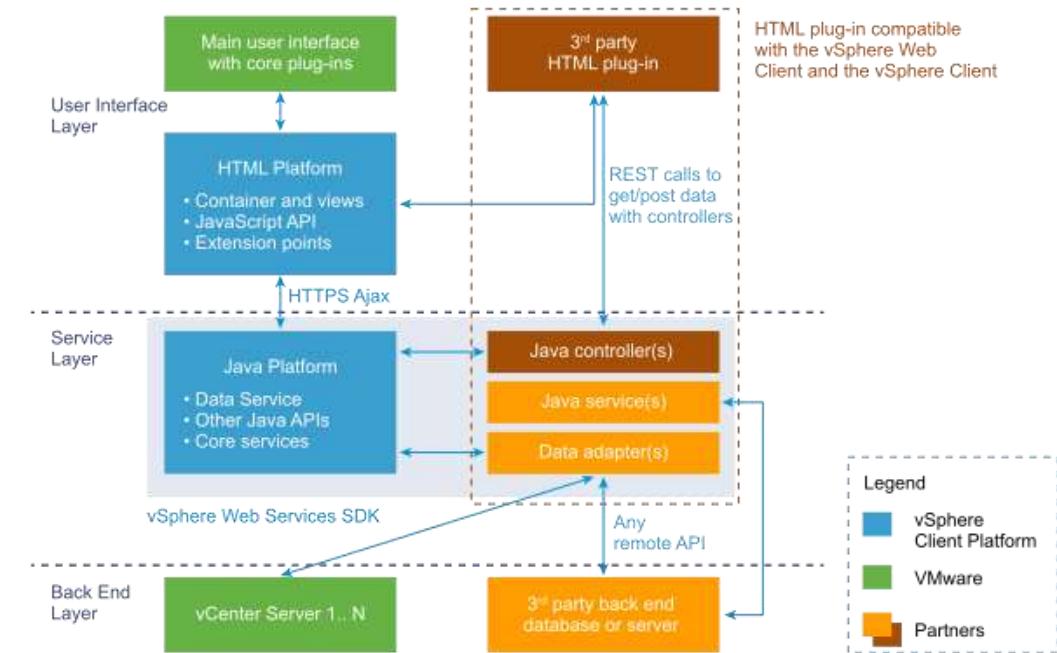
Calsoft helped the customer in developing vCenter plugin and the engagement underpinned:

The plugin inculcated below features:

- Installer:
 - Deploying the plugin to support both vSphere Web Client Server and vSphere Web Client (v6.7). Upgrade to new plugin version. Repair installation.
- Discovery and inventory:
 - RBAC - Managing user privileges and contextual actions for storage. Inventory view for various VMware objects. Detailed information views with Summary, Manage related object views .System Utilization Graphs & Performance Graphs
- Host of storage mapping: Datastore details
 - Storage provisioning: Storage Provisioning for NFS, FC and iSCSI Mount/Unmount/Delete Datastore, replicate Datastore
- Snapshot management:
 - Take/Delete/Restore Snapshot, Create Data Retention Policy , Delete Data Retention Policy
- Health indicators: Alerts and alarms
- VMware certification

Technology

- Java, Apache Tomcat, Postgre, HTML5



Benefits

- Better storage management
- Better monitoring of VMware infrastructure

Engagement

Calsoft was engaged with the customer in helping them for VMware hardware certification for iSCSI software.

Solution

Calsoft helped the customer for VMware certification and the engagement underpinned:

- Understanding customer's usage with SW iSCSI protocol in terms of requirements for VMware certification.
- Testing lab setup
- Execute storage certification test cases in a standard way as suggested by VMware in the certification guide.
- Execute the verification tests and report the test results
- Submit logs to VMware and follow-up.

Technology

- iSCSI, ESXi, vCenter, Linux

Understanding Lab setup

Test case execution

Test case verification

Reporting

Submit logs and followup

Benefits

- Certification for brand awareness

VxBlock configuration automation

Engagement

Calsoft was engaged with the customer to help them configure and monitor physical and virtual converged infrastructure in VMWare ecosystem, using vRO workflows of vCenter.

The focus was to build CI-centric workflows that utilize existing plug-ins or Ansible Playbooks

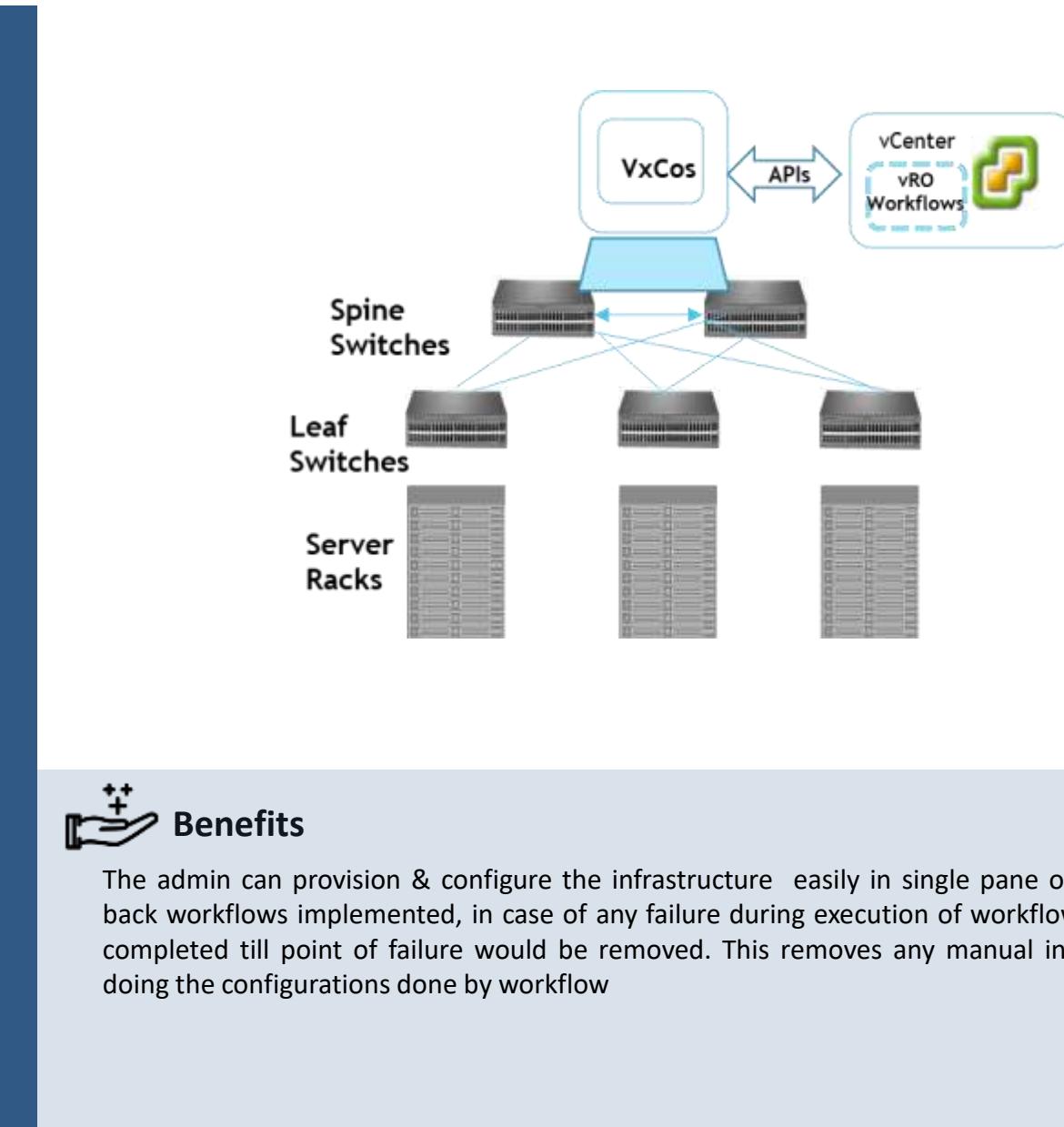
Solution

The engagement underpinned:

- vRO workflows were developed to:
 - Host networking configuration and integration with Powermax, Unity and XtremIO
 - Datastore cluster operation
 - Datastore operations
 - XtremIO – Create new volumes and corresponding data store in vCenter
 - Bare Metal provisioning for XtremIO and Unity
 - Snapshot management for Unity- Export & attach
 - Create new cluster for Powermax, Unity, XtremIO
 - Rollback – Powermax, Unity
- API development
- Plugin generation
- WCF Service POC
- Critical security defect fixes

Technology

- vRO, Java, Javascript, REST APIs, Ansible



VAAI NAS Plugin for Storage Management



Engagement

- Calsoft helped the customer develop a VAAI NAS plugin for storage management.



Solution

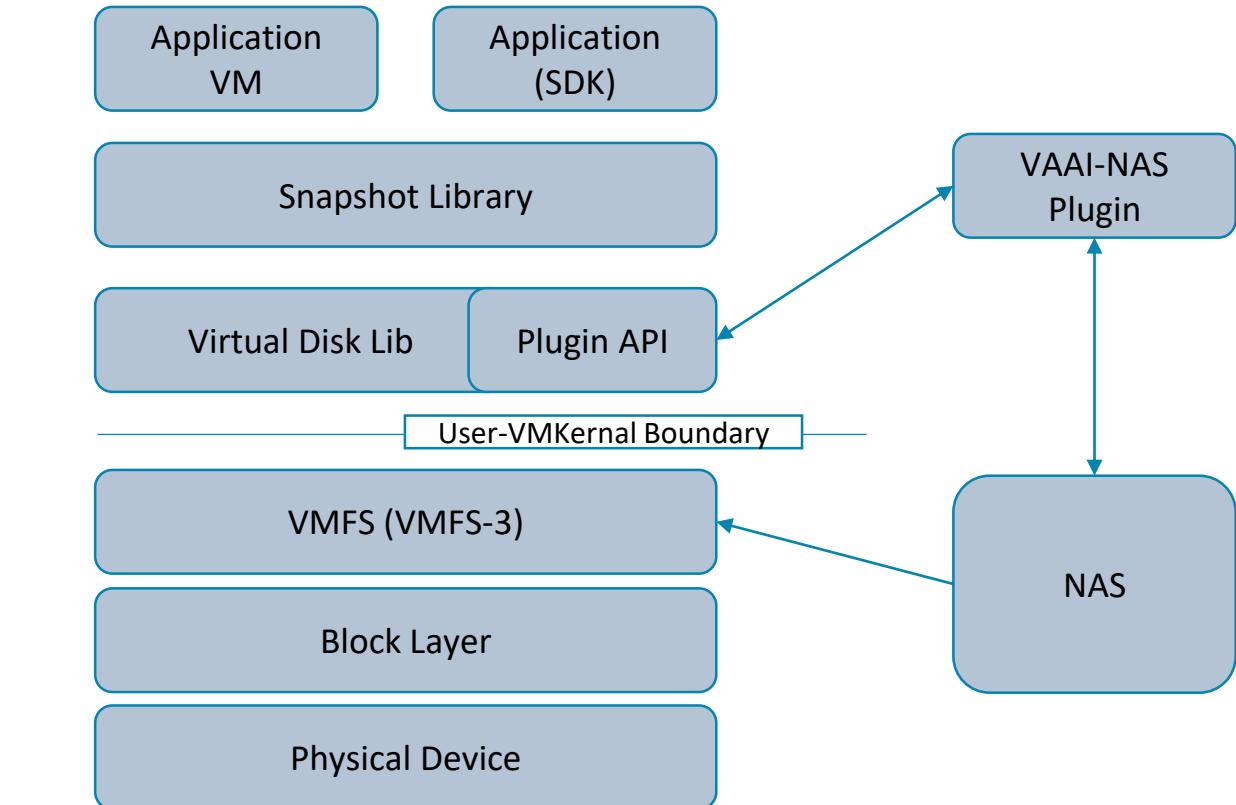
Calsoft helped the customer in developing VAAI NAS plugin using REST APIs. And the engagement underpinned:

- APIs implemented through VAAI NAS plugin
 - Space reservation
 - Session control
- Built a VIB-based installer
- Conducted VAAI-NAS tests, consisting of the following three groups:
 - Common Tests
 - Space Reservation Tests
 - Manual Tests
- Provided assistance for VMware NAS VAAI certification
- Supported vSphere version 6.7



Technology

- VAAI,NAS, REST API, vCenter server



Benefits

- VMware certified
- Better storage management

vRNI – VPAT Implementation



Engagement

- Calsoft assisted the customer in developing a vRNI application, which can be accessible to everyone. They wanted to achieve compliance as per W3C guidelines in a phased manner.



Solution

Calsoft helped the customer in developing a vRNI application accessible to people with a diverse range of hearing, movement, sight, and cognitive ability. The engagement underpinned the following enhancements to achieve accessibility:

- Converted the existing code with semantic HTML wherever applicable
- Introduced Accessibility Rich Internet Applications (ARIA) tags, which help screen reader user or visually challenged user to access a website smoothly
- Created utility functions that can be used to achieve keyboard accessibility for list items
- Corrected the DOM order of the elements; helped the screen reader to traverse through the website in a correct sequence
- Worked on maintaining the color contrast ratio (4.5:1 for small text and 3:1 for text that is at least 18 points or bold 14 points) to help users with sight issues



Technology

- Backbone.js, React.js, jQuery, JavaScript, HTML5, SCSS
- Tools: Jenkins, JIRA, GITHUB
- OS: MAC/Ubuntu

After Deployment

Before Deployment – Dev/Test cycles

Platform for virtualizing network

Assistive technology and adaptive strategy

Deployed over cloud platform

End user
(Auditory, Physical, Speech, Visual, etc.)

Calsoft development

Guidelines
ATAG, WCAG, UAAG



Benefits

- Additional 1.15 billion potential users could access the product
- Web accessibility benefited everybody:
 - Temporary disability: Broken arm, lost glasses, etc.
 - Dysfunctional mouse/keyboard
 - Older people with changing abilities due to ageing
- Improved the customer's reputation
- Was in compliance with the law as such provisions are mandatory to sell products in certain countries
- Improved the SEO (Search Engine Optimization) for the customer

NSX V2T Migration Tool

- Seamless migration, minimal downtime, minimum disruption



Engagement

- Calsoft was engaged with the customer for the development of a migration tool that helps in migrating a virtual data center (VDC).



Solution

Calsoft helped the customer in developing a migration tool for seamless migration of NSX-V backed virtual data center to NSX-T backed virtual data center.

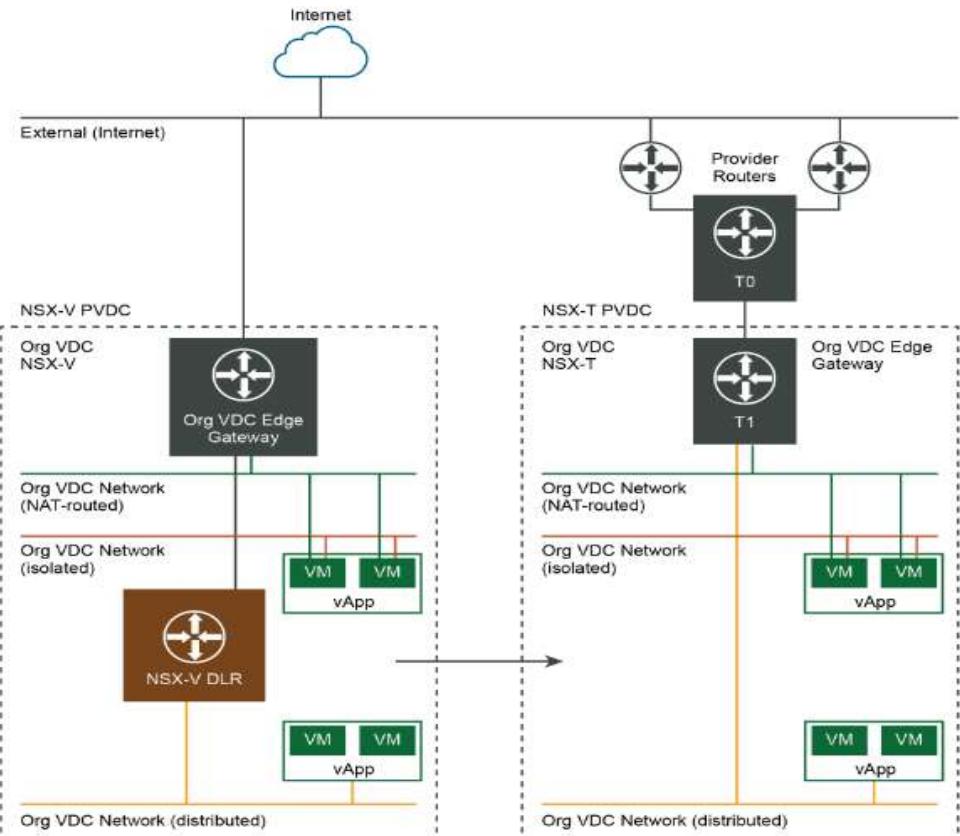
The engagement underpinned:

- Development:
 - Developed an OS-independent, executable package from scratch.
- Test Automation:
 - Automated pre and post sanity checks to verify customer environment before and after the migration.
- Features:
 - Migration of workload VMs and VDC objects in the same vCloud director instance
 - NSX-T bridging
 - Migration of networking services from source Edge gateway to target Edge gateway, ensuring minimal downtime



Technology

- Python, Windows, Linux, NSX-V, NSX-T, VMware vCloud Director



Benefits

- Seamless migration
- Minimal downtime
- Minimum disruption

Performance Calibration of DPDK-enabled Virtual BNG Application

Engagement

Calsoft virtualized a BNG application with DPDK technology for the customer.

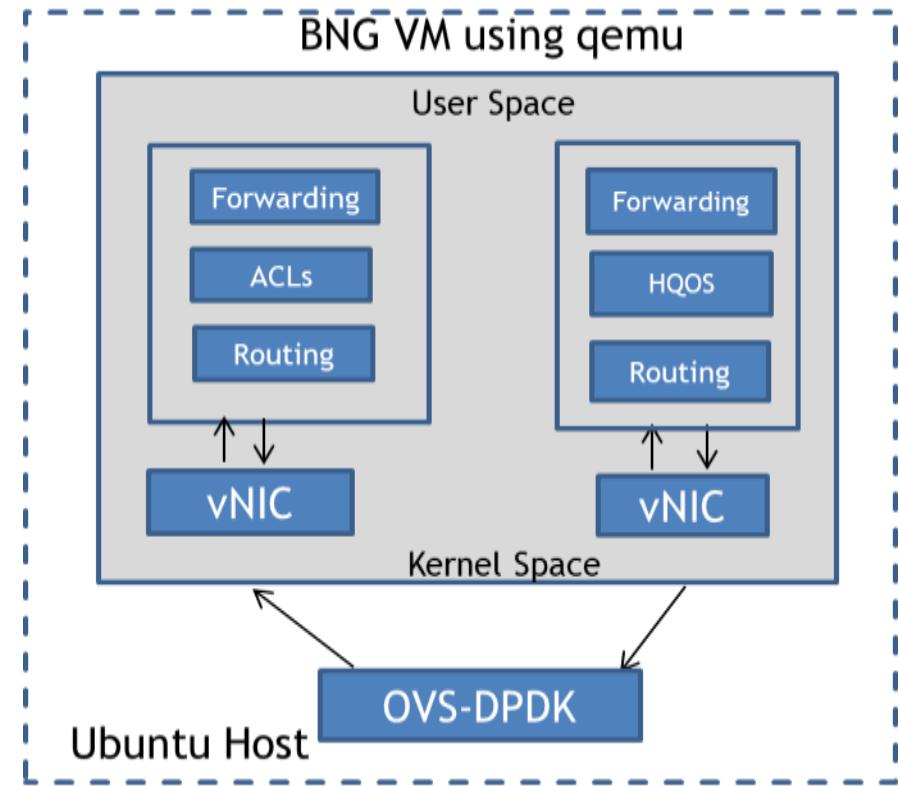
Solution

The engagement underpinned:

- Converted the BNG to virtualized BNG & enabled it with DPDK
- BNG data path has two streams - Uplink & Downlink - which are implemented with functions like Routing, Firewall, HQoS, etc. Calsoft implemented 2 streams as IP-Pipeline tied to the cores in the VM
- Connected the hypervisor to host over vhost-user with OVS-DPDK
- The vNICs in VM are controlled using virtio-net-pci PMD (Poll Mode Driver)
- Performance testing of vBNG using pktgen, which is DPDK-enabled

Technology

- OS - Linux
- Language - C, DPDK, PMD, OVS-DPDK, IP-Pipeline
- Tools - dpdk-pktgen



Benefits

- The packets are generated using pktgen, which is configured for sending 64 Bytes UDP packets with a random source and destination IP. When configured with 4 RX queues, virtual BNG is able to forward packets with 3 times more throughput compared to the forwarding in Linux Kernel.

Automate ESXi & SPP upgrade (HPE Server)

Engagement

Calsoft helped automate upgrades of ESXi & SPP software bundles that hold the BIOS, FW & Driver updates for HPE Servers (GEN8/9).

Solution

Development: Developed an automation framework to upgrade ESXi & SPP software bundles.

Features:

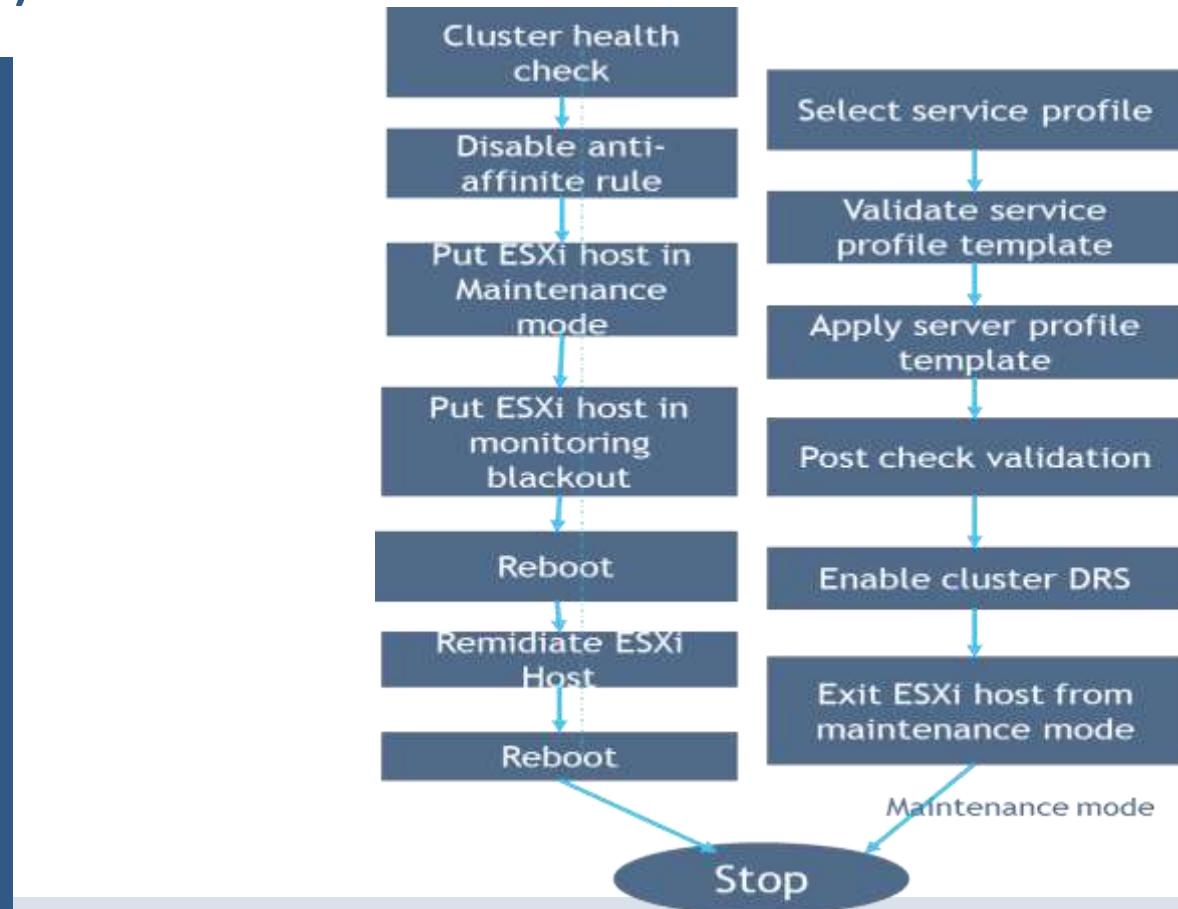
- Cluster Capacity health check
- Put ESXi host in maintenance mode & monitoring blackout
- Remediated ESXi host
- HPE SPP upgrade

Functionality:

- Cluster capacity health check
- Disabling anti-affinity rules, if required
- SPP upgrade - select service profile, validate service profile template, apply service profile template
- Post-check validation – power state
- HA states on ESXi host, ping status for all VMs, network adapter status
- Exit ESXi host from maintenance mode
- Enable DRS flag cluster

Technology

Ansible, Python, Windows, Linux, Git, Kerberos



Benefits

- The customer was able to upgrade servers automatically with minimum supervision

vCenter Server Plugin

Engagement

Calsoft developed a vCenter server plugin for the customer.

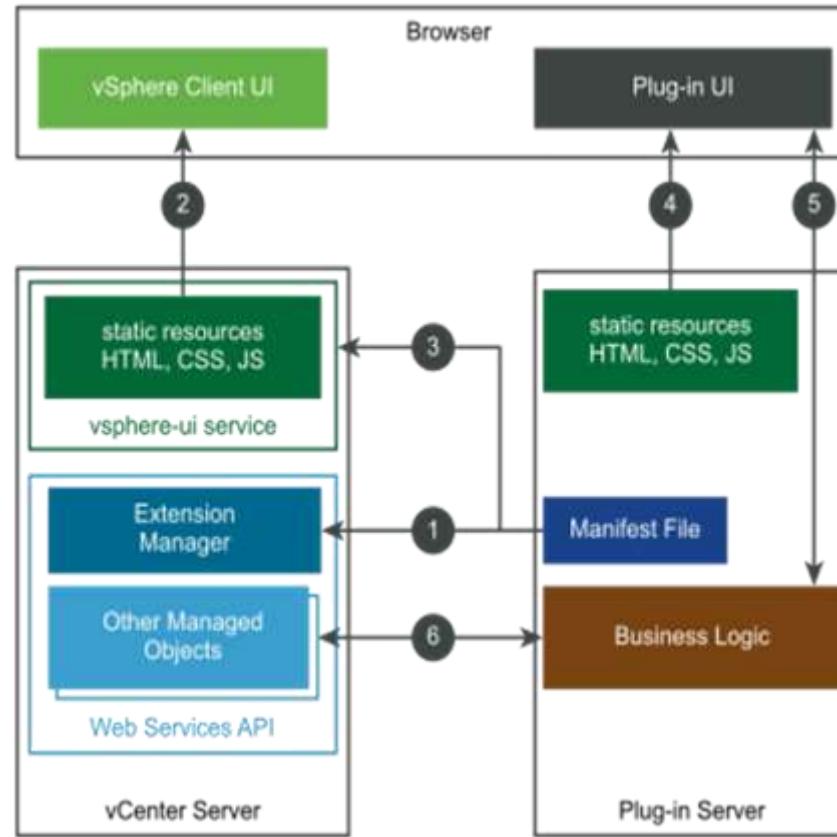
Solution

Calsoft helped the customer in developing a vCenter server plugin to manage composable infrastructure in the datacenter. The plugin enabled features like:

- Plugin installation & registration
- Configuration of plugin with vCenter credentials
- Inventory discovery, inventory mapping
- Health and capacity monitoring and alerts
- Storage actions (Expand/Release memory)
- Storage provisioning
- Create and manage infrastructure provisioning policies
- Engineering documentation for plugin

Technology

- Java, Spring Boot, Maven, vSphere, vCenter



Benefits

- Improved manageability
- Improved security

New plugin support EMC Unity array(NAS)

Engagement

Calsoft was engaged with the client for development of plugin to extend their existing Backup and restore framework to support new EMC Unity array which is based on snapshot backup and restore for NAS protocol.

Solution

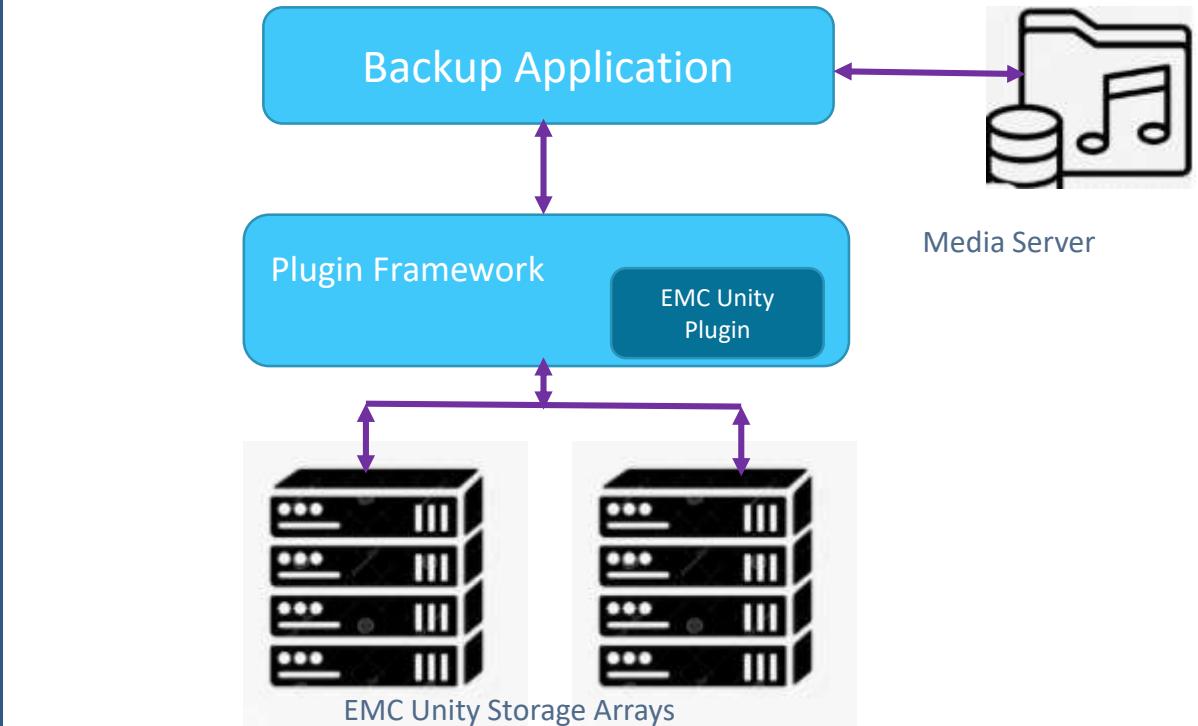
Calsoft was involved to explore the SDK that perform the required operation on EMC unity array of supporting the snapshot based backup and restore helped in supporting below operations and incorporated the action in new plugin.

- Identified the NAS entities.(NAS server, FileSystems, Fileshare-NAS/SMB
- Identified the snapshot and relationship between Snapshot and File share
- Export the snapshot to Backup application by creating the fileshare from created snapshot
- Deport the exported fileshare once the backup is done
- Delete and restore the snapshot

Calsoft also worked on IPv6 support of same plugin and executed the QA activity as well.

Technology

- Python, storops-sdk, Docker, NAS (NFS and SMB), IPv6



Benefits

- Capability to support new array EMC unity NAS for snapshot base backup and restore

vCenter plugin development

Engagement

Calsoft was engaged with the client for developing a vCenter plugin for their existing implementation which required the VMware admins to login to another endpoint to manage their resources

Solution

Calsoft helped the customer in designing and development of a plugin and the engagement underpinned.

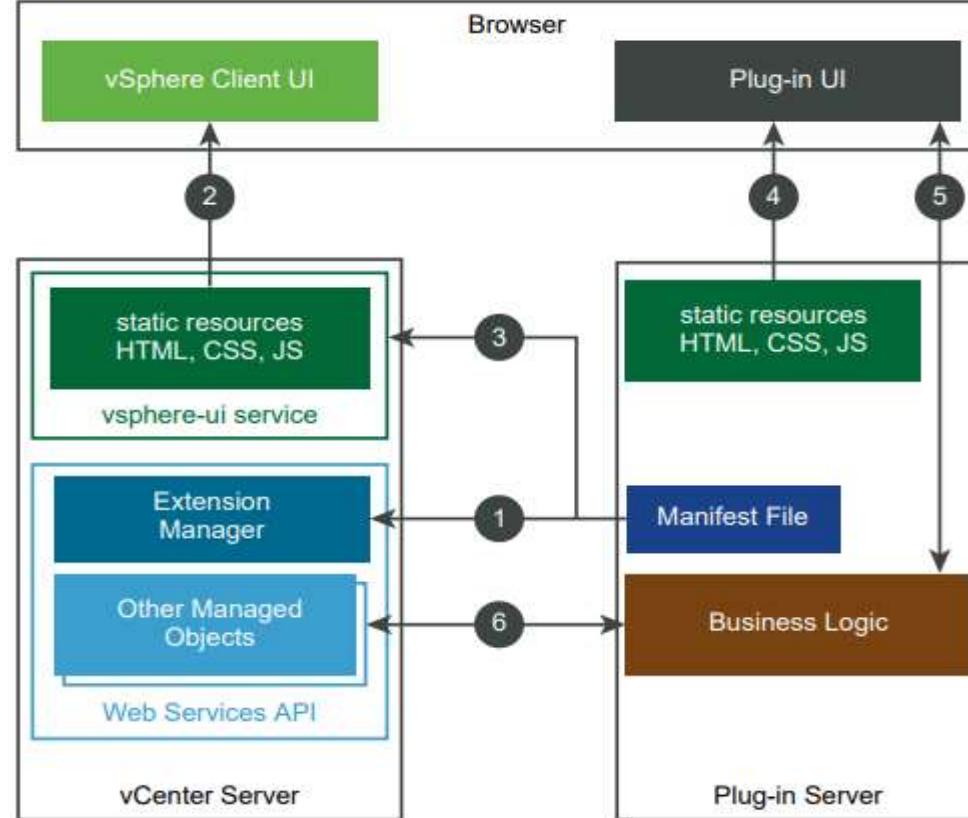
- The Plugin sits remotely on any VM and serves the requests via dockerised container.
- Provided a VMware certified plugin to build trust and assurance for the customers.

Working:

1. Script registers the plugin with vCenter server
2. Web browser downloads UI elements from vsphere-ui service
3. The vsphere-ui fetches manifest file to get the user interface
4. Browser downloads UI elements from plugin server
5. Plugin interface request data from plugin server
6. Plugin server uses the Web Services API to interact with vCenter Server

Technology

- Java 8, Spring boot, Angular 9, Python 3, Docker



Benefits

- Entire Manageability and visibility all under one Composable infrastructure
- Better manageability

vm vSphere Client | Menu | Search in all environments

Liquid Plugin INSTANCE 10.204.104.92:8443 -

Liquid

- System
 - Fabric: 7B
 - calsoft
 - net
 - yoda-satum
 - yoda-model
 - yoda-model2
 - m2
 - m1
 - m3
- Group_Test
- Machine
- GroupTest
 - qwertyuiop
- TestBsp
 - m6
- 1234kl
 - mech1fg
- grpt
- data

Liquid Command Center

Summary

Versions

Name	Version
liquid	2.6.0.247
esp	2.6.0.64
coreboot	2.6.0.2
imx8	2.6.0.6
imx6pre	2.6.0.2
imx7	2.6.0.7
imx8m	2.6.0.49
imx8	2.6.0.134
imx	2.6.0.31

Licensing

Total number of licenses: 12 Licensed in use: 3

Licensed Hosts
anell
calsoft
esoud

Unlicensed Hosts

vm vSphere Client | Menu | Search in all environments

Liquid Plugin INSTANCE 10.204.104.92:8443 -

Machine | Edit Machine | Delete Machine

Summary

- m2
- m1
- m3
- Group_Test
 - Machine
- GroupTest
 - qwertyuiop
- TestBsp
 - m6
- 1234kl
 - mech1fg
- grpt
- data

Machine Name: Machine

Machine ID: 3

IPMI Address: Not Configured

Boot Device: —

Created: Apr 15, 2021, 11:25:38 AM

Assigned Devices

CPUs: 0 55GbE: 0

Details

Stats

CPU Frequency	CPU Cores
—	—
CPU Threads	CPU Sockets
—	—
DRAM Memory	Fabric Connect
—	—
Network	Throughput
Adapters:	0Gb/s
Storage Drives:	Total Capacity
—	—
GPUs:	GPU Cores
—	—
FPGAs:	FPGA Speed
—	0Gb/s

Recent Tasks

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time	Server
Check new	10.204.104.74	Completed		VMware vSphere...	176 ms	04/15/2021, 11:25:38 AM	04/15/2021, 11:25:38 AM	10.204.104.74

Engagement

Calsoft was engaged with the client for developing vCenter server plugin to manage their composable distributed infrastructure (CDI) product

Solution

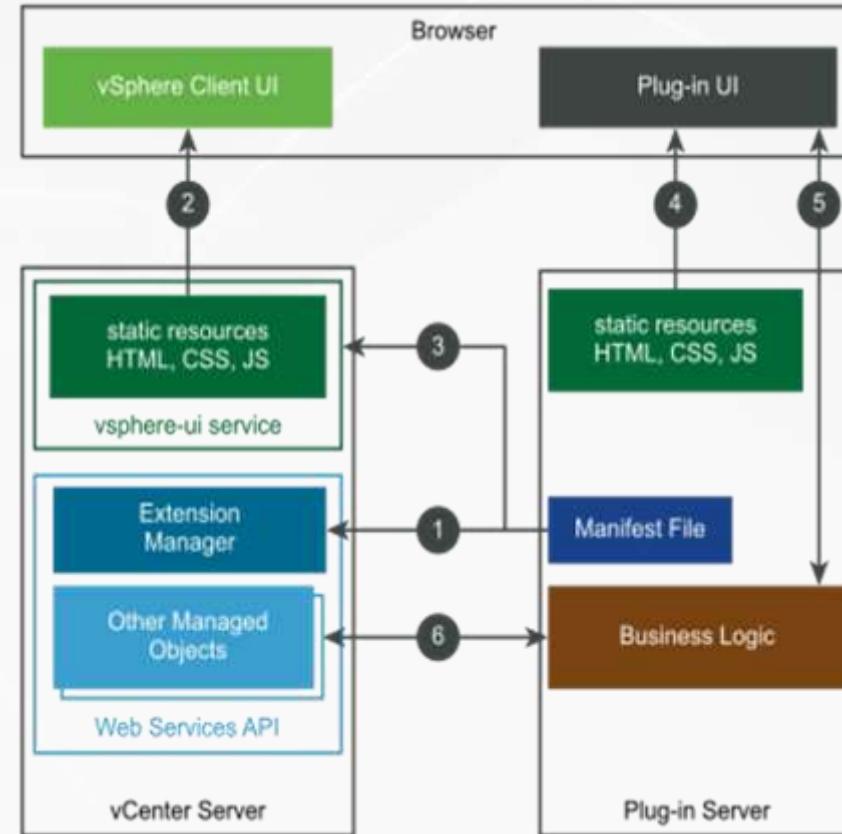
Calsoft helped the customer in developing vCenter server plugin to manage composable infrastructure (CDI) in the VMware based datacenter.

The plugin enabled features like:

- Plugin Installation & Registration
- Inventory discovery, Inventory mapping for components including CPU, GPU, HDD & Network Switches
- Health and capacity monitoring and alerts
- Storage provisioning by composing the storage first and then provisioning it for creating vSphere Datastores
- End to end orchestration of storage actions like Expand & Release memory
- Create and manage infrastructure provisioning policies, validated designs etc.
- Engineering documentation for plugin

Technology

- Java 8, Springboot, Maven, vSphere infrastructure, vCenter Server Plugin SDK



Benefits

- Improved manageability through vCenter web console
- Integrated infrastructure provisioning operations from vCenter Server with the physical infrastructure composer
- Improved security
- Management of validated design based templates for infrastructure provisioning



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and architectural styles visible against a light sky.

Success Stories: ServiceNow

ServiceNow ITSM plugin for Data Center Monitoring



Engagement

Requirement is to develop ServiceNow plug-in for client Administrator. Inventories are fetched from client Administrators database through REST API and pumping them in the ServiceNow Cloud platform in the CMDB_CI table. From fetched and stored Inventories, CI Relationships are created and Incidents/tickets are handled which are created against inventories.



Benefits

- This integration offers data and features unavailable through other discovery methods.
- Agent-less automated service mapping
- Auto inventories CI relations on chassis
- Keep your CMDB up-to-date
- Auto Incidents creation based on serviceable events
- Incidents are managed at ServiceNow and same are updated at client Administrator.



Technology

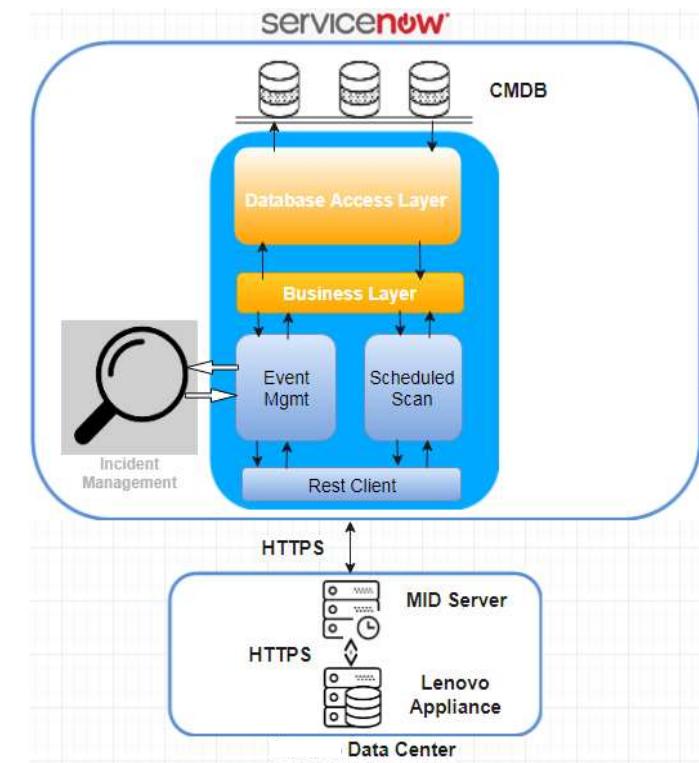
- Service-Now (Jakarta, Kingston)
- Client Administrator version 2.0 .0 REST API



Solution

Calsoft implemented a ServiceNow plug-in that invoke client Administrator REST API through HTTPS from ServiceNow to sync inventories between ServiceNow CMDB and client Database:-

- UI Action/Scheduled Job to import client Inventories into ServiceNow
- Mapping & Creating CI relationship into fetched inventories in ServiceNow
- Auto Incident tickets creation based on serviceable events for inventories



Architectural presentation of the connectivity between Administrator and ServiceNow

ServiceNow Plugin for Storage Vendor



Engagement

Calsoft was engaged with a leading storage vendor for development of a ServiceNow Plugin to enable provisioning of resources from the ServiceNow Platform.



Benefits

- End user can continue to use his everyday ITSM tool like ServiceNow. ServiceNow handles the business and ITSM workflows



Technology

- Scripting Languages: JavaScript, Jelly from ServiceNow



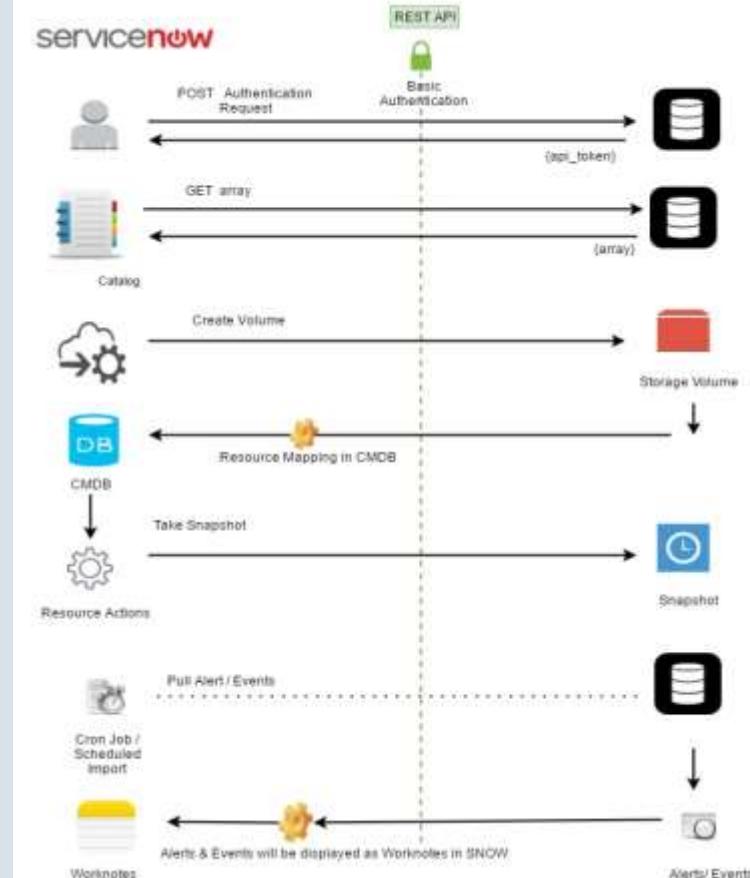
Solution

Features:

- Create customer Service Catalog in ServiceNow.
- Discover customer arrays and Enlist them.
- Display Form to Create volume.
- Integrate volume with CMDB and allow user to perform action on this volume. e.g. Take Snapshot.
- Run cron job to track customer Alerts/Events and display them in ServiceNow as Worknotes or raise as incident.

Functionality:

- ServiceNow Plugin
- Request customer Service Catalog.
- Display Arrays with Create Volume action
- Create volume and form and action
- Monitor volume in CMDB with End user actions.
- Track customer Alerts/Events in ServiceNow.





Engagement

Requirement is to develop and enhance ServiceNow Incident Management Module for the customer where plugin should enable end user to raise request to minimize the negative impact of service disruption on business operations and restore a normal service operations as quickly as possible, thus ensuring that the best possible levels of service quality and availability are maintained.



Benefits

- Track the issue status as users are being notified over email as and when action taken on the ticket towards resolution.
- Provided simple UI for end users to quickly and easily place the resolution request for the issues users are facing.
- To quickly address the issue deciding priority of the issue over business operations.
- The Incident Management feature enabled customer to manage communications effectively and get the appropriate people engaged quickly when a major business issue or incident occurs.



Technology

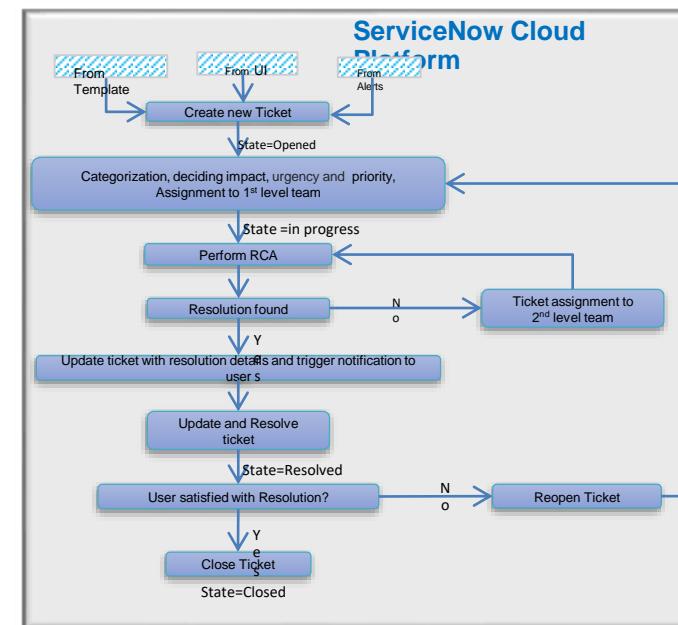
- Service-Now (Helsinki version, Istanbul version patch5- Hotfix1)



Solution

Calsoft helped Customers to:

- Create ticket directly from user friendly IM form.
- Create a ticket from templates.
- Create a ticket from alerts if any functionality goes down for particular module.
- Prioritize issues based on their urgency, impact and priority level
- Create notifications and send it to users, easy classification of tickets, escalate tickets,
- Pull a report on issues faced and resolution provided



ServiceNow Integration for ITOM (IT Operations Management)



Engagement

Requirement is to develop ServiceNow plugin for company providing ITOM support. Data are fetched from vendor Cloud database through REST API and storing them in the ServiceNow Cloud platform in the CMDB_CI table. From fetched and stored data, CI Relationships are created among them.



Benefits

This integration offers data and features unavailable through other discovery methods.

- Agent-less automated service mapping
- Hardware and Software life-cycle data
- Connectivity, Heuristics based service and dependency mapping
- Keep your CMDB up-to-date
- Credentials stay on premises



Technology

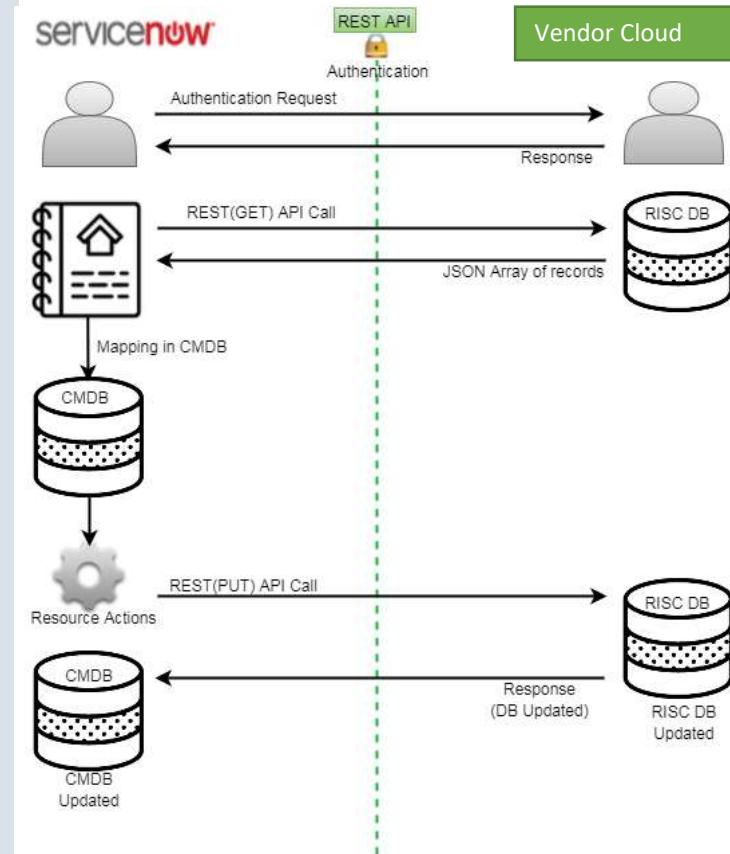
- Service-Now (Istanbul, Jakarta version 1.0.0),
- REST API



Solution

Calsoft implemented a ServiceNow plugin that invoke API provided by vendor from ServiceNow to sync data between ServiceNow CMDB and vendor Cloud Database using REST API through HTTPS:-

- UI Action/Scheduled Job to import vendor datacentre inventory into ServiceNow
- Mapping & Creating CI relationship into fetched data in ServiceNow
- Add Tags and views stacks, relationships in stacks



Architectural presentation of the connectivity between vendor cloud and ServiceNow



Engagement

Requirement is to develop Service now plugin for Array where plugin should enable end user to have the basic functionality like create volume, create snapshot, connect to host group and connect to host using ServiceNow .



Benefits

The integration between two platforms helped to

- Provide an UI for end user to quickly and easily place the request for desired operation with approval workflow
- Track the request status
- To monitor the request via approval through array administrators.



Technology

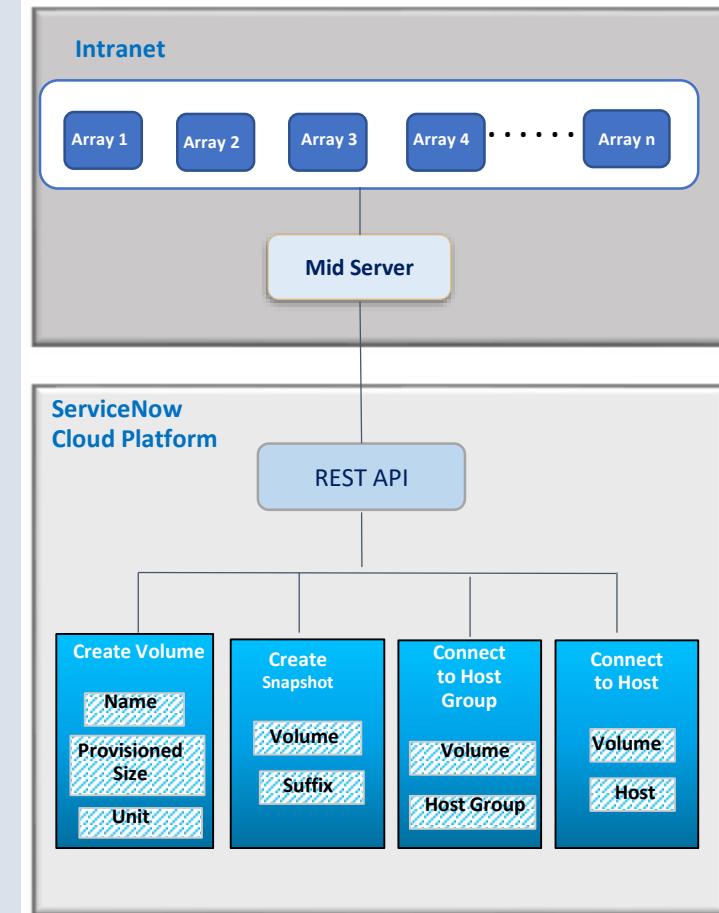
- Service-Now (Istanbul version patch5- Hotfix1),
- REST API V1.9



Solution

Calsoft implemented a serviceNOW plugin that Enabled authenticated users in -

- Creating a volume at array location.
- Creating a snapshot of the volume already created or available at array location
- Connecting a volume to the desired Host Group available within storage location
- Also connecting the volume to the desired Host available within storage location



Architectural presentation of the connectivity between Client and ServiceNow

ServiceNow Plugin for vRealize Automation



Engagement

Calsoft was engaged with VMware for development of a ServiceNow Plugin to enable provisioning of vRA resources from the ServiceNow Platform. Highlights:

- Import and request vRA Catalog Items from ServiceNow Service Catalogs
- Integrate with CMDB and perform Actions on the provisioned resources.



Benefits

- End user can continue to use his everyday ITSM tool like ServiceNow. ServiceNow handles the business and ITSM workflows, while vRA manages the cloud infrastructure



Technology

- Scripting Languages: JavaScript, Jelly from ServiceNow



Solution

Features:

- Import Catalog Items.
- User reconciliation and implementation of “Entitlement” in ServiceNow
- Provision Catalog Items from Service Catalogs
- Integrate provisioned resources with ServiceNow CMDB

Functionality:

- ServiceNow Plugin
 - Import and Configure Plugin
 - Integration with vIDM and Microsoft ADFS for SSO
 - Implement Approval workflows in ServiceNow
 - Email notifications and Integration with Incident Management module in ServiceNow



Engagement

Calsoft is engaged with the client for Product Testing and DevOps (CI-CD) setup of their product.



Benefits

- Calsoft was able to provide the wide range of skillsets required for this product testing - DevOps, QA, Automation, Scripting, etc.
 - Leverage in-house expertise available within Calsoft ecosystem for DevOps & QA domain.

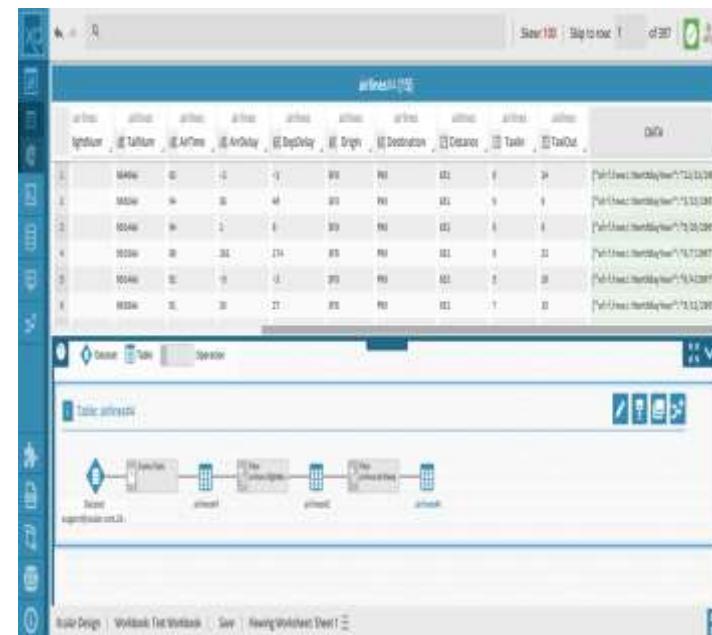


Technology

- Hadoop, MySQL, Oracle, TPCH, Gcov, ASAN, Guardrails, AWS, Azure, Git, Jenkins, Gerrit, Python, Shell Scripts, Linux

 **Solution**

- Build team with complete ownership of QA.
 - Manual testing for Import & Export of data to NOSQL(Big data) and traditional RDBMS DBs.
 - Manual testing for Import & Export of data to and from clouds: Azure and AWS.
 - Setup automation test framework, code coverage, memory leak profiling, & other quality practices.
 - DevOps – Helped build and streamline CI-CD processes
 - Setup Agile development practices.





Engagement

Calsoft was engaged in development of a ServiceNow plug-in for customer's platform which helps in application provisioning and infrastructure automation based on AD/LDAP configuration.



Benefits

- Workflow approval mechanism in place.
- Authentication based on existing AD/LDAP.
- Role based user entitlement to allow launch of orders.
- End to end tracking of requests
- Scheduled jobs keep ServiceNow CMDB up-to-date.
- Customizable dashboard widgets.



Technology

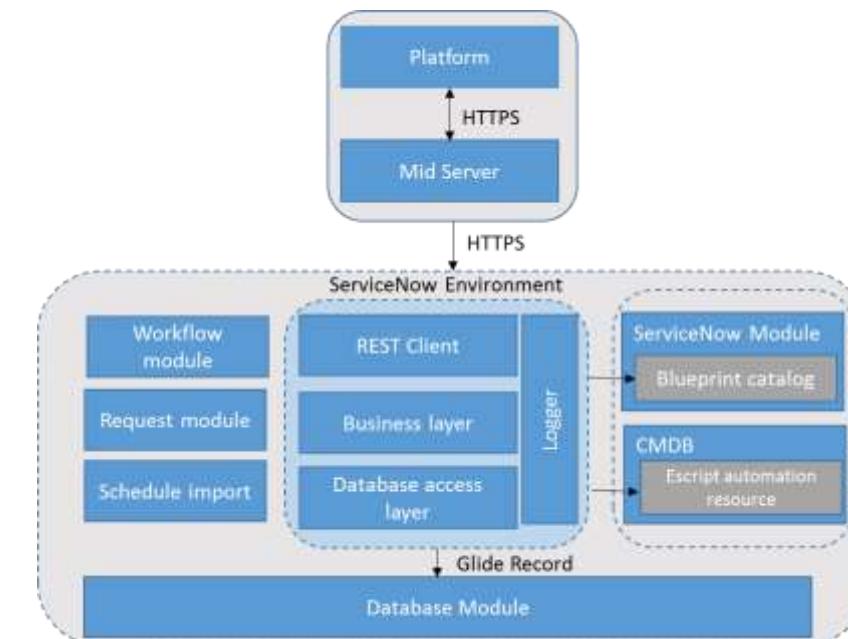
- Service-Now (Kingston , London)
- REST API v3.1



Solution

Calsoft helped customer in fetching inventories through REST API and assimilated it into ServiceNow CMDB. Catalog orders are submitted from the stored inventories as per entitlements to provision application and required actions are performed.

- UI Action / Scheduled Job to import Inventories into ServiceNow
- Mapping assets & creating CI relationships in ServiceNow
- Role-based work entitlement.
- Auto Incident creation based on specific events for inventories





Engagement

Calsoft was engaged with a Fortune listed client for developing ServiceNow plug-in for their platform which adds ITSM capabilities. The engagement underpinned:

- Monitoring of inventories
- Fault alerts
- Creating and assigning incidents to specific group.



Benefits

- ITSM capabilities
- Complete control to end user to define criteria for Incident creation
- Incident summary and analysis with reporting Dashboard
- Mapping between Incident and Inventory helps impact analysis of the fault
- Auto incident resolution mechanism reduces end user workload



Technology

- Service-Now (London), ITSM, JavaScript
- CMDB, Inventory management, Incident management REST API

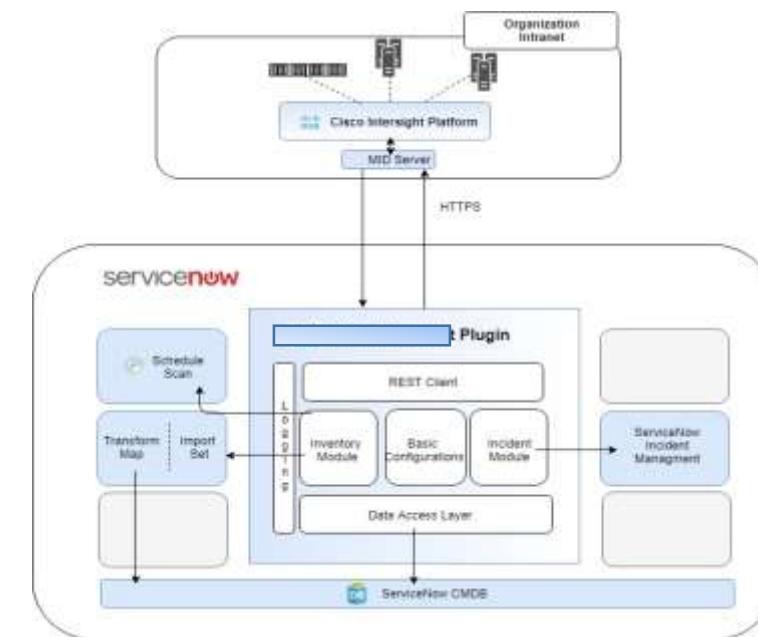


Solution

Calsoft implemented a ServiceNow plug-in that invoked REST API from ServiceNow to perform below operations

Features:

- Scheduled Job to poll inventories and monitor faults.
- Mapping inventories in CMDB and creating relationship between them.
- Auto Incident creation based on user defined criteria.
- Auto Incident resolution in case of Auto Fault clear.
- Provided user interface where user can customize criteria



ServiceNow Integration Plug-in



Engagement

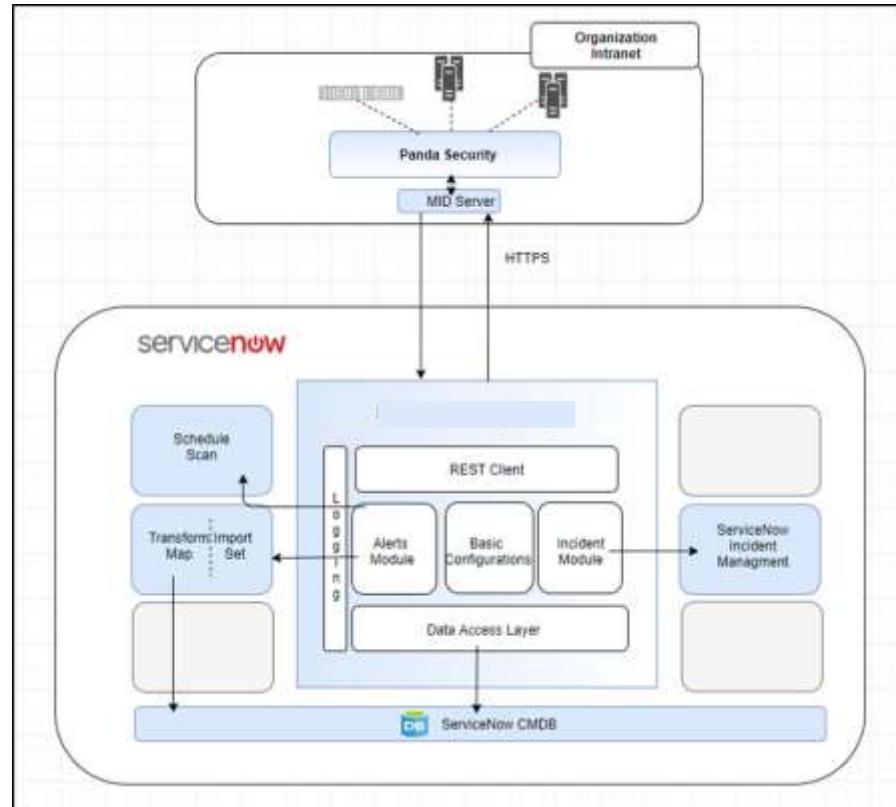
- Calsoft was engaged by the customer for developing a ServiceNow integration plug-in for ITSM requirement.



Solution

Calsoft implemented a ServiceNow plug-in that invoked REST API from ServiceNow for fetching all the indicators of attacks.

- The plug-in provided alerts sync and incident management for specified alerts
- All the alerts were imported in ServiceNow
- As a part of the incident management module, the plug-in raised incident for any serviceability event in ServiceNow
- Scheduled job to poll for indicators of attack (alerts)
- Provided mapping of inventories in CMDB and relationship creation between them
- Auto incident creation based on user-defined criteria
- Provided UI where the user could customize incident creation criteria



Technology

- JavaScript



Benefits

- ITSM capabilities to Cytomic Orion through ServiceNow
- Full control to end user to define incident creation criteria
- Complete incident summary and analysis with report in the dashboard
- Mapping between incident and inventory allows impact analysis of the fault
- Automatic alerts fetch mechanism through polling

ServiceNow SecOps and IR Integration with Customer Security Platform



Engagement

- Calsoft was engaged by the customer for developing a ServiceNow plug-in to integrate the customer's alert/threat management tool with ServiceNow



Solution

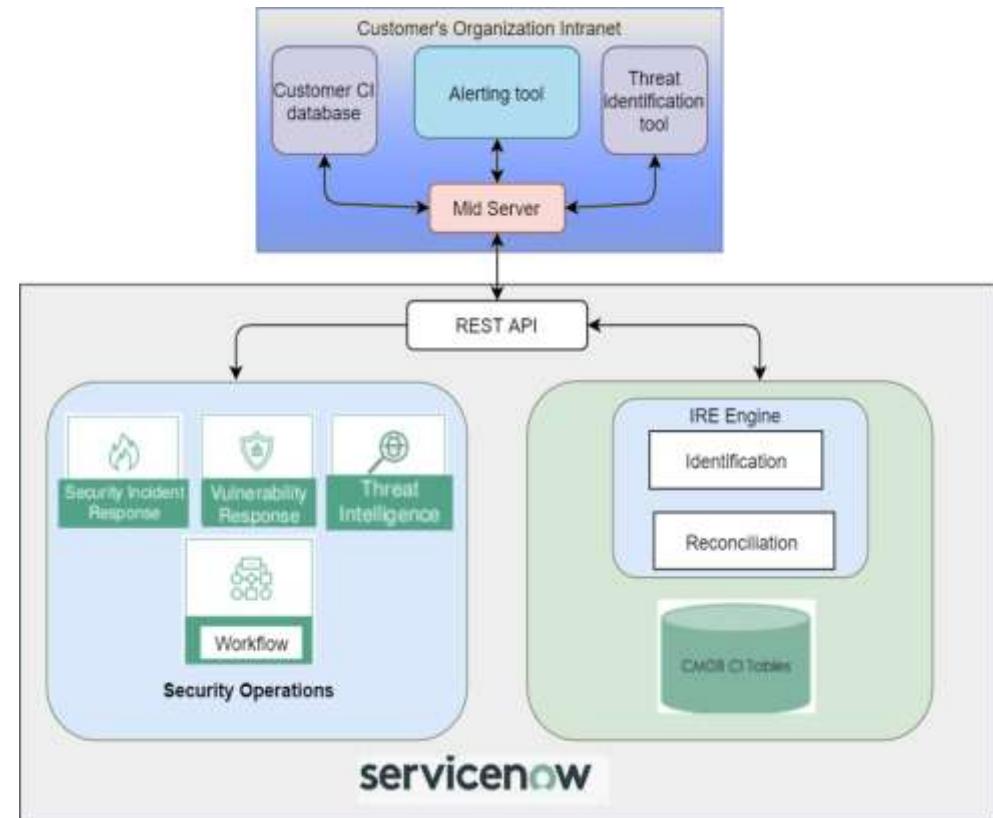
Calsoft helped the customer in developing a ServiceNow plug-in for integration of threat management tool with ServiceNow. The engagement underpinned:

- Integration of two platforms using RESTful APIs and import of security related threats, alerts, logs into ServiceNow
- Fetching of customer CI database into ServiceNow
- Mapping of inventories in CMDB and relationship creation between them
- Installation and configuration of ServiceNow plug-in for security operations
- Fetching of alerts, logs, errors from customer tool into ServiceNow



Technology

- JavaScript
- Rest API



Benefits

- Leveraged ServiceNow CMDB to map threats, vulnerabilities, and security incidents to business services
- Reduced risk of exposure by delivering a more efficient security response
- Ability to quickly address security breaches
- Produced analytics to analyze the threat pattern

ServiceNow Plug-in for Security Platform



Engagement

- Calsoft was engaged by an IT security company for developing a ServiceNow plug-in for their security platform



Solution

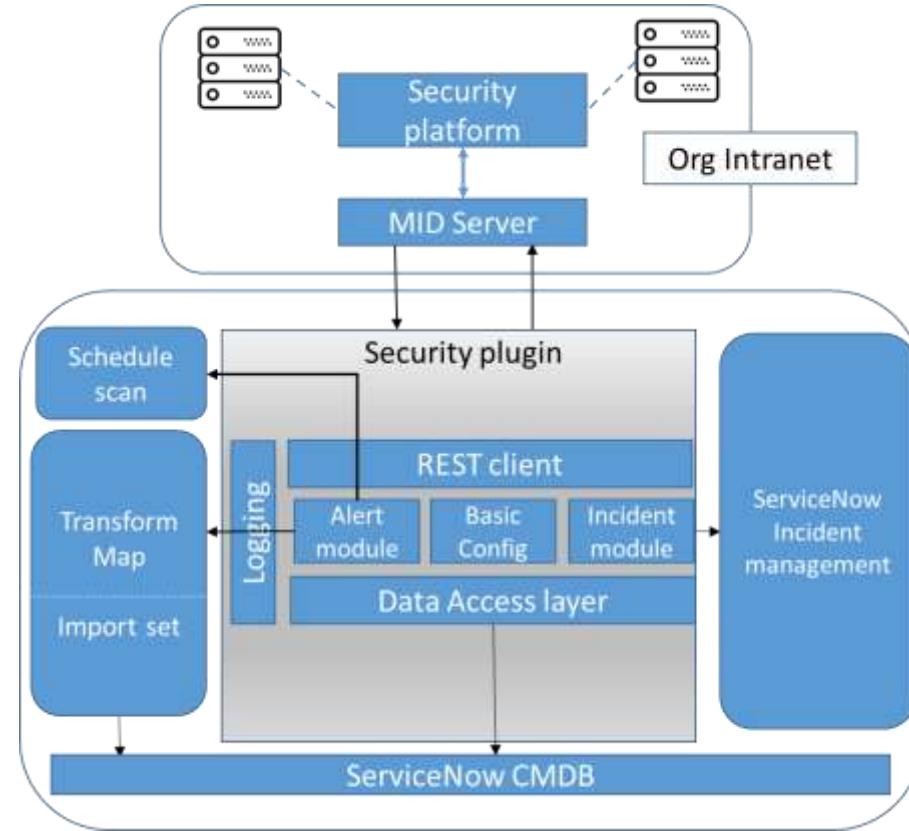
Calsoft helped the customer in developing a ServiceNow plug-in, which helped inculcate ITSM capabilities into their security platform. The plug-in invoked REST API from ServiceNow for the following functionalities:

- Scheduling job to poll alerts periodically
- Auto incident creation based on user defined criteria
- Incident linked to CMDB Configuration Item (CI)
- Monitoring specified criteria such as severity
- UI for user to register security platform and specify incident criteria



Technology

- ServiceNow (London)
- Rest API



Benefits

- ITSM integration for security product
- Full control to the end user for defining incident creation criteria
- Mapping between Incident and Inventory (CI) enables impact analysis of a fault

ServiceNow ITSM Implementation



Engagement

Calsoft was engaged with the customer for improving the IT services management of an organization. It focused on aligning IT processes and services with business objectives to help an organization grow with the help of ServiceNow ITSM.



Solution

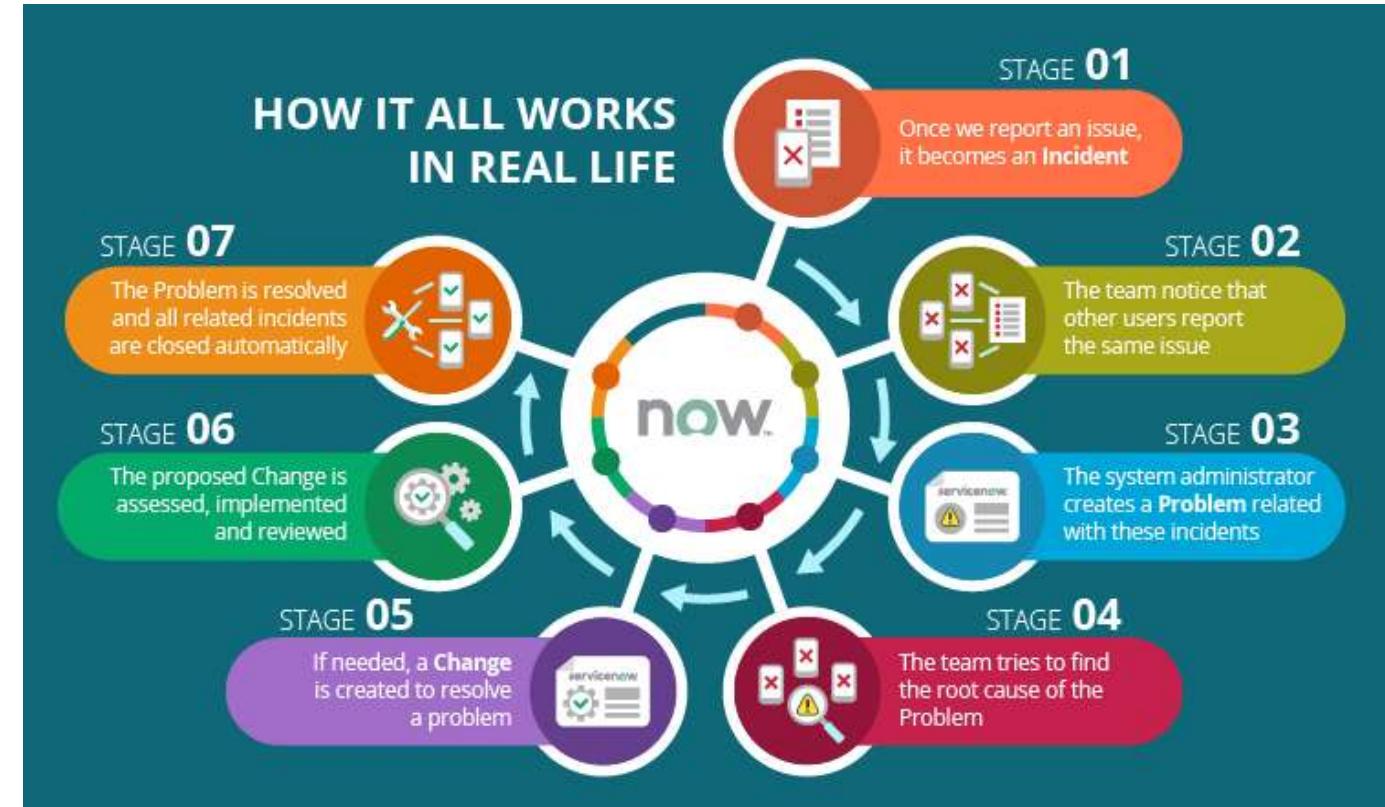
Calsoft helped the customer in customizing a ServiceNow ITSM process as per customer's requirement, which helped our customers to:

- Creating incident ticket by different ways like manual creation, import from external source, via email, custom portal, integration.
- Providing the capability to associate configuration item to incident, problem or change record.
- Identifying potential upstream or downstream impact.
- Eliminate recurring incidents.
- Allowing user to request services and have those services delivered.
- Reducing time for fulfilment of the request.
- Ensuring that the changes are made in planned and control manner.
- Reduces the number of incidents cause by changes.



Technology

ServiceNow
Javascript



Benefits

- Establish well-defined, repeatable, and manageable IT processes business services.
- Clear expectations on service levels and service availability.
- Efficient analysis of IT problems to reduce repeat incidents.
- Risk-free implementation of IT changes
- Better transparency into IT processes and services
- Improved efficiency of IT help desk teams.

ServiceNow Discovery Implementation



Engagement

Calsoft was engaged with the customer for tracking of changes occurring within customer's on-premises and cloud infrastructure in the Configuration Management Database (CMDB) using ServiceNow Discovery



Solution

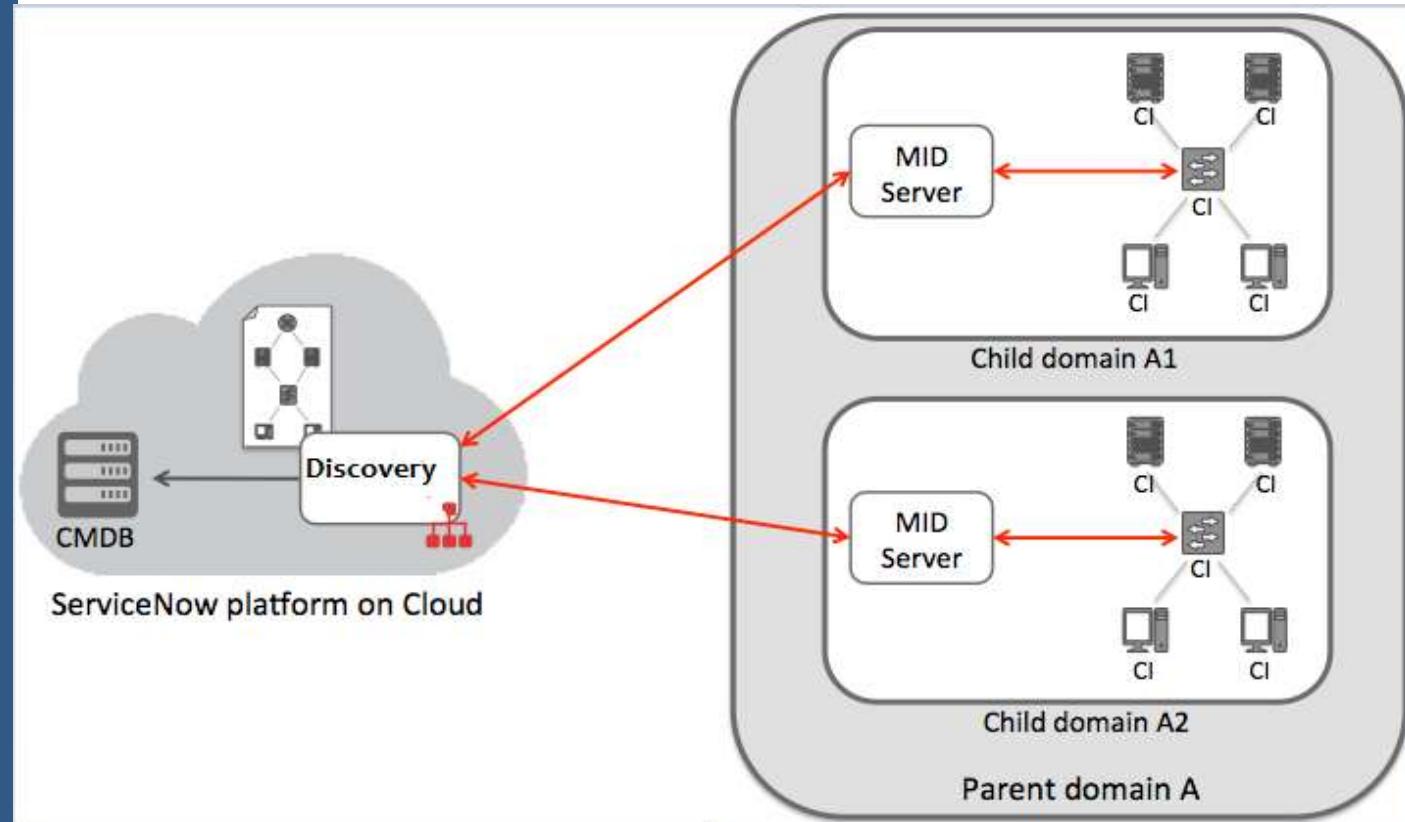
Calsoft helped the customer in implementation od ServiceNow Discovery which helped our customers to:

- Track changes occurring within on-premises and cloud infrastructure in the Configuration Management Database (CMDB).
- Set a strong foundation with accurate data and relationship views for ITSM change management, Software Asset Management, Customer Service Management, Security Operations.
- Avoid the management complexity of having permanent software installed on any computer, or device to be discovered.



Technology

ServiceNow



Benefits

- Rapidly configure and launch a secure, agentless discovery of hardware, software, serverless infrastructure, virtual plus cloud resources, and their relationships.
- Discovery Dashboard makes it easy to analyze all IT resources.
- Reduces the cost for device discovery.
- Help to analyze IT resource relationships using Dependency view.



Engagement

- Calsoft was engaged with customer to fulfil requirements across HR management module.
- With this module/feature development, we provided employee 'on Boarding' process in the ServiceNow right from identifying candidate till releasing an offer to the candidates and later ob-boarding process.
- Also the process has some integrations with SAP to manage different positions across different departments.



Solution

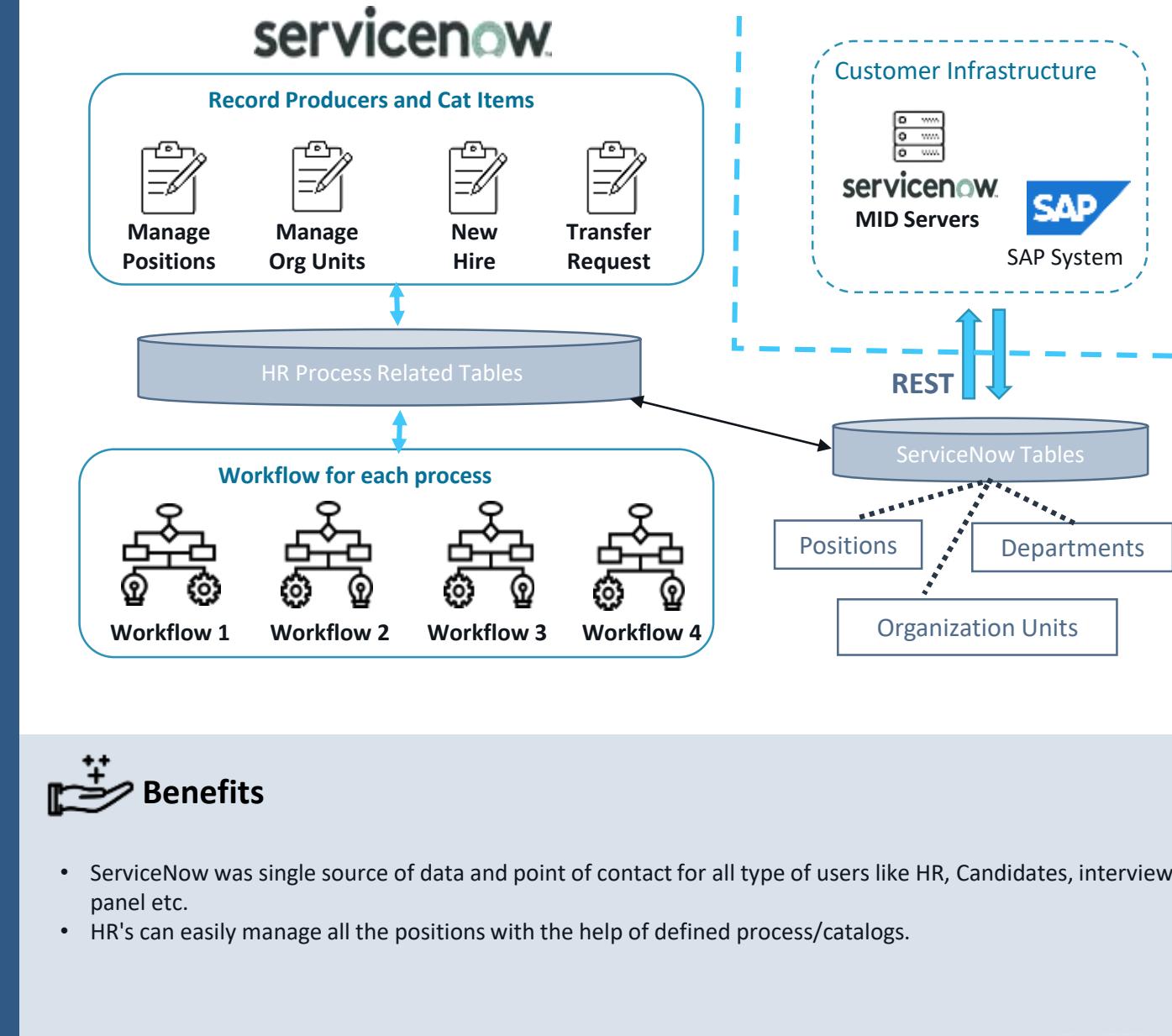
Calsoft helped the customer in implementing a solution for HR department, the solution was to addresses following requirements

- The New Hire process should be completed in one platform i.e. ServiceNow. All the communications and internal data management activities are performed from ServiceNow itself.
- Implemented a process to hire new candidate as well as transfer candidates from across departments and projects through IGP.
- Created processes flow and workflows to manage activities (Create/update/Delete).
- Integration with SAP to get required (process related) data in ServiceNow like Org Units, Departments, Positions etc.



Technology

- ServiceNow (Madrid, Orlando)
- SCCM Integration in ServiceNow



Benefits

- ServiceNow was single source of data and point of contact for all type of users like HR, Candidates, interview panel etc.
- HR's can easily manage all the positions with the help of defined process/catalogs.



Engagement

Calsoft was engaged with an IT company for ITSM Support project. Which Includes ServiceNow Upgrade, L2 & L3 level support for bug fixing and Change Management, SLA Configurations and automating some ServiceNow Request.



Solution

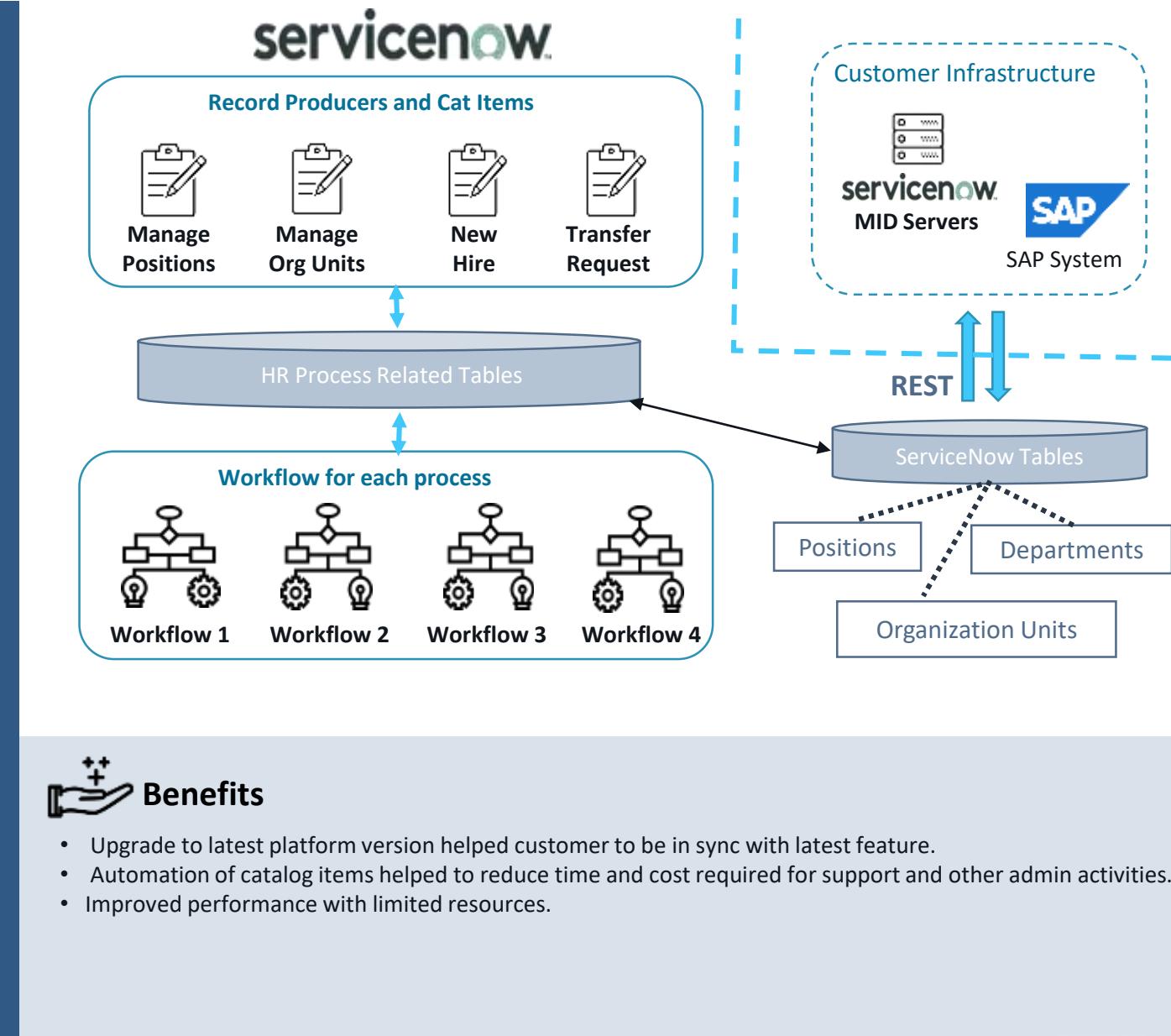
Calsoft helped the customer in supporting an ITSM modules on production. The support was to addresses following requirements

- L2 and L3 support (Bug Fixing and Change Implementations)
- Upgrade Servicenow instance to latest version.
- Configuration and creation of SLA for Existing and newly added department/Service Providers.
- Data import-export and scheduling activity.
- Automated the incident creation process from different sources.
- Automation of some internal Catalogs
- Created custom dashboard to analyze and track ITSM activities.



Technology

ServiceNow (Version- London, Madrid, New-York, Orlando)



Benefits

- Upgrade to latest platform version helped customer to be in sync with latest feature.
- Automation of catalog items helped to reduce time and cost required for support and other admin activities.
- Improved performance with limited resources.

ServiceNow Plugin to Cater to Finance Workflows



Engagement

Calsoft developed a ServiceNow plugin for the customer's requirements around finance workflows.



Solution

▪ Improve Customer & Employee Experience

- Provided a quick solution to customers & employees through content-rich knowledge articles which helped them get answers to their queries before raising any request

Modules Used: Knowledge Management

▪ Fulfill Requests (Request Management)

- Created Catalog items and record requests or queries
- Created self-service templates to place a request or query
- Designed request workflows to follow the request lifecycle from start to end

Modules Used: Catalog Items, Record Producers, Request Management, Workflow/Flow Designer

▪ Feedback/Suggestions Module

- Designed a feedback/suggestions module to understand customer satisfaction rating for the support provided.

Modules Used: UI Pages, Macro, Widgets, Pages

▪ Governance & Compliance

- Instead of email, phone calls, and letters, a single portal was created for all actions like settlements, clearance, records maintenance, quote & proposal creation, verification of policies, requests, approvals, tasks, confirmations using digital automated workflows

Modules Used: Incident Management, Service Portal

▪ Integration with Customer's Finance Tool:

- Integrated customer's web application with ServiceNow, imported the data, assets, records, and secured with rules within ServiceNow

Modules Used: Asset Management, REST Integration, Mid Server; Scheduler; Transform Maps and Import Sets; Access Control Rules

ServiceNow Instance	
Catalog Items, Record Producers	Mid Sever
Service Portal	Feedback Module
Knowledge Management	Incident Management
Request Management, Workflow Management	



Benefits

- Custom portal UI to request something, follow up on requests, queries, status, etc.
- Due to a simple UI, end users could quickly perform request actions
- Smart Catalog capabilities



Technologies Used

- REST API, AngularJS, JavaScript, ServiceNow (Cloud Platform)

SNOW Integration with Cloud Services and Inventory



Engagement

Calsoft was engaged by the customer to develop a plugin for integrating ServiceNow and the customer's cloud services and inventory.



Solution

Calsoft helped the customer in developing the plugin for fetching resource details from their cloud. The project was completed in two phases:

Phase 1:

- Fetched inventory from cloud
- Provided a dashboard using the following widgets for a holistic view of the datacenter inventory:
 - Device inventory
 - Asset and contract tracking
 - Variability by Security Advisory and filed notices
 - Software and hardware tracking with EOL information
 - Configuration best practices

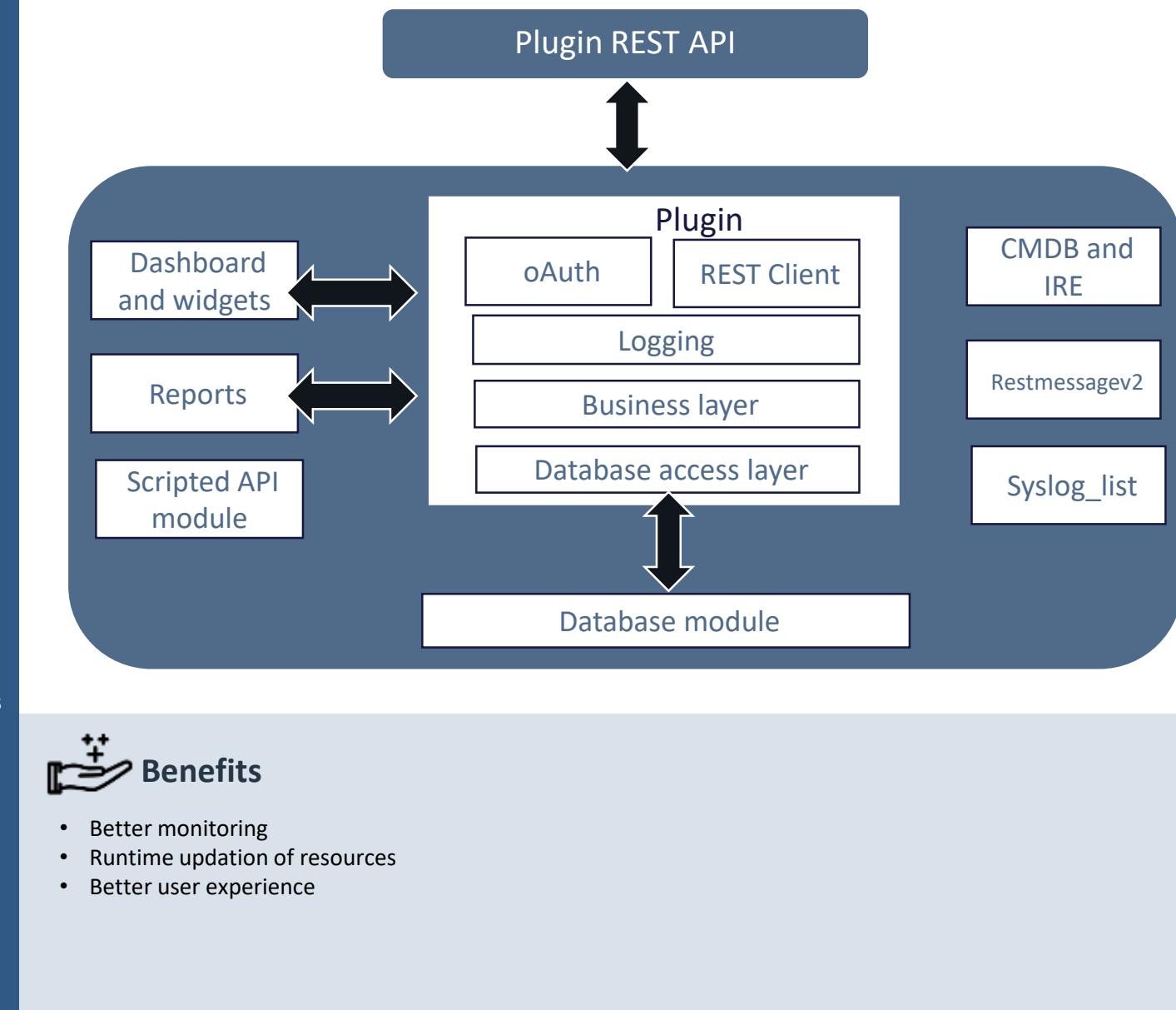
Phase 2:

- Renewing contracts for assets
- Renewing licenses for software
- Addressing vulnerabilities by remediation: creating ITSM tickets and tag them to assets
- Pushing best configurations to assets



Technology

Java, ServiceNow Orlando



ServiceNow integration with resource management solution



Engagement

Calsoft was engaged with the customer to integrate their existing resource management solution with ServiceNow



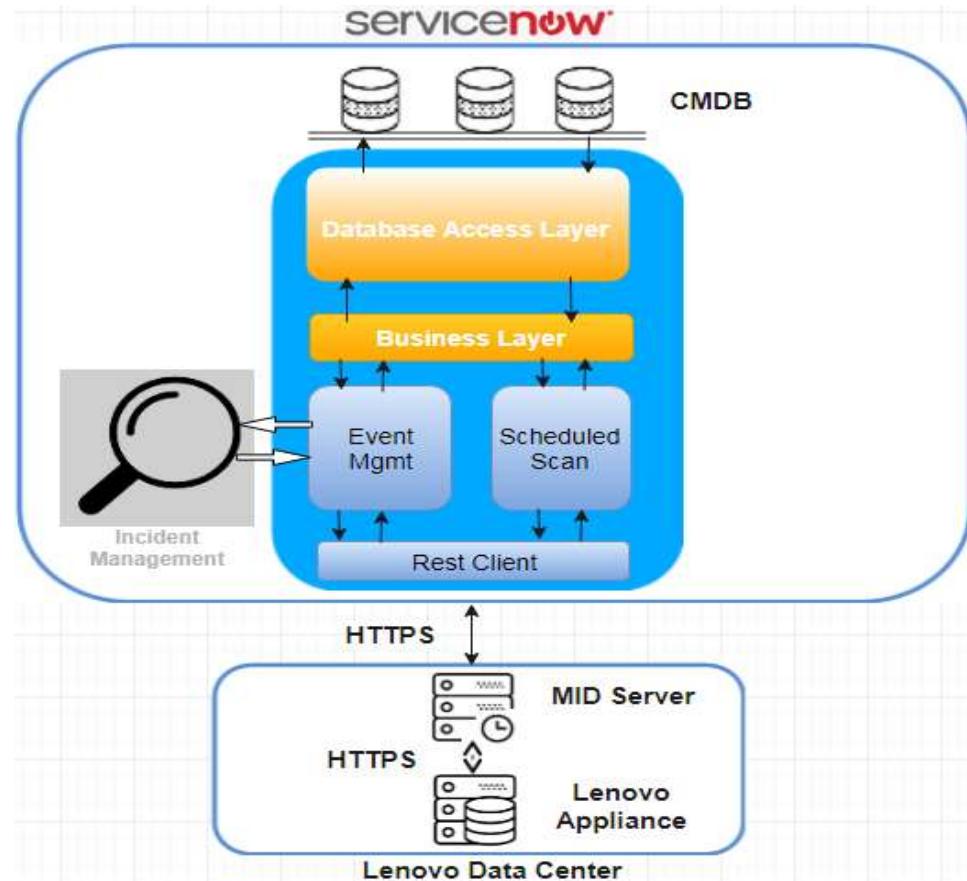
Solution

Calsoft helped the customer in Servicenow integration and the engagement underpinned:

- Developed plugin which invokes REST APIs to synch inventories.
- Fetched inventory using REST APIs and inculcate them in ServiceNow CMDB
- Mapping and Creating CI relations into fetched items
- Auto incident ticket Creation and handling the incidents based on this inventory.
- UI/Scheduled job to import inventories



Service-Now (Jakarta, Kingston), REST API



Benefits

- Better user experience
- Better handling of incidence



Success Stories: Networking

SE Linux + MLS



Engagement

Calsoft was engaged with the client for providing mechanism to define and enforce clearance levels across arbitrary domains for Networked file system (Lustre)



Benefits

- Network file system could utilize benefits for SELinux MLS feature.
- System wide policy enforcement and no user discretion – mandatory access control
- Enabled support for flexible mandatory access control architecture in the Linux operating system for Lustre file system
- Reduced vulnerability to privilege escalation attacks



Technology

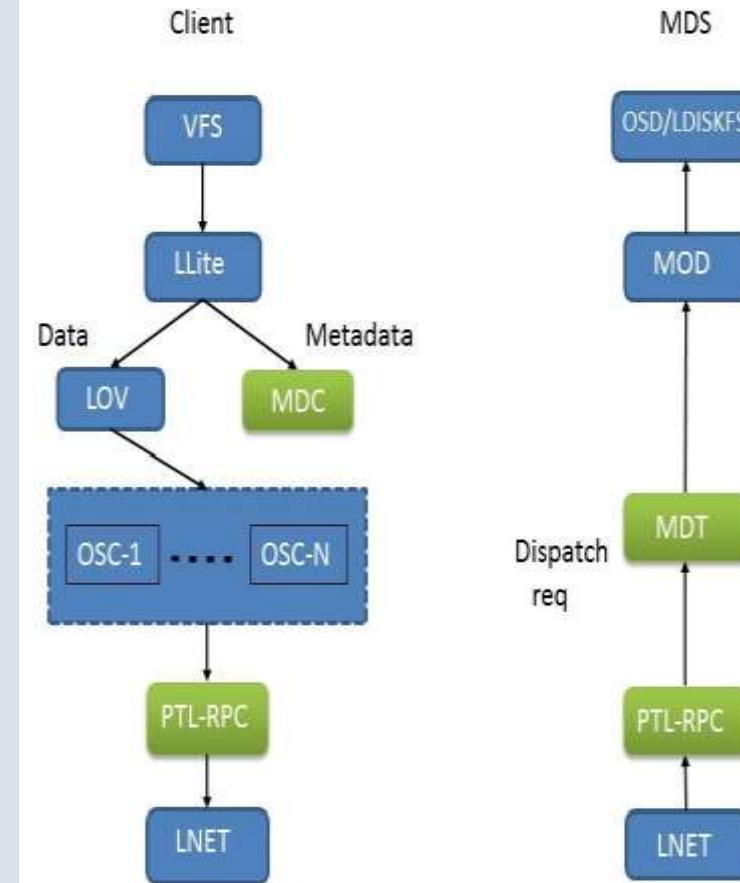
- C, SELinux, MLS



Solution

- Modifying lustre components to authenticate customer processes to access objects using MLS functionality.
- Provided mechanism to support access control security policies for Lustre file system, through the use of Linux Security Modules (LSM) in the Linux kernel

High Level Architecture



Calsoft's contribution towards Open vSwitch



Engagement

Calsoft was engaged with the client for bridging network traffic gap and providing mobility between VMs residing in different hosts along with their network state



Benefits

- Client can now diagnose network problems related to tunneling protocol
- Open vSwitch will now be supported by different Linux based Hypervisor platforms



Technology

- OS – Linux
- Language – C, Python
- Tools – Wireshark

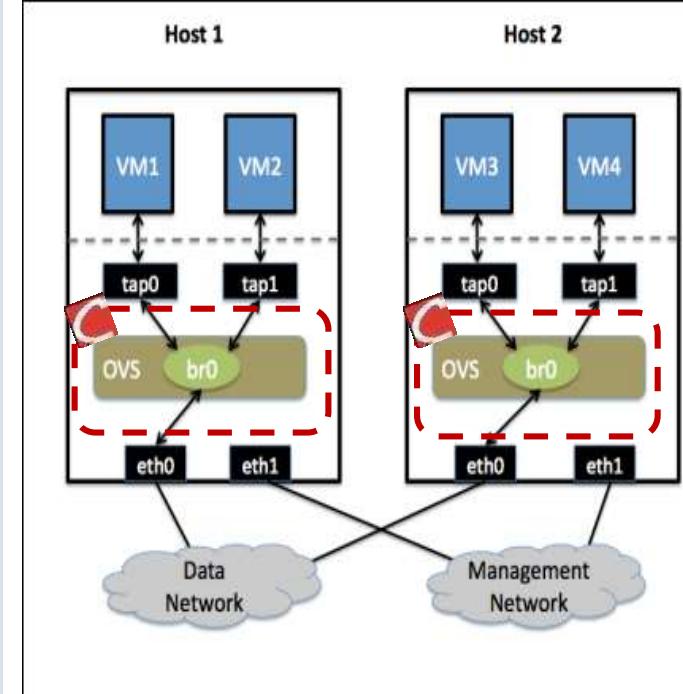


Solution

- **Open vSwitch (OVS)** is designed to support virtual network layer across multiple physical servers licensed under the open source Apache 2

Calsoft's contribution

- OVS Integration with different hypervisors platform
- Provided patches for issues or enhancement related to OVS utilities, Python scripts, and AUTOTEST checks
- Developed Wireshark dissector plugin for tunneling protocol
- Developed internal infrastructure for Wireshark git repository for dissector plugins
- Performed testing for different scenario
- Involved in development of OVS utilities Linux manual pages
- Involved in OVS discussion/development mailing list
- Involved in capturing different performance statistics for scalability



Implementation of cBench



Engagement

Calsoft was engaged with the client for implementing cBench. The engagement underpinned:

- Making available of standard SDN performance tool with good support
- Dealing with the issue of no support got by OFP 1.3, AUX channel that is required by Open source cBench which is a single thread and has hard coded packet structure



Benefits

The implementation can now enable the client to

- Generate more load than standard cBench tool
- Support new/more features enabling more controller configurations to be performance tested
- Have full control on the configuration of the test run
- Easily measure SDN application's performance
- Test latency as well as throughput



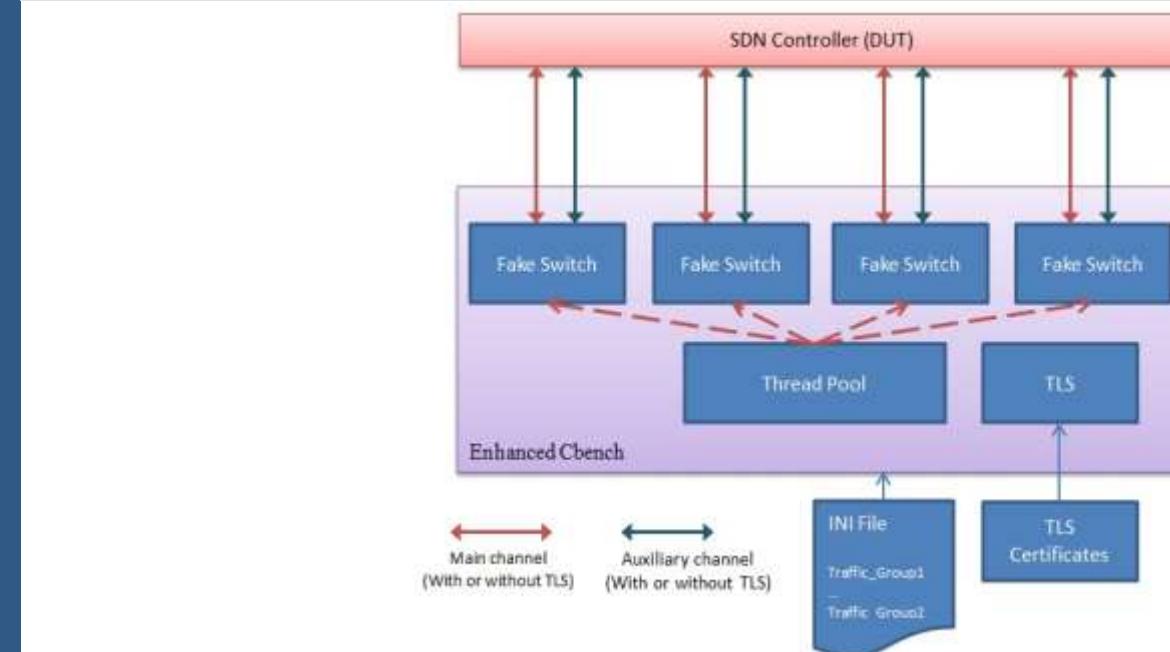
Technology

- SDN (Software Defined Networking)



Solution

- cBench was implemented with multi-threaded architecture to be able to generate maximum load for the controller
- Supports advanced features like OFP 1.3, AUX-channel
- Supports configurable packet structure via config file
- Controllable data rate for each type of custom packet



Cisco Nexus 1000V to Client VDS Migration tool



Engagement

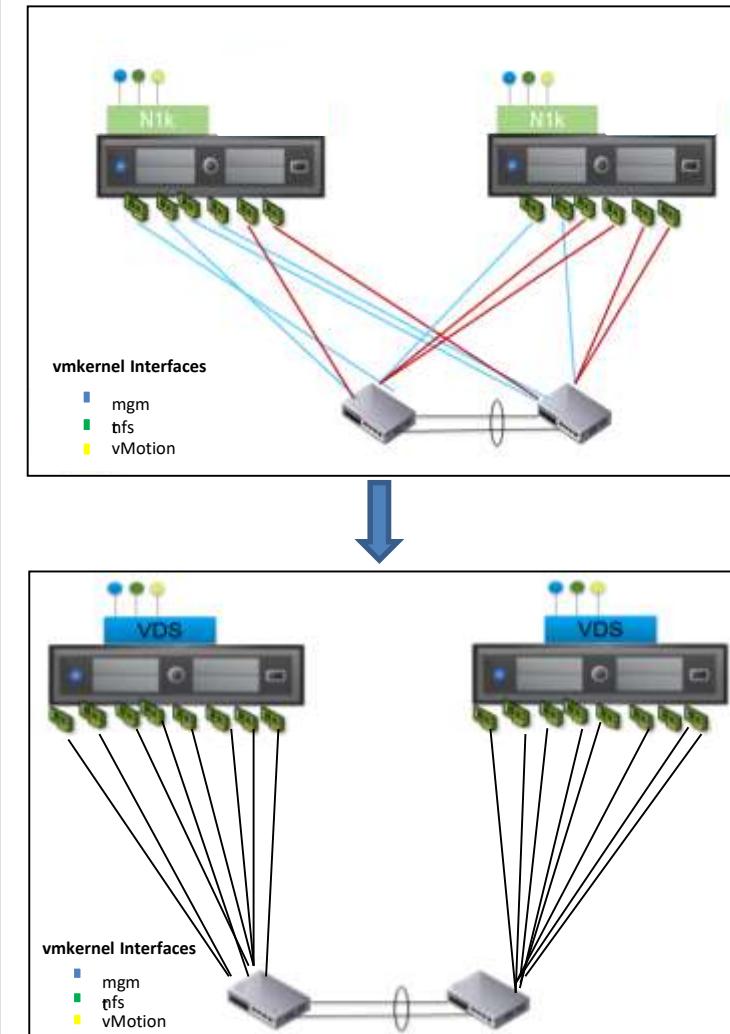
Calsoft was engaged with the client for creating a tool that would enable migration from Cisco Nexus 1000V to Client VDS. The engagement underpinned:

- Establishing an automated migration tool to enable the migration
- Understanding and dealing with complex technologies like Cisco Nexus 1000V, Client VDS, python, vCenter APIs



Solution

- Built The migration tool in python using Pyoni APIs
- Setup many complex Cisco Nexus 1000V deployment environment to test the migration thoroughly
- Created user guide for deployment administrators



Benefits

- Easy migration without any errors due to automation and excellent migration tool built.
- Achievements:
 - Presented demos to internal engineering teams at the Cisco side
 - Presented demos to Cisco's customers
 - Facilitated migration for Cisco's customers



Engagement

Calsoft built an all-inclusive SDN toolkit for the network administrators to enable:

- Packet monitoring
- Get the continuous inter-switch latency in the network
- IP-based firewall
- Network tracer to determine end-to-end latency in the network



Benefits

- Ease of network issue debugging for the administrator
- Network monitoring
- Simple firewall



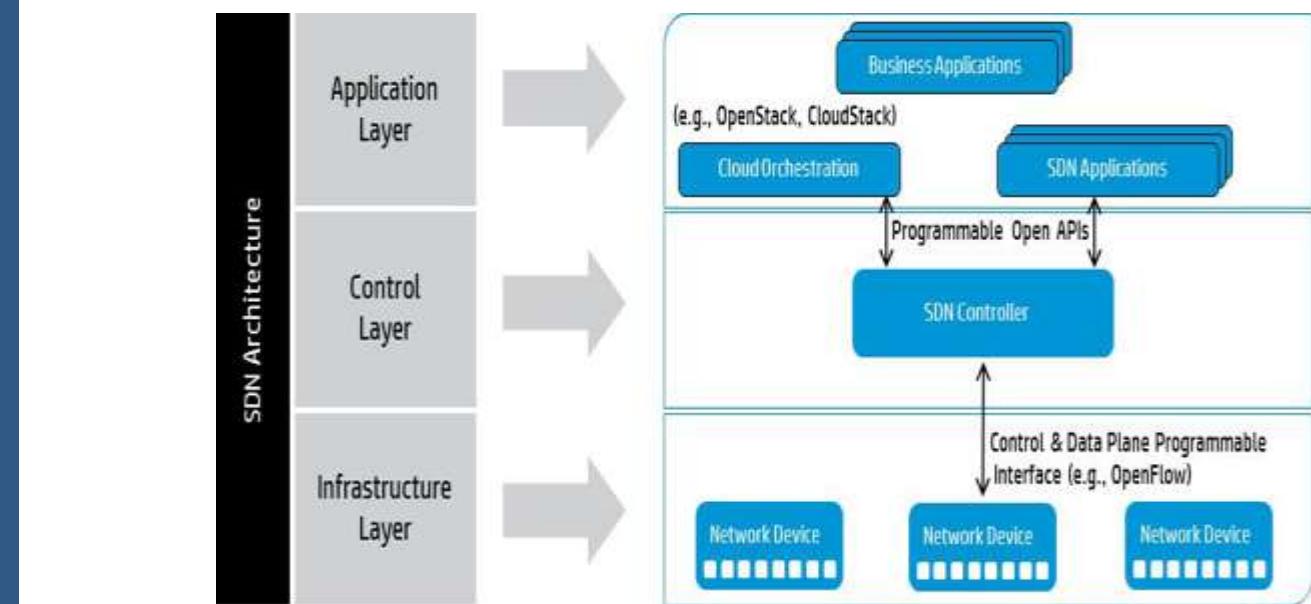
Technology

- OpenDayLight Controller (Hydrogen), OVS,
- Mininet
- JAVA, Maven, OSGi, Python



Solution

- Calsoft using the ODL controller, has built the application to achieve the toolkit requirements.
- Based on the functionality, the applications guides the controller to configure the NW switches using OFP 1.1.





Engagement

With SDN & NFV picking up, both of them need to work in tandem to provide the exponential benefits. But so far, this union of technologies was missing. Calsoft built a solution which enables NFV functions to be dynamically instantiated, managed & moved across the network as per the need.



Benefits

- Client experienced unified management of infrastructure via single system (SDN)
- Ease of moving around the NFVs dynamically across the network
- Reduced Capex by utilizing the spare compute power of the SDN-Switches



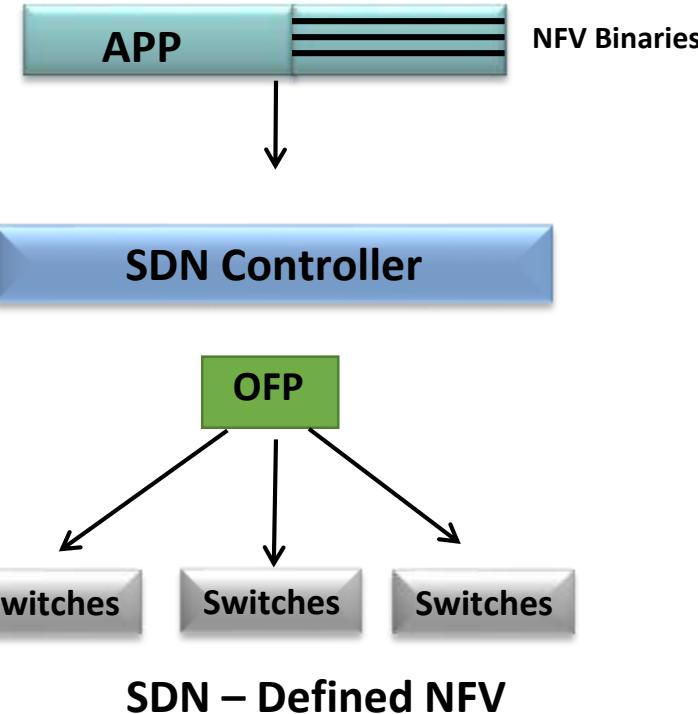
Technology

- OpenFlow, POX, Linux, C, Python



Solution

- Built an application to enable administrator to define and load the NFV binaries to the SDN-switches having spare execution environment
- Built a custom protocol enabling SDN controller to install different NFV binaries on select switches on the network while enabling them to act as specialized NFV functions





Engagement

Calsoft is engaged with the client for development of QuickStart installer for SDN product with Openstack Liberty which can be used to deploy the solution on a single node for product evaluation purpose.



Benefits

- Calsoft delivered the solution on time and without any customer tracking and monitoring, even though only requirement document was provided by customer.
- This was made possible because of in-house expertise available with Calsoft for Ansible, Openstack and networking domain.



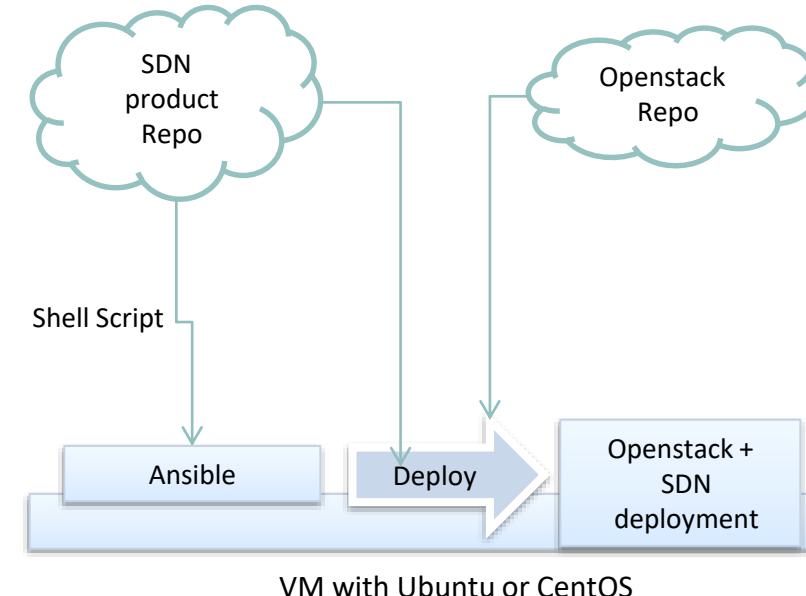
Technology

- Ansible 2.0.1, Shell Script, GitHub, GerritHub, Ubuntu 14.04 and CentOS 7



Solution

- Shell script was written to install and configure Ansible 2.0.1
- Installer is developed using pure Ansible playbook except for installing and configuring Ansible itself.
- Ansible playbooks were developed to install all component of SDN product along with Openstack Liberty.
- Smoke test was created and ran to test the installation and configuration of SDN product and Openstack.





Engagement

Calsoft was engaged with the client for creating a Splunk Plugin that would discover & configure the NSX components to forward the syslogs to Splunk listener & analyze the logs to create useful dashboards & widgets. The tool was aimed at:

- Providing a configuration page to admin
- Discovering & configuring the syslog settings in NSX components
- Analyzing the logs being received from all NSX components to create the meaningful dashboards & widgets for the administrators



Benefits

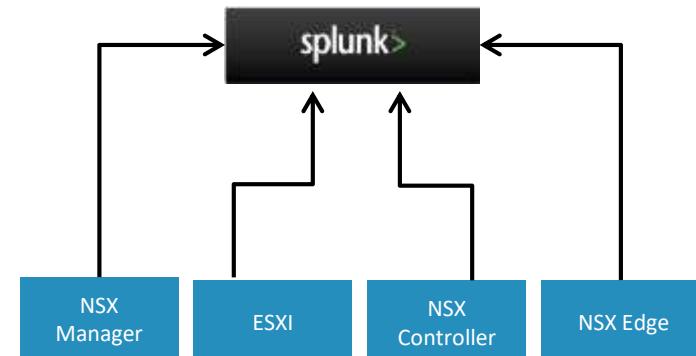
- Single point analysis of NSX environment for administrators to quickly visualize the potential issues in the
- Achievements:
- Met the aggressive timelines
- Implemented the plugin following the Splunk standards
- Implemented the plugin targeting the Splunk certification



Solution

- Backend development which makes NSX REST API calls and discovers/configures all the NSX components like NSX Mgr., Controllers, & Edges.
- Splunk listener which receives & analyses the NSX logs
- Splunk plugin to filter the logs based on queries to create meaningful dashboards & widgets
- User Guide for end user to install, configure & use the plugin

Provides dashboard for overview and alerts of logical switch, logical router, distributed firewall & NSX-vSphere edge



Splunk Technology Adapter



Engagement

Calsoft was engaged with the client for creating a Splunk Technology Adapter . The engagement underpinned:

- Install technology add-on in Splunk
- Enable TA to receive events generated by the client and store it in Splunk Datastore
- Enable Splunk admin to fetch additional data for trigger events.
- Additional data to be pulled into Splunk from different DataStore Via REST.
- Ensuring TA meets certification criteria set by Splunk



Benefits

- Reusable Splunk component
- Common Information Model compliant.
- Rapid in-depth insights on data.
- Rapid conversion from proof of concept to production.



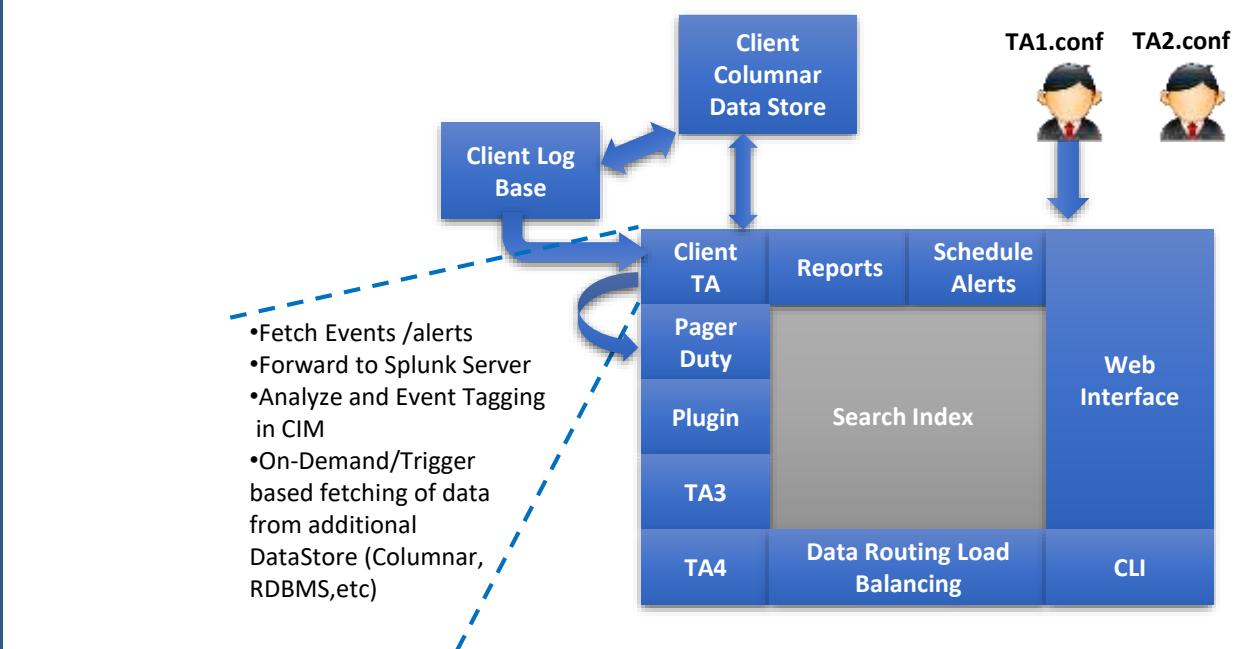
Technology

- Splunk SDK, Python



Solution

- Calsoft provided following phases for the project:
- **Design & Project Plan :**
 - Requirements analysis , feasibility analysis.
 - Detailed design.
 - Deliverables : Functional Specification, Project Execution Plan.
- **Development:**
 - Data Ingestion
 - Event Identification
 - Event tagging in CIM or custom data model
 - Integration with Customer endpoint(s)
 - Packaged add-on
 - Certification
- **Testing, Bug Fixes Regression and Integration Testing**





Engagement

Calsoft was engaged with the client to

- Provide deployment mechanism for client Enterprise SDN product in vSphere environment
- Provide vCenter plugin to control this deployment
- Provide ability to connect vSphere deployment with external OpenStack based MEM deployment
- Provide supplementary features like Continuous Integration



Customer Experience

“Overall the experience with Calsoft team have been great. The technical skills are certainly above the standard skills in the industry.”



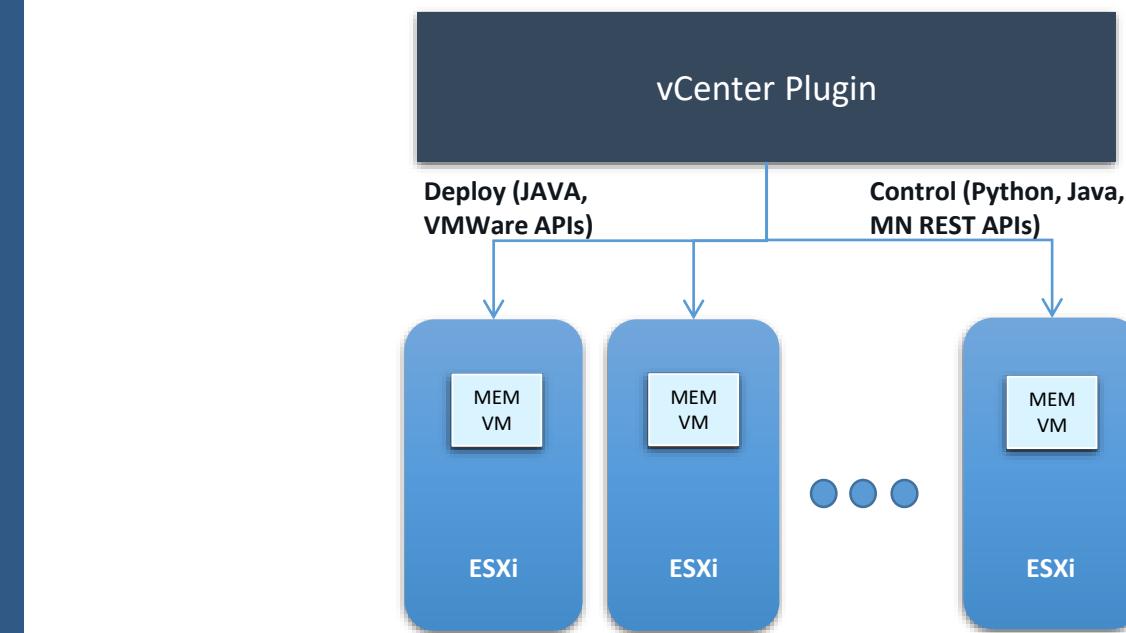
Technology

- VCSA 6.0 and ESXi 6.0
- Ansible 2.0.1
- Jenkins, Jenkins Job Builder
- Python, Java



Solution

- Created vCenter plugin for VCSA 6.0 and ESXi 6.0
- This plugin provides mechanisms to control the complete lifecycle of the MEM deployment in vSphere, from installation of various components (VMs and vSwitches) to setting up connection on the virtual network
- Appliance VM template was created for MEM components using Packer and QEMU
- Installation and configuration of required packages was managed via Ansible
- Appliance deployment and package installation was triggered via the plugin UI



vSphere Integration Plugin for SDN Product



Engagement

Calsoft was engaged with pure-software SDN company for developing vSphere Integration Plugin.



Benefits

- Virtual networks creation and management independently of the underlying hardware
- Provide the L2 gateway with no extra hardware cost
- Provide the network extension capabilities to your clouds without having IP address change and connectivity between VMware –based cloud and the OpenStack/KVM based cloud



Technology

- Java, Python, HTML, Shell Script, Github, GerritHub, Packer, Qemu, Openstack



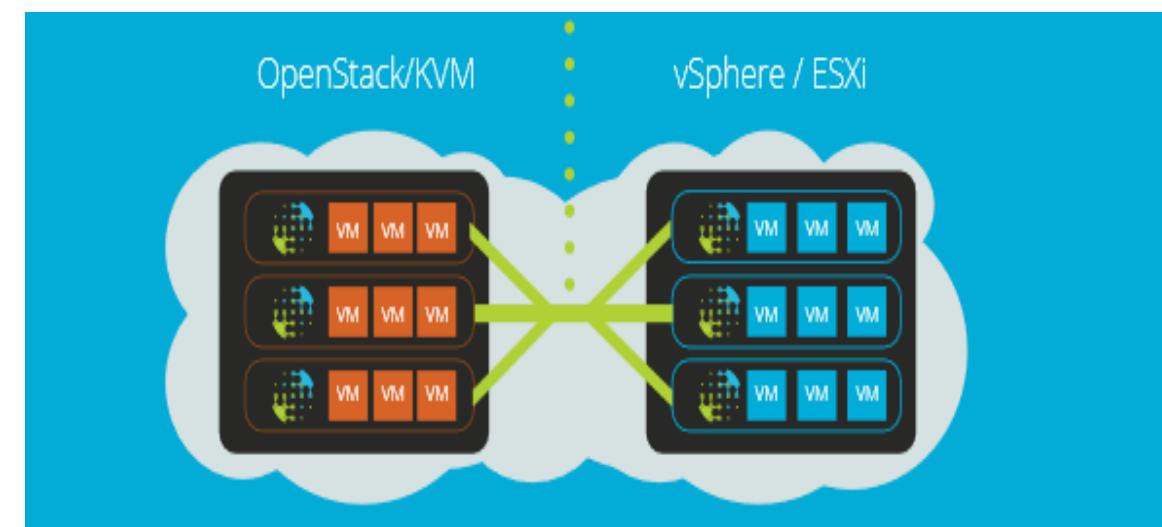
Solution

Development

- Developed vSphere Plugin which manage and configure the agents residing on compute nodes and network/topology databases.

Features

- Deploy the agents and network database appliance in vSphere infrastructure
- Management platform in vSphere web client to manage and configure the SDN appliances
- User interface within vSphere web client for attaching Virtual Machine(s) to SDN solution



Openstack SDN Integration Testing



Engagement

Calsoft was engaged with the client for testing openstack SDN Integration. The engagement underpinned:

- Ensuring that SDN and Openstack integration meets all of its technical, functional and business requirements
- Performing negative and exploratory testing to ensure SDN controller cluster do not affect the data paths



Benefits

- The client was given a reasonably bug free software
- SDN features will work in conjunction with Openstack Neutron.



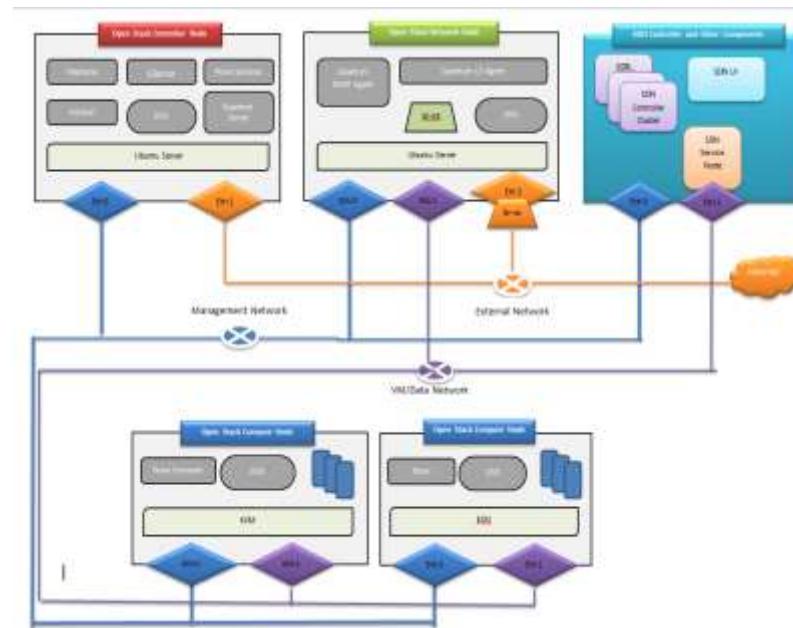
Technology

- OS : Linux
- Tech: Openstack, Virtualization (ESX, KVM, Xen), OVS, SDN, Neutron, Plug-in, NSX



Solution

- Deployment of the Openstack + SDN integrated setup.
- Created and executed different customer scenarios for testing SDN from the Openstack perspective.
- Tested different integration points between Openstack Neutron and SDN.
- Prepared and executed negative test scenarios to make SDN product more robust. The scenarios largely comprised of compute node reboots and controller cluster nodes failover to test if the data paths is getting affected while performing Network operations from Openstack dashboard.



OpenStack – Neutron L3 Plugin and Agent



Engagement

Calsoft was engaged with the client for OpenStack – Quantum L3 Plugin and Agent implementing . The engagement underpinned:

- Providing an overall orchestration for creation of customer's VA instance
- Creating Provision for tenant and demonstrate the multi-tenant functionality in Havana timeframe



Benefits

- Client can now easily diagnose network problems related to tunneling protocol
- Enables network vendor specific switches and routers to be certified with particular Hypervisor in OpenStack based cloud environment
- Helps in avoiding recursion; reduces delay on router create



Technology

- OS : Linux
- Tech: Openstack, Virtualization (ESX, KVM, Xen), OVS, SDN, Neutron, Plug-in, NSX

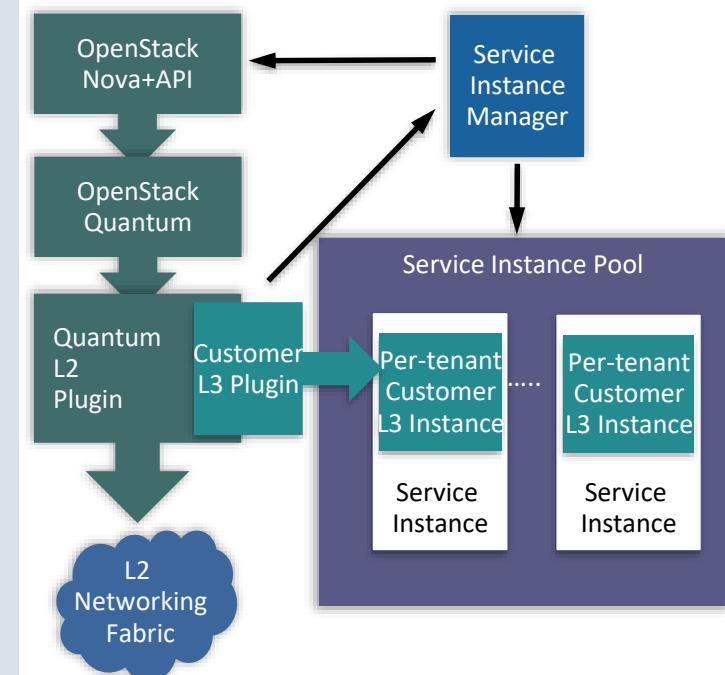


Solution

We implemented 3 components to enable customer's Virtual Appliance work as a router in the Open Stack environment within 5 months.

- OpenStack Quantum L3 Plugin
- OpenStack Quantum L3 Agent
- Service Instance Manager (SIM)

High Level Architecture



OpenStack – Upgradation of module to gather additional telemetric data



Engagement

Calsoft was engaged with the client for collecting telemetric data for KVM hosts and instances running in an OpenStack Environment. The engagement underpinned :

- Integration with various controllers in OpenStack to collect configuration information for hosts and instances.
- Implementation of an agent that resides on KVM hosts and collects telemetric data for instances running on it.



Benefits

- Continuous collection of telemetric data on the KVM host irrespective of connectivity to the host from the controller node
- Based on roll-up and historical data collection, the instances can be analyzed for operational risks and over commits.



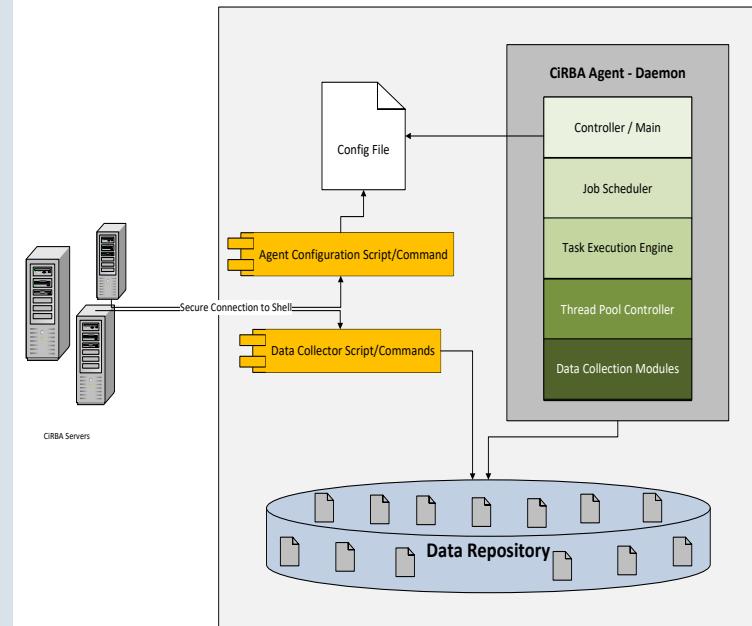
Technology

- Java, JavaScript, Python, Shell Scripting



Solution

- Built an adapter that consumes REST API's from Nova, Glance, Neutron and Keystone services required for gathering configuration information of Hosts and instances.
- Integrated this adapter in the existing data collection framework of the client product.
- Built an agent that gets installed as a daemon on KVM nodes.
- Built a flexible framework that allows the user to configure the meters for data collection. These meters are related to performance of the host and instances in terms of compute, memory, disk and network resources.



NFS Read-Only Access Gateway to S3/Azure



Engagement

- Use Docker based Containers to provide a NFS gateway with Read Only access to Cloud



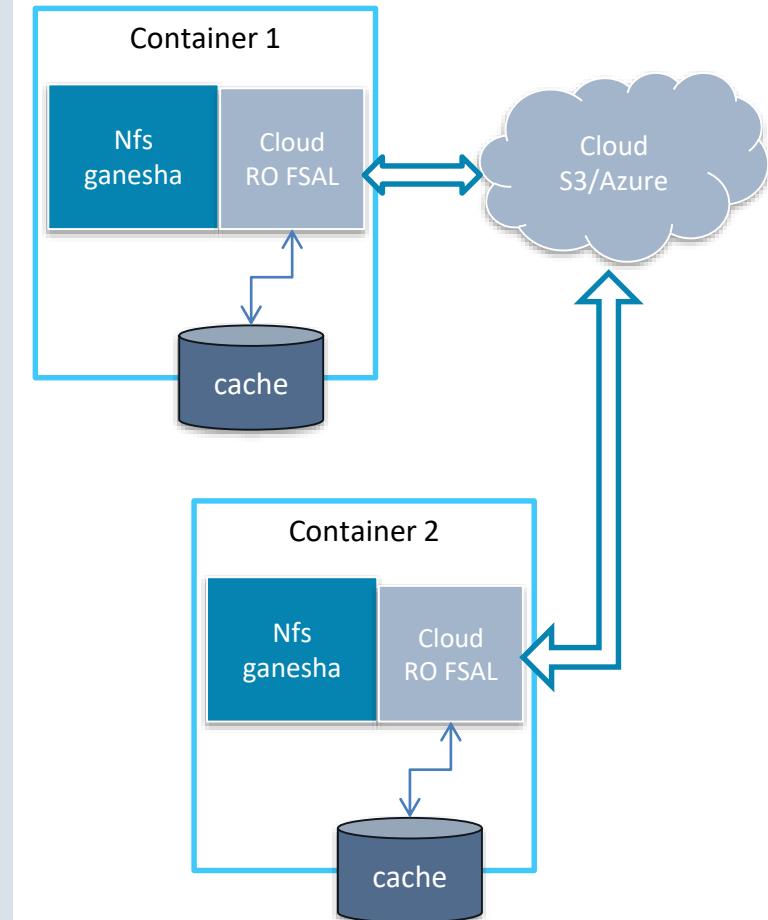
Technology

- Linux, Dockers, YAML, C, NFS Ganesha, FSAL



Overview

- Docker File containerizes NFS Ganesha Server and related configuration.
- Use disk mapped to container as disk based cache for RO data.
- Multiple containers to provide nearline data to various sites.
- Cache coherency with write to cloud.
- Easy way to access archived data lying on cloud.





Engagement

- Use Docker based Containers to provide a NFS HA service with shared nothing Storage architecture



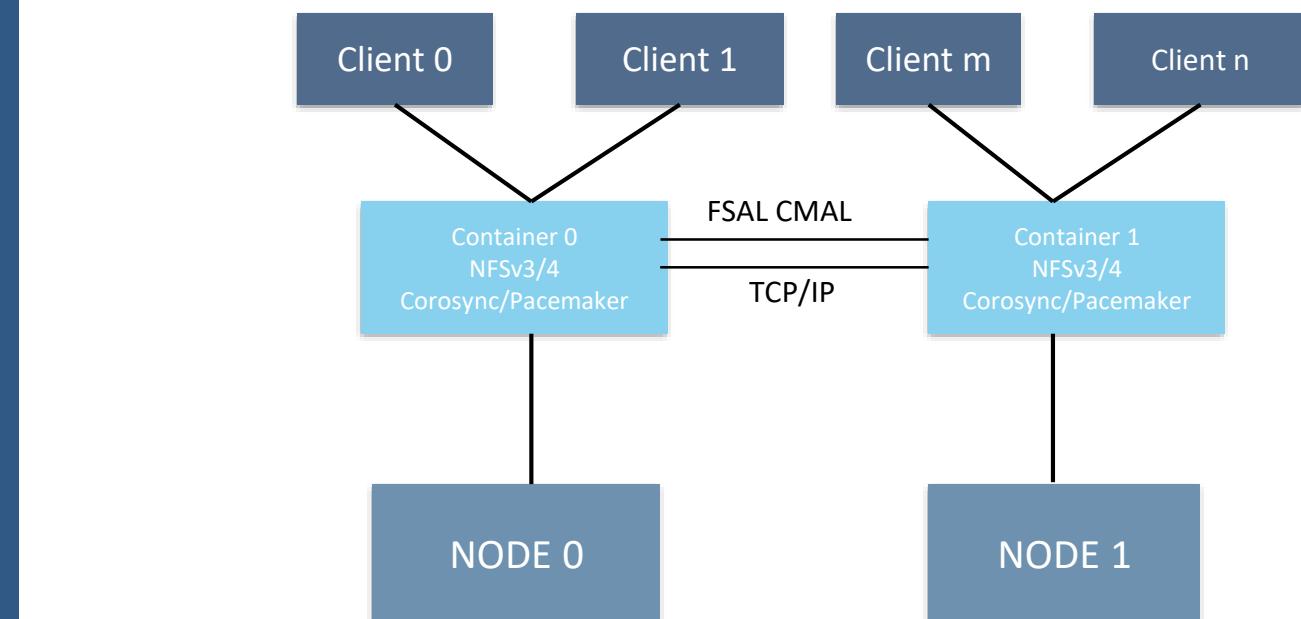
Technology

- Linux, Dockers, YAML, C, NFS Ganesha, FSAL



Overview

- Docker File containerizes NFS Ganesha Server and related configuration.
- Use of Corosync Pacemaker to provide HA for NFS resource.
- Use Failover IP to transfer control to buddy node.
- Build a FSAL to replicate the IOs from one NFS server running in a Source Container on Node XX to another running in a Destination Container on Node YY





Engagement

- Calsoft was engaged with the customer for building the DevOps modules for their product. The aim is to create deployment & configuration modules in various DevOps platform to enable their customers to choose the one that they might be using for their rest of the network automation.



Benefits

- The end customer (IT team of small & large enterprises & Cloud admins) can very easily get the network up & running
- Zero Touch Deployment helps the networking gear to get basic configuration, fabric creation & VLAG configuration
- Auto-VLAG module automatically discovers the topology & creates the auto-VLAG or cluster configuration



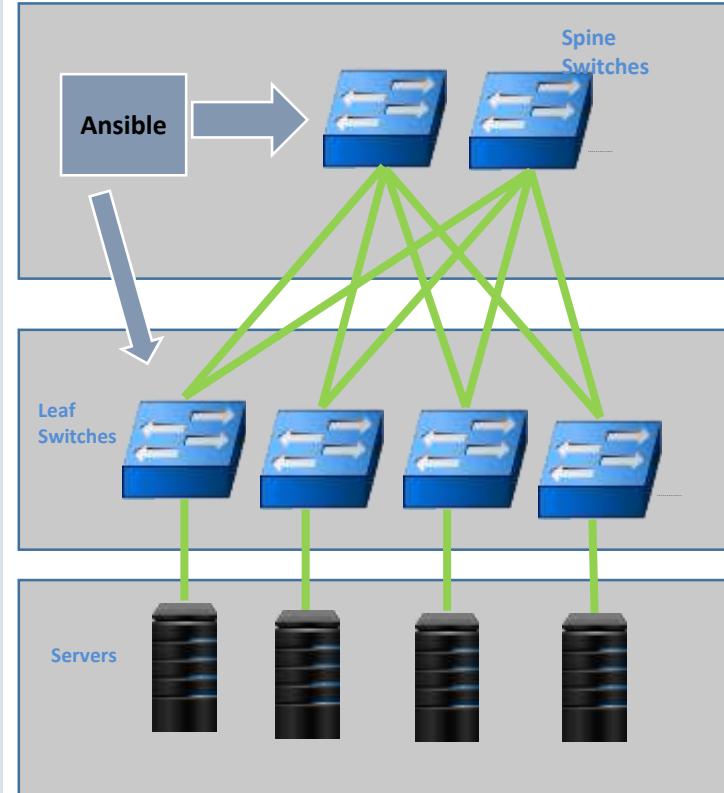
Technology

- Zero Touch Deployment helps the networking gear to get basic configuration, fabric creation & VLAG configuration



Solution

- Created Ansible modules for deployment of the Spine & Leaf switches using ZTP feature
- The above module includes installation of Ansible environment, DHCP server, remote access to switches & configuring them for initial bring up
- Created the playbook to automate L2 & L3 Auto-VLAG features between the switches
- Working on other configuration automation



Network orchestrator with service assurance engine



Engagement

- Calsoft is engaged with its customer in building a flexible traffic management solution for capacity planning, network optimization and analytics.
- The aim is to build an orchestrator which monitors network and triggers defensive strategies to achieve network service assurance



Benefits

- Customer can automate the entire exercise of active network health monitoring & corrective actions.
- End customers get a single application to orchestrate network creation, updation, monitoring thus reducing turnaround time of issue resolution.



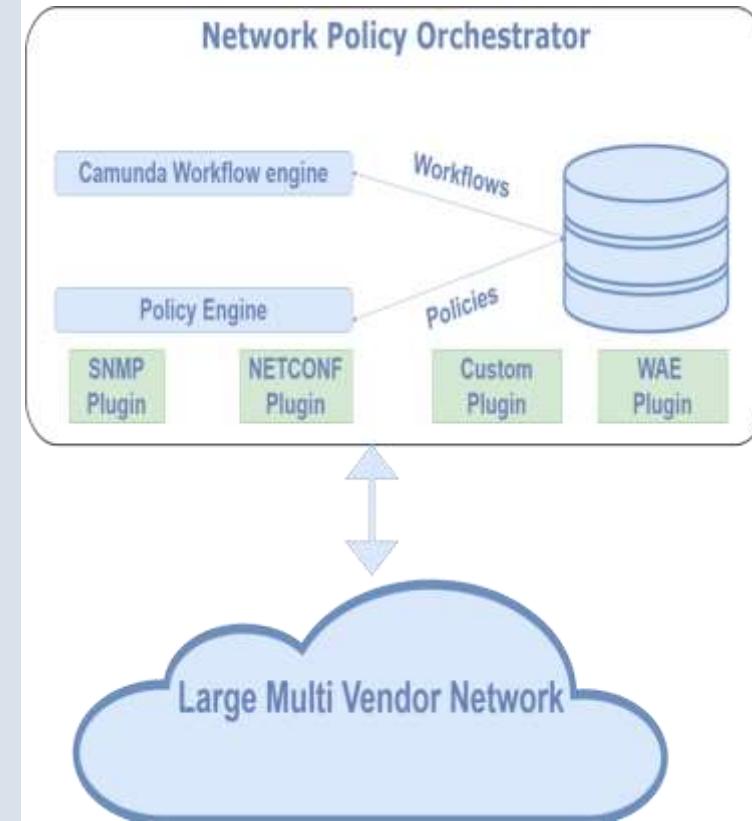
Technology

- REST, Camunda, BPMN modeler, Java, L2/L3 networking, Linux, YANG, NETCONF, SNMP, OpenFlow



Solution

- An orchestrator was developed using Camunda as a core workflow engine, with the flexibility to create custom workflows for network creation.
- It has provision for Out-of-box workflows for network creation, health monitoring and network optimization functionalities .
- Threshold triggers and alarms was incorporated to take defensive actions in order to maintain network availability.
- A policy engine was developed to create, enforce and monitor network rules. Policies created can be integrated with the workflows created by the admins for easy resolution of network optimization issues.
- A mechanism was added for admins to easily add and monitor new network devices.



QA Automation for Whitebox switch



Engagement

- The client needed a robust framework for development of whitebox switch so as to ensure the product would work as per expectations on each iterative development cycle.



Benefits

- Client was able to expedite and scale deployment & QA effort by using the automation framework
- Regression tests resulted in improved quality
- Jenkins and Ansible driven CI/CD helped in faster development



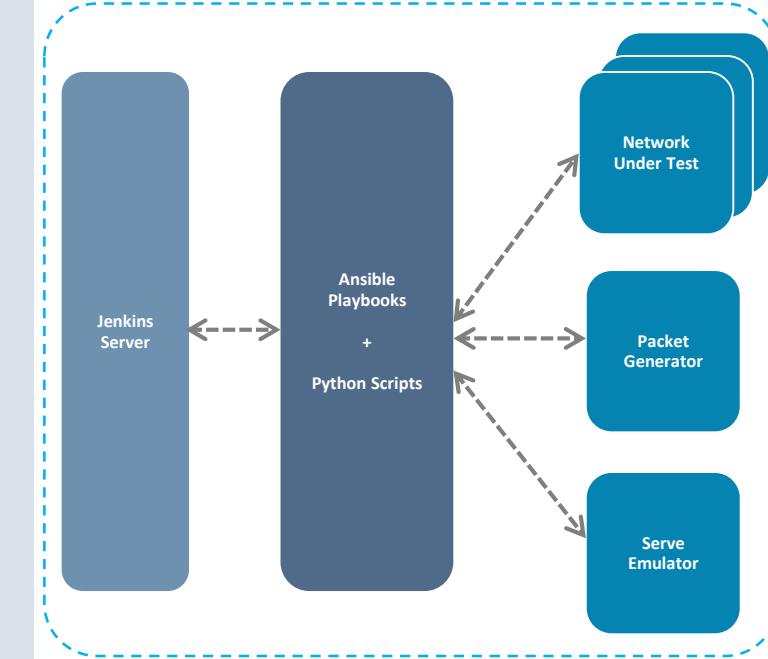
Technology

- Whitebox switches, Broadcom ASIC, Python, Ansible, Jenkins, BGP, OSPF, ISIS, ECMP, Quagga, Containers



Solution

- Calsoft developed the automation framework to trigger test runs, on specific events and intervals, for varying load and duration
- The framework was equipped to create artefacts for creating setup & deploying them on hardware
- A high-speed packet generator, capable of varying load based on traffic types and sizes @10, 40, 60 and 100 GBPS, was developed
- Jenkins was used to integrate git commits and trigger test cases through Ansible playbooks
- Custom Ansible Modules were developed to test the switches for various scenarios of leaf-spine topology
- The workload was generated in multiple containers, to emulate variety of traffic.
- Automated seamless firmware upgrade between release cycles



Development for SDN-VE product



Engagement

- Calsoft was engaged with the client for developing various components of DOVE SDN product such as Dove Connectivity Server (DCS), Dove-Agent, Management console and gateways.



Benefits

- Wireshark dissector plugins helped all development teams for analysis of packets and communication.
- Client was able to resolve the customer issues, handle enhancement requests with the help for Calsoft's solution.
- Client was able to expedite the development and delivery efforts.



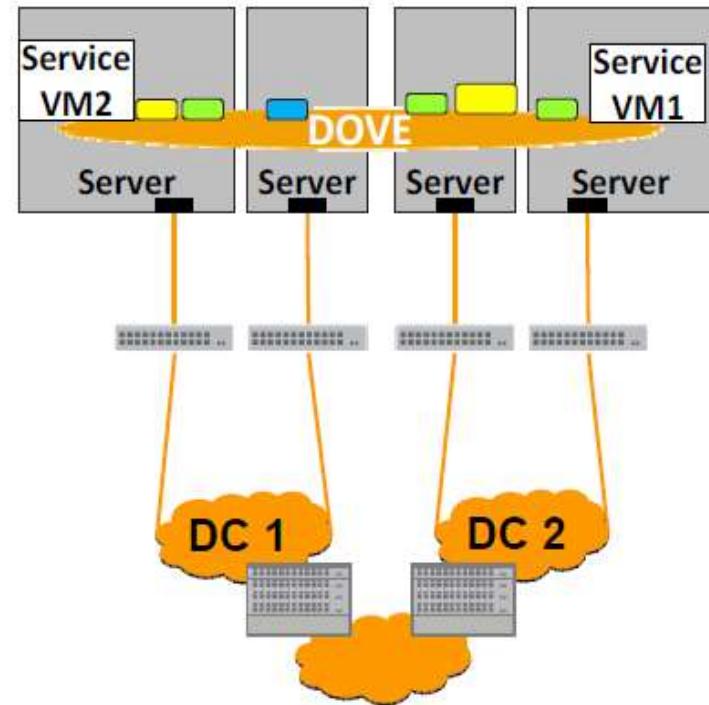
Technology

- OS – Linux
- Language – C, Python
- Tools – RFS, wireshark, KVM, virsh



Solution

- SDN-VE is designed to support virtual network in self serving virtual data centers, with greater workload mobility. It also provides on demand network.
- Calsoft helped on issues related to VM migration mainly related to handling of GARP requests.
- Analyzed the messaging between Dove Agent and communication server. Fixed the handling of GARP packets in dove-agent code with design updates.
- Wrote a Lua plugin, C plugin wireshark packet dissector in order to capture communication packets between DCS and Agents.
- Worked on the configuration CLI design and corresponding backend implementation.
- Tested the end-to-end functionality with DCS, Agent and management console in stand-alone as well as HA mode.



Deployment and Integration of SW components on NOS



Engagement

Calsoft built an all-inclusive SW which can be run on top of a white box switch. The idea was to use open source components to demonstrate the SW architecture:

- Recompile and integrate open source networking suites like quagga, opensnaproute.
- Use openNSL library code to interact with BRCM ASIC.



Benefits

- Facilitated setup of open source components and integration among them.
- Programming of Forwarding plane ASIC
- Protocol testing and performance characterization.



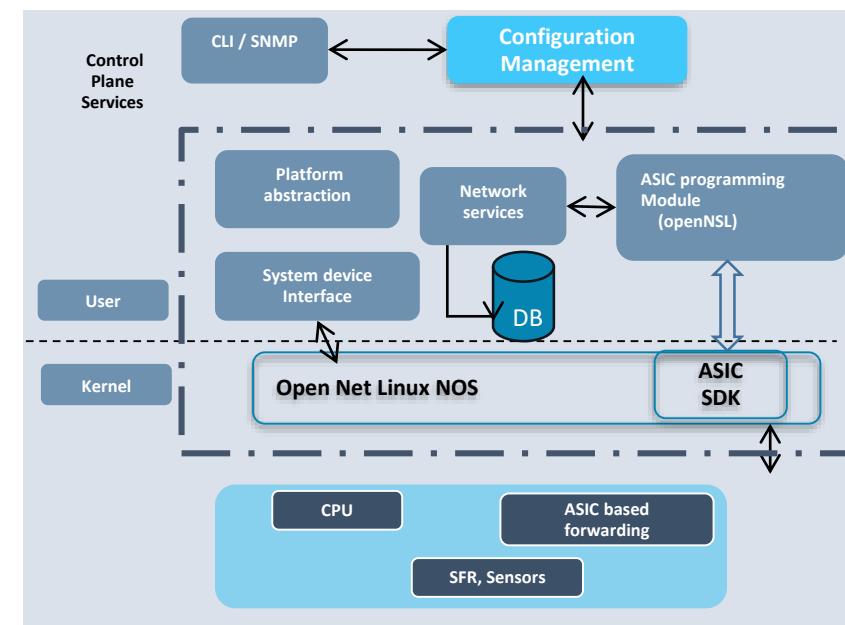
Technology

- C/C++, NOS, BRMC ASIC, Network protocols, wireshark, Quagga



Solution

- Recompiled up openNetLinux and brought up on a VM. Bringing up OS on white box switch is in progress.
- Re-worked the I2_forwarding application from openNSL and added support for debugging, verification of ASIC programming tables.
- Working on a platform software which will provide status of system binaries at any point in time.
- Installed networking suite components quagga , opensnaproute on top on the OS. Wrote configuration files as per underneath network topology. Also, wrote test cases to be executed to verify routing functionality.



24x7 NOC for SD-WAN product



Engagement

- Calsoft is engaged with the client for providing a 24*7 SOC/NOC. The aim is to provide the support for monitoring the cloud deployments SD-WAN components to pre-empt infrastructure failures to avoid any service outages to the end customers (ISPs, Enterprises etc)



Benefits

- Excellent Infrastructure available at Calsoft's development center helped in setting up the NOC/SOC in very short time.
- Calsoft's domain knowledge in the SDN area helped the team gain necessary technology insights



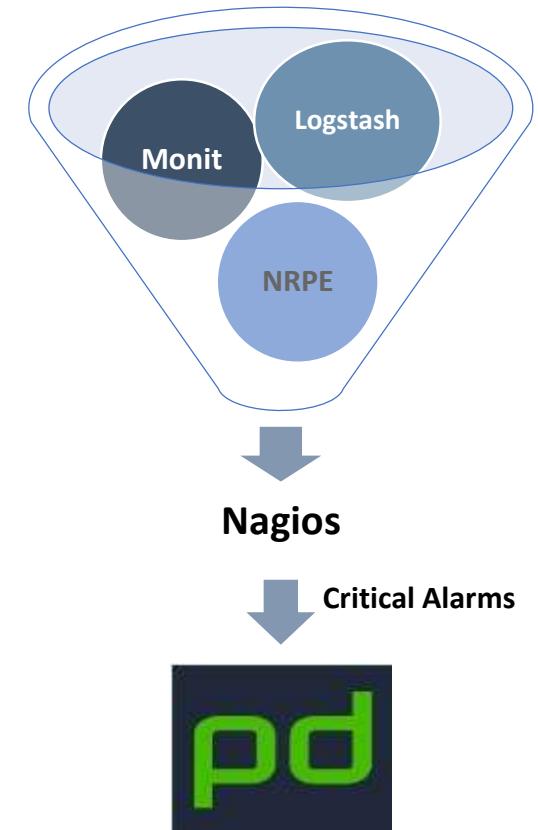
Technology

- Monitoring tools - Nagios, Monit, ELK, Grafana
- Alerting Tools - PagerDuty, Hipchat
- Ticketing - JIRA
- Runbooks – Confluence
- Configuration – Ansible
- Other tools – AWS, Linux system tools, Hypervisors, KVM



Solution

- Monitoring health of the cloud components using NRPE agents
- L1 Support
- Executing incident runbooks
- Executing Ansible playbooks for configuring cloud components.
- Working with L2/L3 teams to resolve cloud infrastructure issues.
- Coordinating with ISPs for outages/ maintenance windows.





Engagement

- Calsoft's team contributed in regression testing of L2/L3 switches. The regression suite had to run on nightly release to ensure that the switch functionality is intact as various new features are added to the product. The regression suite should support 6 hardware platforms and various different network topologies. The regression suite also needs to be enhanced on regular basis to ensure that the scripting related issues are taken care and also new features added to the product are covered as part of subsequent regression executions



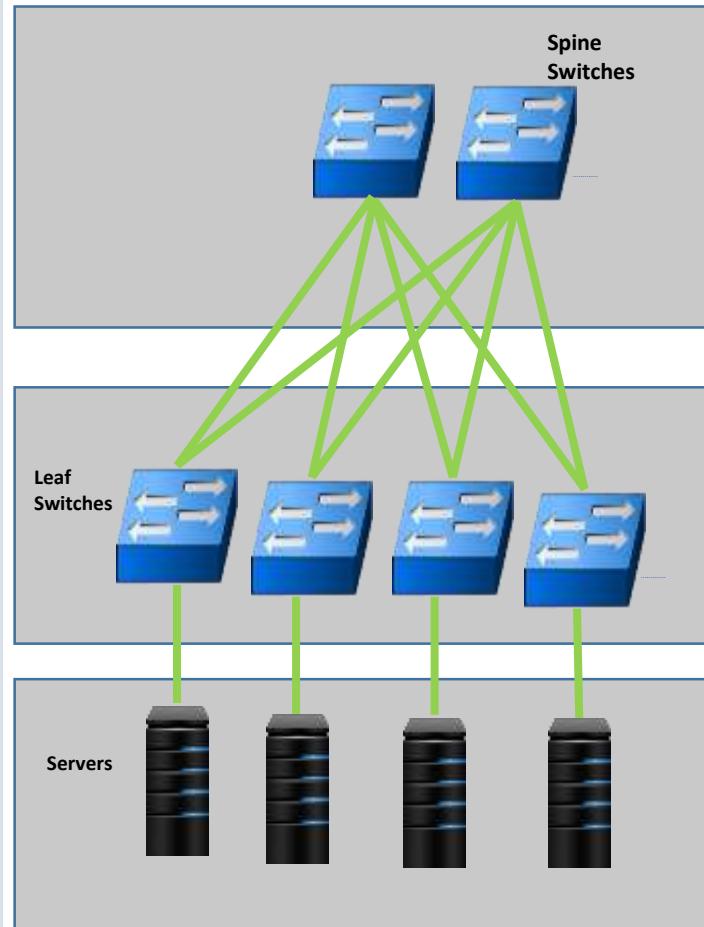
Benefits

- Ensures that existing customer deployments, across all supported platforms, are not impacted due to new feature additions.
- Allows the core team to focus on product roadmap.
- Increased Test Coverage & Automation.



Technology

- Scripting Languages - Shell Scripting, Perl
- No. of Hardware Platforms – 6, Execution frequency – Nightly
- Protocols
 - STP
 - RIP
 - OSPF
 - IBGP
 - EBGP
 - VRRP
 - LLDP
 - LACP



Automation of Cisco Virtual Application Container Services



Engagement

- The engagement underpinned deployment/automation of Cisco VACS (Virtual Application Container Services).
- The project involved bringing together Cisco's virtual network services components - the Nexus1000V virtual switch (N1K), the Virtual Services Gateway (VSG) together with the Prime Network services Center (PNSC) and the Cloud Services Router (CSR) under one umbrella called VACS.



Benefits

The automation bestowed benefits in terms of:

- Reduced overall deployment time from days to hours



Technology

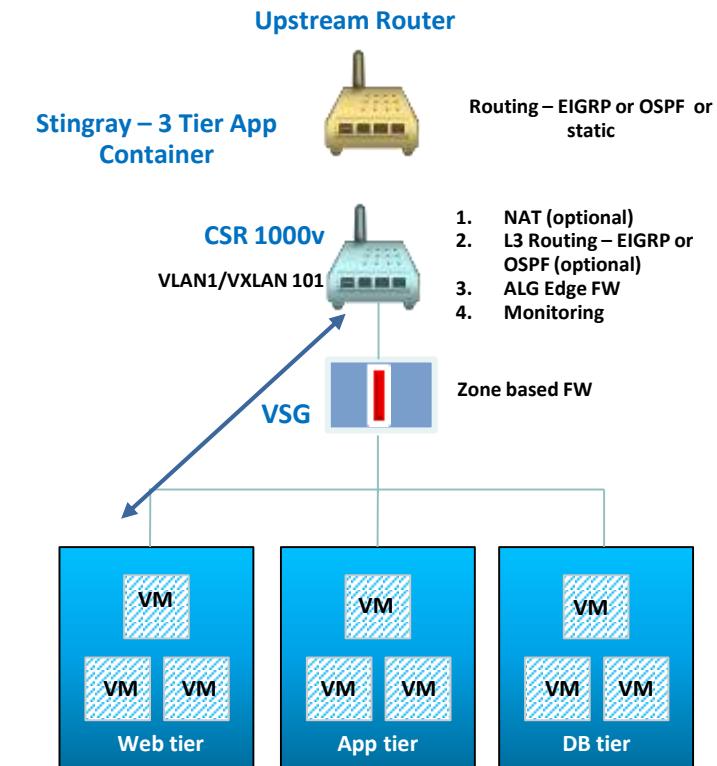
- Core Java 6, VI Java, UCSD APIs



Solution

Calsoft helped client with:

- Provisioning of VM deployment for Cisco's virtual network components
- Provisioning of 3 tier virtual machines and VLAN/VXLAN/PortProfile configurations on N1K switch
- Also worked at UCSD side to create workflows for above installed components and container deployment.



3 Pre-created zones with external connectivity for Web tier only



Engagement

- Calsoft was engaged with a leading company in SSD market, to enable its NVMoE card, for single-PCIe-slot machines, where the slot is occupied by Network Interface Card (NIC).



Benefits

Customer was able to showcase the NVMoE functionality on machines with single PCI slot. This helped in adding a feature to its product.



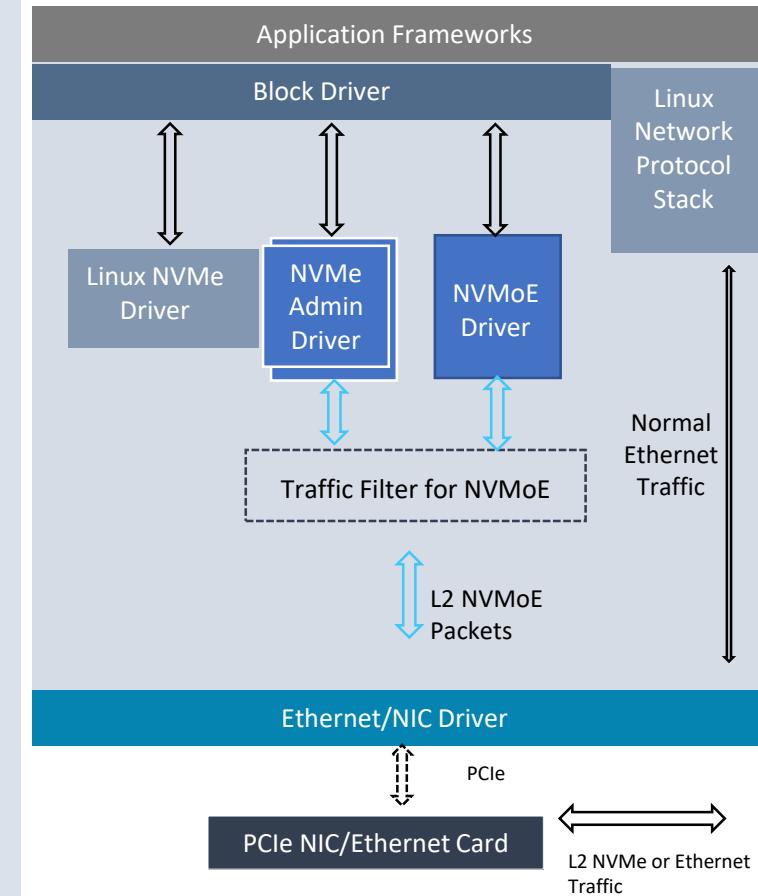
Technology

- C, Linux, NVMoE, Linux Networking



Solution

- To cater to the need of providing NVMoE support to machines with single PCIe slot, NVM traffic coming from NIC is to be captured before it is processed by the Linux Network stack.
- A filter driver was designed and developed by Calsoft team, to capture the traffic of NVMoE.
- A new L2 id was registered to cater to the NVMoE traffic.
- Further the traffic was handled to NVM drivers of customer, through pre allocated kernel memory buffers.
- The buffers were devised as circular queue by the filter driver.
- Apart from testing the driver for its intended functionality, Calsoft also undertook performance test of the driver.
- A traffic generator tool was developed to generate NVMoE traffic at line rate.





Engagement

Calsoft was engaged with the client to built a Linux filter driver for a new networking protocol designed to extend the storage capabilities.



Benefits

- Our client benefitted with shorter time to market
- The solution facilitated the client to attain higher performance
- The void of expertise faced by the client was filled in by Calsoft team



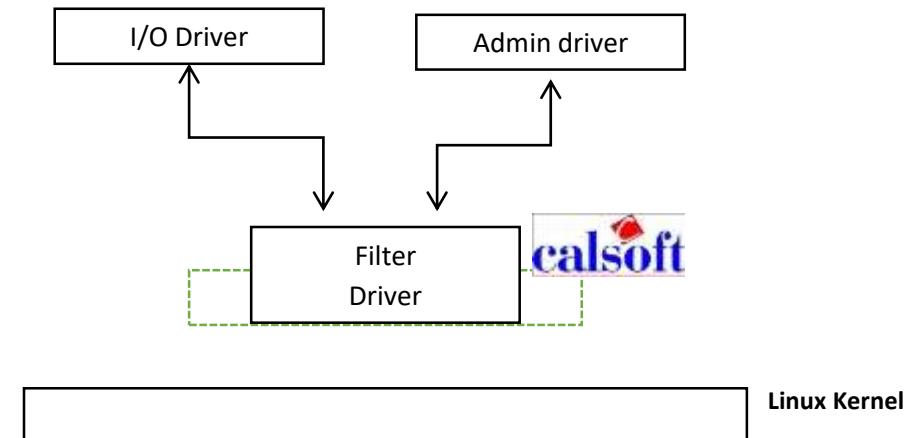
Technology

- C Linux kernel space, Networking



Solution

- Calsoft built the new filter driver registering a new Eth – type
- Built the interface for higher level driver to interact with the Filter driver
- The solution runs on 10G network.



CTFN Filter driver



Engagement

Calsoft is working closely with the customer for integrating the L2/L3 switching infrastructure with VMWare NSX. The integration will allow the L2/L3 connectivity between Virtual Environment controlled by VMWare NSX and other network infrastructure managed by Virtualization Centric Fabric.



Benefits

- This will allow the customers to integrate virtual infrastructure with physical devices (servers, switches)
- Extends the benefits of VMWare NSX for hardware device vendor agnostic network management.
- REST APIs allow integration with any other SDN Controller.



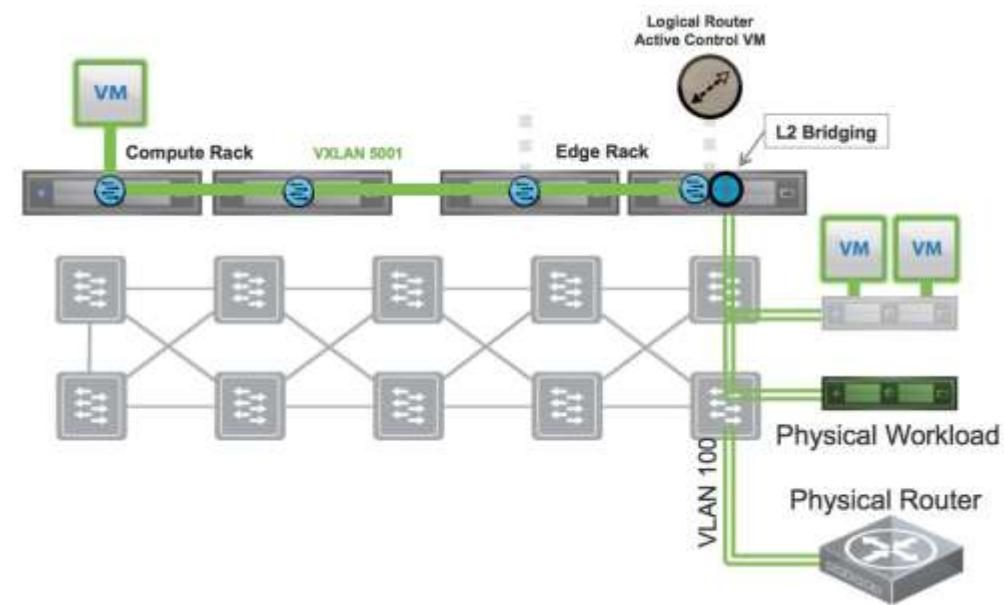
Technology

- VMware NSX, OVSDB, HW VTEP, Java, Shell scripts



Solution

- Design & development of HW VTEP integration with VMWare NSX.
- OVSDB integration component to exchange the required switching/routing information between Virtual environment and physical L2/L3 switches.
- JAVA based CLI & REST API modules for remote configuration.





Engagement

Calsoft is currently engaged with its customer in building the VMWare integration modules for their product. The intention is to make the product VM-aware. It will also allow the customer to use the vSphere web client to monitor and manage the networking infrastructure.



Benefits

- Single pane of management for network administrators
- vRO workflows allow the network administrators to programmatically configure the network components irrespective of vSphere web UI.



Technology

- vCenter APIs, AngularJS, vRealize Orchestrator, Java, JavaScript



Solution

- Created vCenter plugin for vSphere web client
- Developed set of vRealize Orchestrator workflows to interact with custom networking components.
- Integrated the vCenter plugin to use the vRealize Orchestrator workflows over REST APIs to manage the network switches.
- Components like VLANs, Ports, Tunnels and statistics can be managed through this plugin.
- Issues in the network fabric can be viewed & debugged via single pane of glass

SDN Solution: pre-deployment analytics tool



Engagement

Calsoft was engaged with a client to create a tool for analytics and report which would be helpful to find cost benefits of NSX deployment in a data centre.



Benefits

- Help customer to understand NSX benefits
- Improving the network efficiency by reducing network flows which can be pre-understood by NSX deployments



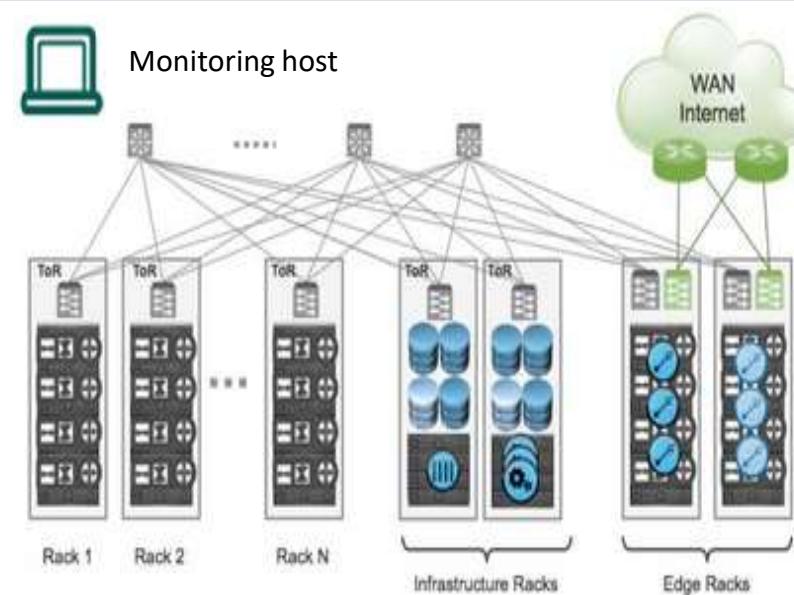
Technology

- vCenter APIs, AngularJS, vRealize Orchestrator, Java, JavaScript



Solution

- Developed a agent based tool which would capture following aspects of the network
 - High level network topology
 - East West & North south Traffic
 - Network flows
 - VLANs
- The agent would connect to VMWare vCenters and collect the network details and fed to an analytics engine which would compare the result and generate a report about the NSX requirement for the network topology
- The report contains details about benefits of NSX in terms of configuration those can be automated , security traffic flows



Protocol Stack Development



Engagement

Calsoft was engaged with a prominent White-box Switch company in developing various protocol components like Flow Control, Priority-based flow control, sFlow and IPv6/ACL



Benefits

- Flow Control, PFC, sFlow, IPv6/ACL are features that are mandatory with respect to different Layers of Protocol stack.
- Calsoft made sure the client got the whole protocol stack functioning well by developing all components well in time



Technology

- Golang, ASIC Programming, BCM_SHELL



Solution

Flow Control

- To ensure zero packet loss in the presence of network congestion by pausing all the traffic on congested interface

PFC

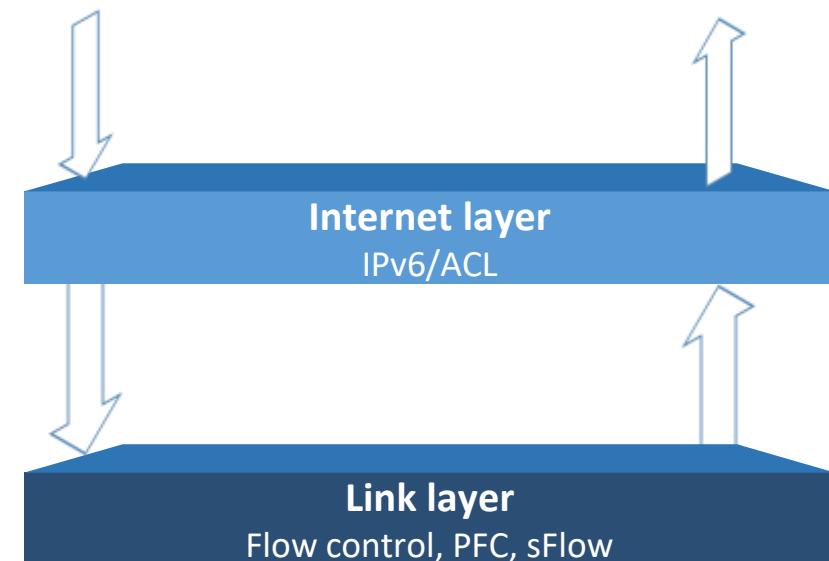
- To ensure zero packet loss in the presence of network congestion by pausing traffic based on priority classes

sFlow

- Physical port mirroring, packet sampling

IPv6/ACL

- Enabling IPv6, Access Control List support in ASIC



Development of Flow Control



Engagement

Calsoft was engaged with the client in ensuring zero packet loss in the presence of network congestion. The complete development code was introduced by our engineers along with all the features. This would facilitate the client during their go live phase



Benefits

- Client can now ensure to have Zero Packet loss in the presence of network congestion
- The engagement assisted the client in carrying out a POC for its client as the project was stuck due to this feature



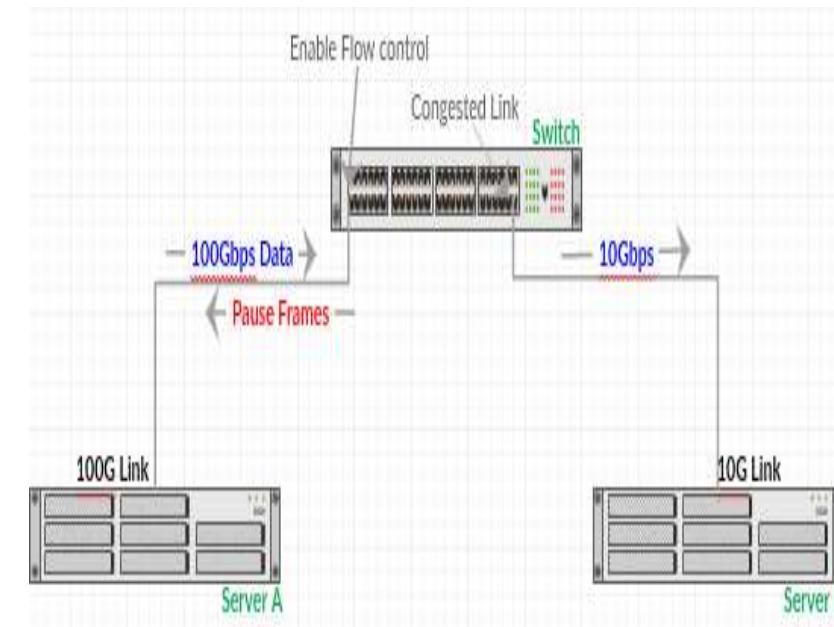
Technology

- Golang, ASIC Programming, BCM_SHELL



Solution

- The sending station (computer or network switch) was transmitting data faster than the other end of the link can accept it
- A pause frame was introduced to allow the overwhelmed network node to halt the transmission of the sender for a specified period of time
- MAC frame was used to carry the pause command, with the Control opcode set to 0x0001, IEEE 802.3x standard
- The pause frame included the period of pause time being requested
- After pause period was over the sender could start transmission



Development of Priority Flow Control (PFC)



Engagement

Calsoft was engaged with the client in developing priority flow control to ensure zero packet loss in the presence of network congestion.



Solution

- Provided a link-level flow control mechanism that could be controlled independently for each class of service (CoS), IEEE 802.1Qbb
- This was similar to the working of Flow Control, but at a more granular level as it can control different priority traffic classes
- The MAC control opcode for a Priority pause frame is 0x0101
- Priority pause indicates the pause time in quanta for each of eight priority classes separately



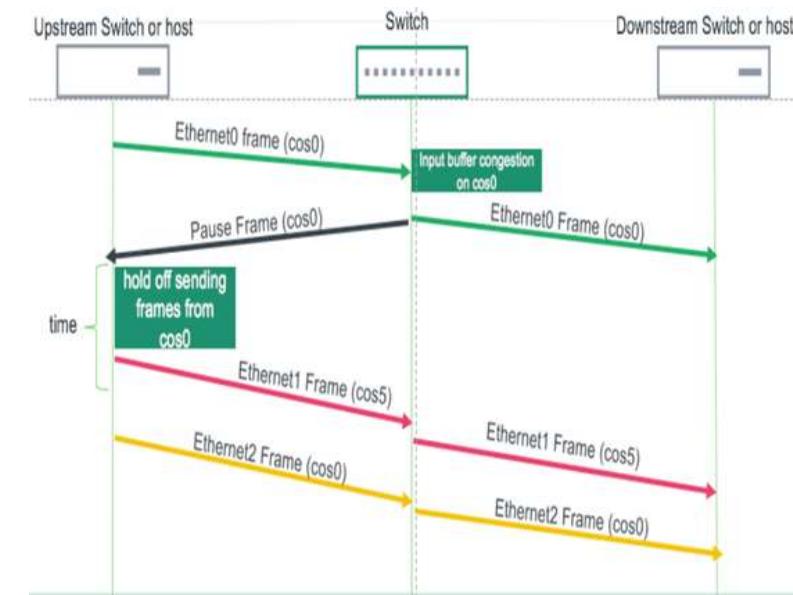
Benefits

- Zero Packet loss in the presence of network congestion
- Applicable to data center bridging (DCB) networks
- It would allow prioritization of voice over IP (VoIP), video over IP, and database synchronization traffic over default data traffic and bulk file transfers



Technology

- Golang, ASIC Programming, BCM_SHELL



Development of sFlow



Engagement

Calsoft introduced and supported the physical code, Physical port mirroring and packet sampling needed for monitoring and analytics purpose



Benefits

- Sampled packets could now be sent to the collectors for the purpose of traffic monitoring and analytics



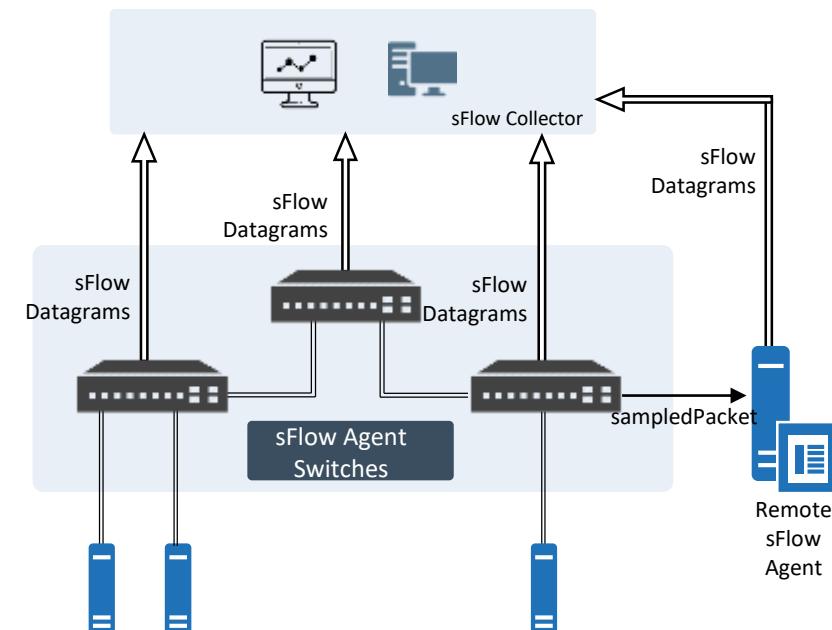
Technology

- Golang, ASIC programming



Solution

- Port Mirroring
- Mirror traffic coming on one physical port to another physical port
- Created multiple mirroring sessions between ingress ports and egress port
- Packet Sampling
- Took samples of incoming packets on specified port at every certain interval
- Encapsulated each sampled packets as sFlow packet and sent them the sFlow agent
- The Agent then sends sampled sFlow packets to the collector



Development of Flow Agent



Engagement

Calsoft was recently engaged with the client in collecting and transferring various statistics - node, app, network resources in kubernetes cluster for the purpose of monitoring and analysis.



Benefits

- Stats collected were used for the purpose of monitoring and analysis



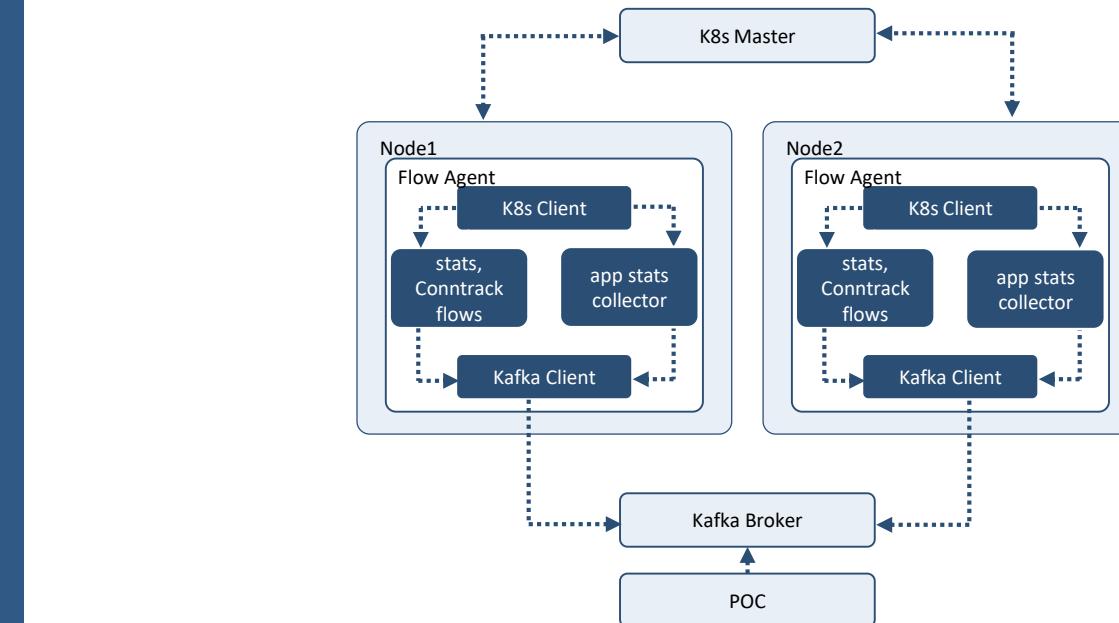
Technology

- Golang, Kafka, K8s, conntrack



Solution

- Identifying and keeping a close watch on resources(nodes,pods,services) in the k8s cluster
- Run flow-agent on every node to collect:
 - ip-conntrack flows:
 - Forward/reverse flows
 - Categorize flows based on source and destination
 - Counters for analytics purpose
 - App Stats:
 - Custom app related stats, bandwidth utilization, system-stats
- Transferred the collected stats to Kafka-Topic after a certain interval



Development of kubernetes Client



Engagement

Calsoft first identified and then kept a close watch on resources (nodes, pods, services) in the k8s cluster. This was a part of the flow agent for monitoring the kubernetes resources



Benefits

- Kubernetes cluster monitoring could now be successfully carried out
- This critically helped in monitoring and watching resources(nodes, pods, services) in k8s cluster



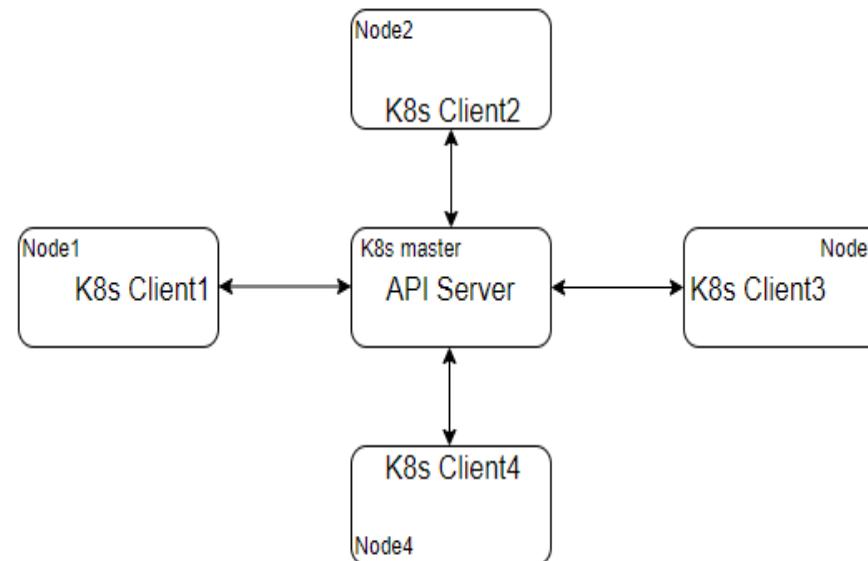
Technology

- Golang, K8s.io library



Solution

- Every node in K8s cluster itself is a client of K8s
 - Client on one node has the capability to see the behavior of other nodes in cluster
- Subscribed to k8s master for various resource's update/deletion/addition events
- Continuous mapping of various resources like pods per node, pods per service, etc which can be queried easily
- Helped in categorizing network flows (Example: service to service flow)
- Interfaced between presentation(UI) and K8s cluster





Engagement

Calsoft facilitated the transfer of collected stats to Kafka-Topic kafka topic every certain interval. This process was part of Flow Agent providing schema based encoding of stats



Benefits

- Data streaming and encapsulating data.
- The engagement helped in big data Analytics. The data went through the middleware which majorly facilitated in big data analysis.



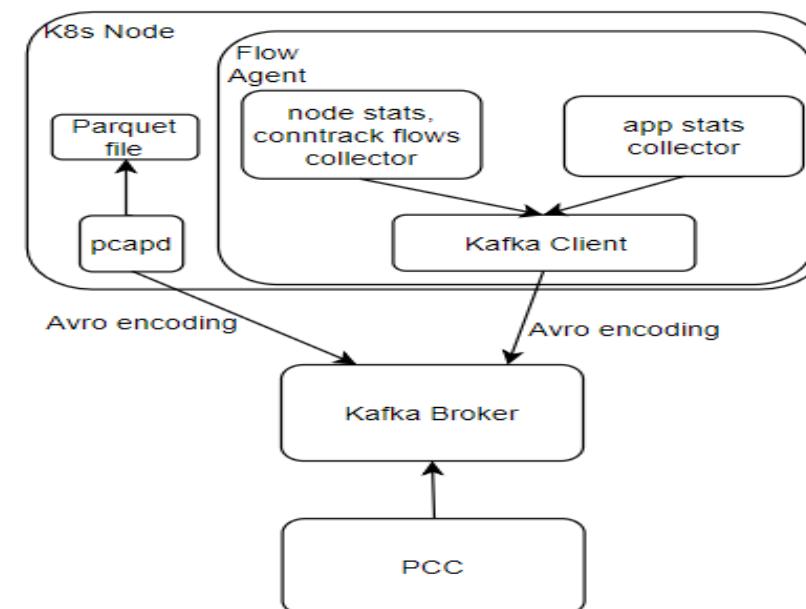
Technology

- Kafka, Apache Parquet, Apache Avro



Solution

- Kafka
 - Distributed streaming platform that is used to publish and subscribe to streams of records
 - An Interface between Flow Agent and PCC
- Parquet
 - Big Data columnar storage for Hadoop ecosystem
 - Used to log various packet flows, that would require further processing and analysis
- Avro
 - Encapsulate data/stats with Avro serializer which then gets transferred to Kafka



Development of HF-counter to collect data for Machine Learning



Engagement

Calsoft collected the data required for predicting congestion in network switch and router interfaces for the client.



Benefits

- Data gathered can be useful for the purpose of analytics
- The data can be processed based on different ML algorithms and can create mol model using the collected data.



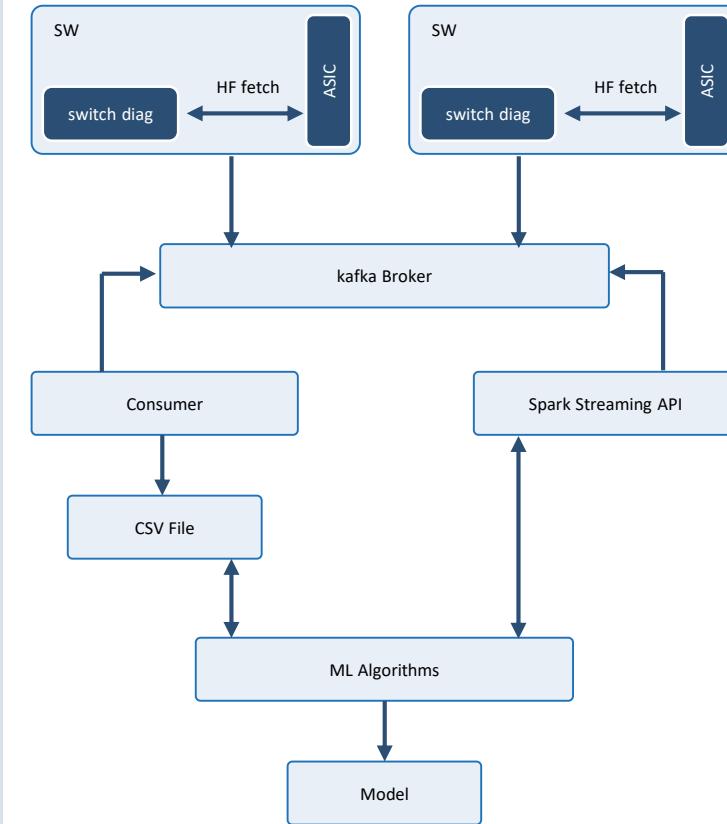
Technology

- Golang, ASIC Programming



Solution

- Fetching port counters, pipe counters, ingress buffer usage, egress queue thresholds, etc from ASIC at High Frequency(HF)
- Transferred these collected counters to kafka topic every certain interval
- Further the data processing can be performed by consuming data from kafka topic and the data can be normalized using various machine learning algorithms
- ML models can be created with the set of normalized data gathered from every switch in the network



Exploration and R&D with reference to IPv6/ACL



Engagement

This project was mainly an R&D project that was carried out for the client to advise on enabling IPv6, Access Control List support in ASIC. Currently IPv4 is being supported in their switch.



Findings

- IPv6 reduces size of routing tables and makes routing efficient
- ACL provides more security by performing packet filtering



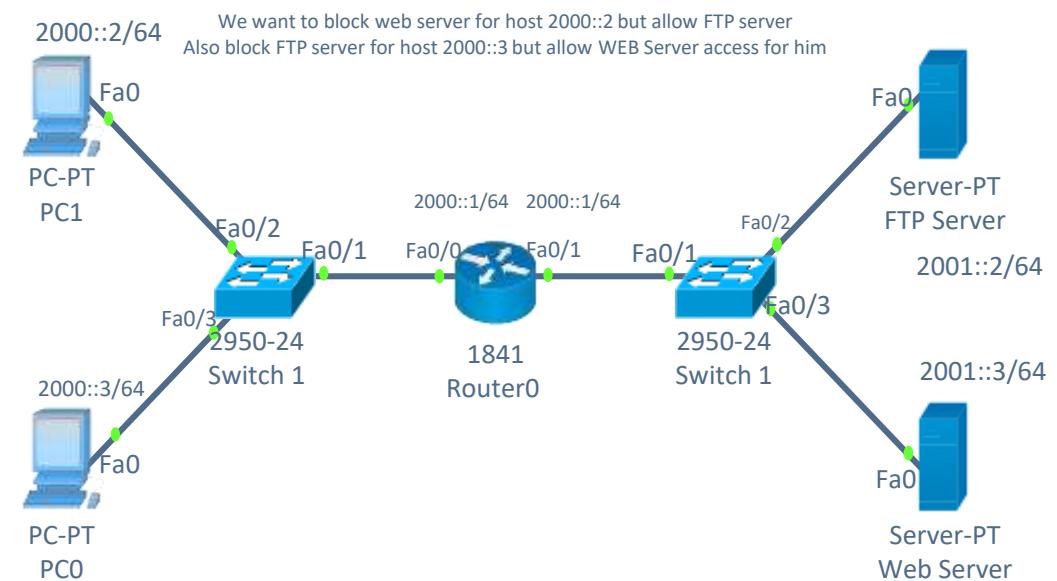
Technology

- Golang, ASIC programming, BCM_SHELL



Solution

- IPv6
 - Providing support for 64/128 bit IPv6 addresses in ASIC
 - Handing IPv6 routing entries in L3 table
- ACL
 - Similar to IPv4 add ACL support for IPv6
 - Programming ACL keys for IPv6 in IFP TCAM_WIDE tables
 - IFP TCAM/TCAM_WIDE holds all ACL keys
 - Implementing Prefix Pool counters for verifying lookup of added ACL keys



Exploration and R&D with reference to IPv6/ACL



Engagement

This project mainly underpinned Calsoft creating a Use case for the client's product and advising them to use a better topology.

Topologies to deploy the product: Leaf-Spine Network Deployment model – switches only, Server deployment model – switch and servers



Findings

- As compared to traditional topologies Leaf Spine Network is a better option.
- Leaf-Spine Network improves redundancy, performance, scalability, security



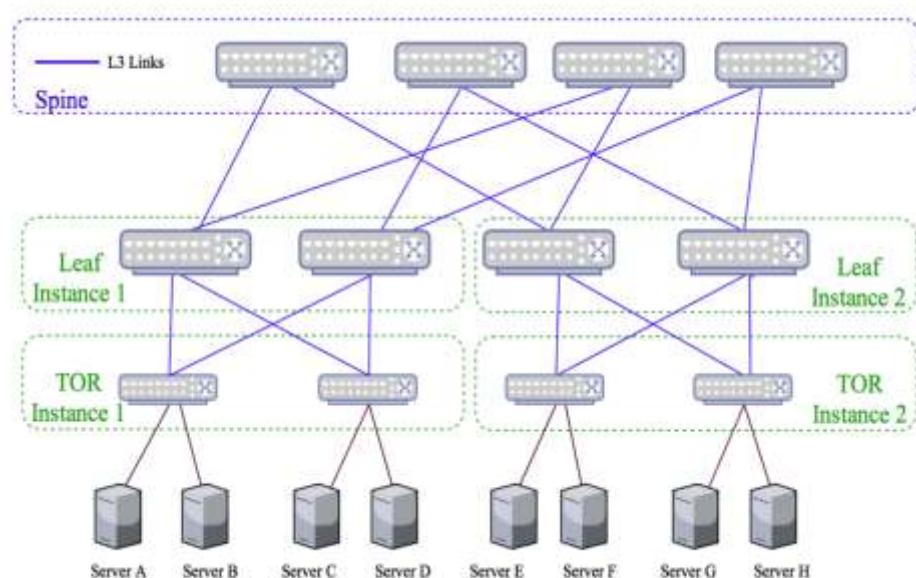
Technology

- Leaf-Spine Network Topology



Solution

- Leaf-Spine Deployment
 - Customers having requirement of distributed networking system can deploy client's switches in Leaf-Spine model as a replacement of Traditional 3-tier model
- Server Deployment
 - Customers having requirement of distributed networking system along with clusters of servers
 - K8s cluster can be used to provide cluster management



Linux/Windows Packet Capture Agent



Engagement

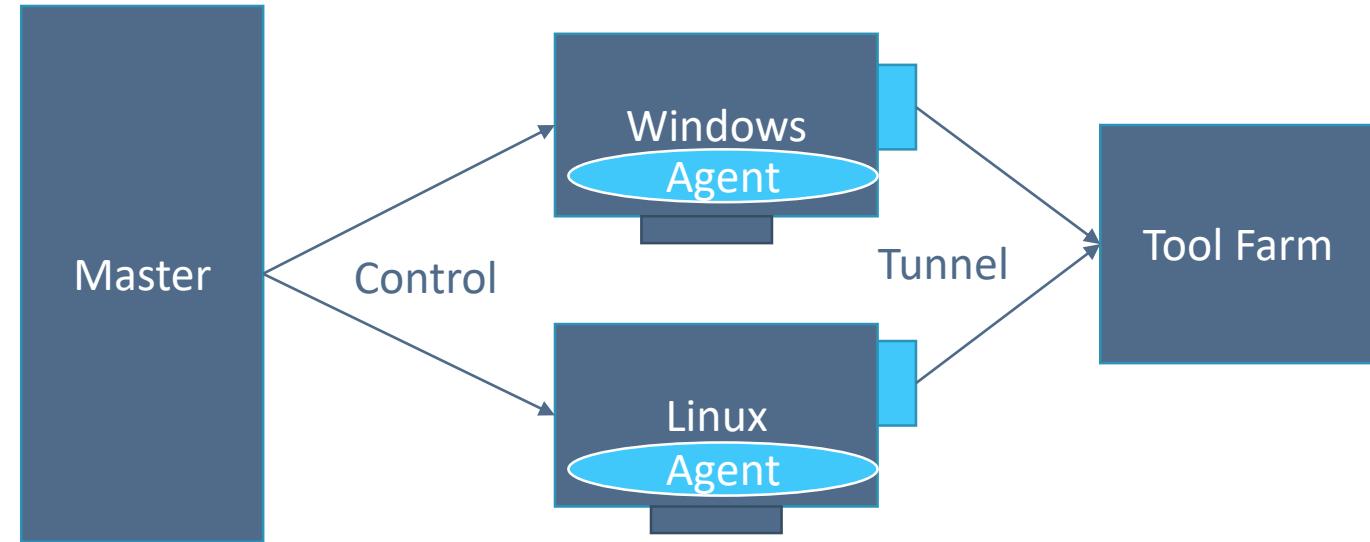
Calsoft was engaged with the client for building an agent for Linux & Windows OSes to capture packets based on filters :

- Building agent for Windows & Linux
- Agent to tunnel the captured packets to tool farm
- Build API layer for agent to be controlled via master



Solution

- Calsoft built the agents using Winpcap & libpcap
- The agents had an API interface to be managed by a master which can trigger the capture to start, stop, specify filter, specify tool farm & tunneling mechanism
- Based on the commands received, agent would selectively capture the packets and stream it to tool farm
- Facility to store it locally in a pcap file to copy to an analytics tool offline



Benefits

- Provide packet capture in public cloud where putting taps isn't feasible
- Provide captures in virtualized environments without any physical network modification



Technology

- C, Python, Django, HTML, jQuery, CSS3, libpcap, winpcap

Network Infrastructure support

Engagement

Calsoft was engaged with a Fortune Listed Company to help them in L1 support on network infrastructure issues.

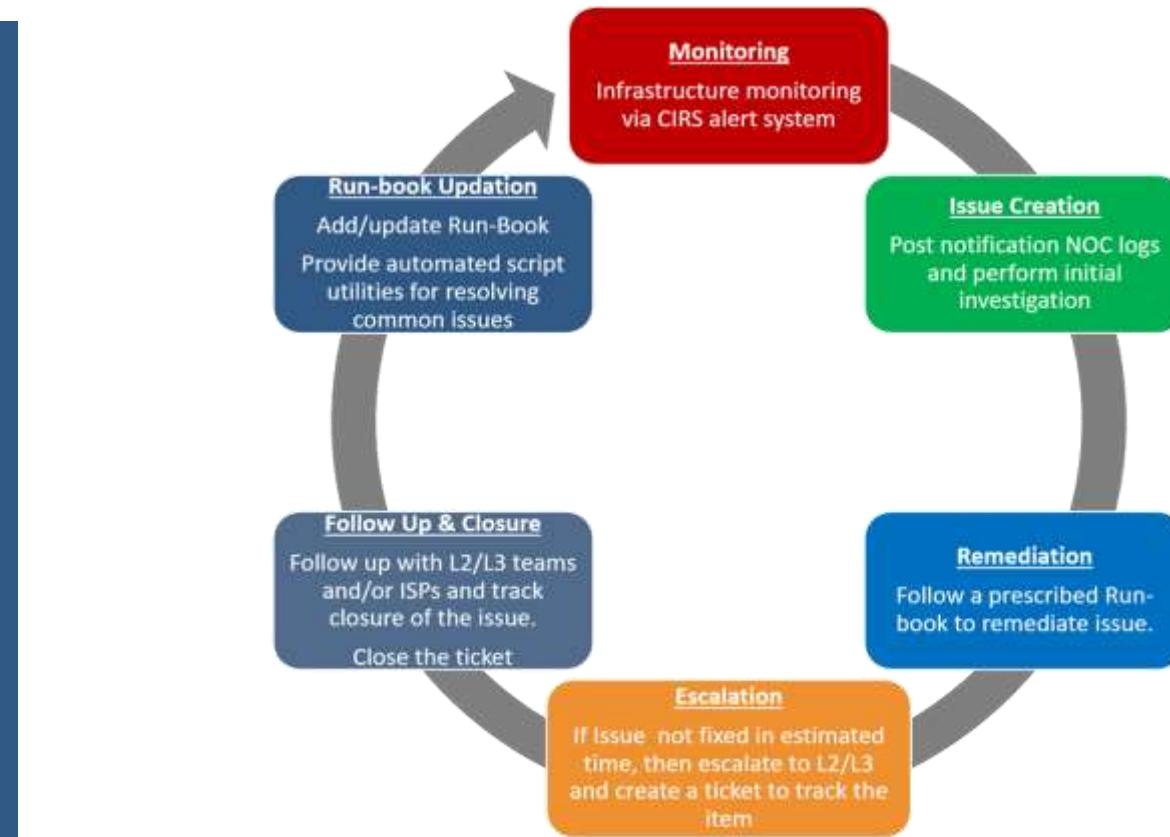
Solution

Calsoft helped the customer with L1 support, the engagement underpinned:

- Network Infrastructure support for
 - Switching
 - Routing
 - Load balancing
 - Firewalls – Cisco ASA/Firepower etc.
- Created script based utilities for automating resolution of common customer issues.
- Contribution towards documentation(Runbooks) for future reference and quicker resolution

Technology

- NSX –V 6.2and NSX APIs, Java, Maven ,
- HTML5, Networking (Routing)



Benefits

- Improved productivity
- Faster turn around time
- Improved accuracy
- Higher customer satisfaction

MEC & REC Edge Development with End-to-End Orchestration



Engagement

- Calsoft was engaged by the customer for developing 5G MEC & REC Edge platforms.



Solution

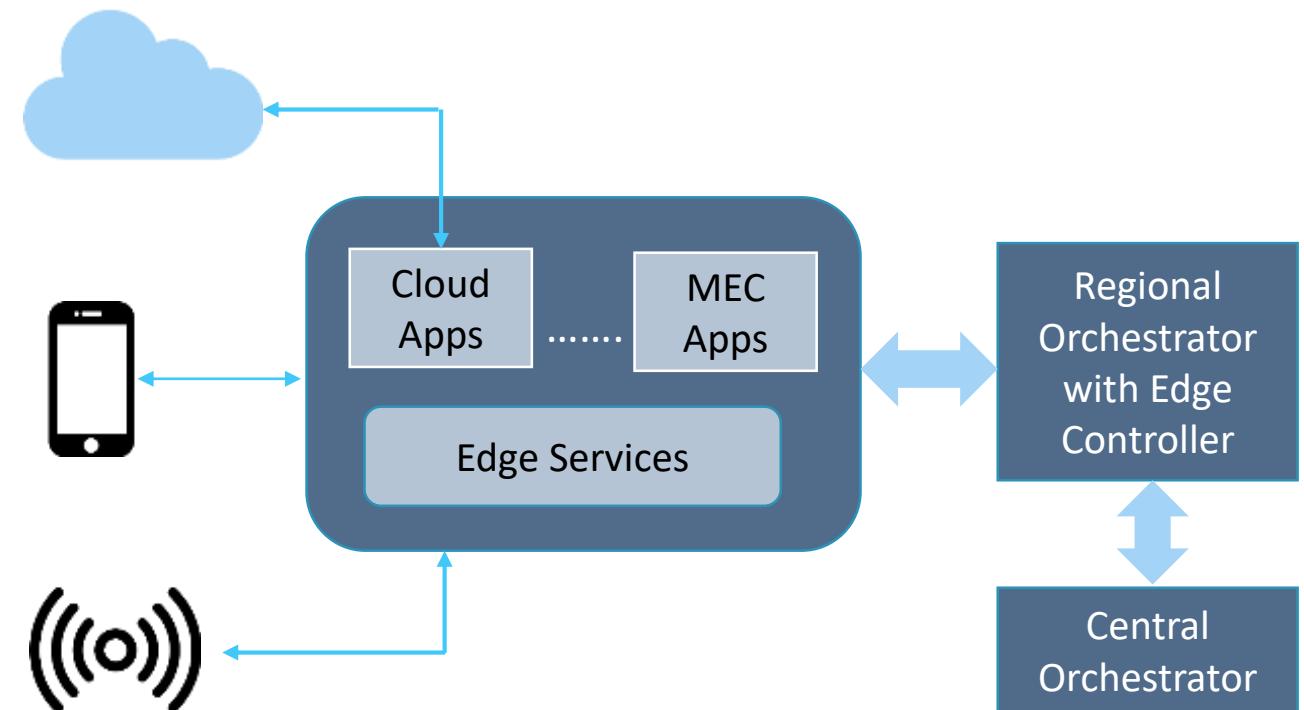
The engagement underpinned

- Designing & developing the Edge platform based on Kubernetes
- Designing & developing the set of microservices at the Edge host & Edge controller
- Designing the traffic steering, DNS, QoS, and managing the Edge & application lifecycle
- Designing & developing the multi-tier orchestration solution Edge deployment automation for ZTP
- Designing & developing various interfaces for application developers, UE Apps, 5G Core Services, etc.
- Sample app onboarding and demonstrating end-to-end use cases to Telco customers



Technology

- MEC, 5G Core Services, K8S, ONAP, CNI, Akraino, AWS Greengrass



Benefits

- The time to market significantly improved with Calsoft engineering partnering the design and development
- End-to-end product roadmap created instead of just the Edge host perspective

Microsoft SCOM Monitoring Solution

- Centralized monitoring of customer hardware using proxy-based agent solution



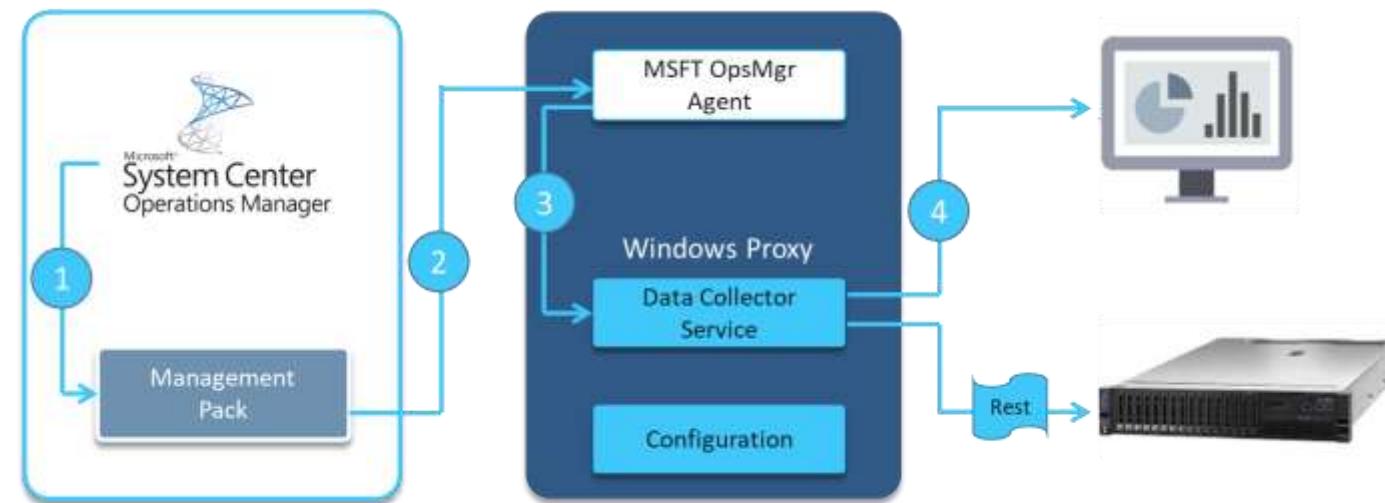
Engagement

- Calsoft was engaged with the customer to develop a Microsoft SCOM based monitoring solution for custom hardware.



Solution

- Calsoft collaborated in the system architecture design along with incremental improvements in the design to showcase the incremental benefits
- Calsoft defined the Test Strategy, Test Tools, and Test Cases to be run for the performance benchmarking



Technology

- Whitebox switches, Broadcom ASIC, NVMe Storage, Hadoop, HDFS, Kubernetes, Alluxio, AWS, HighBench, BigBench, SparkMultiuserBenchmark, in-memory Spark-Bench, Python



Benefits

- Centralized monitoring of customer hardware using proxy-based agent solution
- Highly scalable
- Solution is compatible with SCOM Management Interface; which means, the user need not learn any new management interface
- Devices can be added or removed at run time
- Since no software is running on customer hardware, there is no performance impact



Engagement

- Calsoft provided domain/product knowledge of SD-WAN to the customer for integration with their Network Flow Monitoring product. The aim was to provide complete network flow visibility to large customers having one or more small branch offices, with DC at the Head Office.



Solution

- Designed and built a virtual lab environment to simulate the real-world SD-WAN designs and scenarios for testing the customer's product.
- Provided understanding of the functionality and flow of SD-WAN to developers to help them grasp the technology and suggested some features that can be more useful for SD-WAN monitoring.
- Tested the integration, functionality, accuracy, and flow of SD-WAN with the existing customer product, which aims to provide intelligent operations for any software defined network environment.
- Successfully completed the feasibility phase and based on its study, developed a list of scenarios:
 - NSX in DC
 - Branch-to-branch connectivity
 - Complex NW topology in branch
 - Hub & Spoke configuration
- Deployed these topologies and validated the functional aspects of the monitoring product integration with SD-WAN.



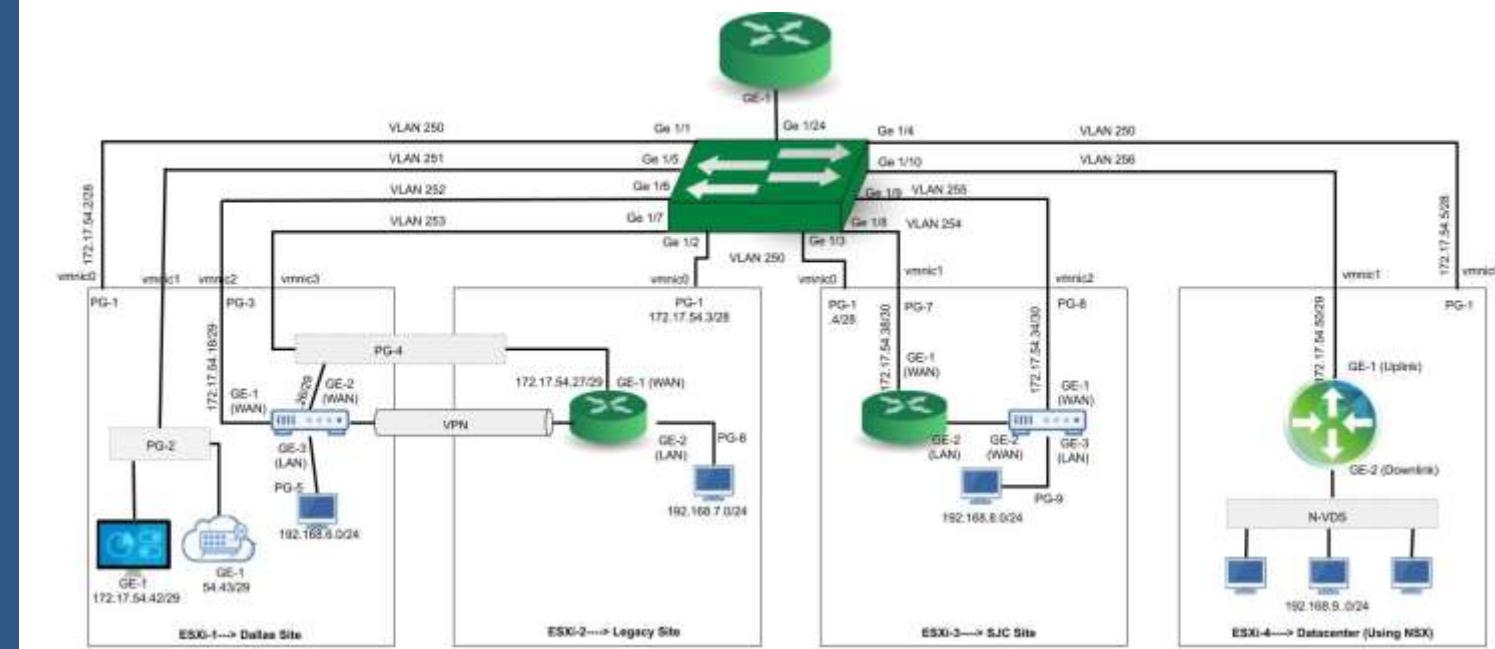
Benefits

- Global RTM version of the product could be released on the targeted date and the product is now providing the appropriate SD-WAN solution to the end customers across the globe.



Technology

- NSX, vSphere, SD-WAN, Cisco Switches, NSX APIs, Java, Maven
- SD-WAN Controller framework and Network Policies
- HTML5, Networking (Routing)



Feature Development for Networking Solutions

Engagement

Calsoft provided the customer new feature support for their existing lab.

Solution

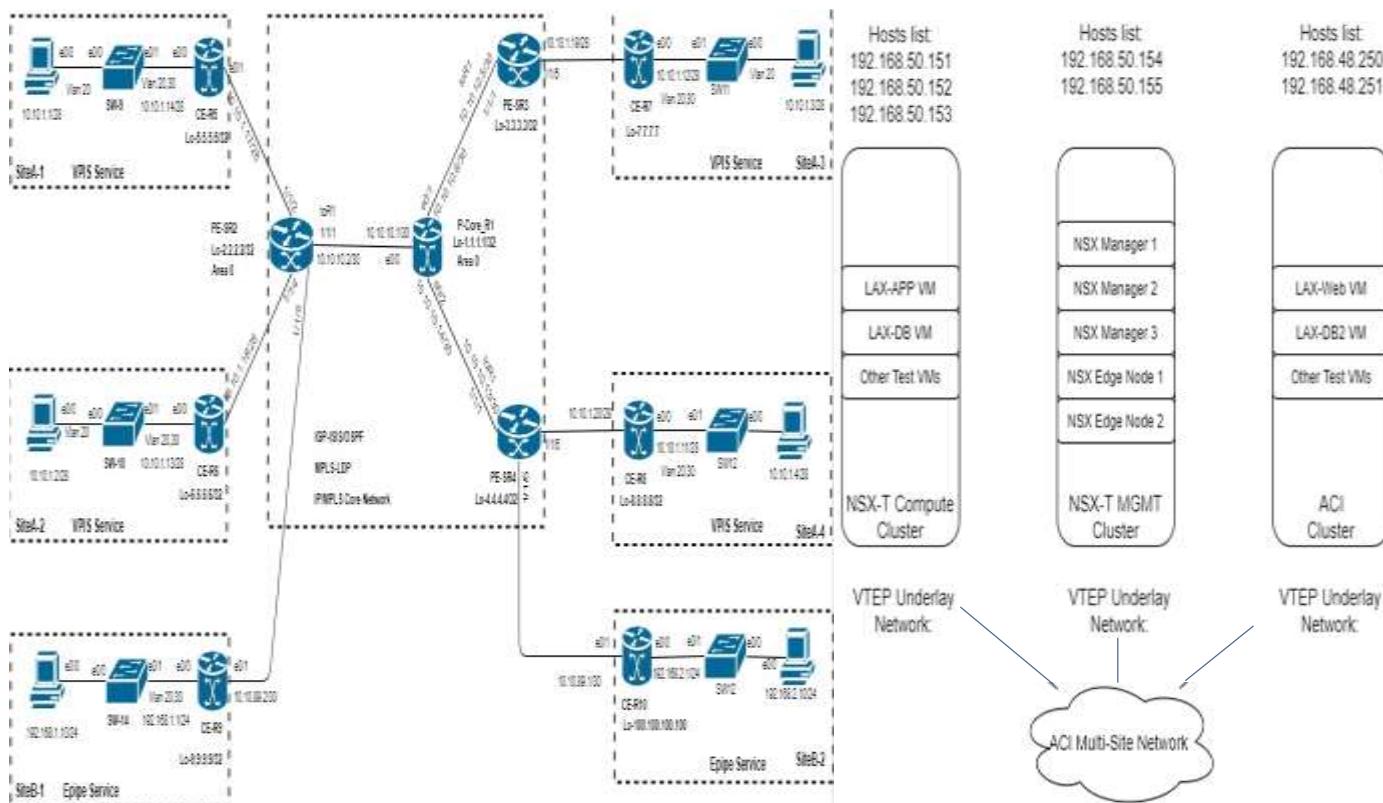
Calsoft helped the customer with its niche networking expertise in providing new feature support for their existing lab.

The engagement underpinned:

- Finding deltas/gaps in current configuration
- The following configuration were provided -
 - NSX-T: Edge Bridge, PNICs, HA, VRF lite, NAT, DFW on SDDC, VPN, Edge Services
 - Alcatel Lucent Service Routers
 - SDP, SAP, VPLS, Services, Cisco Core router
 - Nokia ALU: Cisco sub-interface to realize SAP (Cisco ESR9K at core)
 - Nokia ALU: Nokia ALU (SAP-SDP conversion)
 - SAP for only ETH type, Mesh & Spoke SDPs, Dot1Q/VPLS/E-pipes encapsulation
- Provided best practices document with new feature support and network diagrams

Technology

- NSX-T and Nokia ALU lab infrastructure, Discovery tool



Benefits

- Supported extension of the customer's network by providing more network-specific configurations
- New features configured in the customer's existing plugins or network

Networking plugins for Intent Based Network Automation Platform

Engagement

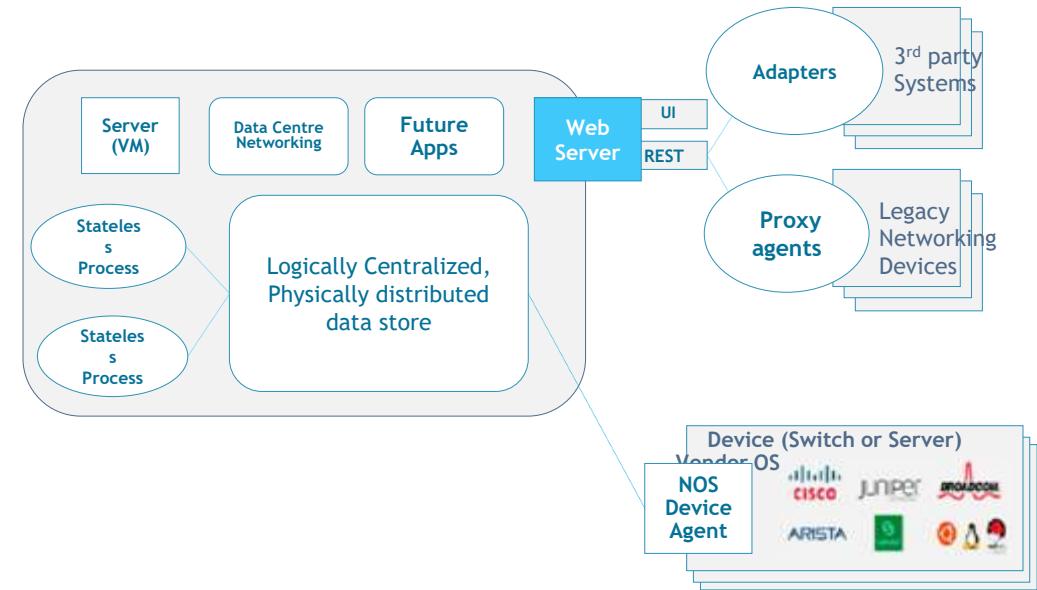
Calsoft developed new plugins for the customer's intent-based network automation product.

Solution

- The product is a collection of stateless agents, which are used to interact with users, perform application domain-specific transformations, write configurations, and gather telemetry from physical, virtual devices/systems using native interfaces
- The system delivers a set of system resources as a service following a reference design and subject to constraints based on user-specified blueprints
- Calsoft developed new features and enhancement of the existing features required for the integration of the system with different networking devices, SD-WAN & WLAN controllers such as Arista, Juniper, Versa Director, Mist, etc.
- Apart from development, Calsoft also had a team to support Integration testing, Scale testing, test automation and creation of the testbeds required for the customer demos

Technology

Python, SD-WAN, VxLAN, Firewalls, Networking and Network security protocols



Benefits

- Developed 50+ new features and enhancements to make the product more feature rich, covering a wide range of networking devices, controllers of different vendors, etc.
- Fixed critical bugs

Plugin Development for Network Modeling Platform

Engagement

Calsoft developed VeloCloud SD-WAN, NSX in AWS, and Extreme Networks L2/L3 Switches plugin for the customer's network modeling and risk scoring platform. The customer models the entire hybrid data center of public and private cloud and physical network.

Solution

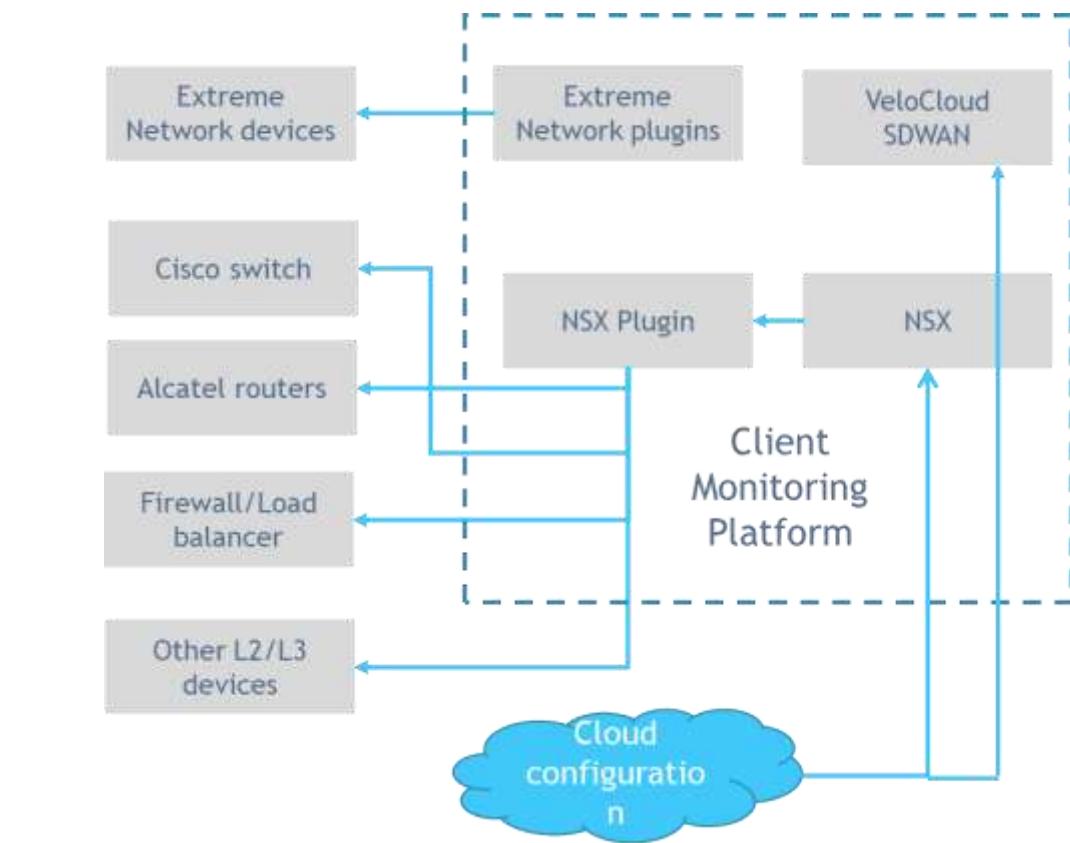
- The primary input for the network model comes from configuration files taken from switches, routers, firewalls, and load balancers.
- Apart from many other plugins, Calsoft developed NSX, SD-WAN, and Extreme Networks L2/L3 switches plugin for the customer's network modeling platform
- The main objective of the plugins was to provide seamless connectivity among the various heterogeneous networking devices in the DC

Technology

Languages: Java, Spring, REST APIs

Tools/Libraries: NSX, VeloCloud SD-WAN, Maven, Gradle., NAT, ACL

OS: Windows/Linux



Benefits

- The customer could model SD-WAN, NSX, and Extreme Networks L2/L3 switches to their network modeling application
- This data could be integrated with public and private cloud managers to include all network environments in the network model

SD-WAN Vendor - NSX Integration

Engagement

Calsoft developed NSX Plugin and Extreme Networks L2/L3 Switches Plugin for the customer's network modeling and risk scoring platform. The customer models entire hybrid data center of public and private cloud and physical network.

Solution

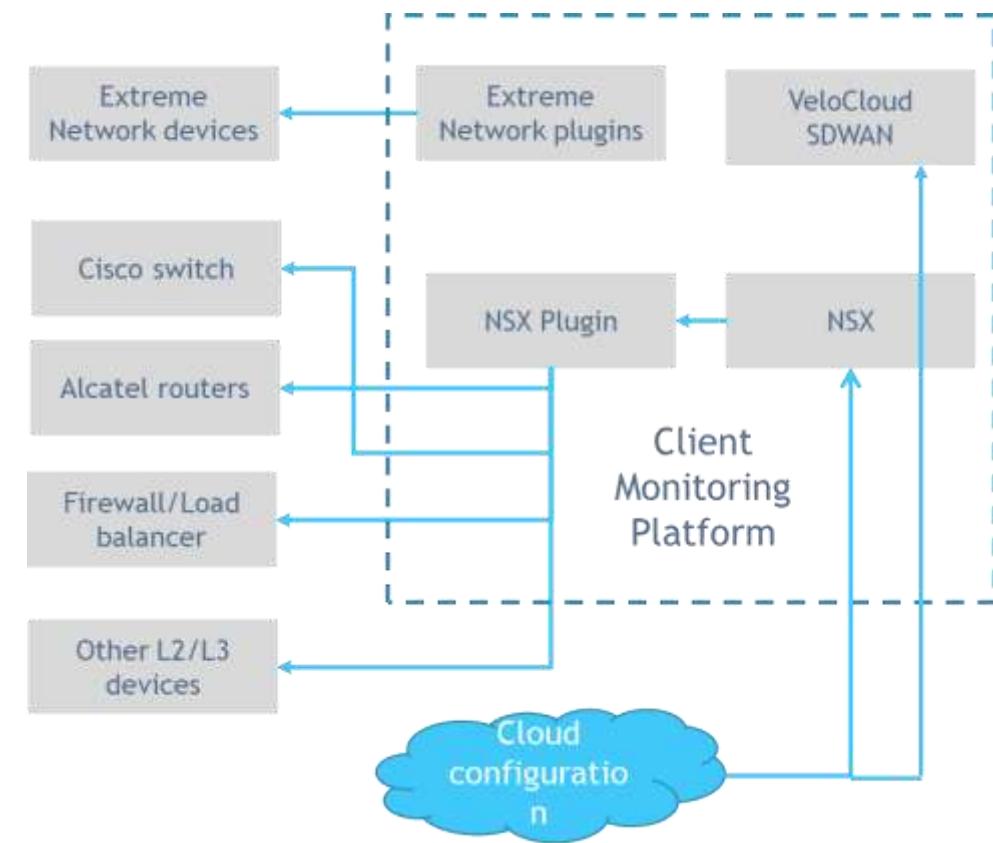
- The primary input for the network model comes from configuration files, which are taken from switches, routers, firewalls, and load balancers.
- Calsoft provided NSX plugin and Extreme Networks L2/L3 Switches Plugin for the customer's network modeling platform.
- The main objective of the plugins was to provide seamless connectivity among the various heterogeneous networking devices in the data center

Technology

Languages: Java, Spring, REST

Tools/Libraries: NSX, Maven, Gradle, NAT, ACL

OS: Windows/Linux



Benefits

- The customer was able to model NSX and Extreme Networks L2/L3 switches to their network modeling application
- This data could be integrated with public and private cloud managers to include all network environments in the network model

Network Controller

Engagement

Calsoft helped the customer build a platform for network monitoring, management, and automation. The product is being built with next-gen architecture, written in Microservices architecture.

Solution

The engagement involved:

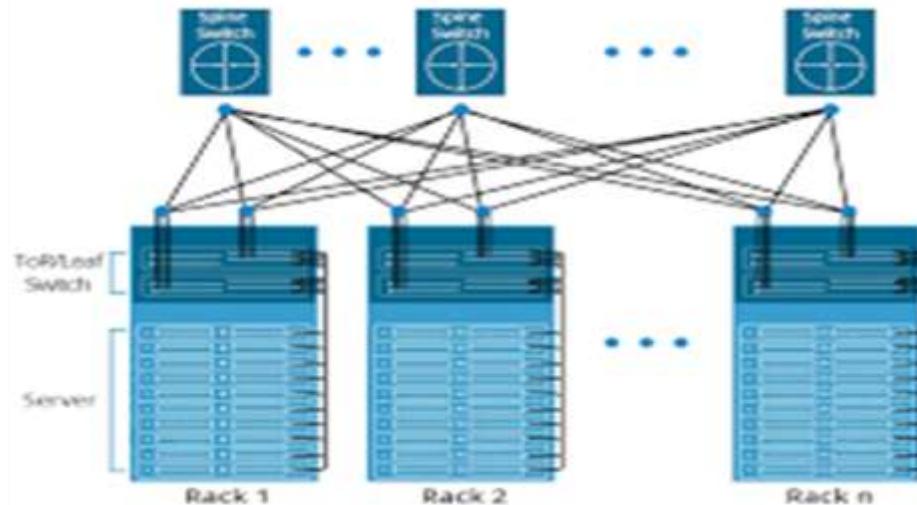
- Designed the platform & developed some of the features written in Microservices
- Developed some of the features in management, monitoring, and automation (Fabric Monitoring, Inventory, Fabric Configuration, Upgrades, etc.)
- Provided integrations with VMware NSX, OpenStack & Nutanix
- Testing and automation platform development as well as CI/CD pipeline (DevOps)

Technology

- Golang, REST APIs, VMware, NSX, OpenStack, Nutanix, VPN, VXLAN, BGP EVPN, VRRP, Jenkins, Python, Git, JAVA, etc.

Network Controller (Monitoring, Management, Automation)

The leaf switches are not connected to each other and spine switches only connect to the leaf switches (and an upstream core device).



Benefits

- The platform enabled closed loop automation, automated workflow, FCAPS, single pane of glass, and other features to the NW admin along with 5G enablement

Network Fabric Controller

Engagement

Calsoft is engaged with the customer to build a platform for Network Monitoring, Management and Automation. The product is being built with next-gen architecture, written in Microservices Architecture.



Solution

Calsoft helped the customer to build a platform for Network Monitoring, Management and Automation. The product is being built with next-gen architecture, written in Microservices Architecture.

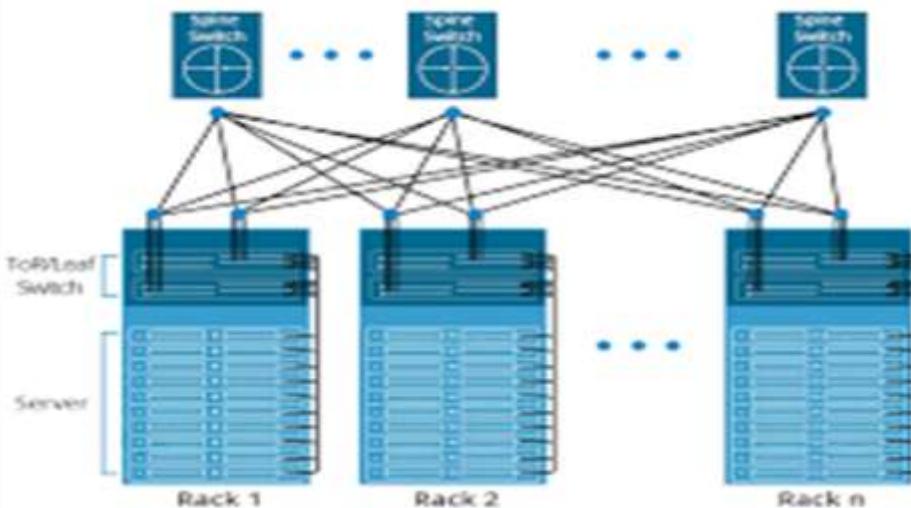
- Designed the platform as well as development of some of the features written in Microservices
- Developed some of the features in Management, Monitoring as well as Automation (Fabric Monitoring, Inventory, Fabric Configuration, Upgrades, etc.)
- Provided integrations with Vmware NSX, OpenStack & Nutanix
- Testing and Automation platform development as well as CI/CD pipeline (DevOps)

Technology

- Golang, REST APIs, Vmware, NSX, OpenStack, Nutanix, VPN, VXLAN, BGP EVPN, VRRP, Jenkins, Python, Git, JAVA, etc.

Network Controller (Monitoring, Management, Automation)

The leaf switches are not connected to each other and spine switches only connect to the leaf switches (and an upstream core device).



Benefits

- The platform enables closed loop automation, automated workflow, FCAPS, single pane of glass, etc. features to the NW admin as well as 5G enablement

Microservices-based Network Controller



Engagement

Calsoft is engaged with the customer to build a platform for Network Monitoring, Management and Automation. The product is being built with next-gen architecture, written in Microservices Architecture.



Solution

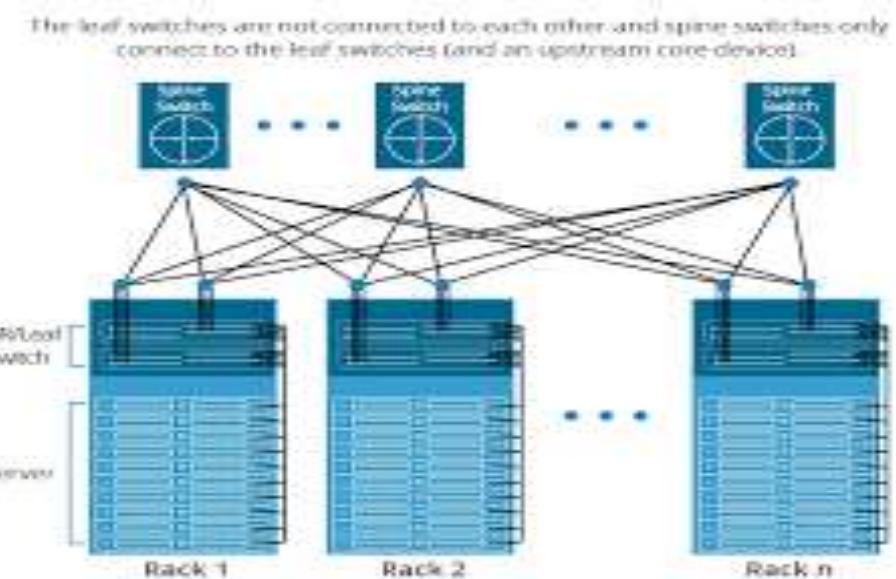
- Calsoft is involved in designing the platform as well as development of some of the features written in Microservices
- Calsoft is developing some of the features in Management, Monitoring as well as Automation (Fabric Monitoring, Inventory, Fabric Configuration, Upgrades, etc.)
- Calsoft is also leading the integrations with Vmware NSX, OpenStack & Nutanix
- Calsoft is also involved Testing and Automation platform development as well as CI/CD pipeline (DevOps)



Technology

Golang, REST APIs, Vmware, NSX, OpenStack, Nutanix, VPN, VXLAN, BGP EVPN, VRRP, Jenkins, Python, Git, JAVA, etc.

Network Controller (Monitoring, Management, Automation)



Benefits

The platform enables closed loop automation, automated workflow, FCAPS, single pane of glass, etc. features to the NW admin as well as 5G enablement

Network Configuration



Engagement

Calsoft was engaged by the customer to develop end-to-end products including backend and UI for network configuration.



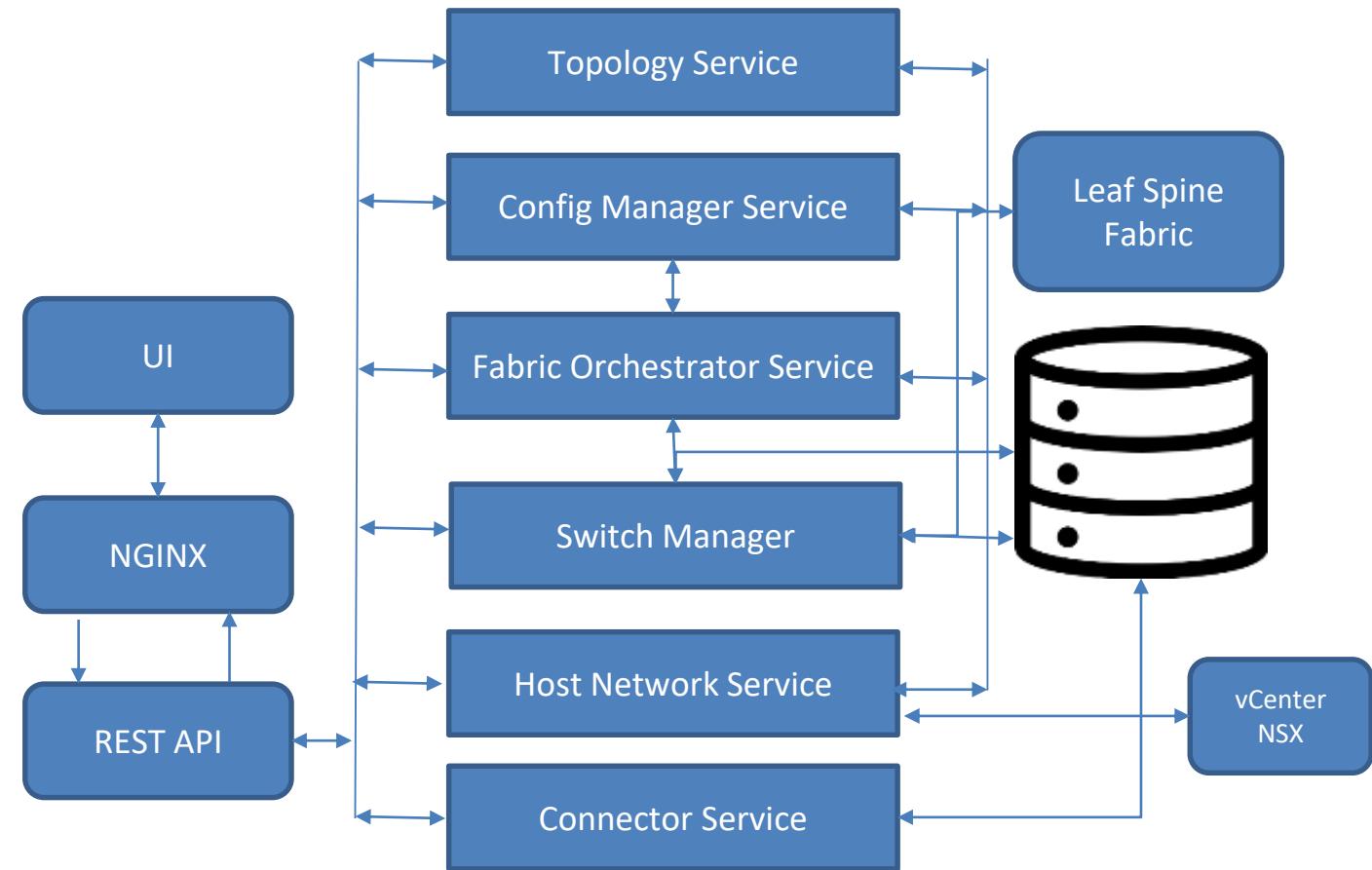
Solution

- Calsoft helped the customer with feature development for network configuration and underpinned:
- Developed UI and backend features like:
- Multi-tenancy
- Import/Export Host Networks
- Edge Links/Edge Peers
- DHCP
- Auto Discovery (AD)
- Upgrade module: SFD upgrade from one version to new SFD
- Upgrade and restore back-up job with maintenance app
- Restore and back-up job
- Topology configuration for BGP EVPN FI type and L2, L3 types
- Monitoring page API integration
- VM-Manager configuration for FI in Service
- Associate/Disassociate VM according to L2,L3 FI type
- Planned and provided bug fixes in every release
- Bug fixes for critical customer issues
- Code review for complex changes



Technology

Backend: Java, REST Web Services, Swagger, Google RPC aka grpc, Python, ElasticSearch, Mockito, Maven
Front-end: Angular, Clarity Framework, Jasmine Karma



Benefits

- Better UI
- Helped customer in achieving milestones in stringent timeline.
- Critical bug fixes on time

NOC: Network Monitoring, TACACS, Network Diagrams (Visio)



Engagement

Calsoft engaged with the customer for providing a 24*7 NOC. The aim was to provide support for Network monitoring, Terminal Access Controller Access Control System, Network Device Replacements, Network mapping diagrams, and Inventory Maintenance & Management.



Solution

Calsoft helped the customer with 24*7 NOC support and the engagement underpinned:
ACCELOPS - Network Monitoring and Configuration Backup Tool

- Monitoring of network and keep the configuration backup of each network device
- Periodic checks of the network device configuration and compare it against the saved data. In case of difference the new config with a new version number is maintained and also generates an incident on its dashboard about the change.

Terminal Access Controller Access Control System (TACACS+)

- Determine user network access via remote authentication server communication.
- Provides a single password file for all the approved users.
- Provides authentication, authorization, and accounting for all connected users.

Network Diagrams (Visio):

- Keep track of new deployments
- Creation of the network diagram and its upgrade.



Technology

- Security Information and Event Management (SIEM)
- Access Control Server (ACS)
- Visio, Routing & Switching, Load Balancing



Benefits

- Better Planning, Organizing and Controlling
- Centrally manage and secure network devices
- Better performance and availability monitoring
- Better data flow for Infrastructure Management

Implementation and support for Red Hat OpenShift Container Platform (RHOPC)



Engagement

Calsoft was engaged with the customer to implement and support Red Hat Openshift platform on top of bare-metal servers in their customer's datacenter.



Solution

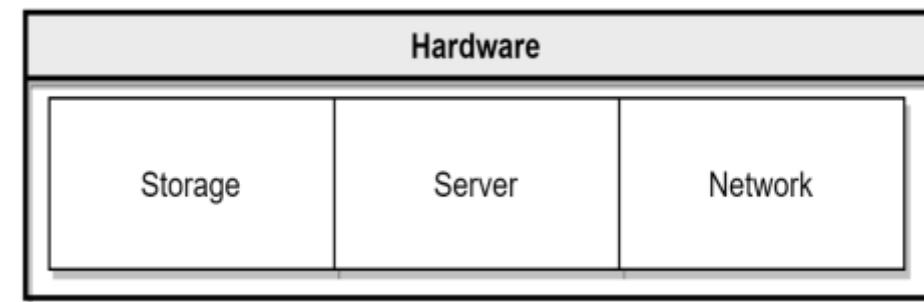
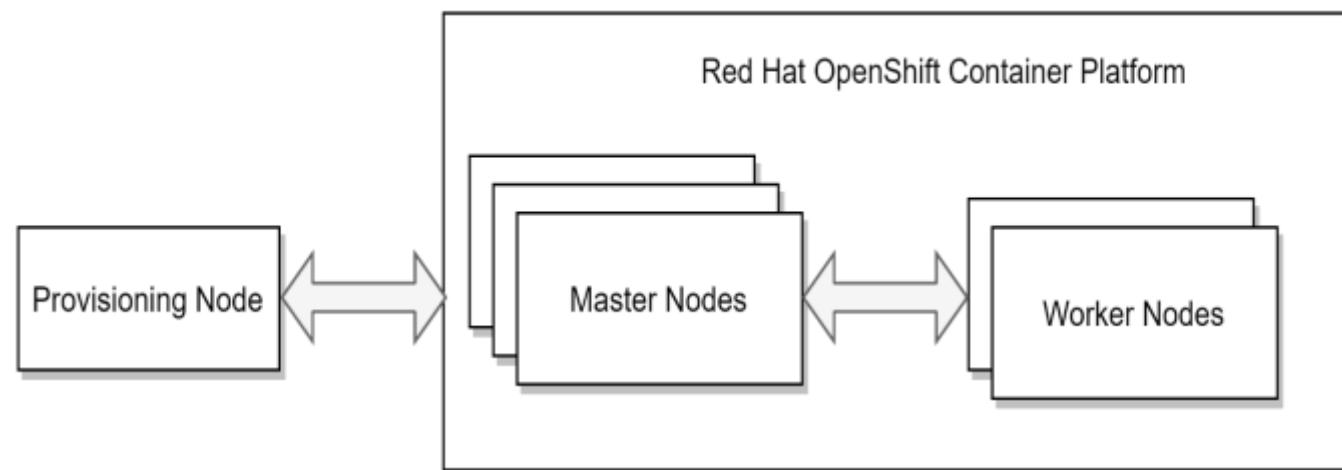
Calsoft helped the customer in implementation of RHOPC and the engagement underpinned:

- Deployed and configured RHOPC on bare-metal (Greenfield installation)
- Configured 10 additional Operators on RHOPC
- Deployed and configured Function as a service based on RHOPC and Knative
- Used CEPH storage as persistent storage volume for RHOPC
- Leveraged Existing AD, DHCP, DNS, NTP, LB from customer premises for this environment and helped in integrating required integration.
- Provided training to customer to manage the setup.
- Post implementation, provided one year support to vendor's customers.



Technology

RHOPC, AD, Greenfield, DHCP, NTB, DNS



Benefits

- Better customer experience cause of support.
- Performance enhancement

Ookla software deployment on PCS cluster with HA

Engagement

Calsoft was engaged with the customer to help their service run as part of HA cluster. The service is developed by Ookla

Solution

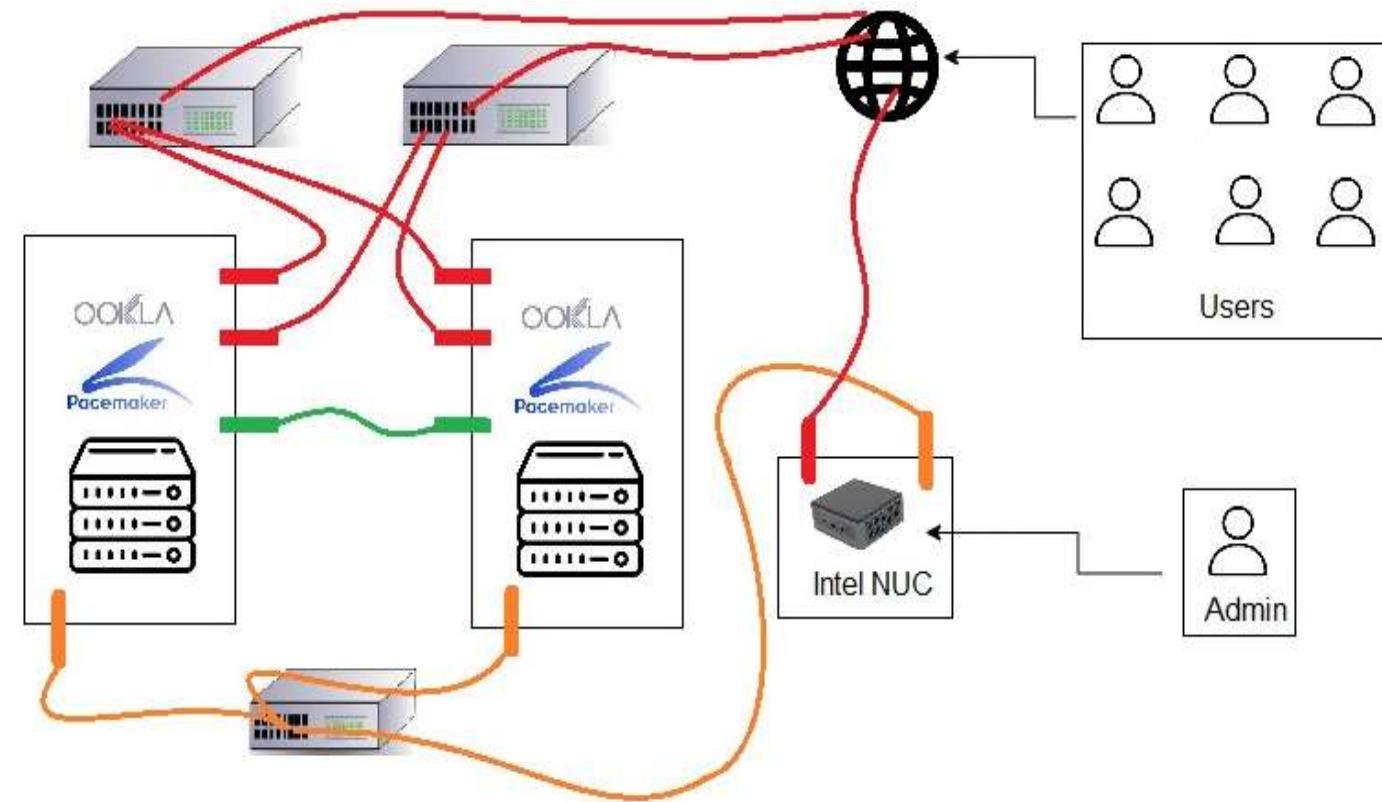
Calsoft helped the customer to run their services on HA cluster. The service is hosted on publicly available servers on the internet and needed to be hosted on multiple publicly available sites

Project was executed in 3 major steps:

1. Identify: Identified correct configuration for clustering services to run custom Ookla services on top of pacemaker PCS cluster
 2. Verify: Performed multiple tests along with NIC bonding, failure scenarios, recovery scenarios, individual NIC, performance checks, etc.
 3. Deployment: Ansible automation script for deploying components of the clusters automatically.
- Also helped customer in:
 - Assisting on physical cabling requirements.
 - Firewall configuration for publicly reachable servers
 - Backup mechanism in case of restoration using Intel NUC.

Technology

Ansible, pacemaker pcs cluster, Networking



Benefits

- Seamless speed test service exposed to public
- Significant reduction in Time required to setup individual sites Ease of management in case of failures
- Performance boost since new gen HPE servers deployed on all previous sites

Server Firmware automation

Engagement

Calsoft was engaged with the customer to upgrade firmware of multiple HPE servers, which vary across different generations of hardware / models.

Solution

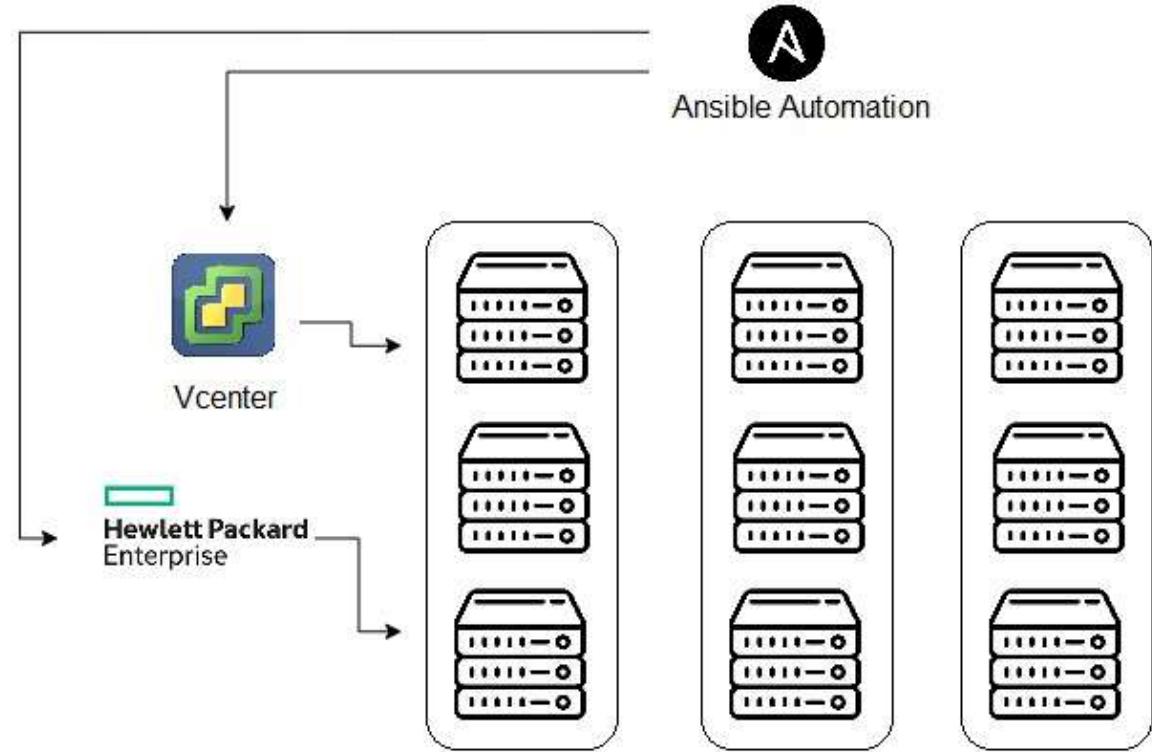
Calsoft helped the customer in creating an automation framework, which further performs firmware upgrades for Administrators.

The solution, implemented in Ansible, integrates below components :

- Vcenter –
 - To interact with ESXI clusters / VMs / Migration of resources. Ansible scripts perform operations such as migration / downtime / upgrade VIB etc.
- HPE One View –
 - Helps in listing hardware details such as current firmware, available firmware, etc.
- Ansible –
 - Allows configuration of intended servers, gives users downtime window for any additional manual tasks being performed on case to case basis. Verifies pre-requisites and post-upgrade checks

Technology

Ansible, Vcenter, Vcenter modules – PyVmomi, HPE one view Ansible modules & Rest APIs



Benefits

- Easy upgrades at any moment of time
- Better monitoring with reports on failure

Monitoring and Ticketing tool integration



Engagement

Calsoft was engaged with the customer to help integrate multiple monitoring tools like VeeamOne / HPE One View / HPE Info sight with ticketing system to help and ensure NOC team takes corrective measures based on the issue reported.



Solution

Calsoft helped the customer to integrate monitoring tool with ticketing system and the engagement underpinned:

- Calsoft developed scripts/services which monitor these tools using their individual mechanisms and send out tickets to a common ticketing tool called Autotask.
- Helps in mapping / business logic between alarms and actual ticket which NOC will work upon
- Incident created in case of alerts.

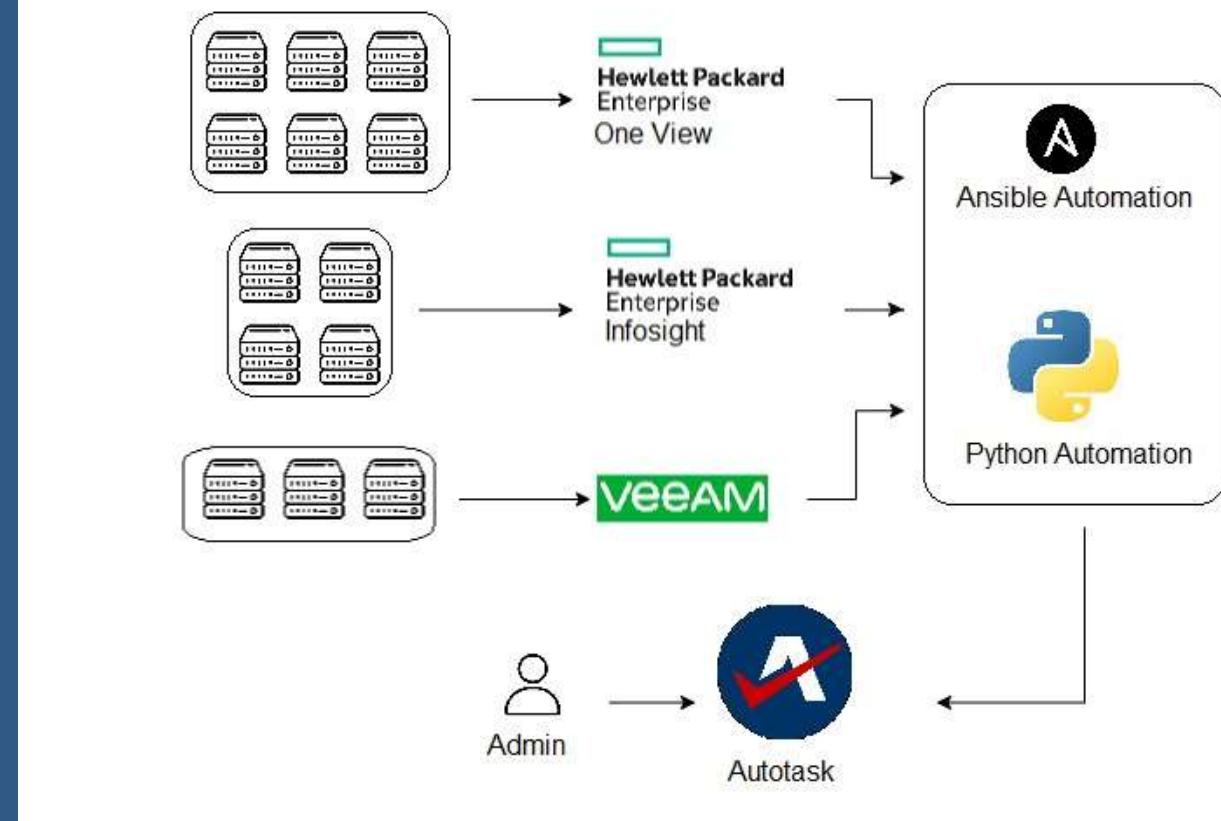
Below were the Components used to connect with Autotask.

- VeeamOne – inbuilt PowerShell script mechanism to trigger Ansible scripts
- HPE One view – Rest APIs
- HPE Info Sight – Rest APIs, Selenium
- Autotask – Rest APIs for creating tickets



Technology

Ansible, Python, RestApis, Selenium



Benefits

- Single pane of glass for all infrastructural issues
- Enhanced monitoring and better problem fixing.
- Less TAT.
- Better Scalability in case different monitoring tools come up in future

Tool development for ODL

Engagement

Calsoft was engaged with the customer for development of tool to enable compatibility of ODL for client's network switches

Solution

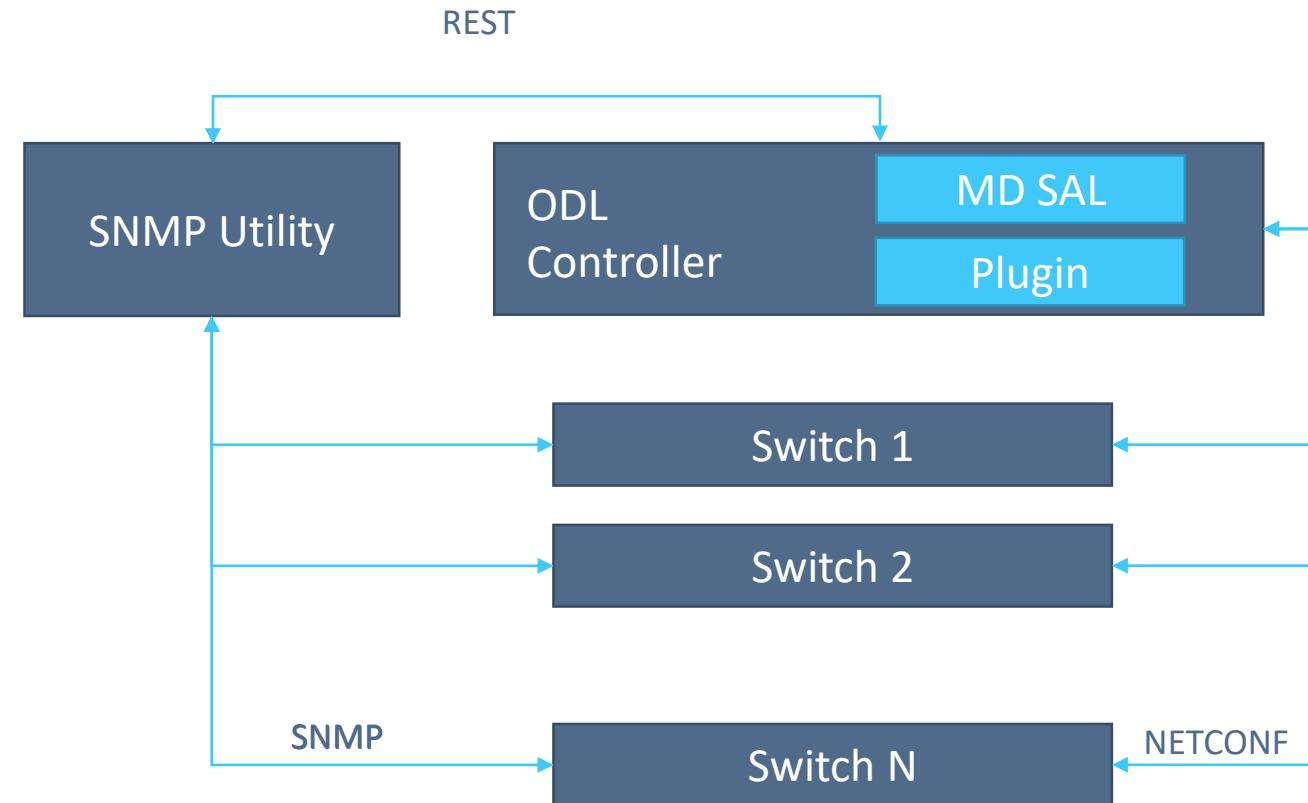
Calsoft helped the customer in design and development of SNMP tool which can help them mount/unmount SNMP based switches.

The Tool helps in:

- Bridging gap between ODL and customer switches.
- Getting SNMP Traps from switches and process it which mount these switches on ODL by calling REST API's.
- Providing scope of further additional features.
- Verifying the ODL integration with customer netconf devices.
- Verifying MPLS L3VPN service using multiple protocols such as OSPF, ISIS, BGP.
- ODL migration and compatibility from Carbon to Magnesium & Aluminium for customer devices support.
- Fetching LLDP topology details from customer devices using netconf and rendering topology on UI.
- Preparing Day0 config for customer devices using ansible for ZTP support.
- Standalone UI integration with ODL and support interaction with ODL, kibana ,ODL restconf and rendering network topology.

Technology

- ODL(Open day Light), Java, SpringBoot, Gradle, SNMP, REST.
- MPLS, L3VPN, ISIS, BGP, OSPF



Benefits

- Decrease in time consumption for outing with ODL and configuring multiple devices.
- Better UI for network management

New plugin support EMC Unity array(NAS)

Engagement

Calsoft was engaged with the client for development of plugin to extend their existing Backup and restore framework to support new EMC Unity array which is based on snapshot backup and restore for NAS protocol.

Solution

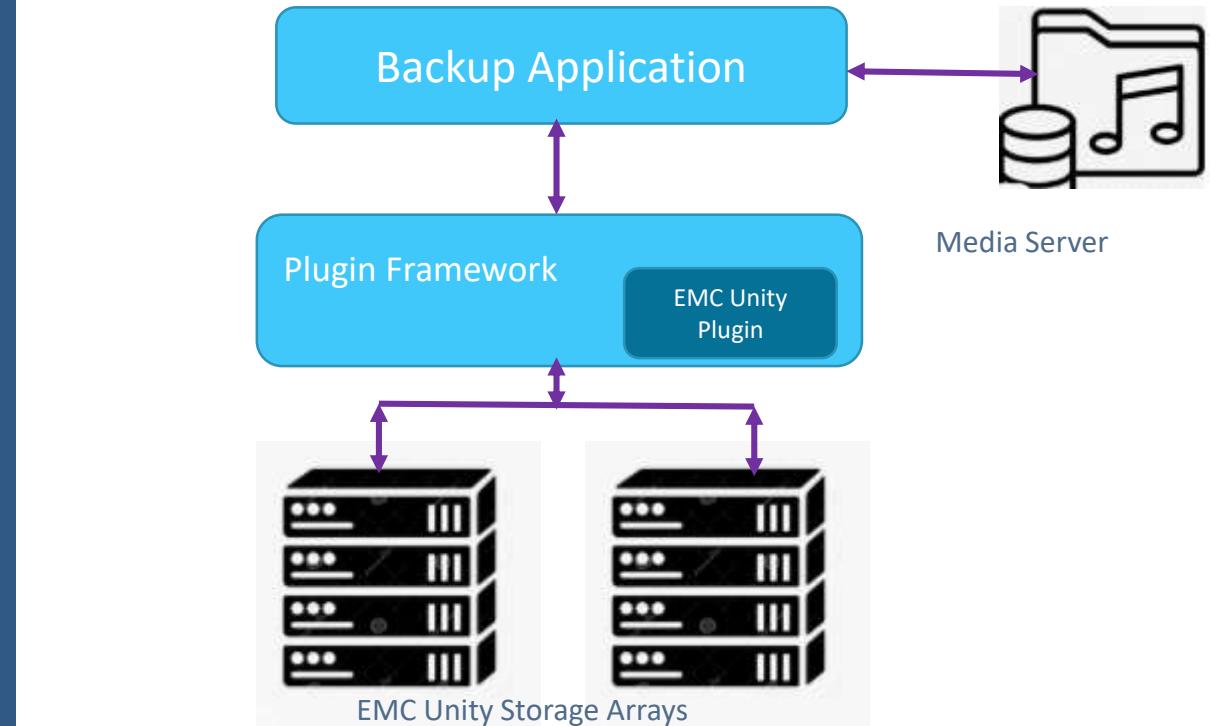
Calsoft was involved to explore the SDK that perform the required operation on EMC unity array of supporting the snapshot based backup and restore helped in supporting below operations and incorporated the action in new plugin.

- Identified the NAS entities.(NAS server, FileSystems, Fileshare-NAS/SMB)
- Identified the snapshot and relationship between Snapshot and File share
- Export the snapshot to Backup application by creating the fileshare from created snapshot
- Deport the exported fileshare once the backup is done
- Delete and restore the snapshot

Calsoft also worked on IPv6 support of same plugin and executed the QA activity as well.

Technology

- Python, storops-sdk, Docker, NAS (NFS and SMB), IPv6



Benefits

- Capability to support new array EMC unity NAS for snapshot base backup and restore

Tool development for Network service orchestration

Engagement

Calsoft was engaged with the customer for development of network service orchestrator to orchestrate transport network,L3VPN and L2VPN.Develop and improve NSMO GUI, ELK and log stash for single point of network monitoring and configuration.



Solution

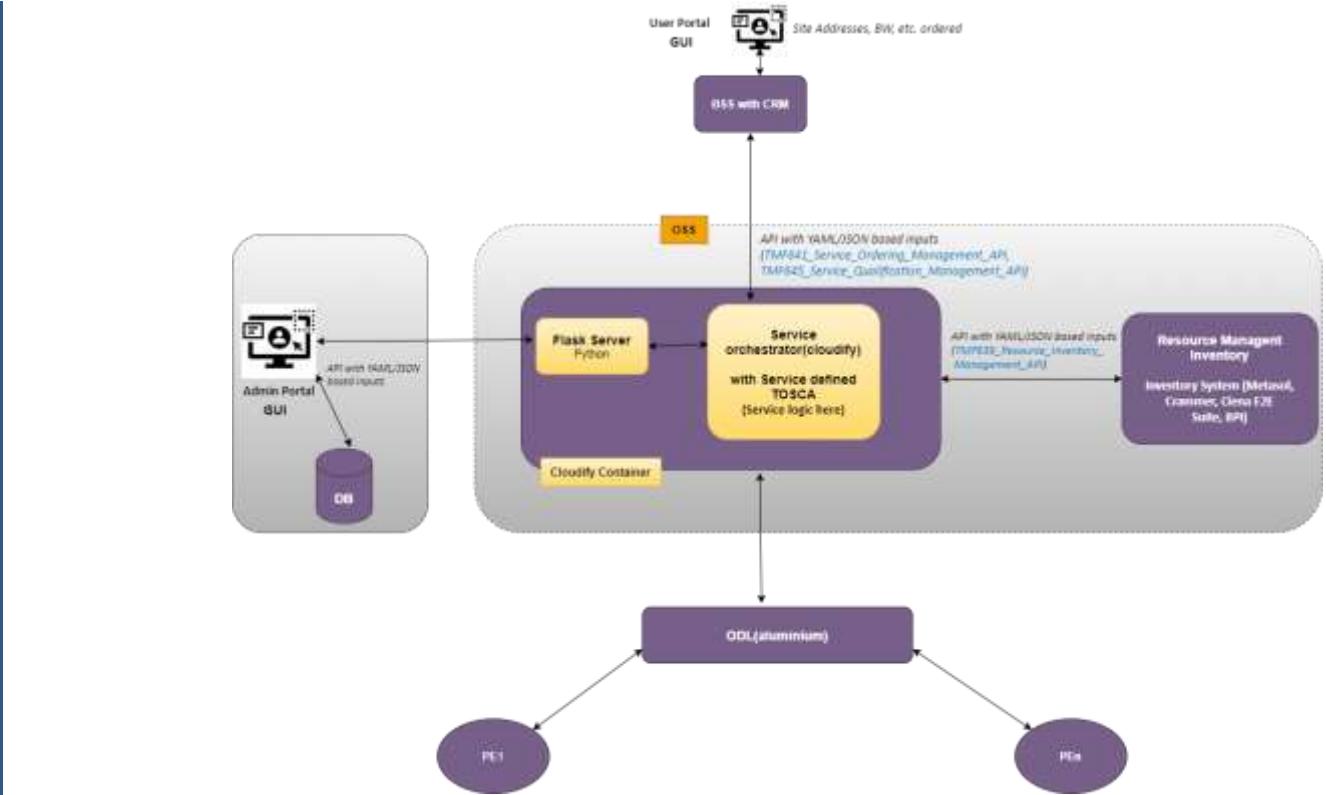
Calsoft helped the customer in design and development of service orchestrator, ELK, log stash and NSMO GUI which can help them to provide central network configuration and monitoring of ocnos switches:

The engagement underpinned:

- The Tool which was developed helps in:
- Orchestration of transport network,L3VPN and L2VPN services.
- Orchestrator send REST API request to ODL based on workflow defined in Cloudify and then ODL will do configuration of network services.
- Further we will add other network services like VPLS by adding workflow into orchestrator.
- Verifying the network services configuration on network devices by using ODL API.
- 3D visualization of network topology and easy to navigate through topology by using NSMO GUI.
- User can mount/unmount device from UI and support for import/export of bulk devices.
- Preparing Day0 config for customer devices using ansible for ZTP support.
- Support for external application(Odl,kibana,restconf and ELK) integration in GUI.
- Visualization of devices statistics like protocol traps, interface traffic, fan and temperature on kibana using ELK.

Technology

- ODL,Nodejs,Vuejs,Javascript,Couchdb,ELK stack, REST.
- MPLS, L3VPN,L2VPN, ISIS, BGP, OSPF



Benefits

- Decrease in time consumption for network services configuration on multiple devices.
- Better UI for network management and configuration.
- Easy external application integration in GUI.
- By using ELK stack customer can easily fetch and monitor devices statistics.

Service Orchestration using ONAP



Engagement

- Calsoft is engaged with a network service provider company for developing network service orchestration use cases.
- Calsoft is responsible for building the ONAP platform and building service orchestration use cases on top of it. Calsoft is currently doing requirement analysis and feasibility study of customer requirements.



Benefits

- Network Automation: offers network automation capabilities, allowing operators to streamline and automate various network management tasks
- Service Orchestration: ONAP enables service orchestration, allowing operators to efficiently provision and manage complex network services
- A centralized platform to define, deploy, and monitor network services, simplifying service delivery and accelerating time-to-market.
- network virtualization, enabling operators to leverage software-defined Networking (SDN) and network functions virtualization (NFV) technologies.
- Ecosystem Collaboration: ONAP fosters collaboration within the networking industry by bringing together a diverse community of vendors, operators, and developers.
- Promotes the sharing of best practices, accelerates innovation, and enables the development of standardized, interoperable solutions.



Technology

- Java, Ruby, Maven, Github, Docker, Kubernetes, Helm, Netconf, Cassandra, ELK Stack, Consul



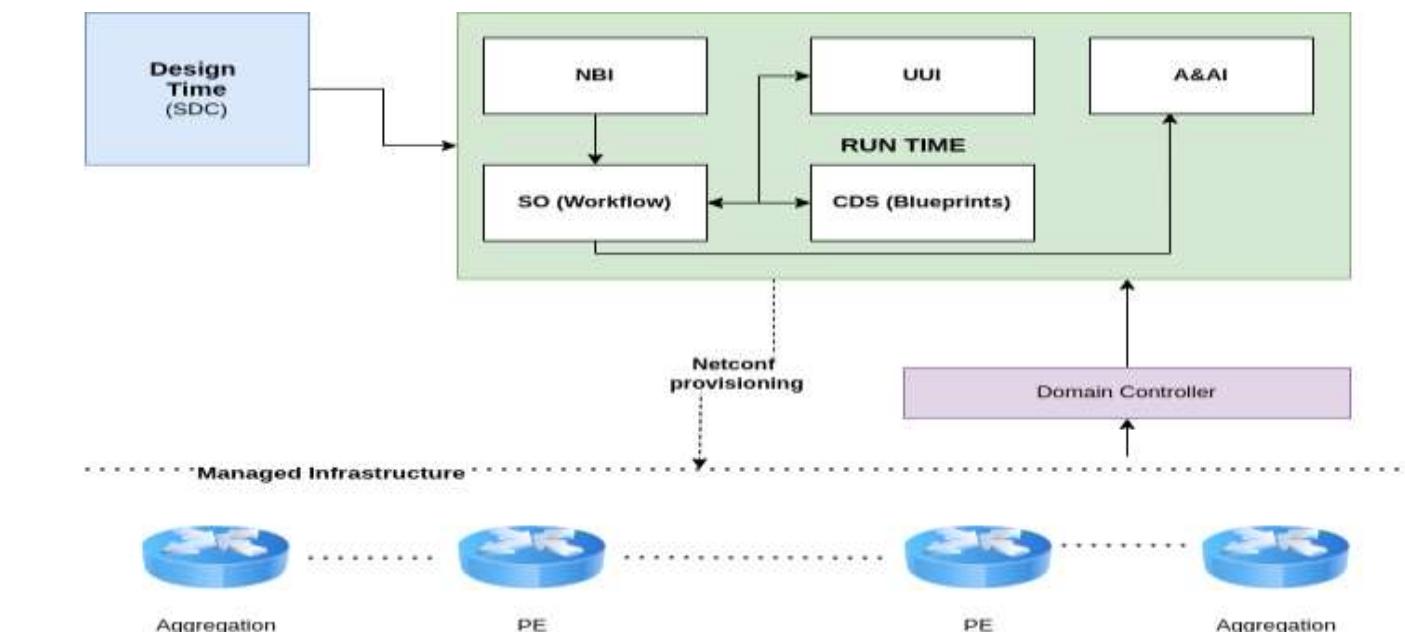
Solution

Development

- Engaged in developing Ethernet BoD service use case.
- Develop and configure consul monitoring tool to ensure ONAP services monitored in real-time.
- Written BPMN workflow and CDS blueprints for service orchestration

Features

- Engaged in setting up ONAP platform (Jakarta release) with required components. (OOM & Online platform, AAF, AAI, CDS, SO, SDC.)
- Upgrading platform with latest monitoring tool ELK stack and consul



Elevate membership – Automatic workflow

Engagement

Calsoft was engaged to develop a UI wrapper for elevating permissions automatically to a specific group of people for a limited time.

Client wanted to auto approve requests for a certain set of individuals to get elevated privileges, for a limited period of time, with appropriate logging of events.

Solution

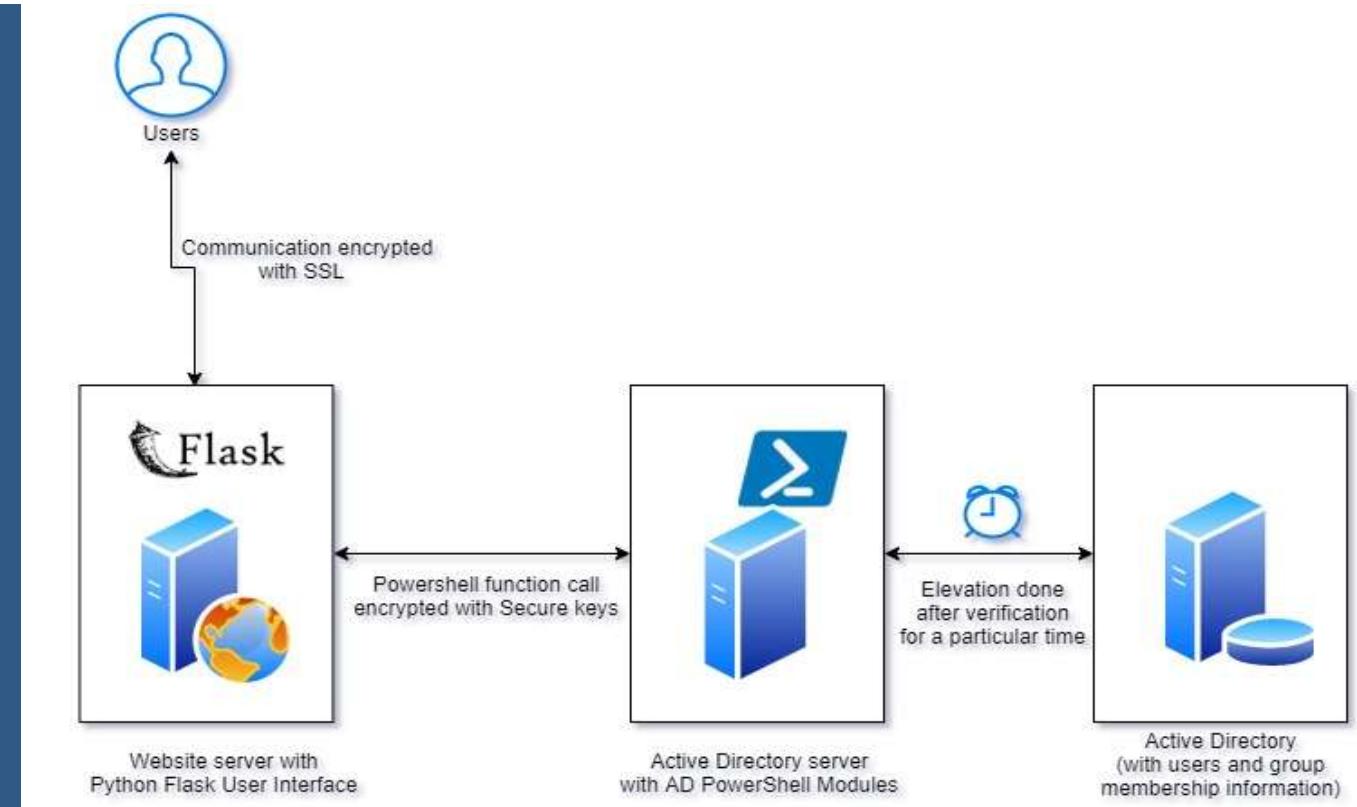
Calsoft came up with a secure workflow of overall scenario.

Calsoft designed :

- Group membership structure
- User Interface (Python Flask web application) for interacting with users
- Powershell commands for making membership changes to AD
- Secure mechanism for passwords/function calls to be encrypted
- Safety Logic – Exception handling to report unexpected behavior with effective logging with dashboard on UI.
- Overall solution hosting in public cloud

Technology

Python Flask, PowerShell, Azure



Benefits

- Customer does not have to approve each and every elevation request manually, saving time.
- Customer can do an effective logging as to which member has which rights from a single pane of glass, giving enhanced visibility at all times.
- Entire workflows is secured by industry best practices, ensuring security at all times.



Engagement

Calsoft was engaged with creating automation to eventually create multiple S3 buckets automatically.

Creating S3 buckets was a manual tedious process in Scality Ring, which coupled by different policies was an error prone task



Solution

Calsoft created a Django based web application to take multiple inputs from stake holder, about target bucket, such as retention policy, size, quota, etc.

Calsoft created automation to securely collect these data from end users and after various safety checks, proceed to interface with Scality component called Scality supervisor.

Eventually creating the target bucket on Scality Ring.

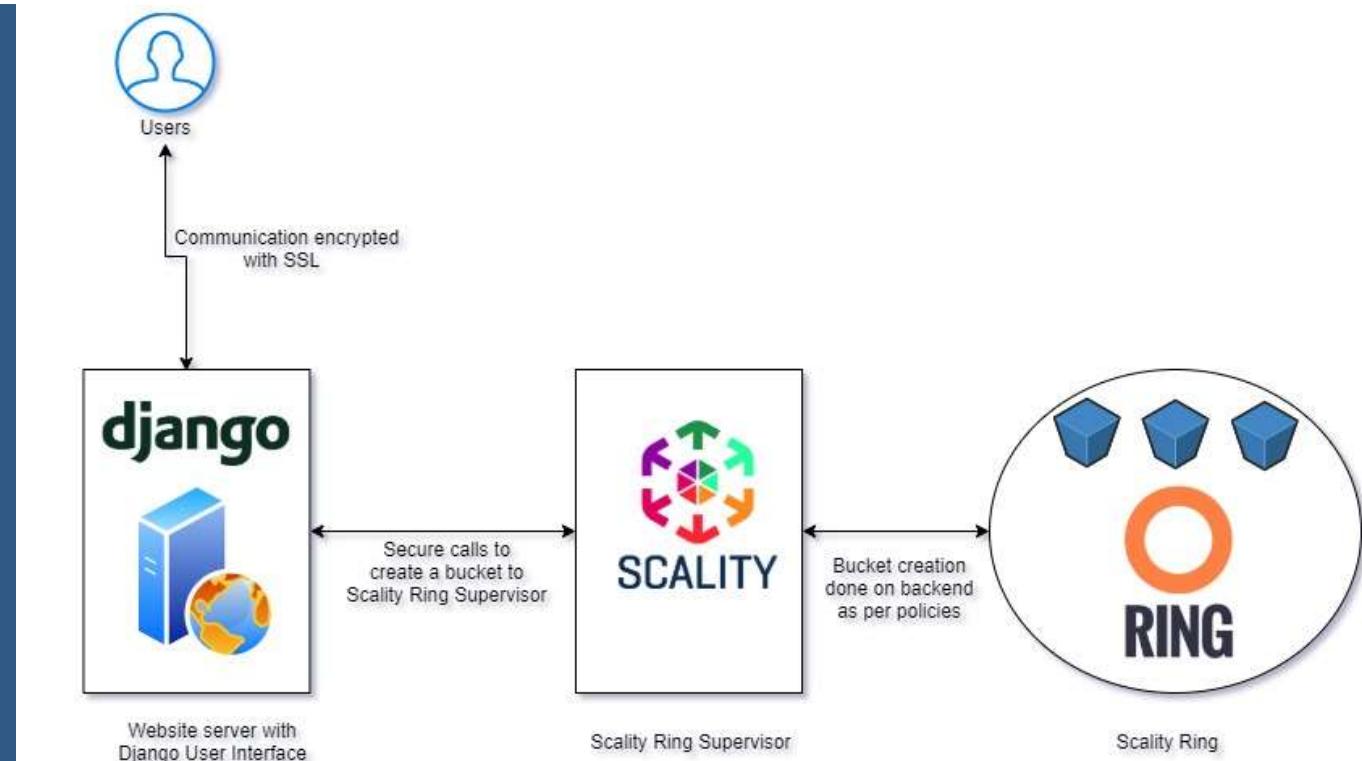
This module also verifies the bucket, logs all details, and provides keys to access bucket in a secure manner to required development team stakeholders.

This automation takes less than few minutes to create a bucket



Technology

Django, Python, Scality Ring, APIs, S3, Cloud



Benefits

- Time taken to create bucket reduced to few minutes, instead of hour.
- Efficiency due to safety checks ensure error free provisioning of buckets.
- Customer team can securely access this cloud hosted app

Cost Analysis Dashboard - AWS

Engagement

Calsoft was engaged to reduce/optimize cost of hosting components in Cloud infrastructure -> Primarily on AWS.

Client manages a wide range of AWS infrastructure and wanted ways to bring down hosting costs of different components – ec2, LBs, different tiers, SaaS, Databases, etc.

Solution

Calsoft provided a multiple phase approach to bring down costs.

Phase 1 – Calsoft developed a dashboard to list down current usage of components – doing a discovery on entire infrastructure, with additional details pertaining to tiers/ usage/ configuration

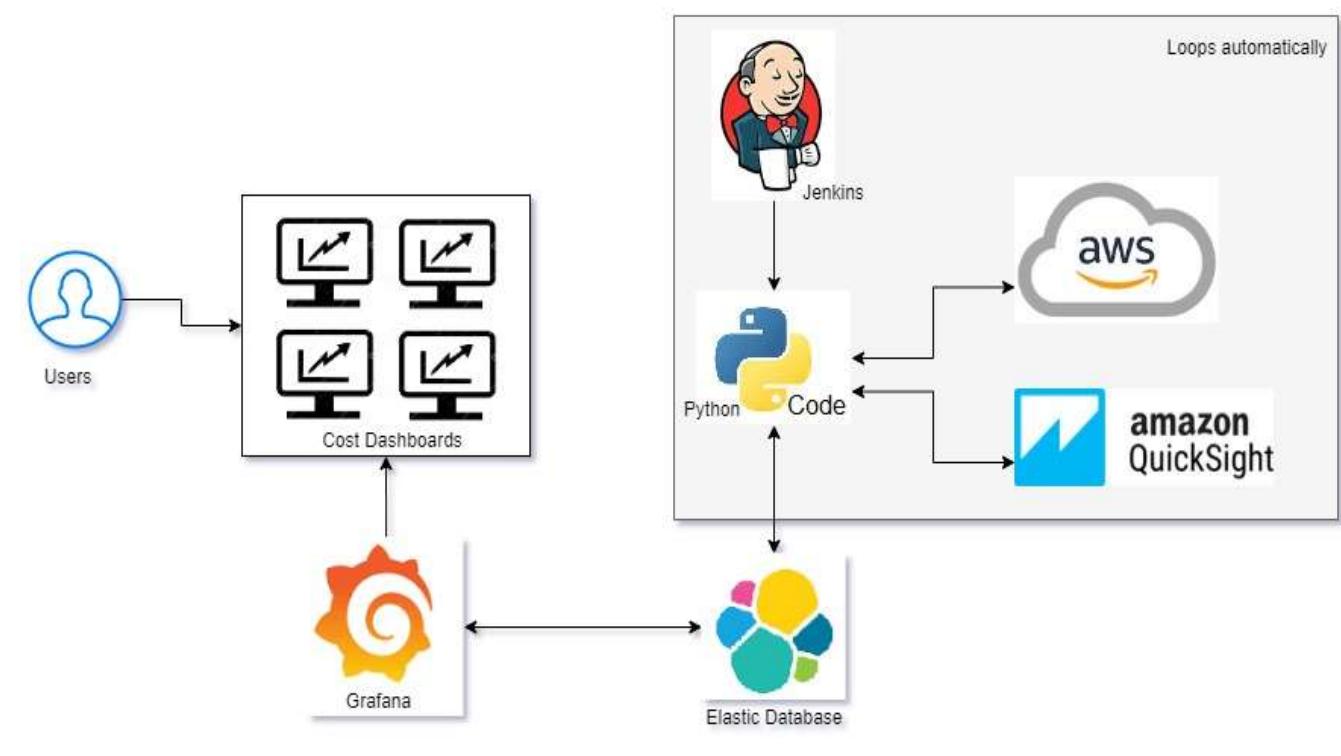
Phase 2 – Calsoft developed a dashboard to highlight the tier wise configuration based on parameters of the infrastructure, such as, Auto scaling, scale sets, subscriptions, etc.

Phase 3 – Based on Phase 2 findings, manual action items were highlighted and infrastructure was reconfigured with correct settings.

Based on Phase 1 findings, a near real time comparison was done for the specific infrastructure that was optimized

Technology

Grafana, Elastic, Python, Amazon QuickSight, AWS APIs, Jenkins



Benefits

- Cost savings -> Hosting costs drastically went down, without any impact on efficiency/uptime.
- Cost analysis -> Customer has a near real time view of hosting costs, from different sources, enabling customer in making an informed decision before changing any configurations.

Engagement

Client wanted to do inventory management for multiple assets but was unable to find an integration tool for flowing this data from their inventory tool to Jira.

Calsoft developed this automation and hosted it on cloud for securely transferring the inventory details to required Jira project, using JSM APIs

Solution

Calsoft hosted an SFTP server in Azure and worked with client to manually push CSV files (containing asset data), to the FTP bucket.

Calsoft also assisted in developing scripts for the end customer infra to automatically push their CSV files periodically into SFTP server.

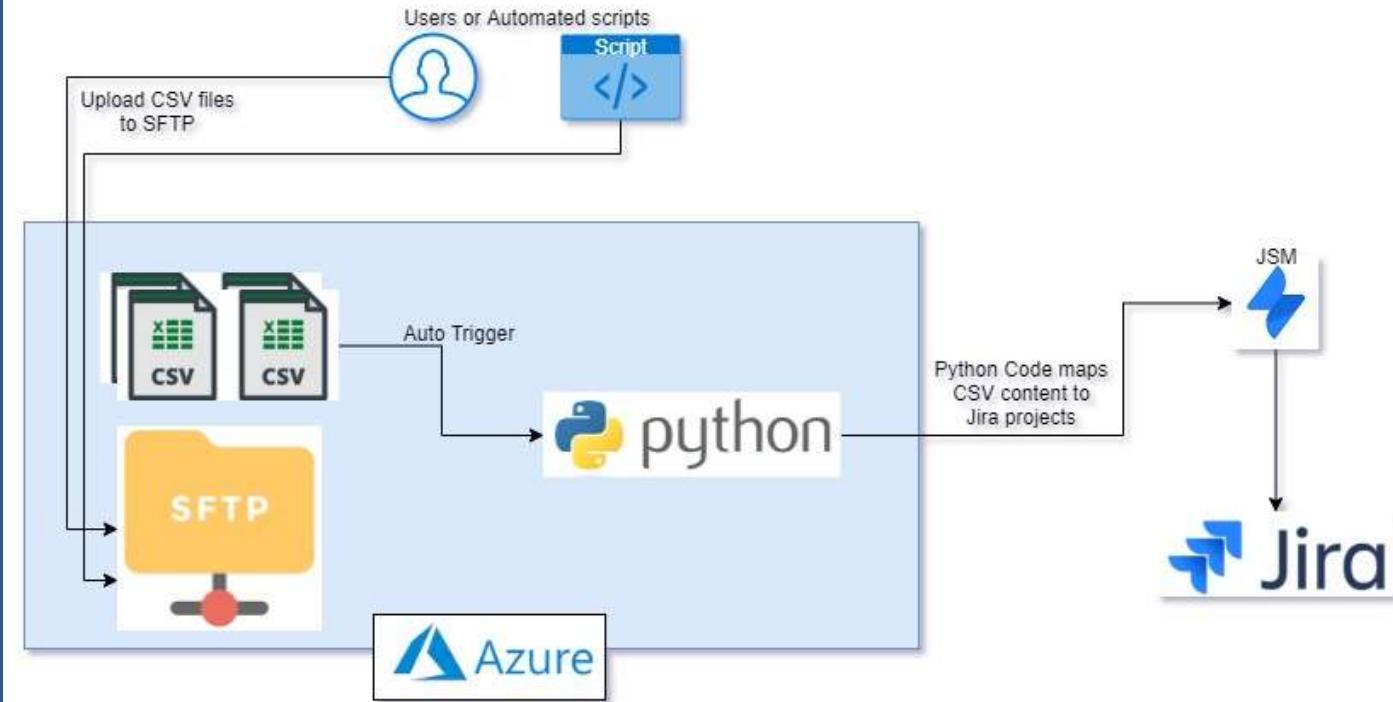
Calsoft developed code for mapping fields from CSV to asset attributes in Jira and called Jira Service Management APIs to push/update this asset info into Jira on regular basis.

Schedulers were used with smart logic to push data periodically and this entire module was hosted on Azure.

Appropriate logging/error message notifications were sent if the users / scripts upload incorrect files to FTP server.

Technology

Jira Service Management(JSM), Jira APIs, python, Azure



Benefits

- Customer has an automated way of flowing information to Jira, giving better control
- Multi Tenant capabilities to the python code, enabling a single hosting can cater to multiple clients with different SFTP/Jira
- Error notifications are sent to customers in case of bad data in CSV file. Previously customer would discover this manually in runtime, which was inconvenient.

Engagement

Client wanted to gain insights into their multiple big data clusters with 50+ nodes spanning each cluster.

Calsoft developed this solution and hosted it on on-prem server to gather server metrics and gain valuable insights.

Solution

Calsoft hosted an Grafana, InfluxDB, Elasticsearch, Telegraf installation on client provided Linux VM.

Calsoft also configured Telegraf to collect and store server metric from Collectl tool into InfluxDB for analysis.

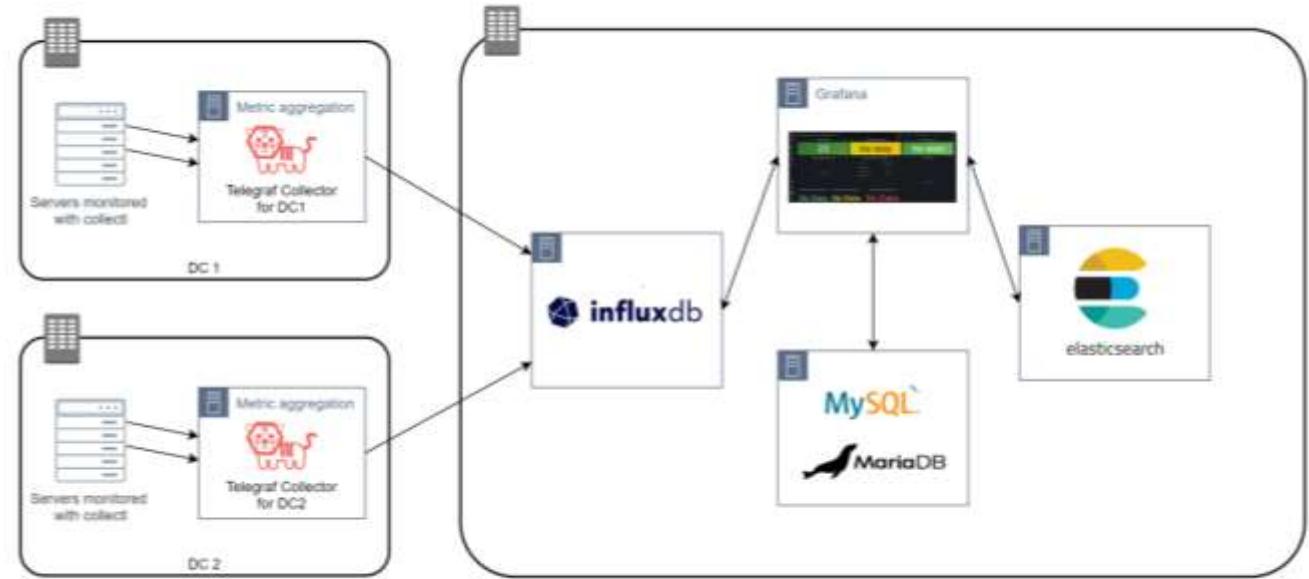
Calsoft developed multiple profiles that can works as alerts to cluster operators.

MySQL/MariaDB is used to store inventory data regarding clusters and hosts.

Ansible based installer is used for ease of deployment.

Technology

Grafana, Collectl, InfluxDB, Telegraf, Elasticsearch, Apache-Echarts



Benefits

- Customer gains insights into cluster from built-in profiles or can customize it accordingly.
- Customer has access to historical cluster performance metrics.
- Solution provides a Single-pane-of-Glass to monitor multiple clusters.



Engagement

Calsoft was engaged to add and monitor all backups/restore/replication jobs and its metrics into single Dashboard from below backup tools.

1. DELL DPA
2. IBM VDP(ACTIFIO)
3. IBMSP
4. AZURE-RSV
5. NETAPP
6. AWS
7. COMMVAULT



Solution

Calsoft helped the customer to integrate all backup/restore jobs from all tools into single dashboard.

we used different approach to collect all information into Elasticsearch DB.

DELL DPA/IBM-VDP/COMMVAULT –

To get backup details from this backup tool, Using selenium script we download CSV report of all jobs activity, then we parsed it.

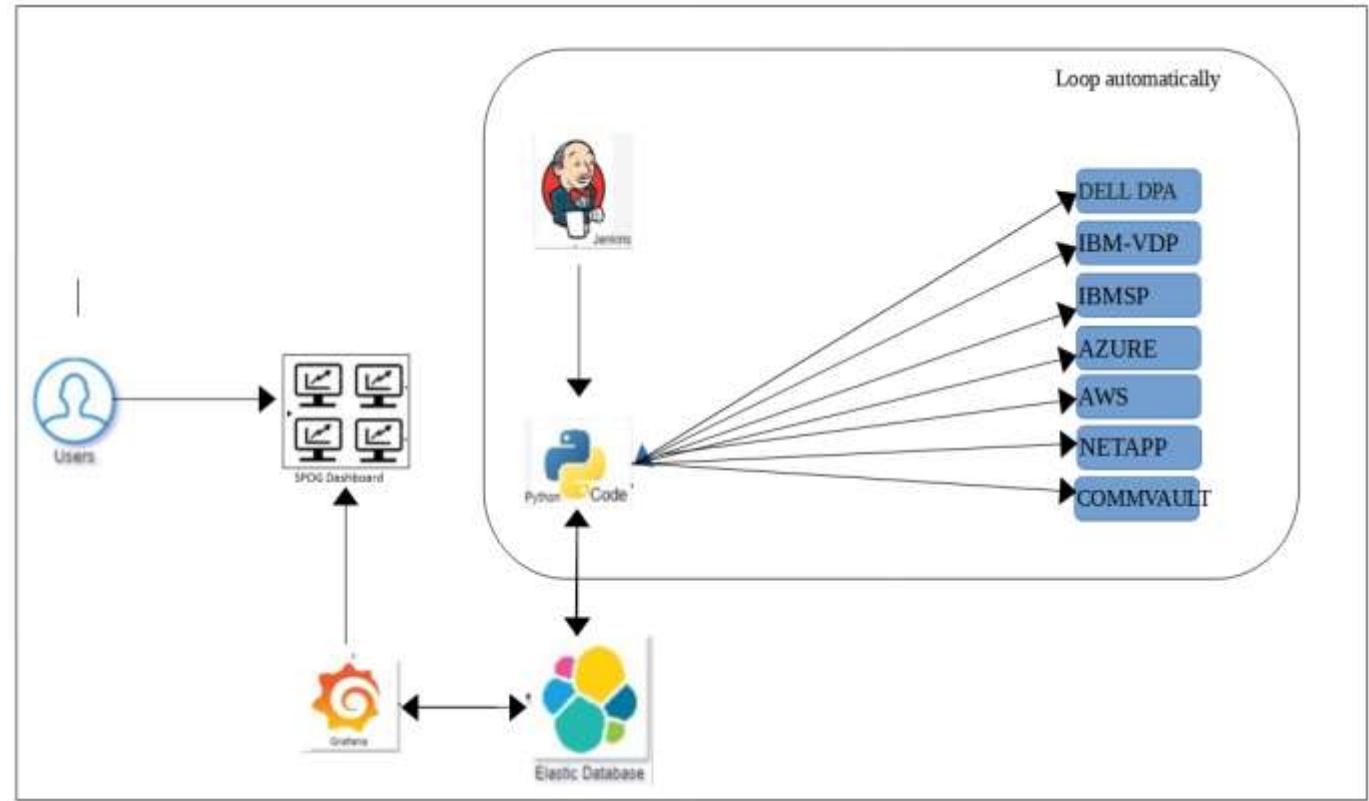
IBM-SP/NETAPP/AWS/AZURE -

To get backup details from this backup tool, Using CLI of respective tool we are collecting all information and parsing data to push it in Elasticsearch DB.



Technology

Grafana, Elastic, Python, DELL-DPA, IBMSP, NETAPP, COMMVAULT, AZURE, IBMVDP, AWS , Jenkins



Benefits

- SPOG Dashboard -
Single Dashboard for all seven backup tools to monitor backup activity and backup Infrastructure.
- No Need to login each backup tools separately for basic information of backup jobs.



**Success Stories:
NFV & VNF Experience**



Engagement

Calsoft is working on virtual router project to provide routing capabilities in virtualised environment.



Benefits

- The packets are generated using DPDK-PktGen which is configured for sending 64 Bytes UDP packets with a random source and destination IP. When Configured with 4 RX queues, Virtual Router is able to forward packets with 3 times more throughput compared to the forwarding in Linux Kernel.



Technology

- OS – Linux
- Language – C, DPDK
- Tools – Quagga



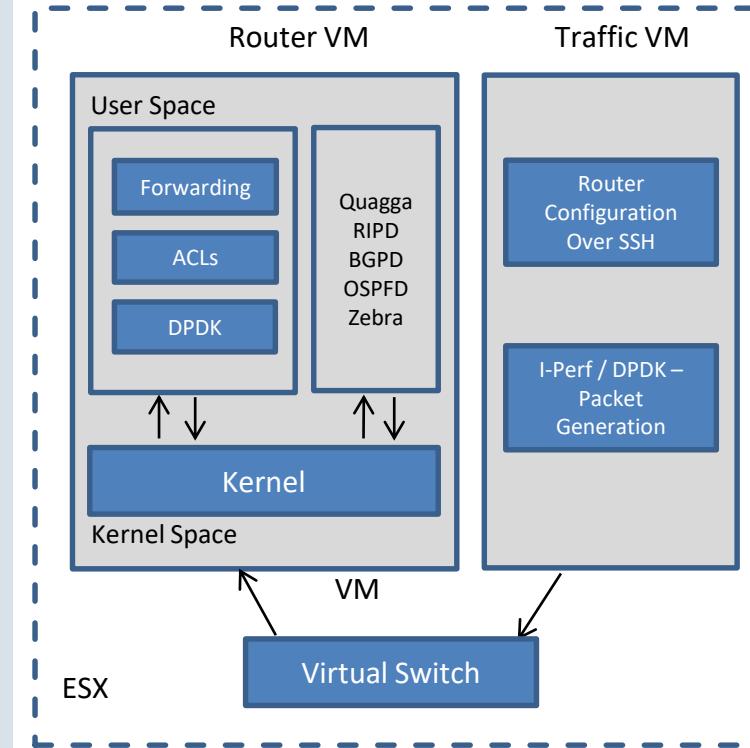
Solution

The forwarding path is optimized with DPDK.

- Routing services like OSPF , BGP etc. Are provided with the help of Quagga.
- Virtual Router has support of L3/L4 ACLs which can be configured with the help of CLI
- Switching many packets using the LPM algorithm
- Making this switching scalable with the possibility of adding more packet queues/CPU's

Calsoft's contribution

- Cloud image based on Ubuntu 14.04 with Virtual Router DPDK based application and Quagga.
- Ubuntu OS image is fully optimized to achieve highest throughput performance.
- Used DPDK optimized iperf tool for performance testing.



NFV: vRouter Integration with Openstack Tacker



Engagement

Calsoft is working on life cycle management of virtual router. Openstack-Tacker which implements ETSI-MANO architecture is used for this purpose. The vRouter will be spawned VNF service VM



Technology

- NFV, Openstack, ETSI-MANO, Network Virtualization, TOSCA

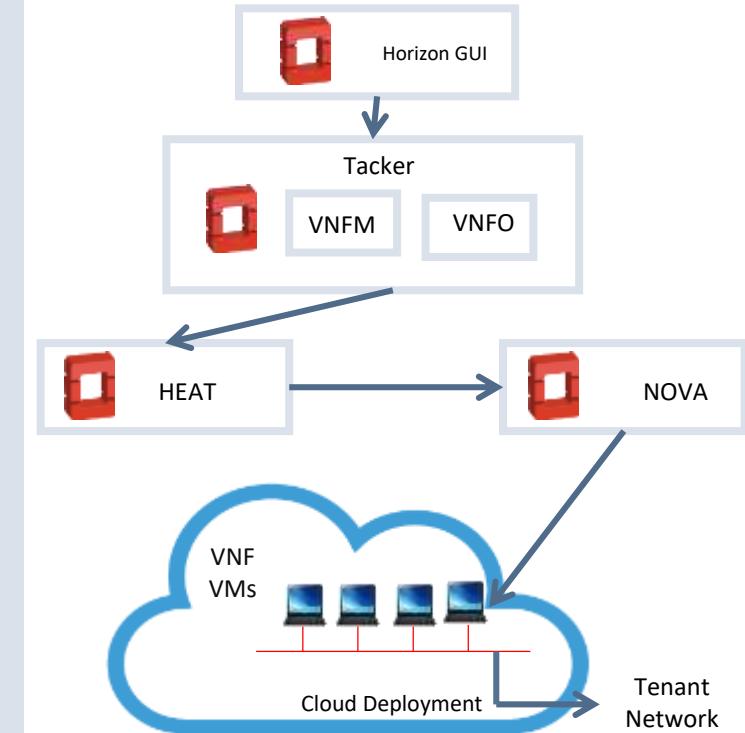


Solution

- Integrating vRouter with Openstack Tacker
- Openstack Tacker provides VFM manager and VMF orchestrator
- VNF manager can be used for life cycle management of the vRouter
- vRouter will provide virtual routing services like OSPF and BGP etc.
- TOSCA based catalogue templates are used to describe VNFD for vRouter

Calsoft's contribution

- Understanding Openstack Tacker architecture
- Integrating vRouter with Tacker
- Testing the functionality





Engagement

Calsoft is working on comparison of performance with/without DPDK of standard networking applications.



Technology

- OS – Linux
- Language – C, Python
- Tools – Wireshark

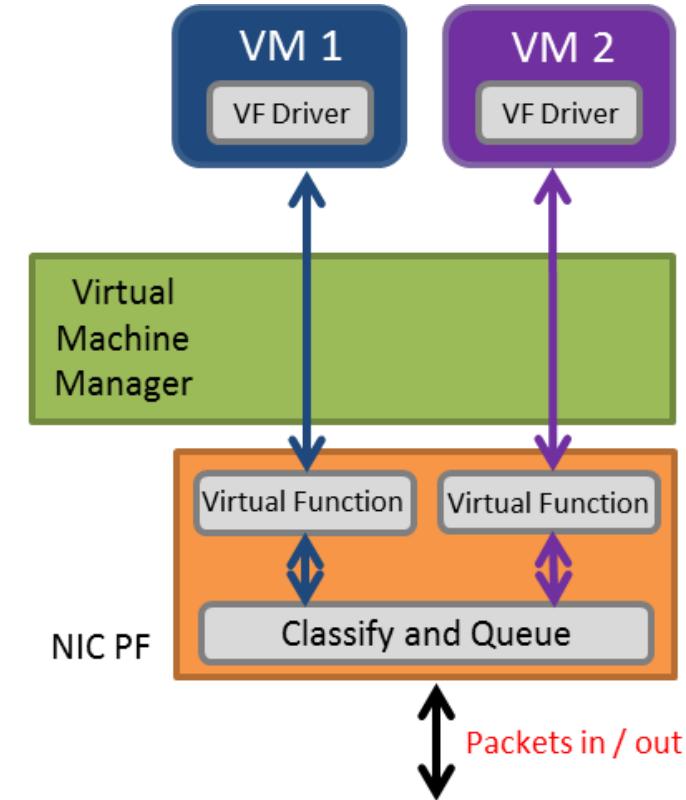


Solution

- DPDK, SR-IOV are integrated technologies which are used to boost the packet processing performance.
- Technologies like DPDK, netmap, SR-IOV are building blocks for NFV where every network function is run on a virtual machine of cloud or a data center instead of dedicated appliances.

Calsoft's contribution

- Understanding the HW level and SW level enhancements made to DPDK.
- This consists of PMD, Huge page map, dedicated libraries like timer, thread, LPM.
- Worked on DPDK enabled networking applications such as OVS, load-balancer, QoS scheduler and porting of custom applications like iperf.





Engagement

Calsoft is working on FreeSwitch project to provide VoIP capabilities in virtual environment or in Cloud Environment.



Benefits

- Cost Savings
- Easy Implementation
- Minimum Downtime
- Scalability
- Wide Coverage



Technology

- OS – Linux
- Language – C, SQL
- Tools – FreeSwitch

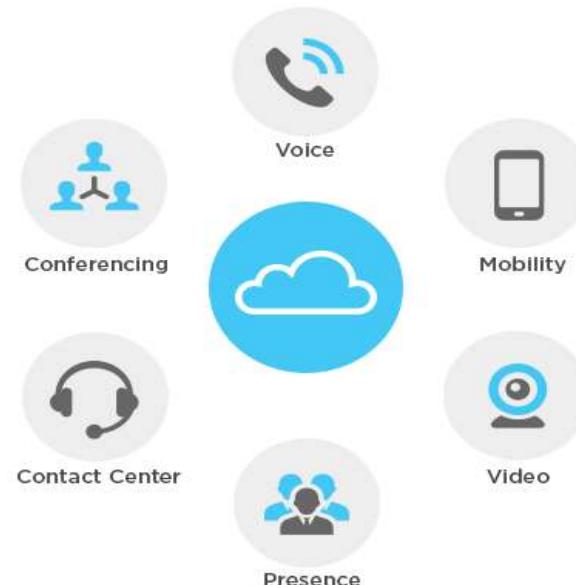


Solution

- FreeSwitch version 1.6.15 is used on Ubuntu 14.04 VM
- Deploying WebRTC to let the users use their browsers as VoIP clients;
- Setting up a static IVR;
- Programming the server to look up some databases before connecting a call;
- Queues, call centres, virtual assistants, etc.

Calsoft's contribution

- Cloud image based on Ubuntu 14.04 with FreeSwitch.
- Ubuntu OS image is fully optimized to achieve highest throughput performance.
- Tested with various open source VoIP clients.



SD-WAN Vendor - NSX Integration



Engagement

Calsoft is engaged with the client for providing a solution of NSX integration with SD-WAN Vendor product. The aim is to provide cost effective solution to large customers having one or more small Branch Offices, with NSX Deployed at the Head Office



Benefits

- Calsoft delivered the solution on time and without any customer tracking and monitoring, even though only requirement document was provided by customer.
- This was made possible because of in-house expertise available with Calsoft for Networking, VMware NSX, Java domain.



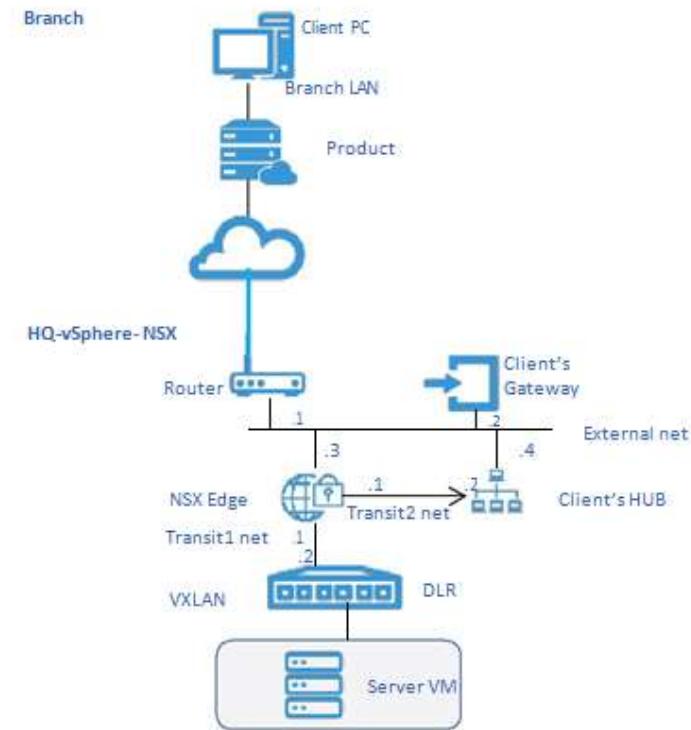
Technology

- NSX –V 6.2 , vSphere,
- and NSX APIs, Java, Maven ,
- HTML5, Networking (Routing)



Solution

- Successfully completed the feasibility phase and based on its study, developed a Plugin with below listed features :
- Installer
- Client's Hub and G/W Deployment & Configuration.
- NSX Edge Configuration (Configure Routing)
- NSX Config Change Monitor
- Third party service registration on NSX Manager
- Launch client Service from NSX Manager.
- Provision and Activate client Hub and Gateway using clients API's.





Engagement

- Automate Deployment of VMWare vCloud Infrastructure Platform for NFV.
- The deployment process should be based on VMware vCloud NFV Reference Architecture 2.0
- The Deployment automation should be done on customer's bare metal hardware
- Provide a framework to orchestrate the entire deployment



Benefits

- Drastically reduces the time taken for deployment of the NFV infrastructure
- Drastically reduce the professional service cost
- Besides production environment it also very useful in setting up lab for demos, PoC and testing environment
- Eliminate the human errors by using end to end automation



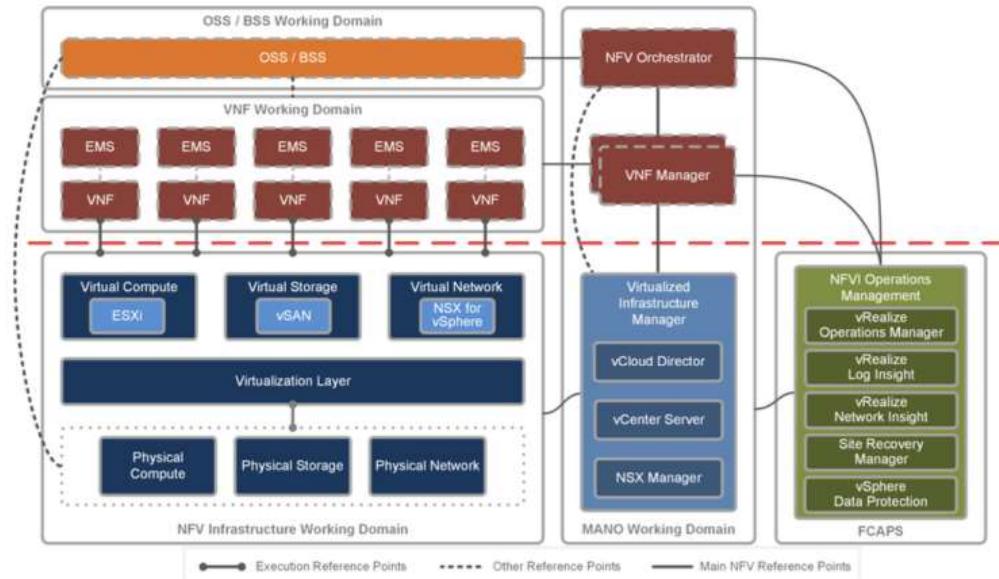
Technology

- NFV, VMware, Networking, Storage, Virtualization, Python, PowerShell



Solution

- Create a solution guide containing detailed steps for manual deployment and configuration of each components in NFV Infrastructure.
- Identify the feasible interface for automation for all the NFV infra components like ESXi, VCSA, PSC, vSAN, NSX, vCD, vRLI, vROPS, SRM etc.
- The feasible interface for automation can be REST api, CLI, Python SDK
- Using the identified interface automate the deployment and configuration of each component



Dell Red Hat Openstack Platform (RHOSP)



Engagement

Calsoft is engaged with the client in enhancement of the RHOSP based NFVi deployment automation.



Benefits

- Help in performance enhancement of the system via configuration management
- User interface enhancement for performance specific configuration management



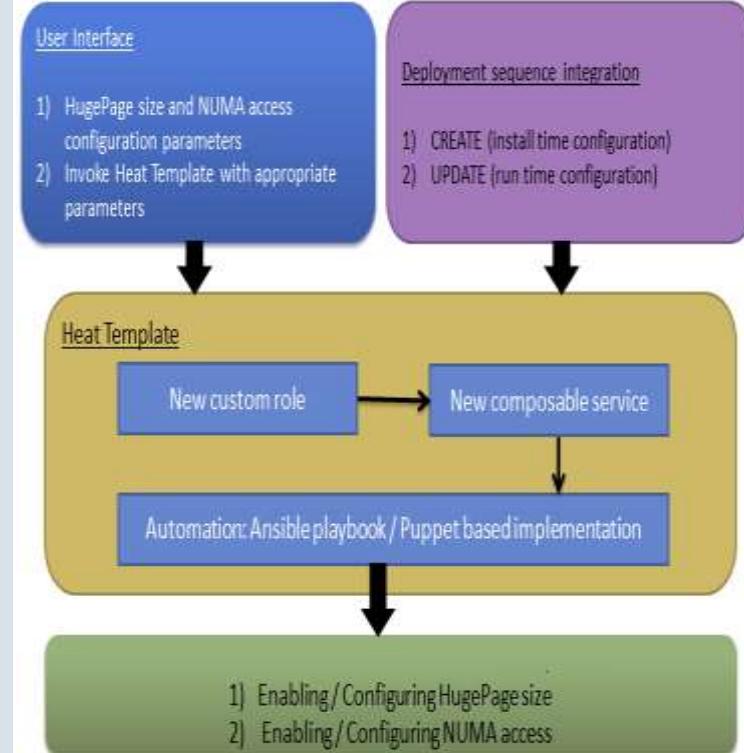
Technology

- Platform: RH Openstack
- Technologies: TripleO, Heat, Mistral, Ansible, Puppet, Python, ReactJS



Solution

- Understand the RH Openstack deployment environment for undercloud and overcloud deployment automation management
- 1. HugePages – Performance improvement by increasing memory page size
 - Configuration management
 - Integrating with automated deployment
- 2. NUMA (Non Uniform Memory Access) CPU Pinning
 - Updating CPU pinning to optimize performance
 - Integrating with automated deployment
- 3. Automated deployment management and Day 0, Day N-enablement of performance configuration management features



Reliance Jio: Wi-Fi Offload Solution



Engagement

- Design carrier class cloud controlled Wi-Fi offload solution for India's tier-1 4G operator



Benefits

- Operator can successfully manage Wi-Fi devices over the cloud and manage them centrally.



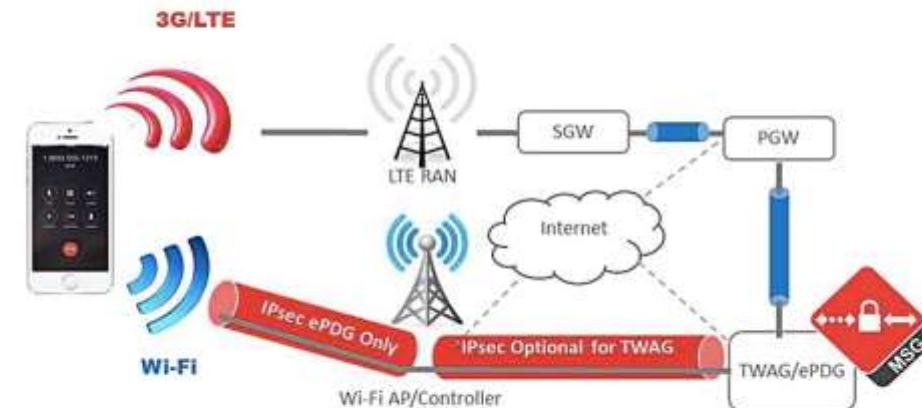
Technology

- VMware ESXi, vMotion, VMware HA



Solution

- Re-architected cloud managed WLAN solution to integrate with Telco's 4G network.
- Integrated the WLAN controller with operator's network elements for performance management, fault handling, analytics, device provisioning and seamless handovers with 3GPP network.
- Implemented high availability solution with use of VMware software solution for local and geographical redundancy (vMotion, VMware HA)





Engagement

- Create a virtualized LTE EPC and IMS network setup using open source EPC & IMS software. Set up end to end IMS VoLTE call and send voice packets between mobile subscribers. Also, do uplink and downlink data transfer over the EPC network for a packet data network (PDN) session.



Benefits

- We could demonstrate vEPC and vIMS setup on virtual machines and setup mobile subscriber data and VoLTE sessions.



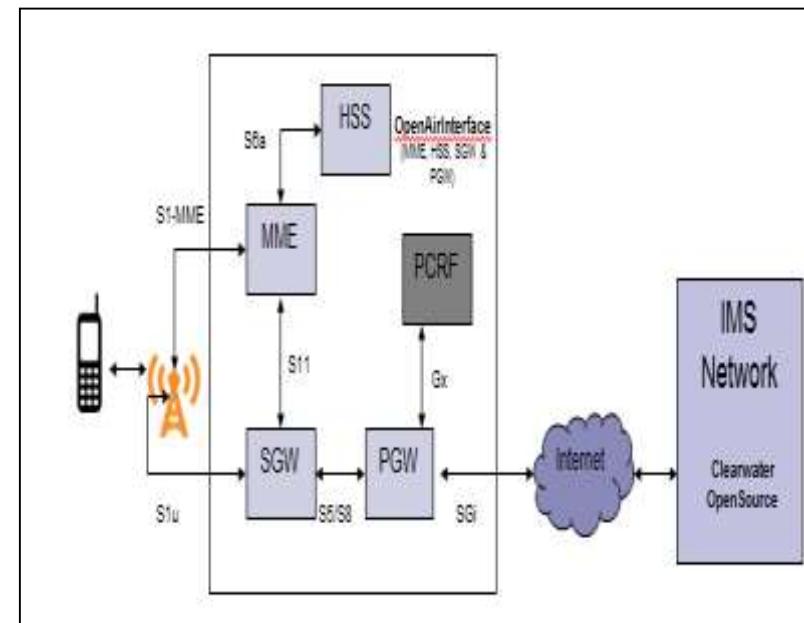
Technology

- Openairinterface vEPC, Clearwater vIMS, Zoipper SIP client,



Solution

- Used Openairinterface EPC software for MME, SGW, PGW and HSS. LTE eNodeb and mobile subscriber were simulated in software. IMS network was setup using Clearwater open source IMS solution.
- Setup a dedicated bearer for VoLTE session.
- The voice packets were transferred from the calling UE to called UE.
- Tested end to end EPC and IMS call flow. Performed EPC control plane testing and SIP signaling over the EPC network.



NFV Total Cost of Ownership Solution Design



Engagement

- Design solution to calculate total cost of ownership to migrate network services from proprietary hardware to NFV system for an ISP in India.



Benefits

- Migration to NFV based services involves adoption of new technologies that impact business aspects. Proposed design aids the client to create a NFV migration plan in terms of cost assessment, hardware & software infrastructure and skilled personnel.



Technology

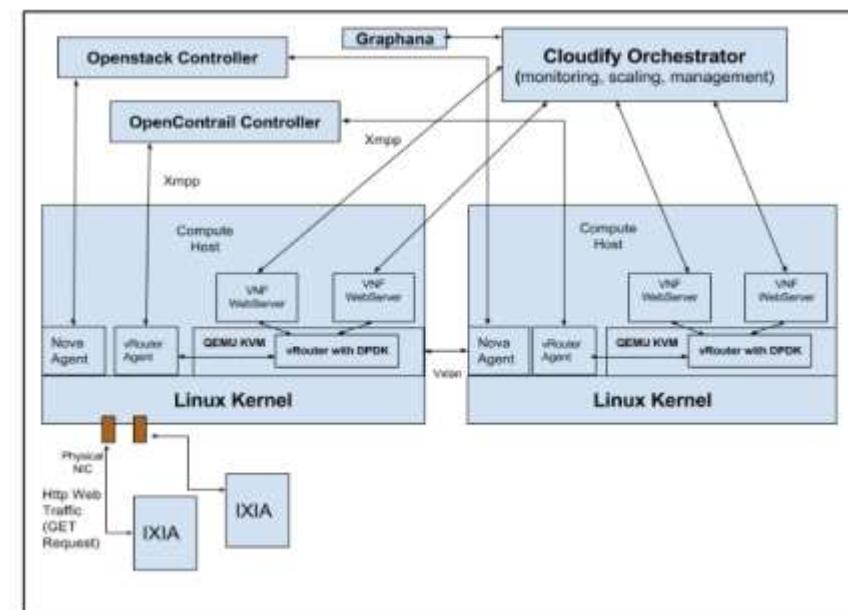
- Juniper OpenContrail virtual networking, Openstack Cloud, Cloudify Orchestrator, DPDK, IXIA Traffic generation tool, Ubuntu Linux, Graphana Visualization, KVM



Solution

Openstack cloud based solution with

- Virtual networking
- MANO orchestration
- Data plane acceleration
- Traffic generation tool
- Visualization tool



Performance benchmarking for the VNFs deployed on VMWare Cloud



Engagement

Calsoft is engaged with the client for testing VIO (VMWare Integrated OpenStack) platform for VNF deployment and performance benchmark testing.

- The engagement includes:
- Deploying NFV infrastructure including cloudify orchestrator and OPNFV test framework.
- Testing of VNFs on top of the NFV environment using OPNFV Functest test suites.



Benefits

- Benchmark results for VNFs and VIO running inside the NFV infrastructure.
- VNFs in the setup can be replaced to compare VNF performance and VIO infrastructure stability.



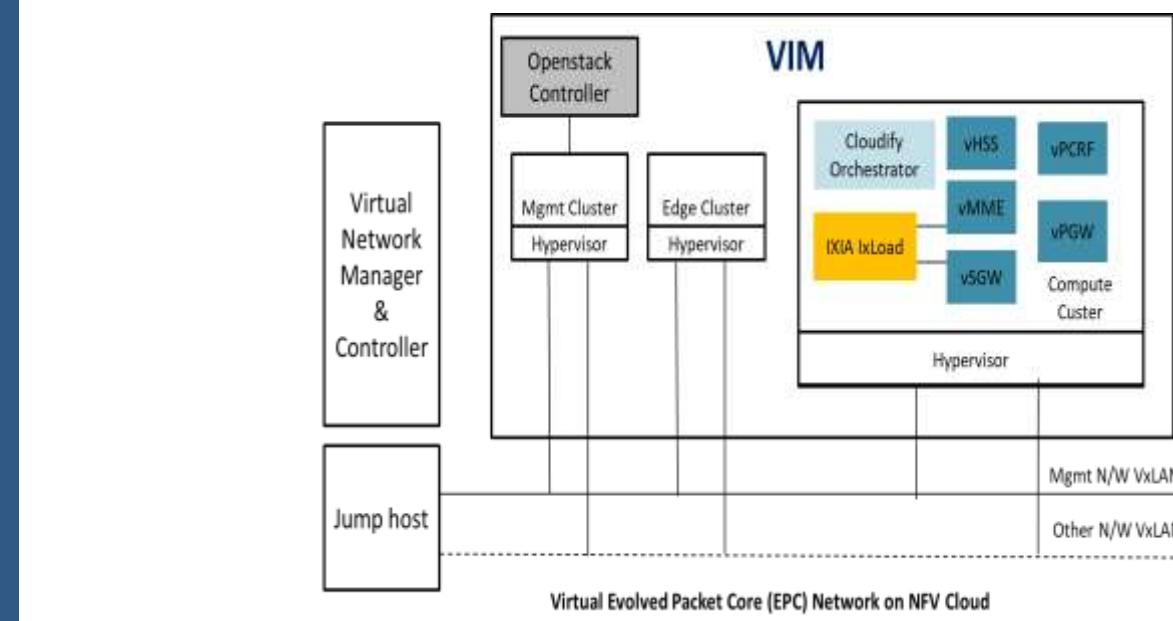
Technology

- MANO, VMware VIO, OPNFV, Cloudify, Functest
- Yardstack, Functest, Aodh, IXIA, SIPP, clearwater metaswitch, OAI EPC



Solution

- Deployed NFVi where underneath cloud is based on VIO. Also, added other MANO components, cloudify orchestrator and openstack controller.
- Deployed the VNFs for vHSS, vMME, vSGW,vPGW to create a EPC (Evolved Packet Core) network. The VNFs are bought from standard vendors.
- Deployed OPNFV Functest framework on a separate cloud environment which has direct access to VIM inside the deployment.
- Leverage OPNFV project tools like yardstick to test out the VNFs for performance, smoke tests, health checks.



VMware VIO NFV Platform Deployment Automation



Engagement

- Automate Deployment of VMWare VIO and other Relevant VMware components like ESXi, VCSA, PSC, vSAN and NSX for NFV platform
- Create a build guide compliant to NFV MANO architecture
- The Deployment automation should be done on customer's bare metal hardware
- Provide a framework to orchestrate the entire deployment



Benefits

- Drastically reduces the time taken for deployment of the NFV infrastructure
- Drastically reduce the professional service cost
- Besides production environment it is also very useful in setting up lab for demos, PoC and testing environment
- Eliminate the human errors by using end to end automation



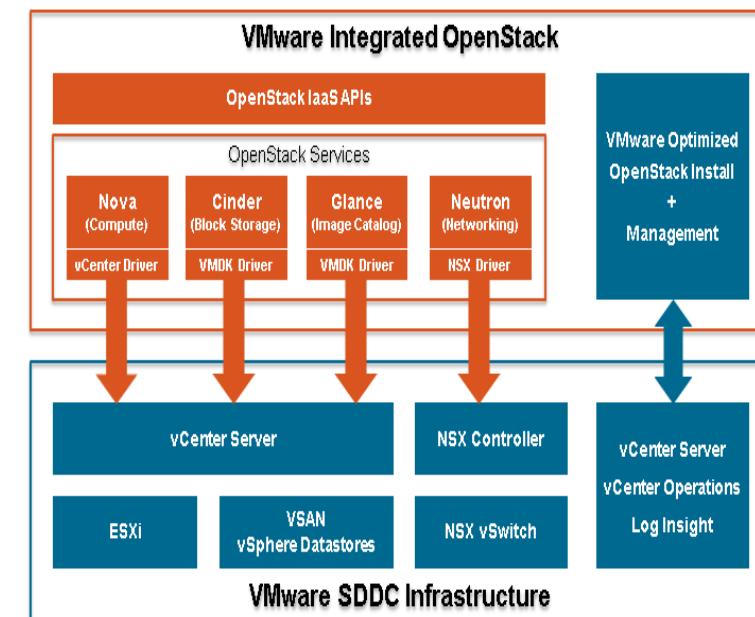
Technology

- NFV, VMware, OpenStack, Networking, Storage,
- Virtualization, Python



Solution

- Manually validate the build guide targeted for automation
- Study the end to end automation feasibility of VIO vAPP's deployment and configuration
- Identify the feasible interface for automation for all the VMware components like ESXi, VCSA, PSC, vSAN, NSX etc
- The feasible interface for automation can be REST api, CLI, Python SDK
- Using the identified interface automate the deployment and configuration of each component



uCPE devices: VNF performance baselining & deployment automation



Engagement

Calsoft is engaged with the client for testing performance of VNFs on top of uCPE devices.

The engagement includes:

- Deploying bare metal OS, middleware like VMWare ESXi on edge node devices.
- Deployment of VNFs on the NFVi infrastructure.
- Validate the VNFs and create performance baselining reports.
- Demonstrate repeatability and automate firmware bring-up and VNF tests.



Benefits

- Benchmark results for VNFs and uCPE edge devices.
- Automated the steps for repeatability and System integrators.



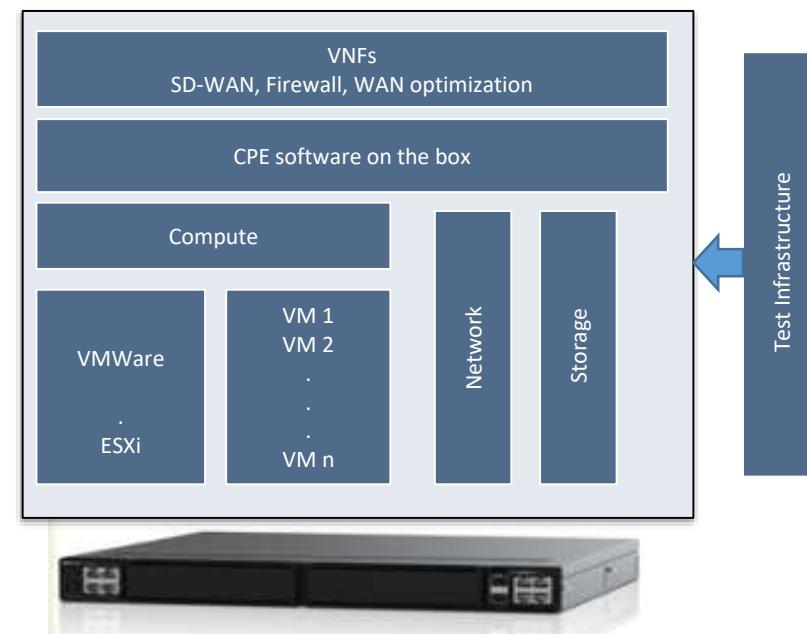
Technology

- ETSI MANO, VMware ESXi, VNF testing, IMIX, IXIA, SD-WAN, vFirewall, python scripting



Solution

- Deployed bare metal OS on uCPE edge device as per deployment guides. Validated BIOS and baseboard (BMC) firmware.
- Deployed the VMWare ESXi middleware and created ready environment for VNFs.
- Deployed VNFs like SD-WAN, complex Firewall , WAN acceleration from vendors and tested performance.
- Sample performance measurements like throughput test, latency tests, packet loss tests, IMIX tests, Jitter tests were carried out.
- Created performance reports along with CPU, memory, disk utilization of the device
- Automated the complete process using python scripts.



Telecom Data Analytics : Validation and Performance Benchmarking



Engagement

Calsoft is engaged with a client for deployment of cloudera platform, zaloni data lake and cardinality analytics on top of customer NFVi layer.

The engagement includes:

- Deploying NFV infrastructure and validating customer use cases on top of the infrastructure.
- Testing, validation of use cases and benchmarking the performance numbers to create the report.



Benefits

- Verified analytics based sample use cases in big data deployment.
- Created a platform for optimizing and improving the telecom network.



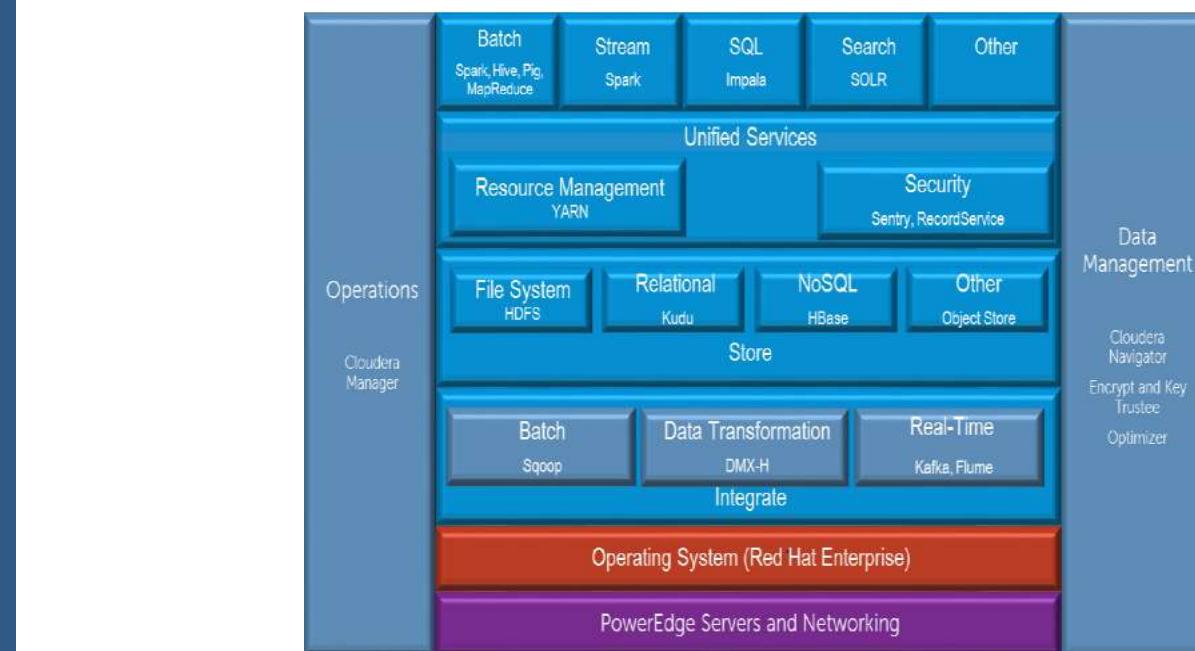
Technology

- TDA, Zaloni, Cardinality, Cloudera Manager,
- Kafka, Kudu, hadoop, HDFS, spark, hive, Yarn



Solution

- Deployed cloudera CDH platform which includes key components like spark, hive, hadoop, yarn, kafka etc .
- Deployed data lake from Zaloni on top of the cloudera infrastructure and applied analytics from cardinality.
- The platform supports batch, stream data processing, SQL query, data searching and scalable data lake.
- Created telecom use cases specific tests based on cardinality analytics features. These use cases include improving customer experience, network utilization, creating incentives for subscribers, optimizing network usage.
- Validation of the use cases and performance benchmarking is in progress.





Engagement

Calsoft engaged with the Client to develop a tool that help its users discovering the cost-savings opportunities by virtualizing network with VMware. The calculator shall take inputs from user to find the total cost of ownership (TCO) of user's current environment with VMware vs. Alternative Open Source as NFVi.



Technology

- Server side - Java 1.8, Spring Boot, Spring Security SAML.
- Client side - HTML5, CSS3, Angular(5), Angular Material, Chart.JS.

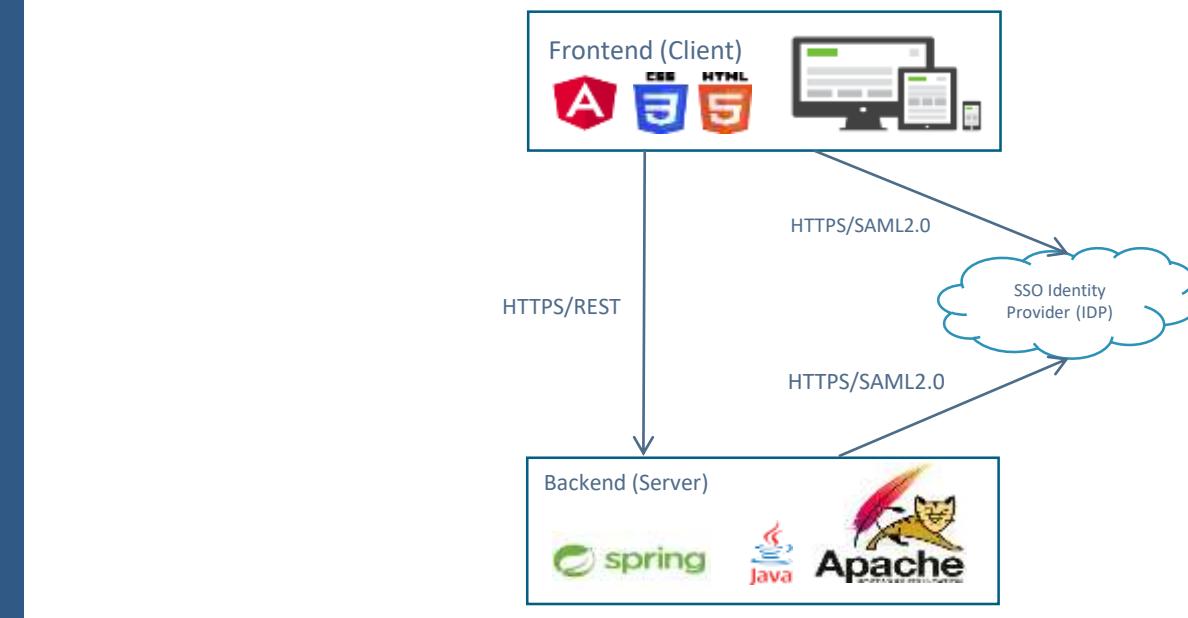


Solution

Calsoft proposed to develop this tool as web application using open source technologies. The front end was developed using SPA architecture responsive design principles. The back end was developed using Java . The communication between front end and back end was over HTTP REST.

- Highlights:

- Built using single page application (SPA) architecture for fluid and desktop like user experience.
- Followed responsive design principles to support multiple device resolution and form factors.
- Developed using popular open source technologies and frameworks like Angular(5), HTML5/CSS3, Angular Material Spring Boot, Spring Security etc.
- SSO (WorkspaceSpace1) integration for user authentication.
- Multi step wizard based user input interface
- Graphical display of TCO savings and other benefits as final calculation results



Tanzu Kubernetes Grid Using vSphere with Kubernetes



Engagement

- Calsoft was engaged by the customer for designing, deployment, and post validation of Telco Cloud VCF - Tanzu Kubernetes Grid using vSphere with Kubernetes



Solution

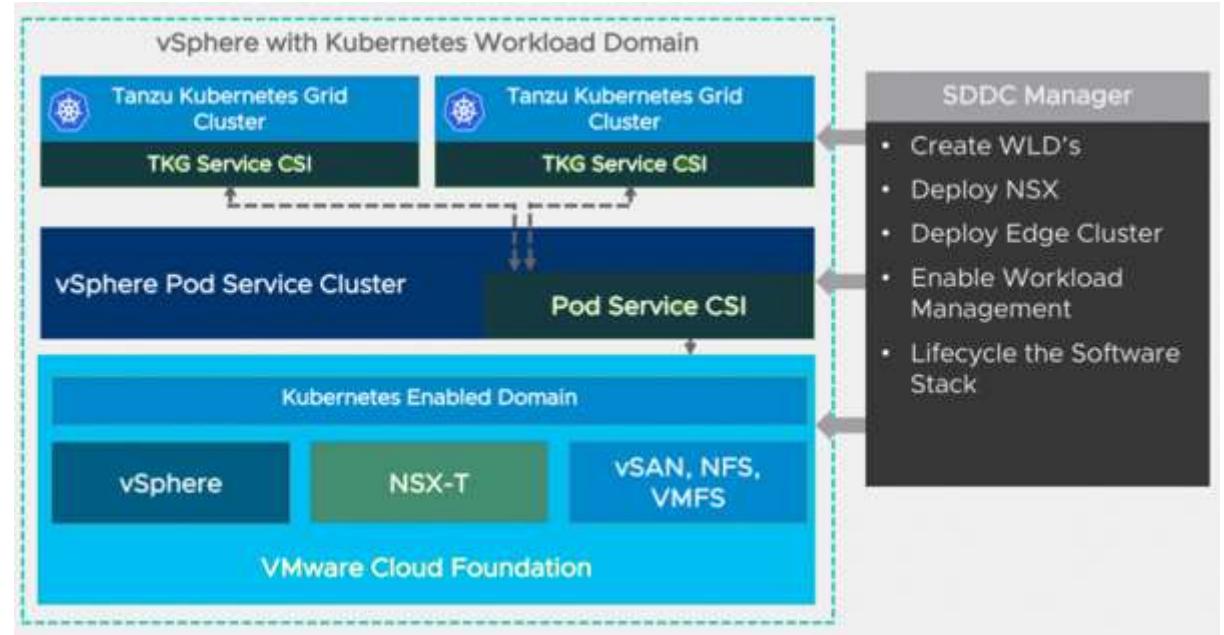
The engagement underpinned:

- Designing the physical network topology, virtual network topology, and deployment based on VMware Validated Design document
- Switch configurations, firmware upgrades, automation of ESXi installation using VIA
- Manual deployment of auxiliary components
- Automated deployment of management domain using VCF
- Deployment of workload domain and vRealize suite using SDDC manager
- Deployment of TKG Guest cluster on top of the K8S-enabled vSphere Cluster
- Post-validation testing and documentation



Technology

- NSX-T
- Tanzu Kubernetes Grid
- VMware Cloud Foundation (VCF)
- Software Defined Data Center (SDDC) Manager



Benefits

- Automated deployment of NFV components using VCF and SDDC Manager
- Provided Kubernetes APIs to developers, enabled the CI/CD processes across a global infrastructure
- Containerized solution for workloads with containers running inside the vSphere pod and TKG Cluster

vCloud NFV for Edge

- Enhanced data protection



Engagement

- Calsoft was engaged with the customer for building an Edge solution with vCloud NFV for Edge 3.2.1.



Solution

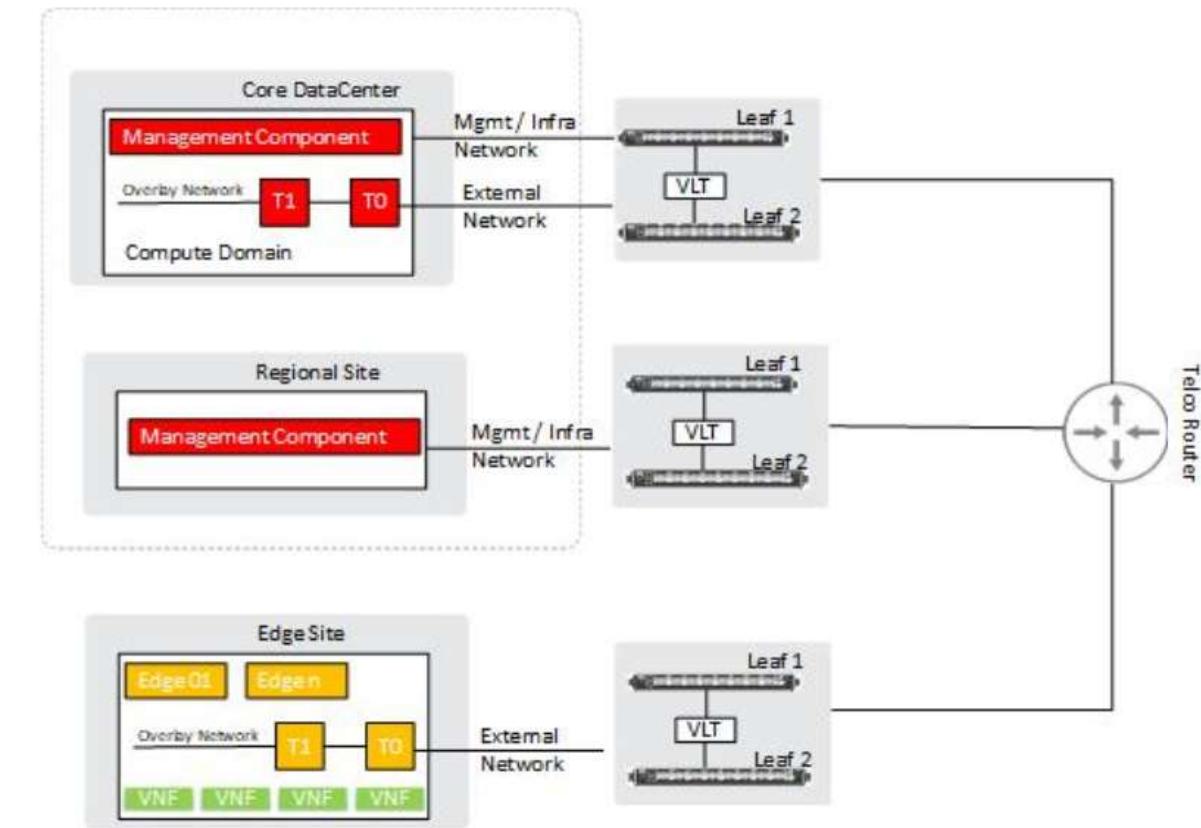
The engagement underpinned:

- Designing of physical network topology based on the reference architecture
- Multi-site solution for vCloud NFV environment
- Manual deployment with respect to topology and reference architecture
- Deployment of components such as: ESXi, AD-DNS, NTP, vCenter Server, NSX-T, vROps, Data Domain, vCD
- Switch configuration
- Firmware upgrade
- Data protection in the environment
- Multi-site vCD
- Post-validation testing and documentation



Technology

- NSX-T, vROps, vCenter, vCD



Benefits

- Benefited the customer with deployment of complete stack and its validation, post-deployment
- Better data protection
- Multi-site vCD implementation gained customer confidence for the overall solution

K8s pipeline implementation

Engagement

Calsoft was engaged with the customer to implement K8s pipeline and helping in redesigning for their customer.

Solution

Calsoft helped the customer in implementing kubernetes pipeline and the engagement underpinned:

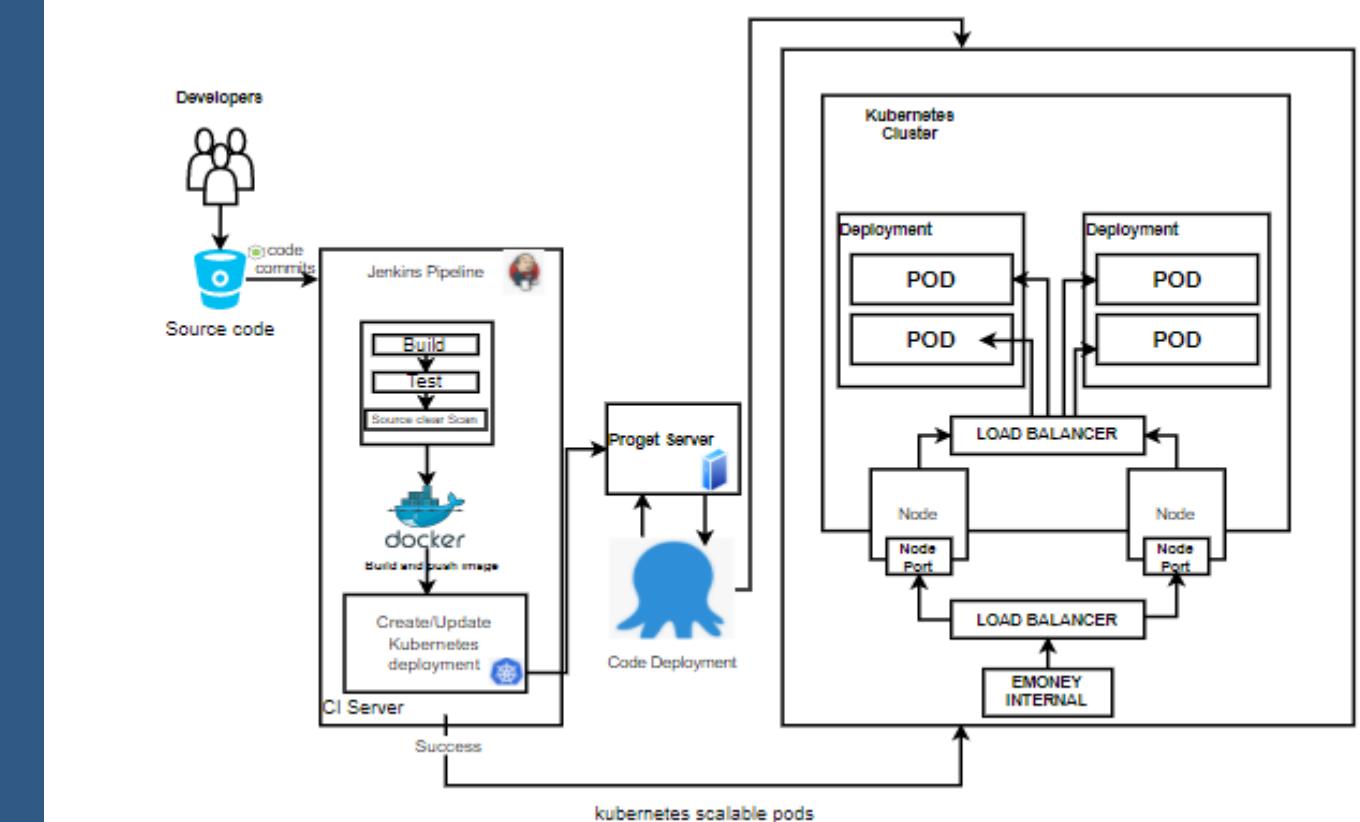
Identifying requirements and providing technical pointers as to how different components will interact to each other.

Setting up these pipelines helped in below functionality:

- Cloud agnostic (as long as possible)
- Git pipelines integration for different infra components
- CI/CD workflows (Usually via Jenkins), enabling CI/CD
- Artifactory integration
- Best practices for Permissions / IAM to enable RBAC
- TKGI - Tanzu integration (for a specific customer)

Technology

Git/Bitbucket, CICD, Jenkins, Kubernetes, Jfrog, AWS, cloud, IAM



Benefits

- Streamlined pipelines for Coding practices for End Developers
- K8s enabled CI/CD managed deployment of applications in prod infra
- Scalable infra as K8s
- Performance benefits of TKGI (for a specific customer)



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and architectural styles visible against a light sky.

Success Stories: Cloud Computing



Engagement

Calsoft is engaged with the client for providing a 24*7 CloudOps services. The aim is to provide the support for monitoring and L2 support for pre-empt infrastructure failures to avoid any service outages to the end customers (end customers, Enterprises etc)



Benefits

- Customer doesn't have to worry about the operational status of the cloud application
- Calsoft team automated some of the repetitive tasks of monitoring & typical debug and issue resolution steps



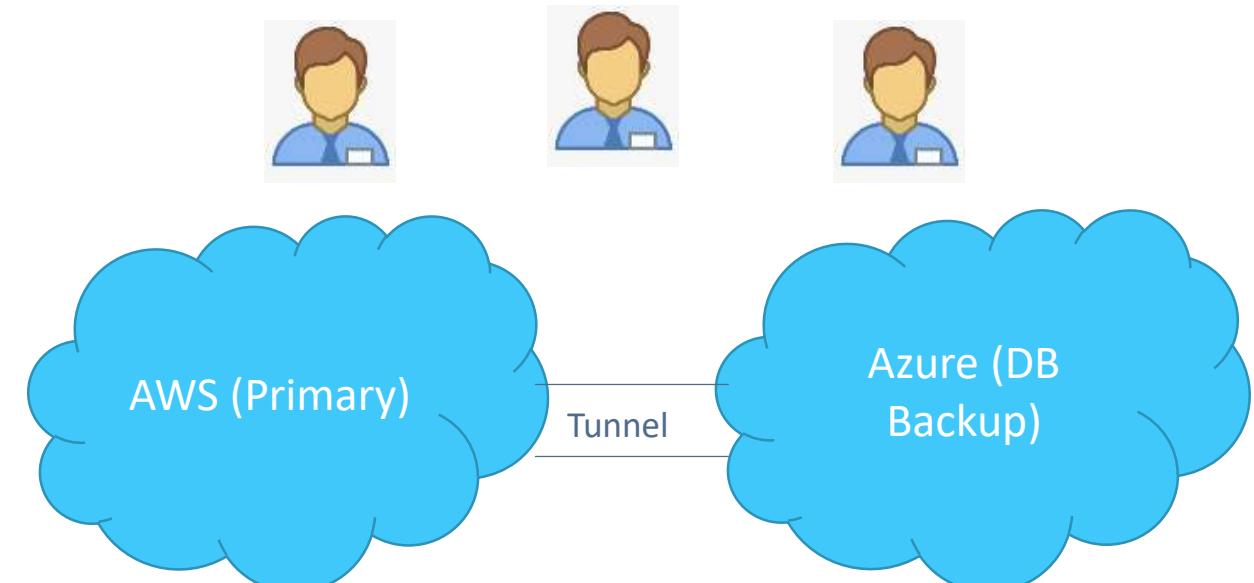
Technology

- Ticketing – JIRA
- Incident Mgmt – PagerDuty
- Monitoring – NewRelic (APM, CPU, Mem, etc.), Graylog, CloudWatch
- Runbooks – Confluence
- Configuration – Ansible
- Other tools – AWS, Azure, VPN Tunnel, Linux system tools
- Graphana – API GW Monitoring, Biz alerts, etc.



Solution

- Monitoring health of the different application running in the AWS cloud using ECR (Container Registry),EBS,EKS,EC2,MSK (Managed Kafka),ESS (Elasticsearch), etc. services
- Monitoring cloud infrastructure, scaling, reporting incidences & participate in security compliance audits
- L2 Support, user access mgmt., Multi-Factor Authentication
- Executing incident runbooks
- Coordinating with ISPs for outages/ maintenance windows.



Cloud Integrated Archive Storage



Engagement

Calsoft was engaged with the client for integrating cloud archive storage. The engagement underpinned:

- Integration with Windows Azure
- Implementation of data retention and destruction policies
- Redesigning graphical user interface



Technology

- Linux File System filter, Windows Azure, AWS cloud API, library, NFS/CIFS



Solution

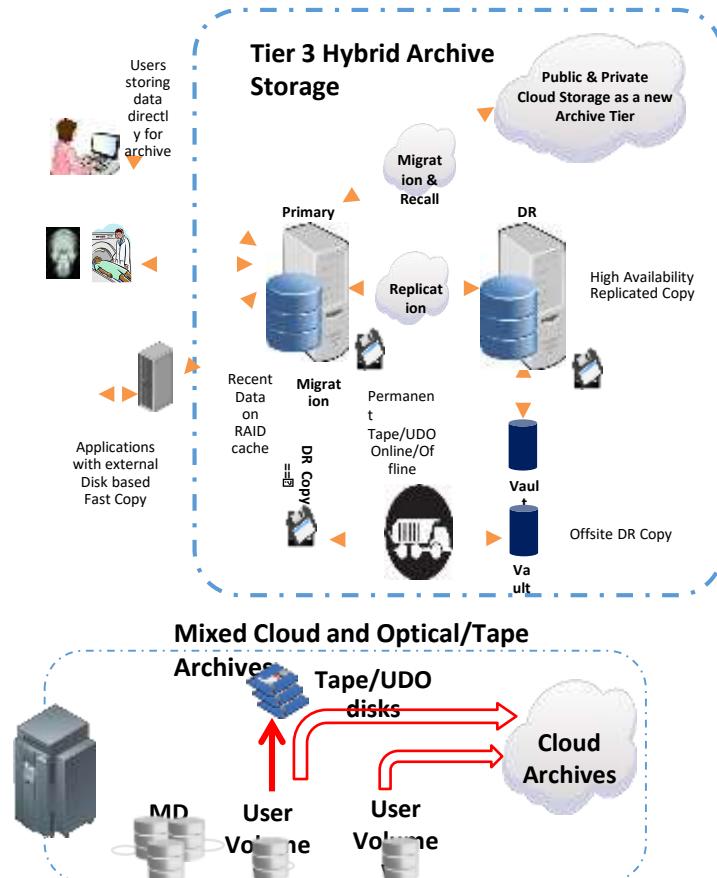
Provided engineering services and support for customer's Hybrid NAS appliance to:

- Combine local storage with cloud archive storage. MD RAID is used as local storage.
- Archiving the data present in local storage to either Tape/UDO/ODA media and/or Cloud storage.
- Provide compliant archive protection capabilities in single, cost-effective package

We helped our customers with:

- Creating User volumes and LVM volumes on top of RAID
- Writing data from User volumes to Tape/UDO disks using SCSI interface.

For cloud archiving Amazon/Azure standard APIs were used.



Airship - Bare-metal provisioning through Ironic+K8S



Engagement

Airship is a collection of open-source tools for automating cloud provisioning and management promoted by AT&T. This project aims to enable bare-metal commissioning of nodes, with and without specialized hardware, through Kubernetes CRDs, Ironic and Metal3.

Calsoft is expected to design and develop the solution and contribute to opensource.



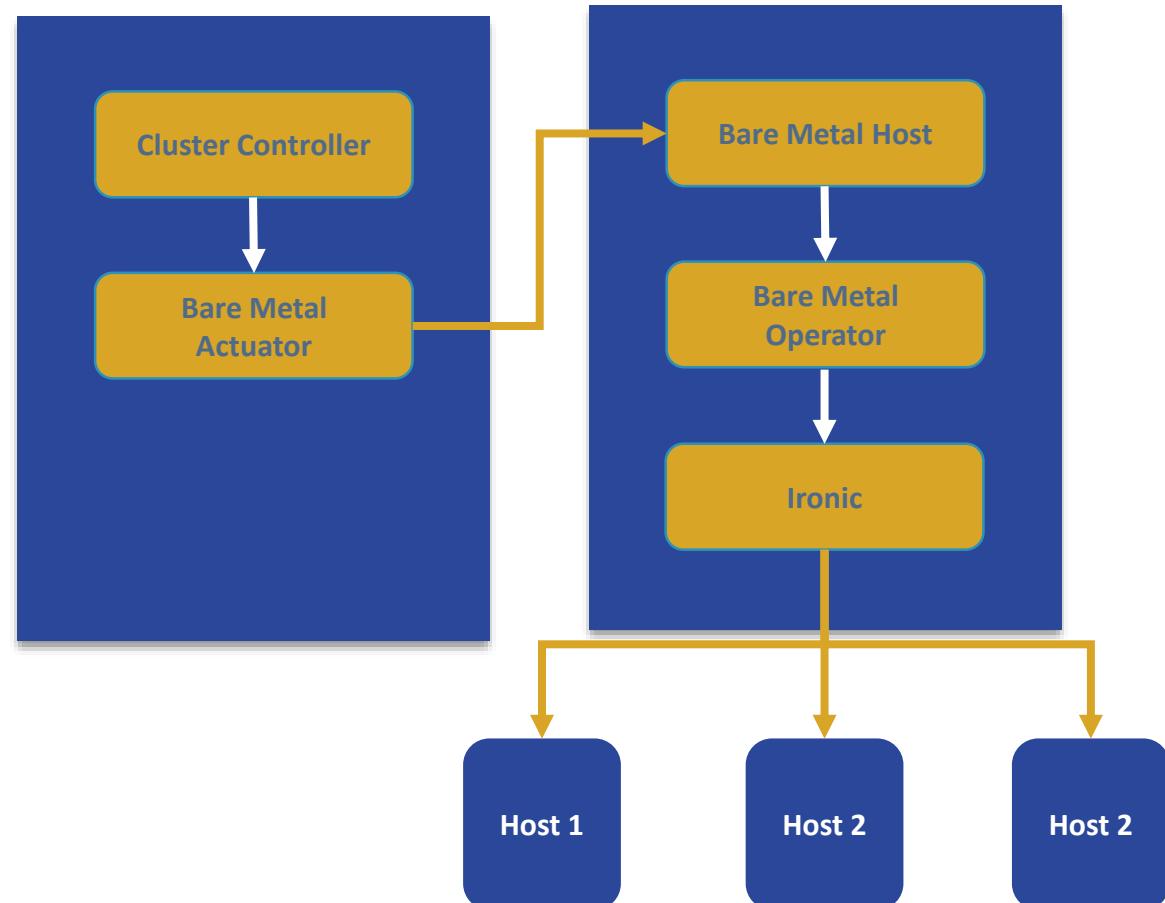
Solution

- We are working with Airship community on adding firmware support like GPU, Smart NIC features to BareMetal Host in Metal3 and cluster-API project
- Currently feature spec design is in progress
- Features will be submitted to Beta release
- Also, we are adding Hardware Validation to BareMetal CRD in cluster-API which will be useful for telco providers



Technology

- SmartNIC, OpenStack, Kubernetes, Ironic, Metal3, GOlang, Python, RAID, BIOS



Multi-K8S Cluster Management



Engagement

Calsoft engaged with the customer for building bare-metal automation for their SaaS-based product of configurable Kubernetes deployment.



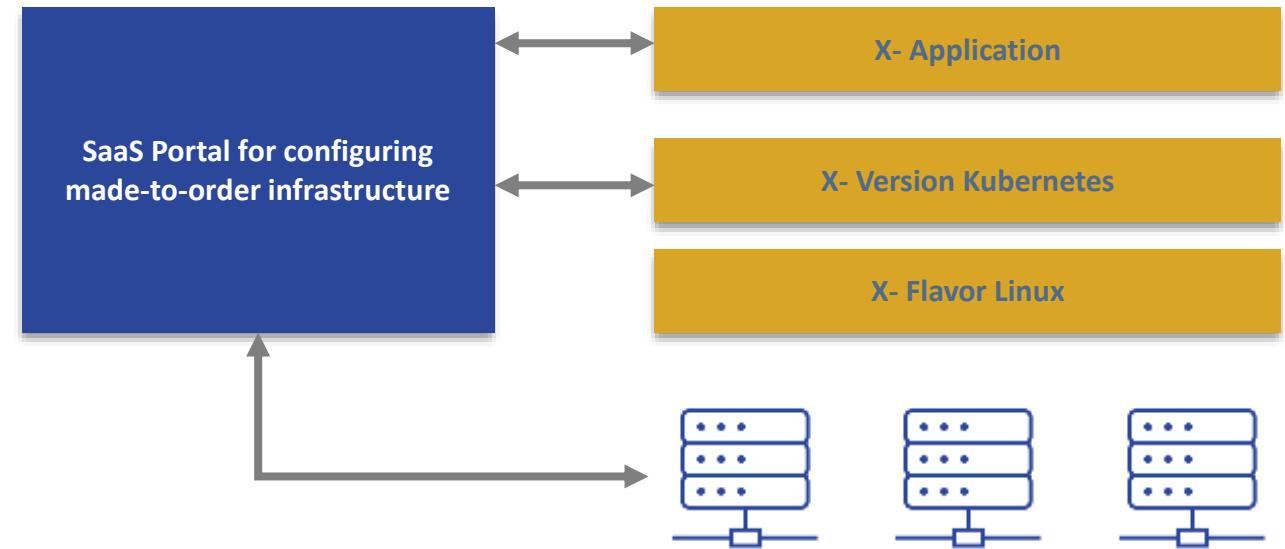
Solution

- The product aims at providing make-your-own-K8s-infrastructure user experience, with all components involved selectable. The user can select the exact version of Linux, K8S, and applications on top of it.
- Calsoft is developing the bare-metal provisioning component for the infrastructure.
- The solution includes creating APIs adhering to the existing framework on the North Side and writing corresponding south-bound APIs to cater to:
 - Interacting with devices through variants of IPMI protocol
 - CRUD operations of storage partitions and file systems
 - Installation of operating systems from network through PXE boot
 - Commissioning of parameters of operating system
 - Installation and commissioning of K8S components
 - Installation of desired applications



Technology

- Bare-metal provisioning, Kubernetes, Python, Linux, REST APIs, CRDs



Benefits

- Calsoft's expertise in deployment automation from bare-metal layer to application layer has helped the customer in developing the product faster and with the desired quality.

IaaS (Infrastructure as a Service) Portal Management



Engagement

Customer's IaaS requirements necessitated a web portal to manage enterprise vendor's virtual appliances and hardware. The engagement involved:

- Unified Cloud Governance: Cloud provisioning, management and monitoring
- Management of on-premise (physical and virtual) infrastructure
- Supporting Policy management and compliance



Benefits

IaaS Web portal helped our customer in realizing the following benefits :

- Statistical Data visualization of services - usage of disk space, bandwidth, memory and CPU enabled
- Single dashboard to manage, customize and configure linked networks
- Overall reduction in cost of IaaS management



Technology

- Java, Spring, JavaScript, Bootstrap
- VMware API's, Hibernate



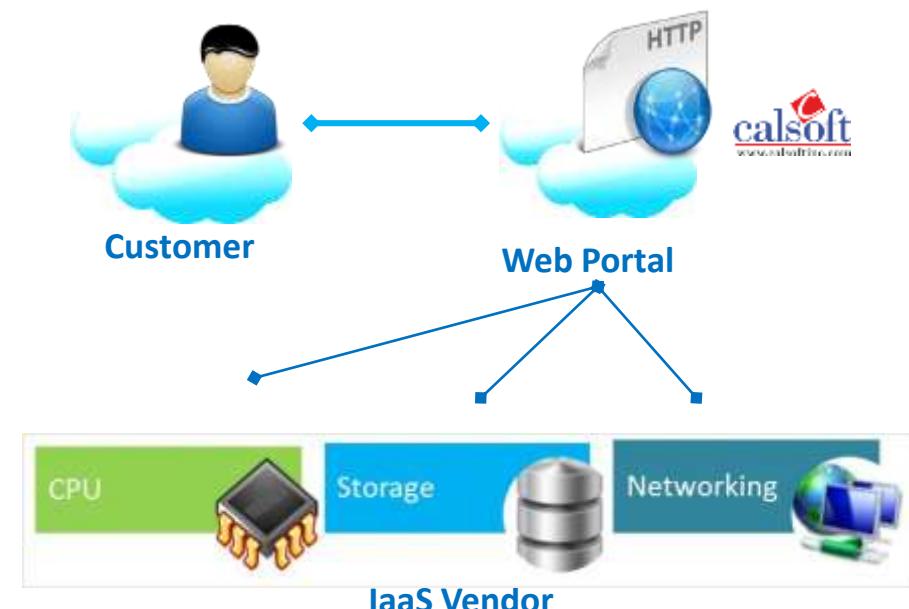
Solution

Calsoft developed a web portal by integrating components of:

- vSphere
- vCloud Orchestrator
- Role Based access Control (RBAC)
- SolidFire storage
- VMware Chargeback manager though public API's

Web portal has following features:

- Multi-tenancy support
- Two-factor security authentication
- Reseller service request handling
- Capability to manage customer's own datacenter



Snapshot Solution Screenshot - 1

Administrator ▾

Select Customer Microsoft

Monthly Statistics
02/10/2012 - 02/11/2012

Disk Space: 29.35 GB +13% | Bandwidth: 12.5 GB +17% | Avg. Memory: 53 GB -33% | Avg. CPU: 80 % +3%

Disk Space Usage: 58 percent / 29000 MB / 50000 MB

Bandwidth: 78 percent / 3900 GB / 5000 GB

Memory: 100 percent / 64 GB / 64 GB

CPU: 83 percent / 3 GHz / 3.2 GHz

Usage History: Cpu

VIRTUAL MACHINES: 9

vAPPS: 4

NETWORKS: 4

Storage Volumes: 2

Open Tickets: 1

Running Tasks: 4

The screenshot displays a comprehensive monitoring interface for a Microsoft customer. At the top, a navigation bar includes a dashboard icon, a dropdown for selecting the customer (set to Microsoft), and a user account for the administrator. Below this is a header section with four circular performance indicators: Disk Space (29.35 GB, +13%), Bandwidth (12.5 GB, +17%), Avg. Memory (53 GB, -33%), and Avg. CPU (80 %, +3%). The main content area features four large donut charts representing Disk Space Usage (58%), Bandwidth (78%), Memory (100%), and CPU (83%). Below these charts is a line graph titled 'Usage History' showing CPU usage over a 30-day period. The bottom section contains six cards with icons and counts: Virtual Machines (9), vApps (4), Networks (4), Storage Volumes (2), Open Tickets (1), and Running Tasks (4). A vertical sidebar on the left lists various monitoring categories with corresponding icons: Dashboard, Customer, Users, Compute, Storage, Networking, Billing, Logs, and Support.

Snapshot Solution Screenshot - 2

Administrator

Dashboard Customer Users Compute Storage Networking Billing Logs Support

Compute

Home > Compute

Dashboard vApps

CPU

CPU usage %

Time	Green CPU Usage (%)	Blue CPU Usage (%)
12:00A	95	20
1:00A	85	22
2:00A	88	25
3:00A	75	28
4:00A	75	85
5:00A	65	25
6:00A	55	20
7:00A	50	22
8:00A	45	20
9:00A	75	25
10:00A	40	20
11:00A	35	22
12:00A	45	20

Memory

memory usage (GB)

Time	Blue Memory Usage (GB)	Red Memory Usage (GB)
12:00A	18	2
1:00A	10	5
2:00A	8	8
3:00A	15	10
4:00A	8	12
5:00A	5	12
6:00A	7	15
7:00A	10	15
8:00A	5	15
9:00A	8	12
10:00A	10	5
11:00A	12	8
12:00A	10	10

Disk Space

Type	Value
Used Space	56.66 %
Free Space	43.34 %

Information

Virtual Machines: 9 vApps: 4 Networks: 4 Storage Volumes: 2

Storage-as-a-Service



Engagement

Calsoft was engaged with the client for designing & developing cloud management console for storage-as-a-service in a box solution for hardware array vendor

The engagement underpinned:

- Competitive analysis of various cloud management solutions



Benefits

- Value addition to bare storage array
- our client who was a storage array vendor can now enter new market.



Technology

- Python and proprietary service oriented architecture



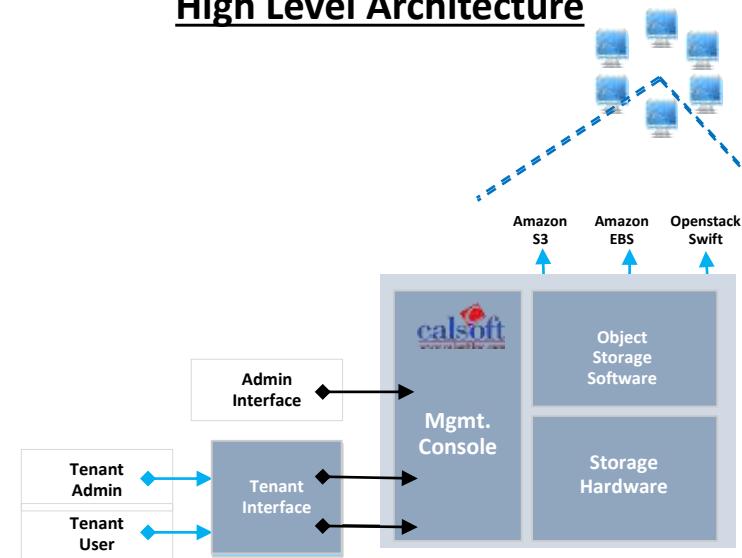
Solution

Designed, Developed cloud management console for storage-as-a-service in a box solution for hardware array vendor

The cloud management console has following features:

- Admin interface
- Tenant interface
- Storage object management
- Tenant management
- User management
- Audit logs
- Cluster management
- Role based access control
- Invoicing and integration with billing system
- Workflows

High Level Architecture



Development of Windows based Client Applications for Cloud storage

Engagement

Calsoft was engaged with the client for developing windows based client applications for cloud storage. The engagement underpinned:

- Resolving system performance bottleneck
- Reducing high bandwidth usage
- Enabling delayed response times
- Complying issues with Windows different platforms

Benefits

- Improved input/output rate
- Reduced bandwidth usage significantly
- Enhanced performance for window based clients

Technology

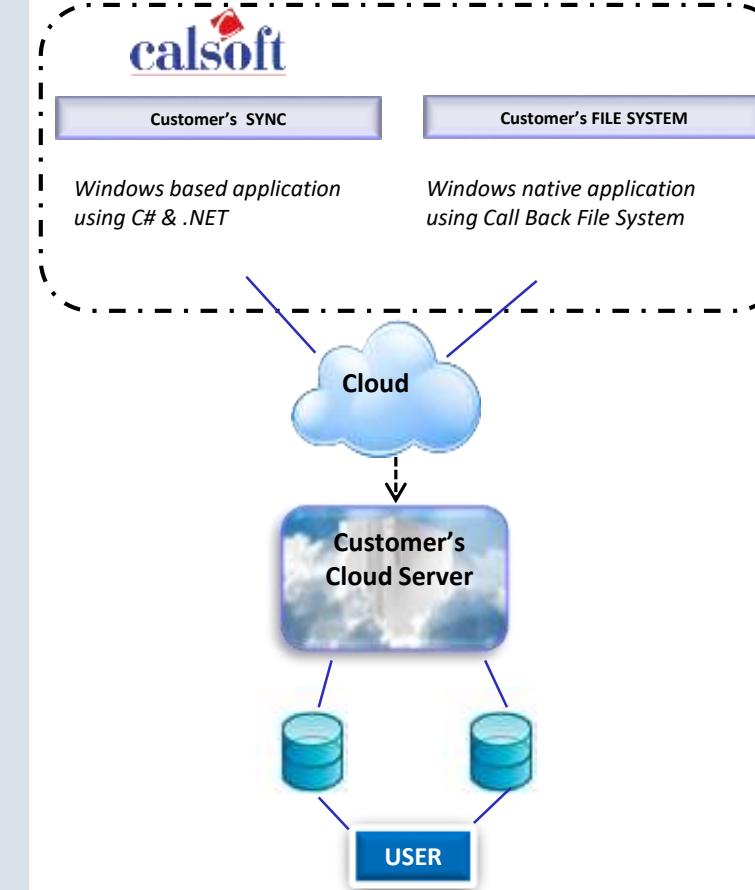
- Language: C++, C#, .Net
- OS: Windows

Solution

- Overcome the performance issues
- Added enhancement features to the Customer Sync and Customer FS applications.
- Ensured compatibility with Microsoft's OS (XP & 2003)

Features

- Included on-disk local cache
- Web based interactive interface





Engagement

Calsoft was engaged with the client for providing cloud file sync service. The engagement underpinned:

- Optimizing business opportunities by integrating cloud features in data storage products



Benefits

- Complemented data storage hardware products with software solution
- Increased revenue due to addition of cloud features
- Customer could now assist data center companies in cloud enablement



Technology

- Language: C++



Solution

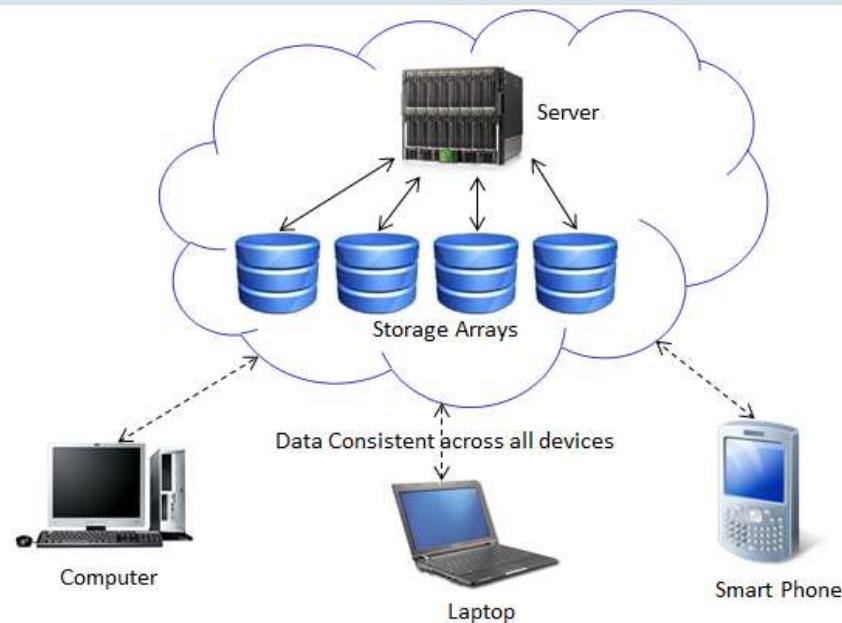
- Designed and developed cloud file sync service
- Also performed competitive analysis and market survey

Features

- Storage as a cloud file server
- File sync service
- Data encryption and compression in cloud
- SOX compliance
- Information life cycle management
- Deduplication
- Backup, Replication and Hierarchical storage management for data

Functionality

- Data accessible only to user with passcode
- User can sync its data across various devices and computers



Challenges in setting up remote Test Lab



Engagement

Calsoft was engaged with the client for setting up remote test lab. The engagement underpinned:

- Efficient use of hardware resources for testing
- Dealing with budget constraints for shipping hardware offshore
- Dealing with the issue of Bulk licensing that is needed for heterogeneous OS and Application Environment which cannot be transferred offshore



Benefits

- Significant reduction in compatibility testing time
- Saved dollars for shipment and licensing of Systems / Apps



Technology

- Platform: VMWare ESXi 4.0, 5.0
- Protocols – RDP, SSH, HTTP



Solution

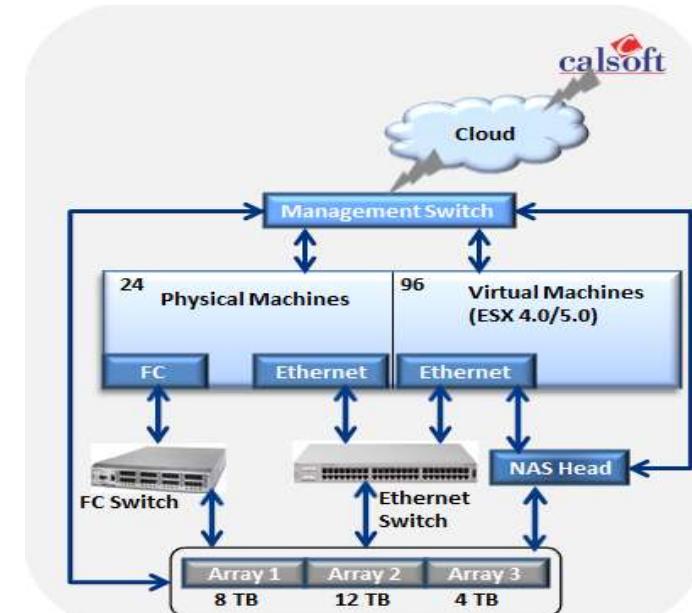
Calsoft created an onsite lab with access control using VPN & VLAN

Features:

- Remote access using VMware vCenter Infrastructure
- Use RDP, SSH, Telnet, HTTP to work with different OS & storage sub-systems
- On the fly installation of VMs & Hardware LUNs on the backend storage sub-systems
- Dedicated offshore resource for Lab management & troubleshooting with a point-of-contact for remote onsite issue management

Functionality:

- Ease of working from anywhere using VPN access to the lab
- Ability to use common software & avoid duplication
- Able to restructure & provision new hardware easily with no major down-time



Oxygen Cloud - Files System Events Notifier



Engagement

Oxygen Cloud has a FUSE based file-system written on Mac OS-X and Windows which actually connects to the cloud at backend. Calsoft's engagement underpinned:

- Resolving the issue of antivirus installed on customer computers as it would cause the programs on the system to fetch all the data which would be a huge overhead



Benefits

Calsoft assisted client in realizing the following benefits:

- Client can now block unnecessary I/O to cloud
- Essential user bandwidth wastage averted



Technology

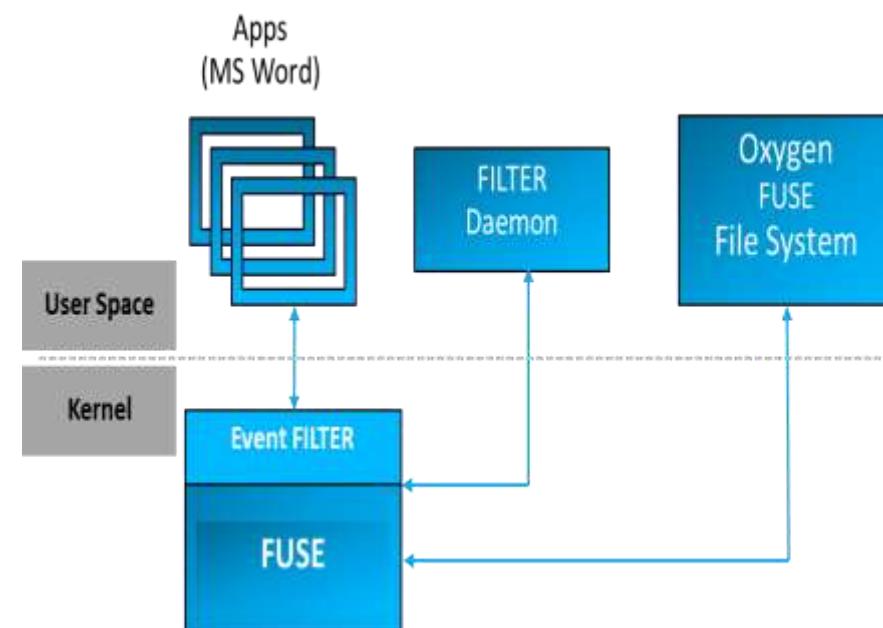
- FUSE, Windows Filter driver



Solution

Calsoft developed a notification mechanism that:

- Notified Oxygen cloud's daemon to distinguish between caller of the file-system events and avert irrelevant copy operations
- Enabled cloud daemon to 'selectively' deny fetching data for antivirus programs



Automation of Client Virtual Application Container Services



Engagement

The engagement underpinned deployment/automation of Client VACS (**Virtual Application Container Services**).

The project involved bringing together Client's virtual network services components - the Nexus1000V virtual switch (N1K), the Virtual Services Gateway (VSG) together with the Prime Network services Center (PNSC) and the Cloud Services Router (CSR) under one umbrella called VACS.



Benefits

The automation bestowed benefits in terms of:

- Reduced overall deployment time from days to hours



Technology

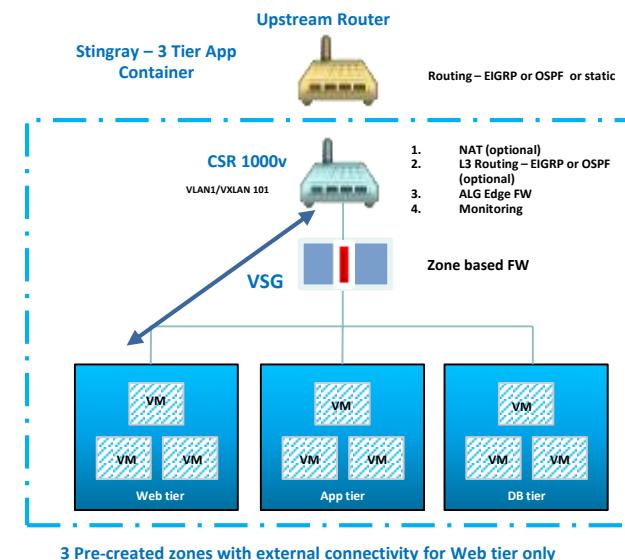
- Core Java 6, VI Java, UCSD APIs



Solution

Calsoft helped Client with:

- Provisioning of VM deployment for Client's virtual network components
- Provisioning of 3 tier virtual machines and VLan/VXlan/PortProfile configurations on N1K switch
- Also worked at UCSD side to create workflows for above installed components and container deployment.



Engagement

Calsoft's engagement in building the Resources Management modules for their product with the client involved:

- Removing complexity in design and delivery of cloud-based managed services
- Reducing Cost of Ownership and Operations
- Increasing the flexibility between the operational choices

Benefits

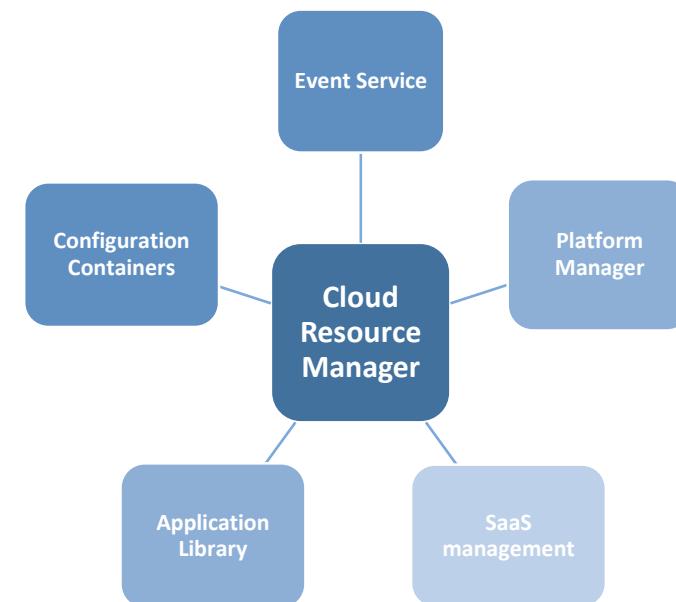
- The end customer (IT team of small & large enterprises & Cloud admins) can very easily get the network up & running
- “Single-Pane-of-Glass” to marshal diversified Cloud Infrastructure

Technology

- Angular, Python, Openstack, C#

Solution

- Worked on UI for
 - Real-time visibility
 - Physical and virtual control
 - Scale up or down in an automated fashion
- Created modules for Flexible IP Management, Load Balancer, Firewall, VPN management using Openstack
- Worked on configuration management



Development of Comprehensive Cloud Management Platform



Engagement

Calsoft was engaged with the client as their development partner for their continuously evolving cloud management platform. The engagement underpinned:

- Scaling of skilled engineering resources primarily in,
 - Online L3 Support
 - Integration of new platforms, technologies & Automation of workflows involved.
- Dealing with lack of testing resources and automation of test scenarios in the Cloud Computing Area.



Benefits

- Improved Performance with enhanced product features
- Client was able to achieve faster time to market



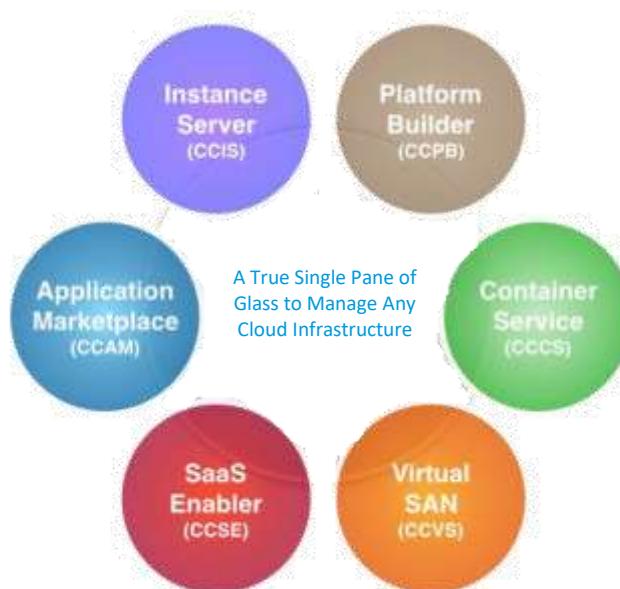
Technology

- Domains: Networking, Cloud Computing



Solution

- Setup a ODC team of 15+ engineers skilled in cloud & networking domain.
- Development of platform independent integration layer.
- Development of New GUI allowing end user cloud management thru "Single pane of Glass" interface.
- Software Feature enhancements –
 - Network Automation
 - Addition of multiple platforms, technologies as service catalogue items.
- Implemented automation of test scenarios
 - Fixed quality related issues



Deployment of MicroServices security platform on AWS



Engagement

Calsoft was engaged with the client for building an automation solution to deploy their microservices security platform in Kubernetes cluster on AWS. The engagement underpinned:

- Providing a scalable and configurable solution to easily bring up Kubernetes cluster on AWS cloud platform.
- Deploying their security platform on this Kubernetes cluster seamlessly through Ansible.



Benefits

- Client can now easily bring up required infrastructure on AWS, needed to deploy their platform.
- Client can easily scale/reconfigure deployed infrastructure/resources.
- For incremental releases, client can use Calsoft solution to easily deploy their platform without any changes.
- Eliminates manual deployment of resources and help save time.



Technology

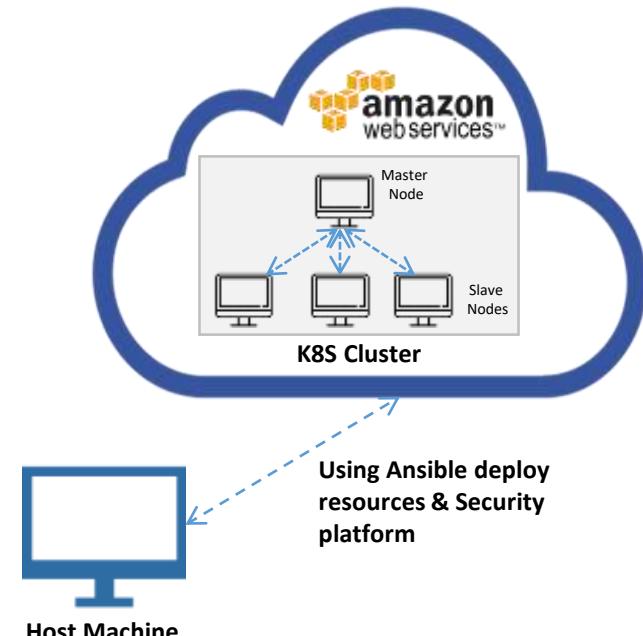
- Ansible, AWS Cloud Formation, AWS CLI, Kubernetes



Solution

Calsoft developed Ansible infrastructure/code base to achieve and successfully deliver client requirements.

- Created scalable and configurable Cloud formation templates to deploy required resources in AWS, like k8s masters & minions VMs, Network security groups, Route tables, VNETs, Storage, Availability sets etc.
- Developed Ansible playbooks to deploy these resources on AWS along with installing client's security platform.



Cloud Gateway to S3 and Azure



Engagement

Calsoft was engaged with the client to implement a cloud gateway to migrate data from traditional storage to cloud seamlessly. The engagement underpinned:

- Integrating with iSCSI target on the premises side.
- Maintain map of data objects being migrated.
- Provide data processing services, like compression, encryption, dedupe, replication etc.
- Policy engine for management of data
- Provide a common interface to migrate data to various cloud vendors.



Benefits

- Seamless migration of data.
- Track the status of migration through jobs.
- Enable direct data mining and search on cloud to provide nearline performance.
- Traditional applications need not change as iSCSI target available on north side.



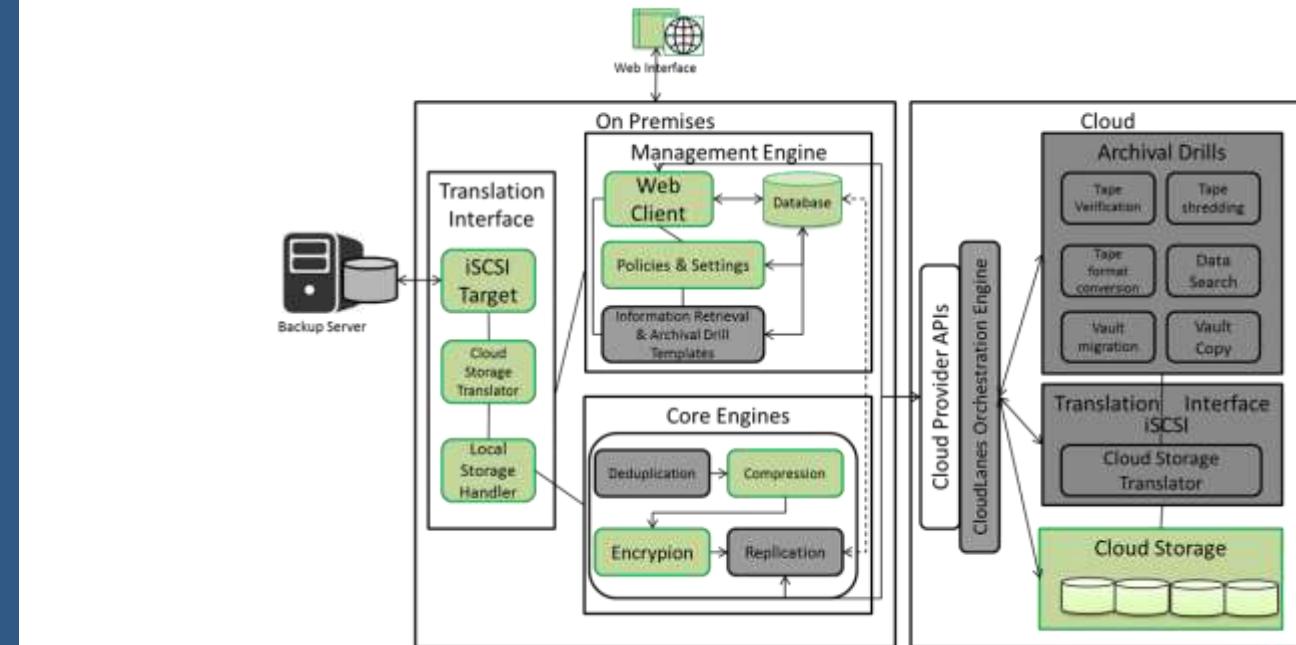
Technology

- Languages: Java, C, HTML CSS, Javascript.
- OS: Linux



Solution

- Integrated with mhvtl iSCSI target as source of data. Maintained a map of tapes being filled up and enabled migration for them.
- A java based core policy engine to control and perform migration.
- Integrated with S3 and Azure as cloud providers.
- Provided facility to start VMs on the cloud to allow access to the migrated data for data mining and search.



vCloud Availability Orchestration For vCloud Director



Engagement

Calsoft was engaged with the VMware for building vCloud Availability Orchestration for Cloud DR Service. The Orchestration consists of pre-canned workflows to carry out common DR activities such as Replication Group Creation, DR Runbook/Plan, Migration, Fire-Drill, Planned Failback and Unplanned Failover of VMs and vApps.



Benefits

- Scalable workflows which can automate DR services
- Scheduling of workloads for supported DR activities
- Create custom workflows as per requirements



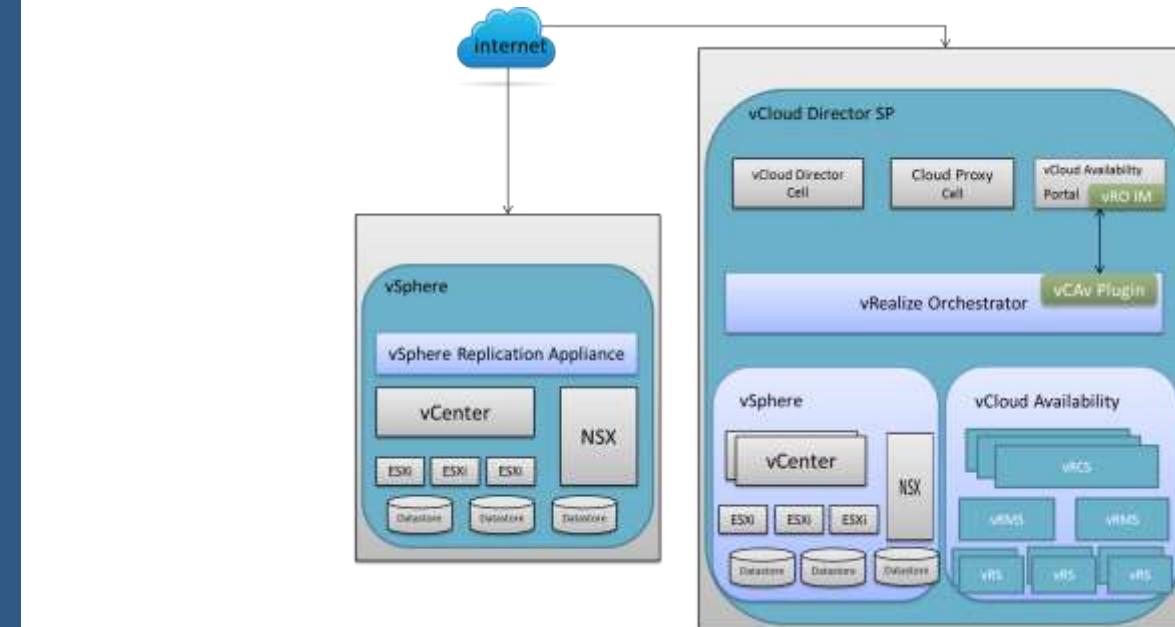
Technology

- Backend - Java
- Client Side – AngularJs , HTML5



Solution

- Present vSphere and vCloud Director managed objects as vCAv inventory
- Designing GUI for workflow execution and scheduling
- Provide triggers and events for signal-based workflow execution
- Build wrappers for accessing vRO and vCAv services.
- Build and deploy vCAv plugin to vRealize Orchestrator.



Cloud Storage Gateway



Engagement

Calsoft was engaged with the client to develop Cloud Storage Gateway to provide access to on-premises and public cloud storage with S3-compatible object storage connectivity.

The engagement underpinned:

- Development of multi-platform solution for data storage.
- Implement caching, deduplication and compression
- Development of appliance for AWS, Azure etc.
- Support multiple storage protocols including iSCSI, CIFS and NFS



Benefits

- Simplified migration to public cloud platforms
- NFS, CIFS/SMB, iSCSI storage support
- Accelerated test & development environments
- Scale capacity as needed.



Technology

- Python 2.7.6, APScheduler, Celery, PyVMomi, Azure SDK, google-cloud-storage api, boto , Cludian hyperstore API

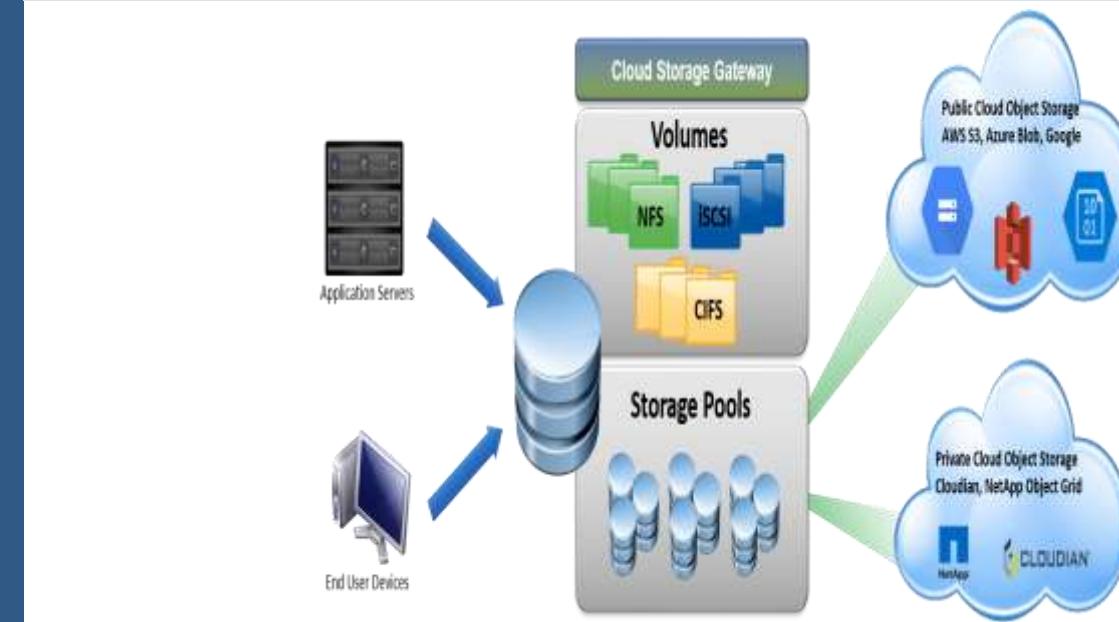


Solution

Development of a secure storage gateway for managing data in a hybrid cloud environment in which this gateway appliance would sit at the enterprise edge providing mount points for the NFS/CIFS clients on one side and act as a forward caching proxy for cloud storage services like AWS S3, Azure Blob or Google Cloud.

Features:

- Data efficiency (thin provisioning, deduplication & compression)
- Lifecycle management tools (snapshots and easy provisioning)
- Data Safety (multi-site replication, encryption)
- Performance adaptable (flexible caching configurations using RAM and disk tiers)
- Active Directory and LDAP integration



Federated File System for cloud storage



Engagement

Calsoft was engaged in developing solution for addressing the need of unified storage across different clouds, thereby providing a global namespace spanning across multiple cloud storage servers.



Benefits

- The solution helps the end user to seamlessly use different cloud storage offerings as a single file system.



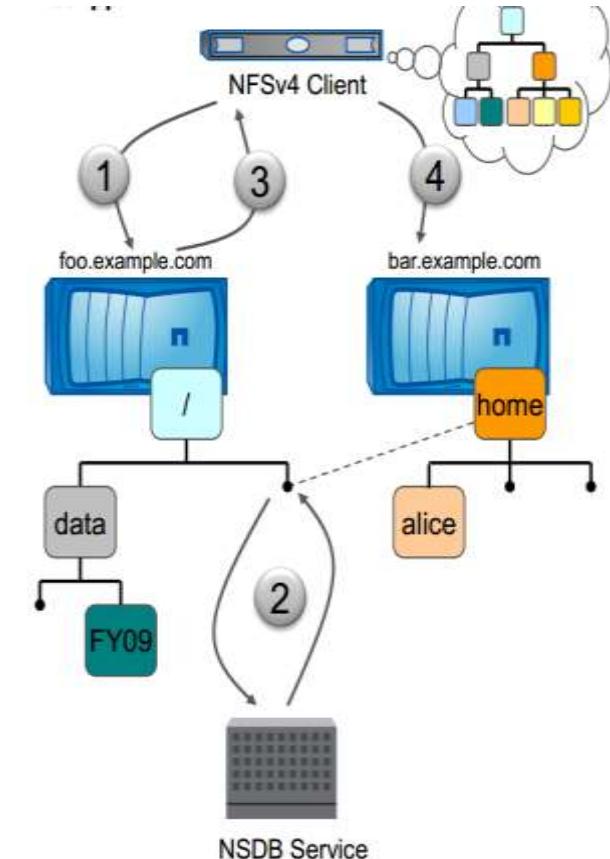
Technology

- C, C++, S3, Shift, CDMI, NFS Ganesh, Samba, IOR, lozone



Solution

- The designed framework spanned across different storage offerings like S3 (AWS), Shift (Openstack) & CDMI (SNIA standard for cloud storage).
- Plugins for each offering were developed which communicates with NFS/Samba clients Northside, and cloud storages on South side
- An object cache was maintained at client node for storing objects of frequently accessed files
- Policy based namespace redirection was also part of the solution, for managing files based on user/file-type/directory-type/storage-type.
- The test suite included file I/O across different clouds, with load varying on size, access-patterns and error injections



Configuration Drift Management



Engagement

- Calsoft was engaged with the client to develop a cloud based configuration drift management utility. The tool was able to run on-demand/scheduled checks against a deployed converged infrastructure system. The tool ensures that the deployment is following the hardware and software compatibility matrix defined by the vendors.



Benefits

- Easy identification of configuration drift with respect to the validated design
- SAAS portal to manage configuration drift validation.
- Extendible User Interface
- Simplified management of patch/updates.
- Email notifications and alerts.



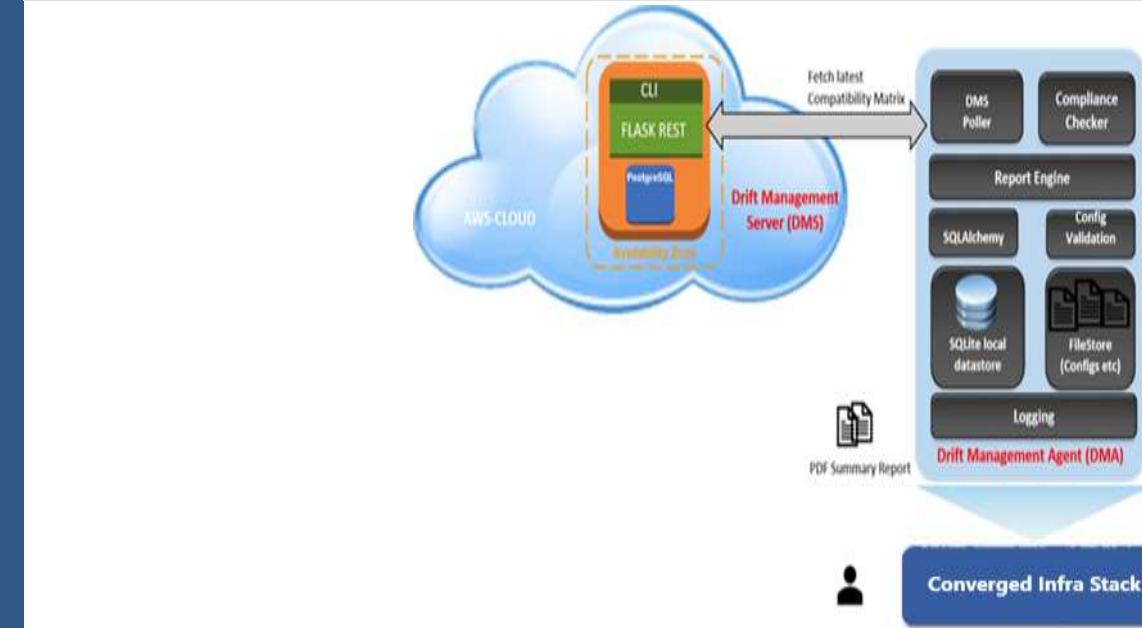
Technology

- Python(2.7.6), Boto, Python-Flask, SQLAlchemy, AWS, SQLite, PostGreSQL, Jinja2, weasyprint, UCSM XML API's, Apache



Solution

- Client-Server model to fetch updates related to compatibility information pertinent to the Converged Infrastructure Stack.
- Drift Management Server (DMS) hosted on public cloud.
- Drift Management Agent (DMA) is a python service deployed in the stack.
- Command line interface for ease of operations on DMA and DMS.
- Polling service in DMA fetches latest updates for the compatibility matrix.
- Configuration data fetched and validated against the compatibility matrix.
- Provide execution report of the configuration validation check.
- On-demand/scheduled drift validation checks can be setup.
- Solution supported multi-format reports.
- Cloud portal supports multi-tenancy with role based access control.



Cloud Monitoring Solution



Engagement

- Calsoft was engaged with the client for developing multi-tenant cloud infrastructure monitoring solution. The engagement involved:
- Analysis of SaaS based monitoring solutions
- Architecting multi-tenant, distributed and scalable solution to support workload monitoring deployed on various public and private clouds
- Designing flexible Licensing Model for various monitoring offerings



Benefits

- Scalable and extensible monitoring solution to support workloads deployed on multiple platforms
- SaaS based solution to support multiple tenants
- Flexible and extensible licensing model for the offerings
- Multi-Tenancy support with support for various identity management systems
- Micro-services based architecture to enable ease of deployment



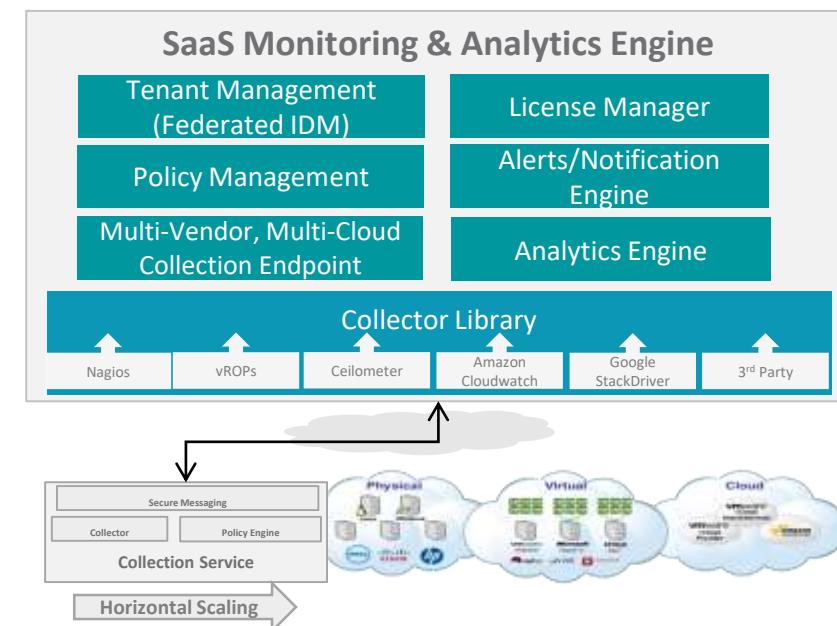
Technology

- OS Platform- RHEL 7.3
- Hypervisor Platform – ESXi
- Cloud Platform – Amazon, Google, OpenStack
- Language –Python 2.7.6, APScheduler, PyVMomi, Cassandra, Neo4J, AngularJS 2.0,
- Project tools & application – Ansible, Grunt



Solution

- Detailed feature analysis of competitive products
- Micro-services based architecture for easy scaling
- Secure authentication and authorization by making use of various IDMs like SSO, LDAP, AD, Federated IDMs etc.
- Support for various cloud by means of pluggable remote collector mechanism. OOTB connector plugins for Amazon, Google, OpenStack and VMware platforms
- Feature and workload count based licensing model
- Implementation of multi-layer cloud stack data and access security



Monitoring as a Service Solution



Engagement

- Calsoft was engaged with the client for re-designing an on-premise infrastructure monitoring solution to SaaS based Monitoring as a Service solution deployed in cloud. The engagement involved:
- Analysis of SaaS based models for Data Isolation, Data Security, DLP etc.
- Architecting multi-tenant, distributed and scalable solution to support workload monitoring deployed on proprietary private cloud platform



Benefits

- Scalable and extensible monitoring solution to support workloads deployed on private clouds
- SaaS based solution to support multiple tenants
- Flexible and extensible licensing model for the offerings
- Multi-Tenancy support with support for various identity management systems
- Micro-services based architecture to enable ease of deployment



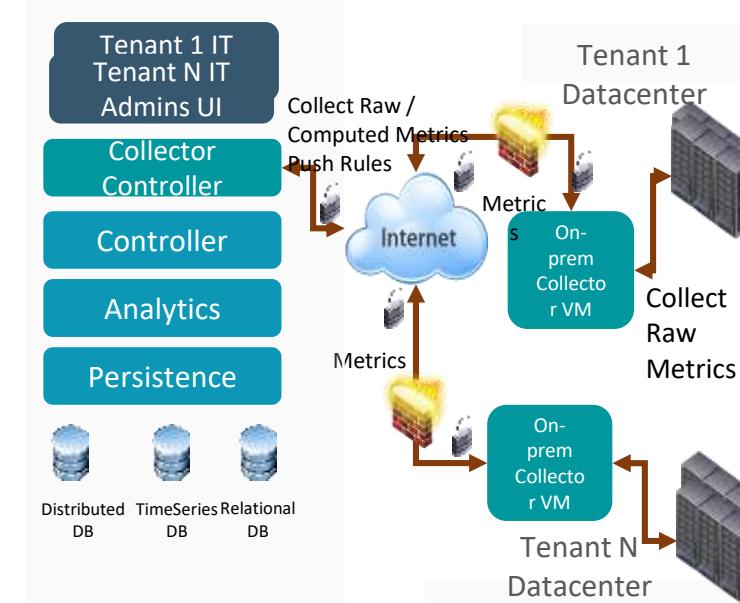
Technology

- OS Platform- RHEL 7.3
- Cloud Platform – Proprietary Private Cloud
- Language – Python 2.7.6, APScheduler, Cassandra, Neo4J, AngularJS 2.0,
- Project tools & application – Ansible, Grunt



Solution

- Detailed analysis of existing product for the supported features
- Security analysis and solution for data protection
- Secure authentication and authorization by making use of various IDMs like SSO, LDAP, AD, Federated IDMs etc.
- Support for various tenants by means of pluggable remote collector mechanism
- Exhaustive licensing model
- Implementation of multi-layer cloud stack data and access security



Composable Kubernetes Infrastructure

Engagement

Calsoft is engaged with the client building bare-metal automation for their SaaS based product of configurable Kubernetes deployment.

Benefits

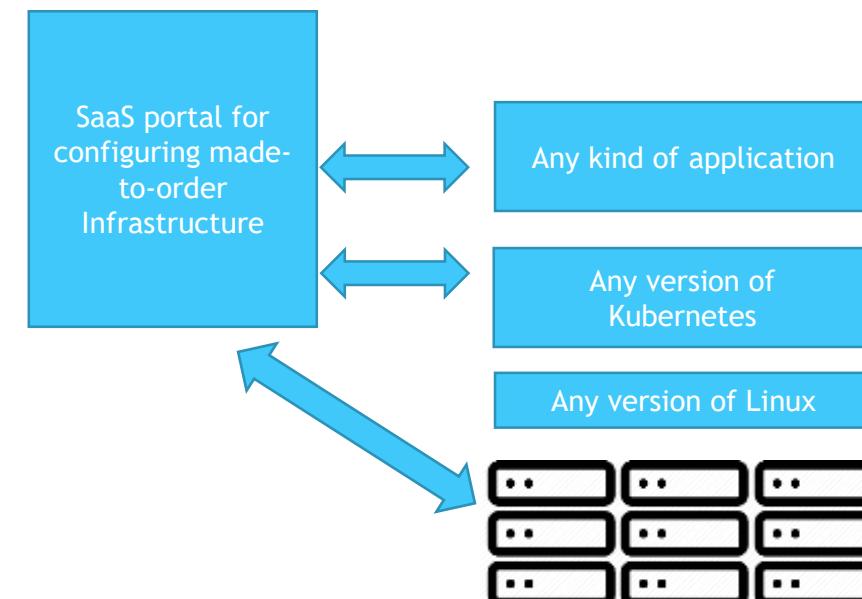
- Calsoft's expertise in deployment automation from bare-metal layer to application layer has helped the client in developing the product faster and with desired quality

Technology

- Bare-metal provisioning, Kubernetes, Python, Linux, REST APIs

Solution

- The product aims at providing creating make-your-own-K8s-infrastructure user experience, with all components involved selectable. The user can select the exact version of Linux, K8s and applications on top of it.
- Calsoft is developing the bare-metal provisioning component for the infrastructure.
- The solution includes creating APIs adhering to the existing framework on the North Side and writing corresponding south-bound APIs to cater to
 - Interacting with devices through variants of IPMI protocol
 - CRUD operations of storage partitions and file systems
 - Installation of operating systems from network through PXE boot
 - Commissioning of parameters of operating system
 - Installation and commissioning of K8s components
 - Installation of desired applications



Cloud Orchestrated Backup & Restore Solution



Engagement

Calsoft was engaged with the client for developing a cloud orchestrated Backup & Recovery solution for VMware vSphere infrastructure using their existing backup and recovery applications.

- Understanding client's existing backup and recovery products
- Packaging components of client's products as micro-services
- Designing interactions between different micro-services
- Designing the SQS based communication layer with the cloud orchestrator



Solution

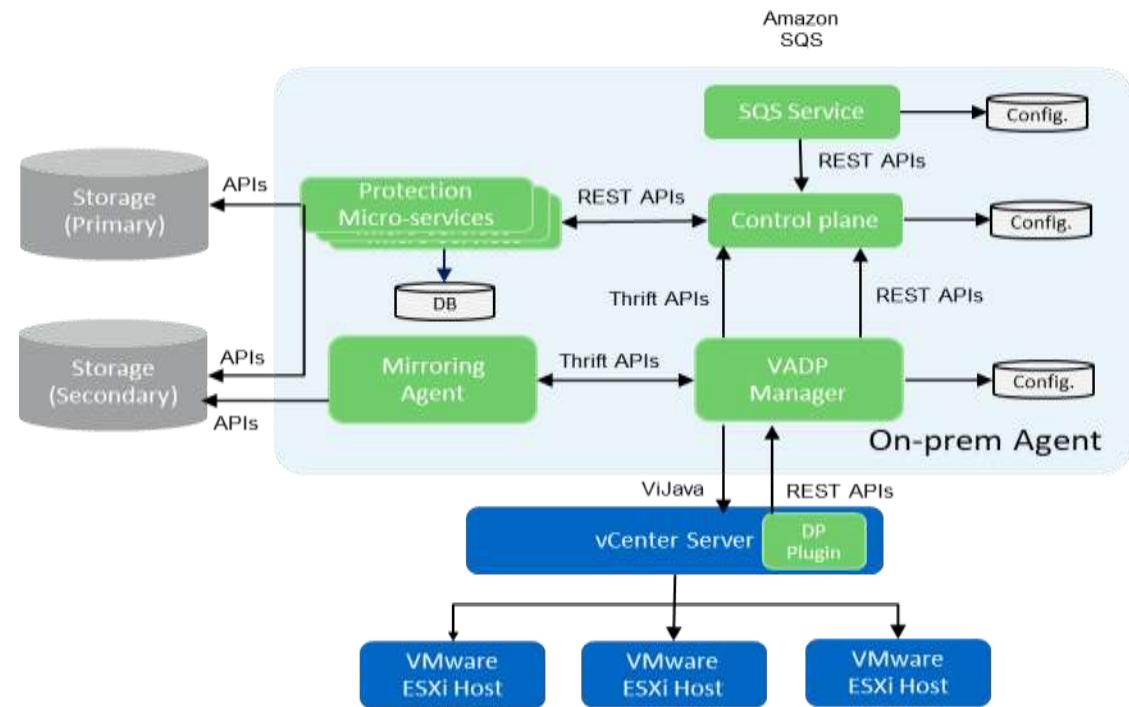
- Developed on premise agent component, packaging different components of solution as micro-services
- Packaged all the micro-services in OVA format for ease of deployment
- Developed framework for supporting deployment, configuration and upgrade of the OVA based Agent component
- Packaged selected services as Docker containers running within the VM
- Designed and developed Amazon SQS based communication channel to facilitate the Cloud based orchestration
- Designed and developed vSphere inventory synchronization mechanism for cloud orchestrator
- Automated the deployment and functional testing of Agent using Jenkins, Python and Selenium



Technology

- Languages: JAVA 8, VMware vCenter SDK, Docker CLI, Amazon SQS, Apache Thrift, Spring-Boot, Jenkins, Python, Selenium
- OS: Debian 9

Cloud Orchestrator



Benefits

- Client could transform their on-premise only model of the existing solution to Cloud orchestrated one
- Reuse of all of the existing solutions components
- Ease of packaging
- Ease of upgrade
- Ease of management using Cloud orchestrator

Develop, Configure & Validate Use Cases for Cloud-based Platform



Engagement

- Calsoft supported the customer with the development, configuration, and validation of use cases for a cloud-based platform.



Solution

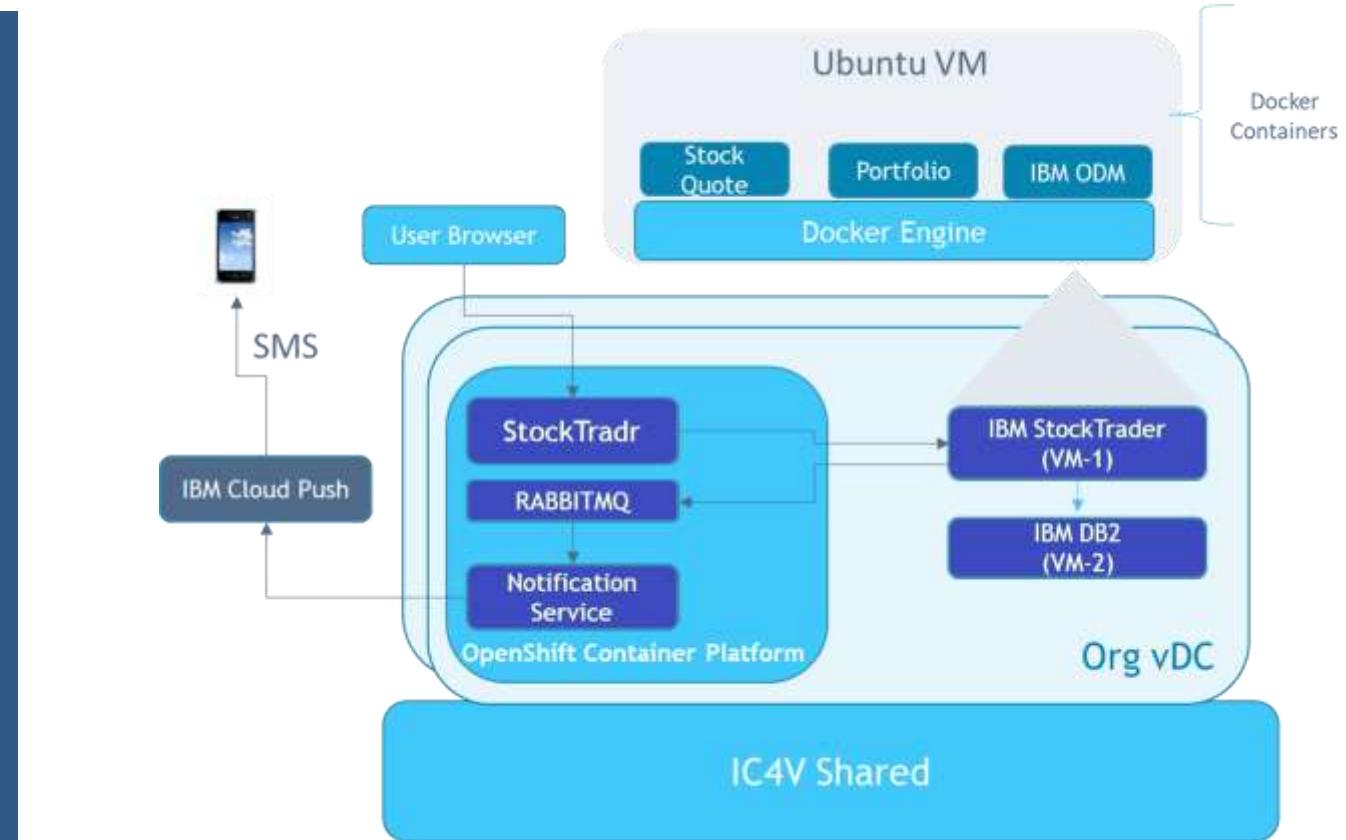
Calsoft helped the customer in showcasing the following use cases for the platform:

- vCAV-based lift-n-shift of traditional (VM-based) application on the platform.
 - Added Docker compose scripts to package the application as Docker containers
 - Deployed the application in VM
 - Exported the VM as OVA
- Showcased platform capabilities for ease of application modernization
 - Deployed the application in OpenShift Container Platform
 - Configured networking parameters
- Showcased ease of use of Bitnami Data Services in the platform
 - Provisioned RabbitMQ instance
 - Modified Portfolio service to send message on RabbitMQ-hosted queue
 - Developed and deployed new Notification service
- Showcased the usage of Object storage through the platform
 - Stored dummy user-specific account statements (PDF format) in MongoDB
 - Fetched & displayed account statements in Tradr UI via new microservice "Statement Service"



Technology

- Oracle, Ubuntu, RabbitMQ, Docker



Benefits

- Seamless working of multiple use cases



Engagement

- Calsoft was engaged with the client to develop an iPaaS application enabling enterprise customer use case automation. The customer had IT workflow to enable/disable VPN configuration based on the user group and project allocation, etc.



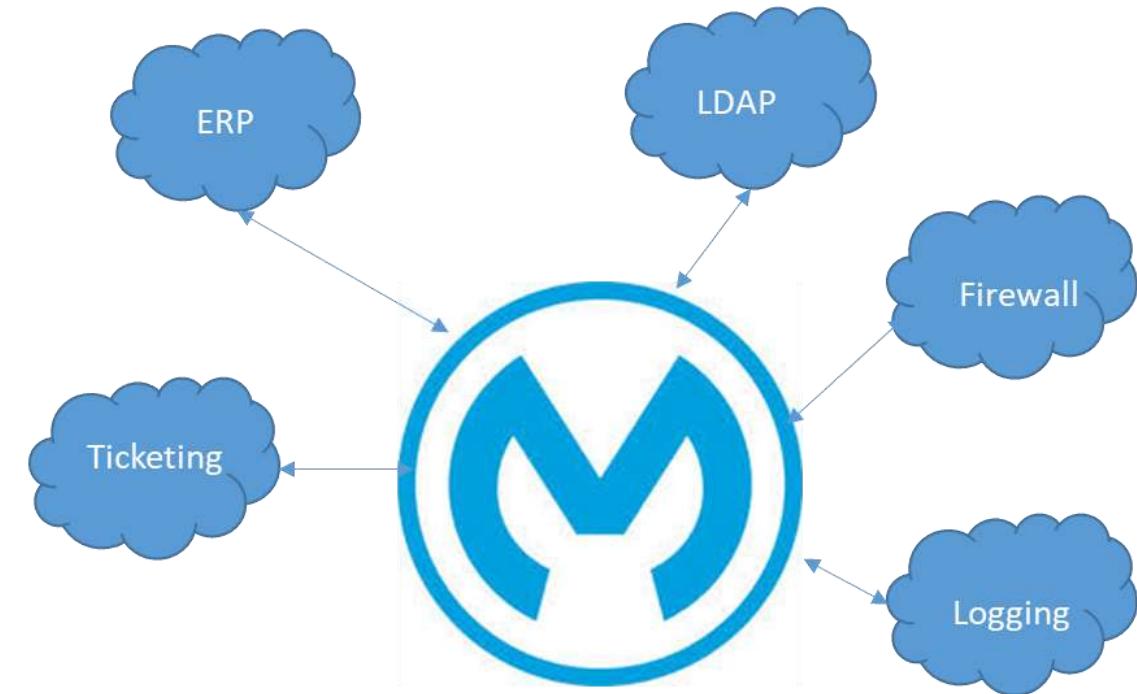
Solution

- The IT workflows were built using Mulesoft to connect to various business systems to bring in enterprise automation. Here's an example
- Calsoft built a MuleSoft application, which gets triggered from an external ticketing system
- The application connects to LDAP for validating that the requested user exists in the system
- The application then connects with ERP systems to get the projects to which the user is assigned, which are then mapped to VLANs associated with these projects
- The VLAN list becomes an input to automate the VPN configuration for the user with access to all the required VLANs automatically



Technology

- JAVA, MuleSoft, Anypoint Studio, API Manager, REST APIs, etc.



Benefits

- All business applications are connected via the same interface for providing enterprise class automation
- Easy and automated provisioning
- Quick and error-free turnaround

API Standardization Using API Gateway for IaaS Solution



Engagement

- Calsoft helped the customer externalize the API layer for a PaaS solution. The core issue of the customer was to reduce the maintenance efforts involved in keeping the provisioning and management APIs standard across a variety of platforms supported in the backend, including VMware, OpenStack, Hyper-V, Kubernetes.



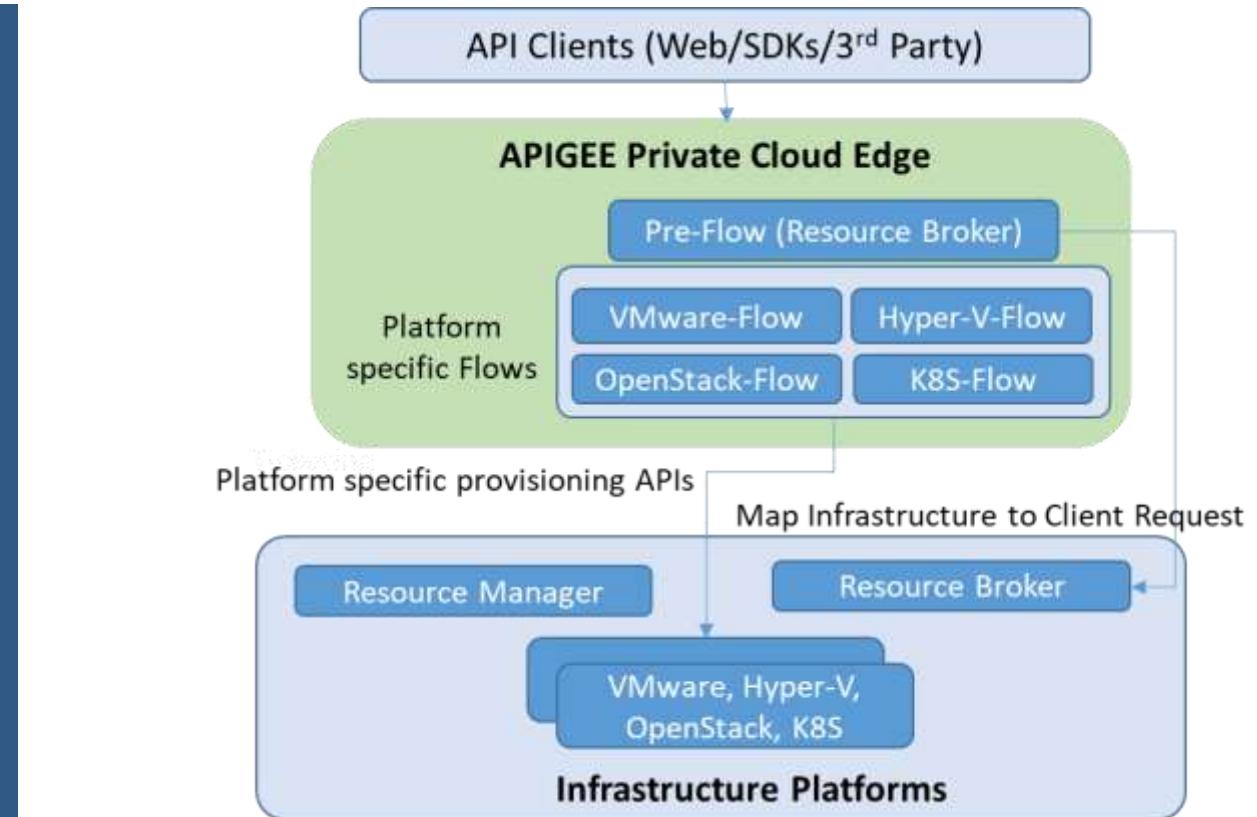
Solution

- Calsoft designed an API orchestration layer using API gateway (APIGEE)
- Flows were developed for each platform individually
- Separate ResourceBroker and ResourceManager maintained the mapping between infrastructure platforms and tenants
- The flows abstracted the code for invoking platform-specific APIs
- The declarative mechanism of specifying conditional flows based on requested resource made the maintenance of provisioning operations easy



Technology

- JS, APIGEE Edge for Private Cloud, REST APIs



Benefits

- Externalized logic for invoking platform-specific APIs reduced maintenance efforts
- Externalized API security concerns
- Easy to add newer infrastructure platforms in the backend

Cloud Cost Calculator

- Development of a three-tier web application for cloud cost comparison



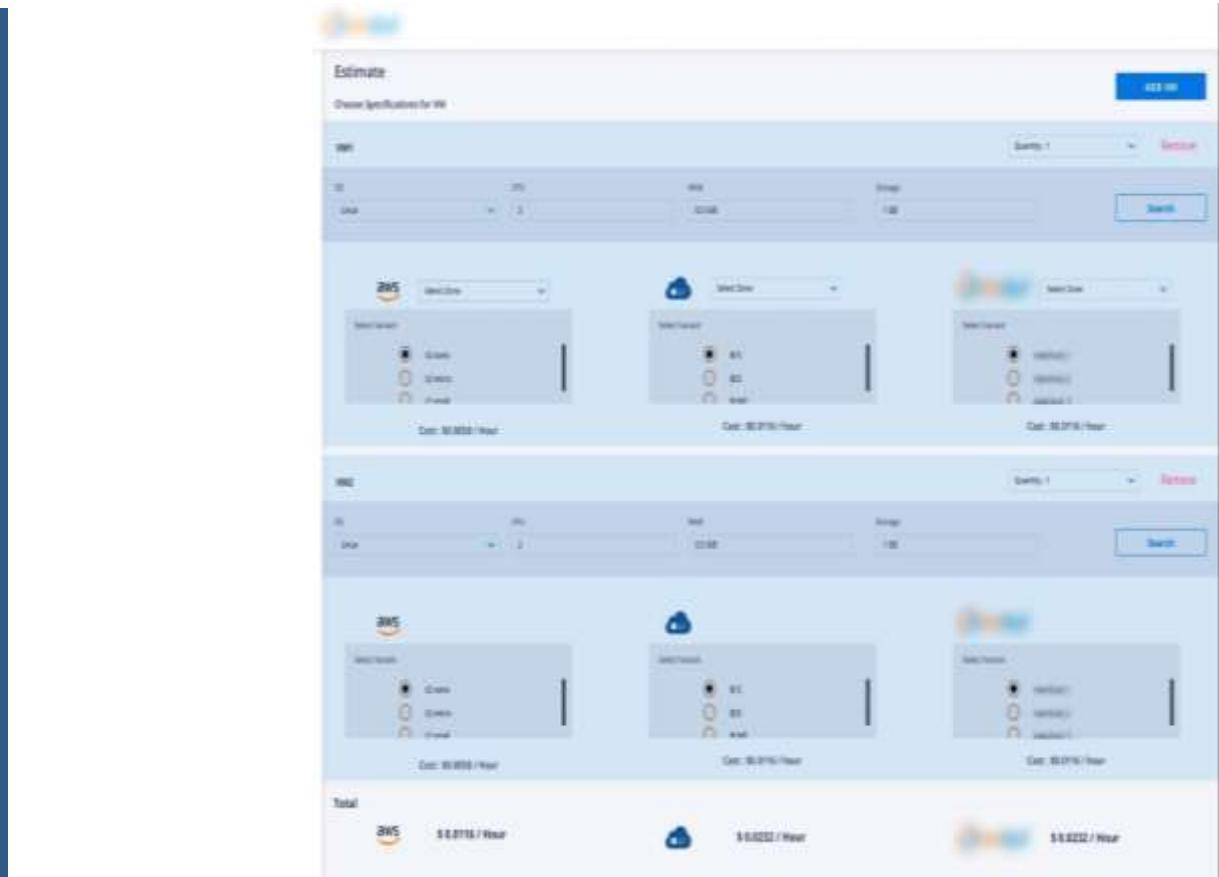
Engagement

- Calsoft was engaged with the customer – a reseller as well as a private cloud provider – to create a cloud cost calculator, using the pricing of offerings from public cloud vendors and the customer's own offerings.



Solution

- Calsoft developed a three-tier web application for cloud cost comparison with the following features:
 - Integration with public clouds through its pricing APIs for fetching the prices of different offerings
 - Pricing engine to provide comparisons, cost savings, and analytics based on different options of Pay-As-You-Go, Dedicated, Long-term, and other pricing models
 - Angular framework based responsive user interface
 - REST API support to export the functionality for integration with other ecosystems



Technology

- Pricing APIs of AWS and Azure, Angular, Python, REST APIs

Benefits

- The customer was able to showcase their offerings vis-à-vis public cloud, highlight the price savings, and improve their end customer conversion ratio.

Dashboard for Multi-Cloud Visibility & Provisioning

- Development of a single app to manage resources across multiple clouds



Engagement

- Calsoft was engaged with the customer to create a single application to manage resources across multiple clouds.



Solution

- Calsoft developed a web application with the following features:
 - Automation modules using Terraform to commission VM, Storage, and Network across Azure and AWS for IaaS requirements
 - Custom Python-based automation suites to configure Day 1 setups
 - Integration with public cloud monitoring APIs to fetch the metrics of different components
 - A comparison engine to provide comparisons, resource utilization, and analytics
 - React-based responsive user interface
 - REST API support to export the functionality for integration with other ecosystems



Technology

- Terraform, AWS and Azure APIs, React, MongoDB, Python, REST APIs



Benefits

- A single application to manage components of different public clouds helped the end users to overcome the learning curve easily.
- The reports and analytics from the same utility enabled better comparison and planning.

SQL Server Migration & Consolidation to SQL Azure Database

- Saving of costs on hosting and managing several databases



Engagement

Calsoft was engaged with the customer for migration & consolidation of their on-premises SQL servers to Azure SQL Database, which included:

- Consolidation & migration of several physical & virtual SQL servers to Azure SQL database
- Validation of each database for its connectivity & configurations



Solution

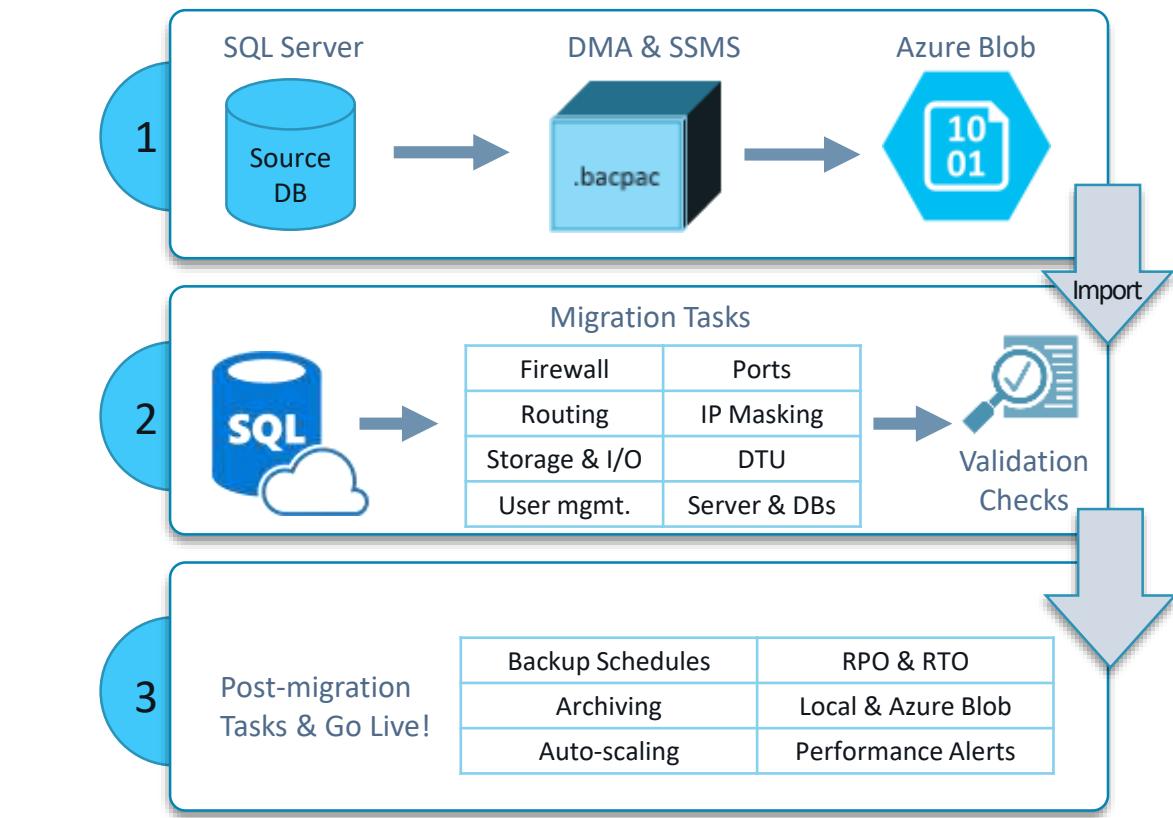
The engagement underpinned:

- Migration assessment & analysis of the source database with Data Migration Assistant
- Migration matrix for network endpoints & firewall rules, access privileges, DNS, storage requirements
- Mapping the DTU of existing servers to the required DB performance DTUs in Azure
- Creation & configuration of Azure SQL logical database server (DNS, firewall, routes, etc.)
- Use of SSMS to create .bacpac file, transfer to Azure storage; import to Azure SQL database
- Configuration of database-level access permissions of each DB; check external connectivity
- Design test plan & create test cases for post-migration checks
- Validation of database sanity & connectivity with the test application
- Execution of test cases on customer scenarios including functionality, performance, and stability



Technology

- SQL Server version – SQL server 2008 R2
- Hypervisor Platform – Physical & Virtual
- Cloud Platform – Azure
- Project tools & applications – DMA, SQL Server Management Studio



Benefits

- Consolidation & migration helped save costs on hosting and managing several databases
- Rigorous testing for connectivity configuration helped front-end apps to smoothly transition to cloud DBs

Hardware Classification Controller – a Scheduling Mechanism

- Contributed towards open-source technology



Engagement

- Calsoft is engaged with the customer in designing and developing hardware-classification-controller (HCC) for classifying BM hosts at Edge-level deployment.



Solution

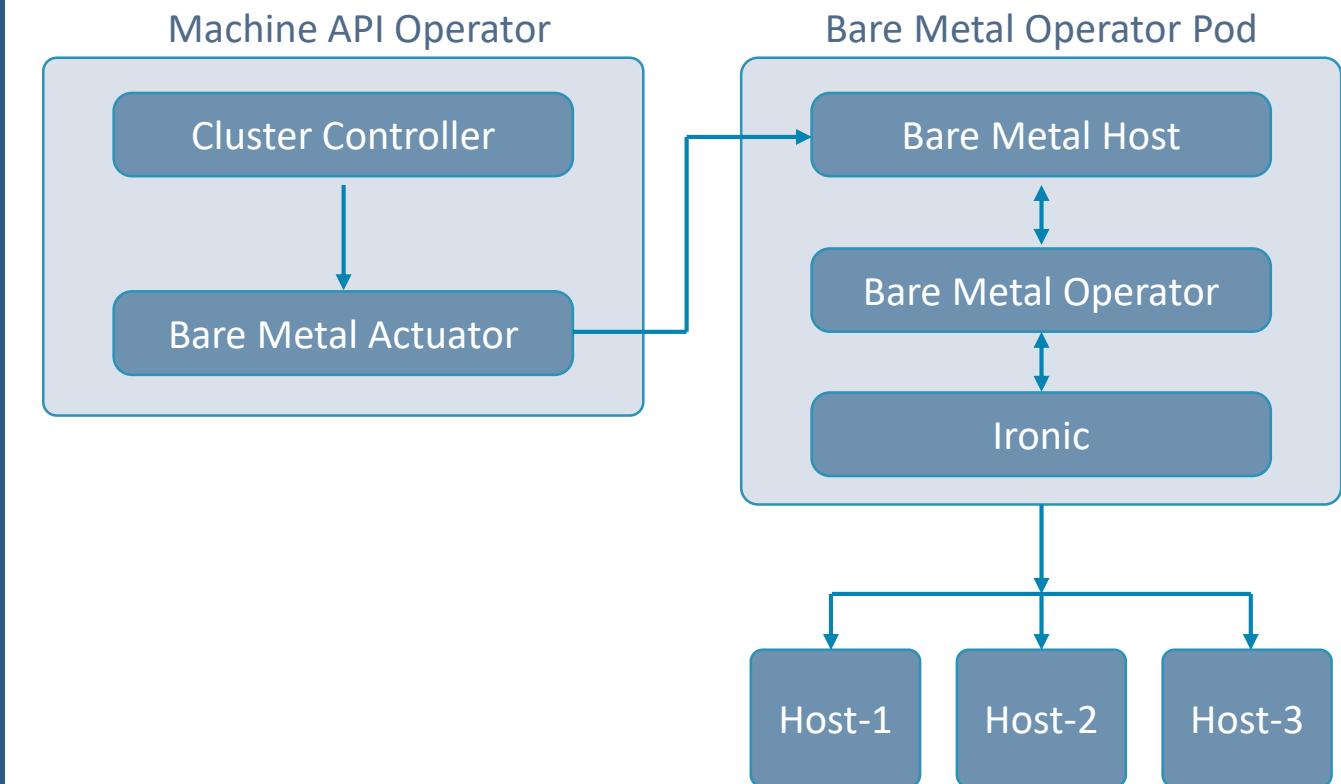
The engagement underpinned:

- Project execution from idea incubation till project formation (open-source project) under the Kubernetes cluster API Provider Bare Metal.
- Enablement of bare-metal commissioning of nodes, with and without specialized hardware, through Kubernetes CRDs, Ironic, and Metal3.
- HCC helps classify hosts for Edge-level deployment before provisioning a cluster or hosts. This helps the users find the right match hosts for their workloads before provisioning.
- Addition of firmware support such as GPU, SmartNIC features to Bare Metal Host in Metal3 and cluster-api project.
- Addition of the hardware validation feature to Bare Metal CRD in cluster API
- Currently working on feature specification design to be provided in the Beta release.



Technology

- Kubernetes, Ironic, Metal3, Golang



Benefits

- Better provisioning
- Contribution towards open-source technology

Subscription-based Limits in SaaSified DP Solution



Engagement

Calsoft helped a multi-tenant DP solution provider to validate the usage of API gateway like APIGEE for applying subscription/license-based limits to its Data Protection APIs.



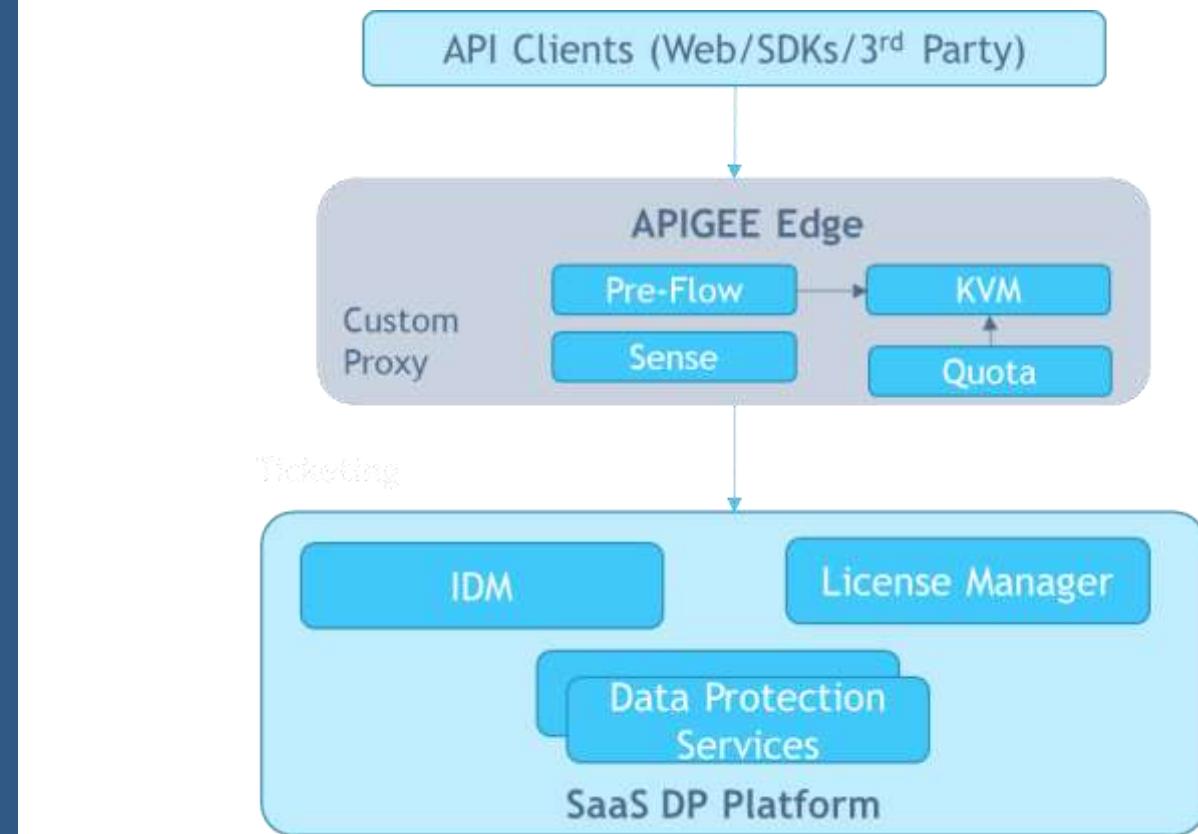
Solution

- Calsoft helped the customer to validate the usage of API gateway and the engagement underpinned:
 - Analyzing DP APIs and the conditions required for limiting their usage
 - Analyzing the usage of APIGEE for applying dynamic limits per tenant
 - Developing a new API Proxy with custom flows and Quota limit in APIGEE
 - Validating the usage limitations for APIs
 - Maintaining the proxy across API version changes



Technology

JS, APIGEE Edge for Private Cloud, REST APIs



Benefits

- Externalized logic for applying limits to API users; cleaner implementation
- Externalized API security concerns
- Ready-to-use API analytics for understanding the feature usage pattern across customers

API Standardization Using API Gateway for IaaS Solution



Engagement

- Calsoft helped the customer externalize the API layer for a PaaS solution. The core issue of the customer was to reduce maintenance efforts involved in keeping the provisioning and management APIs standard across a variety of platforms supported at the backend including VMware, OpenStack, Hyper-V, Kubernetes.



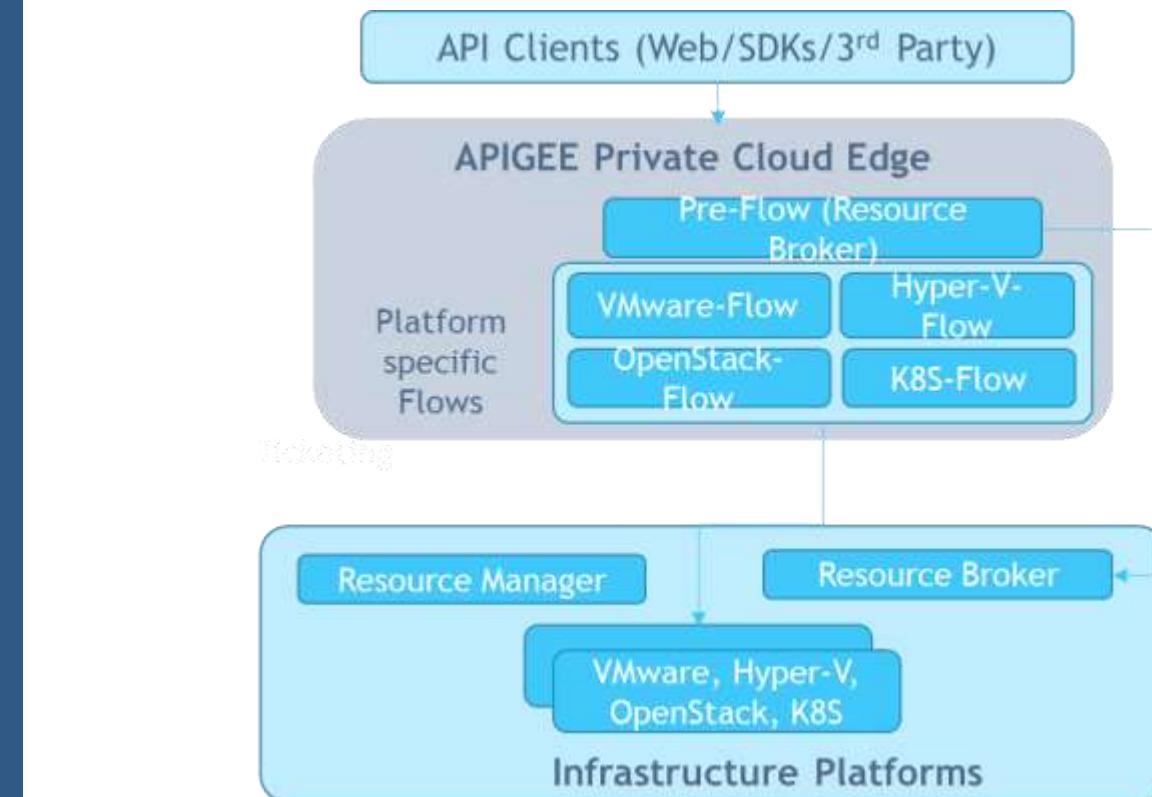
Solution

- The engagement underpinned:
 - Designing an API orchestration layer using API gateway (APIGEE)
 - Developing flows for each platform individually
 - Maintaining a separate ResourceBroker and ResourceManager for the mapping between Infrastructure Platforms and Tenants
 - The flows abstracted the code for invoking platform specific APIs
 - The declarative mechanism of specifying conditional flows based on requested resource made the maintenance of provisioning operations easy



Technology

- JS, APIGEE Edge for Private Cloud, REST APIs



Benefits

- Externalized logic for invoking platform specific APIs, reduced maintenance efforts
- Externalized API security concerns
- Easy to add newer infrastructure platforms at the backend

Cloud Cost Optimization Using AWS Lambda

Engagement

Calsoft owns the CloudOps function for the customer's SaaS-based product. As a part of the cost optimization mandate, Calsoft undertook the project of optimization of EC2 usage through serverless AWS Lambda.

Benefits

- The number of EC2 instances was reduced by 30% and the overall AWS cost per month was reduced by 27%
- The architecture of the solution became lean and more maintainable
- This set the stage of further improvisation of the software architecture and enabled movement from the stateful to the stateless pattern

Technology

- AWS Lambda, AWS EC2
- Java, Python
- AWS Aurora, AWS DynamoDB

Solution

- The customer's SaaS-based product consisted of multitenant architecture to cater to its end customers
- Each tenant's deployment consisted of several EC2 instances - a few being perpetual and a few spawned on need basis
- As a part of the cost optimization exercise, Calsoft mapped different compute functions of the application
- Services and features were segregated for per-client-driven vs generic-application-driven objectives
- Different functionalities were identified that could be function without dependencies
- Such functionalities were then converted to Lambda functions to reduce the responsibilities of the service and daemons
- This helped reduce the number and size of the EC2 instances required
- A few examples of the converted Lambda functions are:
 - Periodic polling for specific flag value
 - Weekly report generation
 - Backup of configuration database



Consulting – Design, Deployment, Automation & Ops Strategy

Engagement

Calsoft was engaged by a startup for consulting services for their new Cloud product. The engagement underpinned:

- Analysis of the product idea, design, use cases, and market
- Consulting at various stages of the product lifecycle to include recommendation & blueprints for Cloud selection, design, deployment & operations

Solution

- Calsoft Product & Cloud Architects worked together in assessing the product, design, scale, use cases, and market
- Based on the findings, Calsoft recommended the Cloud & Cloud Services to be used in the product design/development
- The Calsoft team also helped the customer in setting up a CI/CD pipeline from day#1 enabling 100% automation right from the beginning
- The Calsoft team shared the blueprint for deployment design including VPCs, ALB, public/private subnets, peering, backup, failover, security config, IAM, etc.
- As product development matured, the Calsoft team also strategized the cloud operations for day-to-day monitoring and management

Technology

- OS Platform: Linux
- Cloud Platform: AWS
- PaaS: VPC, Lambda, SQS, SNS, S3, IAM, Peering,
- Tools: Terraform, Jenkins, CloudWatch, PagerDuty

Customer Product Phase



Idea Phase

Calsoft Cloud Consulting (“look ahead” strategy)



- Idea/Product Analysis
- Cloud Selection

Product Design Phase

- Cloud Deployment Design
- CI/CD Setup

Product Development

- Cloud Automation

Beta Trial

- 24x7 CloudOps Strategy

Benefits

- The customer benefited from Calsoft's years of experience in Public Cloud Engineering, design & operations
- The customer succeeded in reducing the time-to-market with next phase design readiness with Calsoft Consultants as their engineering team continued on previous phase implementations

Application Migration & Modernization

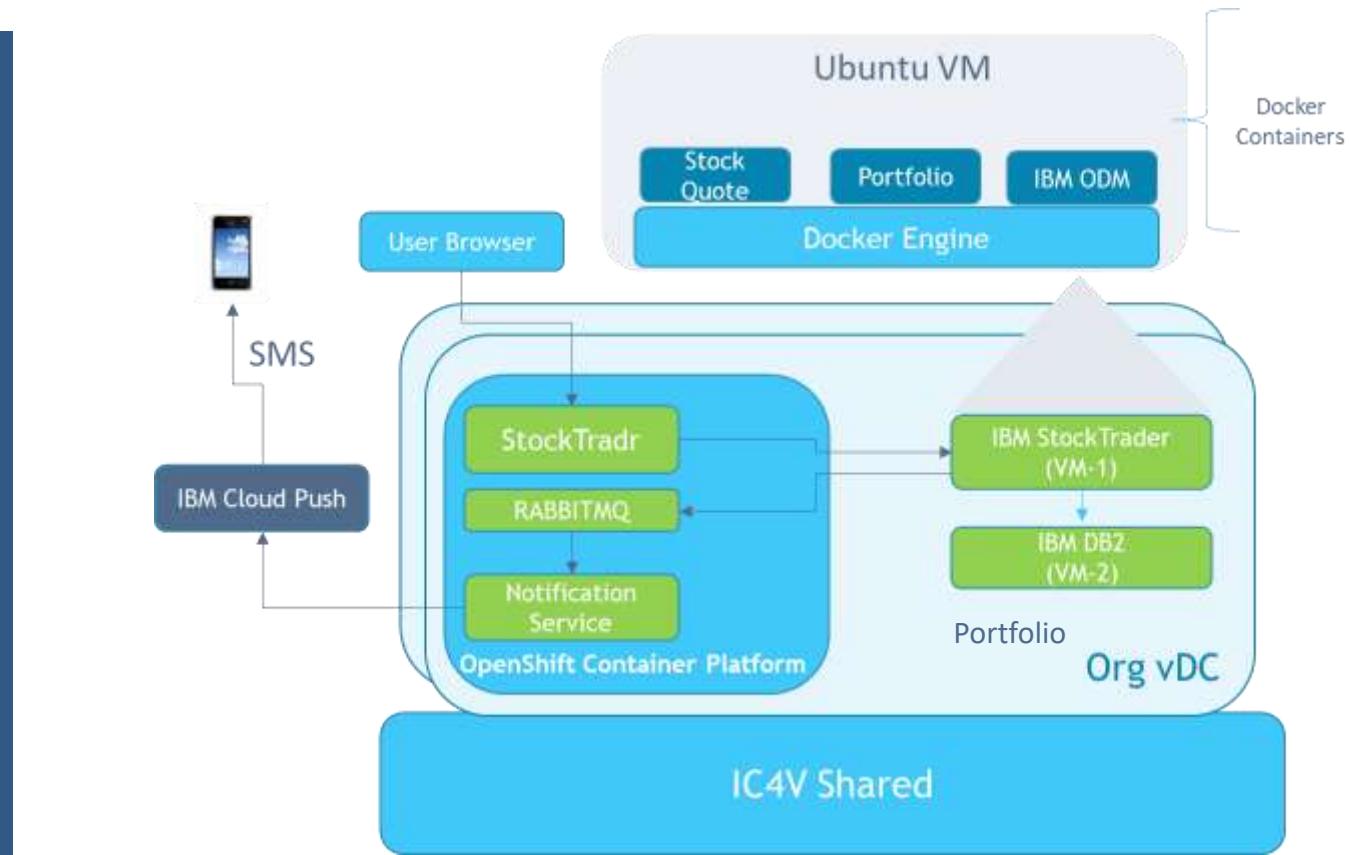
Engagement

Calsoft was engaged by the customer for development, configuration, and validation of a migration & modernization use case.

Solution

Calsoft helped the customer in showcasing the following use case :

- vCAV-based lift-n-shift of traditional (VM-based) application on the platform.
 - Add Docker compose scripts to package the application as Docker containers
 - Deploy the application in VM
 - Export the VM as OVA & migrate the VM to Cloud
 - Deploy the application in OpenShift container platform
 - Configure networking parameters
 - Provision RabbitMQ instance
 - Modify portfolio service to send message on RabbitMQ-hosted queue
 - Develop and deploy new notification service
- Showcase usage of object storage through the platform
 - Store dummy user-specific account statements (PDF format) in MongoDB
 - Fetch and display account statements in Tradr UI via new Microservice "Statement Service"



Benefits

- Application migration to cloud
- Cloud modernization

Technology

- Oracle, Ubuntu, RabbitMQ, Docker, OpenShift

Engagement

Calsoft developed a tool that can be used to convert a live VM into container images. Major points are:

- Conversion of live VM into Docker Containers without any interruption in the VM
- Conversion of a number of applications (running in the VM) into containers

Benefits

- Tool handles multiple running apps for conversion
- Applications running in the container require less memory as compared to VM
- No OS required for the application; the tool handles dependences of apps
- Automated way to convert VM applications into containers

Technology

C, Python, Linux-ubuntu, centOS



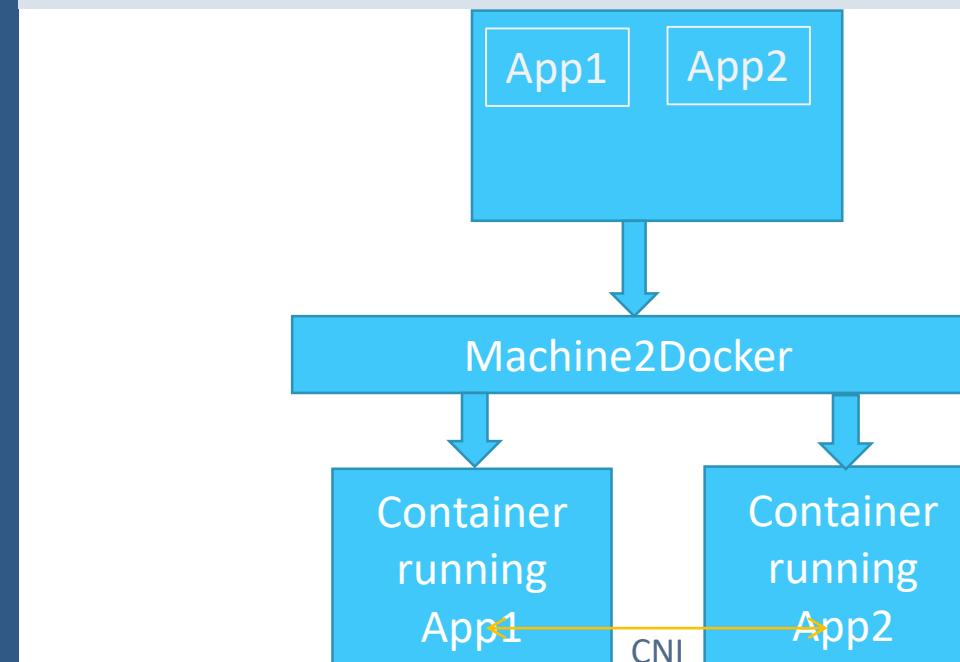
Solution

Features:

- Convert any Linux-based VM into container
- Create a number of containers as per the applications running on the VM. e.g: web server, database, client-server architecture

Functionality:

- Client-server architecture based
- Automated to convert running application into containers
- Reusability of Docker images
- Communication between applications running inside the VM is handled
- Tool works on a VM can within the host machine or other machine over the network



Migration of Security Audit & Compliance Application to Cloud

Engagement

Calsoft was engaged by the customer for re-architecture & migration of their network security & compliance application to Azure cloud. The engagement underpinned:

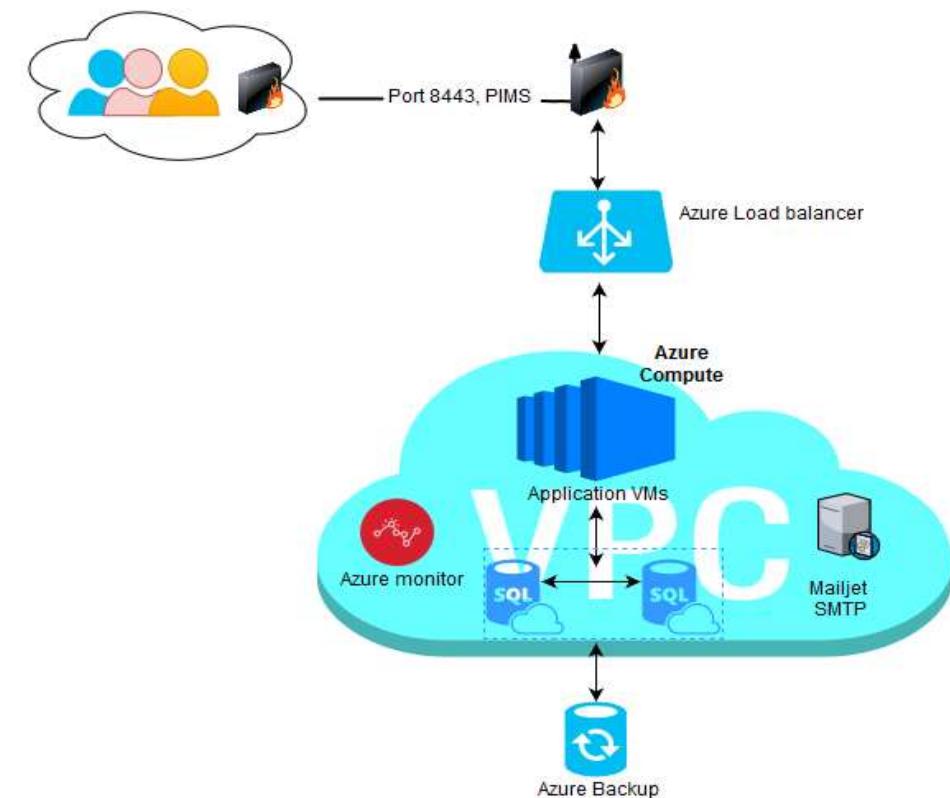
- Analysis of current architecture & redesigning modules as scalable services
- Migration execution and validation of application functionality

Solution

- Assessment & analysis for existing architecture, modules & inter module communication. Prepared Application Topology and Dependency map
- Re-designed the application using Cloud native technologies (LB, DNS, VM sizing & pricing, scale-out strategies, etc.)
- Changed required module interfaces (Business logic) to take advantage of IP communications within VPC (from IPC to IP Communication)
- Designed test plan & created test cases for post-migration checks
- Designed and executed test workflow for migration to identify possible issues
- Used Azure resource monitoring functionality for performance & stability

Technology

- OS platform: Windows
- SQL Server version: SQL server 2012 STD
- Cloud platform: Azure
- Project tools & applications: Azure native tools, MVMC 3.0 (P2V tool)



Benefits

- Re-Architecting the application for cloud before migration ensured future scalability needs (Cloud native ready)
- Application's availability in Azure marketplace enabled targeting of a large customer base

Engagement

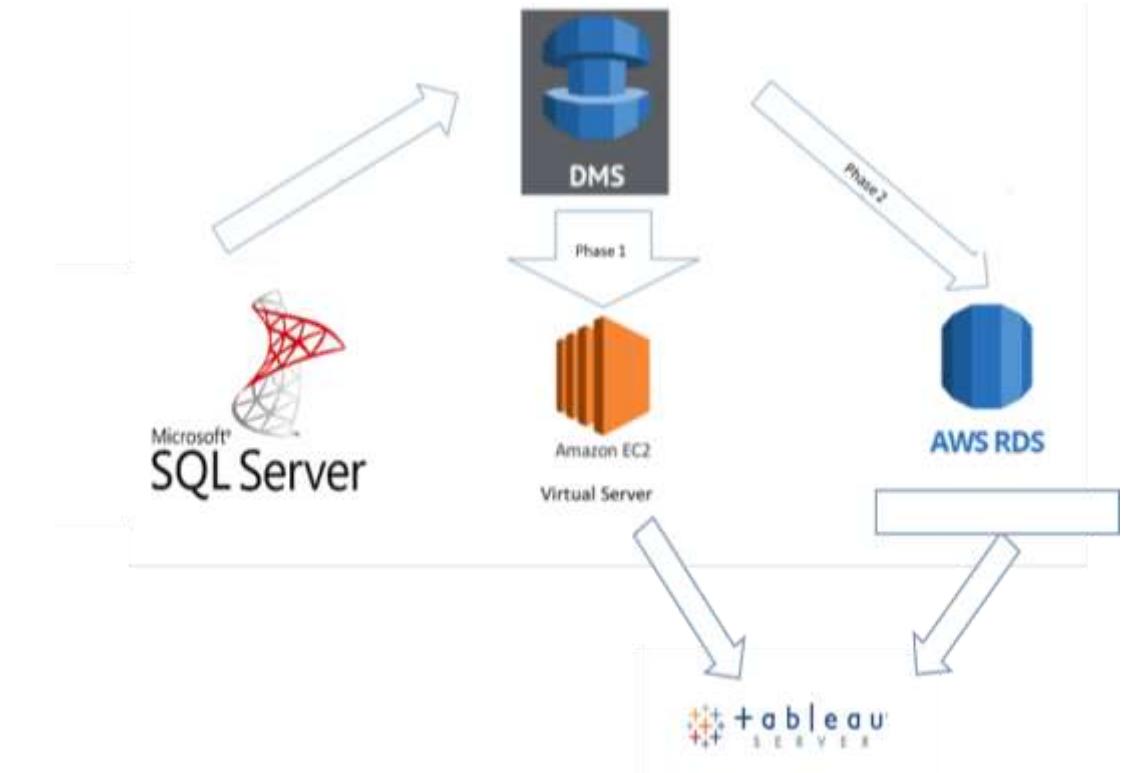
- The subject of migration was a fast-growing set of analytical databases and BI applications with some ad-hoc interfaces.
- The main issues with the customer's on-premises databases were high cost and complexity of support and the inability to scale quickly when needed.
- Teams tried to work around this lack of agility by requisitioning and holding resources in excess of and in advance of true needs, anticipating delays.
- These problems compounded each other and resulted in vicious, unbreakable cycles of project delays and silos of unutilized infrastructure resources.
- Another factor was the expectation of autonomy by business units in managing their own infrastructure, which made IT support difficult and increased technical debt.

Solution

- Migration was achieved in 2 phases as a risk mitigation measure. In the first phase, a lift-and-shift was performed onto EC2 VMs. After a set cooldown period, final migration to RDS was performed.
- The pattern was repeated for all the databases.
- The BI applications were also updated in 2 phases.

Technology

- Database Migration Service (DMS) by AWS + Schema Conversion Tool
- Amazon EC2 virtual machines
- AWS Relational Database Service
- Microsoft SQL Server



Benefits

- The required agility and scalability were achieved for the project teams.
- Total cost of ownership became more manageable and predictable.
- Ease and effectiveness of infrastructure governance was highly improved.

Serverless Applications – Error Validation & Content Marketing

Engagement

Calsoft was engaged by the customer for providing managed services around error monitoring.

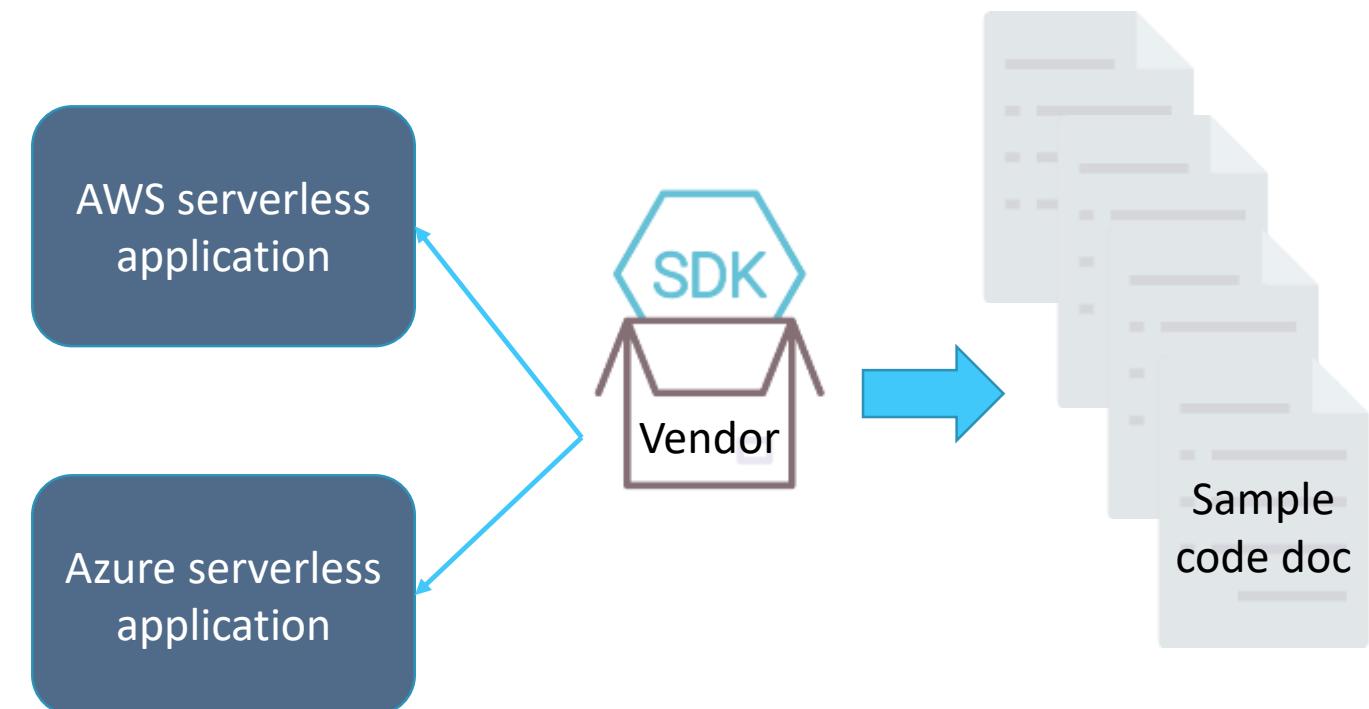
Solution

The engagement underpinned:

- Understanding the customer environment
- Getting well-versed with the customer's SDKs and platform
- Identifying the use cases for serverless implementation
- Implementing POC for serverless implementation using SDK
- Providing monitoring services that help software teams to discover, triage, and prioritize errors in real time
- Identifying and fixing issues in the SDKs
- Creating engineering knowledgebase in terms of sample codes, documents, etc. for serverless platforms

Technology

- Java, Python
- AWS, Azure
- AWS Lambda, Azure functions
- Linux system tools



Benefits

- Calsoft created industry standard sample codes and documentation that enabled increased adoption
- Calsoft identified and fixed issues in the SDKs
- Calsoft helped in onboarding new customers with in-house expertise in the cloud ecosystem

Content Distribution: AWS Cloud Native Apps

Engagement

The customer's platform is global and serverless. It enables users to pay and access content and videos, it distributes content and videos to premium users with short-lived links.

Solution

For the customer, Calsoft engineered and integrated the entire platform with AWS native services and improved the content delivery platform.

1. Premium User service:

- The client through HTTPS interacts with the Amazon API Gateway.
- The Amazon API gateway invokes the AWS Lambda and Query/read data from the DynamoDB table, which contains the User table with types of Users.

2. Authentication:

- The client is authenticated through Cognito and Verify the authentication by the API gateway

3. Storage Service:

- S3 is used by the customer to store the Content and Videos

4. Security:

- Global Distribution and Secure Distribution CloudFront with OAI (Origin Access Identifier) interacting with the S3 Bucket policy

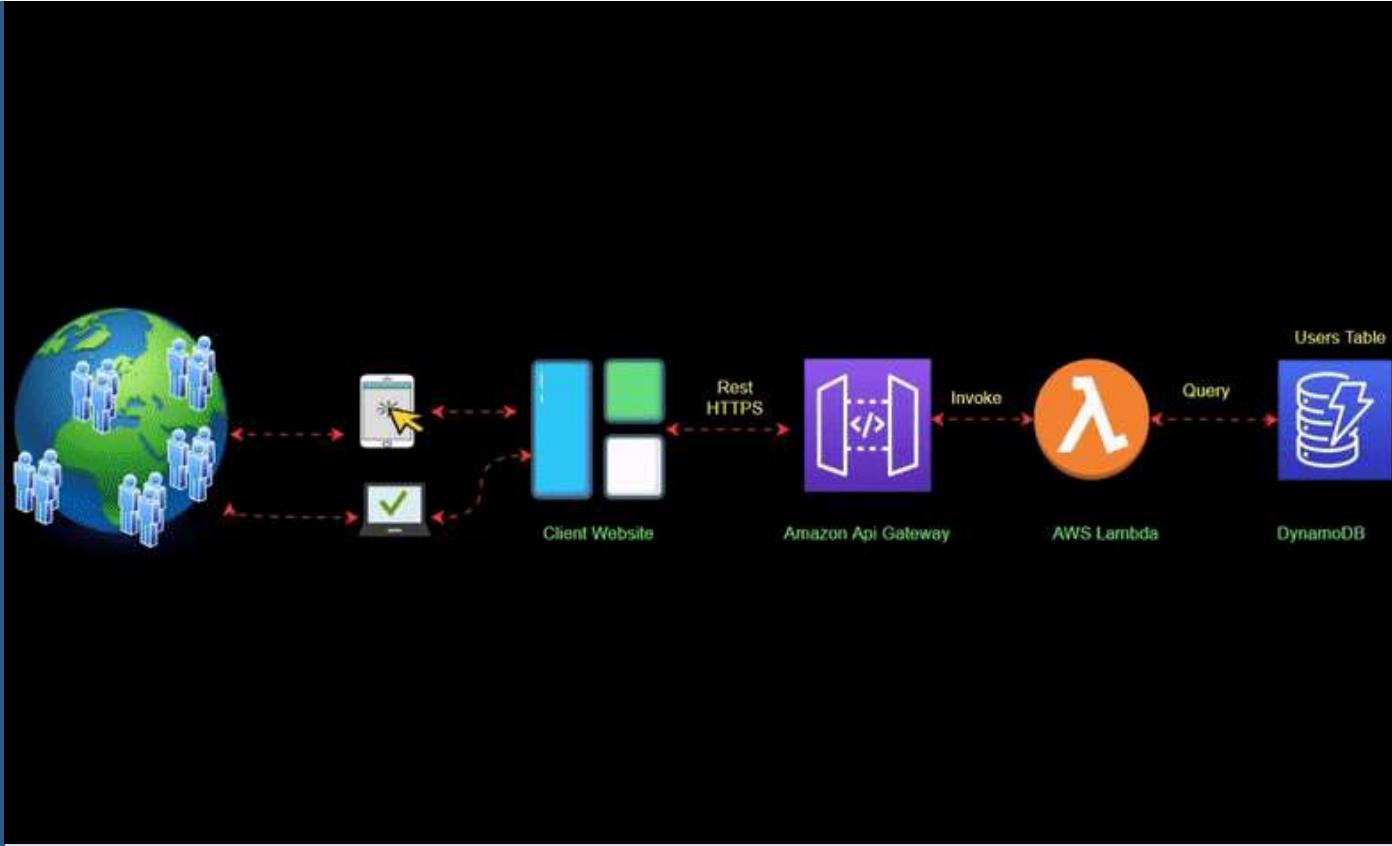
5. Distribute the Content to Premium User:

- The client invokes the API gateways to get a signed URL, which requests through a Lambda function
 - To get the User details from the Dynamo DB
 - To get the Signed URL from the CloudFront with Expiration time

This Signed URL is provided to the Client to use this URL through Cloud front for Global Distribution and provide better services to Premium Users.

Technology

AWS Serverless: CloudFront, DynamoDB, Cognito, Lambda, S3



Benefits

- Adhere strictly to the cloud native principles
- Complete Serverless and Scalable solution
- Highly secure service where users cannot bypass



Engagement

Calsoft was engaged by the customer to build a CI/CD automation pipeline for their Cloud product. The engagement underpinned:

- Building CI/CD pipeline to automate the development to production process
- Providing flexibility to build and release features faster
- Building of unit tests to make sure new code/feature won't break the existing functionality



Benefits

- The customer can now easily make changes to the code
- Build & deployment process is automated
- New features can be easily added and released without any manual intervention
- Developers get notified if the build fails along with the reason for the failure
- Decreases code review time



Technology

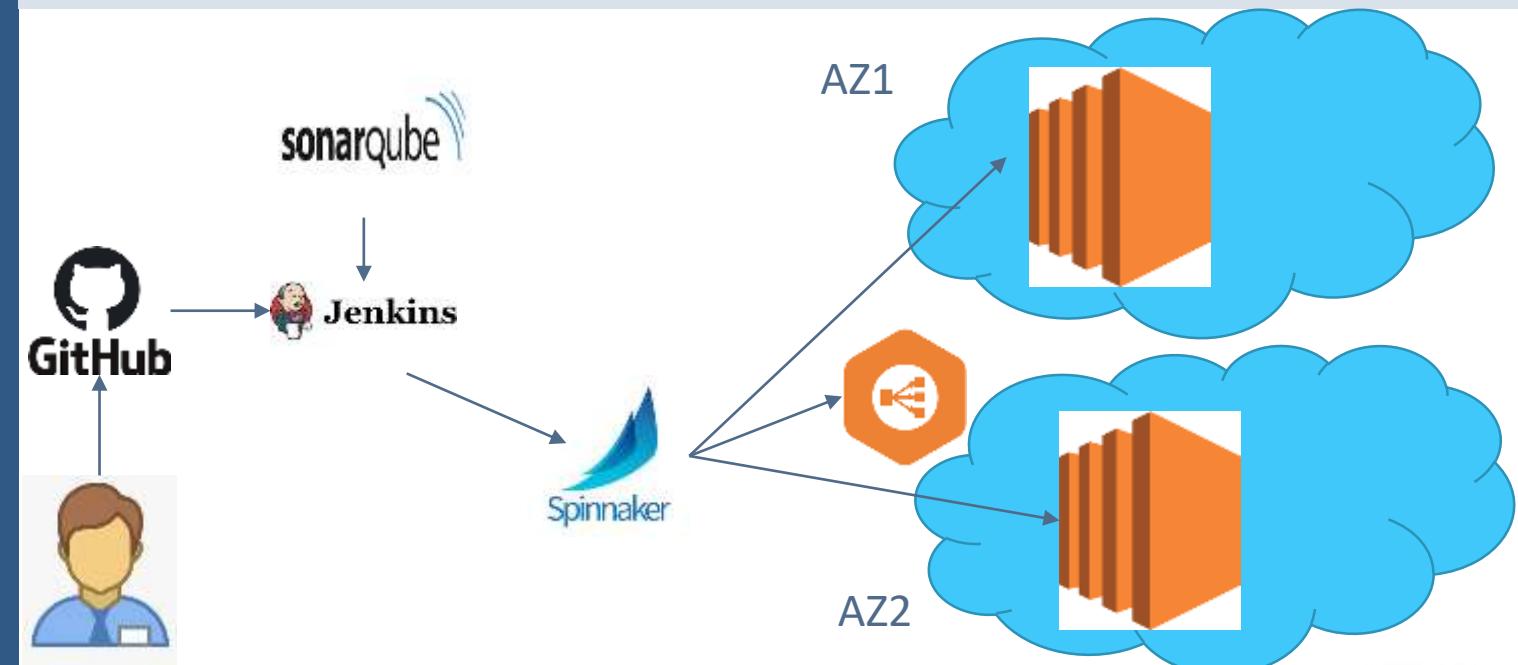
- Github, Jenkins, SonarQube, Maven, SonarQube, AWS LB, AWS EC2



Solution

Calsoft built the CI/CD automation pipeline and successfully delivered on the customer expectations:

- Jenkins was installed and configured to build the code for every GitHub check-in.
- Review board was used to automate the process of code reviews and commits.
- Maven was used to create the artifacts to put it into production.
- Spinnaker was used as a multicloud deployment tool.



Cloud Deployment Automation for Multi-tenant SaaS Product

Engagement

Calsoft was engaged by the customer in their cloud roadmap of offering their on-prem application to Azure. The project objective was to automate the deployment of cloud infrastructure, SaaS-based application components, orchestrate application launch, on-board end customers, and provide monitoring and management capabilities.

Solution

Design

- Calsoft designed the cloud architecture to host the SaaS application. This involved considerations of current and future requirements of compute and storage.
- Azure was used as the base platform for the cloud stack.

Deployment Automation

- Designed and developed an application to launch different version of the customer's application, as per the selected configuration by the admin.
- The launch would trigger the spawning of necessary VMs in the private cloud with the necessary storage and networking configurations.
- It would also trigger the orchestrator to chain the sequence of application and service launch and eventually present the end customer with application UI.

Post-deployment Monitoring

- The application included a monitoring component for post-deployment application monitoring, reporting, and management

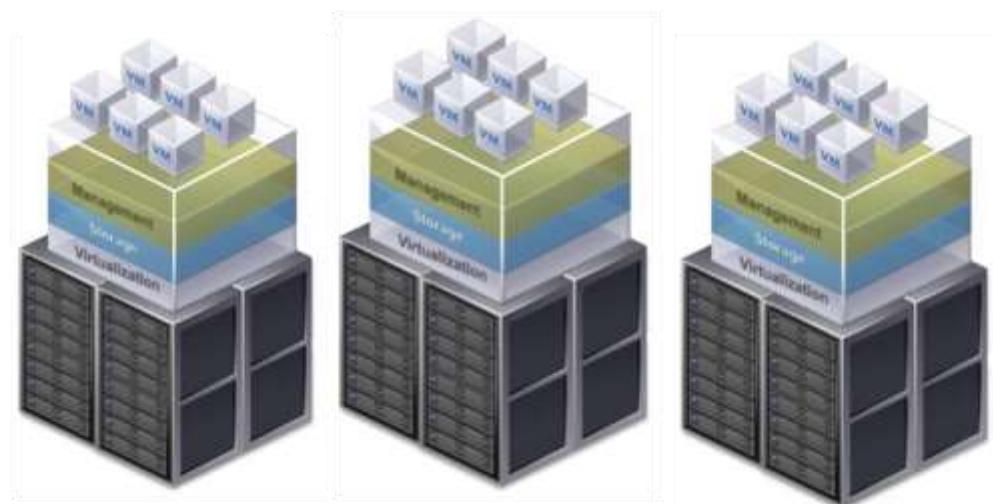
Technology

Azure, Microsoft, Terraform, MySQL, IIS, Azure Resource Manager (ARM) Template

Deployment Automation

Orchestrator

Monitoring



Benefits

- Quick turnaround of cloud offering, from existing on-prem portfolio for the customer
- End-to-end deployment automation helped minimize human intervention



Engagement

Calsoft is engaged by the customer for providing 24*7 CloudOps services. The aim is to provide monitoring and L2 support for pre-empting infrastructure failures to avoid any service outages for end customers, mostly enterprises.



Benefits

- The customer need not worry about the operational status of the cloud application
- The Calsoft team automated some of the repetitive tasks of monitoring & typical debug and issue resolution steps



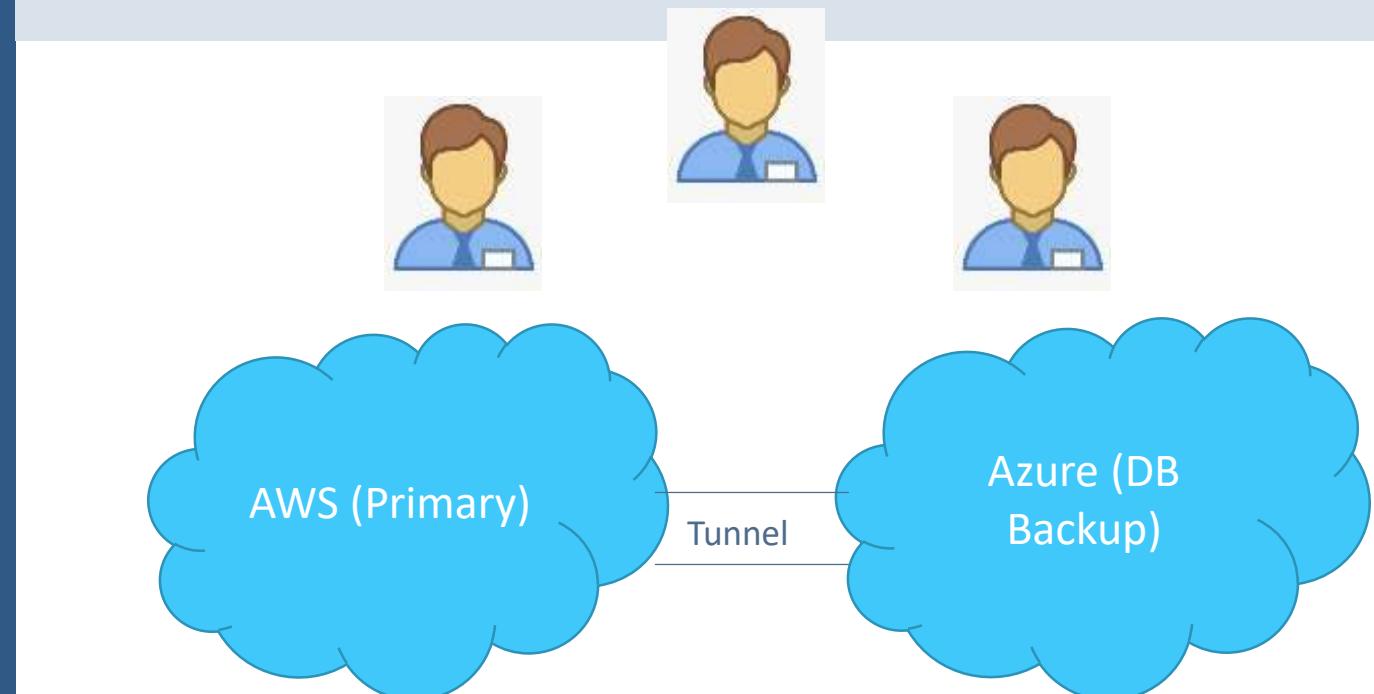
Technology

- Ticketing: JIRA
- Incident Management: PagerDuty
- Monitoring: NewRelic (APM, CPU, Mem, etc.), Graylog, CloudWatch
- Runbooks: Confluence
- Configuration: Ansible
- Other tools: AWS, Azure, VPN Tunnel, Linux system tools
- Graphana: API GW Monitoring, Biz alerts, etc.



Solution

- Monitoring health of the different applications running in the AWS cloud using ECR (Container Registry), EBS, EKS, EC2, MSK (Managed Kafka), ESS (ElasticSearch), and other services
- Monitoring cloud infrastructure, scaling, reporting incidences, and participating in security compliance audits
- L2 Support, user access management, multi-factor authentication
- Executing incident runbooks
- Coordinating with ISPs for outages/maintenance windows



Cloud Migration/Cloud DR Product Testing



Engagement

Calsoft was engaged by the customer for cloud migration/cloning testing. The engagement underpinned:

- Expanding QA team with Cloud, Backup/Recovery, Networking & Virtualization expertise in a short period without compromising on quality and time
- Performing quality testing with limited documentation available



Benefits

- Multiple critical bugs removed in Production & Staging environments
- Product life cycle accelerated



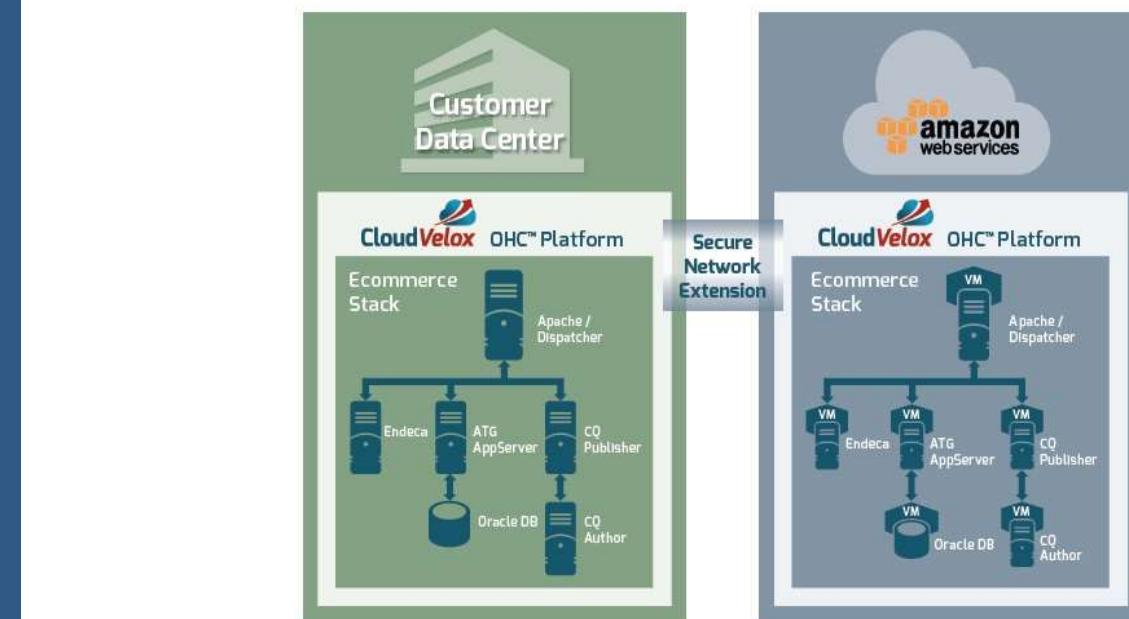
Technology

- OS Platform: Windows 2k8, 2k12, 2k12R2
- Hypervisor platform: ESX, Hyper-V
- Cloud platform: Amazon, Azure
- Applications: Exchange, SharePoint Cluster
- Project tools & applications: Wireshark



Solution

- Designed test plans, test setups & executed test cases for Cloud Migration & Cloning on AWS & Azure
- Wrote test cases on customer scenarios, including functionality, performance, stability, usability, and negative scenarios
- Installed & tested real-world applications like Exchange, SharePoint Cluster, JIRA, Redmine, etc. with Windows domain environment
- Suggested product improvement ideas based on testing experience on this & similar other products



Cloud Deployment Automation for Multi-tenant SaaS Product

Engagement

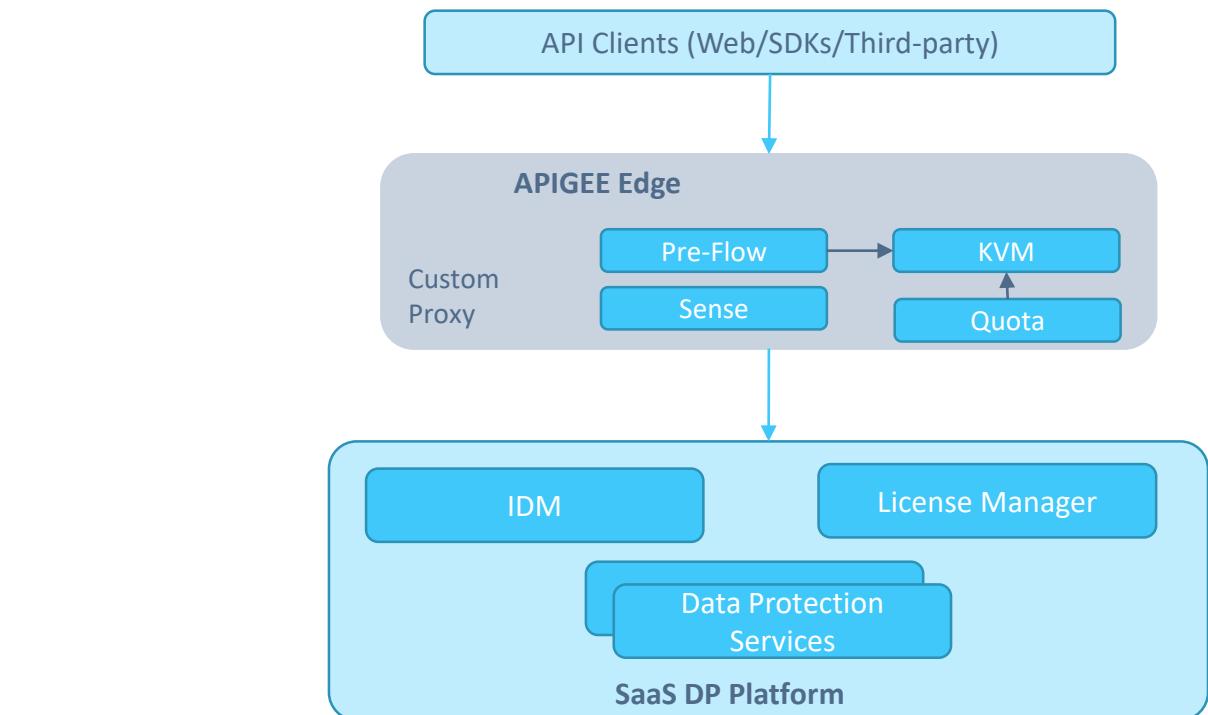
Calsoft helped a multi-tenant DP solution provider to validate the usage of an API gateway like APIGEE for applying subscription/license-based limits to its Data Protection APIs.

Solution

Analyzed DP APIs and the conditions required for limiting their usage
Analyzed the usage of APIGEE for applying dynamic limits per tenant
Developed a new API Proxy with custom flows and Quota limit in APIGEE
Validated the usage limitations for APIs
Maintained the proxy across API version changes

Technology

JS, APIGEE Development Portal, REST APIs, etc.



Benefits

- Externalized logic for applying limits to API users resulted in cleaner implementation.
- Externalized API security concerns.
- Ready-to-use API analytics for a better understanding of the feature usage pattern across customers.

Cloud-based Appliance Visualization Platform

Engagement

Calsoft was engaged by the customer for developing a cloud-based management platform that provides insights and analytics information driven from telemetry data coming from on-premises Backup/Recovery Appliance.

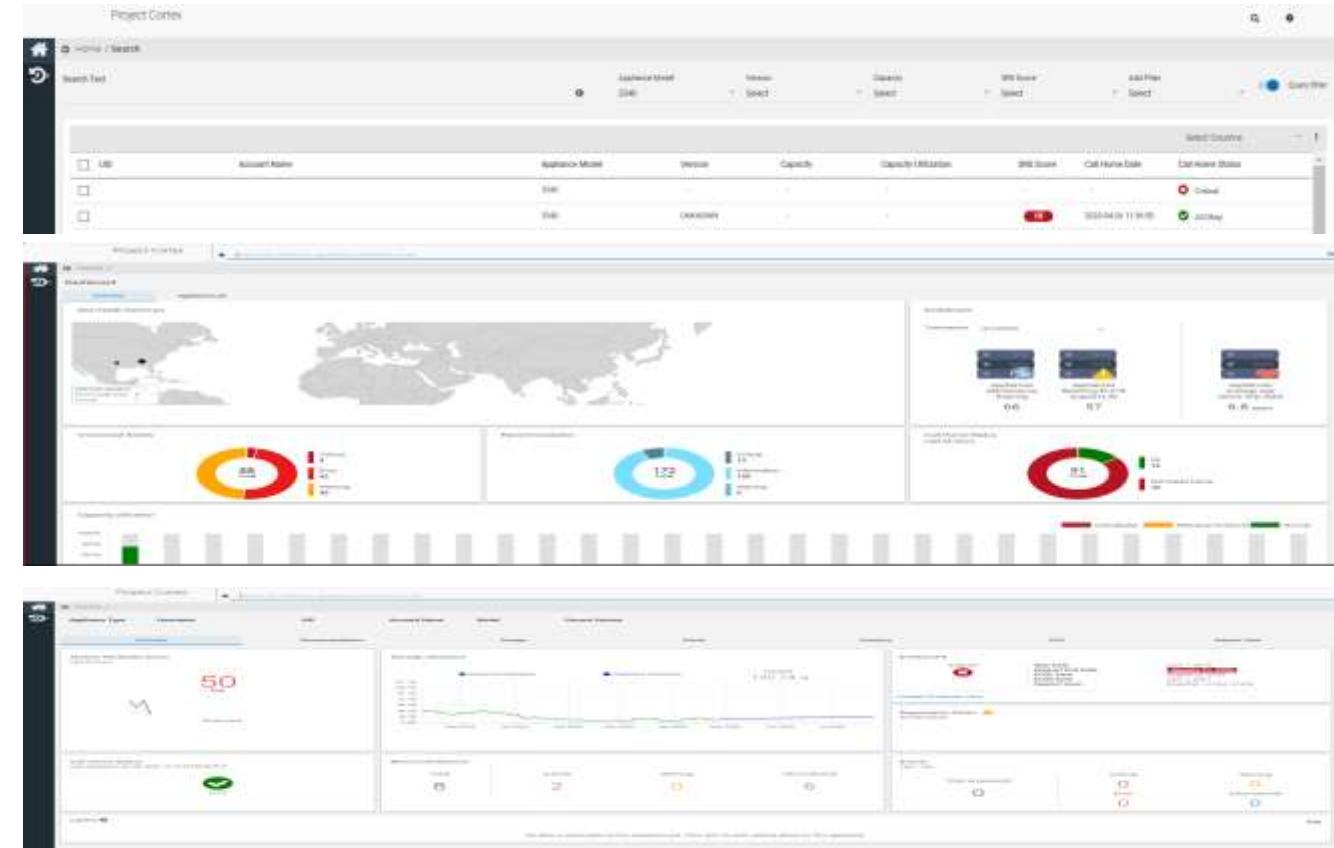
Solution

Calsoft helped the customer design & develop a microservices-based multi-tenant portal. The engagement underpinned:

- Calsoft provided UX, UI & backend design support for various services of the portal. Also designed the search & analytics dashboard services.
- The search service utilized ElasticSearch DB for indexing multiple properties of the appliance and provided features such as:
 - Auto suggest for appliance
 - Advanced filter-based search
 - Tagging appliances
 - Capability to register, manage, search on-premises backup appliances
- The dashboard comprised performance statistics, health, alerts, capacity planning, recommendations for common issues, etc.
- Worked on end-to-end automation & manual testing for all the features

Technology

- Java, Angular 8.x, MongoDB, ElasticSearch, Logstash, Bitbucket, AWS, Jenkins, JIRA, Confluence



Benefits

- Better UI and visibility of all appliances in a single customer dashboard by its geo location and aggregated analytics information
- Better auditing and tracing of user activities
- Reduced support workload by providing intelligent recommendations based on AI engine analyzing support data

GCP Plugin for Cloud Based DR Solution



Engagement

Calsoft was engaged with a Fortune-listed company for the development and enhancement of GCP Plugin & WebUI for its Cloud DR solution. Engagement underpinned:

- Discovery of assets, usage with data update/refresh.
- Cross Region & Projects replication of snapshots (VM & Disk snapshots)
- WebUI enhancements to enable GCP regional hierarchy for asset management
- QA & Automation (Unit, functional, regression, security & automation)



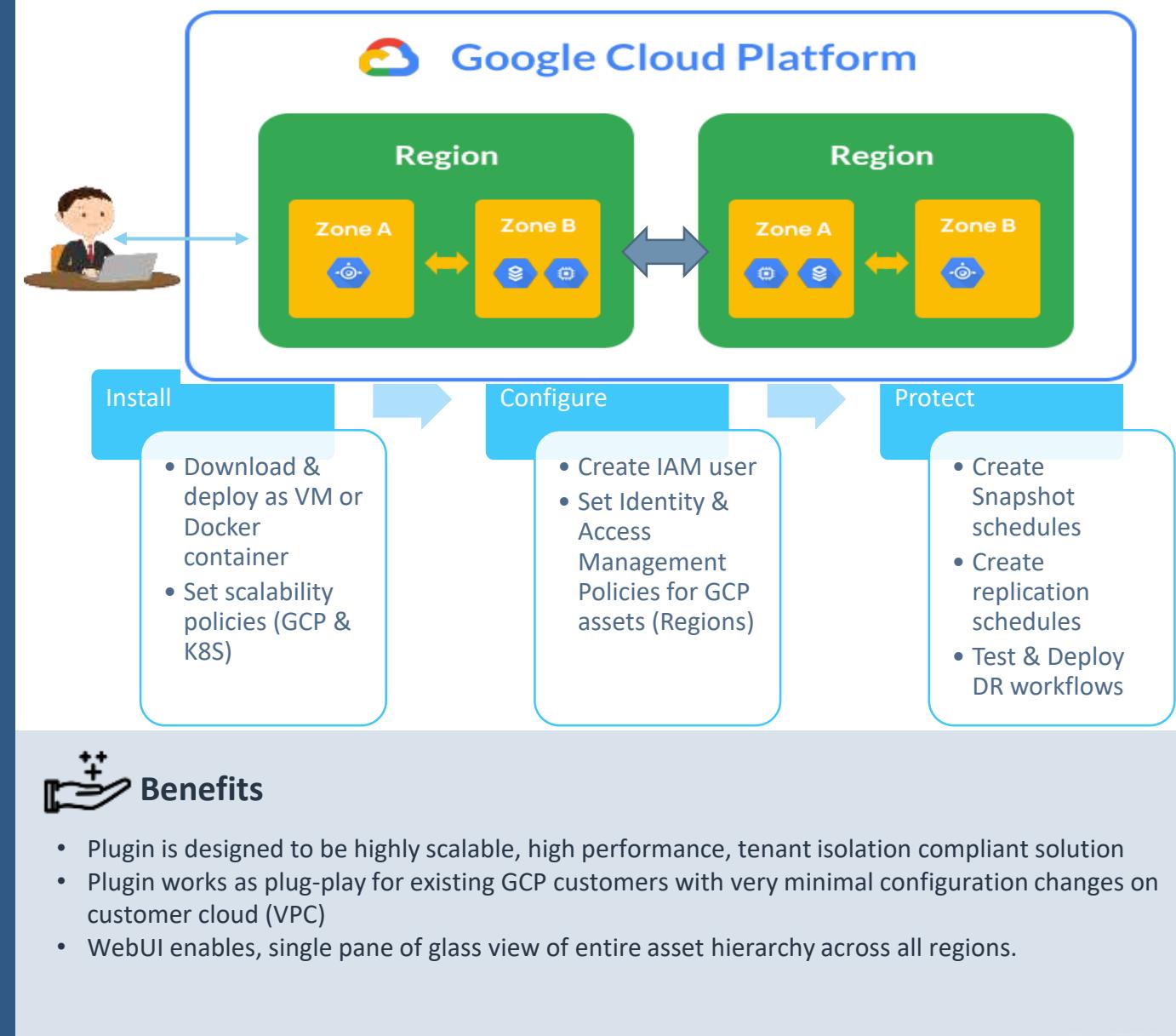
Solution

- GCP Plugin's objective is to enable protection of cloud resources such as VMs, disks golden images & configuration by replicating them across regions and projects.
- Calsoft designed a Plugin to ensure:
 - Discover cloud-based assets (Network details, VMs, disks & disk metadata, snapshots, images etc.) of a client, with secure authentication
 - Plugin also enables re-arranging the discovered assets as per Regions to enable inventory & asset management use cases.
- Plugin is designed to run on a VM or as Kubernetes container, to enable scalability/performance & tenant isolation
- Plugin uses GCP SDK & APIs to orchestrate scheduled snapshots, DR workflows, manages test recoveries, approximate costs & provides compliance reports
- Plugin also provides integration with On-premise enterprise class backup/recovery applications



Technology

- Java, Python, Angular JS, GCP SDK & API, REST , Kubernetes





Engagement

- Calsoft was engaged with an SIEM product to integrated Google Cloud Platform (GCP)'s data of different kind, to enhance the analytics capability of the SIEM



Benefits

- The solution enabled the SIEM to offer GCP data ingestion as added feature set
- The end users of SIEM were able to see the metrics in single pane of glass format and can corelate with rest of the metrics of the organization



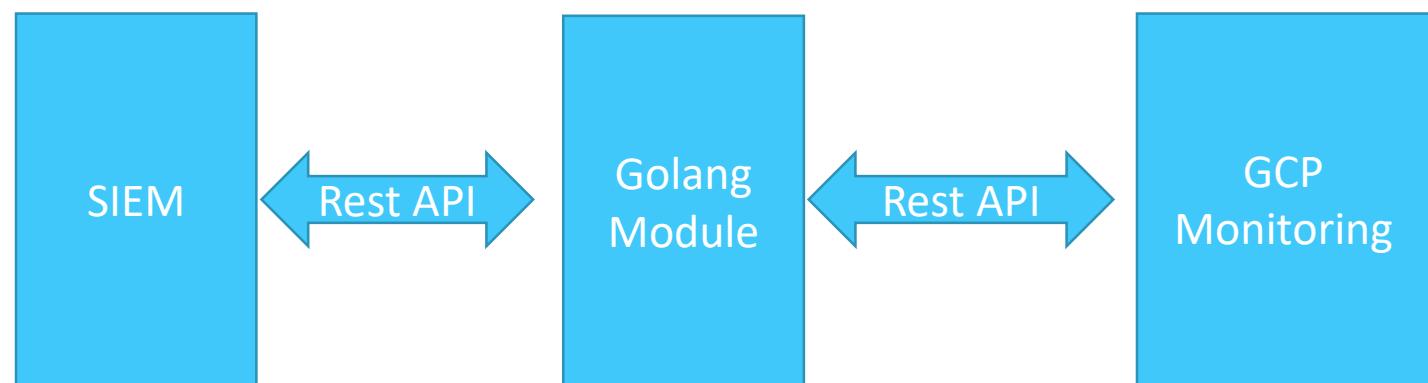
Technology

- GoLang, GCP
- REST
- SIEM



Solution

- GCP's cloud monitoring collects metrics and log information for compute instances, its metrics like CPU, memory, disc IO, etc and as well as process level metadata
- While ample solutions are available to do analytics on these data in GCP ecosystem, Calsoft developed a mechanism to export these data and ingest in client's SIEM product
- The solution was developed in Golang using the Cloud client libraries provided by GCP, using the REST API interface
- The module enabled fetching of details of following modules
 - List of VMs
 - Network listing
 - Firewall rules
 - Aggregated time-series data of VM and network metrics
- The modules in SIEM further converted the ingested data into graphs and reports



Agent driven monitoring for GCP Compute



Engagement

- Calsoft was engaged with an application monitoring product to include Google Cloud's compute in the application monitoring footprint



Benefits

- The application monitoring product was able to enhance its decision engine with details from within the VM of GCP
- The configuration was automated to enable such metric fetching for each new VM that is launched in GCP



Technology

- GoLang, GCP
- REST
- Agent based Monitoring



Solution

- Any VM on cloud, by default, would not export metrics or details of processes running in the VM.
- Details like process status, communication pattern, resource usage, etc. is important to provide detailed analysis of a VM's state, leading to overall application health surety.
- Calsoft team integrated the inbuilt Ops Agent to collect the logs and metrics of the VM and redirecting to Cloud Logging and Cloud Monitoring respectively
- The process monitoring is enabled by default with Ops Agent, to collect metrics like
 - Count of processes, CPU time, disk i/o and usage
 - Memory consumption, swapping details
- To determine the availability of the VM, the uptime check was configured to verify the VM's up and working state. This was done through Go functionality, as part of a larger monitoring application



GCP Cloud Logging



GCP Compute Engine
With
Ops Agent



GCP Cloud Monitoring



CloudOps & Monitoring automation for GCP based SaaS Application



Engagement

- Calsoft is engaged with a SaaS application for providing day to day support for cloud operations as well as building automation modules to collect metrics and monitoring data



Benefits

- Calsoft's expertise in Cloud operations has helped the client in delegating complete day to day operations, thereby focusing on core engineering of their application
- Calsoft's automation has helped in providing enhanced visibility to resource utilization and cost overlay



Technology

- Python, GCP, Monitoring
- CloudOps
- Cloud Monitoring and Cloud Logging



Solution

- Calsoft's cloudops team consisted of two sub-team, with below mentioned mandates
 - To own daily operations like active monitoring, CRUD operations on GCP platform through console, UI and playbooks, generate reports and attend customer and internal calls
 - To create playbooks to automate monitoring and metric collection
- For CloudOps, along with hands-on manual efforts, the team integrated Cloud Deployment manager as much as possible to automate the spawning of resources
- For automated monitoring, python scripts were developed to fetch the aggregated time-series data at regular intervals and generating collative reports for further analysis
- The scripts also configured various alerting mechanism based on the AlertPolicy functionality to generate notifications and alarms, based on thresholds configured or absence of a particular metric



CloudOps Team
providing
24 x 7 support



Automation team
for python based automation
for monitoring and
Cloud Deployment automation



Engagement

Calsoft engaged with the customer to:

- Provides E2E VMware managed Infrastructure on customer Data Center
- Complete Life Cycle management and upgrades with no downtime



Solution

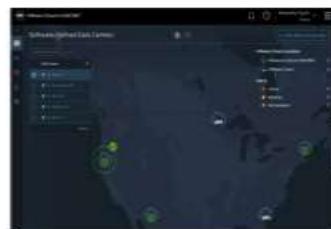
- Deployment of SDDC infra on Physical environments.
- Triaging and Fixing issues on customer environment
- Monitoring and automation of pipeline on DEV and STG environments.
- Life Cycle Management QE and automation.
- E2E UI Performance test cases development, execution and validation.
- Creating and populating dashboards based on Pipeline status.



Technology

- Languages: JAVA, selenium, Python, Groovy.
- Tools/Libraries: Jenkins, Grafana (Data Visualization Tool), P4V, Git.
- OS: Windows/Linux

VMC on Dell EMC – high level architecture

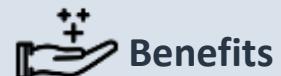


Control Plane



VeloCloud Gateways

SDDC at Customer Sites



Benefits

- Customer has to just place an order and SDDC is delivered fully configured at the Data Center.
- Fully Managed and supported by Dimension Team.
- Better UI performance for the customers.

On-Premise Excel Tool to Multitenant Cloud Application

Engagement

- Client had a requirement where a standalone Excel Based tool was be designed & developed into a web-based application.
- Post the UAT the application was deployed in a Multi-Tenant Cloud Based environment
- SSO authentication was implemented. This was later updated to MFA
- UI Screens are designed and developed

Solution

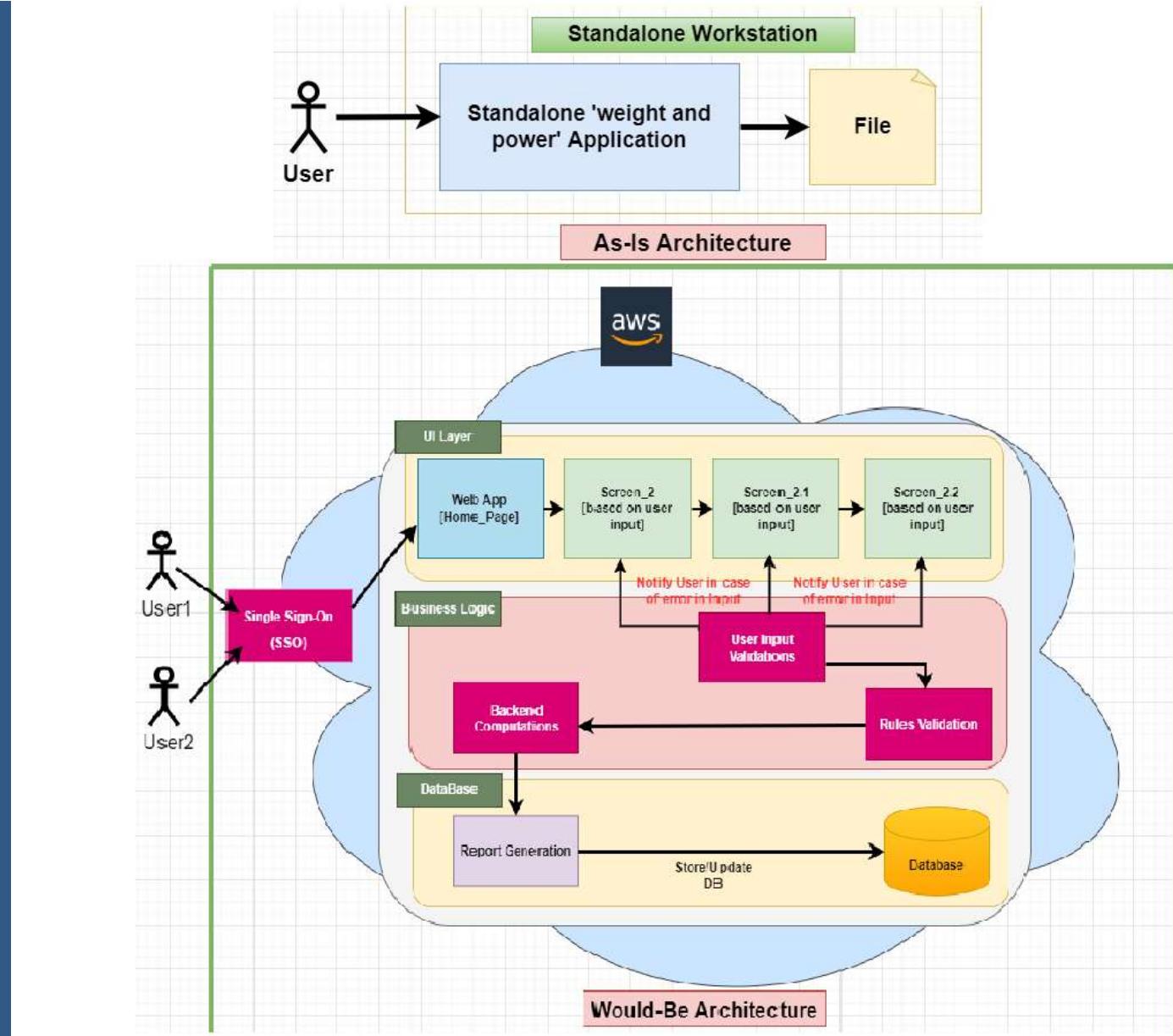
- Calsoft was involved in:
 - Analyzing the existing 'computation & validation' logic and determining the approach to migrate same to Python backend for web application development
 - UI/UX redesign and development
 - Implementing the Authentication mechanism
 - Designing the DB Schema & determining the different reporting formats
 - Testing and Support of the multi cluster multi region stack.

Benefits

- Each user utilizes the same version of the application
- Upgrades and other changes are easier to make and shared with all
- Application is accessible anywhere anytime due to SSO/MFA usage and deployment in cloud
- Usage Reports are easy to generate & same copy of data is shared with all the user

Technology

MS Office, AWS Cloud, React Library/Next.js, Django Web Framework, Python/Java/Golang, MySQL



Real-time Tracking and Monitoring Vehicles on Highway Tollbooth



Engagement

- On Indian highways current Fastag will soon be replaced with high response HD cameras to track traffic and deduct toll tax.
- Calsoft involved in setting the infrastructure for the customer which will involve edge cluster nearby to each toll plaza and setting up the centralized data center on GCP.



Benefits

- Vehicles will save fuel as they don't need to stop on the toll plaza
- Low maintenance from customer point.
- Use google cloud platform's scalability, durability, availability, security and services to implement the customer requirement more efficiently while also considering the cost aspect.



Technology

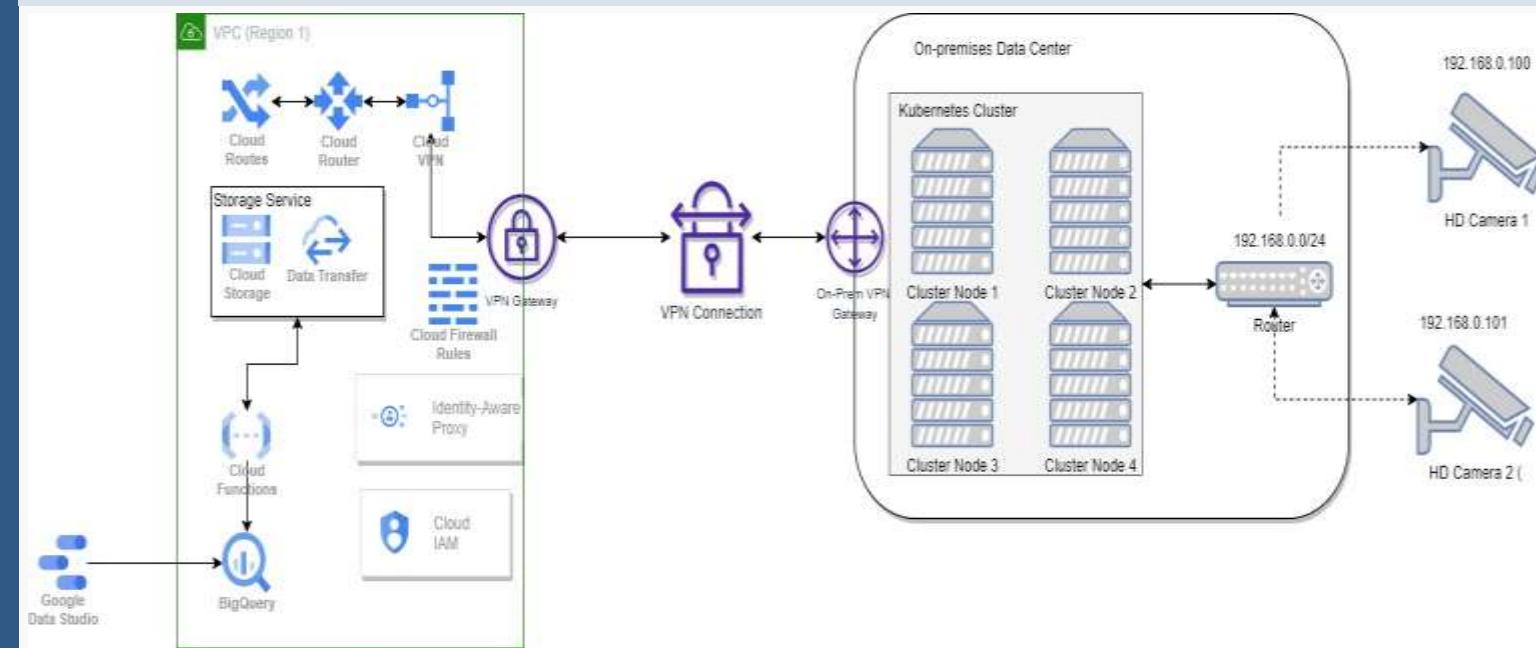
- On-prem edge cluster, GCP
- On-prem: Ubuntu, Kubernetes, MySQL
- GCP: Data Transfer, Cloud Storage, Cloud Function, BigQuery, VPC, Cloud IAM, Firewall, IAP
- Other: Google DataStudio, Python



Solution

Final Solution Involving the following:

- Design and execute the implementation of the camera-based solution backed by robust infrastructure.
- Use storage and analytics services of GCP to track on vehicles and collection and compare with current fast-tag method. This will help in understanding the areas of improvement and timeline to implement the new solution across all geographical regions.



5G Core on AWS for low latency communication



Engagement

- With 5G the latency attribute has become more important than ever.
- This has become even more important to Telco organization going global with cloud and plans to deploy the 5G core function on Public Cloud.
- How public cloud like AWS can meet the low latency expectation of 5G UPF <10ms using AWS Local Zones?



Benefits

- Cloud hosted 5G core functions enabling low Capex/Opex and dynamic scalability
- Enable near edge 5G UPF with very Low Latency communication between user device and 5G UPF.
- Can be used as a Proof-Of-Concept for very low latency 5G Usecases like Cloud Gaming, Autonomous Car, Industry 4.0 etc.



Technology

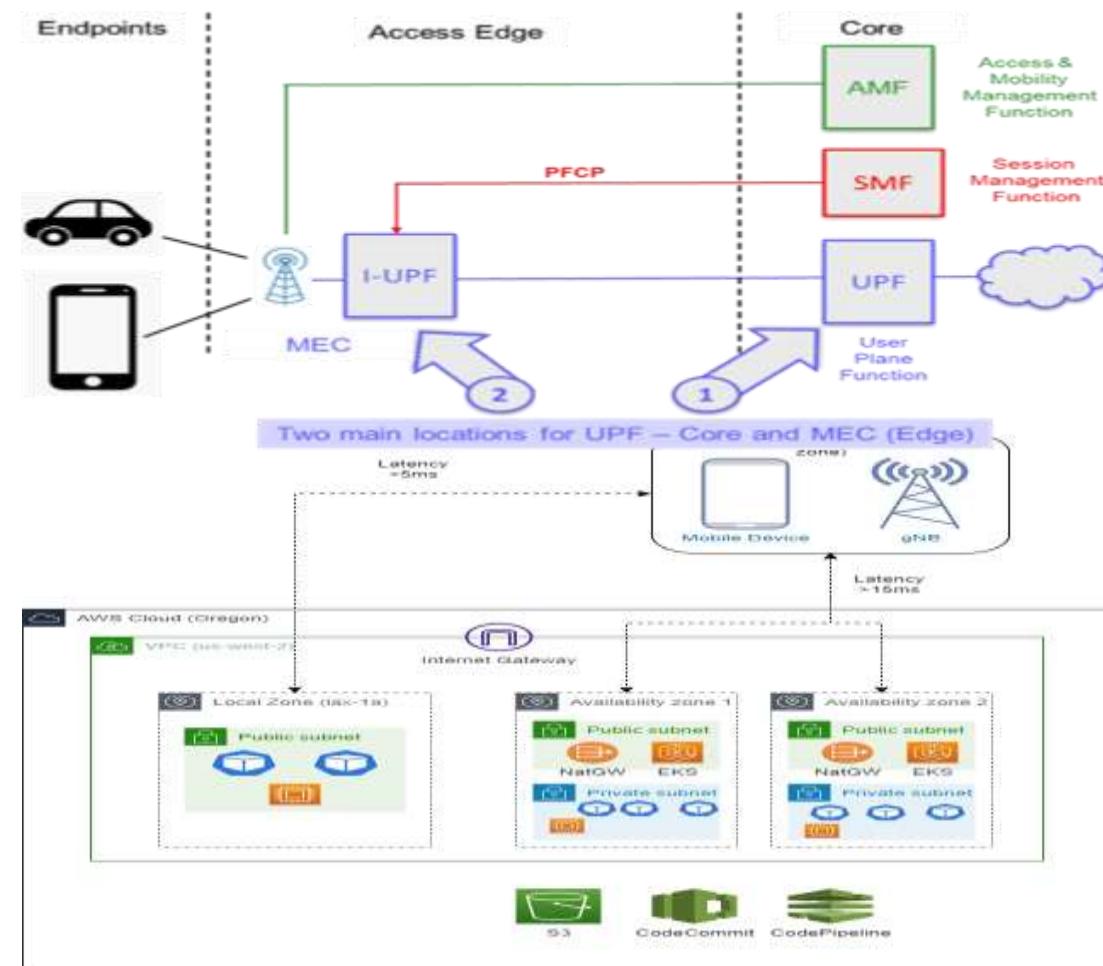
- AWS: EKS, VPC, Local Zone, S3, CodeCommit, CodePipeline, EC2, Cloudformation



Solution

Final Solution will involve the following:

- The main infrastructure will be part of AWS
- Simulation of device located nearby gNB for latency test.





Success Stories: OpenStack

Object storage integration with OpenStack Swift



Engagement

Calsoft was engaged with the client for Object storage integration with OpenStack Swift. The engagement underpinned:

- Resolving OpenStack Swift Scalability issues
- Dealing with lack of skilled engineering OpenStack expertise
- Integrating Object Storage with OpenStack swift



Benefits

- The integration enabled in associating multiple object storage servers to one object storage layer
- New use case helped boost business of the object storage product for the client.



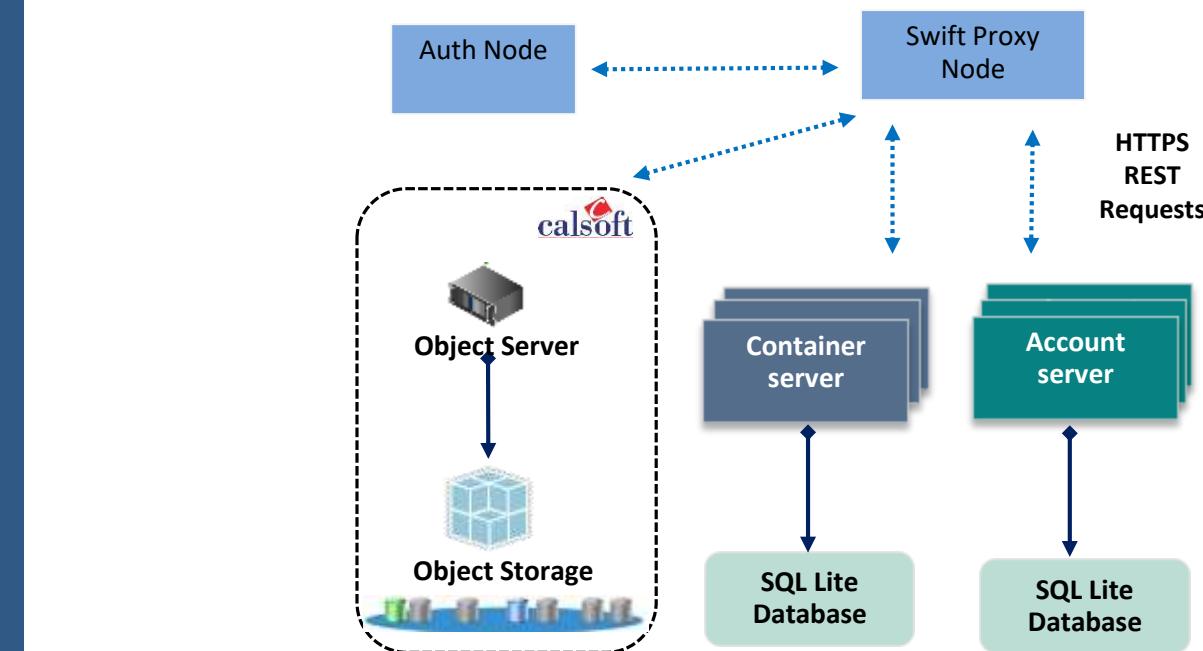
Technology

- Python



Solution

- As a development feature, enabled integration with OpenStack Swift by way of doing necessary changes to object storage
- Migrated object storage metadata store to better performing database



Engagement

Calsoft was engaged with the client for developing cinder plugin. The engagement underpinned:

- Dealing with lack of skilled engineering OpenStack expertise
- Integration of storage array with OpenStack

Benefits

To vendor

- New use case of storage array product which translates to more business

To customers of storage array vendor

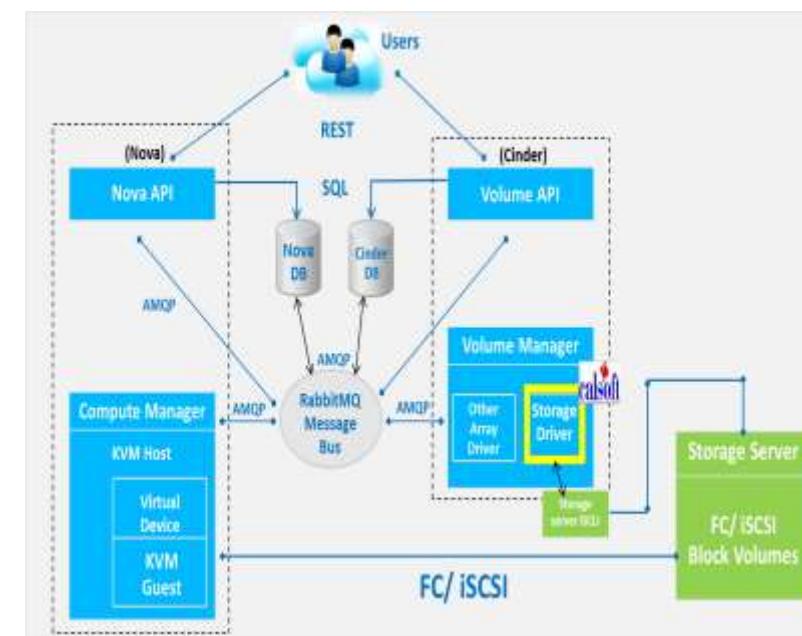
- Efficient management of storage array from OpenStack Horizon
- Can now use storage out of this specific storage array in OpenStack environment

Technology

- Python

Solution

- Developed Cinder Plugin for storage array vendor
- This plug-in was then tested by Calsoft's QA team



Integration with OpenStack - Ceilometer to gather telemetric data



Engagement

Calsoft was engaged with the client for collecting telemetric data for KVM hosts and instances running in an OpenStack Environment :

- Integration with various controllers in OpenStack to collect configuration information for hosts and instances.
- Integration with Ceilometer service to pull capacity and performance metrics.



Benefits

- Agentless collection of telemetric data of KVM hosts
- Based on roll-up and historical data collection, the instances can be analyzed for operational risks and over commits.
- Based on these results, densify the KVM environment using OpenStack



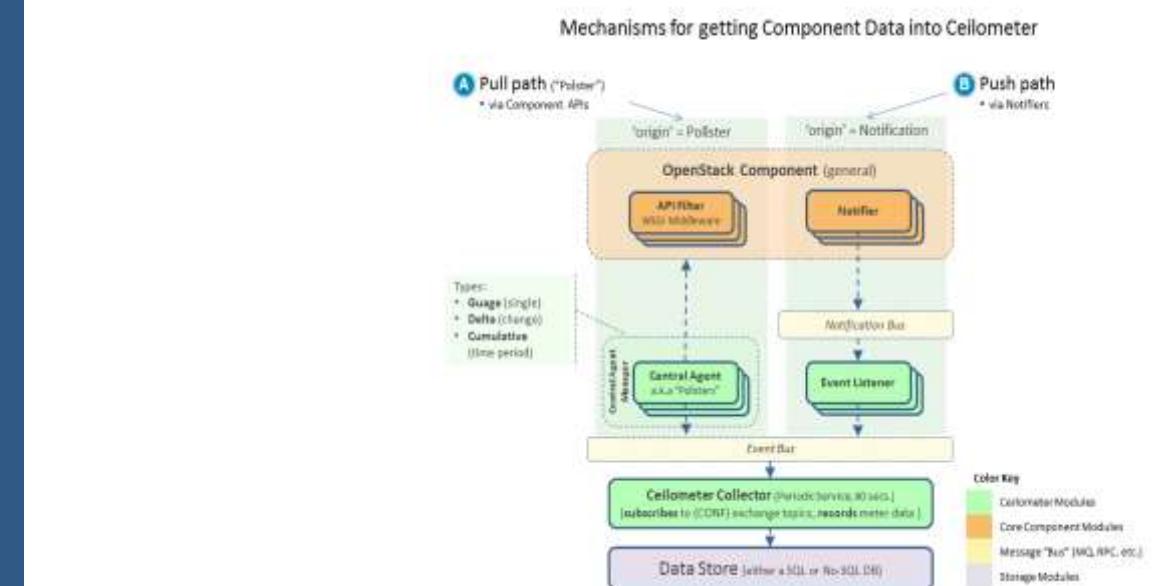
Technology

- Java, JavaScript, Python



Solution

- Built an adapter that consumes REST API's from Nova, Glance, Neutron and Keystone services for gathering configuration information of Hosts and instances.
- Integrated this adapter in the existing data collection framework of the client product.
- Built an adapter that consumes the REST API's for Ceilometer to gather the default meters implemented by it.
- Built a ceilometer plugin to extend the Ceilometer framework to collect custom meters from KVM hosts and instances.
- Implemented this plugin using SNMP and libvirt API's.





Engagement

Calsoft was engaged with a leading cloud service providing firm. The engagement underpinned:

- DRS and HA cluster
- Multi-hypervisor integration
- Multi-node setup
- Integration with billing system



Benefits

- End to end deployment of OpenStack based cloud
- Centralised billing & chargeback solutions for CSP
- High/ Multi availability (Controller can be present at different geographical locations)
- Scalability and elasticity
- Failover and disaster recovery (A-Z deployment)
- Reduced downtime, increased efficiency, reduced complexity



Calsoft Add ons

- Integration of heterogeneous hypervisors
- Onsite support
- Consultation sessions
- Best Practices
- Hands on experience in OpenStack cloud deployment
- Certified engineers in –
- Windows and Linux servers, Virtualization and Storage technologies

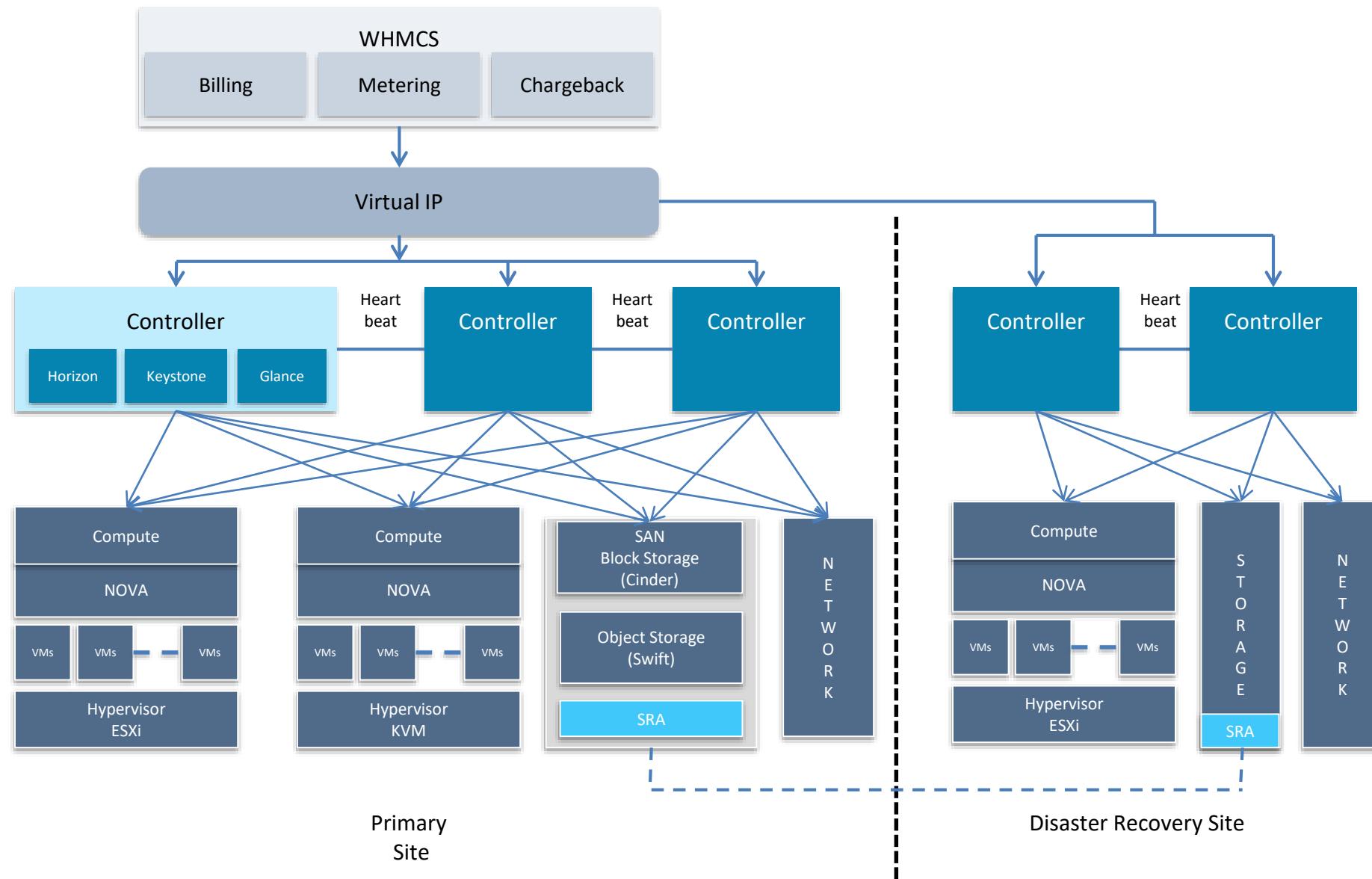


Solution

Calsoft assisted client with the following solutions:

- 3 node cluster at primary site
- 2 node cluster at disaster recovery site
- Integration of heterogeneous hypervisors
- Centralized and automated resource allocation and billing, chargeback system
- Calsoft approach –
 - Solution architecture
 - Implementation/build
 - Test and production
 - Testing after implementation support

OpenStack Public Cloud Architecture





Engagement

Calsoft is currently engaged with its customer in building the central management application with Cloud Platform to manage the switches and allow day#0 & Day#n switch configuration.

- The aim is to build a framework where any SDN Controller can be integrated in future
- Framework being built is independent of the protocols



Benefits

- Customer doesn't have to build a complex central management piece
- End-customers get single pane of glass for the entire switch topology
- Allows Day#0-Day#n automation for the Green Field deployment by controlling DHCP server



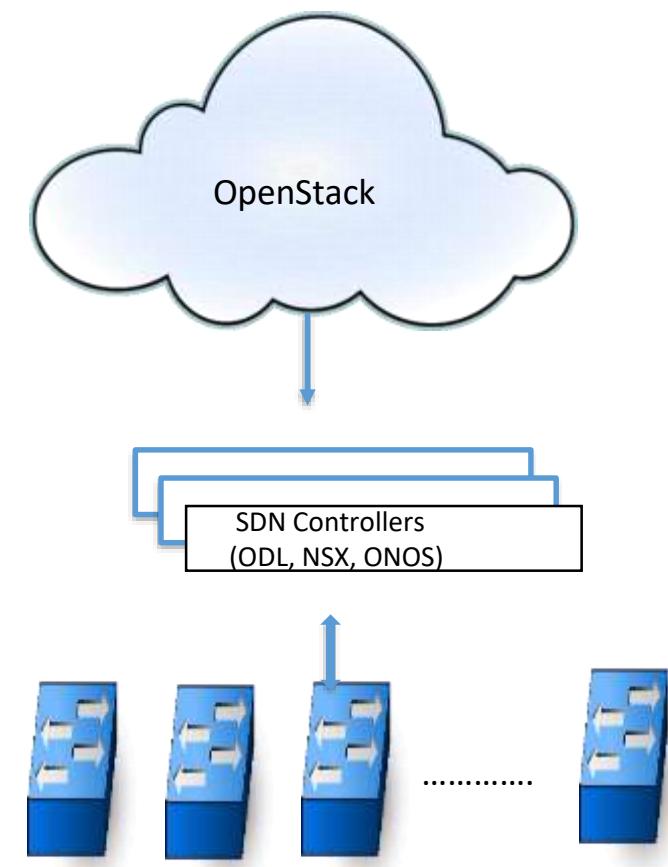
Technology

- Ansible, DevOps, Python, L2/L3 Networking, DHCP, ZTP, VLAG, Auto-VLAG, Ubuntu



Solution

- Build an Horizon extension plugin for the admin to see the topology and configure the switches
- Build the communication channel between OpenStack & SDN controller layer to retrieve the topology & allow switch configuration.
- First SDN controller built is OpenDayLight



Network Edge – Ironic Baremetal Management using DRAC and RedFish driver



Engagement

Calsoft was engaged with the client for adding support for dell hardware in OpenStack Ironic and dracclient

- Aim is to implement RAID Management, Node Discovery, Inband and OOB Introspection, Realtime RAID Management, Clear Foreign Drivers, Hot Spares, Adding New cleaning steps in Ironic.
- All the above tasks should be pushed to OpenStack Ironic upstream



Benefits

- Realtime RAID creation and deletion without rebooting nodes. Insightful introspection which fetch information of every device.
- Ironic based PXE NIC management, boot Management etc.
- Easier Dell baremetal management using Ironic.



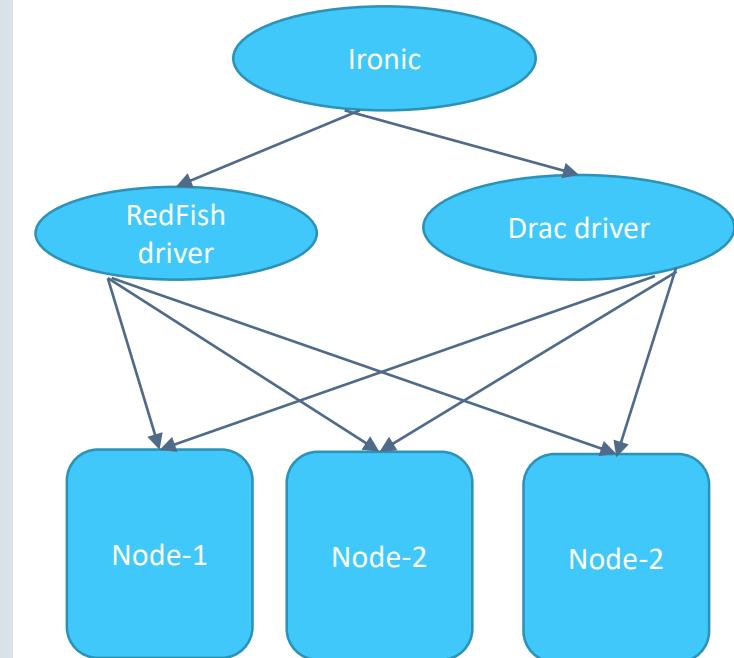
Technology

- Python, Ironic, dracclient



Solution

- Implemented feature in Ironic for realtime supported Controllers which help perform realtime RAID creation and deletion operations.
- Added feature in Ironic for PXE NIC based on BIOS and UEFI boot mode.
- Also fetch CPU's based on NUMA sockets and actual memory as part of Node introspection and validation.
- Implemented feature in dracclient for clear foreign config and Hot Spares, also implemented substep implementation in Ironic as part of delete and create configuration in Ironic.
- Currently implementing RedFish PXE NIC enablement in OOB introspection base on BIOS and UEFI
- Also Done investigation RedFish Management Interface for Node Management like set/get supported boot devices, get/set boot modes, get sensor data like fan, temperature, power, drive etc.



OpenStack – Global Admin & Ceph Storage Support for Backup Product

Engagement

Calsoft developed a global admin feature for the OpenStack plugin of a backup product.

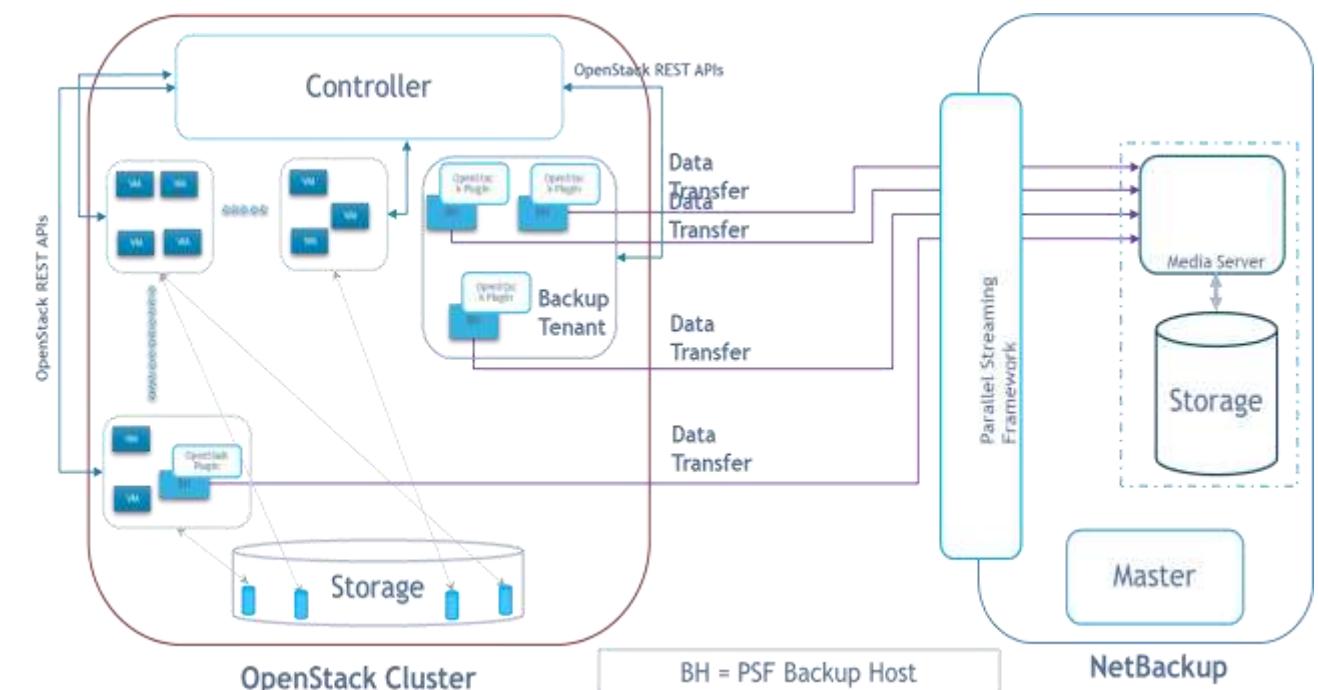
Solution

Calsoft developed a Global Admin feature for the customer. This feature enabled users to protect the OpenStack environment without deploying Backup Host into the OpenStack Tenant. The engagement underpinned:

- Designed and implemented user role “Global Admin”, which will allow them to share the same backup host with multiple tenants
- Implemented the feature to support protection for OpenStack environment deployed on CEPH-based Cinder Storage
- Fetched & preserved additional metadata information during backup, which can be useful to the users while restoring OpenStack instances

Technology

- C/C++, Perl, OpenStack, REST APIs, Bitbucket, AWS, JIRA, Confluence



Benefits

- Improved manageability
- Improved security

Development of OpenStack Cinder driver for CDI Vendor



Engagement

Calsoft helped a leading Composable Disaggregated Infrastructure (CDI) vendor with the development of an OpenStack Cinder driver. The goal was to enable OpenStack to perform storage management on the vendor's CDI appliances' storage components.



Solution

Part 1: Design & Development

- PoC NVMe/TCP with Linux Host + OpenStack (Data path + Control path). Gap analysis, if any
- Cinder driver design with & without SPDK. Comparative analysis of approaches & mapping of Storage APIs & Cinder Framework. Creation of sprint & test plan, test setup, and writing test cases
- Calsoft helped in designing & implementing the following APIs, use unit tests against each call listed below:
 - Driver configuration – driver specific parameter, add separate driver for Fungible, update config files
 - Volume operations (Create, delete, attach, detach....etc.), Snapshot operations (create, delete & create volume from snapshot)
 - End-to-end testing of driver functionality & integration with OpenStack Cinder services for all features
 - Engineering-level documentation

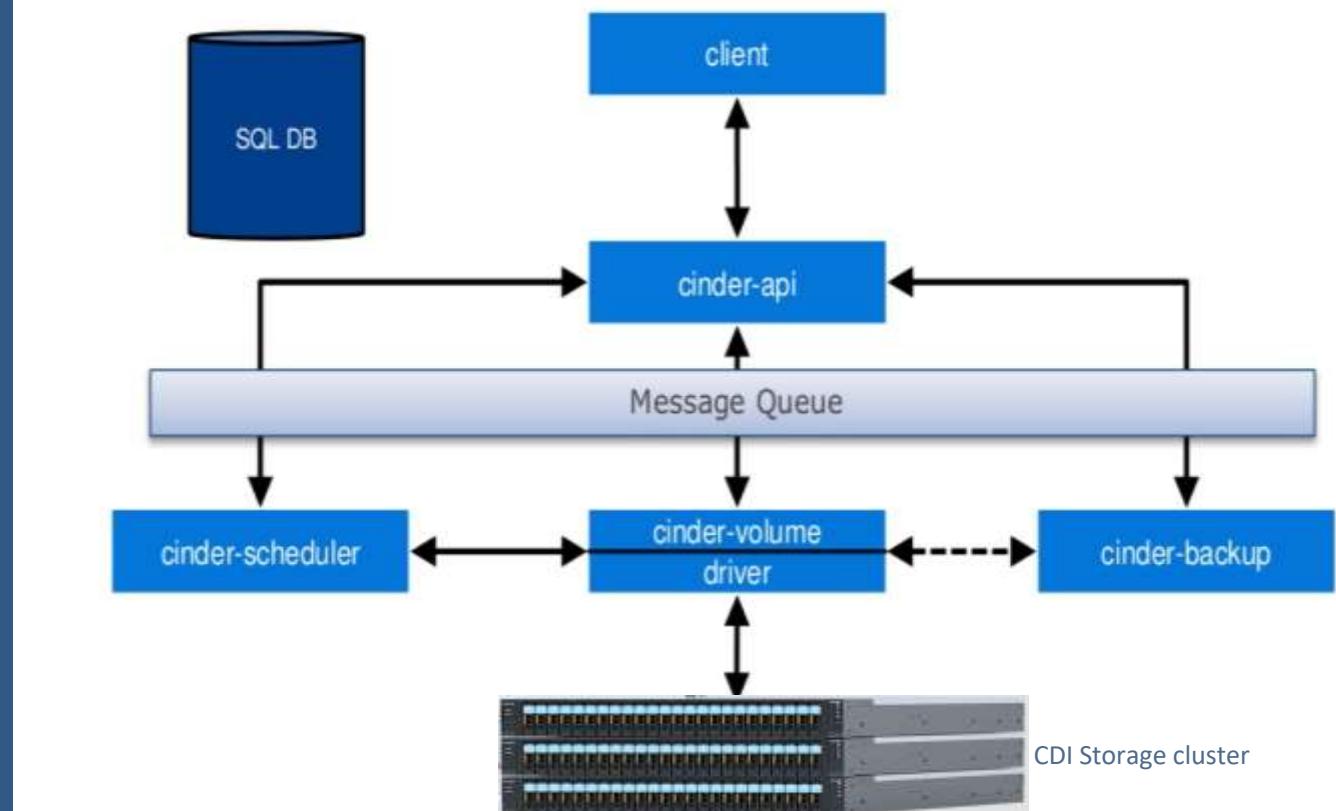
Part 2: Validation & Community acceptance

- Used tempest test run for OpenStack submission. Calsoft will assist Fungible in community review & acceptance of the driver



Technology

- Python 3.5, proprietary Storage APIs for CDI platform
- OpenStack Victoria, Tempest



Benefits

- Better acceptability among OpenStack-based cloud service providers
- Seamless working with OpenStack-based cloud services providers for a better market acceptance



The background of the slide features a soft-focus photograph of a dense urban cityscape, likely Chicago, with its characteristic tall buildings and a grid of streets. The lighting suggests it's either dusk or the photo was taken through a window.

Success Stories: Container Technology

Container storage interface plugin

Engagement

Calsoft was engaged with the customer in designing and developing container storage interface plugin based on technical requirements

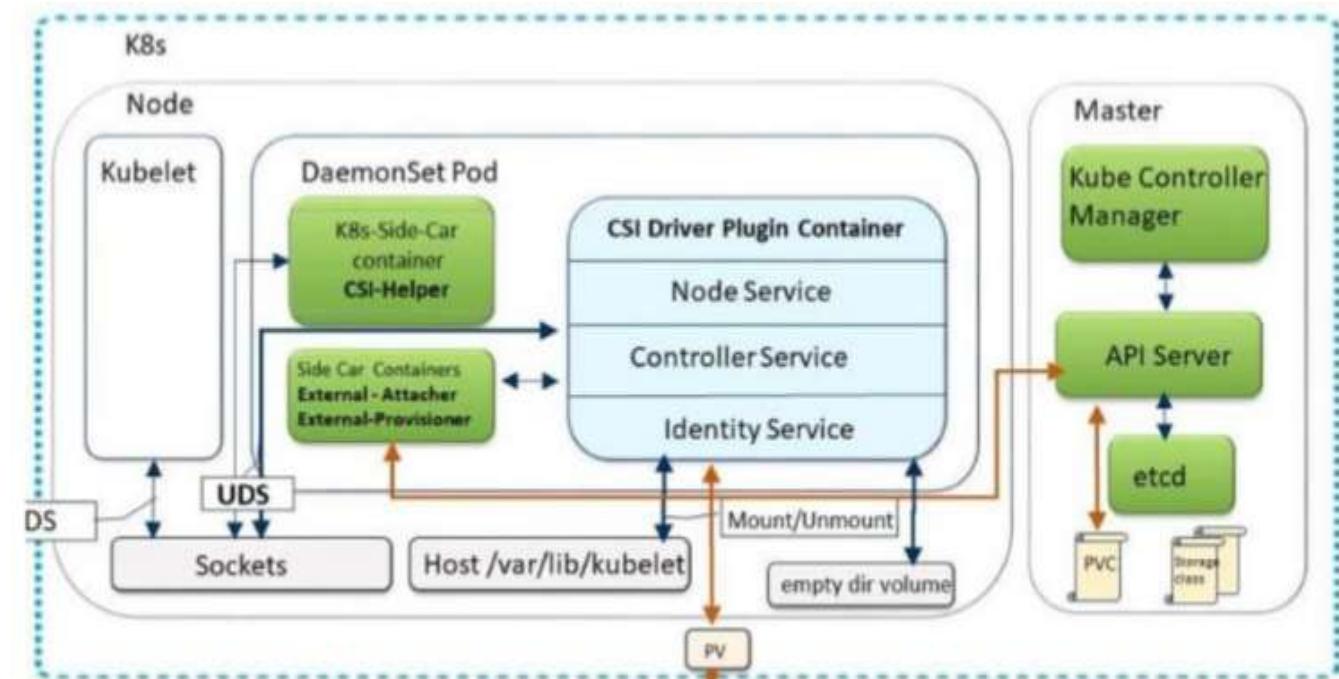
Solution

Calsoft helped the customer in developing CSI plugin and the engagement underpinned:

- CSI plugin:
 - Create PV, Attach metadata. Attach PV, Delete PV, Detach metadata. Detach PV, List PV
- CSI Plugin – Snapshot
 - Create volume snapshot, list volume snapshot, delete volume snapshot, restore volume snapshot, create PV from existing volume
- Support for CHAP
- Volume expansion
- Logging: Support multi-level logging with custom log messages for specific events
- UAT
- Documentation

Technology

- GoLang, Glide, Kubernetes, Apache



Benefits

- Support for several storage protocols

BPF Agent for Performance Calibration in Kubernetes Cluster

- Real-time performance measurement of all the HTTP server traffic



Engagement

Calsoft helped the customer as an engineering partner in developing a BPF agent to measure the HTTP server response time. This involved gathering and arranging the session-based data at the data-link layer obtained from the BPF kernel module.



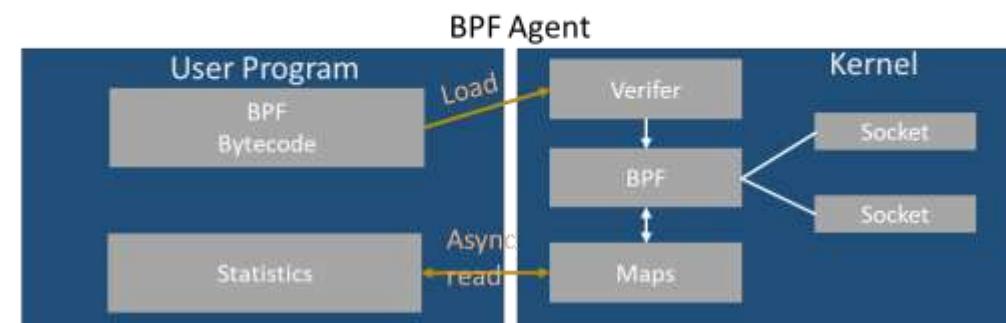
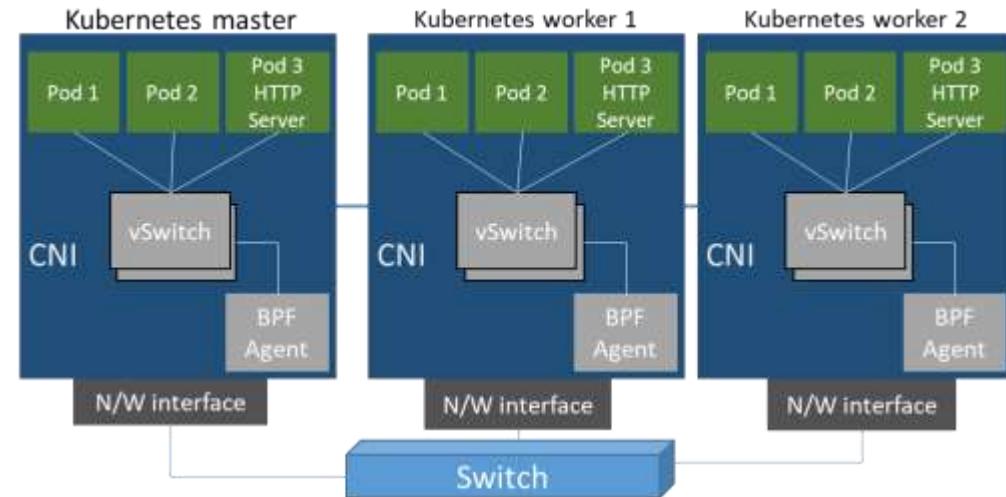
Solution

- Developed BPF infrastructure to measure the performance of the HTTP server
- Developed containerized gateway for Kubernetes
- Provided the HTTP server performance details like response time and highlighted HTTP errors with parameters such as:
 - Source & destination IP
 - Source & destination ports
 - Incoming & outgoing byte counts
 - Method (GET, PUT) detection



Technology

- BPF, AWS, Docker, Kubernetes, Python, C, Golang



Benefits

- Real-time performance measurement of all the HTTP server traffic
- Easy diagnosis of HTTP server performance degradation or unavailability

Microservices architecture for Identity Management application



Engagement

Calsoft is working on converting monolithic architecture of Identity service management product to microservices based architecture to achieve scalability.



Benefits

- This is a proof of concept where a part of monolithic product can be carved out of it and put into containerized environment. There are minor changes needed to rest of the product. Effectively, whole product can be converted to microservices architecture by converting one service at a time with continuous integration.



Technology

- OS – Linux
- Language – Python
- Tools – Kubernetes, docker, Kong, Rabbit MQ, Zookeeper.

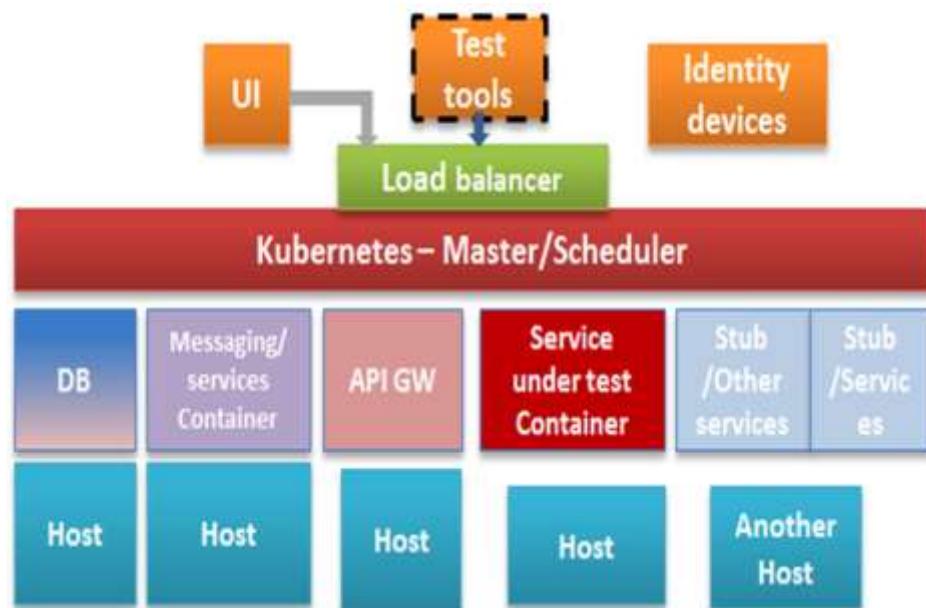


Solution

- Understood the existing design of the identity management product from services point of view which are stateless and can be developed, tested and deployed independently.
- Develop microservices stack with building block components like API Gateway, Message Queues, Discovery Services which are deployed in host containers.
- Design one service (under test) and containerized it with the understanding of its interaction with external services .

Calsoft's contribution

- Get the microservices stack up and running using various tools like RabbitMQ, Kong, zookeeper, kubernetes for orchestration.
- Create a container for the service under test, implement logic to interact with other services. Made minor changes to other services to communicate with service under test.
- Test whether end to end flow of the identity product works in this test setup.



Project calico development on windows platform



Engagement

Calsoft is engaged with a client to port their enterprise solutions for windows based platforms. The customer has a open source solutions as well as enterprise solution. Calsoft is working to develop the enterprise solutions for windows platforms as well as making associated changes to other open source repositories like kubernetes, flannel, container, networking, config daemon, acs-engine, kops.



Benefits

- Working as a ODC for customer.
- Involved in all phases for customer solutions
 - Feature design.
 - Feature development.
 - Feature testing , deployment, scaling
 - Resolve Customer support issues.



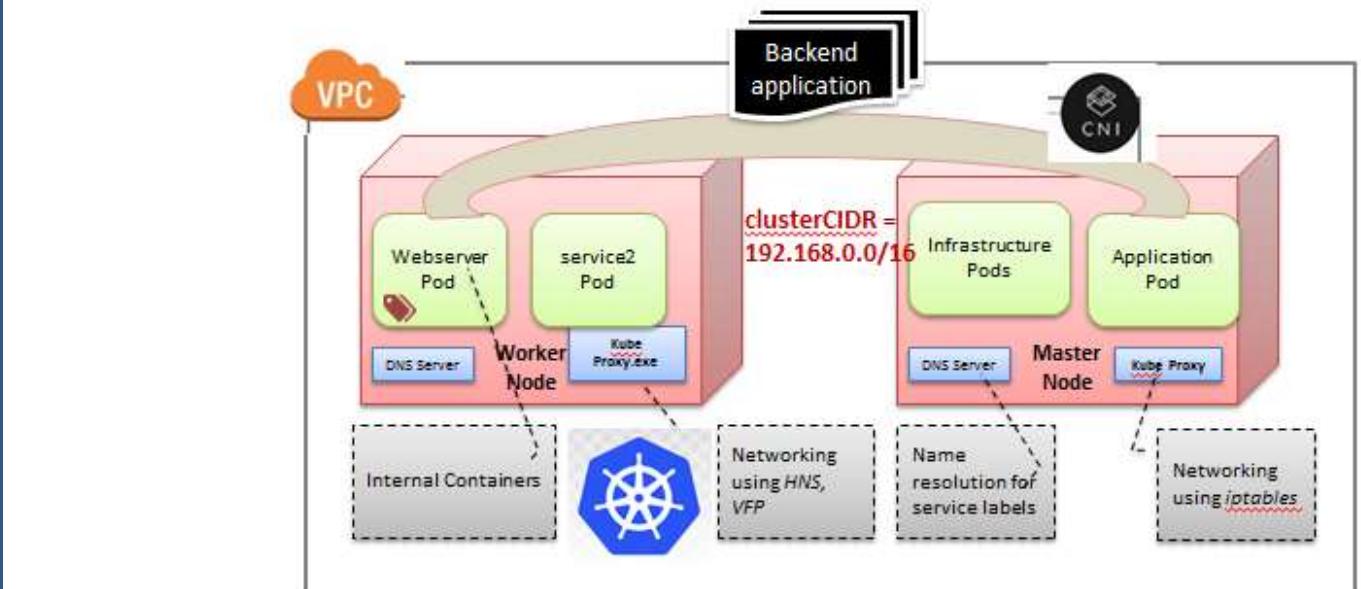
Technology

- Docker, kubernetes, CNI, flannel, Golang, acs-engine, kops, AWS, Azure, BGP daemon, confd.



Solution

- Create automation scripts to deploy kubernetes cluster on AWS (using kops), Azure (using acs-engine), GCE.
- Make changes to kubernetes repository to work for windows platforms. E.g. changes to e2e framework.
- Port the propriety features of projectcalico for windows platform using windows container networking infrastructure (HNS).
- Make changes to CNI networking repository in order to test the projectcalico CNI plugin and test delegations to other IPAM plugins like host-local, dhcp.
- Designing the solution, adding required features in common modules like CNI plugin frameworks, other popular networking solutions like flannel.
- Testing the solutions for functionality and scalability.



Ready to use Microservices stack



Engagement

Calsoft is working on creating a ready to use base infrastructure stack for microservices using kubernetes orchestration in dockerized environment.



Benefits

- The time required to get the base infrastructure up and running for deploying microservices is reduced significantly. The automation with little changes can get the required infrastructure up and running for production, development and QA environments.



Technology

- OS – Linux
- Language – Python
- Tools – Kubernetes, docker, Kong, Rabbit MQ, etcd, Cassandra DB.

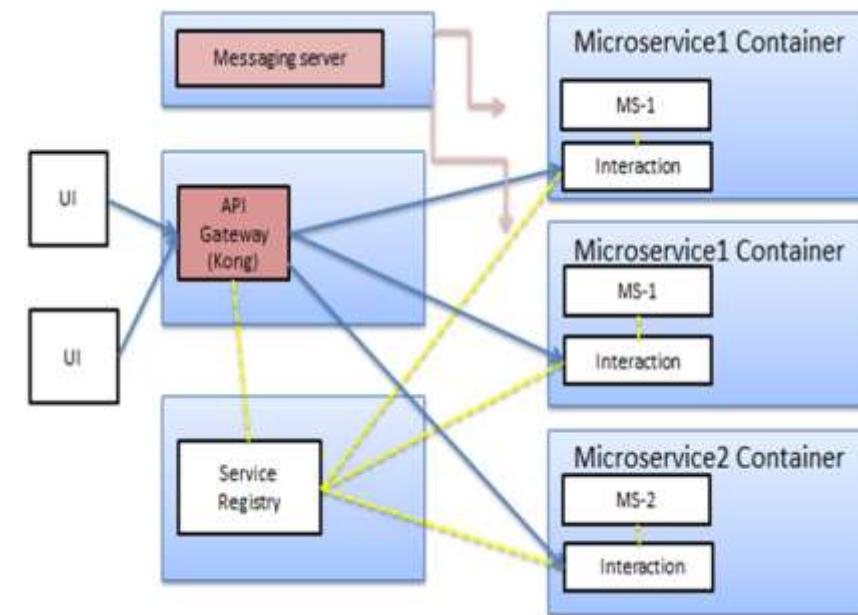


Solution

- The docker environment is setup, various service components are installed and dockerized. kubernetes is used for orchestration of microservices running inside containers.
- Various microservices essential components like API Gateway, Message Queues, Discovery Services, Key Value pair database are containerized and deployed for ready to consume.
- These components are deployed in cluster for high availability.

Calsoft's contribution

- Get the base infrastructure for microservices up and running using various tools like RabbitMQ, Kong, etc, kubernetes for orchestration.
- Validate the infrastructure using a sample microservices application.
- Testing and tuning the infrastructure for performance, scalability and high availability.



Web application development for Food Delivery



Engagement

Calsoft was engaged with a popular food delivery aggregator services company to develop their mobile based web application using microservices architecture.



Benefits

- Food delivery service aggregator
- Real time payment settlement using payment gateway integration



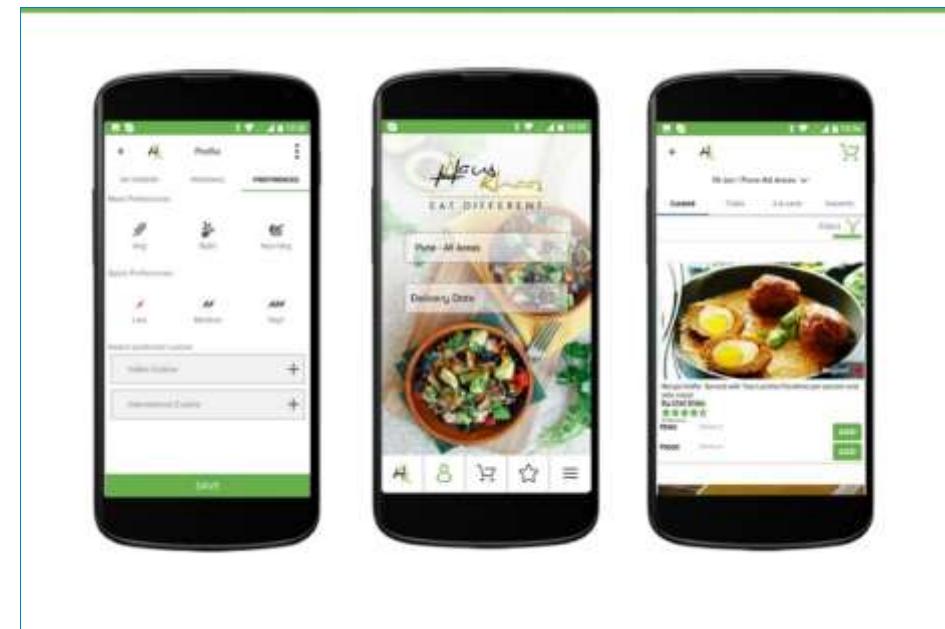
Technology

- Android 4.0 and above , iOS 8.3 and above
- Payment gateway integration
- Social media integration (Facebook, G+)
- REST'ful web services
- Push notification , Google Analytic SDK integration



Solution

- Implementation using Google Material Design & Custom animations.
- Real time updates of food delivery tracking and scheduling
- Execution of application request over backend database (MongoDB & MySQL). This is the backend tier of the 3-tier applications.
- Tested the scalability, current requests execution for the application.



Deployment of Microservices security platform on Azure



Engagement

Calsoft was engaged with the client for building an automation solution to deploy their microservices security platform in Kubernetes cluster on Microsoft Azure. The engagement underpinned:

- Providing a scalable and configurable solution to easily bring up Kubernetes cluster on Microsoft Azure cloud platform.
- Deploying their security platform on this Kubernetes cluster seamlessly through Ansible.



Benefits

- Client can now easily bring up required infrastructure on Azure, needed to deploy their platform.
- Client can easily scale/reconfigure deployed infrastructure/resources.
- For incremental releases, client can use Calsoft solution to easily deploy their platform without any changes.
- Eliminates manual deployment of resources and help save time.



Technology

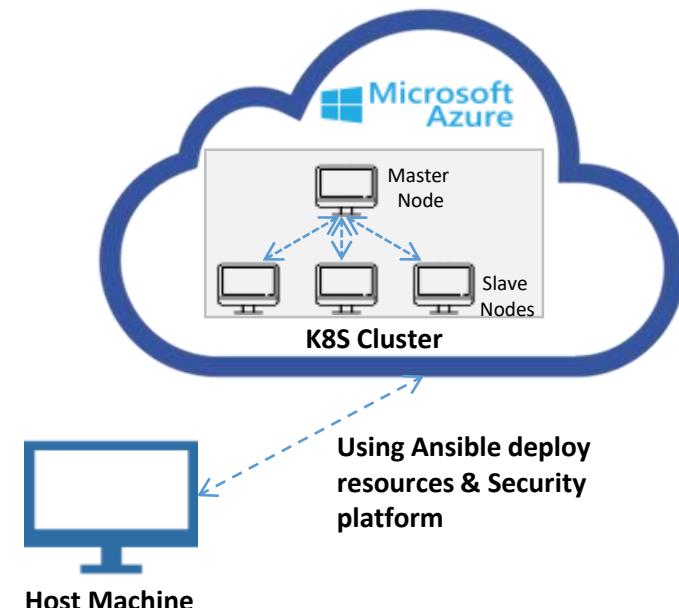
- Ansible, Microsoft Azure resource manager/templates, Azure Cli, Kubernetes



Solution

Calsoft developed Ansible infrastructure/code base to achieve and successfully deliver client requirements.

- Created scalable and configurable Azure Resource Templates to deploy required resources in Azure, like k8s masters & minions VMs, Network security groups, Route tables, VNETs, Storage, Availability sets etc.
- Developed Ansible playbooks to deploy these resources on Azure along with installing client's security platform.



Kubernetes Dynamic Volume Provisioner



Engagement

Calsoft was engaged with the client to implement a volume provisioner to provide persistent storage for containers deployed in Kubernetes.

The engagement underpinned:

- Development and testing of out-of-tree or external dynamic volume provisioner



Benefits

- Storage vendor customers who deploy container orchestration solutions using Kubernetes will be able to provide tight integration between K8s and the storage.
- Administrator can configure various storage classes.
- User can reference a claim in pod specific to the StorageClass.



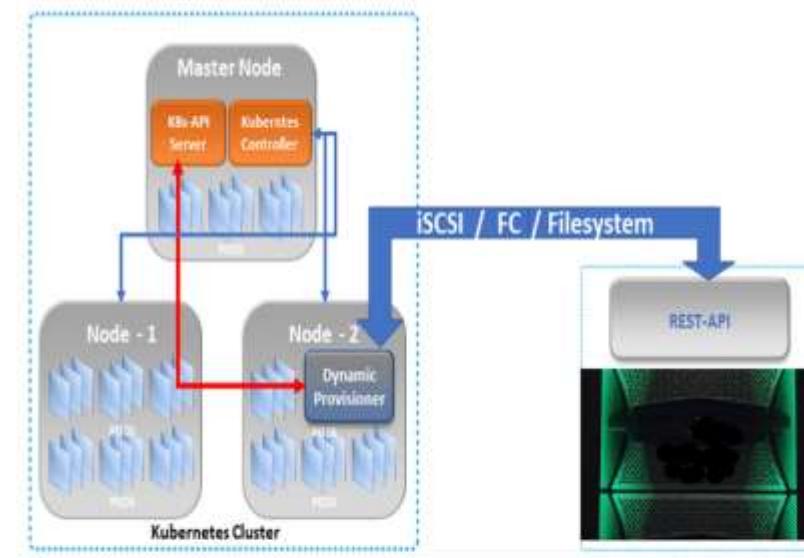
Technology

- Kubernetes 1.8, Docker 1.12, GoLang v1.9



Solution

- Develop an external dynamic provisioner using native kubernetes interfaces and constructs.
- Solution makes use of the key K8s-primitives like persistent volume claim, persistent volume, storage class etc.
- Provisioner is deployed as a pod with replica set to 1
- Provisioner watches the K8s-API Server for storage provisioning requests/events in the form of PVC.
- Provisioner then creates the requested storage asset either a volume or filesystem and returns the asset properties in the form of a persistent volume.



High Level Architecture

Plug-in development & QA of container monitoring product



Engagement

The client has monitoring and analytics product for container based applications. This project undertakes plug-in development for new application integration & the quality assurance of the product.



Benefits

- Calsoft's expertise in containers and best practices in QA helped the client to ensure detailed coverage of the product and improved the quality.



Technology

- Python, Docker, Kubernetes, Proxmox,



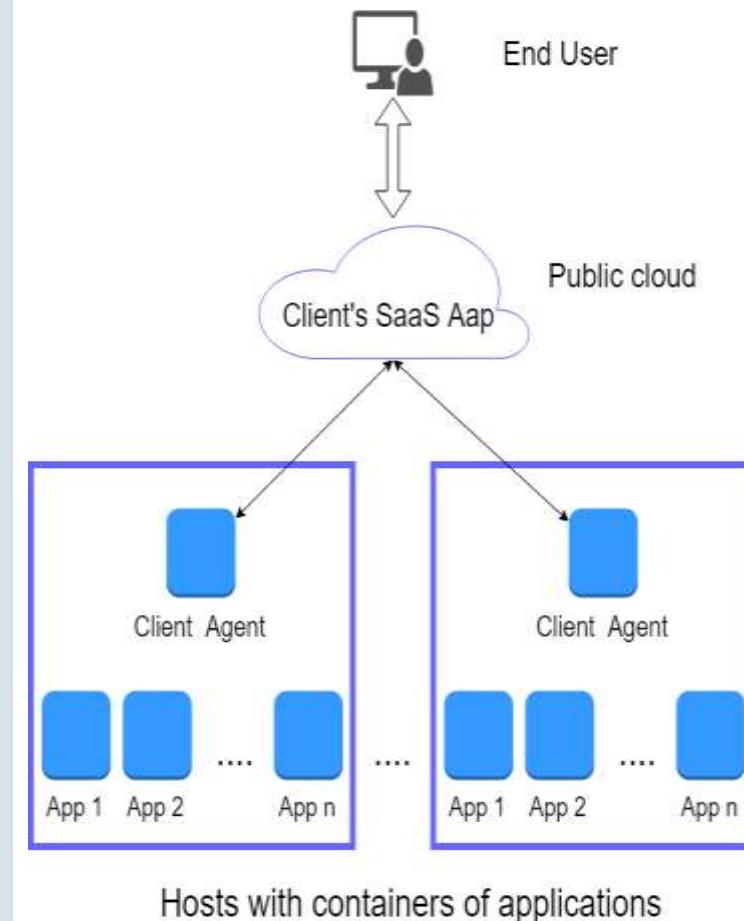
Solution

Calsoft developed the plug-ins for new applications like Memsql, memcached, nginxplus, couchbase and kafka.

The plug-ins are written in python.

Calsoft undertook the QA of the product, conducting following activities.

- Deployment of containerized infrastructure using Kubernetes on on-prem and cloud infrastructure.
- Deployment of docker-based applications.
- Test cases development involving 50+ application scanning.
- Execution of test cases and report generation.
- Development of python based test automation suite, per application and for set of related and disjoint application.



Hosts with containers of applications

Deployment and Test Automation

Engagement

Calsoft was engaged with the client to develop scripts to automate the deployment of various components on Azure Cloud. Also automated the complete test suite.

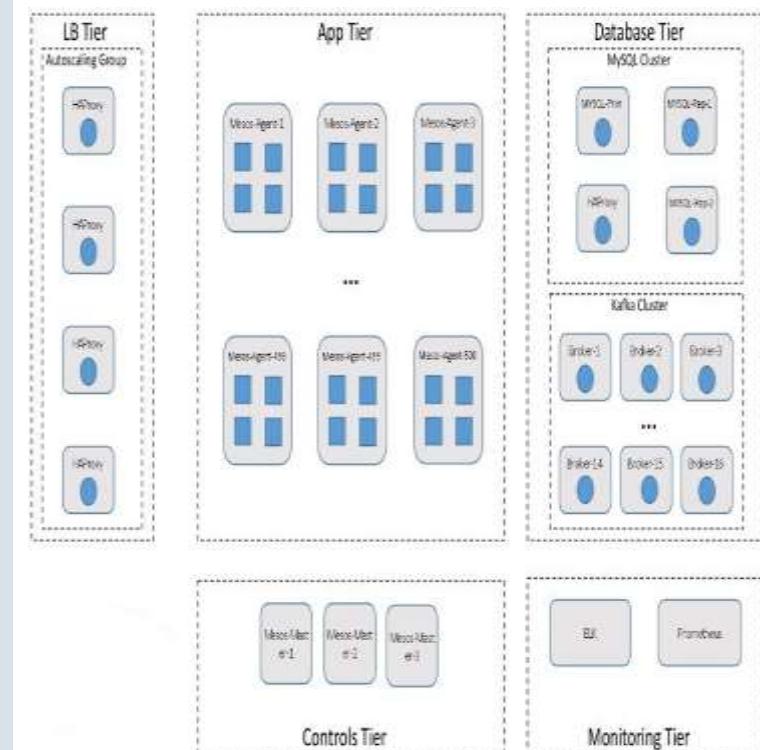


Technology

- Mesos/Marathon, Vagrant, Python, Prometheus, Grafana, Confluent Kafka, Azure Cloud, Kubernetes, Ansible, HA proxy, nginx, Redis

Solution

- Development of Automation scripts to deploy on Azure Cloud and on-premise (using vagrant):
- Cluster of Mesos/Marathon.
- Cluster of kafka cluster
- Create VM and required network resources like NSG, VNET, subnet.
- Deploy HA proxy load balancer & nginx webserver
- Prometheus node for monitoring of Cluster
- MySQL & Redis database nodes.
- Automated Kubernetes cluster deployment using Ansible.
- Created Microservices which can communicate internally with each other using Kafka
- Designed kafka traffic generation app which will generate huge amount of messages for load testing.
- Testing of the product which provides network security at the application level.
- Integration of the existing platform to work with multiple containerized services and creating roles and policies to provide or block the access to them.



Kubernetes plugin for Edge Compute Controller



Engagement

Calsoft is engaged with the client, a startup making whitebox networking switches, to develop a Kubernetes plug-ins, for its Edge Compute Controller



Benefits

- Calsoft's Kubernetes expertise has helped the client is fast-tracking the product development, with complete reliance of Kubernetes related tasks on Calsoft



Technology

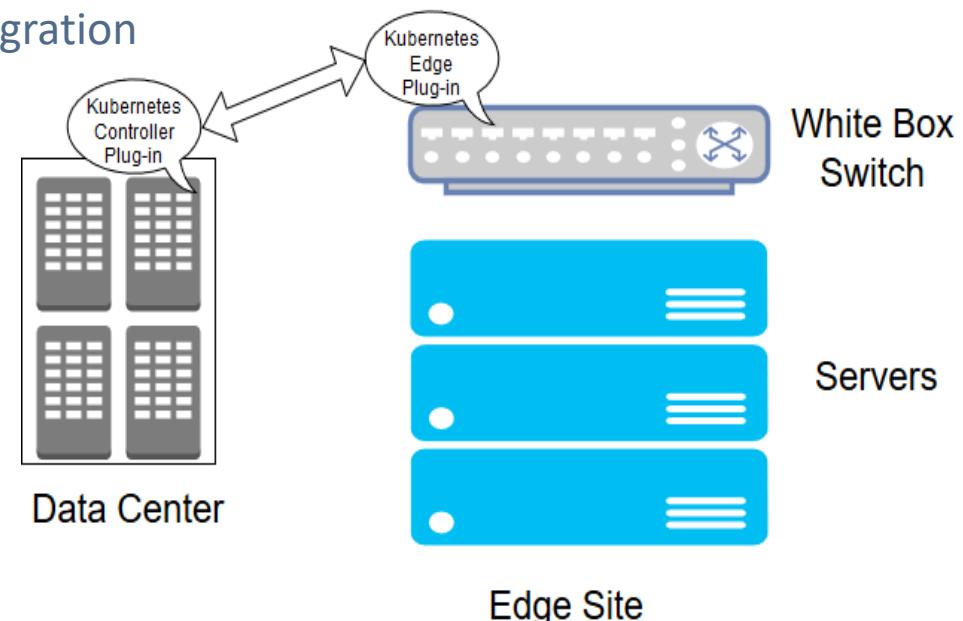
- Kubernetes, Python, Whitebox switch, Linux,
- REST APIs



Solution

- The Edge Computer controller's objective is to orchestrate, monitor and control Edge infrastructure, having servers and whitebox switches of the client.
- The workloads on the server would be containerised and Kubernetes will be used to orchestrate the containerised workloads.
- Calsoft is developing Kubernetes plug-ins for
 - The Edge controller, to communicate with geographically sparse Edge sites
 - Edge site, to collate metrics and handle commands from the edge controller
- The Kubernetes plug-in for Edge controller is developed in Python. It uses REST APIs to communicate with edge sites, to do controlling handshakes, metrics fetching and infrastructure management
- The Edge site plug-in integrates Prometheus for metrics collection and also act as mediator between Kubernetes controller and Edge Controller

User State Migration solution



Application Modernization for Financial domain



Engagement

Calsoft was engaged with the client in FinTech domain to transform their legacy applications micro services based architecture, to efficiently utilize their data centre infrastructure and reduce CAPEX/OPEX.



Benefits

- Stateless, independent & loosely coupled containerized applications
- Compatible with future workloads (via kubernetes), with minimal or no change
- Smaller footprint and better resiliency, boosting data centre resource utilization
- Short turn around time for upgrade of applications due to CI/CD integration.



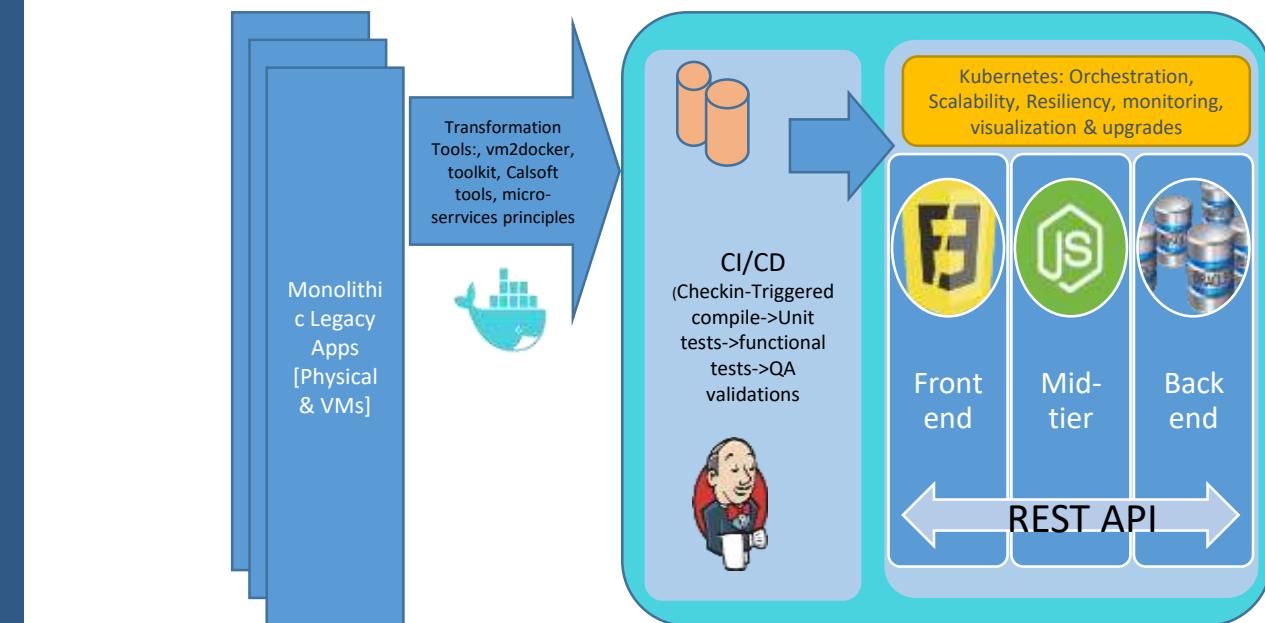
Technology

- Tools: vm2docker, home grown tools for application analysis, Kubernetes, ha-proxy, graphana



Solution

- Assessment of existing application communication interfaces(Pipes, Shared memory, IPC, web API etc)
- Transformation using images, tools, scripts & validation of workflows
- Refactoring of code to set application functionality as REST/Web API
- Code integration to complete the transformation of legacy application, as independent, stateless & containerized service.
- Use of CI/CD to roll out newer version of applications



System Management Services in Microservices Environment



Engagement

Calsoft supported the customer with design, implementation & testing of the Microservices environment, used to manage the system services of their product.



Solution

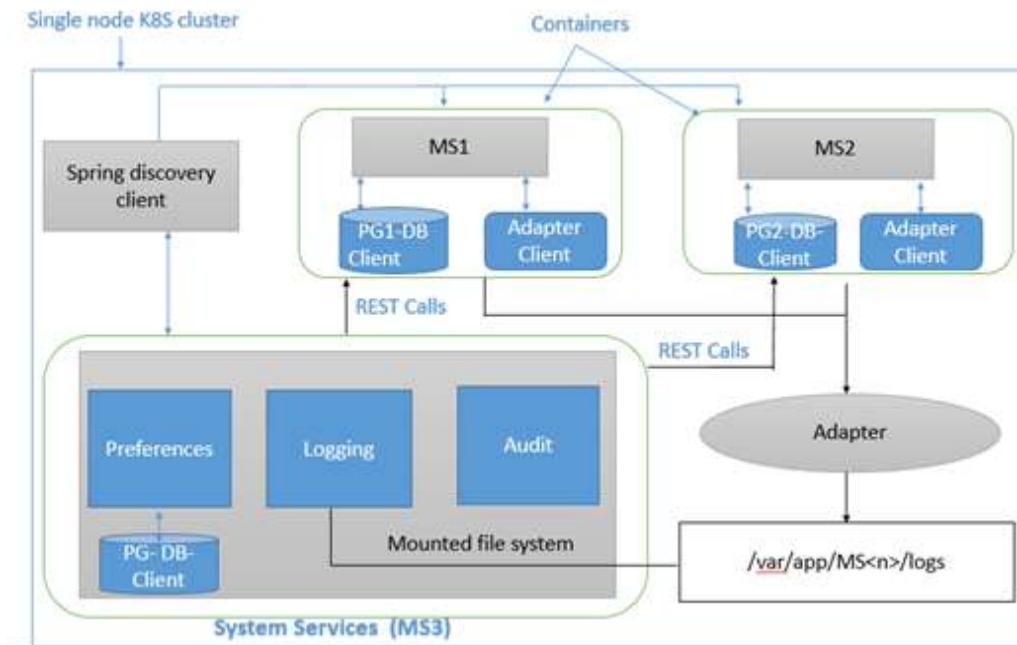
The engagement underpinned:

- The system management services included logging, tracing, audit & debugging facilities needed in the Microservices environment. System service is a single point of contact for the rest of the Microservices in order to trace, debug, search through the logs of the system.
- The following design aspects were considered:
 - Design of request/responses for querying logs
 - Tracing the system logs based on service ID or trace ID
 - Finding the relevant logs based on service, filename or a category
 - Auditing the services and aggregating the audit records
- Implemented the system service code, exported API endpoints for the rest of the Microservices, stored the logs in PostgreSQL DB
- Tested the API endpoints for functionality and possible parameters of the APIs; used tools like Junit for unit testing of the various system services
- Created mock services to test the functionality of the interaction with the rest of the Microservices containing the business logic
- Deployed the product on-prem with a single node k8s cluster for developer-level testing



Technology

JAVA, JUnit, Docker, Kubernetes cluster management, PostgreSQL, Jenkins



Benefits

- Better management
- Enhanced performance

End-to-end Automation Solution for vSphere Suite



Engagement

Calsoft automated and upgraded the deployment of vSphere suite for the customer's next-generation converged infrastructure and developed the microservices for enabling the functionality of the converged infrastructure system.



Solution

The engagement underpinned:

Built an end-to-end solution with integration of the existing framework, making it easier for the users to perform, upgrade, and deploy the vSphere suite.

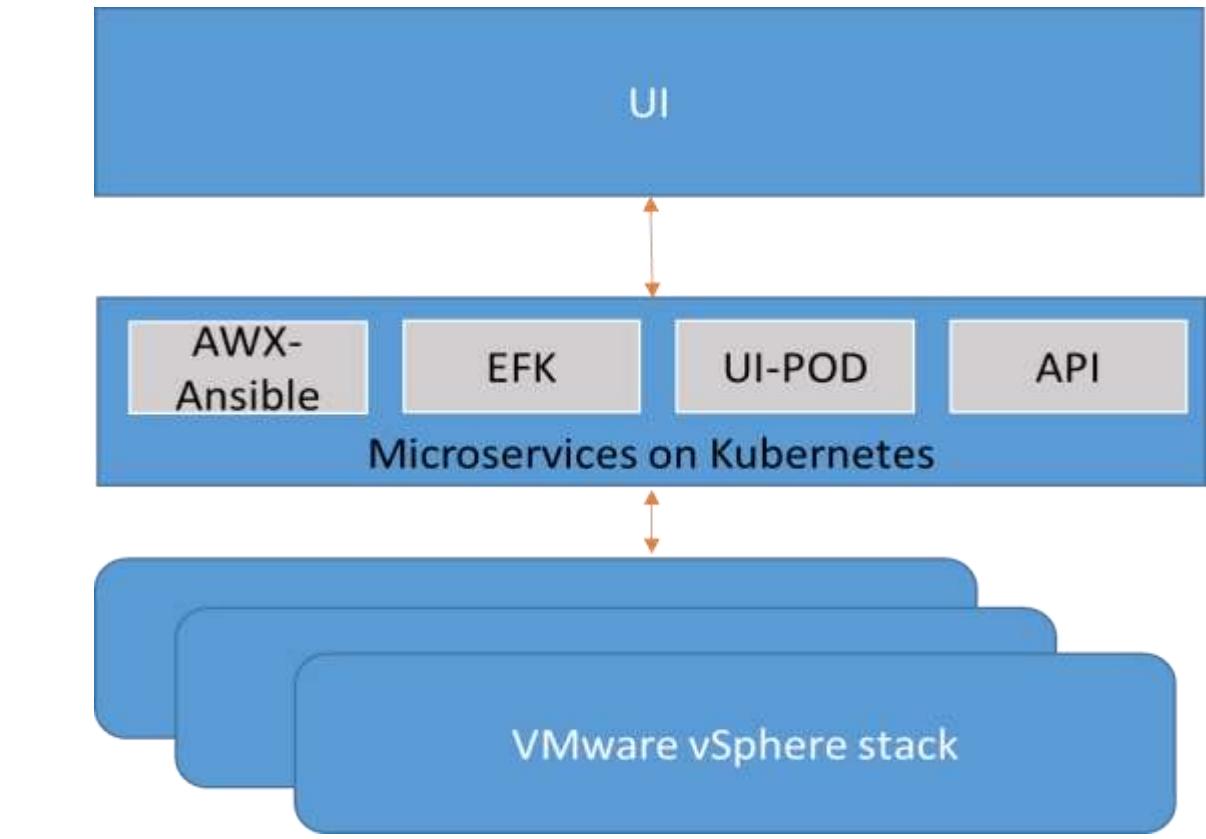
Features:

- Developed the Ansible playbook for upgrading vCenter and ESXi
- Developed the Ansible playbook for deployment of vRLCM, vROps, and vROps management pack
- Integrated the Ansible playbook with other microservices running on the K8S cluster
- Integrated the Ansible playbook with AWX so that the workflow could be called by other microservices using REST API
- Extended the microservices functionality by adding new features



Technology

Ansible, Python, Go, AWX, Docker, Kubernetes



Benefits

- Ease of use
- Single-click upgrade and deployment of vSphere suite (vCenter, ESXi, vRLCM, vROps, and vROps management pack) helped save time

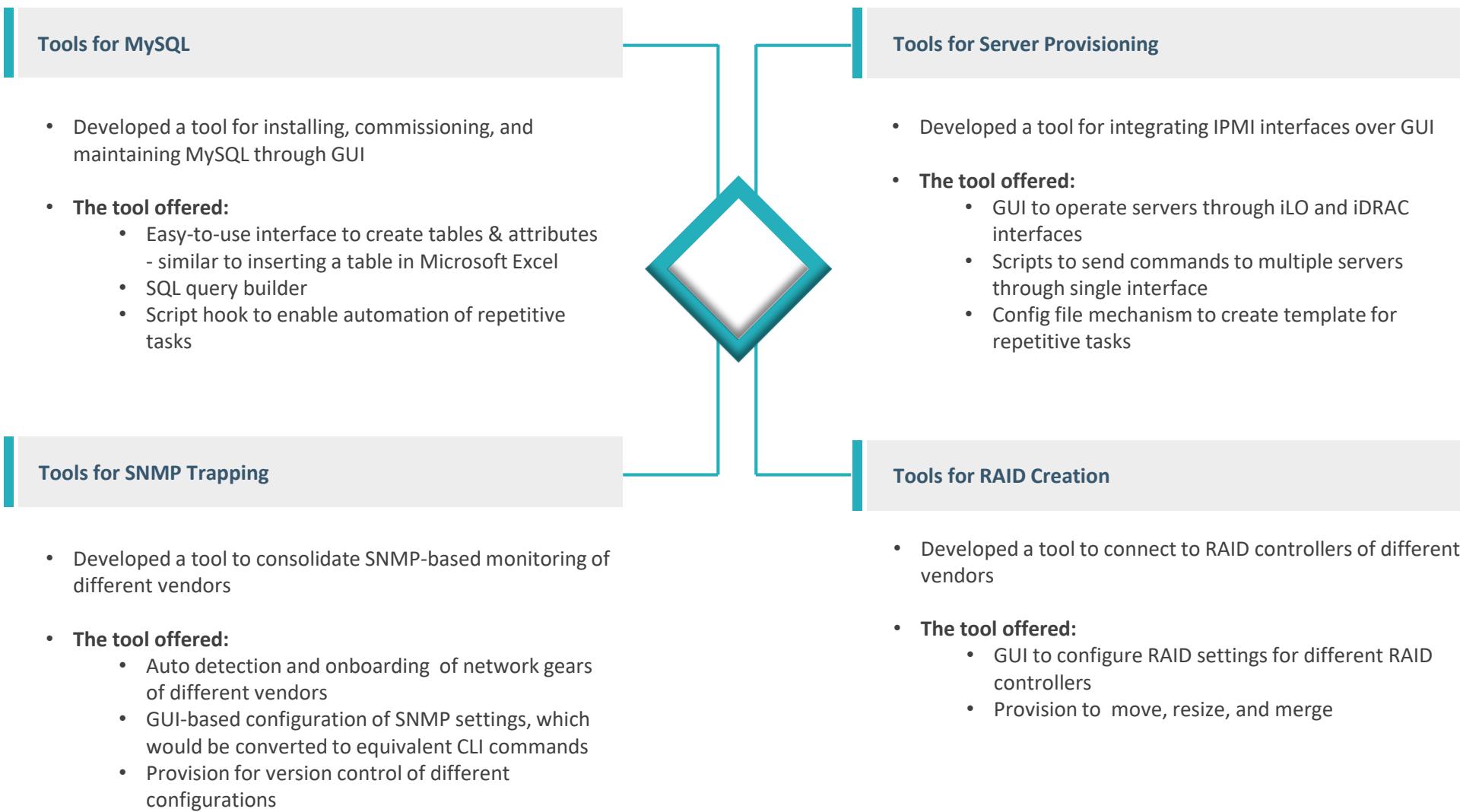


The background of the slide features a soft-focus photograph of a city skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) prominent. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there is a solid teal rectangular area containing the main title text.

Success Stories: Data Management

Windows-based Configuration Toolsets

Calsoft helped a Data Center Service Provider to create custom applications for managing several entities remotely. These applications helped the customer overcome the limitations of integrating disjoint vendors with limited integration flexibility.



Enterprise Data Quality Management Implementation



Business Challenges

The customer was facing some of the most damaging Data Quality issues in terms of financial, regulatory, and reputational impact:

- \$4M orders missing from trading report
- Pricing: incorrect product prices on website
- Client communication: outdated subscriber list
- Customer analytics delayed due to lack of cross-channel reconciliation
- Lost productivity for analysts



Solution

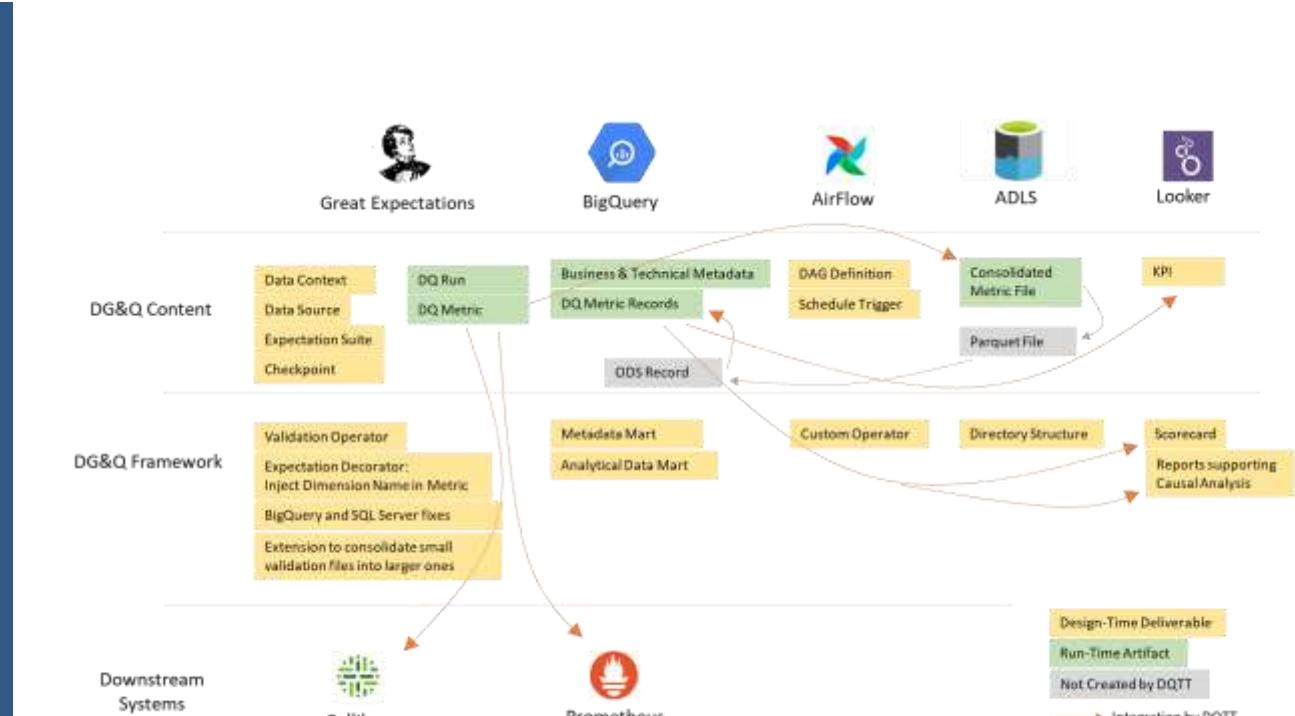
Consultancy, process Management and bespoke application development for the Enterprise DQ initiative. This included:

- Evaluating Data Quality Management tools for suitability
- Integrating with the Enterprise Data Catalog
- Setting up Data Quality Monitoring & Measurement and Data Quality Controls processes
- Building the Technology Platform using the chosen tools
- Setting up the Data Strategy for executing these frameworks



Technology

- Collibra for the Data Catalog
- Great Expectations (open-source) for the Data Quality test framework
- Apache Airflow for Workflow Management
- Google BigQuery for the Analytical Data Model
- Looker for visualization
- Azure Data Lake Storage
- Prometheus for logging
- Bespoke feature development and integration using Python
- Atlassian suite for Project Management



Benefits

- Enterprise Data Quality Scorecard provides MIS interfaces for insight and oversight.
- Causal Analysis Reports helps identify weak areas and causes of Data Quality issues.
- Financial and reputational impact due to low Data Quality mitigated.
- Business Stakeholders are assured that data will be complete, accurate, timely, and suitable for business decision making, communication, and reporting. They have a forum to report and receive service for Data Quality issues.

Enterprise Information Architecture



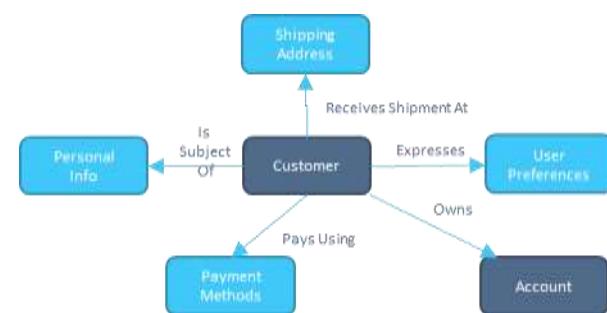
Business Challenges

- Consolidation of 6 small banks over 200 years into a single entity introduced disparity in operational systems and data sources
- Consequences: Integration challenges, customer misalignment, regulatory challenges
- The Bank's business strategy was to ensure sustainability over the next 200 years



Solution

- Enterprise Architecture published its data strategy and established a Data Governance program - Enterprise Conceptual Models, Data Quality, Data Mastering & Harmonization, Reference Data Management
- The Data Organization penetrated from CXO level down to individual contributor roles such as Developers
- Our Information Architects provided Enterprise Information Architecture support and Solutions Consulting



Technology and Skills

- Management Consulting
- Conceptual and Logical Modeling
- Data Quality management
- Erwin Data Modeler
- Sparx Enterprise Architect
- ArchiMate Modeling language



- ## Benefits
- Successfully implemented the Bank's data strategy for sustainability
 - Provided the Technology, People, and Process platform for monetizing the Bank's vast data
 - Streamlined change management
 - Single pane of glass for oversight and observability

Enterprise Data Governance Program (Focus: Data Catalog & Lineage Management)



Business Challenges

- 5,000 employees and hundreds of systems
- Units and people across the enterprise were not in full agreement on the understanding of fundamental entities such as 'Customer'
- Data mastering systems/SVoTs were not consistently defined across the enterprise; integration decisions were localized rather than following a consistent framework
- It was impossible to deliver predictable results in Change Management
 - Impact analysis
 - Project sizing and planning



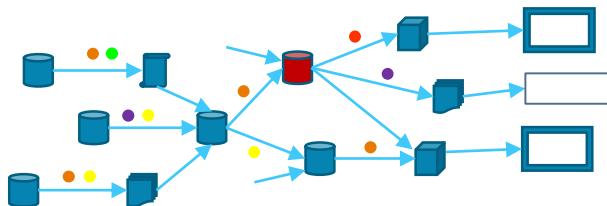
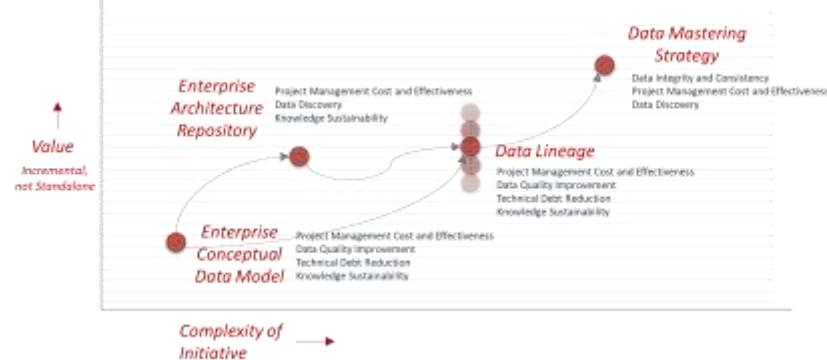
Solution

- Requirement Specification Workshops with cross-functional teams
- Enterprise Data Strategy
- Gap Analysis & Roadmap
- Exploratory Analysis & Tooling
- Data Catalog & Lineage Platform – tools selection, customization & content development
- Overall Program Management



Technology

- Collibra for the Data Catalog and Lineage Publication system
- SSIS, Spark, and Google BigQuery load jobs for integration
- Integration and Tooling using Python
- Neo4j for the Queryable Lineage Graph
- Atlassian suite for Project Management



Sample Effort-Benefit Matrix					
		Value Targeted			
		Project Management	Data Quality Improvement	Data Discovery	Compliance
Metada ta in Lin eage Mo del	Data Flow Source & Destination	X	X	X	X
	Data Content and Format	X	X	X	X
	DQ Metrics		X		X
	SoRs, Masters, etc	X		X	X
	Business & Technical Owners	X			X



Benefits

- Enterprise Data Quality Scorecard provides MIS interfaces for insight and oversight.
- Causal Analysis Reports helps identify weak areas and causes of Data Quality issues.
- Financial and reputational impact due to low Data Quality mitigated.
- Business Stakeholders are assured that data will be complete, accurate, timely, and suitable for business decision making, communication, and reporting. They have a forum to report and receive service for Data Quality issues.

Patch Management for Windows



Engagement

- Calsoft developed automated patch management software for a Managed Security Service Provider (MSSP).
- The software was intended to automatically detect and apply missing patches, updates, hotfixes, and security updates.



Benefits

- The MSSP was able to apply patches and keep the end points up-to-date with no manual intervention.
- Automated patching reduced the security threats.
- Seamless upgrade reduced the downtime.



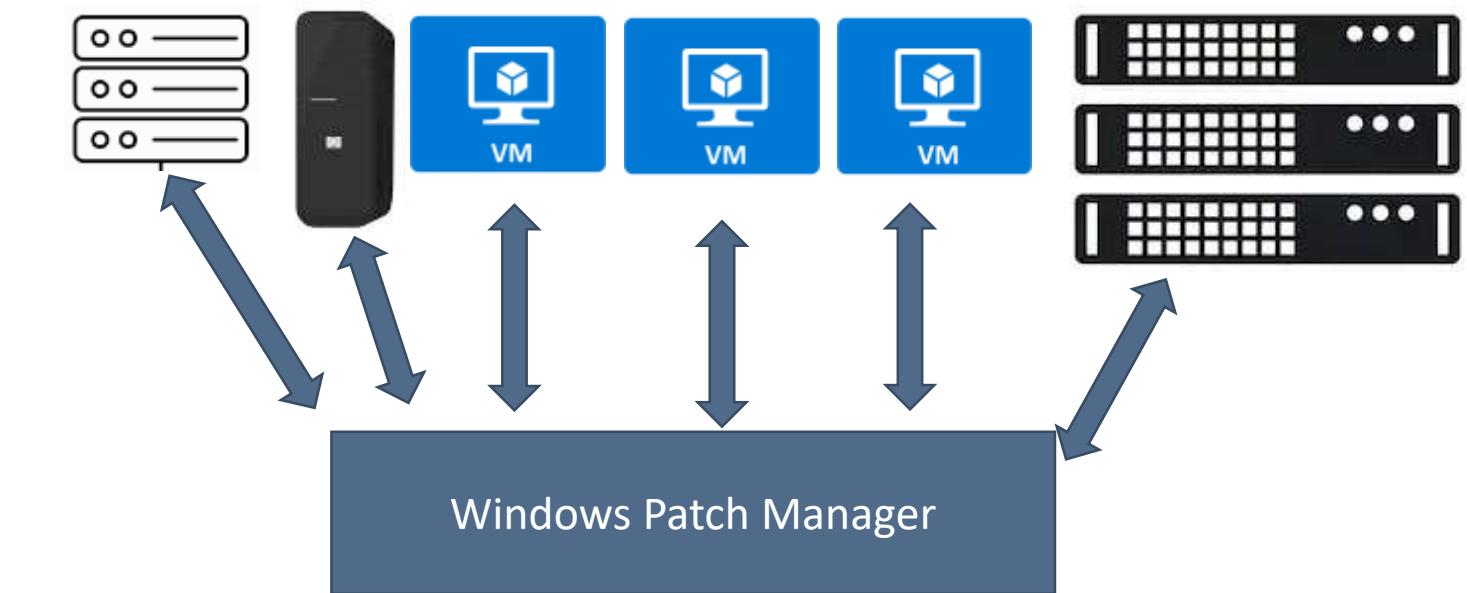
Technology

- Windows
- .NET Framework, C#, PowerShell



Solution

- Calsoft designed a Windows .NET framework-based application. It used the Windows Presentation Foundation (WPF) library to create user interfaces that would be resolution independent.
- The software had different modules to cater to:
 - Auto detection of end points and its state of operating system.
 - Central repository of patches, updates, and hotfixes for different versions.
 - Silent Patch dispatcher.
 - Add-ons for different variants of 200+ commonly used applications and libraries like IIS, SQL, Antivirus, FTP Servers, etc.
- The application extensively used the inherent features of .NET to make the application resilient and adaptive to future changes
- Calsoft developed the solution in 4 months, with a team of 6 .NET Developers and 3 QA Engineers
- Post the release of the first version, Calsoft continued working on the next 3 releases and sustaining the past releases for hotfixes to production deployments



Backup Infrastructure Revamp for SQL Server farm



Engagement

Calsoft helped a large IT vendor revamp backup infrastructure & data analytics for their SQL server farm. The engagement underpinned:

- Setting up Business Continuity & DR strategy for on-premises SQL server farm
- Setting cloud integration for storage tiering & archival for compliance
- Setting up Database-as-a-Service for internal data mining/BI applications



Benefits

- Well-tested DR strategy with on-demand dry-run workflows enabled
- Optimized way of backing up SQL Server farms, with reduced backup window, better RTO and RPO
- Implementation tuned for SQL Server & server farm environment, with optimized reporting (local & central repositories) and licensing structure
- Reduced local storage utilization with cloud integration & cloud storage tiering
- DB-as-a-Service created with periodically backed-up data to cloud
- New use case of Data Analytics was formulated using public cloud's own data analytics services, providing better ROI



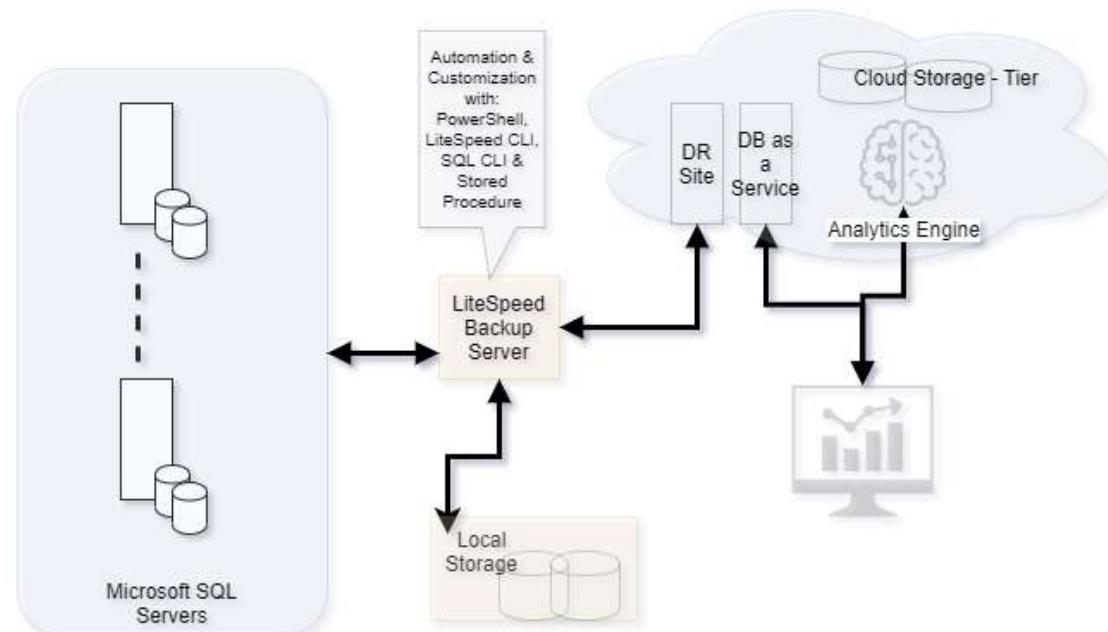
Technology

- Database: SQL Server 2012/16
- OS platforms: Windows Server 2012/16 & Windows Core
- Tools: LiteSpeed for SQL Server 8.2,
- PowerShell, SQL, Azure SDK, AWS SDK, .NET Framework



Solution

- Customer has 500+ VMs with SQL Server instances running in standalone and clustered modes.
- Calsoft created BC & DR plan using LiteSpeed server for backing up SQL Server instances.
- Backups were configured to use on-premises and as cloud object storage (Azure & AWS).
- Storage tiering within cloud was implemented to archive older backups, required for compliance.
- Implemented PowerShell, SQL scripts and stored procedures to run automated database backup checks, restores & point-in-time recoveries for offering DB-as-a-Service for business intelligence tools.
- Implemented one-click on-demand dry run for DR of databases, using AWS & Azure SDK & CLI
- Recovered DBs were configured for Azure Analytics Services for business intelligence, analytics use cases.



PVC(Product Variant Configurator) – SNP (Services & Peripherals)

Engagement

- To enable one product variant (Monitor) with multiple SKUs (Stock Keeping Unit), so that we can display all the available configuration in a single UI page for the given product variant.
- SKU will contain all the configuration information about the product like resolution, screen size and whether its a curved screen or flat screen etc.
- Earlier the page in the dell.com will contains only one SKU information for the product variant.

Benefits

- User friendly UI - Using this UPD (Unified Product Details) page experience the end user can see and select all the available configuration of a particular product
- For instance, if the product variant configured with 2 SKUs, one SKU with 24-inch screen size and other SKU with 26-inch screen size means the end user can see both the options and select.

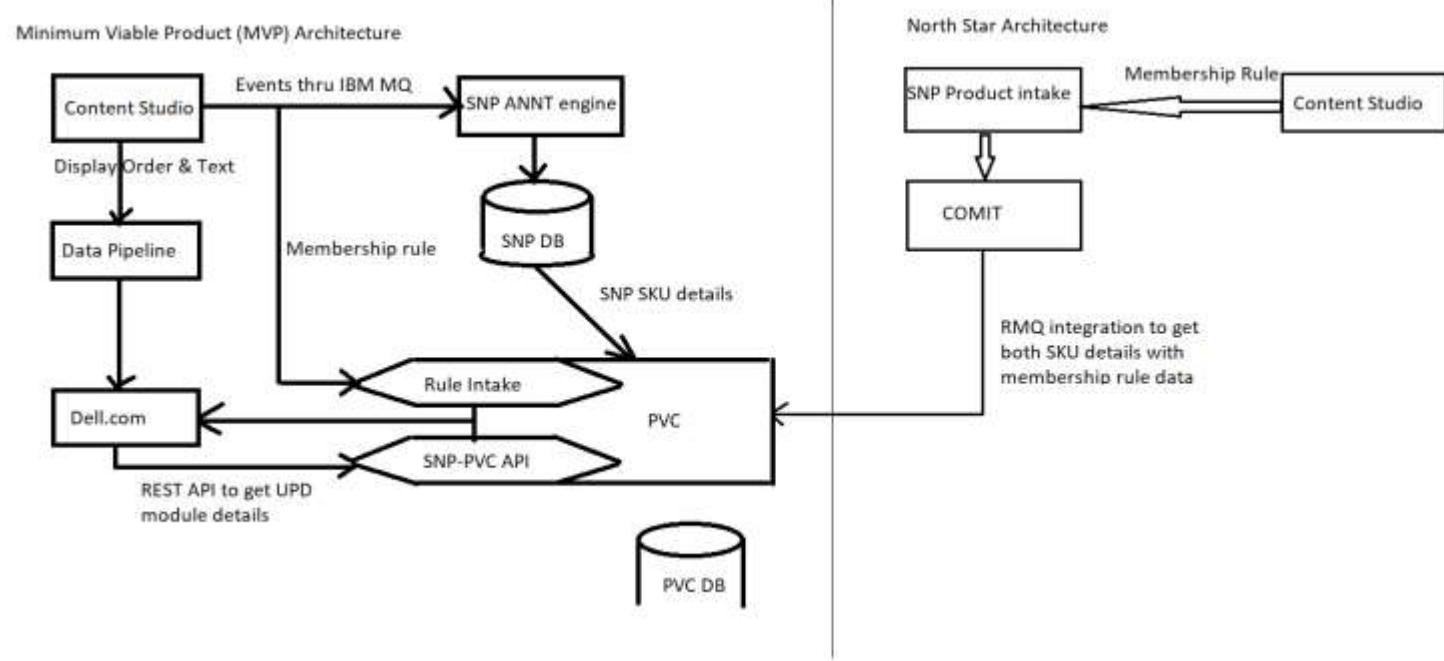
Technology

- Cloud: Pivotal Cloud Factory
- Tools: Gitlab
- Database: Mongo
- Programming Lang: Java
- Frameworks: Spring Boot
- Messaging: RabbitMQ



Solution

- This is a micro services-based pipeline applications.
- Content Studio → PVC Rule Intake → PVC SNP Processor → Dell.com
- Content studio is the product authoring system, we are receiving events from there and we are processing the events.
- The core component of this pipeline is the “PVC SNP Processor” and its responsible for converting multiple SKUs information into one mongo document and sending events to the dell.com about the newly created document.
- PVC SNP Processor component developed by our engineer and contributed to other component development.
- Involved in deployment via CICD pipeline for prod and non prod environments



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Benefits

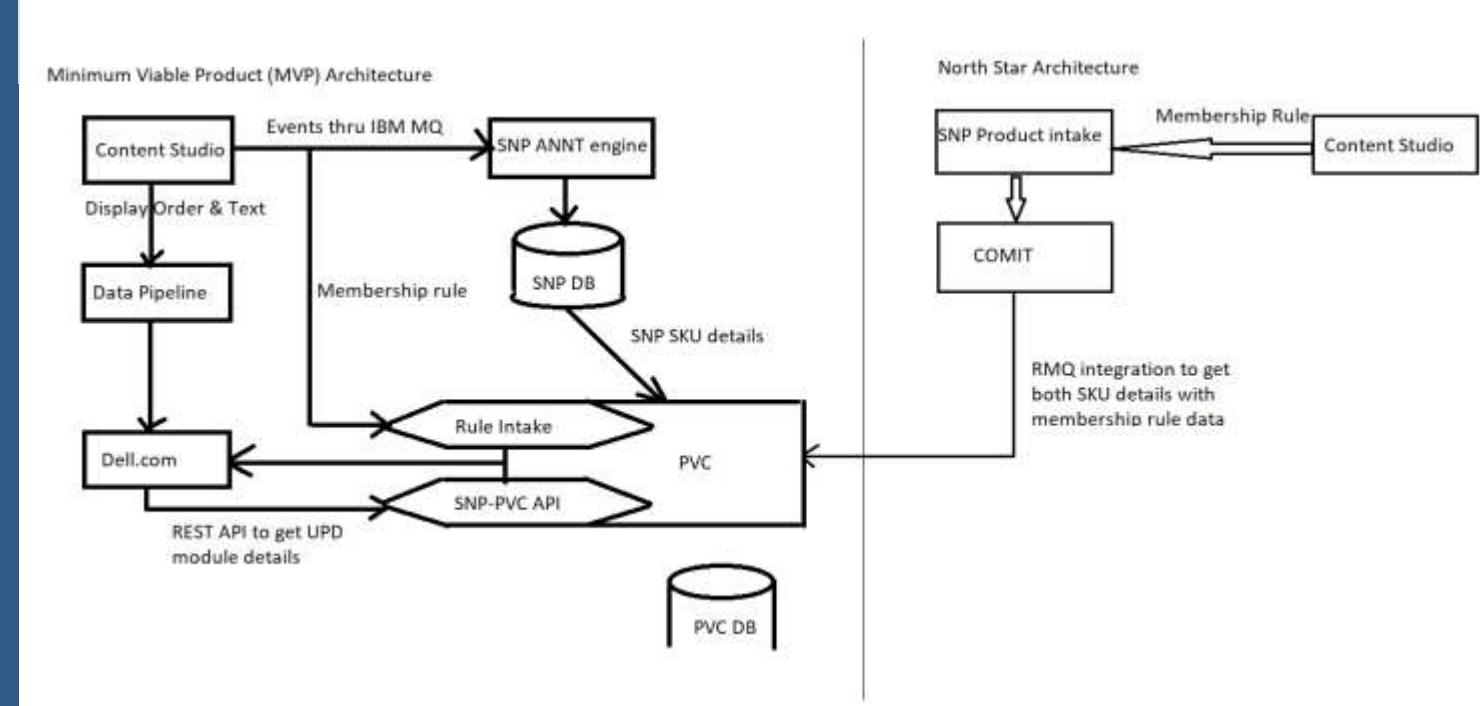
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Order Code Event Flow (OC Event Flow)

Engagement

- Once order has been created by customer that order goes through different stages like staging config, full catalog, Dellware, chassis changed, order code unavailable, chassis unavailable etc.
 - There are two services process these orders which are Sentinel and COMIT.
 - Sentinel having process order within different stages and send it to COMIT.
 - COMIT also process order from same stages and send it to next process.
 - Single catalog can have multiple orders
 - We can filter out these orders based on region, language and catalog and reconcile mode
- 1) Catalog
2) Hourly Changes

Benefits

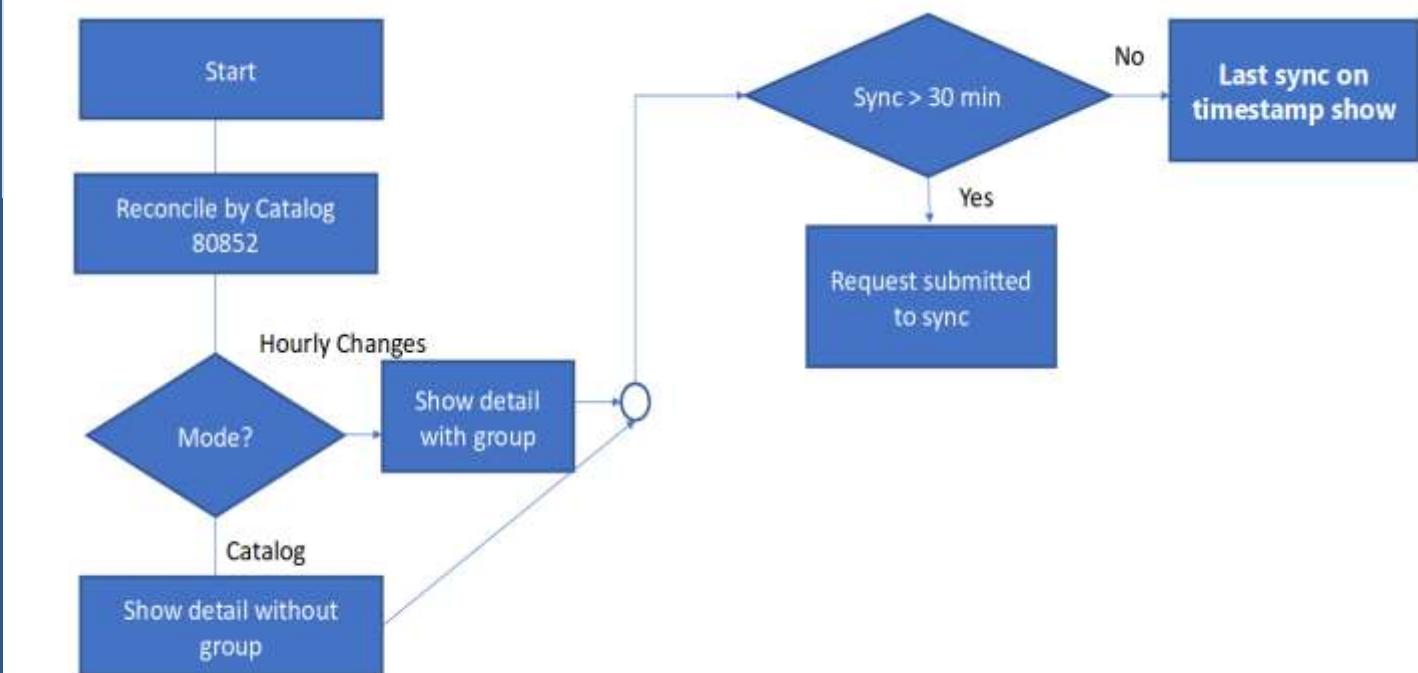
- It only monitor order count stages by country and region wise
- It easily find out total sentinel/COMIT processed order code count.
- It shows recent state of order code last 30 min

Technology

- Cloud: Azure
- Tools:Visual studio code, git
- Database SQL Server
- Programming Lang: Angular, .Net WebAPI,

Solution

- Developed to show count of order code stages like staging config, dellware, order code change
- Developed background processes which move order code to next stages and next application



Sales Catalog Application



Engagement

Sales catalog application is an API that is consumed by DSA applications and Search Services. These API's provides the details such as Categorytree, ProductVariant etc. to the ecommerce site dell.com. There are thousand of products with different variants published for worldwide sale.

Sales Catalog Applications :-

Sales catalog aggregation service.

Sales catalog indexing service.

Sales catalog transaction service.

Sales catalog intake application.



Benefits

Security :-Sales catalog application is secured by using token based authentication and authorization.

Performance :- The application performance increased by using caching, indexing, nosql database etc.

Manageability :-Application is divided into various modules and sub modules as per the functionality, so it can be easily manageable.

Integrity :- For managing the complexity of the application the application is divided into various sub modules and this sub modules working together to achieve single functionality.

Maintainability :-Application is divided into various modules so it can be easily update and test



Technology

WCF Services

SQL

.Net Core

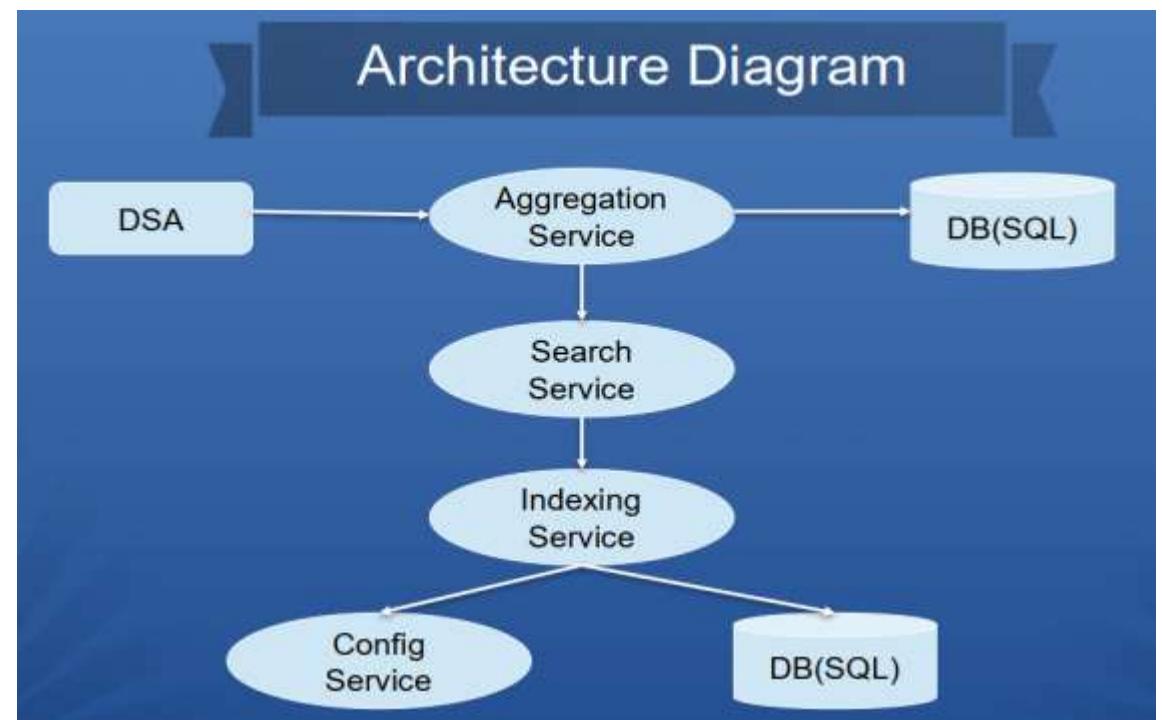
MongoDB

React



Solution

- Sales catalog application is APIs that consumed by DSA applications and Search Services. This API's provides the details such as Categorytree, ProductVariant etc. to the ecommerce site dell.com. There are thousand of products with different variants published for worldwide sale.
- Sales catalog run various background jobs to maintain and validate the product details. Also there are various background jobs that helps to keep folder structure clean, validate the categories, import the data from uploaded files. Etc.
- Also provides the various data monitoring tool to validate the product details and check the various activities.





Engagement

Calsoft was engaged with the client for development of a web application which will be responsible for validating configurable product and rules given by end user, along with the Calsoft team also helps in pipeline and deployment support for multiple services.



Benefits

With the Validation Intake it become easy to ensure the validation of product and rule configuration, it provides information of mismatch. And validate the end user inputs about product based on upstream rules.



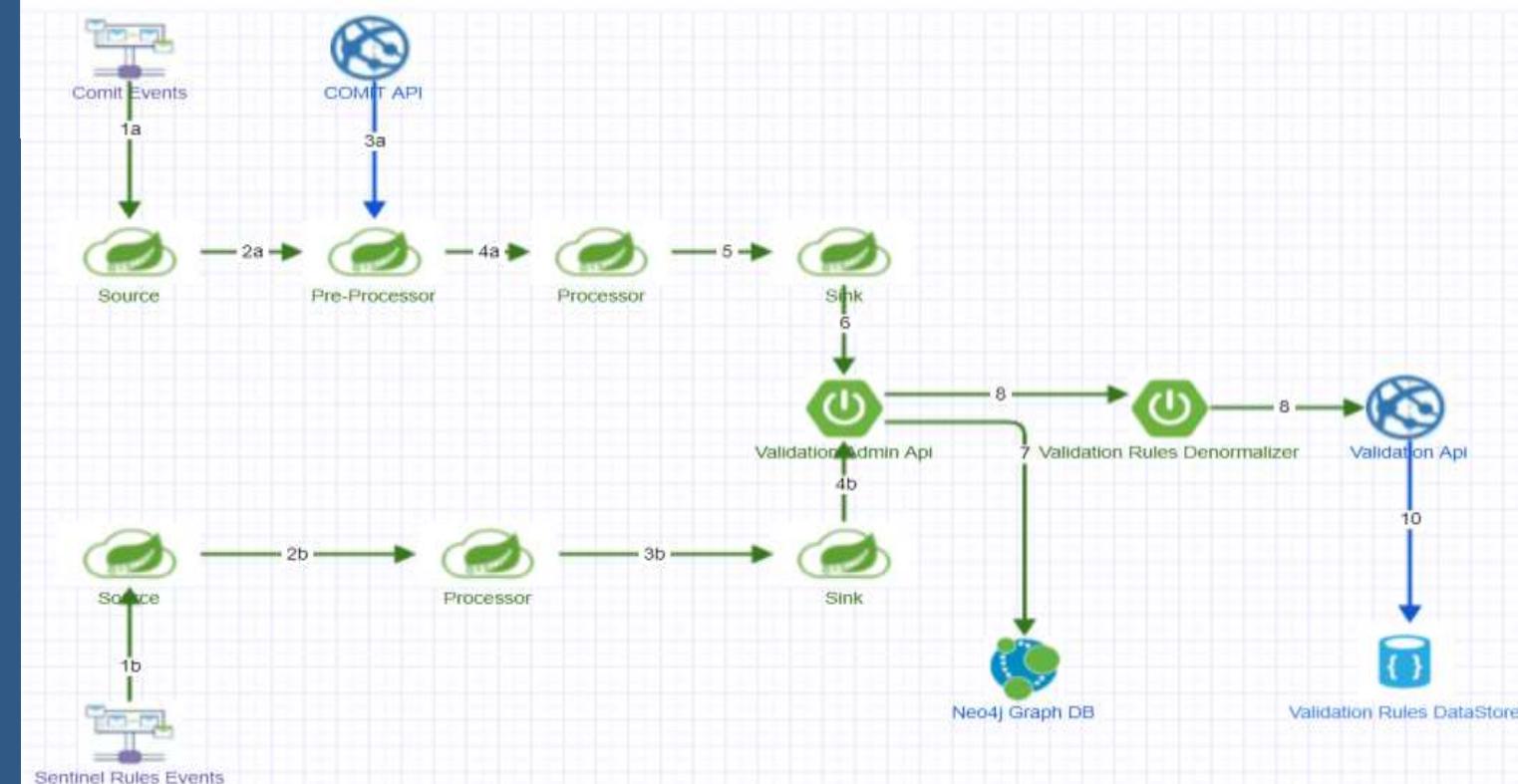
Technology

- Java, Spring boot, Spring cloud
- GitLab, Gradle, Git
- Neo4j, MongoDB
- Angular, ReactJs, Typescript
- RabbitMQ, Kafka
- Etc..



Solution

- Validation Intake validate configurable product and rules based on relation in Neo4J.
- Those rules and product related information will be captured or fetched by ITV API calls.
- This whole process will be managed in between upstream and down stream.
- Rules and product configuration changes based on region for which it be available



Product Intake (ISG pipeline)



Engagement

- Getting the solution structure from pac csb, order code from sentinel and config (V2 model) map to V4 model commit.



Benefits

Provide one solution structure for multiple order codes.



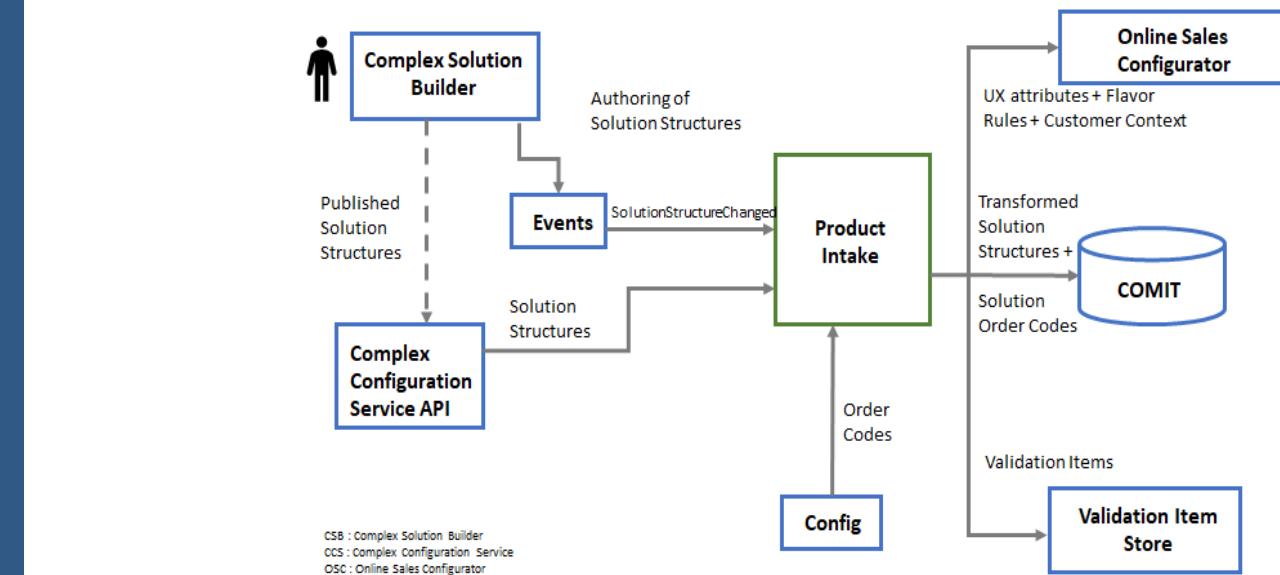
Technology

- Java.
- REST API.
- MongoDB
- RabbitMQ.
- JPA.
- Junit.
- Log4j.



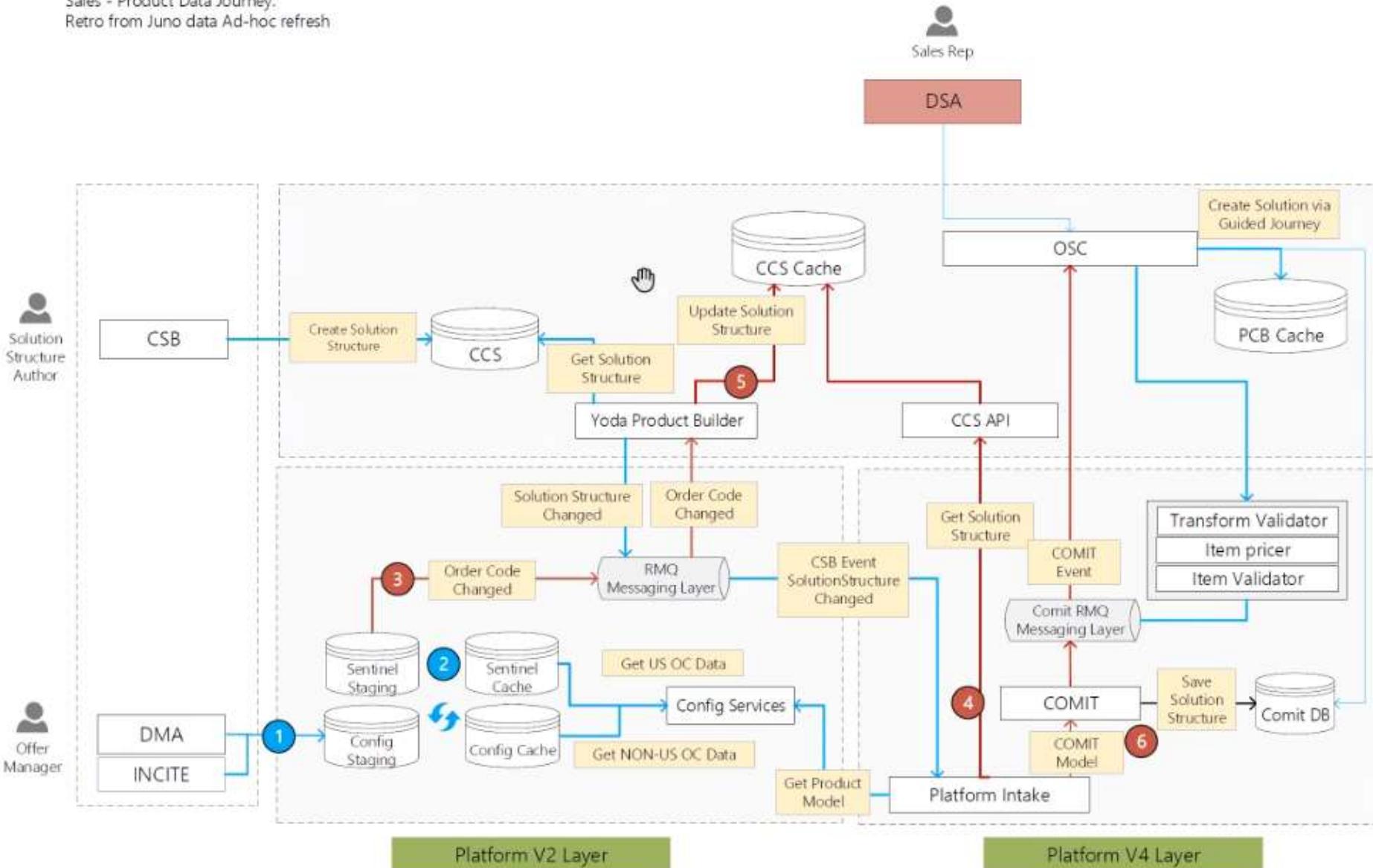
Solution

- ISG work as data mapper. It get solution structure from pac csb map with sentinel or config order code data.
- The ISG application is divided into 3 modules which follows filter, processor and sink
 - Filter - filter is used to verifying solution structure.
 - Processor – is used to map solution structure with order code.
 - Sink – is used to send transformed solution structure to commit.



Project detailed explanation

Sales - Product Data Journey:
Retro from Juno data Ad-hoc refresh



Consumer and Small Business Modernization (COSMOS - Data Platform)



Engagement

Design and development of Consumer and Small Business Modernization (COSMOS - Data Platform).



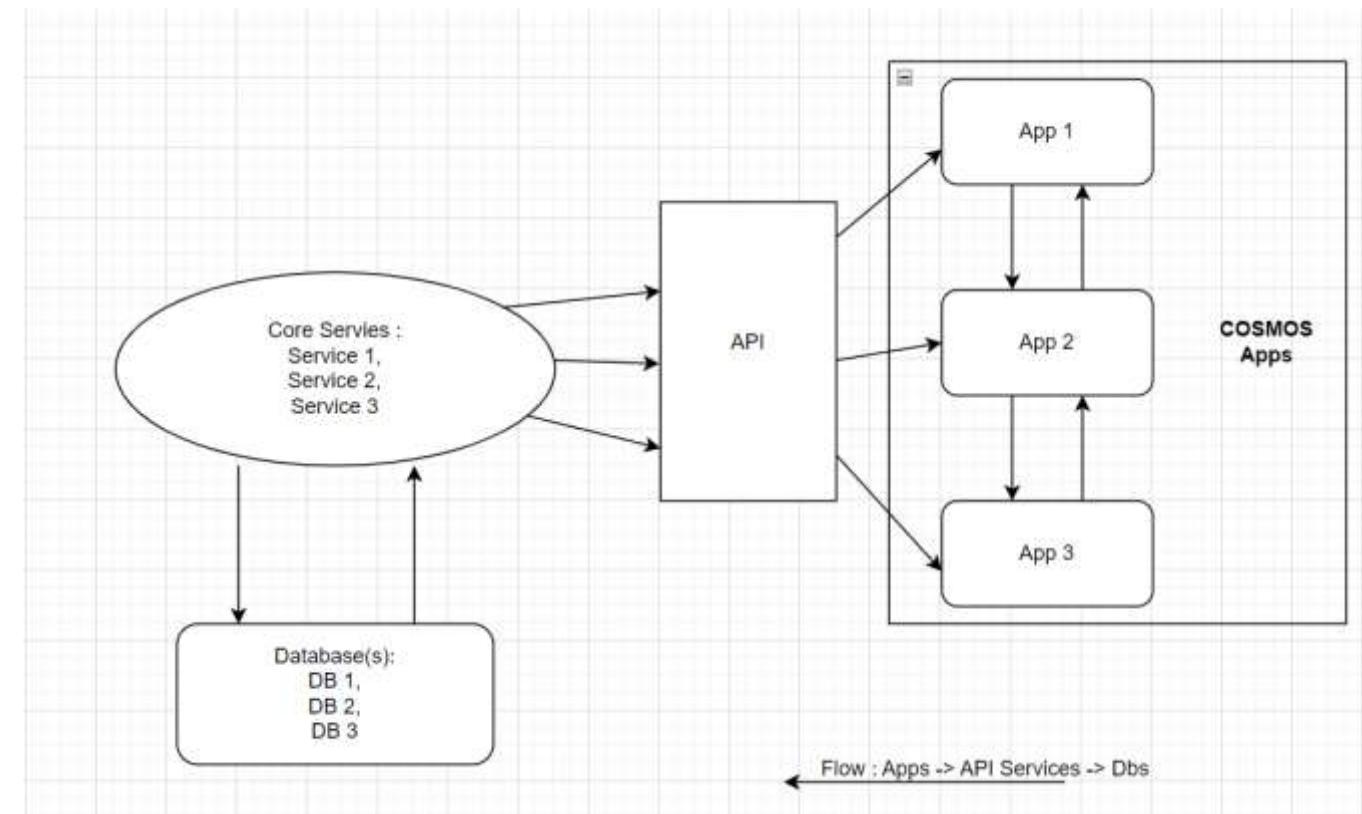
Solution

- Development of new features like Product Matrix app, User Management app with other backend services.
- Standardized the workflow between and across different work streams.
- Transitions from offline artifacts to online and cloud-based environments.
- Incorporated Machine Learning to automate and provide decision-support for key business objectives (pricing, forecasting, assortment planning, etc.)



Technology

Angular, .Net Core, Web API, SQL Server, .NET Automation, Microservices architecture, GITlab for CI/CD, Checkmark, SonarQube, Dynatrace



Benefits

- CSB Modernization is a multi-year initiative to improve, standardize and augment the operations processes for the CSB org.
- We support Dell technologies strategy cascade of "modernizing and growing our core business" which is a top priority.



Success Stories:
Data Quality and Governance

Enterprise Data Quality Management Implementation

For a Top European Luxury Fashion Marketplace



Business Challenges

Some of the most damaging Data Quality issues faced in terms of financial, regulatory and reputational impact –

- \$4M orders missing from trading report
- Pricing – incorrect product prices on website
- Client communication – outdated subscriber list
- Customer analytics delayed due to lack of cross-channel reconciliation
- Lost Productivity for Analysts

Data Quality was managed by individual Data Engineering teams without inter-coordinating.



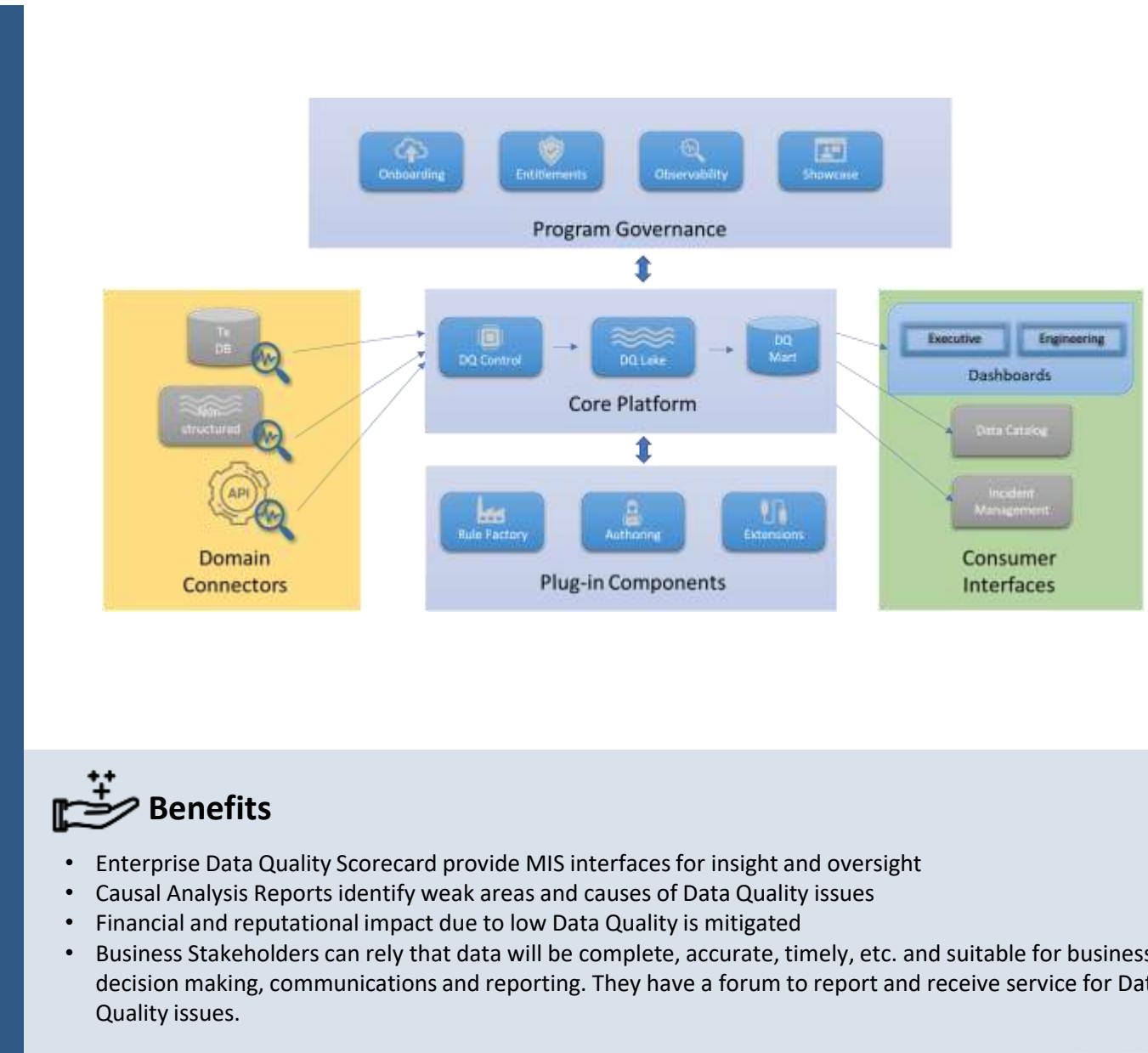
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- Evaluate Data Quality Management tools for suitability
- Integrate with the Enterprise Data Catalog
- Set up Data Quality Monitoring & Measurement and Data Quality Controls processes
- Build the Technology Platform using the chosen tools
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Technology

- Collibra for the Data Catalog
- Great Expectations (open source) for the Data Quality test framework
- Apache Airflow for Workflow Management
- Google BigQuery for the Analytical Data Model
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Enterprise Information Architecture

For a Top Australian Bank



Business Challenges

- Consolidation of 6 small banks over 200 years into a single entity introduced disparity in operational systems and data sources
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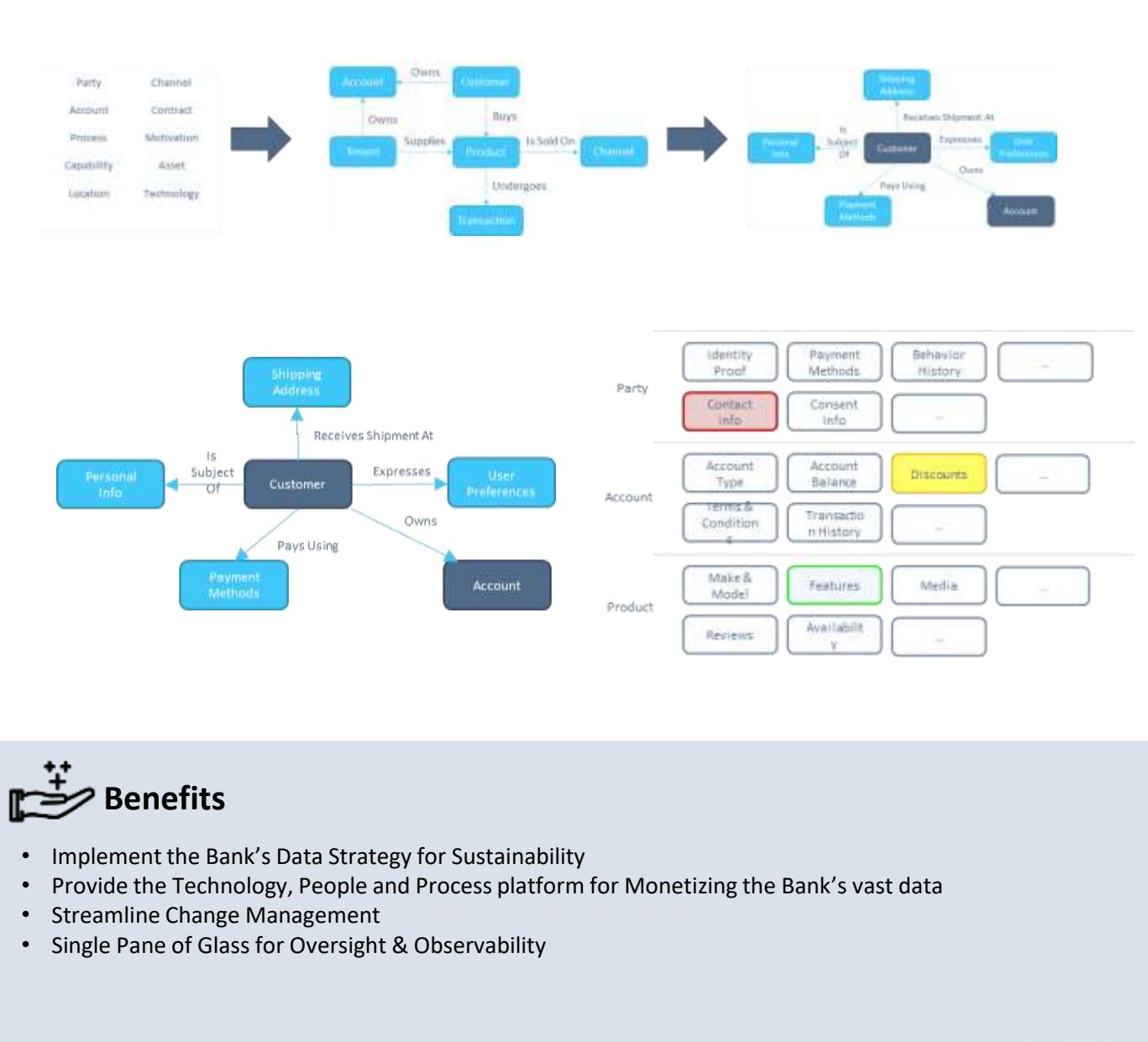
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- The Data Organization penetrated from CXO level down to individual contributor roles such as Developers
- Our Information Architects provided Enterprise Information Architecture support and Solutions Consulting



Technology and Skills

- Management Consulting
- Conceptual and Logical Modeling
- Data Quality management
- ERwin Data Modeller
- Sparx Enterprise Architect
- Archimate Modelling language





Success Stories: Certifications



VMware VAAI Block Certification for NAS Storage



Engagement

Calsoft was engaged with client to carry out certification testing of client's iSCSI block storage product that was VAAI compatible.



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "NAS" product.
- Setup the required test lab.
- Setup the VAAI environment.
- Execute VMware VAAI/Block certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Benefits

- Calsoft helped client in running and verifying the success of iSCSI Protocol and VAAI Block Primitives test suite on VMware Workbench 3.5 for VMware Certification for NAS Storage Box.



Technology

- vSphere 6.0, vCenter 6.0, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware Storage Hardware Certification - FC SAN



Engagement

Calsoft was engaged with client to carry out certification testing of client's Storage box with FC protocol



Benefits

- Calsoft helped client in running and verifying the success of FC Protocol on VMware Workbench 3.5 for VMware Certification for Storage Box.



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "SAN FC" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Technology

- vSphere 6.5, vCenter 6.5, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware Storage Hardware Certification - iSCSI SAN



Engagement

Calsoft was engaged with client to carry out certification testing of client's Storage box (SAN-iSCSI)



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "SAN (iSCSI)" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Benefits

- Calsoft helped client in running and verifying the success of SAN (iSCSI)Protocol on VMware Workbench 3.5 for VMware Certification for Storage Box.



Technology

- vSphere 6.5, vCenter 6.5, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware Storage Hardware certification



Engagement

Calsoft was engaged with client to carry out certification testing of client's Storage box (SAN-iSCSI)



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "SAN (iSCSI)" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Benefits

- Calsoft helped client in running and verifying the success of SAN (iSCSI)Protocol on VMware Workbench 3.5 for VMware Certification for Storage Box.



Technology

- vSphere 6.5/6.7/7.0, vCenter 6.5/6.7/7.0, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware vSAN File Services Certification



Engagement

Calsoft was engaged with client to carry out certification testing of client's on NAS Storage box



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "NAS" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Benefits

- Calsoft helped client in running and verifying the success of vSAN (NAS)Protocol on VMware Workbench 3.5 for VMware Certification for Storage Box.



Technology

- vSphere 6.7, vCenter 6.7, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware Storage Certification (NVMe-oF array with RoCEv2) for vSphere 7.0



Engagement

Calsoft was engaged with client to carry VMware NVMe-oF array Hardware certification for NVMe-oF over ethernet using RoCEv2 RDMA on vSphere version 7.0



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "NAS" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.



Benefits

Calsoft helped client in running and verifying the success of VMware NVMe-oF array Hardware certification for NVMe-oF over ethernet using RoCEv2 RDMA on vSphere version 7.0



Technology

- vSphere 7.0, vCenter 7.0, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware Minor Storage Firmware Certification



Engagement

Calsoft was engaged with client to carry VMware Minor Storage Firmware Certification on 6.7



Benefits

Calsoft helped client in running and verifying the success of VMware Minor Storage Firmware Certification on 6.7. Customer had already certified on 6.5 and wanted to re certify, Calsoft proposed to have minor certification for minor changes on 6.7



Technology

- vSphere 6.7, vCenter 6.7, VMware Workbench 3.5, Software test Automation Framework (STAF)



Solution

Following parameters were undertaken for completion of this project

- Understand the client's "NAS" product.
- Setup the required test lab.
- Setup the Test bed/Test environment.
- Execute VMware Storage hardware certification test cases in a standard way as suggested by VMware.
- Report the test results to client.

Customer under NDA

VMware vSphere web client certification on 6.5/6.7 and 7.0



Engagement

Calsoft was engaged with client to carry out the vSphere web client certification on 6.5/6.7/7.0



Solution

Following parameters were undertaken for completion of this project

- Develop a vCenter plugin.
- Test the plugin.
- Getting it certified on 6.5/6.7 and 7.0



Benefits

Calsoft helped client in running and verifying the and getting the product listed on the vCG for 6.5/6.7 and 7.0



Technology

- vSphere 6.5/6.7/7.0, vCenter 6.5/6.7/7.0, VMware Workbench 3.5, Software test Automation Framework (STAF)

Customer under NDA

VMware vROps Management Packs certification for converged infrastructure



Engagement

Calsoft was engaged with the client to built a vROps management packs for their next generation converged infrastructure. The engagement underpinned:

- Discover and showcase topology relationships across components in converged infrastructure.
- Provide monitoring and alert services based on thresholds.
- Capacity Planning and Trending
- Develop performance optimized MPs so that they don't impact vROps performance



Benefits

- Consistent monitoring of appliances
- Predictive analytics
- Shows Health of resources
- Tracking of interrelated affected resources for resolving issues if any.



Technology

- Java, REST API, vROPs 7.5/8.0/8.1



Solution

- Built a separate vROps management packs to monitor individual components of converged infrastructure.

Features:

- Correlates data from applications to storage in a unified, easy-to-use management tool that provides control over performance, capacity and configuration with predictive analytics which helps in driving proactive action.
- Provides visibility in terms of capacity, efficiency and risks for various components
- vROps alert lifecycle for custom defined alerts.
- The analytics engine analyses collected metrics and provides self-learning predictive analysis, smart alerts and capacity optimization across virtual and physical stack.
- Shows Topology relationship across components and physical to virtual infrastructure.

Functionality:

- Dashboards for monitoring all resources
- Provides information about health of resources
- Resolution of issue by providing recommendation of possible solution



VMware Certification Testing for Unified Storage Appliance



Engagement

Calsoft was engaged with the client for VMware Certification Testing for Unified Storage Appliance. The engagement underpinned:

- Solving issues faced by the client due to changes made by VMware in ESXi 5 while certifying their products, and making them workable with vSphere 5
- Running S/W iSCSI certification and impart training in FC certification for their unified storage appliance



Benefits

- In-house testing on storage appliance helped in mitigating infrastructure availability issues
- Certification testing ensured unsurpassed performance of unified storage appliance



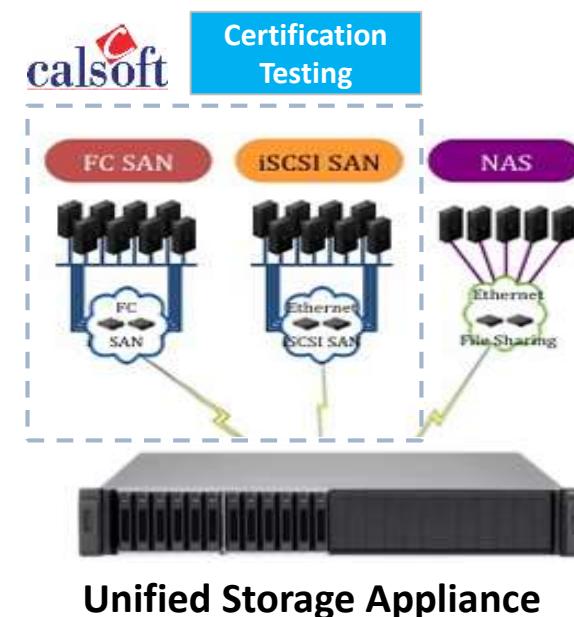
Technology

- Platform: VMware ESXi
- Protocol – iSCSI, FC



Solution

- Calsoft performed S/W iSCSI & FC certification for customer's unified storage appliance using VMware Workbench version 2.0.
- Details include:
 - Number of test cases for S/W iSCSI = 26
 - Number of test cases FC = 40



Microsoft Windows Server 2016 SDDC-AQ For Storage Media on Certified Server HW



Engagement

Calsoft was engaged with the client for WS2016-SDDC Certification of their SSD media devices, including cloud simulation workload using qualified server hardware. The engagement underpinned:

Carry out certification of the SSD media against SDDC-AQ and MAS, so the product qualifies to be listed on Windows Server Catalog.



Benefits

Certification testing ensured features and performance of SSD drives in a Windows 2016 SDDC environment.



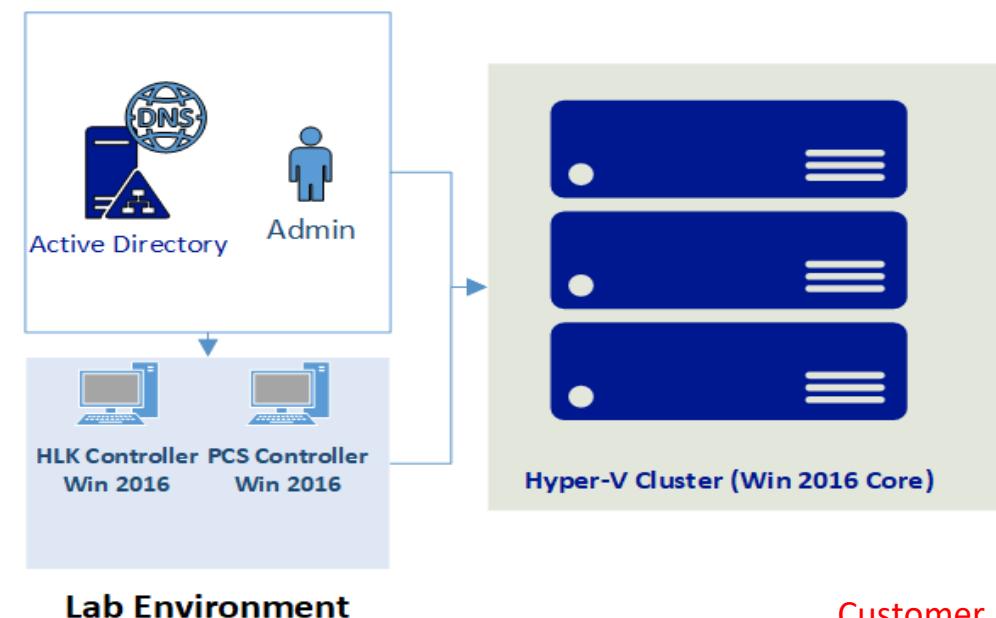
Technology

- Platform: Windows Server 2016, Hyper-V, Microsoft qualified server hardware
- Tools: Windows HLK, MS PCS, Hyper-V Clustering



Solution

- Calsoft deployed the test environment in their lab necessary for the certification.
- Calsoft engineers performed certification as prescribed by Microsoft procedures. Testing included device qualification under Private Cloud Workload.
- Test results submitted to Microsoft as part of the device qualification submission package.



Customer under NDA



Engagement

Calsoft was engaged with the client for To get the Bus and Storport drivers signed by Microsoft for multiple Windows versions.

The said certification was carried out on Hardware Lab Kit (Windows HLK) on Windows 2019,Windows 2016,Windows 2012R2 & Windows 10



Solution

- Calsoft deployed the test environment in their lab necessary for the certification.
- Calsoft engineers performed certification as prescribed by Microsoft procedures. Testing included device qualification under Private Cloud Workload.
- Test results submitted to Microsoft as part of the device qualification submission package.



Benefits

Microsoft certification on Windows 2019,Windows 2016,Windows 2012R2 & Windows 10



Technology

Platform: Windows .NET Framework 4.5
Windows 2019,2016,2012 R2 Windows 10.

Customer under NDA

Engagement

Calsoft was engaged with the customer in providing Citrix certification services.

Solution

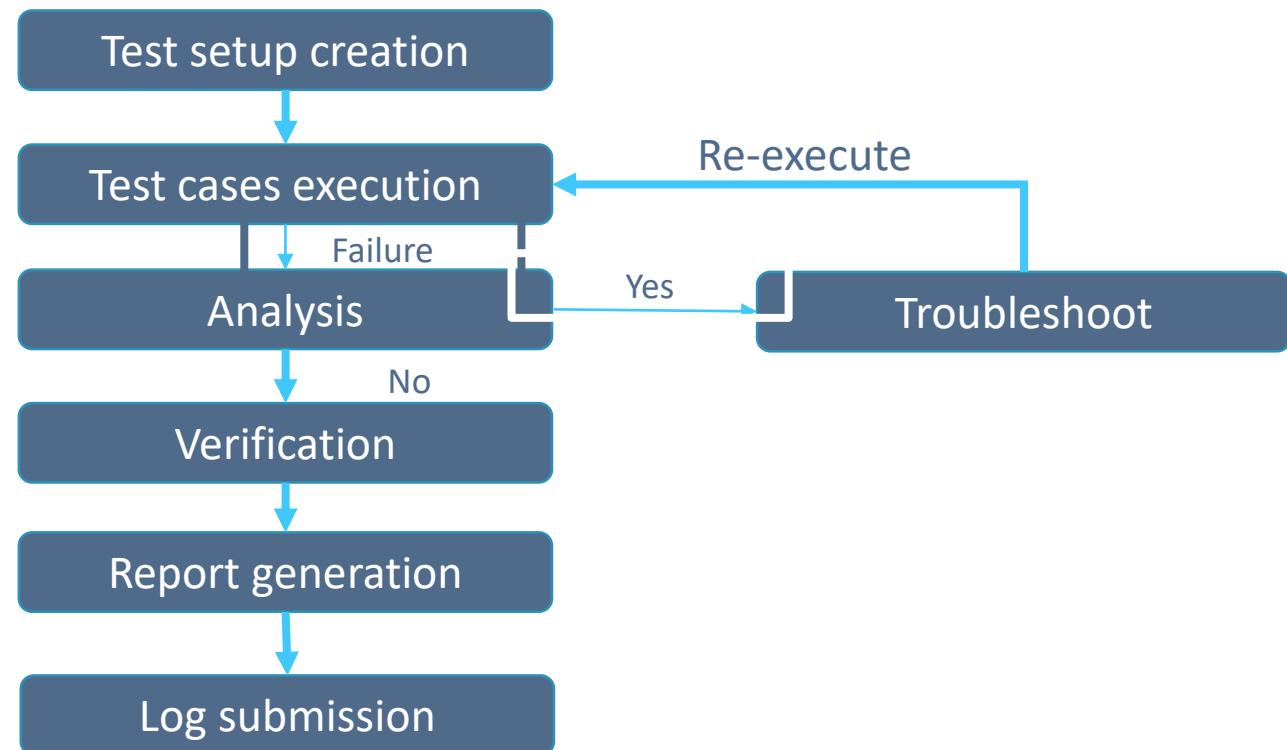
Calsoft helped the customer in providing Citrix XenApp and Xen-Desktop certification services for their desktop application.

The engagement underpinned:

- Certification for XenApp and XenDesktop version 7.15 / 7.18
- Created the test setup
- Executed the test cases as per Citrix certification kit.
- Analyzed and troubleshoot the test failures, make changes in case of failure and re-executed the tests
- Submitted logs to Citrix
- Assisted customer to respond to queries raised by Citrix
- Citrix XenApp and XenDesktop certification with Major and Minor releases in sequential manner

Technology

- XenApp and XenDesktop version 7.15 / 7.18, windows server



Benefits

- Integration with Citrix environment
- Keeping the products up-to-date with technology and features
- Better market value

Citrix and VMware Certification



Engagement

- Calsoft was engaged by the customer for providing Citrix and VMware certification services.



Solution

Calsoft helped the customer in getting Citrix XenApp, XenDesktop certification, and VMware Thin client certification. The certification was carried out for:

- XenApp and XenDesktop version 7.15LTSR Cu3
- VMware Blast with VMware Horizon 7

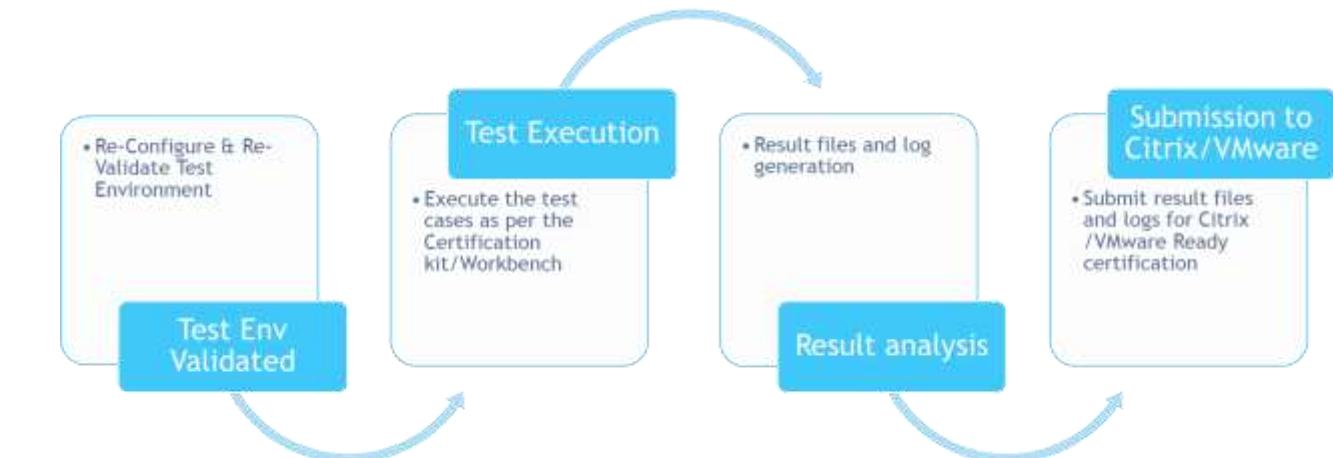
The engagement underpinned:

- Configuring test setup/test-bed/test harness, in case of any specific test-setup, specific test failures
- Executing test cases as per Citrix certification kit and VMware certification guide
- Analyzing test failures, making changes, and re-executing the tests
- Submitting logs, test results to Citrix and VMware
- Assisting the customer in responding to queries raised by Citrix and VMware regarding the certification



Technology

- XenApp and XenDesktop, VMware Horizon, VMware Blast, AD Server, hypervisor , SQL Server



Benefits

- Integration with Citrix and VMware environment
- Keeping the products up-to-date with technology and features
- Faster time-to-market
- Better market value



Engagement

- Calsoft is engaged with compute SW CoE Testing and Automation group for OS certification and qualification activities.
- OS Certification scope involves test bed setup and kit-based manual test execution configuring the Test bed setup with CPU, memory, storage and network cards, PSU, HDD etc.
- The OS certification process involves rigorous testing and validation of the operating system on HPE server platforms
- Testing is performed leveraging the tools provided by OS vendors to conduct various tests and assessments during the OS certification process.



Benefits

- OS certification with HPE ensures that the operating system is fully compatible with HPE server hardware, firmware, and management tools.
- Ensures that the combination of the operating system and server hardware functions reliably, minimizing system crashes, errors, and downtime.



Technology

- Operating Systems (VMware, Windows, RHEL, SLES and Ubuntu) and
- Systems domain knowledge (Servers, Storage and Networking)
- OS Certifications (HLK, VMware VIVA/workbench, rhcert, SUSE Yes Cert kit, Ubuntu Cert kit)
- Automation scripts using Python, PowerShell, Selenium and Ansible, Jenkins that supports CI/CD and Framework design (BDD or Robogalaxy or similar)
- Spira, ALM, Jira, bluebird, Github



Solution

- Calsoft team collaborates with HPE team to understand the plan and configuration required for each certification.
- Establish a dedicated test environment with HPE server hardware and necessary networking infrastructure. Install and configure the base operating system on the test servers.
- Verify that the OS can be successfully installed, recognized, and function properly on HPE servers.
- Assess the performance of the operating system on HPE servers under different workloads and network conditions.
- Generate logs and send them to the HPE team for review and approval
- Engage in collaboration and communication with HPE team to address any identified issues and retest as and when required.
- Once the operating system meets all the certification criteria and passes all the required tests, the WU is marked as done in Jira.



Mellanox, Broadcom, Marvel

Our Certifications Partners

We root ourselves deep into our partnerships

We innovate through our partnerships with leading technology providers like -



Gold Certified Partner

Partnership with Microsoft Azure
for IaaS, PaaS services

Technology Alliance Partner

Long-term relationship from
Storage to IoT platform

Citrix Ready Partner

Citrix Ready partner

Calsoft is 'Citrix Ready
Verification Testing Partner'.

<https://citrixready.citrix.com/calsoft-pvt-ltd.html>

Successful Certifications done for...



Tintri



CERTIFICATION

CERTIFICATION

Increase product availability and visibility by getting these products certified with us. We assist ISVs and product owners to make their products compatible across various environments and platforms, turning them into market-ready revenue machines.



CITRIX READY CERTIFICATION

Get your products Citrix Ready with our Citrix Ready Certification offerings to make them compatible with the Citrix Ready Marketplace.

Products verified and validated for:

- Citrix Virtual Apps
- Citrix Networking
- Citrix Hypervisor
- "Standard Verification", which applies to all other solutions



VMWARE READY CERTIFICATION

Our VMware Ready Certification helps product owners to make their products ready for one of the largest virtualization ecosystems.

Products verified and validated for:

- Platform and Compute
- VMware Validated Design Certified Partner Architecture
- Network Function Virtualization
- VMware Ready for vSAN
- Management & Orchestration
- Networking & Security
- Storage
- End-user Computing

KEY ENGAGEMENTS

VMware VAAI Block Certification for Storage Product

- Calsoft engaged with the customer to carry out certification testing of their iSCSI block storage product for its VAAI compatibility

[Read More](#)

VMware Certification Testing for Unified Storage Appliance

- Addressed issues faced due to changes made by VMware in ESXi 5 while certifying their products, and making them workable with vSphere 5
- Ran S/W iSCSI certification & imparted FC certification training

[Read More](#)

Citrix and VMware Certification

- Integration with Citrix and VMware environments
- Keeping the products up-to-date with technology and features
- Faster time-to-market
- Better market value

[Read More](#)

Citrix certification on XenDesktop 7.15LTSR CU3



Engagement

- Calsoft was engaged by the TechSmith for providing Citrix certification services.



Solution - Snagit

Calsoft helped the customer in getting Citrix XenApp and XenDesktop certification for **Snagit** desktop application.

TechSmith Snagit helps customer to quickly capture a process, add your explanation, and create visual instructions. Snagit is also the only screen capture tool with built-in advanced image editing and screen recording.

The certification was carried out for:

- XenApp and XenDesktop version **7.15LTSR CU3** (with Delivery Controller + Citrix Studio + HDX Monitor tool, License Server, Database server, StoreFront server, Two server and Windows machines, AD server and Citrix work Space)

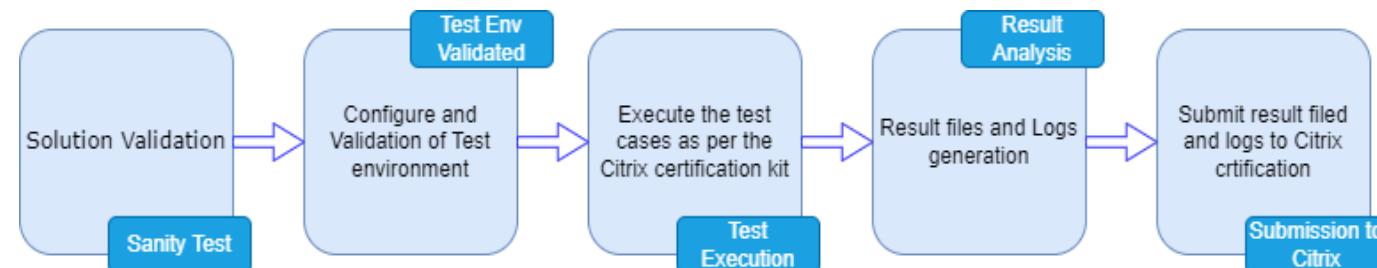
The engagement underpinned:

- Configuring test setup/test-bed/test harness, in case of any specific test-setup, specific test failures
- Performing basic Sanity test on solution to be certified
- Executing test cases as per Citrix certification kit
- Analyzing test failures, making changes, and re-executing the tests
- Submitting logs, test results to Citrix
- Assisting the customer in responding to queries raised by Citrix support team regarding the certification.



Technology

XenApp and XenDesktop, Citrix Work space, AD Server, Citrix hypervisor , XenCenter, SQL Server



Benefits

- Solution listed in Citrix Marketplace
- Integration with Citrix environment
- Keeping the products up-to-date with technology and features
- Faster time-to-market
- Better market value

Citrix certification on XenDesktop 7 1912 LTSR



Engagement

- Calsoft was engaged by the TechSmith for providing Citrix certification services.



Solution

Calsoft helped the customer in getting Citrix XenApp and XenDesktop certification for **Snagit** desktop application.

TechSmith Snagit helps customer to quickly capture a process, add your explanation, and create visual instructions. Snagit is also the only screen capture tool with built-in advanced image editing and screen recording.

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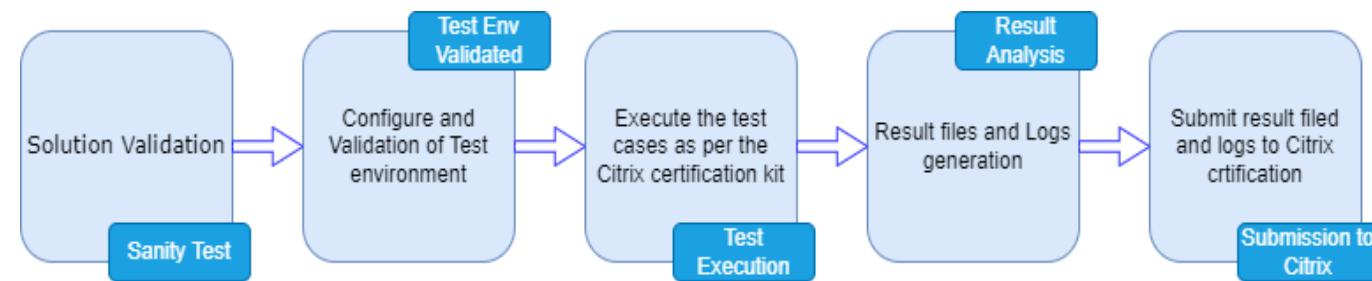
The engagement underpinned:

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- Performing basic Sanity test on solution to be certified
- Executing test cases as per Citrix certification kit
- Analyzing test failures, making changes, and re-executing the tests
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- Assisting the customer in responding to queries raised by Citrix support team regarding the certification.



Technology

XenApp and XenDesktop, Citrix Work space, AD Server, Citrix hypervisor , XenCenter, SQL Server



Benefits

- Solution listed in Citrix Marketplace
- Integration with Citrix environment
- Keeping the products up-to-date with technology and features
- Faster time-to-market
- Better market value

Engagement

Citrix ADC Automation involves in development of testcases and regression testing of existing scripts that contains information of other Citrix features like networking, cluster, policy etc. to help customer to prevent problems before they occur.

Benefits

- Calsoft helped in automating and testing of the testcases for cluster feature.
- Calsoft helped in adding some automation iterations in policy feature.
- Calsoft helped in developing new subroutines for networking feature.

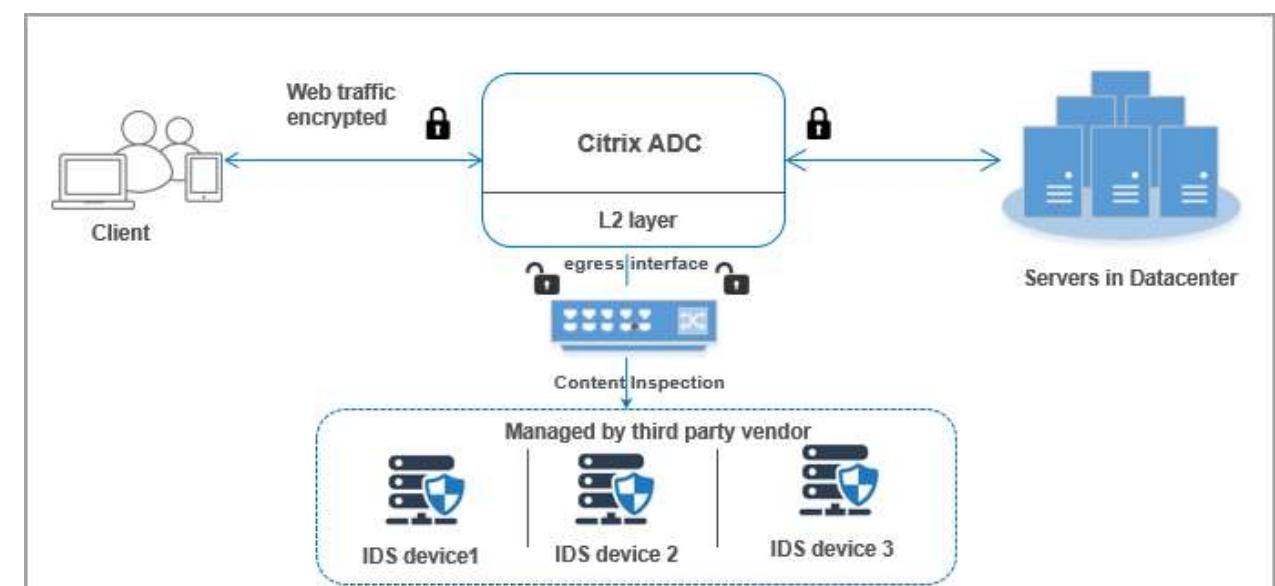
Technology

- Perl scripting, Python scripting.
- Putty, Xencenter, Citrix workspace, Bitbucket, Anakin, Obelix.
- XenApp and XenDesktop, Citrix Work space, AD Server, Citrix hypervisor ,

Solution

Following parameters were undertaken for

- The passed percentage of the CI automation testcases execution has been increased to a good number.
- Migrated around 500+ test cases to CITM till now.
- Citrix ADC** goes beyond load balancing to provide holistic visibility across multi-cloud, allowing companies to more effectively manage and monitor application health, security, and performance.
- Certified the solution on XenApp and XenDesktop.





The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and architectural styles visible against a light sky.

Success Stories: Application Monitoring

Application monitoring using TIGK stack for a supply chain management client



Engagement

Calsoft was engaged with a supply chain management client to build and port their infrastructure monitoring solution to TIGK stack. The stack involves Telegraf as monitoring solution, Influx DB as time series database, grafana as visualization UI and Kapacitor for alert management.



Benefits

- Scalability and stability Improvements with porting to TIGK stack
- Use of telegraf plugins for monitoring as per availability
- Short time to production with CI/CD integration system.



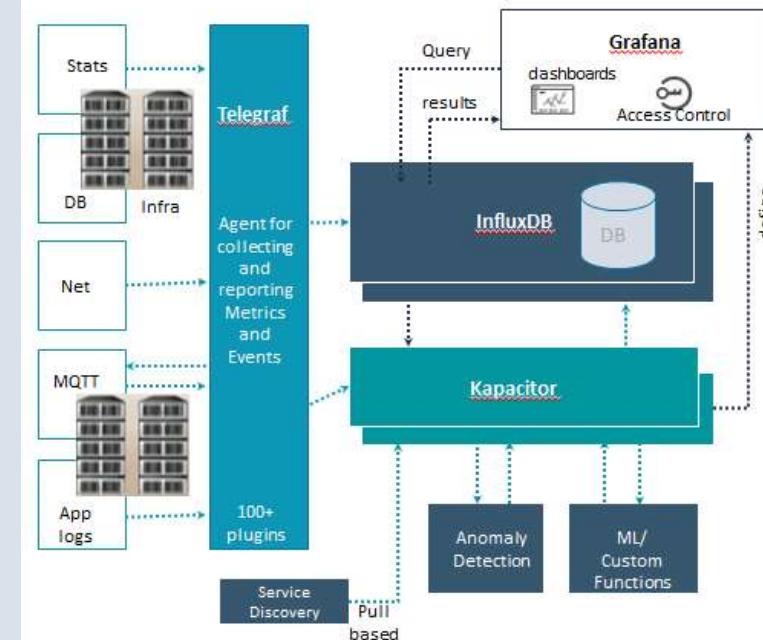
Technology

- Tools: TIGK stack, Perl , Shell, Python scripts, Telegraf plugins, grafana UI customization, Application monitoring



Solution

- Analysis of monitoring solution and finding gaps in terms of missing attributes, resource utilization
- Fix issues in the scripts and test in local environment as well as builds across various data centres.
- Use of built-in telegraf plugins for applications like redisDB, SNMP management
- Tracking issues in JIRA, code management in p4, github with reviews, Jenkins builds for continuous integration.
- Agile management for tracking overall progress and issues.



Re-architecting the File Sync-n-Share Application



Engagement

Calsoft is engaged with the client in converting their monolithic server architecture to microservices. We are in process of converting components to microservices for sync-n-share server (like Dropbox) which allows clients to securely access and share files wherever they go, on any device. The product is also being migrated to cloud now.



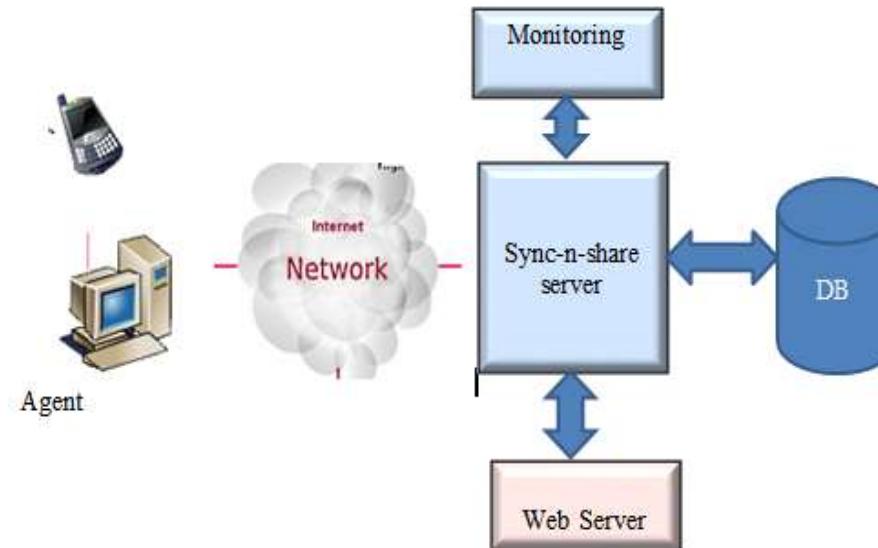
Solution

- Designed the microservices architecture by understanding the existing monolithic architecture.
- Decompose the components into services such that services are loosely coupled, independent which can be developed, deployed, recovered independently.
- Developed scripts for deployment of server using Kubernetes cluster management and monitored the services using Nagios.
- This is an ongoing project.
- Creation of automated scripts, user guide for end user to install, configure and product testing is in progress.
- Deployment of the product off-prem (AWS public cloud) is underway.



Technology

- JAVA, Docker, Kubernetes cluster management (ECS), PostgreSQL HA database, S3 Object Store, Cloud Watch, Cloud Trail, Jenkins, Ansible



Application Performance management system for microservices apps



Engagement

Calsoft was engaged with the client as their engineering development partner. The engagement underpinned

- Developing end-to-end SaaS based tool for application performance management tool
- This involved gathering, correlating and visualizing data obtained from Infrastructure layer, Orchestrator layer & Application layer



Benefits

- Real time visualization of all the layers in data center on single dashboard
- Application performance degradation can be diagnosed easily



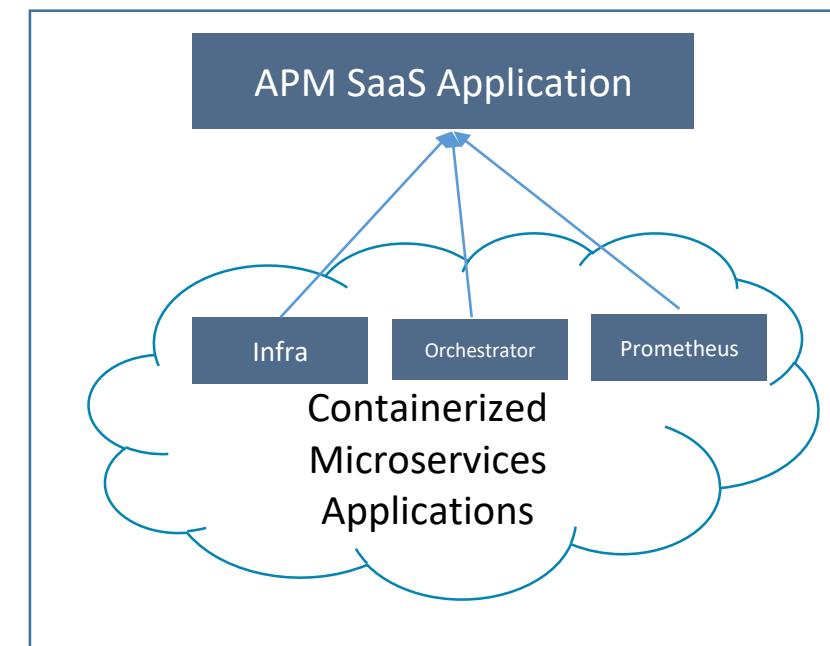
Technology

- AWS, VMware, OpenStack, Kubernetes, Nomad, Kafka, Golang, Java, React



Solution

- Developed containerized infrastructure gateway, to gather information from underlying infrastructure providers like AWS, VMware, OpenStack, etc.
- Developed containerized gateway for Kubernetes and Nomad orchestrators
- Developed messaging protocol between gateways and SaaS application using Kafka
- SaaS application is hosted in cloud and consume/correlate data produced by gateways
- SaaS application also visualize topologies based on multiple criteria



Custom Splunk Dashboard creation



Engagement

Calsoft was engaged with the leading Telecom Service Provider, among top 3 in the country of operation, for developing a solution to display multiple dashboards for improved analysis and utility.



Benefits

- Client was able to get actionable insights by using dashboards created through Calsoft's solution
- It led to better analysis and improved the efficiency of its infrastructure.



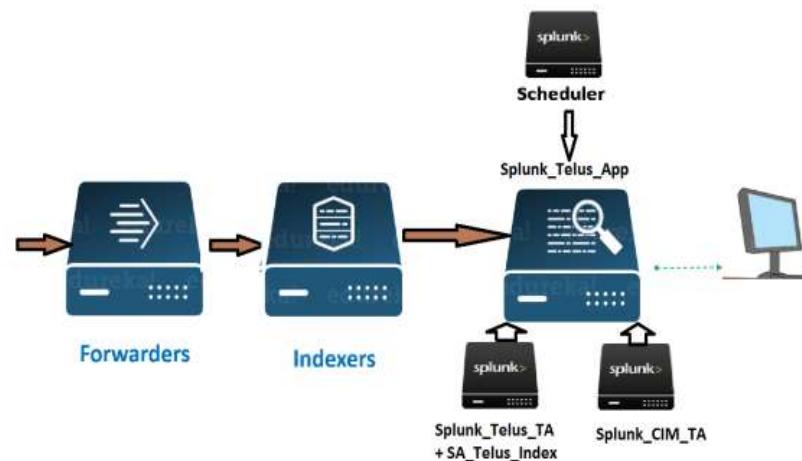
Technology

- Splunk Editor, Splunk Web, HTML, CSS, Javascript, XML



Solution

- Built customized dashboards using Splunk editor and Splunk web
- Built a custom Technology adaptor (TA) that converts log strings and tag it with event identification
- Developed a custom Splunk application for visualizing different customized dashboards
- Built a scheduler for scheduling tasks.
- The solution also used the inbuilt Splunk CIM TA to utilize common CIM functionalities
- For better efficiency Calsoft suggested usage of a heavy forwarder to eliminate redundant logs from the incoming streams



Notes -

- Heavy Forwarders to drop the unrequired messages.
- Splunk TAs to map the data as per CIM standard and translate for Splunk App's queries.

Application Performance Monitoring and Architecture Discovery

Engagement

Calsoft was engaged with a leading Cloud ERP solution company to help them develop a framework for application performance monitoring (APM) and architecture discovery (AD).

Benefits

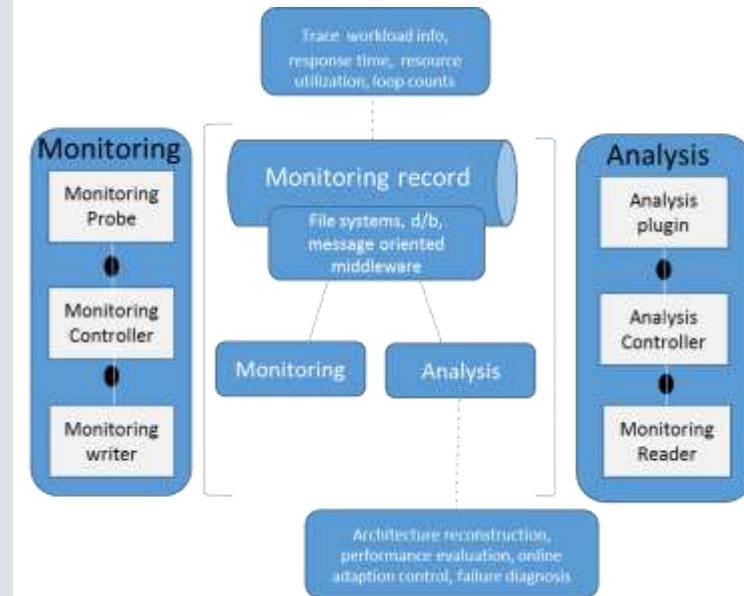
- Increase in efficiency.
- Seamless monitoring and better analysis

Technology

- Java, kieker monitoring
- Explorviz visualization

Solution

- Calsoft developed a framework for customer helping them to observe systems runtime behavior continuously and for extracting architectural information like structural and behavioral aspects. Below are the features for APM and AD
- APM
 - 1. Monitoring:
 - Support for applications in multiple programming languages
 - Different monitoring outputs
 - Dynamic and adaptive monitoring
 - Multiple ways of instrumentation
 - Predefined and customizable probes
 - 2. Analysis
 - Offline and live analysis
 - Predefined and custom analysis
 - Predefined and customizable filters
 - Analysis-supporting tool integration
 - Architecture Discovery:
 - Supports collection and extraction of the following AD information based on dynamic or hybrid analysis
 - Architectural entities (Components, Operations, Execution containers)
 - Distributed control flows, concurrency and synchronization
 - Visualization(calling dependency graphs, Call trees, sequence diagrams etc.)



Nagios Integration for Storage Vendor



Engagement

Calsoft was engaged with a storage vendor to create custom Nagios Remote Plugin Executor – NRPE. The objective was to provide this plugin to their end-customer having Nagios based monitoring.



Benefits

- Customer was able to provide Nagios plugin to its existing and prospective customers, which helped in gaining more acceptability of its product.



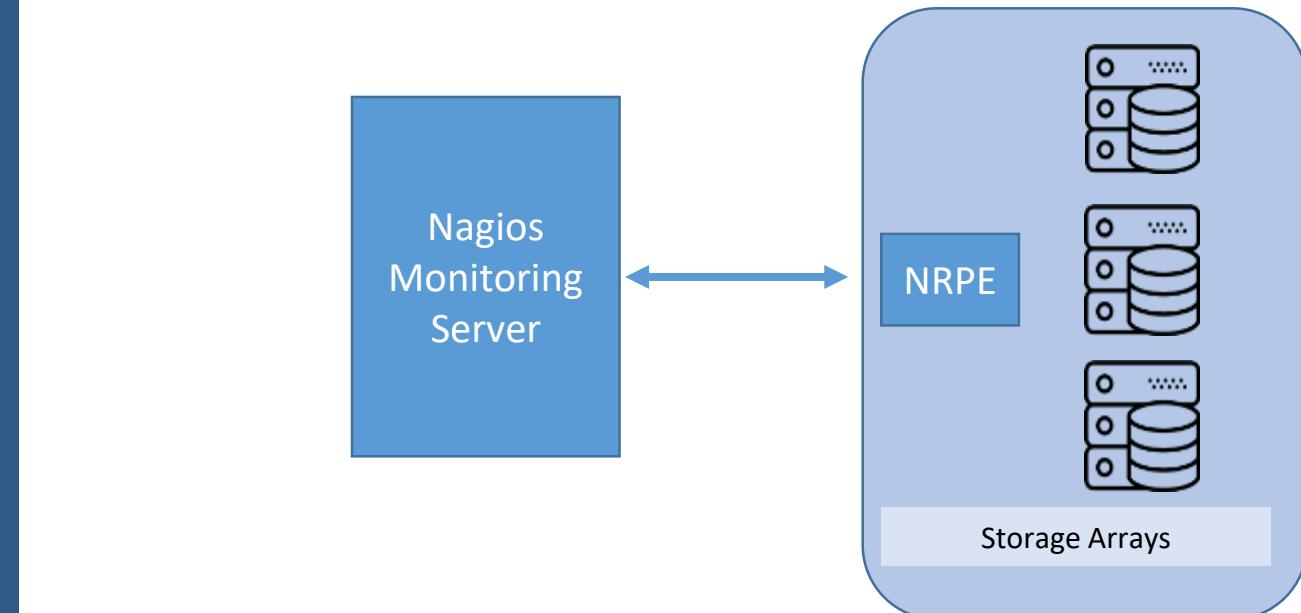
Technology

- Nagios, NRPE, Python



Solution

- Design
 - Analysed the linux based firmware for fitment of Nagios compatibility
 - Evaluated the list of metrics and their frequency
 - Formulated list of commands, format of outputs and conditions to accommodate policies
- Development
 - Developed the python based monitoring module for collecting data, based on policy defined through configuration files
 - Developed auto-installer
- QA
 - Did manual and automated quality assurance to ensure plug-in provides data as expected, under moderate and extreme conditions



Nagios Integration for Hyper Converged Infrastructure Vendor



Engagement

Calsoft was engaged with a hyper converged infrastructure vendor to create custom Nagios Remote Data Processor—NRDP. The client wanted to give processed information as well as raw data – as the end-customer would request – which the custom NRDP fulfilled.



Benefits

- A full fledged monitoring module , supported and tested with Nagios, helped the client in conforming with its client expectations. The flexibility of modules enabled to incorporate changes requested by each end-customer



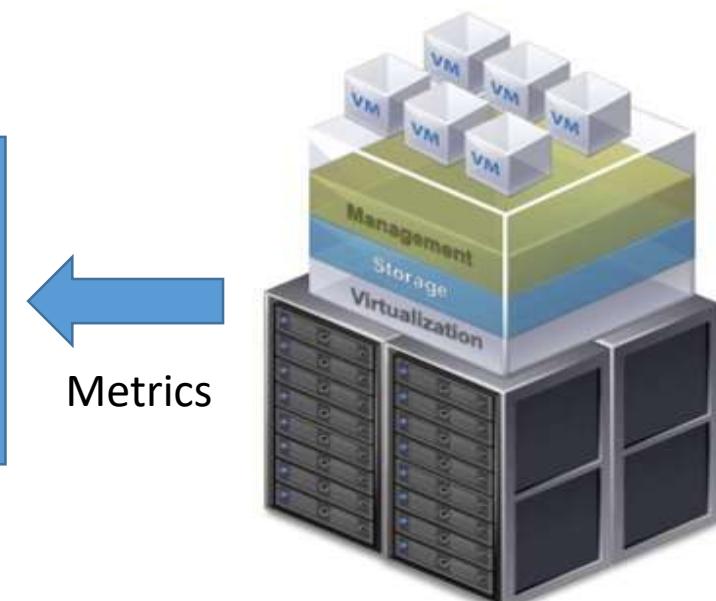
Technology

- Nagios, NRDP, Python, Hyper Converged Infrastructure, Robot Framework



Solution

- NRDP provides flexible data transfer and processing mechanism, built over web technologies. Its architecture is flexible to support feature extension and customization.
- Calsoft undertook the design of the cascaded plug-ins for metrics of server, storage, networking and chassis. It included evaluation of which metrics to push, its data formats, level of verbosity and conditions of push events
- The modular design divided the common functionalities as core modules. Component specific modules used it and provided the required functionality. This approach improved the maintenance of code
- Each element of a group acted as the end-node of a zone sending data to a nodal NRDP, which would collate, process and send concise or raw data, as configured to main Nagios monitoring server.



Performance Analytics and Monitoring as a Service



Engagement

Calsoft was engaged with the client to design and develop a cloud based performance analysis and monitoring application for NFS storage. The engagement involved:

- Design and development of metrics analysis engine.
- Web Portal with multiple dashboards
- Log analysis and event management mechanism with real time monitoring capabilities.



Benefits

- Easy deployment using Cloud Formation template and Docker
- Pre-configured dashboards
- Time lined system events for issue identification.
- Extensible with REST API to retrieve metrics.
- Rich visualization with support for customization.
- Access control



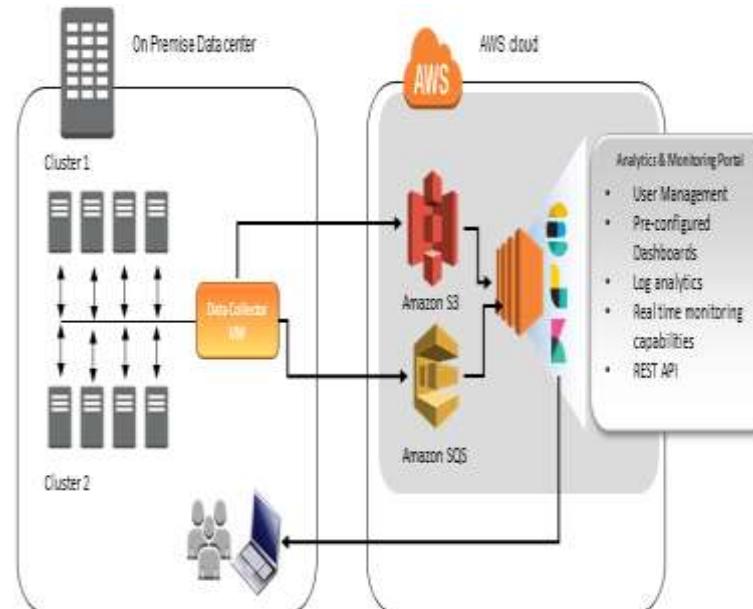
Technology

- OS Platform- CentOS
- Cloud Platform – AWS
- ElasticSearch, Logstash, Kibana, Beats, AngularJS 2.0, NodeJS , Docker1.10
- Project tools & application – Grunt, Ansible



Solution

- Development of a SaaS portal based on the ELK platform with user management capabilities.
- Development of the dockerized data collector component which forwards the performance metrics, logs and system events to the analytical engine.
- Support on premises and AWS environments
- Scheduled and on-demand data collection.
- Data retention and data consistency.
- Generating alerts based on event correlation and issue identification.
- Easy deployment of portal using Cloud Formation template.
- Rest API for automation support and data exploration.



Automated Infra Provisioning: Greenfield & Brownfield

Engagement

Calsoft built an automation platform for baremetal and virtualized cluster for the customer's internal data center.

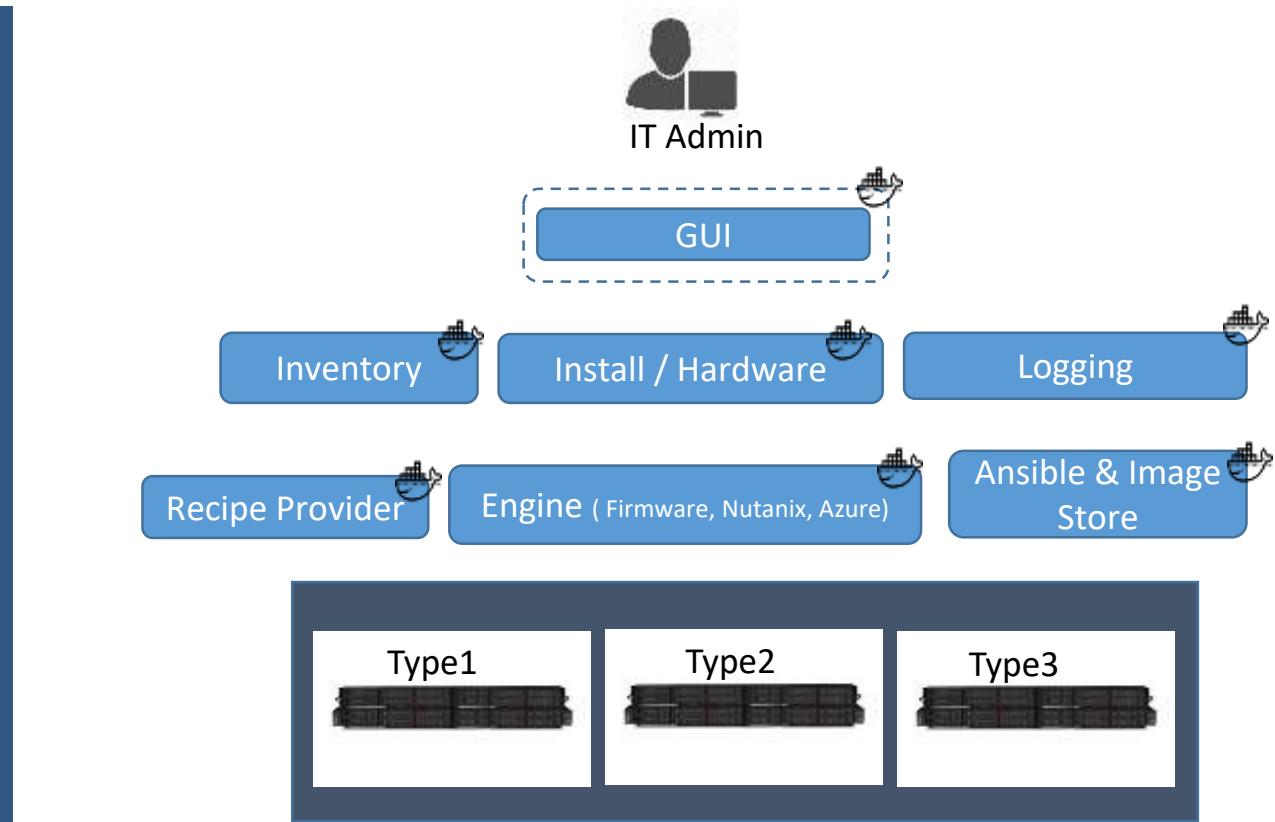
Solution

The engagement underpinned:

- Built a Python-based automation platform for achieving complex IT automation
- Designed workflows that helped in upgrading the firmware & sub-components of the server (greenfield & brownfield) to the best version metric based on server make & the virtualization cluster to be added
- Features & functionality:
 - Microservices-based architecture for future expansion
 - Auto-discovery of servers along with their current firmware & sub-components
 - Get the recommended version metric, compare and upgrade only the required components
 - Add server to VMware, Nutanix or Azure cluster based on the admin choice

Technology

Bare-metal provisioning, Microservices, Python, Linux, REST APIs, VMware vCenter, Nutanix, Azure Stack



Benefits

- Optimized the IT processes by getting rid of 90% of the manual processes
- Improved turnaround time

Engagement

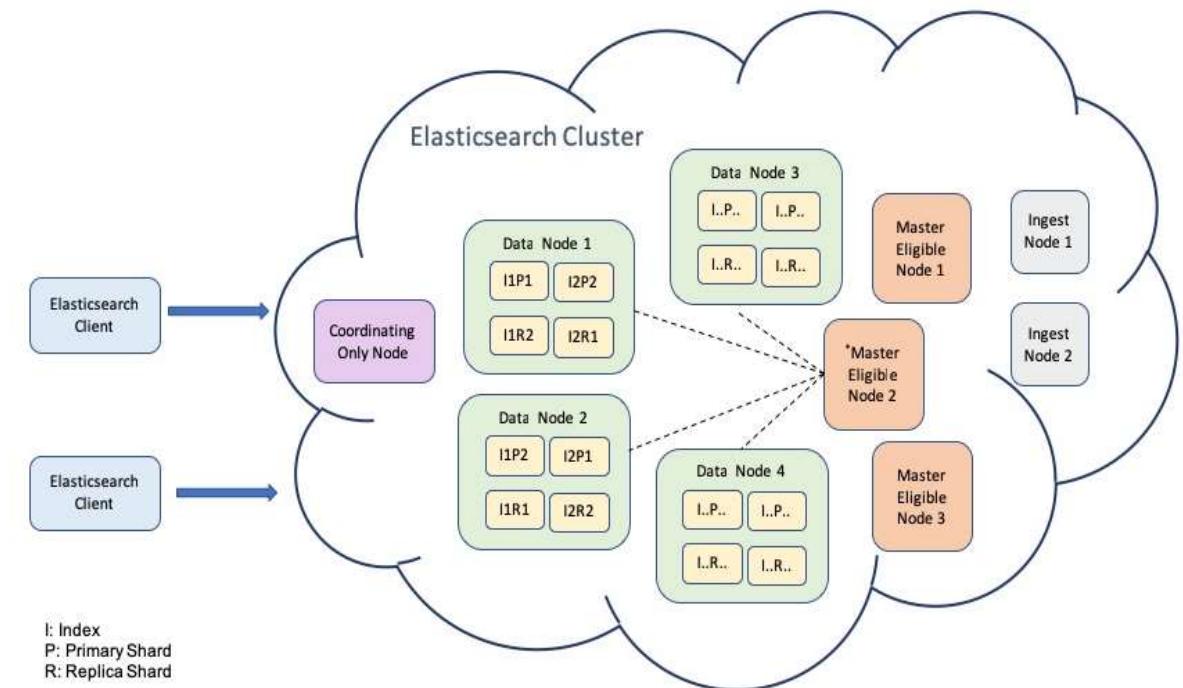
Calsoft is engaged with the client to help in upgrading legacy technology stack to latest for their market leading Application Performance Management product. The upgraded APM is required for premier customer of client in stipulated timeline.

Benefits

- Delivered the upgraded APM in very short duration
- Benefits of latest Elastic Search
 - Enhancements to Elasticsearch's vector search capabilities, native support for modern natural language processing models, increasingly simplified data onboarding, and a streamlined security experience.
 - Improve Search with speed, search at scale.
 - Protect data from unauthorised access with streamlined stack security.

Technology

- Application Performance Management (APM), Elastic Search 8.x, JAVA 17, Gradle 7.x, Check style, Spot Bugs, AWS, Docker and Ubuntu.



Solution

- Current project supports CSaaS and on-prem, Calsoft help to complete CSaaS strip-out activity on the current product version to support on-prem only.
- Calsoft team is involved in Java upgrade version from 1.8 to 17 and Gradle version upgrade from version 5.4.1 to 7.x.
- Elastic Search migration or upgradation version from 2.4 to 8.4.3 for on-prem project with workflow i.e. Publish, Search, Upsert, Maintenance, Admin workflows and Plugin Changes.
- Apart from development, Calsoft also helped to add/update/remove the Regression test cases, Smoke testing, test automation and creation of the testbeds required for the customer Demos.



Success Stories: DevOps



Engagement

Calsoft is engaged with the customer for development of end to end CI/CD pipeline for their SDKs, so that any commit in the product API should also update the corresponding SDK code on github mirror. Using mirror build and release sdk on Open-source GitHub.

Calsoft is also implementing the supply chain security as part of the DevOps pipeline to ensure that TPL & FOSS libs used in the product are risk free.

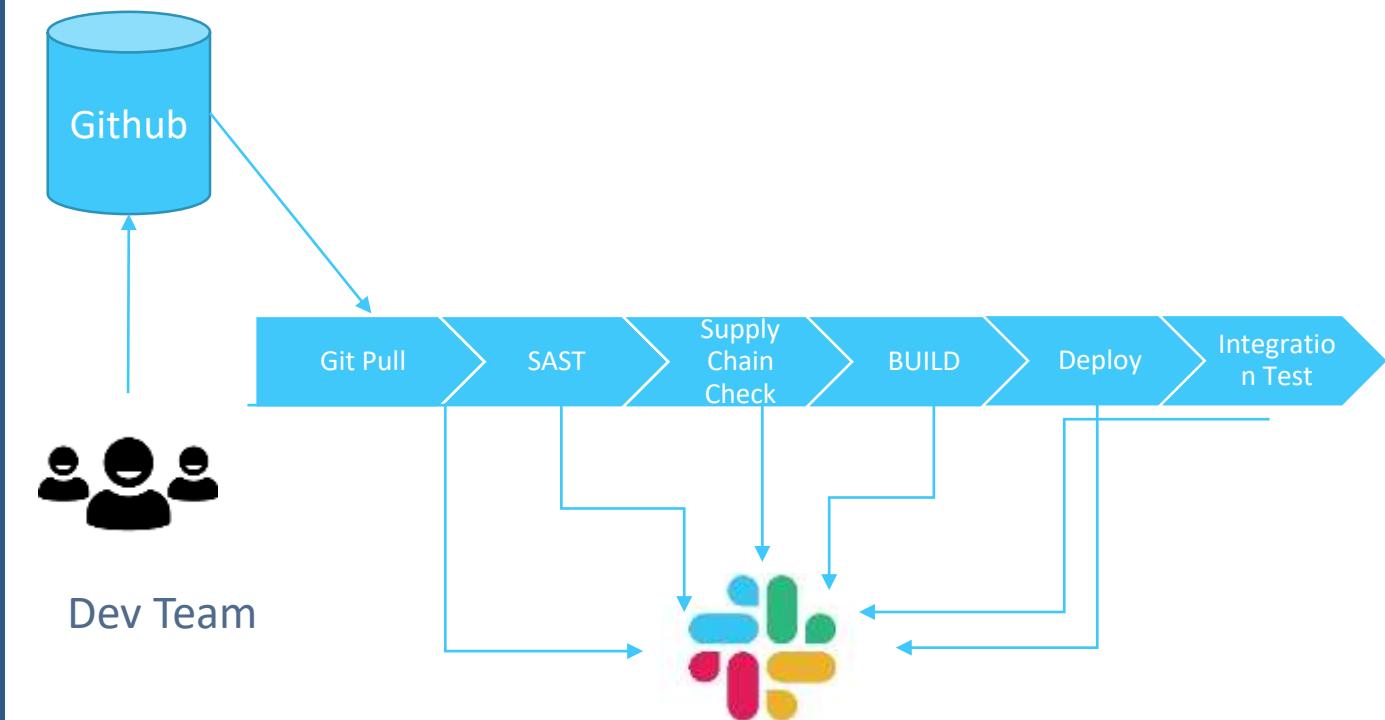


- Calsoft designed gitlab cicd pipeline for customer product SDK.
- Automated the process for copying the product API code to respective downstream projects.
- Developed header automation to replace proprietary header with Github public headers for SDK
- Developed release pipeline for version specific release of VCD SDK.
- Implementing various solutions for security the supply chain (FOSS & TPL libs) by implementing the tools like Scorecard



Technology

- Gitlab pipeline, Jenkins, Github, Cayman
- Python, shell .
- Java, maven.
- Docker, linux
- Scorecard



Benefits

- This was made possible because of in-house expertise available with Calsoft team for, DevOps , DevSecOps, Maven build, Gitlab.
- Better performance and no manual efforts required.
- Increased product security & no blind spot from overall code/product security perspective

CI-CD Using Jenkins Pipeline

- New internal or external release build jobs triggered and executed automatically



Engagement

- Calsoft is engaged with the customer to build DevOps modules for their products.



Solution

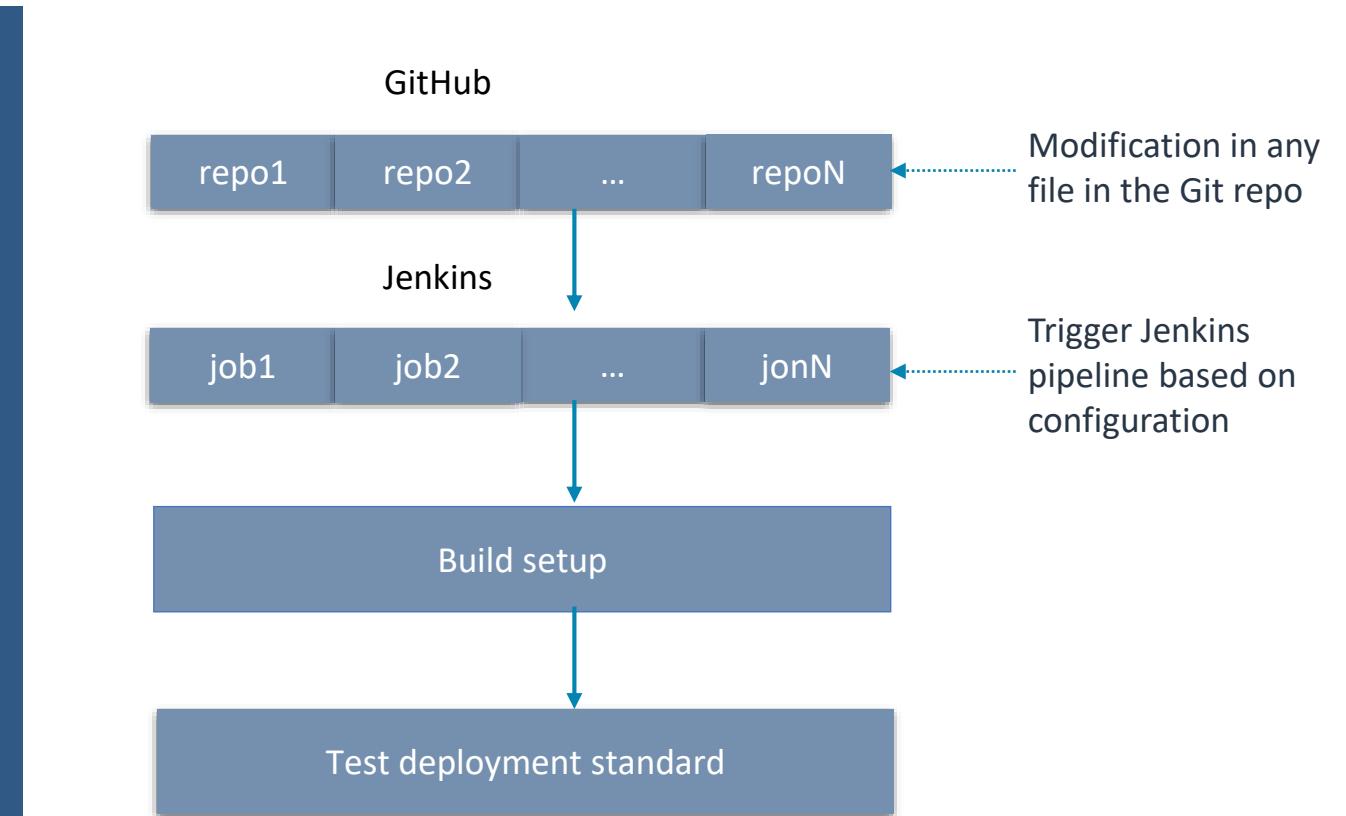
Calsoft helped the customer in building a CI-CD pipeline for their product. The engagement underpinned:

- A different Jenkins pipeline to monitor the build setup and execute test deployment standard
- Maintaining complex build setup using Git repositories via Jenkins (CI)
- Deploying the product as CVIM and management node and perform testing via Jenkins (CD)
- Every internal and external release has a Jenkins pipeline for continuous delivery and continuous integration



Technology

- Jenkins, Git, Shell Scripting, Python



Benefits

- New internal or external release build jobs will be triggered and executed automatically.
- Developers don't need to worry about the changes or any new updates on Git repository that will be tested by Jenkins pipeline for end-to-end set up

Workflow Automation Using Terraform Templates & Ansible Playbooks

- Drastically reduced the time required for provisioning



Engagement

Calsoft was engaged with the customer for the development of a custom Terraform provider, Terraform templates, and Ansible Playbooks to automate the following workflows:

- ESXi deployment on Bare Metal server
- Hadoop cluster deployment
- K8s cluster deployment



Solution

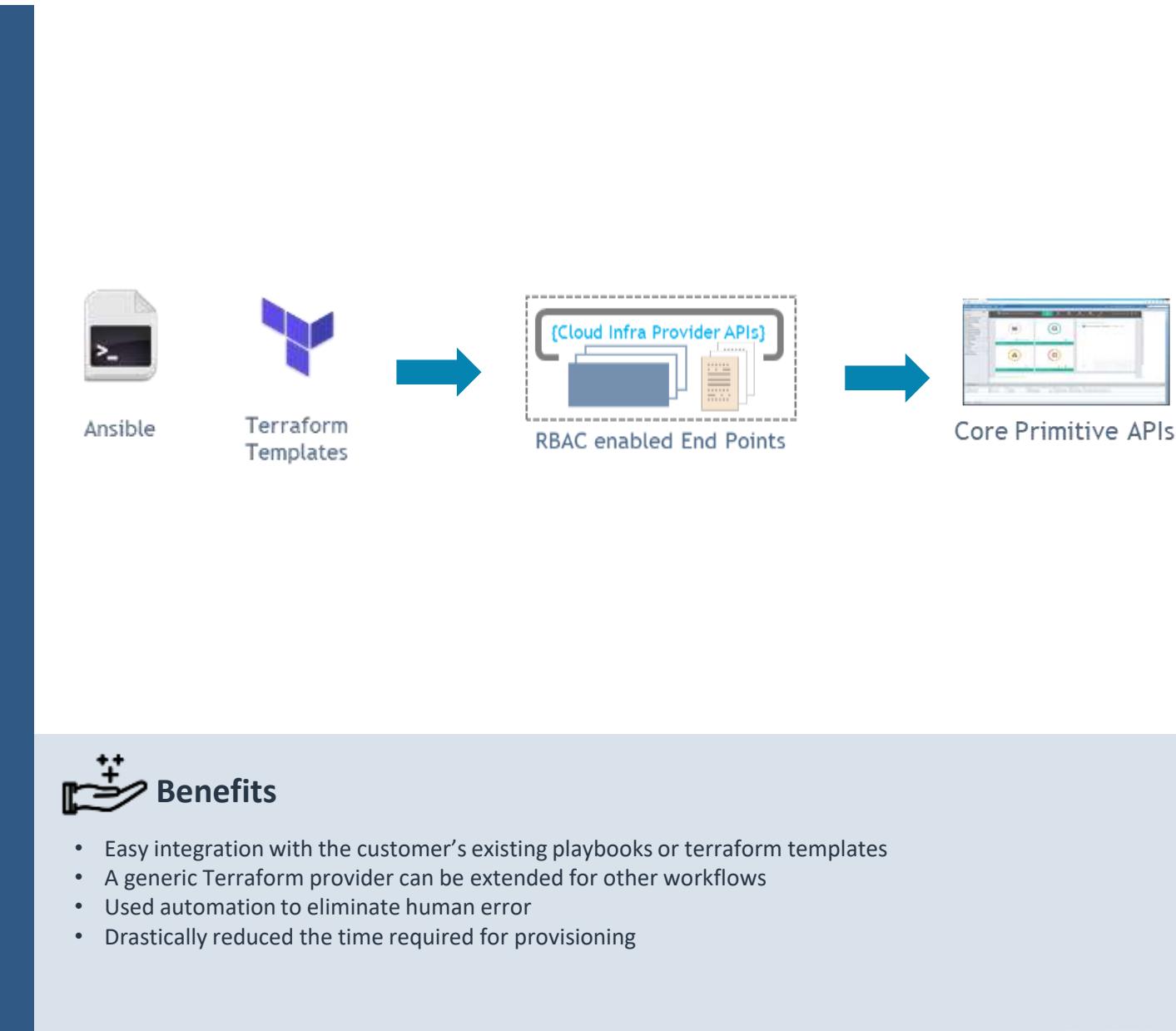
The engagement underpinned:

- Identifying the REST APIs for ESXi deployment, Hadoop cluster deployment, and K8s cluster deployment from the customer's API gateway
- Developing a custom terraform provider that can interact with the customer's API gateway; the terraform provider should take care of authentication & authorization
- Developing Terraform templates for the aforementioned workflows
- Developing Ansible playbooks for the aforementioned workflows



Technology

- Terraform, Ansible, Go Language, Hadoop, Kubernetes, VMware Converged Infrastructure



Engagement

- Automate validation of VIO with OPNFV Functest test framework for different test suites: Healthcheck, Smoketest, Components, VNFs.
 - Automate OPNFV Yardstick framework to benchmark performance of VIO platform.

Benefits

- Certify VMware Integrated Openstack (VIO) by validating it with open source OPNFV test frameworks.
 - Validate VIO against by leveraging test suites from open source communities: Openstack, OAI EPC, Clearwater IMS.
 - Maintain sanity of VIO by running test suites through Jenkins automation framework.

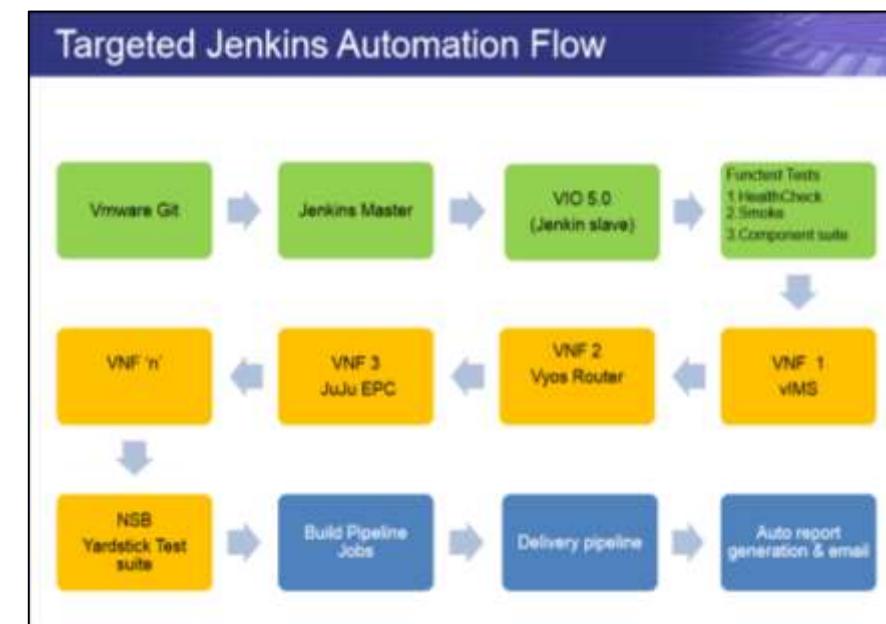


Technology

- VMware Integrated Openstack
 - OPNFV
 - Functest, Yardstick
 - OAI EPC
 - Metaswitch Clearwater IMS
 - Vyos Router

Solution

- Maintain OPNFV Functest and Yardstick repositories in local Git.
 - Leverage Jenkins for automation purpose. Pull OPNFV Functest & Yardstick repositories.
 - Execute Functest from Jenkins for Smoke, Healthcheck and Components test suites. Execute VNF test suites: vIMS, Juju EPC, Vyos Router.
 - Execute Yardstick Network Service Benchmark tests from Jenkins.
 - Build Jenkins task pipeline for above tests.
 - Auto report generation on Jenkins pipeline execution.





Engagement

- Calsoft is engaged with client to build and release management for virtualization product by,
- Maintaining complex Build setup with 100 odd git repositories via Jenkins (CI)
 - Deploy product as virtual machine OVF template and run robot testing suit for sanity and regression via Jenkins (CD)



Benefits

- Now for new Release updated build jobs will be created automatically.
- This reduced migration to new release time only to 2 Days (From earlier 10 days).



Technology

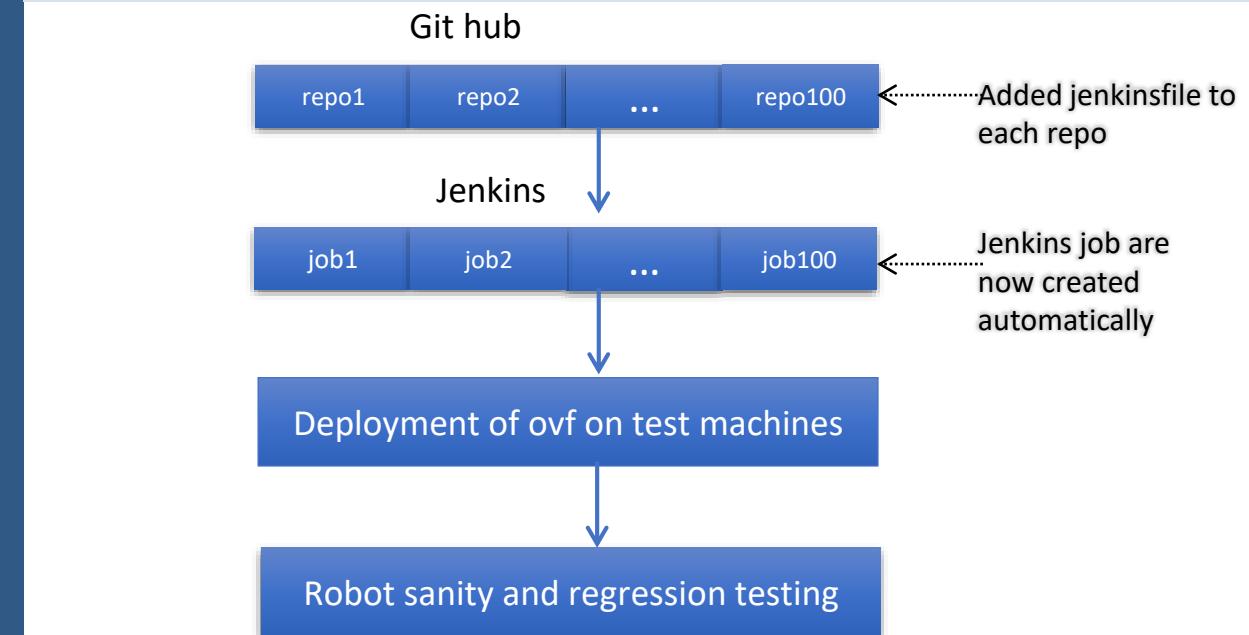
- Jenkins, Git, Maven, Robot, Shell Scripting, VMWare, Artifactory, Groovy



Solution

Jenkins pipeline

- For every new release cycle there used to be 1 week to 10 Days cycle to migrate all build jobs to new version.
- We simplified it by creating build pipeline for CI using “jenkinsfile”.



CI/CD automation pipeline for client



Engagement

Calsoft was engaged with client to build a CI/CD automation pipeline for their product. The engagement underpinned:

- Building CI/CD pipeline to automate development to production process.
- Providing flexibility to build and release features faster.
- Building of unit tests to make sure new code/feature won't break the existing functionality.



Benefits

- Client can now easily make changes to code.
- Build process is automated.
- New features can be easily added and released without any manual intervention.
- Developers get notified if build fails and the reason for failure.
- Decreases code review time.



Technology

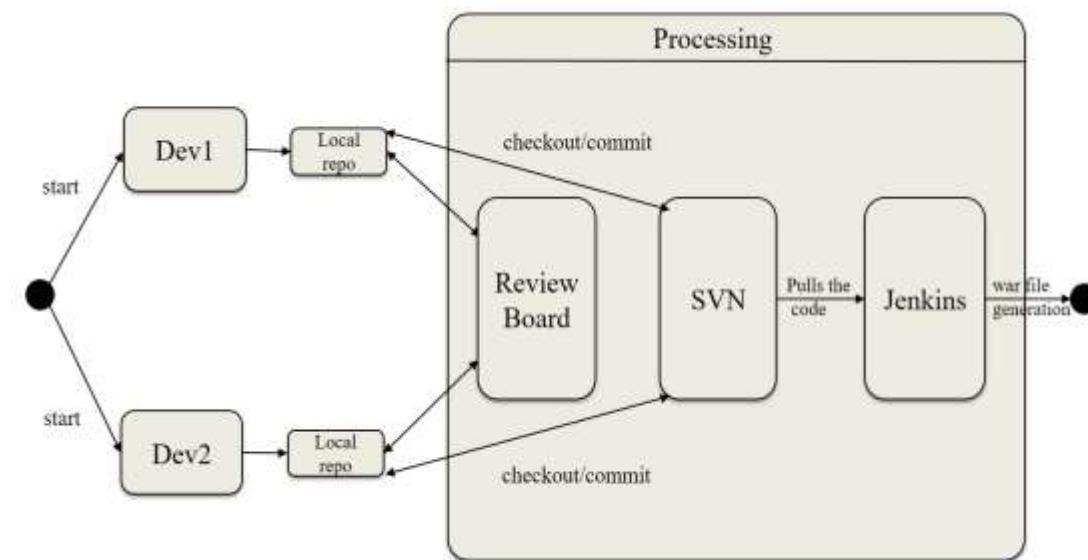
- Jenkins, SVN, Review Board, Maven



Solution

Calsoft build the CI/CD automation pipeline and successfully deliver client requirements.

- Jenkins was installed and configured to build the code for every SVN check-in.
- Review board was used to automate the process of code reviews and commits.
- Maven was used to create the artifacts to put it into production



Continuous Delivery – Continuous Deployment Pipeline

Engagement

Calsoft was engaged with the client to build a CD-CD automation pipeline. The engagement helped in automating and fast tracking of:

- Infrastructure deployment and Vendor product deployment with configurations
- Test cases for infrastructure & services
- Monitoring infrastructure during test execution and Deployment to production

Benefits

- Elimination of manual work and reduced the time taken for deployment, from days to hours
- Automation of the entire process ensured higher efficiency, productivity and quality

Technology

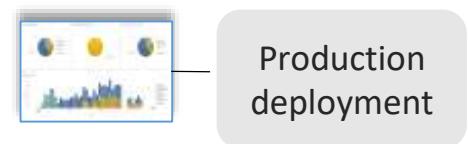
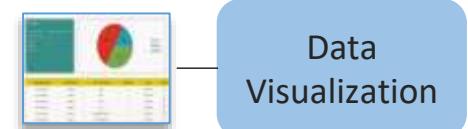
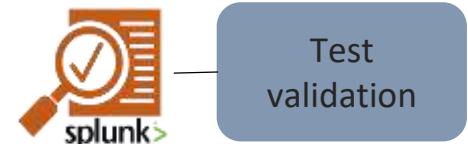
- Python, Ansible, iTest, Test Automation, HTML, CSS, Angular JS, CD-CD



Solution

Solution was developed with following components:

- Ansible based infrastructure deployment which includes playbooks using python modules
- Integration with modular test cases for post-deployment verification
- Test case automation for infrastructure deployment and integration of Spirent iTest cases
- Cloud-like platform inventory, Deployment configuration, Pre-loaded templates with vendor specific configurations
- Dashboard: Current & historic data visualization
- Test case troubleshooting: Details of test executions on GUI. Zoom on specific deployment setup with ample metrics to troubleshoot
- IP management, dependency mapping , roll back functionality on failures, modular for future scope



AWS Test Drive for Storage Product



Engagement

Calsoft was engaged with a storage Original Equipment Manufacturer (OEM) to create a AWS test drive for showcasing its product in AWS environment. The test drive aimed to integrate its storage array in AWS cloud through AWS Direct Connect.



Benefits

- The client was able to showcase the integration of its storage product in public cloud & highlight competitive advantage of having high performing storage array in cloud. With AWS Test Drive, the prospects were able to look and feel the product easily, and imbibed trust and confidence.



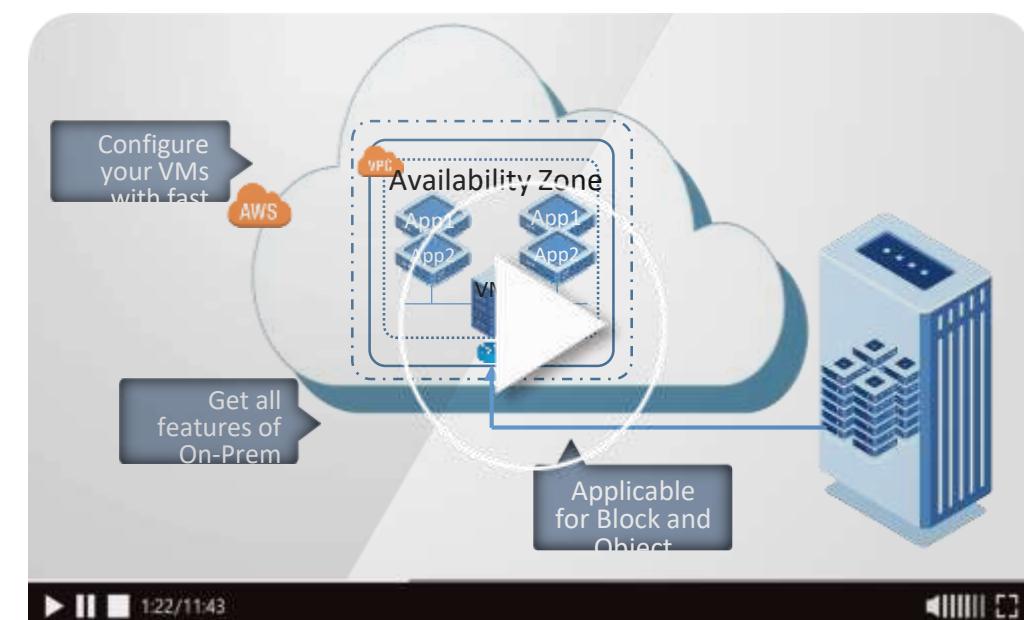
Technology

- AWS Networking, AWS Test Drive, Orbitera framework, Python, Windows Management framework (WMF), iSCSI protocol, Powershell



Solution

- Calsoft team devised an architecture involving offerings of AWS Networking & cloud exchange co-location site Equinix Cloud Exchange (ECX).
- The design achieved the nuances of network approach, commissioning the storage array integration & showcasing the gain in I/O bandwidth and performance through pre-medicated tests of ideal and real-world workloads.
- iSCSI connectivity was established from EC2 instance on AWS cloud to storage array in co-location site
- Automation scripts along with Cloud Formation Templates were developed to automate the network initialization & connectivity, configuration of storage array, launch of EC2 instances & configuration of iSCSI between EC2 & storage array.
- The automation was integrated with AWS Test Drive programme, through Orbitera platform.
- Configurations in Orbitera and AWS were done to launch the required AWS resources , automation templates and scripts to showcase the use-cases and value-add of client's products



Azure Test Drive for Container Security Product



Engagement

Calsoft was engaged with a client having Container Security product, to create a Azure test-drive. The test-drive aimed as showcasing the features and use-cases of their product in Microsoft Azure platform.



Benefits

- Client was able to showcase its products, offerings and use-cases in Azure environment.
- This helped in increasing customer acceptance and awareness of their products



Technology

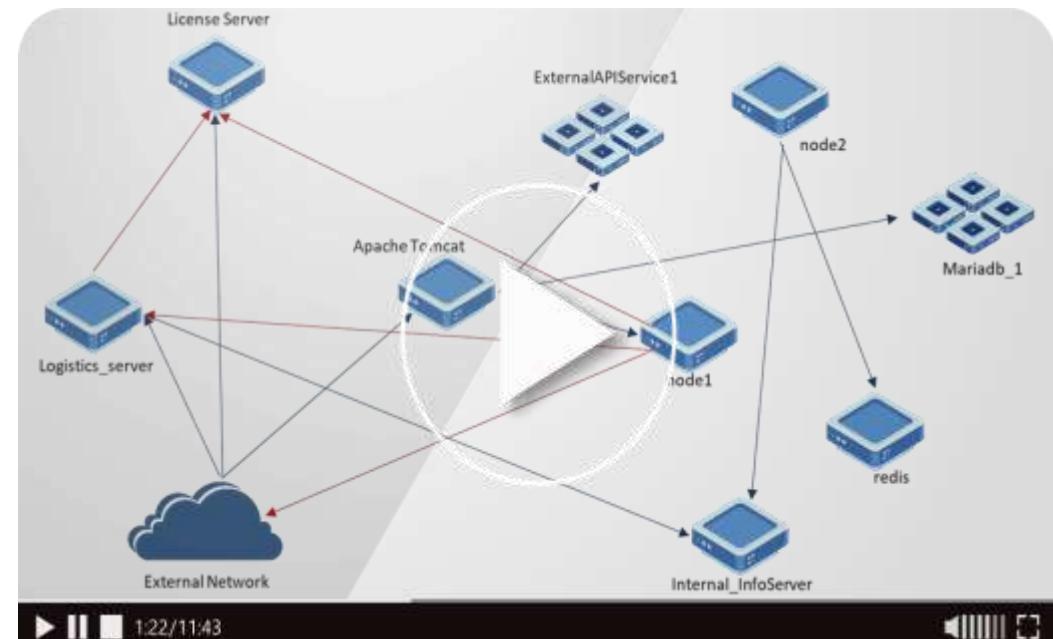
- Azure Resource Manager (ARM), Containers, security policies, Docker, Automation



Solution

Calsoft is the DevOps partner of this client, wherein it works with the Dev & QA team. Calsoft owned this project, independent of the client's engineering team, and undertook following tasks:

- Designed the elements to be used for the test-drive from Azure offerings and client's own IP
- Created the resource group and its configurations
- Created the Azure Resource Manager(ARM) template and wrapper scripts to be used for Test Drive
- Configured Test Drive from Client's Azure account, with settings of hot, warm and cold instances
- Created tutorial videos and knowledge base articles to showcase the working of the test-drive and different offering and use-cases of the product



Workflow Automation using Automation Platform



Engagement

Calsoft was engaged with the client in developing a solution for showcasing the automation of workflows using its Automation platform on its converged infrastructure



Benefits

- Client was able to showcase these use-cases of automation using its products. It would help the prospects see the real-life use-cases in action and increase the chances of product acceptance.



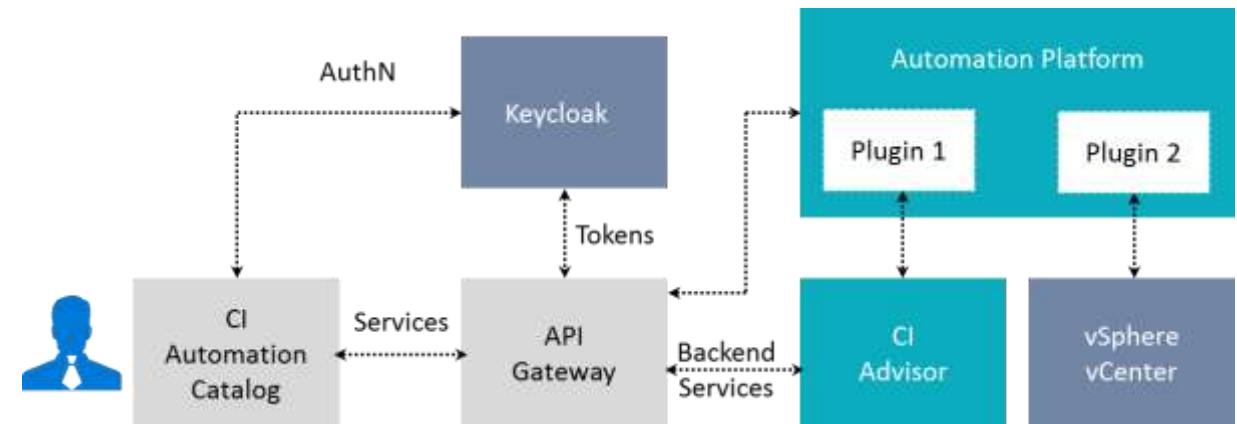
Technology

- Python, Flask, KeyCloak, OAuth2, OpenID Connect, Pyvmomi



Solution

- Workflows related to Virtualization & Bare Metal operations were selected for showcasing the automation
 - Corresponding to these workflows, python scripts were developed to act as Automation Platform plugins
 - Service templates were created to stitch the plugins together
 - A Service API Gateway was developed and deployed to interface with Automation Platform and CI through corresponding REST APIs
 - A simple command line interface (CLI) and Web application were developed to show the catalogue of services.
- Following workflows were automated:
- Deploy and De-commission of VMware vSphere Cluster
 - Add and remove host in vSphere
 - Add Storage to cluster



Engagement

Calsoft was engaged with the leading storage company for DevOps implementation.

The engagement underpinned:

- Implementing configurations for various technologies on production and QA environment.
- Troubleshooting and handling production issues daily on various data centers.
- Providing NOC Coverages

Benefits

- Reduction in downtime.
- Priority triaging & handling of incidents and production Issues.
- Support around the clock network and infrastructure monitoring.
- Real time Administrative Task and Reporting.

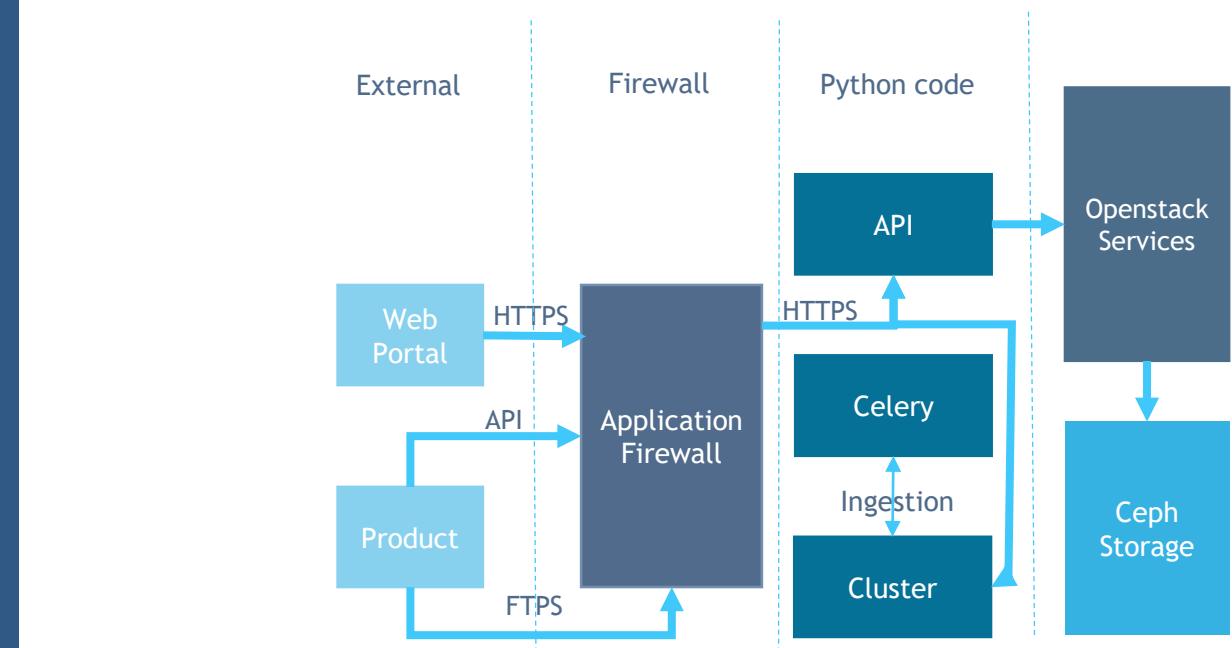
Technology

- Linux, MySQL, MongoDB, Open stack, Apache, Git, Stash, Bamboo, Continuous integration and Continuous deployment, Celery, RabbitMQ, ActiveMQ, Python, Shell Scripting, Nagios, Graphite, Grafana, Monitis, Kibana, Elastic search

Solution

DevOps implementation included:

- Monitoring and troubleshooting of various production issues on various technologies.
- Integrating new configurations on production environment to make it more efficient.
- CI/CD deployment to enhance the infrastructure.
- Automation of administrative, manual tasks and Nagios checks using shell/bash scripting and Salt stack.
- Implementing collected and python plugins for creating graphic metrics.
- Creating and Implementing Nagios Checks on Production Environment.
- Communicating with customer support team to resolve customer support issues.
- Performing Machine Maintenance in production environment.
- Communicating with remote hands in data center to fullfil hardware changes and new implementations.
- Deploying new releases on production environment.



Engagement

- Calsoft built a CI/CD pipeline and performed test automation for a public cloud-based ML-as-a-Service product.

Solution

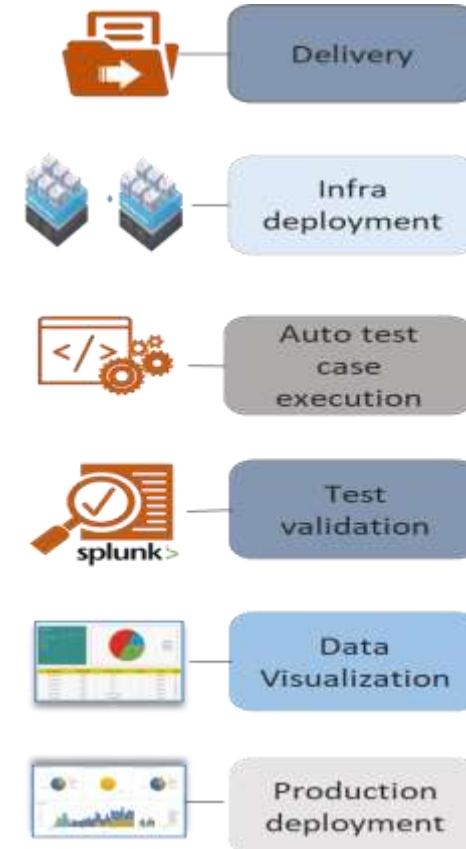
Calsoft supported the customer with developing a CI/CD pipeline for multiple components of their product and performed automation testing.

The engagement underpinned:

- Reviewing and enhancing their existing and partially built CI/CD pipeline
- Building test automation from ground-up using PyTest
- Working with the customer's development team to understand the product components, creating test plan, and providing test automation

Technology

- AWS, Tableau, SnowFlake, Lambda Functions, S3, IAM, RDS, ECR, Fargate, VPC, VPN, Jenkins, Terraform, Python, PyTest, etc.



Benefits

- The customer was able to create a completely automated pipeline for the deployment of components as new features with bug fixes.
- Tests automation resulted in improved quality in an ongoing manner.
- Jenkins and Terraform driven CI/CD enabled faster development.

Database Template Build Pipeline for DBaaS



Engagement

Calsoft was engaged by the customer for building Database Templates (OVA & Container Images) from source code of open-source database engines and related components. The template required to build MySQL, Postgres, RClone, XtraBackup, Wal-G, Telegraph & Qpress from their source code using the customer's build pipeline. After the template was built, the pipeline required automated test cases to be created and executed to validate the template functionally.



Benefits

- Automated pipeline for building open-source databases and related components
- Configuration of YAML for ease of upgrading DB versions
- Fully automated testing of generated templates for faster releases



Technology

- Databases: MySQL & Postgres
- Backup Software: RClone, XTRABackup, WAL-G
- Monitoring: Telegraph
- Compression: Qpress
- Build Tools: Make, Cmake, GO-Build, Dockerfile, Python & Shell Scripts
- Build Pipeline: Custom, based on Jenkins, Nexus Repository



Solution

The build pipeline was analyzed for adding new components. The following steps were taken for building each new component:

- Identified the build steps from the open-source documentation
- Gathered third-party dependencies required for build
- Built the dependencies from source code in cases where the customer's build repository didn't have it
- Updated build scripts for references and/or sequence of build operations
- Packaged the generated artefacts as OVA & Docker images
- Developed automated test cases for functional testing of the templates

Clone component source code



Identify & resolve third-party dependencies



Modify component build script for dependencies resolution



Build third-party dependencies for missing components



Modify build scripts as required



Develop pipeline script for dependency resolution and build invocation



Develop automated test cases and integrate with pipeline

Engagement

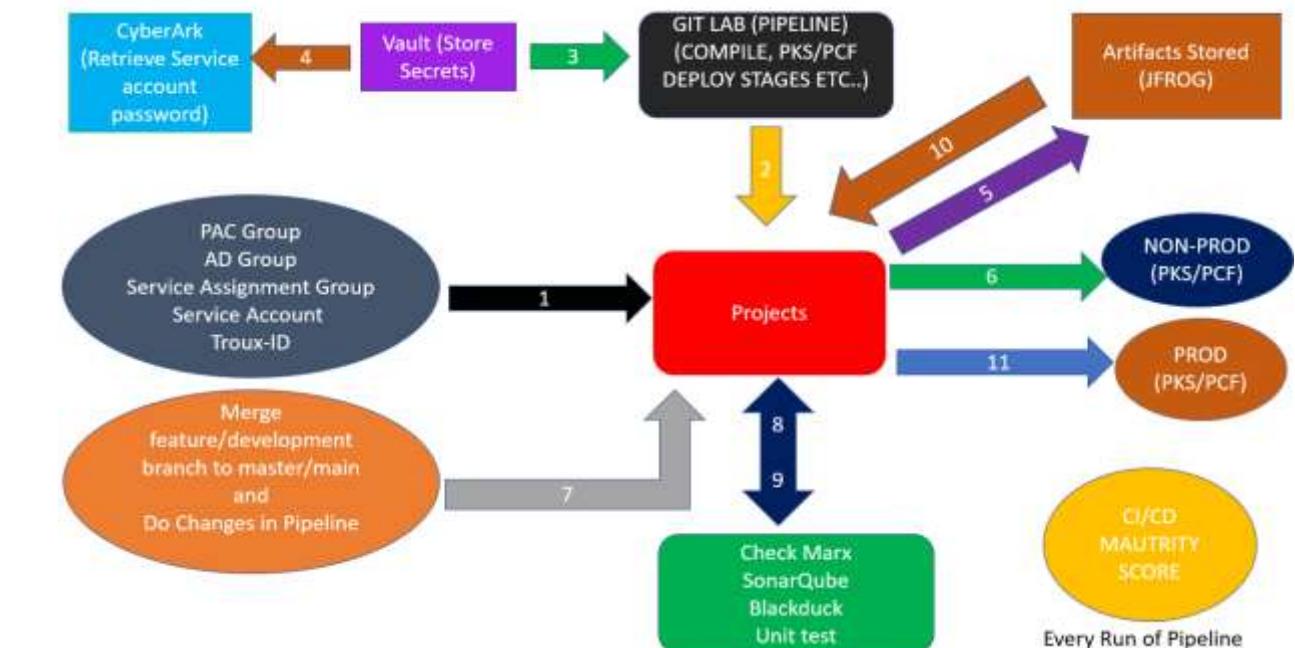
Support DevOps activities across multiple product lines with the business unit.

Solution

- DevOps are actively used for continuous Integration and Continuous deliver of the application deployments for all Ai-Products and COSMOS related applications
- Integrating all Security tools to pipelines and maintaining DAD score at 100%
- Vulnerabilities, automation of unit test cases, fix the pipelines by upgrading to the latest image, and updating the build-packs in CARDS, SPOT, DQS, COSMOS, Dynatrace integration for ALL APPS, update the Secret in the PROD and NON-PROD Vault.

Technology

- Gitlab for CI CD
- PCF(Pivotal Cloud Foundry)
- PKS(Pivotal Kubernetes Service)
- Dynatrace and Grafana etc...



Benefits

- We are contributing to all the Non-prod and Prod deployments for all the APPS in both AI-Product and COSMOS applications.
- We are contributing for reducing the security vulnerabilities such as PKS and Servers(PROD and NON-PROD).
- We are fixing the pipelines issue, which are failing with the different issues.

BLP- Baseline Pricing



Engagement

Design and development of Baseline Pricing (BLP) COSMOS.



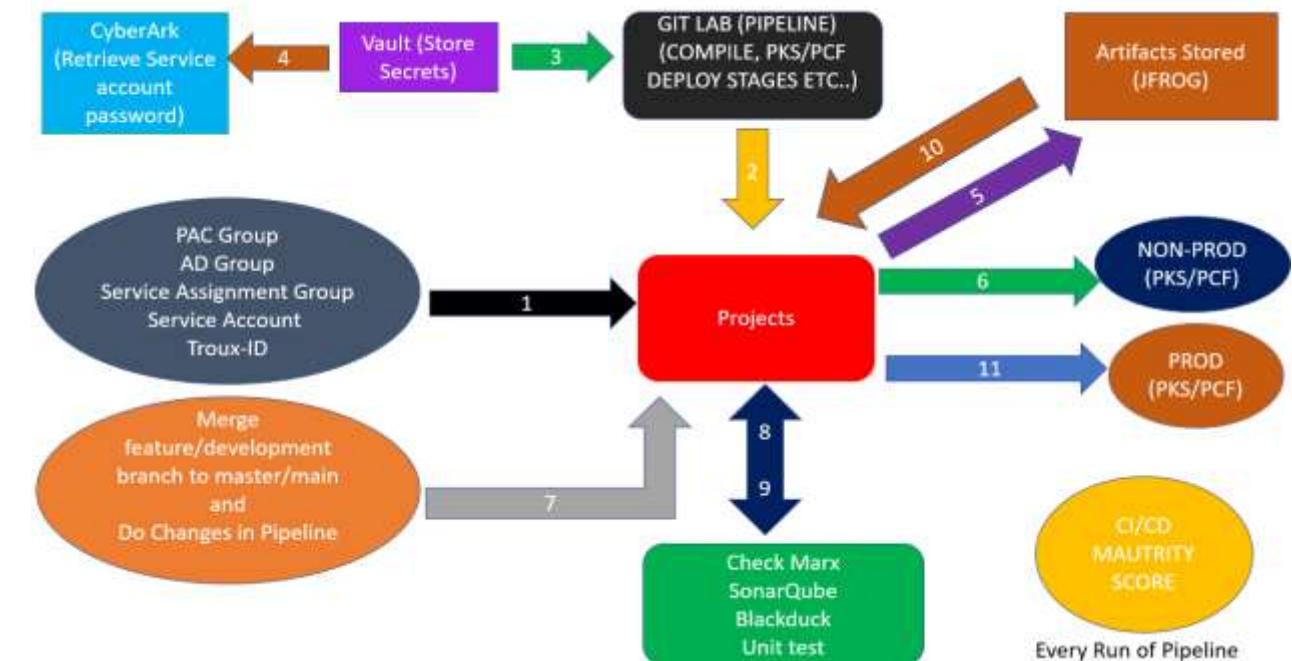
Solution

- BLP COSMOS calculates all cost and price.
- Forecasts 15 months cost/price data.
- The DevOps team worked on CI/CD for application deployments for BLP applications .



Technology

.Net Core, GITlabs for CI/CD, Angular, NUnit Framework, Moon Driver PCF, Checkmark, HCL App Scan , Black Duck Scan, SonarQube



Benefits

- We have planned, optimized, analyzed, and stored product cost and price globally for a consistent and unified experience.
- We have developed the methodology for establishing the correct prices for products ensuring that suppliers are invoicing appropriately at those prices.



Engagement

The aim of QA team is to deliver quality SPOT product, in an agile way.



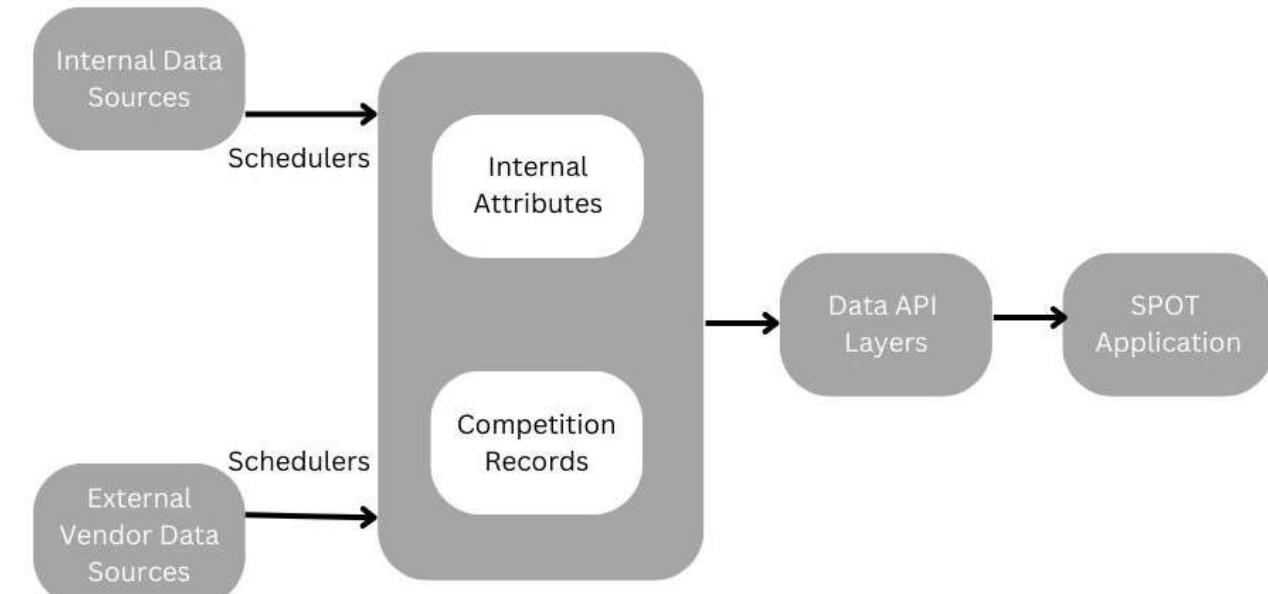
Solution

- SPOT- Dev majorly works on the development of new features by comparison fixing bugs in the current systems.
- Creating data pipelines for external data ingestion (Ugam and Course5) using pricing collaborator.
- Creating a grid for all various competitor's products and saving the data on MS SQL and then moving it to Teradata using schedulers.
- DevOps are actively used for continuous integration and continuous delivery of the application deployments for all SPOT-related applications.



Technology

.Net Core, Angular, MS SQL server, NoSQL, Web API, .NET Automation GITlab for CI/CD ,PCF & PKS, Checkmark, SonarQube, X-ray scan HCL App Scan ,Black Duck



Benefits

- We enable users to compare the competitor price of order codes and parts details with price differences.
- The current system is integrated with third-party data integrators to extract information about competitors and provide a market-competitive price by applying rules.



Engagement

Design and development of Dell Cash Forecast and expanding from one region to another region.



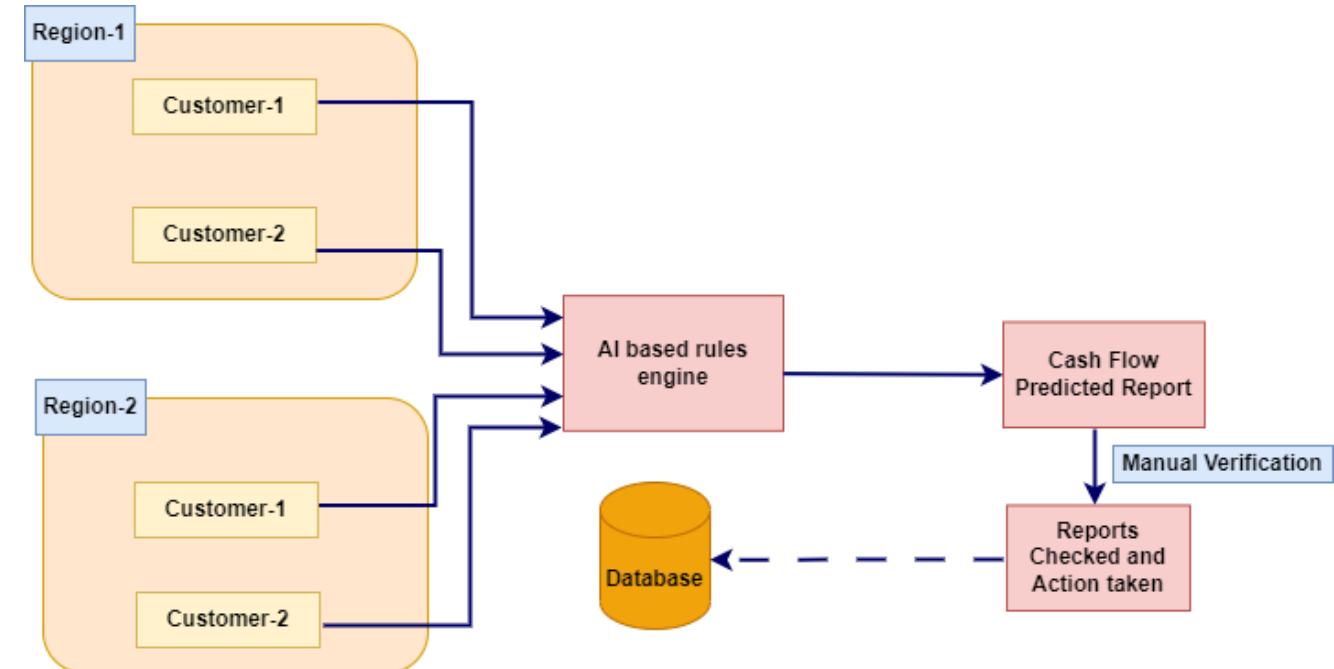
Solution

- Developed Python standalone application under VMs and containers.
- Worked on manual deployment – CI/CD and in-house MLflow server used for custom created own flows and versioning.
- Created pipelines and support data.
- Worked on productizing the code base.



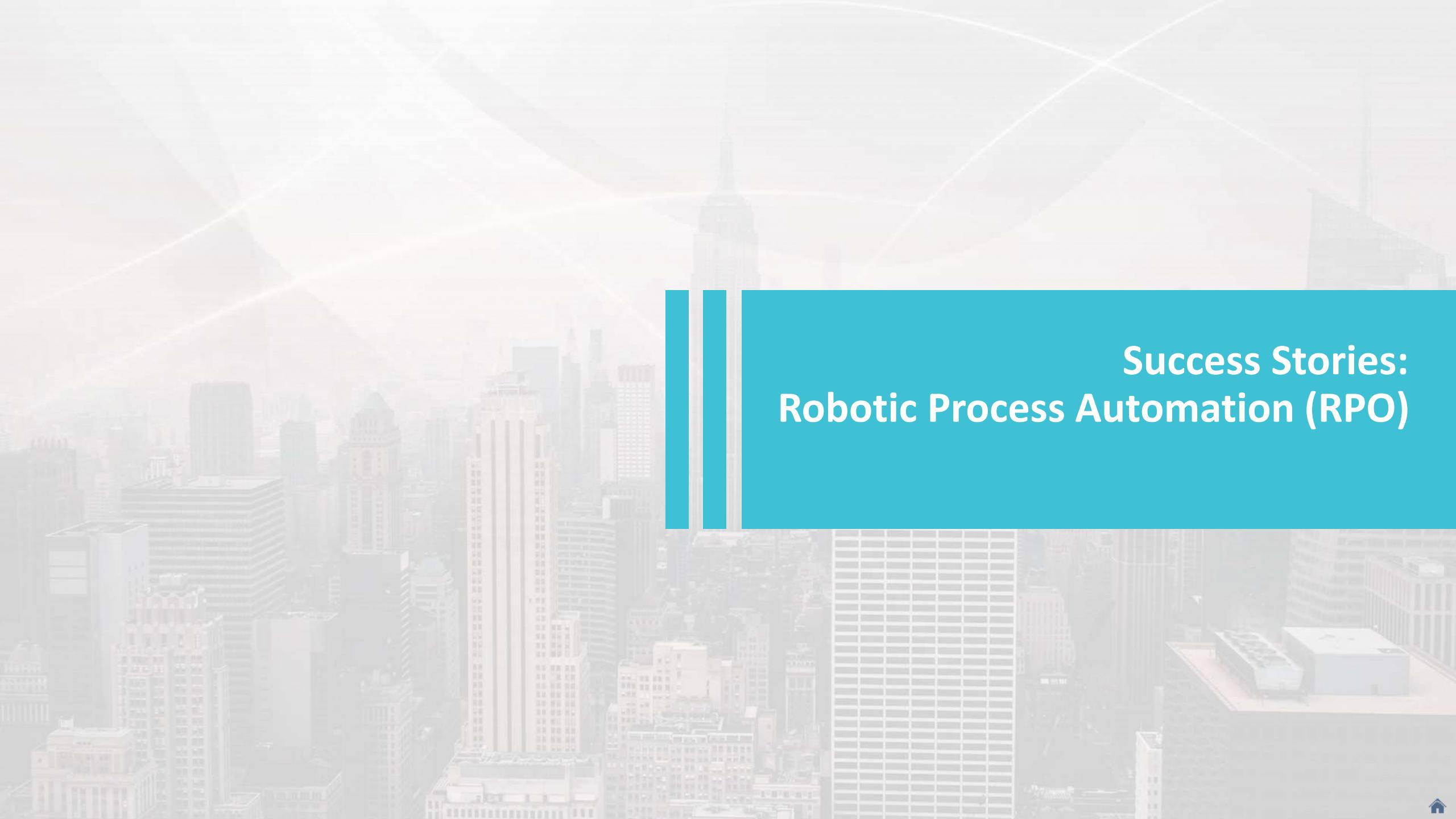
Technology

Python, Databricks, Datapipelining, Terradata

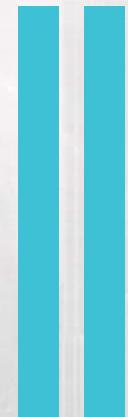


Benefits

- We have successfully created API-based web-based application to automate infrastructure deployment.
- We have automated the current works using MLflow and Airflow with scheduling (API).



Success Stories:
Robotic Process Automation (RPA)



RPA Bot Migration – Automation Anywhere

Engagement

Calsoft was engaged with the customer to migrate Bots in Automation Anywhere to latest version – A360 cloud / (A2019 on prem)

This included migration of

~300 bots

~100 meta bots & dependencies

Bot metadata required for bots to run

Solution

Calsoft helped client drive the entire migration process, which includes:

1) Migration readiness :

- Upgrading - older AA v11 build to compatible AA v11 build
- Scanning bots – to identify which bots can / cannot be migrated
- Analyzing bot scanner report – Plan phases, order, refactoring efforts

2) Preparing new control room :

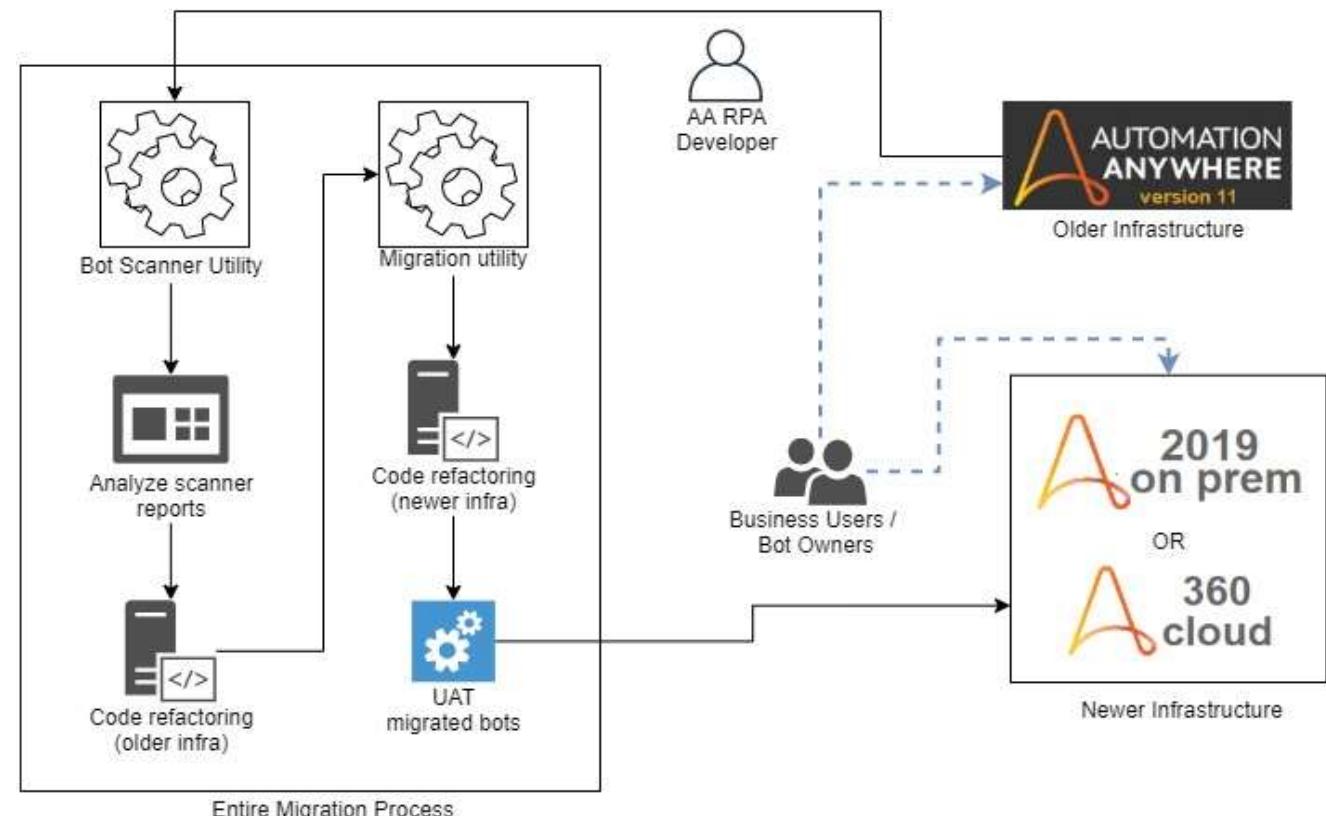
- Identify A360 deployment models – cloud A360 / on Prem A2019
- Setting up licenses – bot runner/ bot creator / devices / etc.
- Configuring new Control Room

3) Migrate and Validate bots :

- Migration utility – to migrate bots
- Refactoring code – for bots which require review / re-capture objects
- UAT – Verification for every bot, execution, triage, confirm results

Technology

Automation Anywhere – migration utility, bot scanner, creator/runner



Benefits

- Customer could leverage latest features of RPA AA 360 – in their existing bot ecosystem
- Customer could re utilize their existing bot code rather than developing from scratch
- Code refactoring was entirely done by Automation Anywhere Certified Calsoft SMEs with minimal dependency from client
- Bot metadata – such as credentials / captured objects / global values / artifacts – was entirely migrated by Calsoft and vetted in UAT



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) visible. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there's a solid teal rectangular area containing the main title text.

Success Stories: Sustenance and Support

Backup and Recovery Product L3 Support Project

Engagement

Calsoft is engaged with the client to provide development support(L3) for a backup and recovery product. Calsoft team is responsible for following tasks:

- To handle customer escalations for backup and recovery product for VM on major Virtualization products – Vmware ESX and Microsoft Hyper-V
- Plan and provide hotfixes to customer for the product.
- Also assist client development team to resolve any internal development bugs

Benefits

- Resolution time for customer escalations and development bugs is reduced
- Provided Onsite support to help L2 accelerate resolution time.
- Saved lot of engineering time for new feature development.

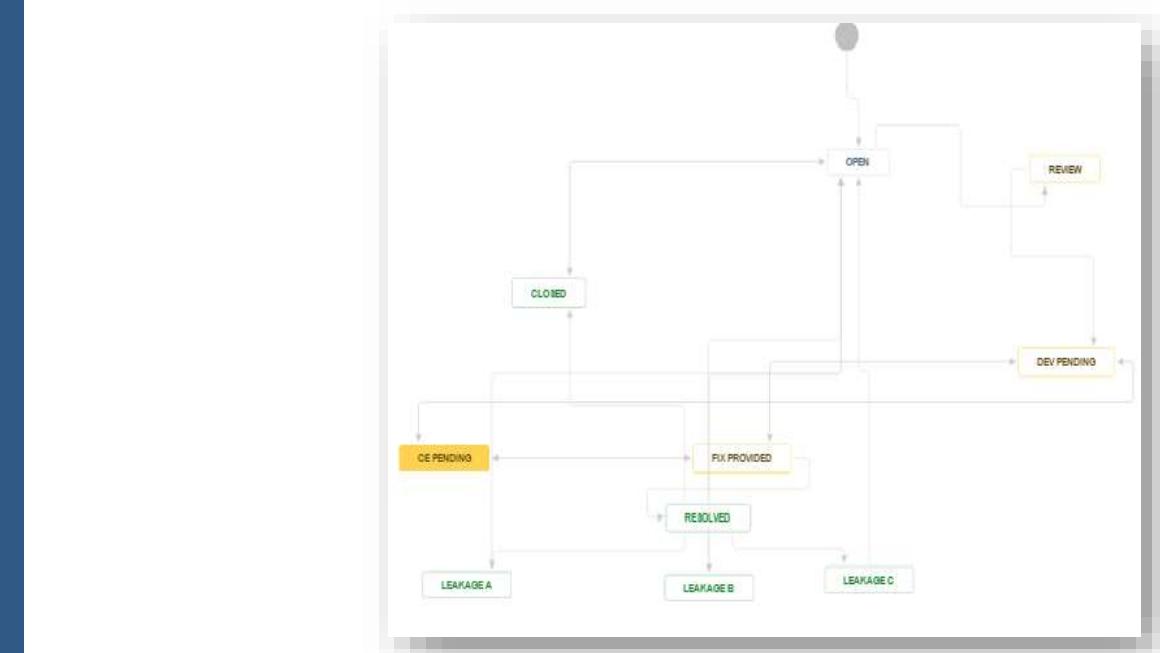
Technology

- Vmware ESX – VI SDK, VDDK, Hyper-V - WMI, PostgreSQL, C
- C++, Perl, PHP, C#, Python, PowerShell, etc.

Solution

Calsoft team is providing following solution:

- Provided hot fixes for critical customer issues.
- Handle priority escalation with minimum resolution time.
- Helped client engineering team to resolve internal development bugs , enhancements, etc.
- Provided technical assistance to L2 team when required.
- Frequently involved in code review for complex changes in the code.



Backup and Recovery Product L3 Support Project - UVB

Engagement

Calsoft is engaged with the client to provide development support (L3 support) for a backup recovery product. The engagement underpinned:

- Development ownership of Backup recovery product for VM on 3 major Virtualization products – Vmware ESX, Citrix XenServer and Microsoft Hyper-V
- Plan and provide hotfixes and releases for the product.
- Maintain the turnaround time and resolution time as per the SLA.

Benefits

- Helped L2 by creating quick reference documents (cheat sheet) for faster resolution of known issues.
- Provided Onsite support to help L2 accelerate resolution time.
- Agile model to track progress on bug resolution and feature developments.

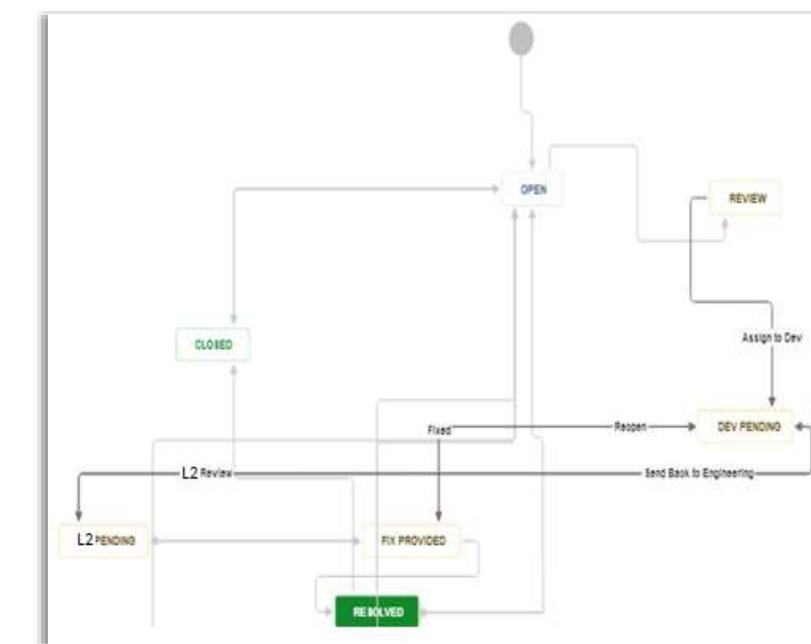
Technology

- VMware ESX – VI SDK, VDDK, Citrix Xenserver- XAPI, Hyper-V - WMI, PostgreSQL, RabbitMQ, Python, JSON, Django, Web Framework, C, C#, C++, Cloud (S3QL) - Amazon S3, RackSpace, Amazon S3 compatible, OpenStack

Solution

Calsoft provided the following:

- Maintained turnaround time and resolution time below the SLA.
- Provided a release every month. This included bug fixes and enhancements – Cloud support, vUSB support.
- Daily update to L2 team on progress.
- WebEx with end customer with the help of L2/L1 engineer in case of complex environments.



- VRanger will transition into sustenance and EOL phase
- VRanger has a current team of 11 engineers based in Santa Clara, CA
- vRanger is a Backup and Restore software solution
 - Backups for VMware, Hyper V and physical Windows servers
 - Leverages the CBT and VSS functionality
 - Delivers the shortest I/O path for fast backup and restoration.
 - Performs Auto-discovery of environment
 - Has an Agentless architecture
- Complete takeover for sustenance, support and bug fix releases in 1 quarter.



Engagement

- Started the engagement with vRanger sustenance project in August 2016
- Terms of engagement changed to take entire engineering ownership of vRanger product in February 2017
- Team size of 11 engineers
- Based on lower expected support cases, additional responsibility of NetVault Hyper-V (dev, QA and support) taken up by same team
- Total 5 successful releases in last 2 years
- Achieved in reduced the average support count from 25+ to 15



Benefits

- Increase RPO and reduce RTO by developing incremental backup using VMware technologies and Hyper-V RCT technology
- Scalable and cost-effective distributed data handling and throughput through VAs
- Keeping the product up-to-date by integrating with latest storage technologies and platform features



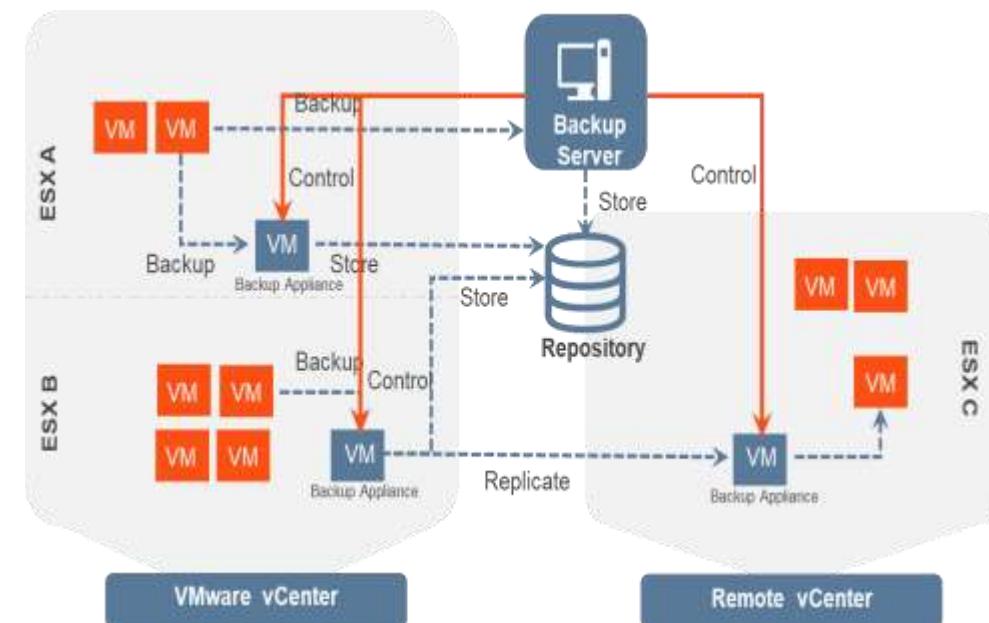
Technology

- C, C#, VMware SDK and APIs, Hyper-V APIs, Powershell, Microsoft SQL, Windows and Linux



Solution

- Support Incremental Backup with Windows 2k16 RCT feature
- Integration with SDS dedupe technology to take faster backups and perform Repository Replication
- Support latest version of EMC DDBlack Library and its certification
- Providing platform support for VMware and Hyper-V with new features
- Quick turnaround for vulnerabilities like Meltdown, Spectre and Ransomware by upgrading the custom Kernel and its packages shipped with the product
- Resolving escalations from customers and provide hotfixes
- Add new features like BMR for Physical Windows® servers





Engagement

- Calsoft's engagement with the client for designing, implementing and testing of the IMManager 7.0 feature set



Project Type

- Manual + Automation



Technology

- Linux



Solution

- Calsoft provided the following:
- Designed, implemented and tested IMManager 7.0 feature set
- Added support for protocols like Jabber
- Implemented integration with Domino Server, and helped in the internationalization/localization effort
- We have also added the Linux pass-through capability to IMManager 7.0.
- Ported the IMLinkage protocol engine and SDK to Linux
- Added functionality such as protocol support for file transfers over various Enterprise IM protocols

Product Description

- Security product for instant messaging (IM) clients and servers.

Sustenance of Cisco Invicta SAN Product



Engagement

- Calsoft is the only engineering team to provide development support (L3 support) for two All Flash Array products.
 - Own end-to-end engineering activities involving development, test, build and release.
 - Plan and provide hotfixes and releases for the product and meet SLAs



Benefits

- Hybrid model - Agile+Waterfall model to track progress on bug resolution and feature developments.
- Complete outsourced model for cost advantage of the customer
- Helped L2 by creating quick reference documents for faster resolution of known issues.
- Reduced the product test cycle with test automation.
- Stabilized the product and added new features.



Technology

- SCSI 2/3 PR, VAAI,LVM, Snapshots, async replication,
- Block Translation Layer
- Reducing write amplification and deduplication
- Error Detection and correction in RAID 6
- OpenStack Cinder Plugin
- MSCS, VDI, Citrix XenDesktop, Hyper-V support
- C, Shell, Python, Zend framework



Solution

- Onsite knowledge transition of the product from the experts maintaining the product for more than 4 years to build knowledge and expertise
- Calsoft maintains 2 products and does patch release every alternate month
- L3 Support for the customers as per Cisco's SLA's – Supported 1000+ Appliances and 40+ Scaling systems.
- Feature enhancements to support new features added in storage products as per their roadmap
- Implemented automation of test scenarios
- Support involved resolving customer issues, handling escalations, providing fixes, etc.
- Weekly update to L2 team on progress.
- WebEx with end customer with the help of L2/L1 engineer in case of complex environments.

Product Usage Domain

- VDI
- Server virtualization
- Relational databases
- Enterprise messaging
- Metadata indexing and logs
- Data warehousing applications
- Online transaction processing (OLTP)
- High-speed data acquisition
- Multitasking systems using high-speed swap files

Support for Software-defined Storage product



Engagement

- Calsoft was engaged with in providing consumer facing first level (L1) support for a leading software-defined storage product.



Benefits

- The team provided 24x7 support for the product. As the team was well equipped with expertise in storage domain, the L1 to L2 case transfer ratio was less and the bugs generated had adequate technical information



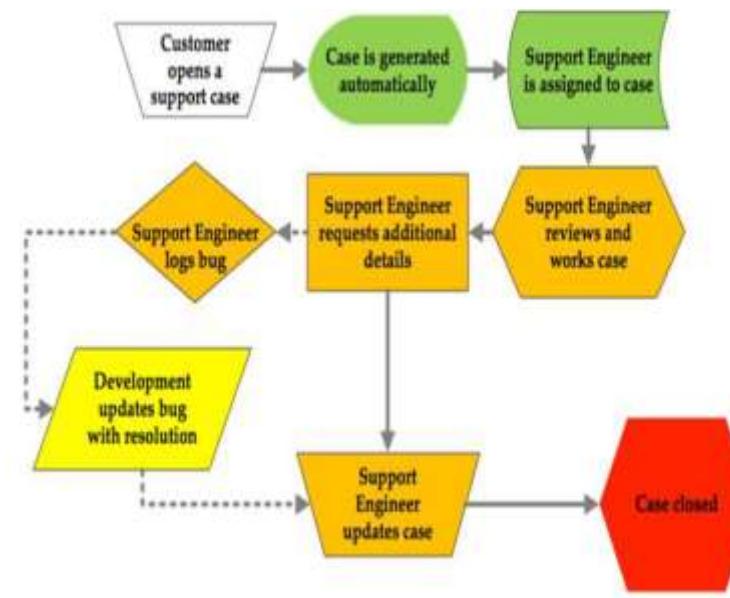
Technology

- Protocols: SAN, NAS, SDS, ZFS, NFS, CIFS, FC, iSCSI
- Platforms: Linux, Solaris



Solution

- Calsoft incubated the team of engineers with wide expertise in storage protocols and products in general and software-defined-storage (SDS), in particular
- The team handled the customer helpline, interacted with customers to evaluate and troubleshoot the case, identifies configuration issues, if any.
- The team also undertook first-level QA to ascertain is the case was a defect, and filed bugs.
- Post resolution by engineering team, Calsoft team would follow-up with the customer to provide the solution



Engagement

Calsoft is engaged with the client for providing 24*7 support to customers of client's Flash Arrays

Benefits

- Team's existing domain knowledge in the enterprise support, helped gain technology insights quickly and work independently on the customer specific issues. It also helped the team to be able to contribute towards helping/educating customers with "Storage optimizations techniques" for better snapshot management and performance enhancements.

Technology

- Customers can access support through email, worldwide toll free phone numbers, Support Portal, and Call-home capabilities
- Callhome tool provides proactive support with automated notification of select system events, proactive diagnosis of potential problems, and case creation when needed.
- Cases handled through SFDC tool.

Solution

- To provide expert level troubleshooting to resolve customer issues
- Support activities include installation, upgrade and configuration of the array
- Coordinating with engineering as and when required to resolve array specific issues.
- If needed dispatch an RMA to replace parts





Engagement

- Implement a plugin to use SDS as a backup storage for any type of backup client like SQL, FS, etc.



Benefits

- Implementation is independent of cloud interfaces.
- Minimal or no change is required in workflow to add support for new cloud storage
- Only unique data goes to cloud storage, reducing cloud storage consumption.
- Highly scalable
- No hardware dependency



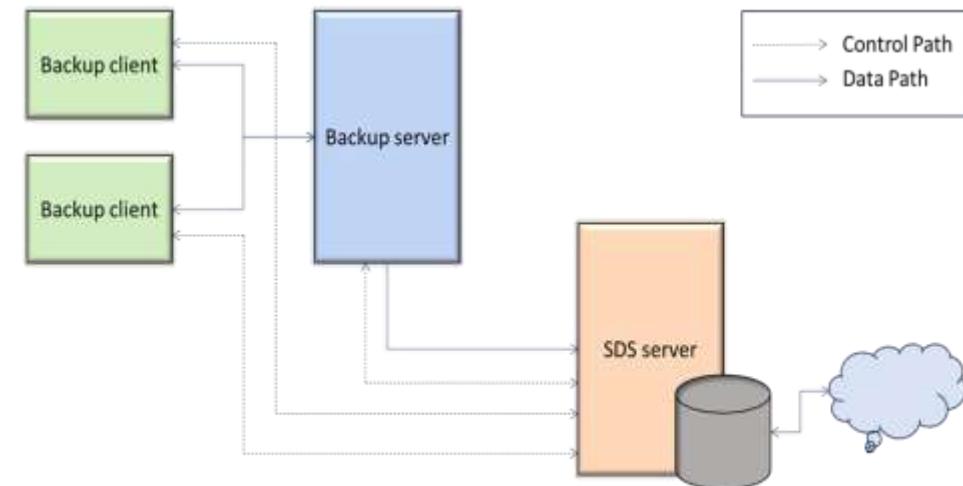
Technology

- C, REST API, OpenDedup, Azure cloud



Solution

- Analysed the interfaces provided by SDS solution.
- Designed and developed SDS plugin for backup store.
- Defined SDS interface layer to add support for respective SDS solution.
- Integrated with data protection streaming layer to read/write data to and from SDS solution.
- Implemented all data and control path operation to support all data protection workflows.
- Implemented NDMP interfaces to make use of SDS as NDMP server.



7



Engagement

- Authentication/RBAC to backup server using Active directory credentials for Linux and windows system.



Benefits

- Centralized RBAC management.
- Can work with on premise or cloud deployed authentication server.
- Enable support for push install workflow
- Can support SSO in case of Converged Data Protection solution.



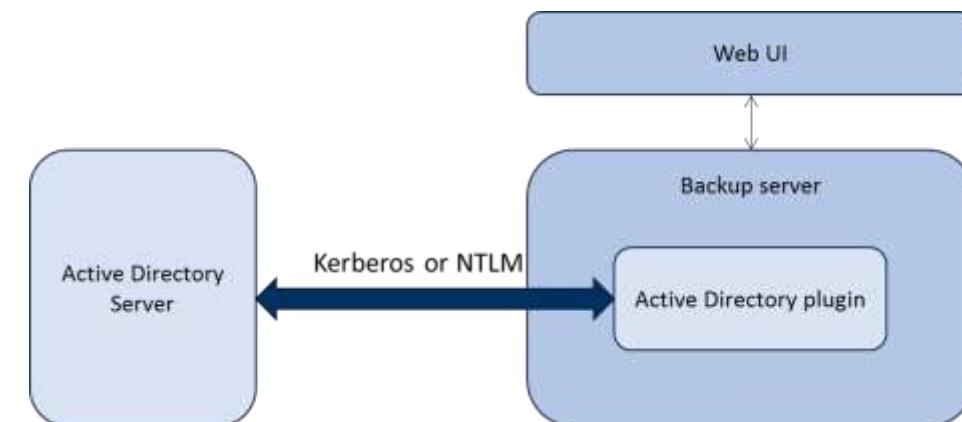
Technology

- C, Azure authentication APIs (MSAL library v2.0), LDAP interfaces, AD interfaces (ADSI)



Solution

- Design and develop new plugin to provide role based access control.
- Implement interfaces to interact with Active directory, Azure Active Directory, LDAP like Extending AD schema, performing AD operations, etc.
- Implementation authentication workflows by interacting with AD or Azure AD.



Deploy Backup server to Azure market place



Engagement

- Enhance backup server to get easily deployed in Azure market place.



Benefits

- Readily available backup server in Azure market place makes it easy for end user to deploy and use it.
- Can be deployed in cloud to perform backup of VMs running in cloud.



Technology

- PowerShell script, Azure APIs, Azure cli



Solution

- Modify backup server initialization process to make it running inside Azure virtual machine.
- Create image compatible to Azure market place.
- Develop an automated deployment process to upload backup server to Azure market place.

Unified Backup and Recovery Product L2 Support Project



Engagement

Calsoft is engaged with the client to provide escalation support(L2) for a enterprise class backup and recovery product. Calsoft team is responsible for following tasks:

- To handle customer escalations for backup and recovery product across platforms, major Virtualization ecosystems (VMware ESX and Microsoft Hyper-V), Networking and Security configurations (LDAP Integration, SSL etc.) and Application backups – Enterprise apps like MS Apps, Oracle



Benefits

- Triageing and debugging customer problems with effective customer communication and reducing the escalation backlog



Technology

- Microsoft Windows, Linux, VMware, Hyper-V, LDAP, AD, MS Apps, IBM DB2, Informix, Domino (Lotus), Oracle, MySQL, Sybase, SAP and SAP HANA



Solution

Calsoft team is providing following services:

- Working closely with customers, customer support team and engineering team for escalations
- Handle priority escalation with reduced resolution time
- Analysis/triaging of escalations, deflection to engineering teams for patch releases and hotfixes
- Reduce TTR (SLA driven based on Severity level)



Design & Implementation of NDMP Server

Engagement

Design and implement NDMP server for their platform to:

- Enable NDMP for client's library system
- Test against known backup products like Symantec NetBackup, EMC Networker etc.
- Enable configuration of NDMP through client's management framework.

Benefits

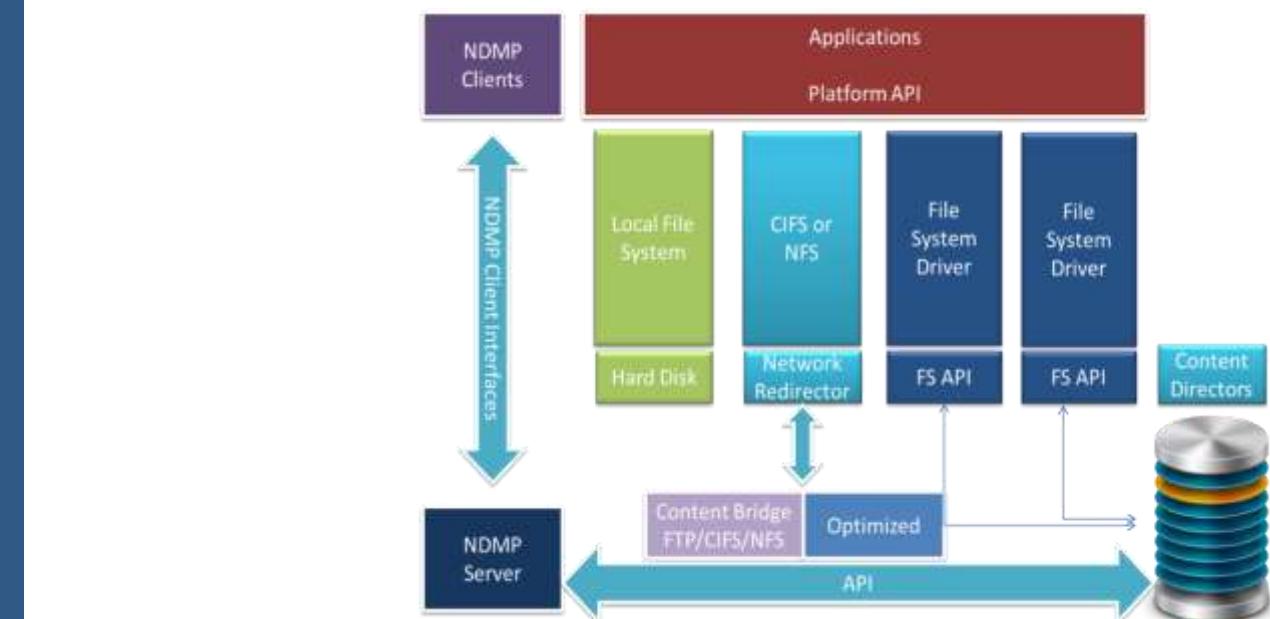
- Helped the client with faster Go-To-Market (GTM) with NDMP Server feature.
- Improved backup functionality with enhanced product features

Technology

- Linux, C/C++, NDMP v3/4 SDK, various 3rd party DMA applications

Solution

- Implemented NDMP Data Server with V4 capabilities
- Implemented management interfaces to enable/disable NDMP services, configure NDMP options
- Software compatibility testing with DMAs – CommVault, Symantec, EMC
- Certification against known DMAs



Engagement

Calsoft was engaged with the client for development of Backup and Recovery plugins and integration with the ConnectWise Suite.

Benefits

- This integration helps the System Admin to manage the entire infrastructure of the premises/company from single UI.
- Tracking of live status of the backup's and all other operations performing through the connectWise plugin UI's and dashboard reporting tool .

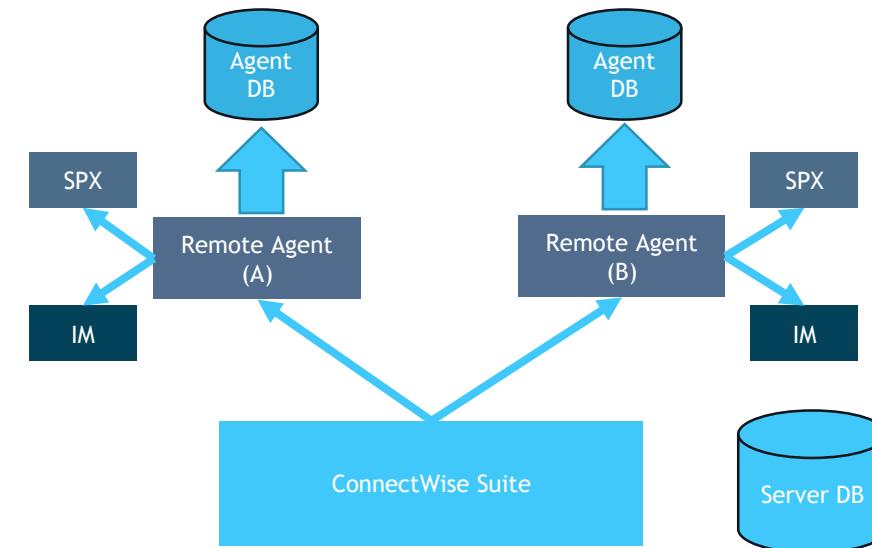
Technology

- VB.NET, WPF, XAML, MySQL, SQLite, MVVM, REST API, Report Center.

Solution

Calsoft helped the client in developing a plugin for SPX and Image Manager and integrate them with the ConnectWise suite. It provided features like:

- Volume level backups of VM's and physical machines.
- Cloud integration to store the images on the client specific cloud and AWS.
- Image consolidation generated by SPX on daily basis or as per the schedule.
- Replication, Retention and Headstart restore.
- Integration of a legacy product with ConnectWise i.e ShadowProtect 5
- Report generation



Cloud monitoring NOC for Fintech company

Engagement

Calsoft is engaged with the client for providing a 24*7 SOC/NOC. The aim is to provide the support for monitoring and L1 support for pre-empt infrastructure failures to avoid any service outages to the end customers (end customers, Enterprises etc)

Solution

- Monitoring health of the different application running in the cloud
- Monitoring cloud infrastructure and reporting incidences.
- L1 Support
- Executing incident runbooks
- Coordinating with ISPs for outages/ maintenance windows

Technology

- Ticketing – JIRA
- Cloud Platform - AWS
- Runbooks – Confluence
- Configuration – Ansible
- Other tools – Linux system tools

Multiple Services for Fintech e.g.
webservers, db, transactions

Native scripts & Cloud monitoring
using cloudwatch

Critical Alarms

Dashboard

Benefits

- As this was done for a fintech startup, the ramp up time was crucial. Calsoft helped in setting up the team pretty quickly because of internal expertise.
- Automating repetitive task for monitoring is another key value add done by the calsoft team

Cloud NOC for Container Security Product

Engagement

Calsoft is engaged with the client for providing a 24*7 Customer success team for a container security company. The aim is to provide the support for any issues that comes during customer on-boarding. This was an extension to the customer's tech-presales team.

Solution

Understand customer environment

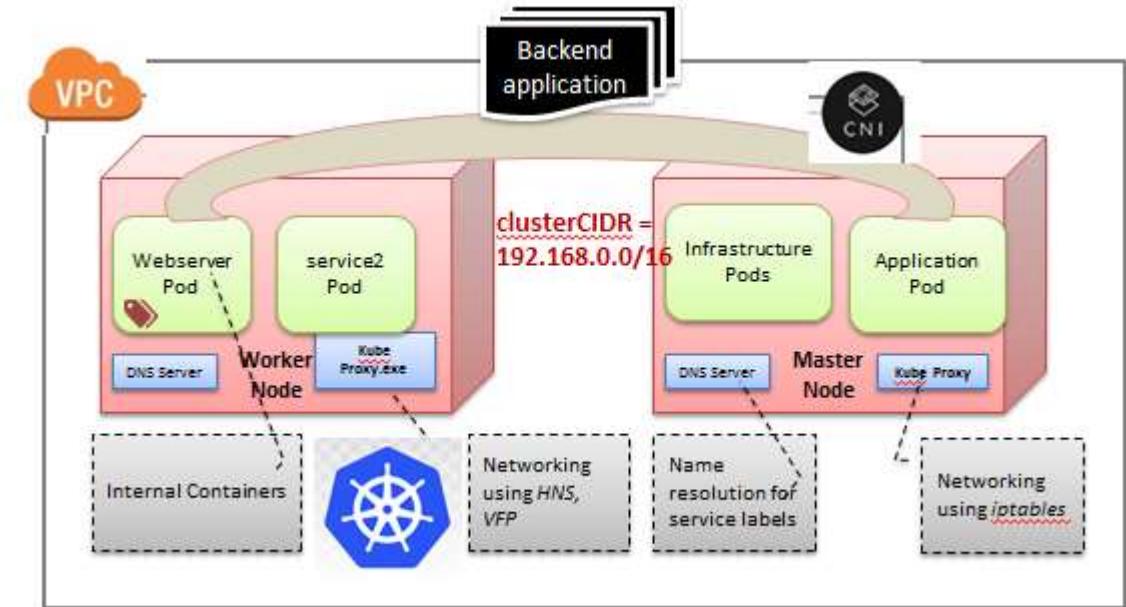
Understand calico infrastructure

Automate calico and other components deployment using Ansible

Create blueprint/PoC as per customer requirements

Create demo labs and trainings for new customers on AWS, Azure or GCP

Working with L2/L3 teams to resolve cloud infrastructure issues.



Technology

- Containers, K8S
- Cloud Platforms - AWS, GCP, Azure
- Ticketing - JIRA
- ELB, Kibana
- Configuration – Ansible
- Other tools – Linux system tools

Benefits

- Calsoft expertise in automation helped building faster blueprint and hence reduced time in on-boarding
- Calsofts expertise in calico (CNI) helped troubleshooting complex issues in lesser time
- Calsoft's domain knowledge in the Networking, Cloud and SDN area helped the team gain necessary technology insights



Engagement

- We helped one of the world's largest consignment, delivery & tracking companies to use Machine Learning and AI, redesigned their production architecture, and moved from Monolithic to Microservices based architecture.



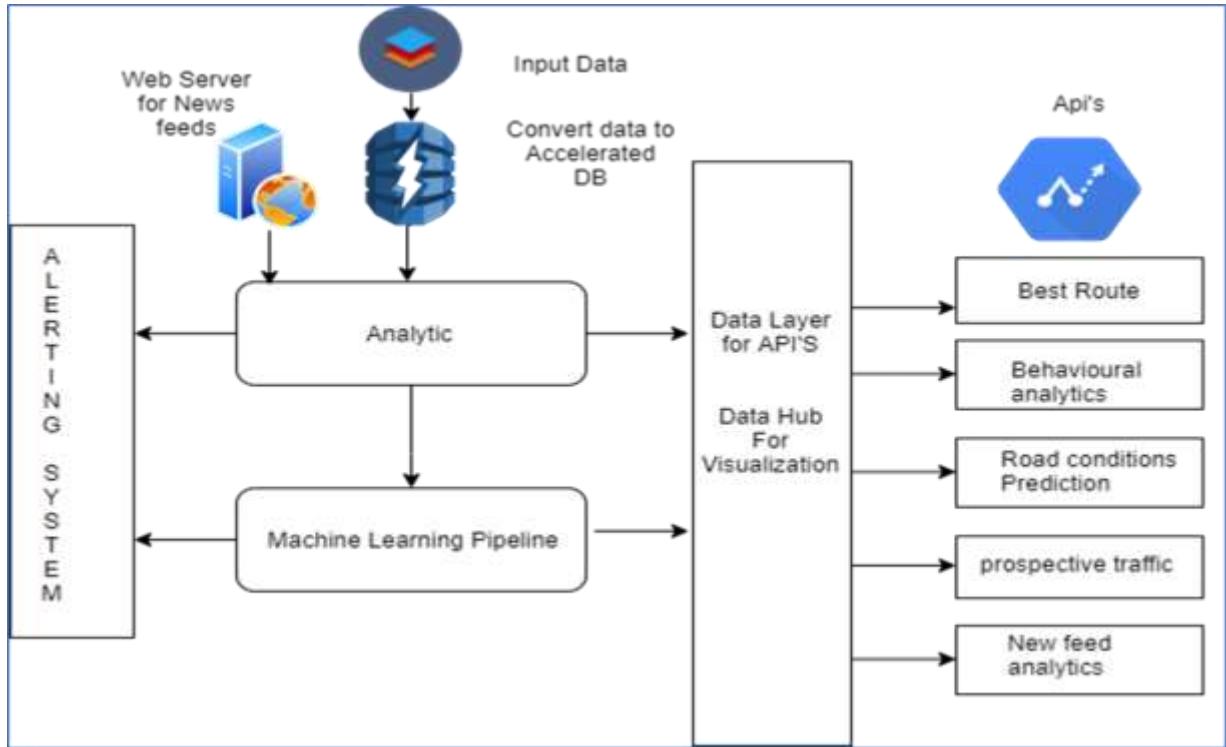
Solution

- Suggested best routes based on GPS information and past data analytics
- Analyzed news feed to provide alerts about weather, social disturbances, natural disasters, etc.
- Predictions based on past data to optimize time and fuel, when to start next trip, etc.
- Predictions for best routes based on individual parameters like time, load, vehicle type, etc.
- Prediction of traffic during weekends, weekdays, holidays, days/nights with respect to goods supply & demand, number of vehicles, planning future fleets & increasing fleet efficiency
- Behavioral analytics of the driver and the vehicle
- Used GPS data and vibration sensor data to understand road conditions and predict scheduled vehicle servicing
- Generated alerts based on past data analytics about driver/vehicle behavior
- Generate alerts based on past data analytics about the terrain and traffic
- Broadcasted information of prospective traffic; proactive information broadcasting of the traffic/environment by the vehicle ahead in the routes



Technology

- Python, Dask, Hadoop, Spark, PyTorch, Django, Rest/GraphQL API, Plotly



Benefits

- Best Route:
 - Recommended overall best route with respect to time, vehicle type, consignment type to optimize cost
 - Best Route based on traffic time, stoppage time or quickest drive time
- Safety and alerting :
 - Deviation from the best route, driver harsh braking, speeding
 - Deviation from driving time and rest-break time

Sustenance Engineering Services for UCP Products

- Faster Go-To-Market and reduced engineering time for new feature development



Engagement

- Calsoft was engaged with the customer to provide support and sustenance to their UCP product.



Solution

The engagement underpinned:

- Working closely with end customers, customer support team, and engineering team for escalations
- Handling priority escalation with reduced resolution time
- Bug-fixes
- Release management
- Lab infrastructure
- Minimal updates to support newer VMware and MS Hyper-V versions
- Security for third-party software stack
- Documentation updates
- SLA adherence



Technology

- .NET (C#), Microsoft SQL, Erlang, CentOS Linux, vCenter, Microsoft WDS, RabbitMQ

Create issue

Open

In progress

Resolved

Reopen

Closed

Issue not resolved

Resolve issue

Resolve issue



Benefits

- Helped the customer with faster Go-To-Market
- Resolution time for customer escalations and development bugs was reduced
- Provided onsite support to accelerate resolution time
- Saved engineering time for new feature development



Engagement

- Dell EMC PowerOne is an integrated infrastructure solution that provides autonomous provisioning of system resources. Calsoft prepared and published Dell EMC PowerOne documents. The documentation team prepared documents from scratch for multiple releases.
- Client Profile:
- Client name: Dell EMC
- Geography: US, Ireland, and India
- Project duration: 1.5 years
- Documentation Delivery:
 - Guides
 - User Guide
 - Online Help
 - Field Services Guide
 - Admin Guide
 - Output
 - PDF
 - OLH



Technology

- DITA Framework
- XMetal Author
- Publication Manager
- TechSmith Snagit
- Microsoft Word
- Adobe Acrobat



Solution

- New Guides Delivered:
 - vROps User Guide (seven products), Field Services Guide, Admin Guide, OLH
- Structured Authoring
- SDL used to manage document source files
- Multi-writer authoring for parallel deliveries
- Best practices implemented to parameterize content, branding, conditional text and variable used, versioning changes for increased flexibility
- Writers helped in product development in terms of reviewing product UI, technical terms usage, etc.
- Experienced writers
- Deep documentation & domain expertise
- Experience with large documentation deliveries
- Helped in improving the existing documents from the UX perspective and improving user experience to a large extent



Engagement

- Calsoft developed a snapshot-based backup & recovery software. The documentation team prepared a set of around 35 documents from scratch for multiple releases.

Client Profile:

- Client name: Hitachi Data Systems
- Geography: US
- Project duration: 4 years

Documentation Delivery:

- Guides
 - Install Guide and User Guide
 - CLI Guide
 - Troubleshooting Guide
 - Release Notes
- Output
 - PDF
 - OLH and Context-sensitive Help
- Documentation Team Size
 - 5 writers



Technology

- Adobe FrameMaker
- WebWorks ePublisher
- TechSmith Snagit
- Microsoft Word
- Adobe Acrobat



Challenges

- Tools Challenges:
 - No documentation tool provided
 - Inefficient as file sizes grew
 - Formatting limitations
- Adobe FrameMaker Templates:
 - Basic Unstructured FrameMaker
 - Creating HDS publication compliant output
 - Branding challenges due to frequent changes
- Source Content Control:
 - Inefficient multi-writer authoring due to multiple doc deliveries & release cycles
 - Version control, single-source tool absent



Solution

- New Guides Delivered:
 - Install Guide, User Guide, CLI Guide, Troubleshooting Guide, Release Notes, OLH
- Adobe FrameMaker Templates:
 - Best practices implemented to parameterize content, branding, conditional text, versioning changes for increased flexibility
 - HDS publication compliant templates achieved
- Controlled Multi-authoring:
 - SVN used to include documentation source files
 - Version control in line with other code
 - Multi-writer authoring for parallel deliveries
- Experienced Writers:
 - Deep documentation & domain expertise
 - Experience in handling large documentation deliveries



Engagement

- Calsoft developed the Archive Management Software that provides a complete Archive Management Solution when combined with Alliance's NETArchive and Archive Appliance solutions.
- Client Profile:
 - Client name: Alliance Storage
 - Geography: US
 - Project duration: 3 years
- Documentation Delivery:
 - Guides
 - Install Guide
 - Admin Guide
 - Service Manual
 - Release Notes
 - Output
 - PDF
- Documentation Team Size
- 2 Writers
- Sample document: Admin Guide



Technology

- Adobe FrameMaker
- Microsoft Visio
- TechSmith Snagit
- Atlassian Jira



Challenges

- Admin Guide:
 - Outdated—not updated for 9 years
 - Missing features
 - Branding inconsistencies
 - Content inconsistencies due to acquisitions
- Service Manual, Install Guide:
 - Did not exist
- Adobe FrameMaker templates
 - Outdated templates for Admin Guide
 - Inefficient handling of branding elements
 - No templates for Service Manual and Install Guide



Solution

- Admin Guide Refresh: Complete refresh of Admin Guide for:
 - Features, Style, Branding
- New Guides Delivered:
 - Service Manual, Install Guide, Release Notes
- Adobe FrameMaker Templates:
 - Best practices implemented to parameterize content, branding, conditional text, versioning changes for increased flexibility
- Experienced Writers:
 - Deep documentation experience
 - Domain expertise
 - Experience in handling large documentation deliveries



Engagement

Dell has two different platforms, premier and transaction with different business criteria and ease of performance. Plan is to have unified performance and experience using new technologies. Calsoft is engaged by providing solution for giving better experience to users on Dell product checkout page and hence encouraging customers to buy product with ease. With features like multishipment, Express Checkout, premier addressbook and quick cart checkout, users are now more comfortable while purchasing product and smooth shipment delivery.



Solution

- * Developing solution for unified checkout which includes address book, multishipment, user preferences features and contact address management like billing/shipping/mailing.
- * Developing and Enhancing new features on the checkout page such as Multishippments to select multiple shipping addresses for a group of Items, MABD(must arrive by date facility to customer)
- * Building solution for providing better experience for purchasing any product on site.
- * Providing devops support for build & deployment like creating pipeline, maintaining different environments to run application and smooth production deployment.



Technology

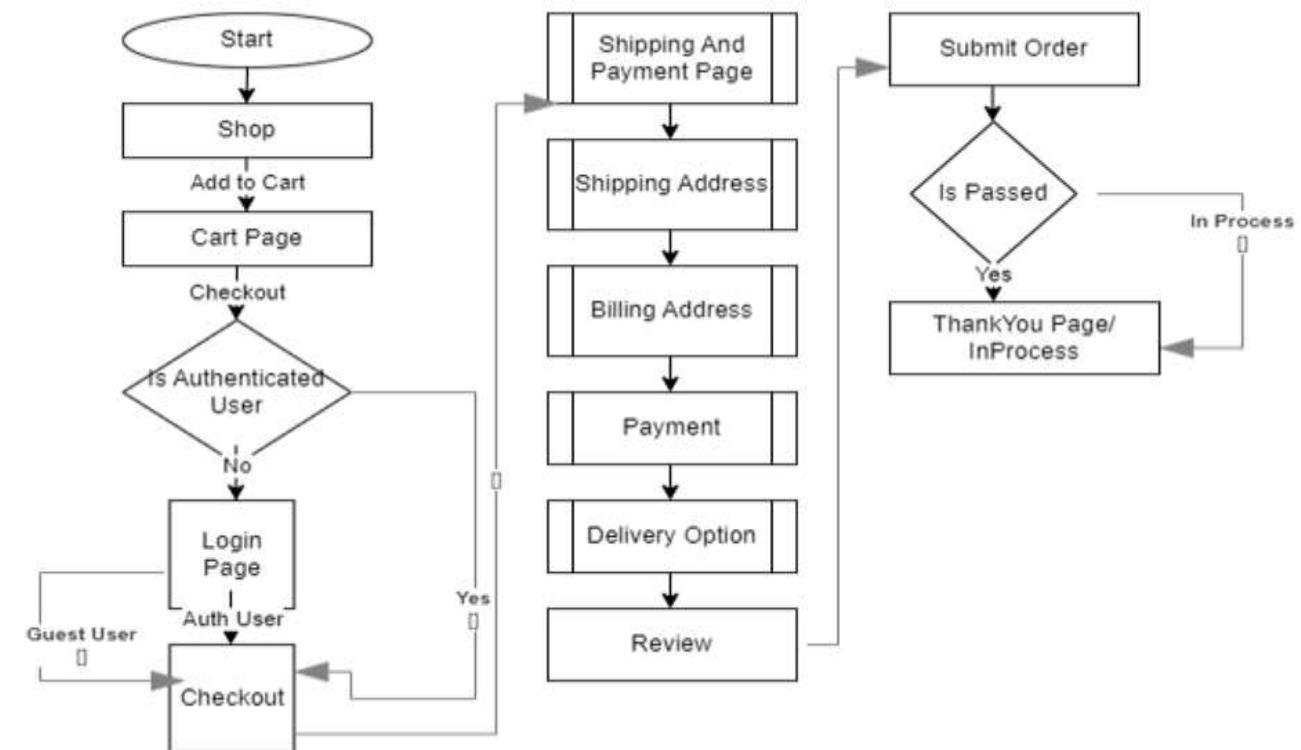
- * Lit framework,TypeScript, REST APIs, .Net Core
- * Azure Cloud
- * SqlServer, MongoDB



Benefits

- Users will get the unified checkout experience while ordering the products like selecting multiple shipment addresses, more controlled address book and support for enhanced checkout experience.
- Recommended necessary solution to client on modernizing Legacy application for further cost optimization.
- Premier checkout experience by express checkout and multishipment.

SUPPORTING ARCHITECTURE DIAGRAM HERE





Success Stories: IoT



Offshore Customer Success Team for a leading IoT Platform



Engagement

- Calsoft engaged as a strategic vendor and setup an ODC for a IoT platform provider, where Calsoft was responsible for creating positive customer experience through customer specific component and feature development, L2/L3 support (triaging and bug-fixing), and regression testing.



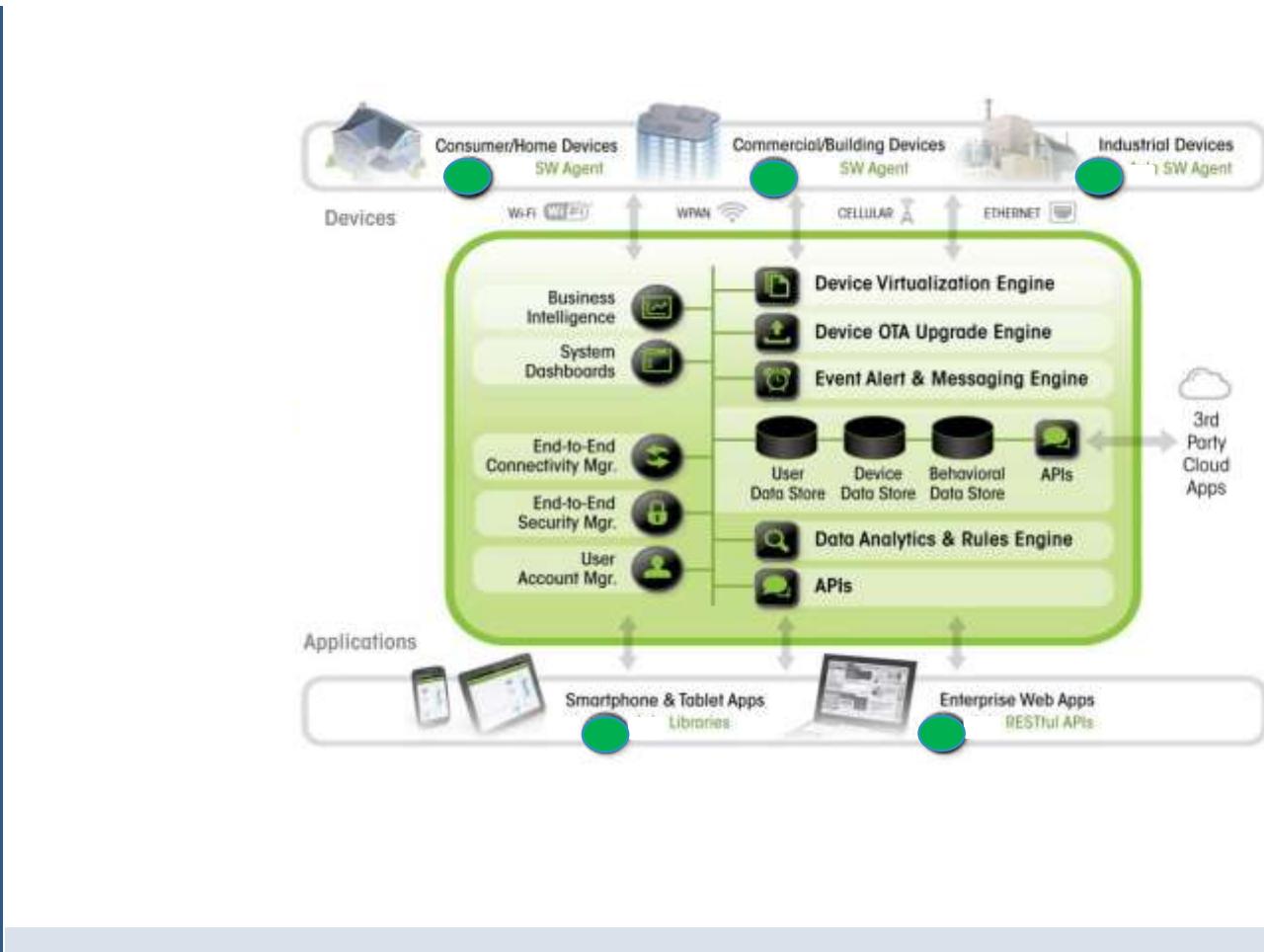
Solution

- Calsoft is responsible for maintenance, customer support, testing of the IoT platform. Various package of work executed by Calsoft team are as follows
 - Device management – OTA, Data Policies
 - Edge – HTTPS, MQTT
 - API - Data exchange, devices, users, Admin, Role management
 - Applications - mobile Android , IoS
 - Mobile applications such as Mosquito repellant, Energy devices- Switch, dimmer, dual plug and single plug, water level monitor
 - Voice Application testing – Alexa and Google Home – Digital Signage, Purifiers
- Calsoft is also responsible for Weekly build testing , bug verifications



Technology

- AWS based custom platform, Alexa, Google direct actions, WiFi and network testing, Embedded gateway software development and testing



Benefits

- Creative positive customer experience through faster turn around and quality of services
- Automated CI/CD and QA resulted in faster release cycle

Digital Solutions Team for a Major Process control Conglomerate

Engagement

- Calsoft engaged with a well known process control conglomerate as a strategic product engineering vendor assisting the client in their digitization efforts by supporting them in the areas of Azure, Infrastructure, DevOps, Data and Analytics, Automation and AI/ML for their transformation journey

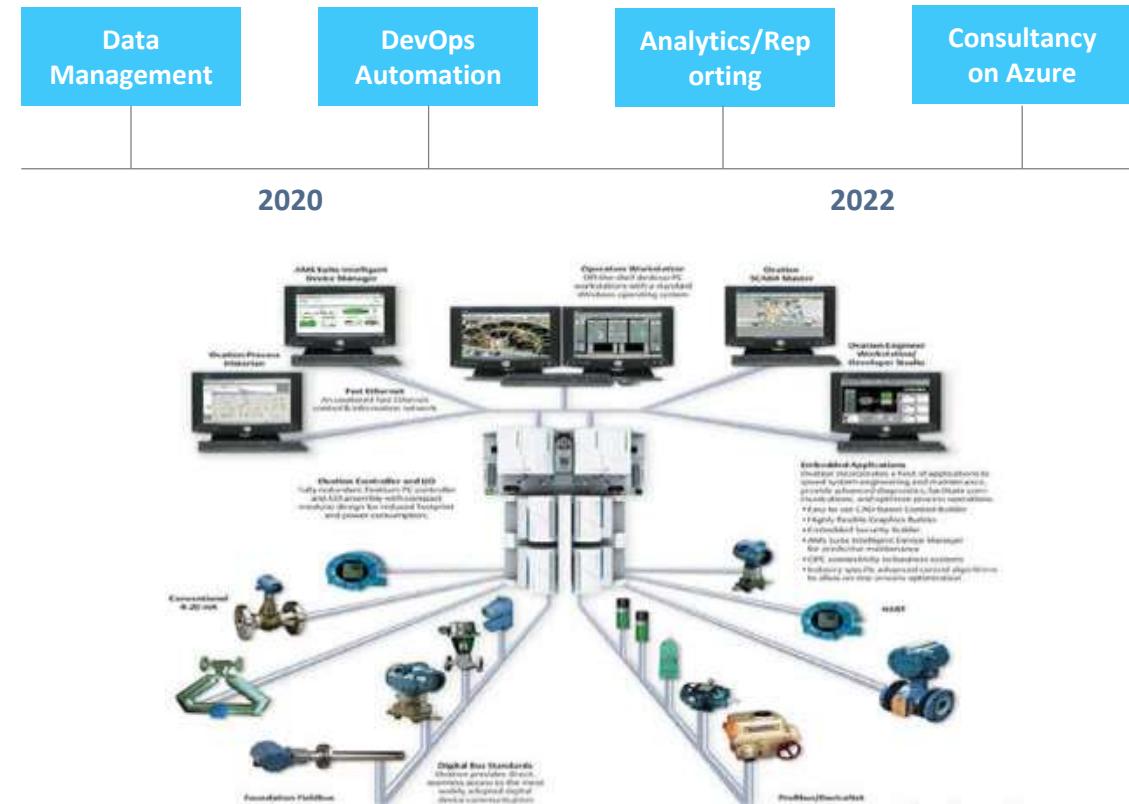
Solution

- Data governance and data management for asset management
 - DevOps Transformation for a large analytical software with multi-site development team
 - Continuous maintenance on Windows based SCADA software
 - Analytics software for production performance management and reporting tool on Azure tool chains
 - Partnership on customer projects for intelligent Edge software
 - Consultancy on worldwide Azure deployment for multiple product line of process control.



Technology

- Azure IoT Central, Azure container registry, PowerBI, Next90, Docker, NodeJS



Benefits

- Helping customer in Azure based solution integration of IT and OT.
 - Governance structure and investment in project management

Development of Industry 4.0 based pump software and IoT platform



Engagement

- Calsoft engaged with the client for building an IoT Controller 4.0 solution for their IoT platform and pump software leveraging Azure IoT central.



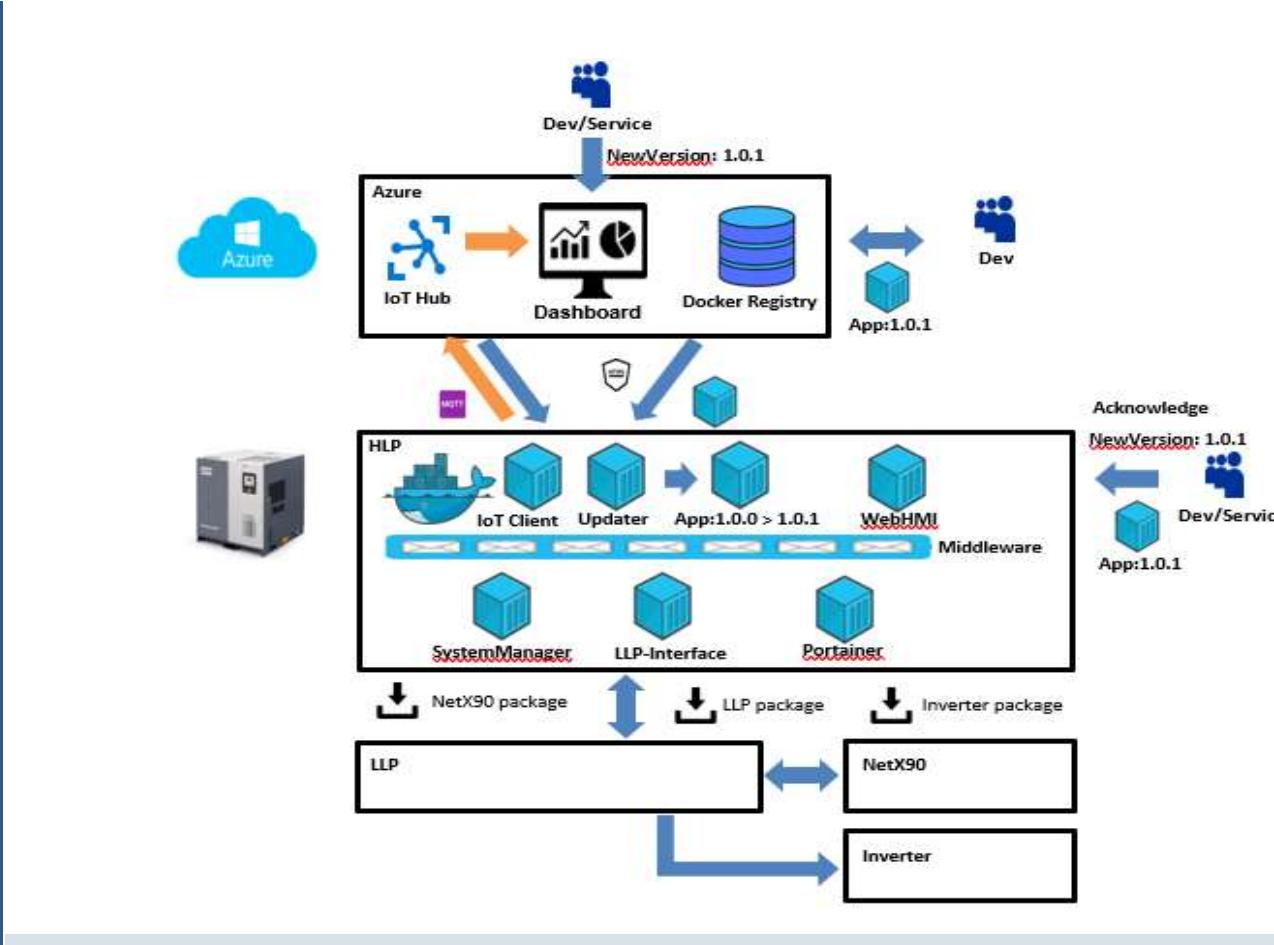
Solution

- Built a visualization dashboard
- Developed a platform for onboarding tools
- Developed custom protocols for connectivity and security layer
- Implemented edge analytics and machine learning along with real time communication protocols for the mission critical pump-control and inverter
- System manager is embedded in middleware and is part of the overall architecture implemented as a High-Level Processor (HLP) which also acts as a communication medium (MQTT) between HLP and LLP (Low Level Processor)
- Provide backup file of set configuration parameters and restore the provided configuration file and perform system check as per parameters.



Technology

- Azure IoT Central, Azure container registry, PowerBI, Next90, Docker, NodeJS



Benefits

- Faster Time to market
- Selection of vendor specific protocol with respective protocol specific configuration file.

Offshore development partner for Edge Engineering for an IoT Platform



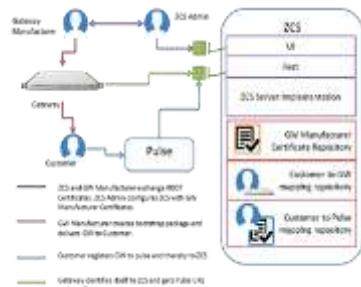
Engagement

- Calsoft engaged with the customer to deliver several IoT related projects in an ODC setup

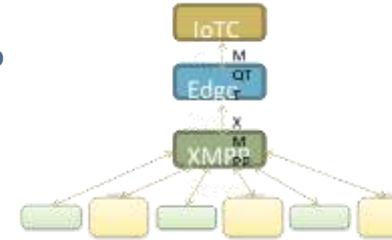


Solution

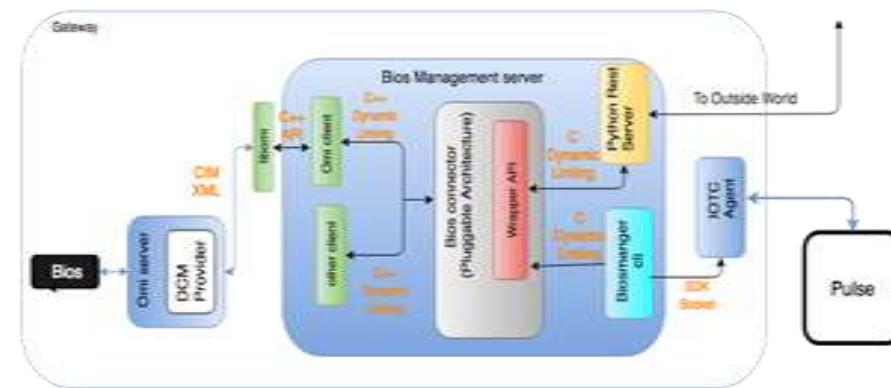
- Calsoft had a team of engineers and architects to develop edge/gateway software
- Calsoft has developed multiple edge utilities
- Calsoft team has developed multiple integrated utility with mobile application, edge software and cloud utilities.
- Calsoft team has worked with clients and customers to develop bespoke integrations with sensors and protocols.



Microservices for Zero touch services for onboarding new gateways.



XMPP Protocol Support for southbound interface of the gateway



BIOS parameter controller and update utility using Redfish



Benefits

- Faster device onboarding
- Faster time to Market



Technology

- XMPP, BIOS, Redfish

Azure ML Deployment for a Large HVAC and Facility management company



Engagement

- Calsoft engaged with the customer to deliver several IoT related projects in an ODC setup



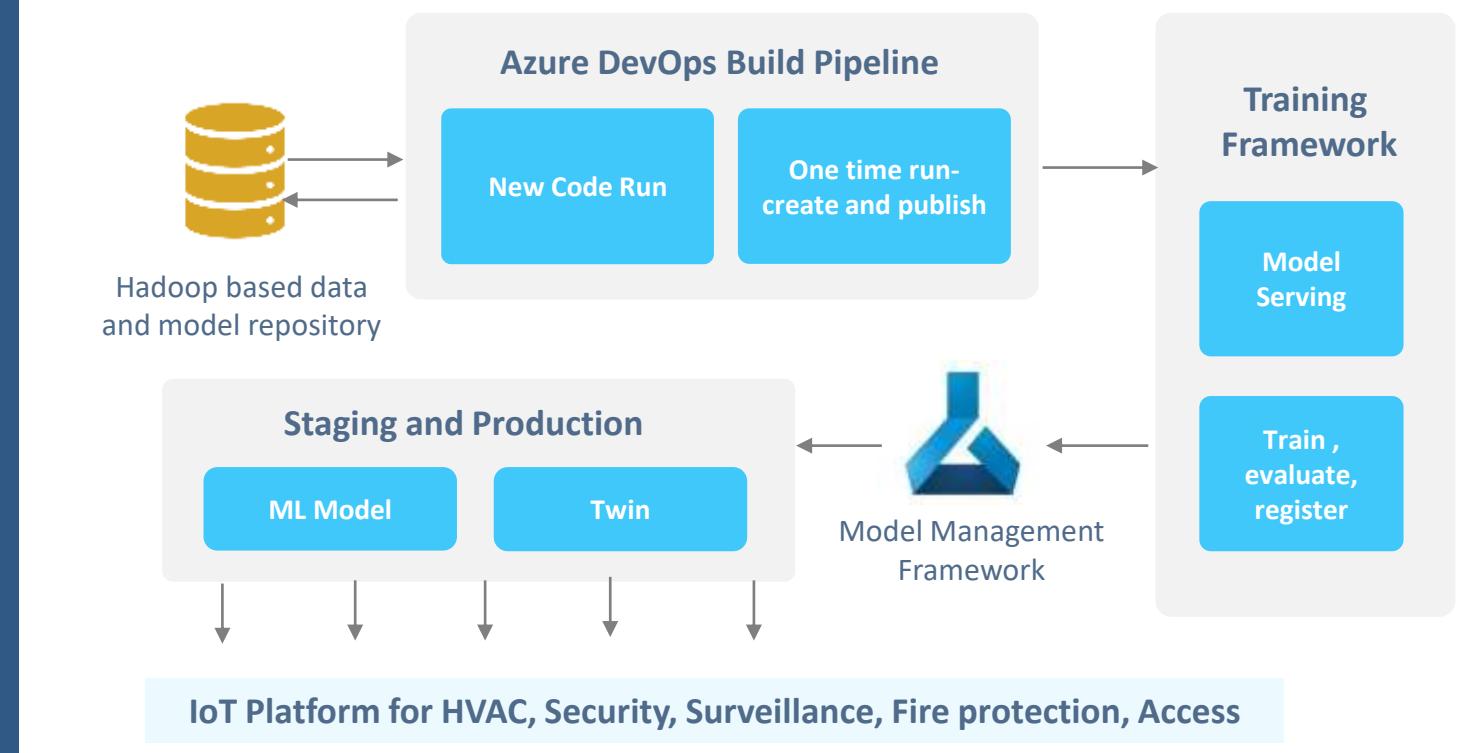
Solution

- Calsoft has developed the infrastructure for MLOps using Microsoft tool chains. Customer has an worldwide deployment of the IoT platform and a central ML training and model development facility.
- Custom models were developed in open source libraries such as Scikit learn and Xgboost
- Models are for condition monitoring, predictive maintenance and optimum operation
- Digital twins data models were developed in Autodesk Forge and GraphQL
- Models deployment API were developed python and integrated with Azure DevOps toolchain for complete continuous training pipeline
- Continuous improvement framework was implemented using a feedback loop



Technology

- XGBoost, Autodesk Forge, GraphQL Azure DevOps ToolChain, Python Libraries



Benefits

- Improved life cycle management with introduction of predictive maintenance
- Reduced downtime

Integration of Legacy Protocol with Azure IoT Hub



Engagement

- Calsoft engaged with the customer to deploy Azure IoT Protocol Gateway. Objective is to implement this protocol gateway in Azure using Cloud Services worker roles & in on-premises environments



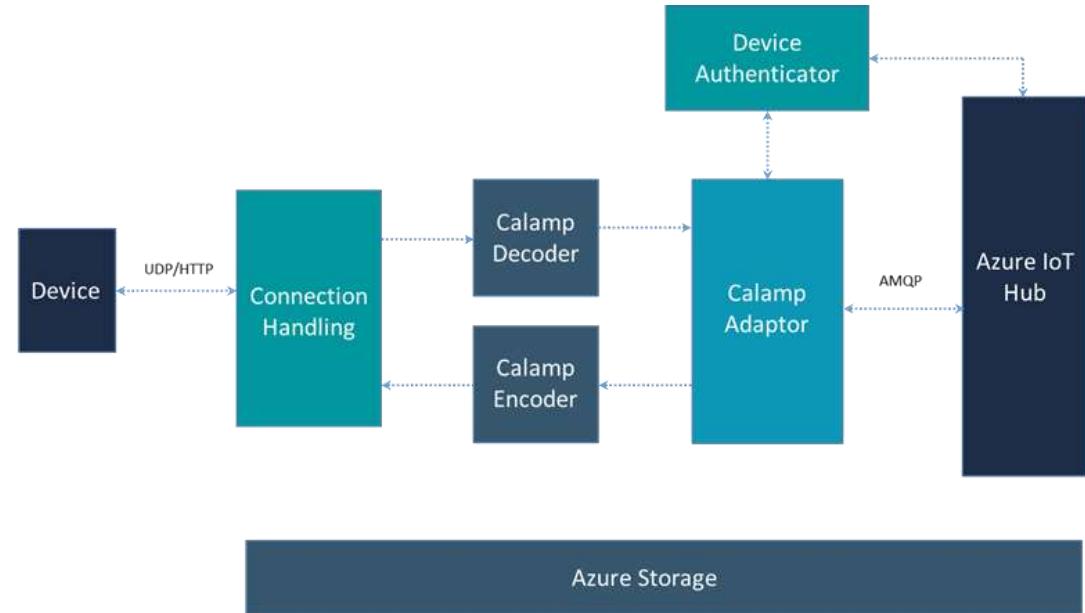
Solution

- Authentication of IoT devices using the device Shared-Access-key (DSA) token through IoT Hub.
- Deploying the protocol gateway in service fabric cluster using standard logging and configuration techniques
- Implementation of protocol Adapter for UDP - As UDP is connectionless, the gateway maintains a dictionary; which saves the last Active Timestamp, the message bridge and endpoint per device for UDP devices.
- Implemented synchronous communication with direct method invocations on a device using HTTPS and AMQP by passing JSON payload for both request and response.



Technology

- .net, AMQP, UDP/HTTP, Azure IoT Hub/Central



Protocol Gateway Design



Benefits

- Adaptation of Client's product in Microsoft Azure environment, thereby, increasing his customer base multi-fold.
- Device updates are enabled from IoT hub integration.
- Low process overhead for the Bi-directional communication on this custom protocol
- Additional security with device authentication mechanisms while requesting for telematic details.

Energy Management IoT Applications

Engagement

Calsoft was engaged with an energy meter device manufacturer to build end to end IoT stack, which provides

- Full analytics pipeline.
- Graph visualization for anomaly detection.

Benefits

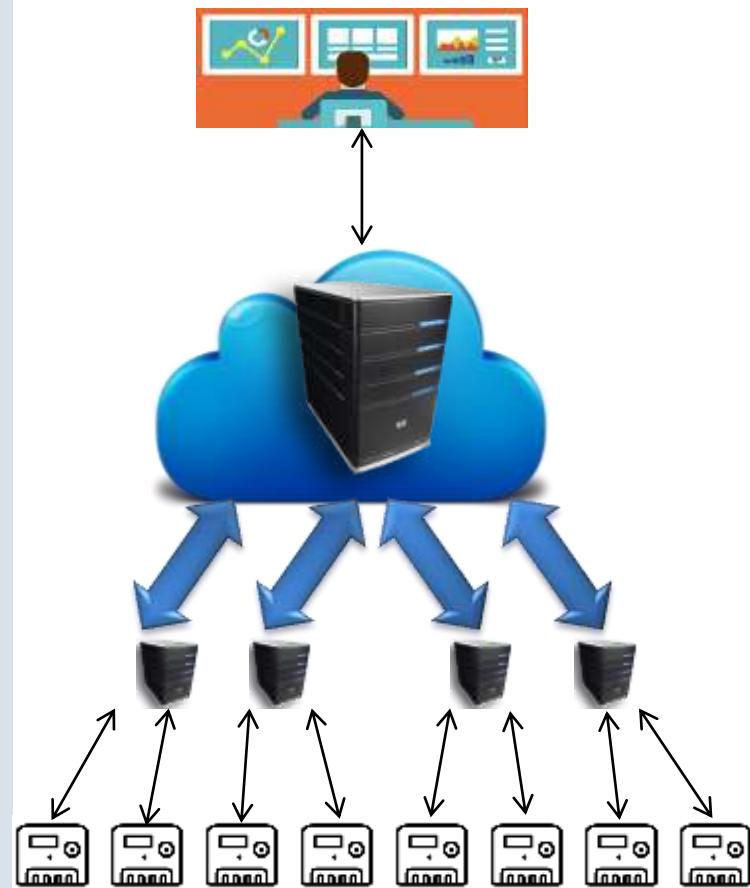
- Full end to end IoT stack was implemented

Technology

- Scripting Languages: JavaScript, Python, R
- Web technologies: angular, bootstrap

Solution

- Calsoft, with its deep understanding in IoT domain, helped its customer with:
- Development of a custom edge gateway on Linux and other open source components.
- Creating a Machine Learning (ML) based pipeline to implement data analytics in the main data center.
- Implementing gateway to datacenter connectivity.
- Implementing a modern web technologies based UI to give various diagnostics, data visualization and anomaly detection.
- Implementing Demand Prediction Analytics in the ML pipeline base on customer's proprietary algorithms



Water Usage Meter

Engagement

Calsoft was engaged with the customer in implementing a water usage meter to connect intelligent water meter devices

Benefits

- Full end to end IoT stack was implemented

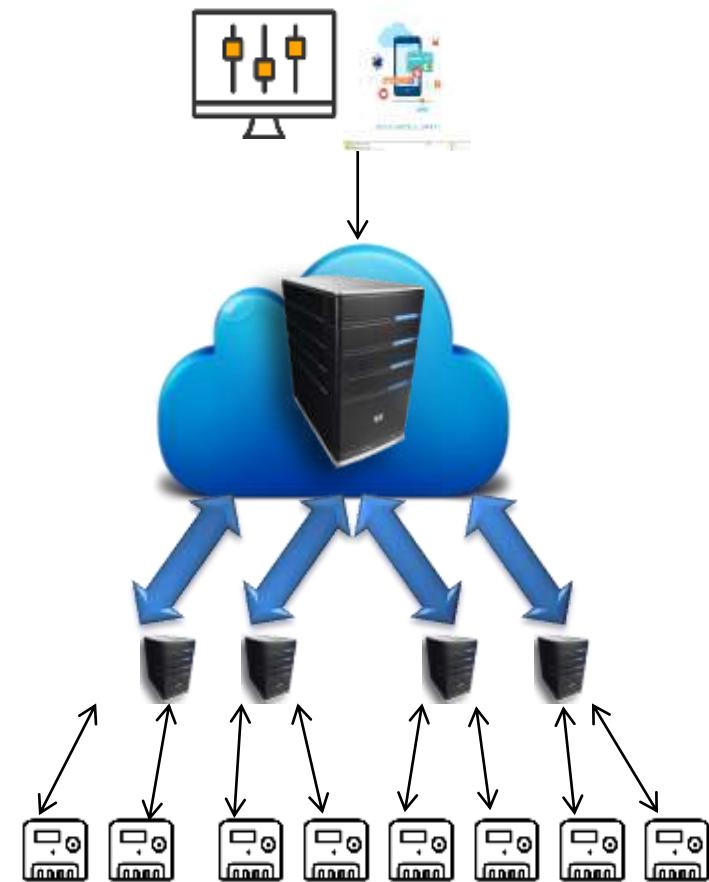
Technology

- Zigbee
- Web APP: angular
- Mobile : Android, iOS

Solution

Calsoft Helped the customer with:

- Developing a Zigbee module to local nodes .
- Implemented RS 485 connections where wired connectivity was available.
- Net water consumption were measured for prediction and aggregate billing.
- Developed a web based billing application and anomaly detection for the utility implemented.
- Developed mobile billing dashboard for end consumer



Six Headed Camera System



Engagement

Calsoft was engaged with the customer with integrating camera modules and implementing a video surveillance application stack



Technology

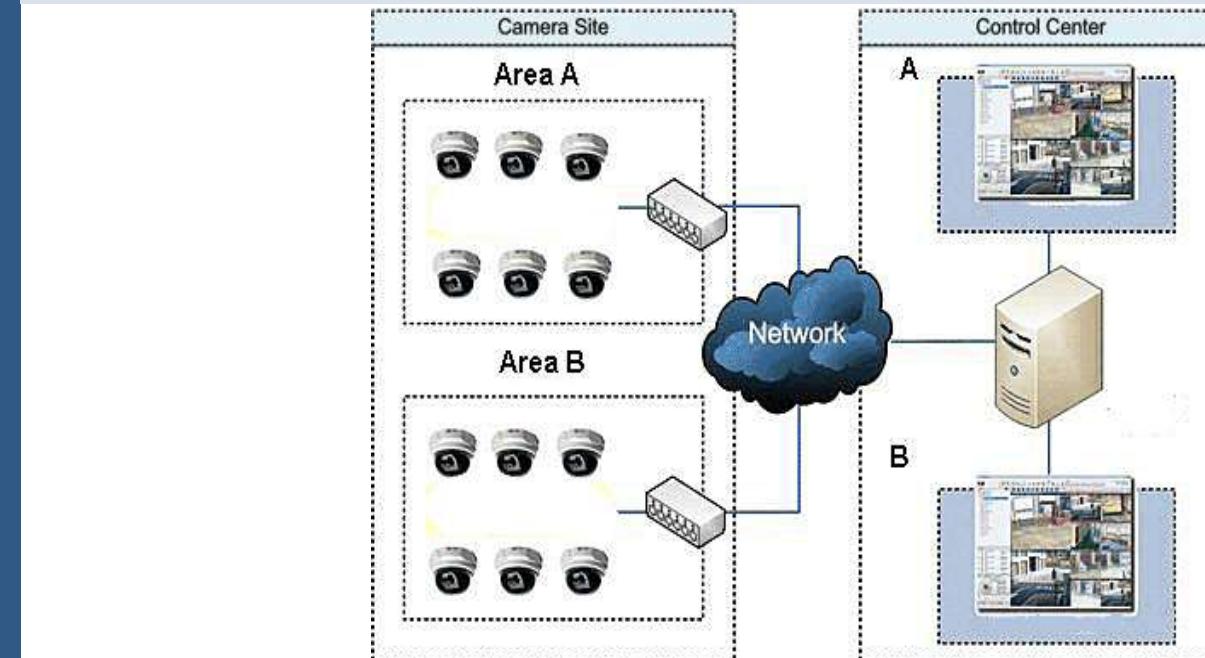
- Wi-Fi, OpenCV, ARM based board stream storage



Solution

Calsoft implemented:

- Proprietary ARM based board and application to get and store the streaming video data
- Storage server and included stream processing pipeline for capturing and archiving the data
- Feature rejection pipeline using OpenCV library
- Camera control API. Also control module was designed and developed



Datacenter monitoring and predictive maintenance



Engagement

Calsoft is engaged in developing a datacenter product that monitors various physical DC parameters like vibrations sensors, temperature, humidity etc. and correlates them to server system parameters like bus failures, storage failures , system errors etc. and uses ML pipeline to do failure predictions for various components



Benefits

- Reduces maintenance costs
- Reduced downtime for data centers



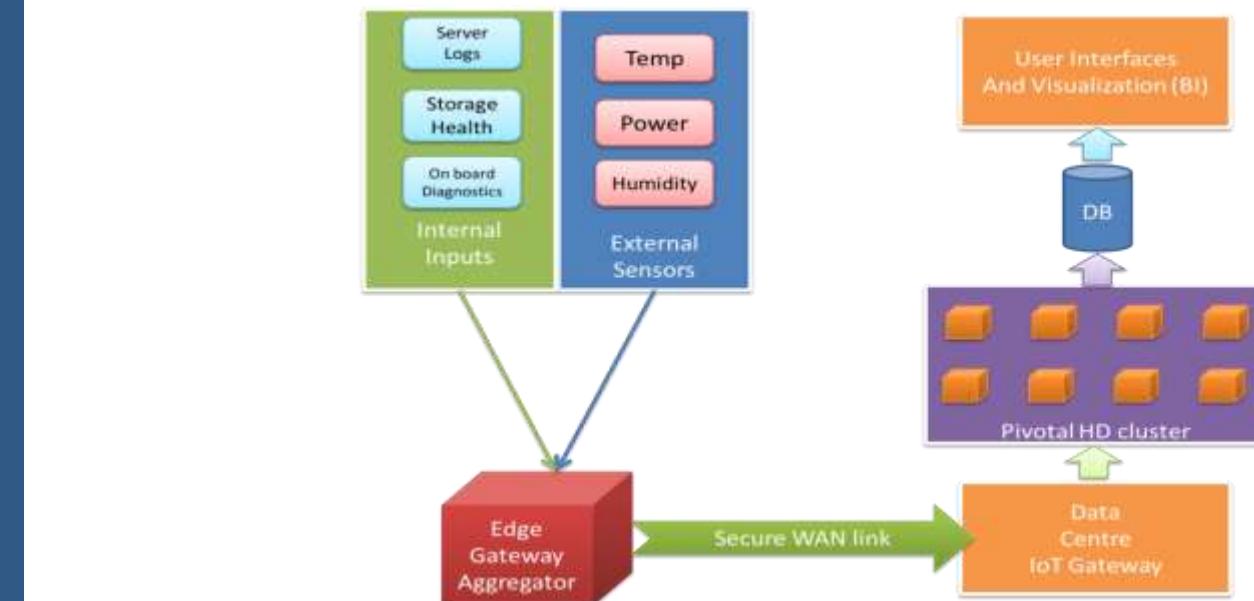
Technology

- Arduino,
- Pivotal HD , OpenTSDB,
- ML: Python, R
- Web technologies: angular, bootstrap

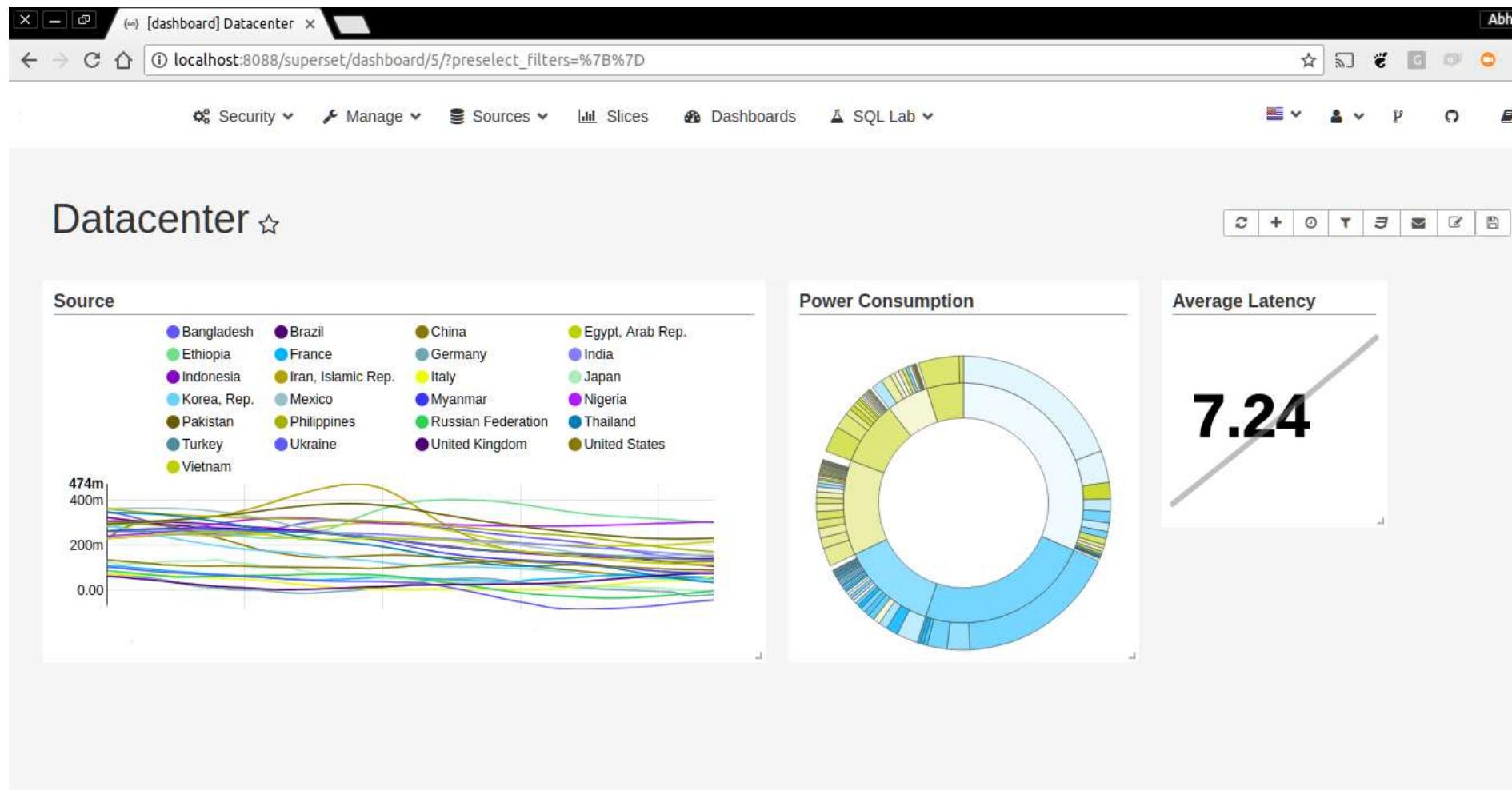


Solution

- A full array of sensors based on Arduino kits was deployed in a datacenter
- A PivotalHD based data processing pipeline was implemented to gather sensor as well as systems data and create real time analytics systems
- Machine learning pipeline was implemented to co-relate the data with server and storage failure
- A custom UI was implemented showing real time DC status / failures as well as predictive failure alerts



Datacenter monitoring and predictive maintenance



Engagement

Calsoft was engaged with the client for providing XMPP protocol support for an IoT system. The target IoT system had mix of devices and manual endpoints that generated data to be logged.

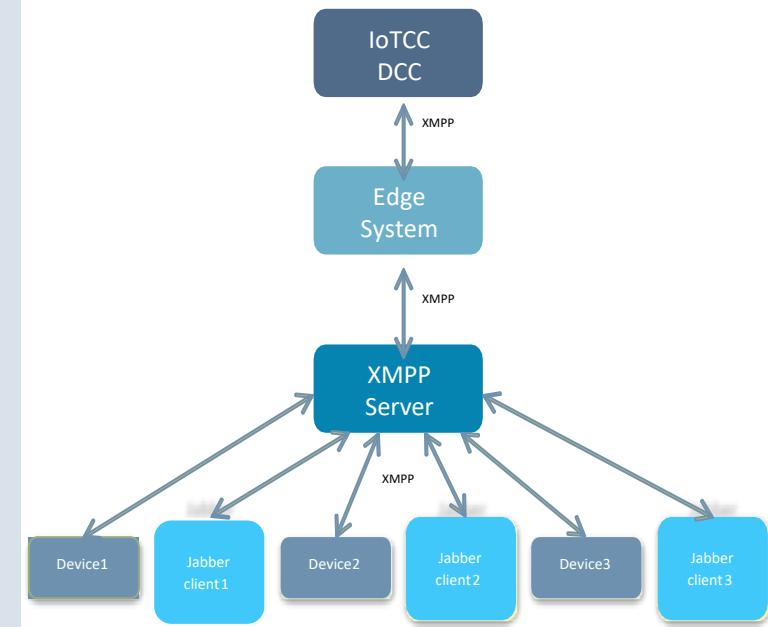
- XMPP protocol clients are readily available on all platforms including embedded devices as well as high level application platforms
- LIOTA supports mqtt, sockets as protocols between devices and IoTCC. The target devices selected xmpp protocols to communicate

Benefits

- XMPP was already available in datacenter as a way to aggregate data generated from standard chat clients. A mix of IoT devices was seamlessly added in the scheme
- LIOTA was used to create aggregation agent that would talk with standard jabber clients which could be used to feed data manually, as well as with IoT devices giving a fully integrated IoT platform where part of the data generation could be done manually through standard chat applications

Solution

- XMPP was implemented as fully supported communication
- protocols in LIOTA
- XmppDeviceComms class was added in LIOTA to support data collection over XMPP from end IoT devices
- XmppDccComms class was added in LIOTA to support XMPP as a communication protocol between edge system and data center



Integration with Azure IoT Hub



Engagement

Microsoft Azure IoT protocol gateway is a framework for protocol adaptation that enables bi-directional communication with Azure IoT Hub. It is a pass-through component that bridges traffic between connected IoT devices and IoT Hub. Objective is to implement this protocol gateway in Azure using Cloud Services worker roles & in on-premises environments



Benefits

- Adaptation of Client's product in Microsoft Azure environment, thereby, increasing his customer base multi-fold.



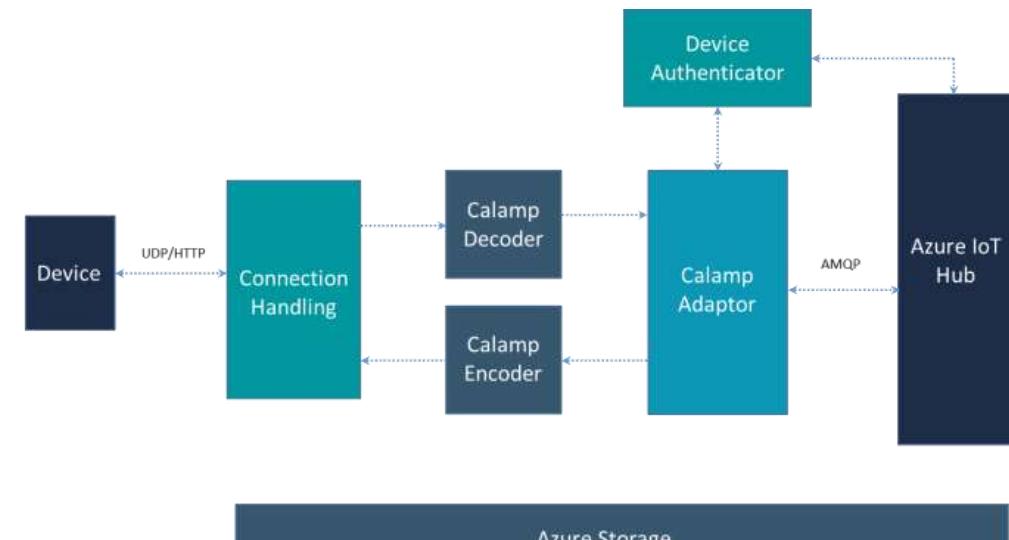
Technology

- .net
- AMQP
- UDP/HTTP



Solution

- Authentication of IoT devices using the device Shared-Access-key (DSA) token through IoT Hub.
- Deploying the protocol gateway in service fabric cluster using standard logging and configuration techniques
- Implementation of protocol Adapter for UDP - As UDP is connectionless, the gateway maintains a dictionary; which saves the last Active Timestamp, the message bridge and endpoint per device for UDP devices.



Protocol Gateway Design

Engagement

- Provide parallel GPU access to multiple container based applications.
- Currently userspace applications get serialized access/locks to the GPU, this limits the parallel processing capability of GPU confined to single application at given instance. By providing parallel access to applications we are trying to use full computational power of GPU.

Benefits

- Better use of expensive GPU thereby increasing efficiency, by executing parallel threads.

Technology

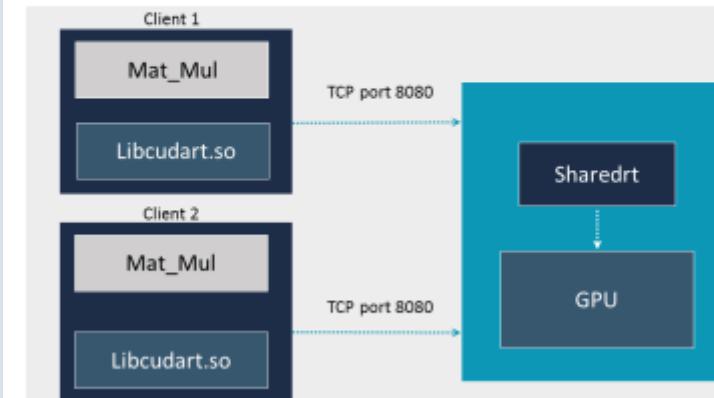
- TensorFlow
- rCuda
- TCP

Solution

- Modification of rCuda Library (libcudart.so lib) to handle multiple clients in parallel.
- Kubernetes single node setup and docker container setup for future demo.
- TensorFlow compilation from source for future container based applications.



Current Design



Proposed design, sharedrt will handle all communication over TCP port 8080 and sends command to GPU

UI for Multiple utility AI Algorithms



Engagement

- Develop UI for intelligent allocation for Field Air Marshal Services
- Develop UI for Patient's Medical history Monitor and Prediction project. Here application monitors people/patients' medical history consuming specific medicine at specific time period. Based on this information, application has to provide highly interactive and dynamic charts. Also, the application provide is expected to provide prediction for required medicine demand/Supply for future dates.



Benefits

- More interactive and Easy to use UI
- Architectural changes to make UI project scalable and re-usable.



Technology

- React JS



Solution

- In FAMS We have provided Map option, thru which user will be able to select specific area and will be able to click the sections in the area to see allocation of marshals in that area.
- In Patient's Medical History Monitor, we provided Interactive charts and smoothing effects on various components.

The screenshot displays a user interface for a system. At the top, there is a navigation bar with icons for help and user profile. Below the navigation bar, there are four main sections: "Smart Search", "What's New", "Feedback / Error Report", and "Support Emails". The "Smart Search" section contains a search input field and a detailed description of the feature. The "What's New" section lists "Version 1.0 (05th February, 2018)" and several bullet points about the new features. The "Feedback / Error Report" section has fields for "Subject" and "Message". The "Support Emails" section has a large blue button. At the bottom of the page is a map showing a network of roads and geographical features, with several red markers indicating specific locations or points of interest.

Curate and deploy machine learning models



Engagement

Calsoft is engaged with the client for maintenance and feature enhancement for Darwin, which helps to build, curate and deploy machine learning models.



Benefits

- Helped to enhance speech to text functionality.
- Helped in enhancing architecture and design.
- Introduced code coverage for both frontend and back-end



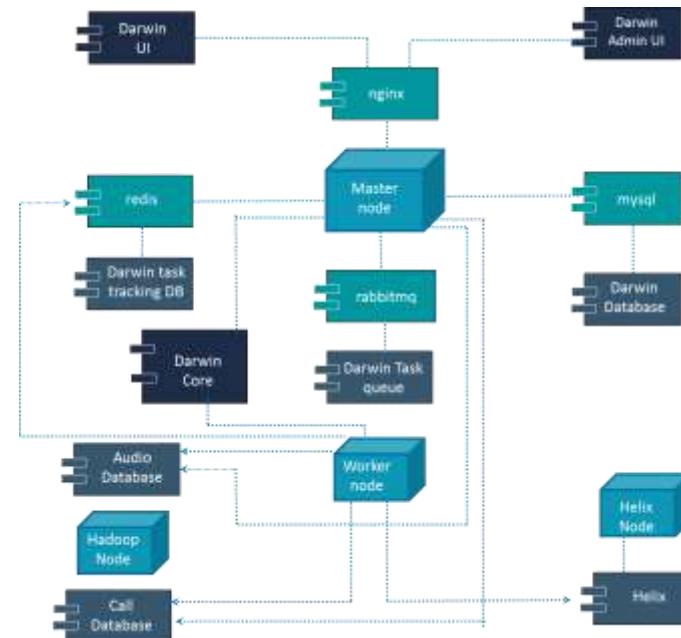
Technology

- Platform: CentOS
- Technologies: Python, Django, Celery, Hadoop, Hbase, Impala, Angular, MySQL, Redis, RabbitMQ



Solution

- Helped in revamping the UI.
- Helped in maintenance and refactoring code back-end for Darwin.
- Took ownership of end to end development of Automated Speech Recognizer Manager, LTM Tool, RAIL Tool, etc.
- Set up CI for both front end and back-end





Engagement

- Calsoft is engaged in developing a set of devices to connect to set of monitors
- The aggregated data to be sent to multiple specialists and emergency workers for analysis can potential anomalies.



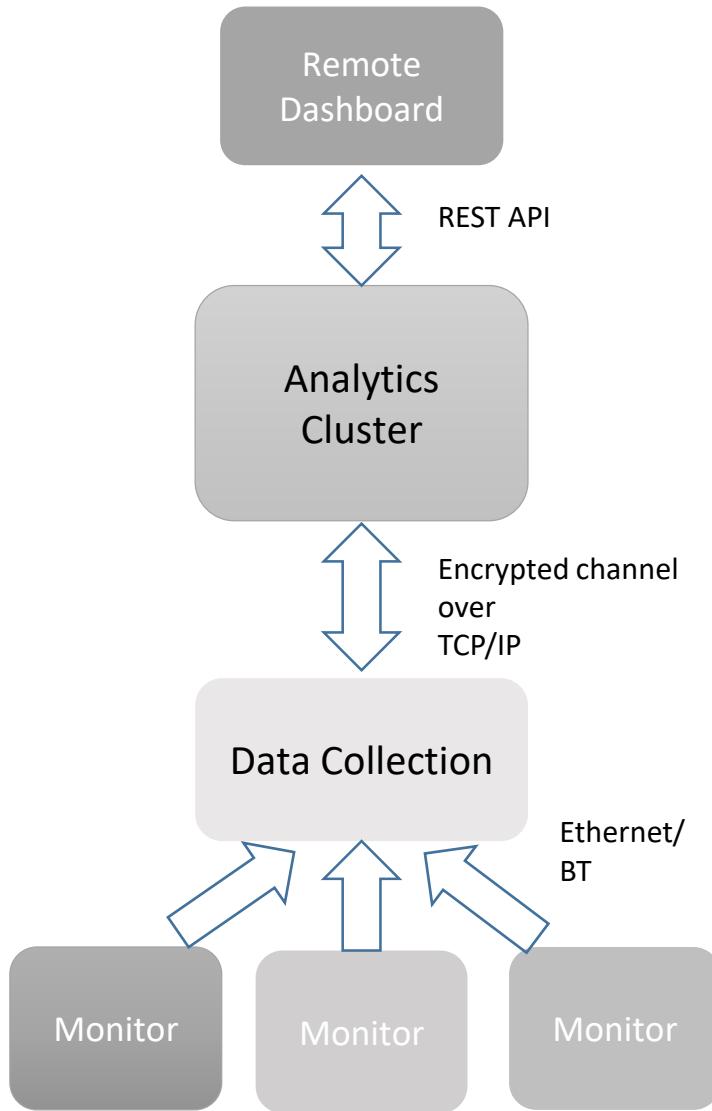
Technology

- Android, sciPy, theano
- Web technologies: angular, bootstrap



Solution

- Connectors for health monitors from various manufacturers were developed
- An embedded android based device was created on top of custom built android supported hardware platform
- The data was collected over bluetooth as well as wifi/ethernet links
- A proprietary encrypted TCP protocol was used to send the data to backend analytics servers
- Theano and SciPy based ML modules were implemented





Engagement

- A compact ECG device was developed by customer and the need was to connect it to a cloud based data processing and distribution module



Technology

- ARM, Embedded Linux, GSM



Solution

- A custom protocol was developed for the ECG module to talk to servers over a flaky GSM based connection
- Various caching modes were implemented to take care of dropped connections
- A device ID Management layer was designed
- A Web based interface that will connect the ECG operator to the remote doctors was developed with secure data storage
- Integration with hospital data management system was developed

Dashboard
For ECG data
For doctors



REST API

ECG Data
Server



ECG Monitor

Replacing PLC based industrial automation with modern ARM



Engagement

- Customer wanted to move from PLC based control systems to drive industrial test platform to a modern ARM based implementation that could be controlled remotely



Solution

- ARM based controller was used to implement all the test algorithms in a standalone firmware
- Secondary ARM Cortex 8 controller was used to give HMI touchscreen interface as well as providing remote API to control the tests and monitoring the output data

Remote
Control and
Data Processing



ARM C8
HMI and API
Controller



Operators
Panel
(Touchscreen)

Embedded
ARM
For test control



Test Platform

Engagement

Calsoft was engaged with the customer for feature development and enhancements for the customer's IoT Device management platform and to port it to a newer architecture.

Benefits

- Reduced costs
- Faster time to market and ecosystem support

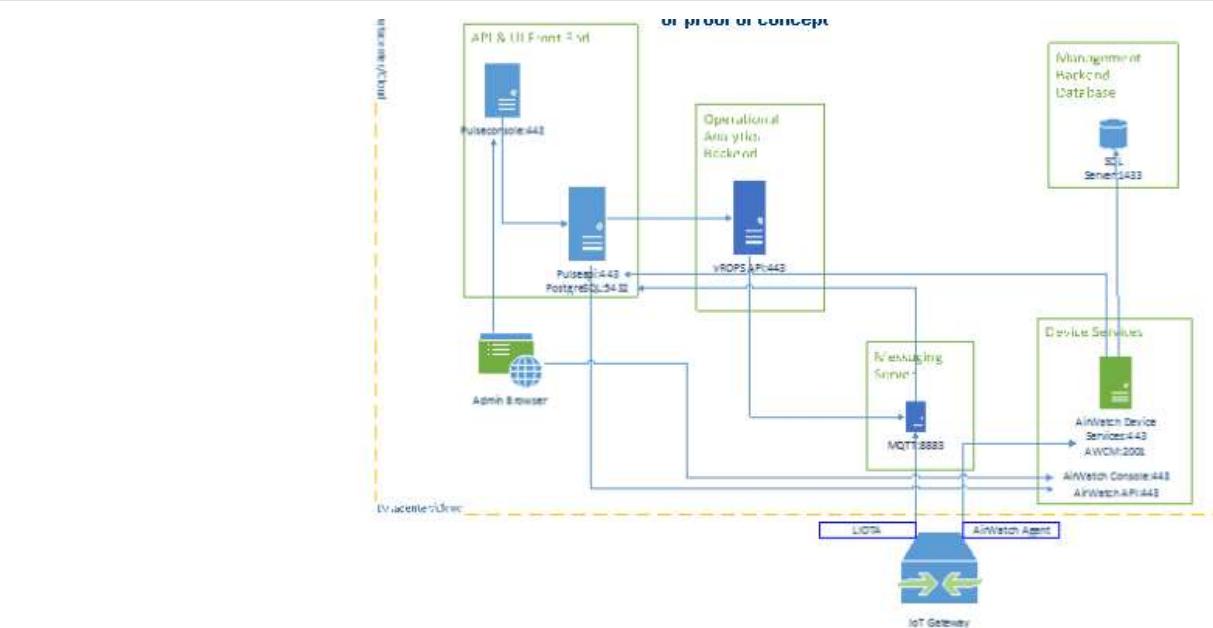
Technology

- Python, MongoDB, LIOTA SDK, Java, RedFish

Solution

Calsoft, with its deep understanding in IoT domain, helped its customer with:

- Architecting and developing new features:
 - Zero Configuration Server that helps auto-provisioning for the edge systems to enable configuring the gateways with features like:
 - High availability
 - Auditing and alerting
 - Liota Editor IDE to push Liota packages to gateway devices
- Migrating the platform from version 1.0 to version 2.0
- Integrating the platform with partner gateways and help in field testing
- Certification of gateways as part of ecosystem support



EdgeComputing IoT Application using EdgeXFoundry



Engagement

Calsoft created a PoC on EdgeX Foundry stack which handles virtual AP devices and helps in collecting information for analysis in different business cases.



Benefits

- EdgeXFoundry Ecosystem consisting of different services for configuration management ,device management, security management helps in implementing the IoT based applications at the edge of the network.



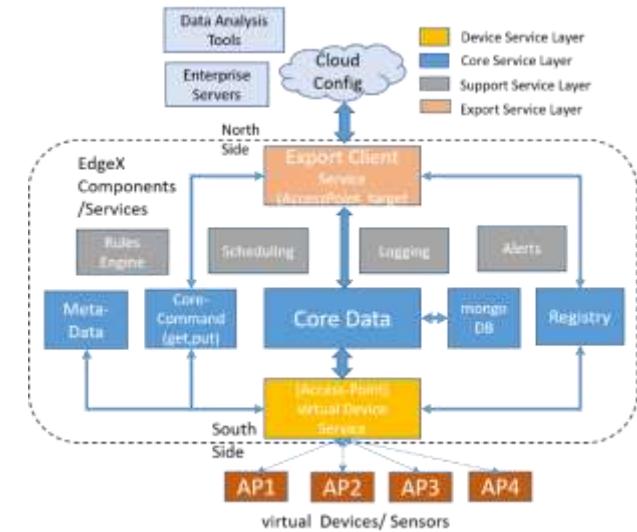
Technology

- Go-lang, Python, REST, Docker , ZeroMQ,Linux



Solution

- Calsoft created a POC on EdgeX Foundry, which is a vendor-neutral open source software platform at the edge of the network, that interacts with the physical devices, sensors, actuators, and other IoT objects. It also supports the functionality to add a device service to handle devices at the edge.
- The working is as follows:
- The set-up simulates a mall kind of environment where information about time spent by people is collected and sent to cloud for future analysis and business cases.
- The entry point of the EdgeX Foundry stack is the Device Service (Access-Point(AP)). It interacts with the onfield devices registered with the service.
- The data received from the virtual sensors contains values like MAC address, connection times etc.
- This data is pushed to the core data service as an event, which is further pushed to the registered export client(AccessPoint_target) capable of receiving HTTP REST calls from EdgeX.
- The received data is published to the cloud or an enterprise server for further analytics and controlling the devices again.



Engineering ODC for Supply Chain Software Company



Engagement

- Customer has a unique risk assessment software which is based on three tier supply chain model and AI/ML based risk assessment . Calsoft worked on data collection, collection framework, database , information architecture, GUI development and testing, API development and testing and backend infrastructure development and testing.



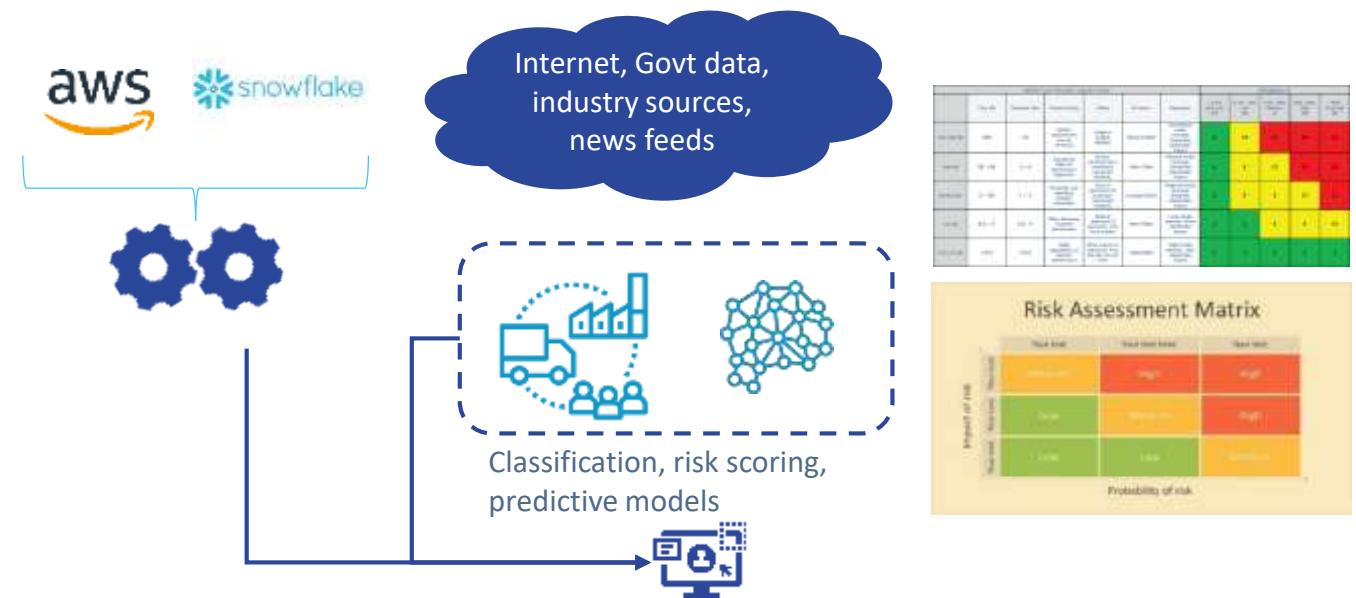
Solution

- Development of UI and its continuous testing support to the development team in the US. There were more than 20 UI screens and each screen has more than 10 function points
- Test automation framework is developed on python for load and robustness testing
- Development of the UI for input of the company and its dependencies, visualization and management of risks based on 6 dominant factors such as geography, cyber, geopolitical, affiliation, Investment pattern
- Proactive database is created by manual data collection by a team of 20 data collectors
- Update framework is based on regular web scraping and harnessing of news items
- API systems based on Swagger was developed and updated based on the requirements of platform, supplier, client etc.
- R and Sagemaker based initial classification and risk assessment model were upgraded to python based open source model and Calsoft contributed in the framework development
- Database was initially developed in AWS and migrated to Snowflake later



Technology

- .NET, Java, Swagger, AWS RDS, Snowflake, API, Python



Benefits

- Customer could benefit from the capability of Calsoft to ramp up 20 member team in one week for data collection
- Calsoft could provide a very efficient offshore onsite model of continuous testing
- Calsoft could maintain the knowledge in the ODC team and provided knowledge of database, API, UI, backend programming, test and test automation

Real-time tracking and Monitoring of Fleets



Engagement

- Calsoft engaged with a transportation company to provide real-time tracking and monitoring of their fleet of buses from their current location perspective, determining whether they are on their intended route



Solution

- The sensor data along with the business application data were processed through AcceleratoAI platform, providing the client with several insights, based on their business objectives and available data within their ecosystem:
 - Real time analytics to show location of trucks
 - Real time analytics to show how many trucks are in transit, and how many remain stationary
 - Average time trucks spent on transit, and time they spend on base and terminal station
 - Average speed of the trucks
 - Analytics of trucks plying with delay
 - Real time tracking of the trucks that are plying outside their regular route
 - Real time analytics and alert system for the trucks making unscheduled stop at unusual space
 - Predicting delays caused by weather and traffic congestion
 - Fuel consumption of the trucks



Benefits

- Optimized the route performance
- Reduced the fuel consumption of the fleets by 20%
- Reduced cost of operation by 15%

Real-time tracking and Monitoring of Fleet of Ships



Engagement

- Calsoft engaged with a shipping company to build an analytics dashboard to monitor fleets trip behavior, predictive analytics of Fuel Oil Consumption and SFOC, detecting anomalies if any through sensors



Solution

- Leveraged AcceleratoAI for their inbuilt data science capability to build a descriptive and prescriptive analytics for
 - Tracking fuel consumptions
 - Auxiliary engine fuel consumption
 - Track the fuel leakage while the ships remain stationary
 - When the ship is being towed
 - How long the ship has been drifting
 - Tracking and monitoring their idle time
- Based on the available information mentioned above we delivered the following dashboards:
 - Trip Behavior Reports
 - Multi-parameter predictive modelling for FOC and SFOC
 - Ship engine characteristics identification based on major operational parameters



Benefits

- Reduced the fuel consumption of the fleets by 10%
- Reduced cost of operation by 12%



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with the Willis Tower (formerly Sears Tower) visible. The sky is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there's a solid teal rectangular area containing the main title text.

Success Stories: Machine Learning

Multi-headed Camera System



Engagement

Calsoft was engaged with the customer with integrating camera modules and implementing a video surveillance application stack



Technology

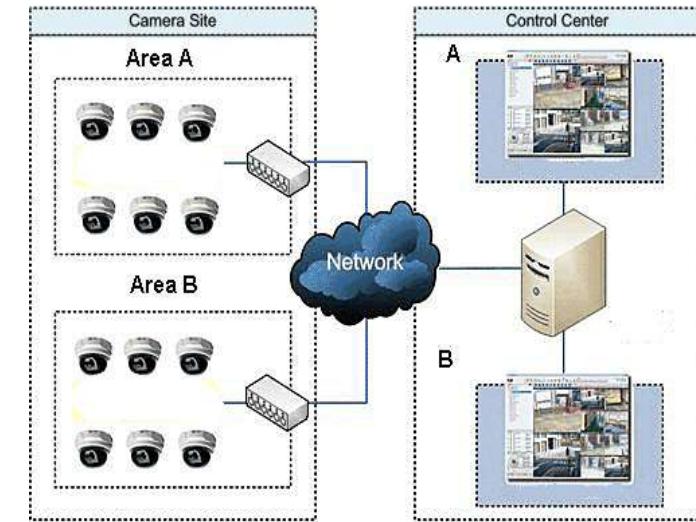
- Wi-Fi, OpenCV, ARM based board stream storage



Solution

Calsoft implemented:

- Proprietary ARM based board and application to get and store the streaming video data
- Storage server and included stream processing pipeline for capturing and archiving the data
- Feature rejection pipeline using OpenCV library
- Camera control API. Also control module was designed and developed



Engagement

Electronic commerce system which is receiving lot of transactions from merchants regarding customer purchases. It needed fraud protection

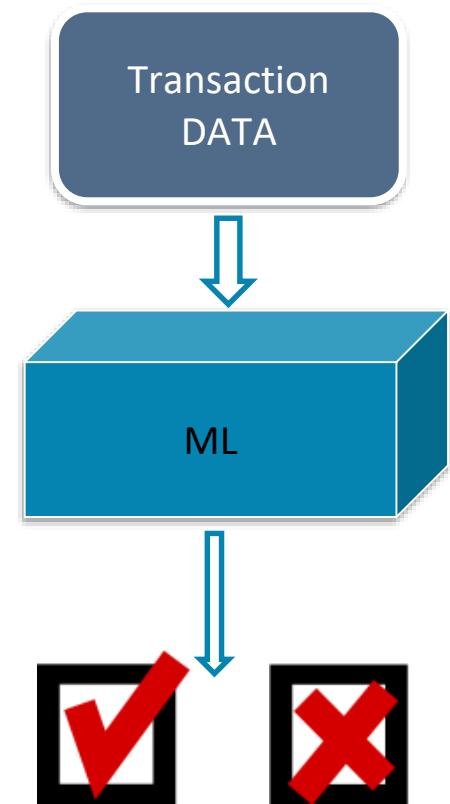
Technology

- Python, Numpy, scipy

Solution

Calsoft implemented

- Machine Learning system that can be trained using past identified fraudulent transactions
- Do post postmortem for fraudulent transactions to add additional training data
- Use multitude of data sources from merchant transaction systems to build a co-relation
- Create a cascade pipeline of various algorithm



Automated Lead Generation for Sales using Machine Learning



Engagement

Collect data base of companies from various sources, like government database, news and others like search targets etc. to build dynamic interaction profiles for companies to find best possible sales partners



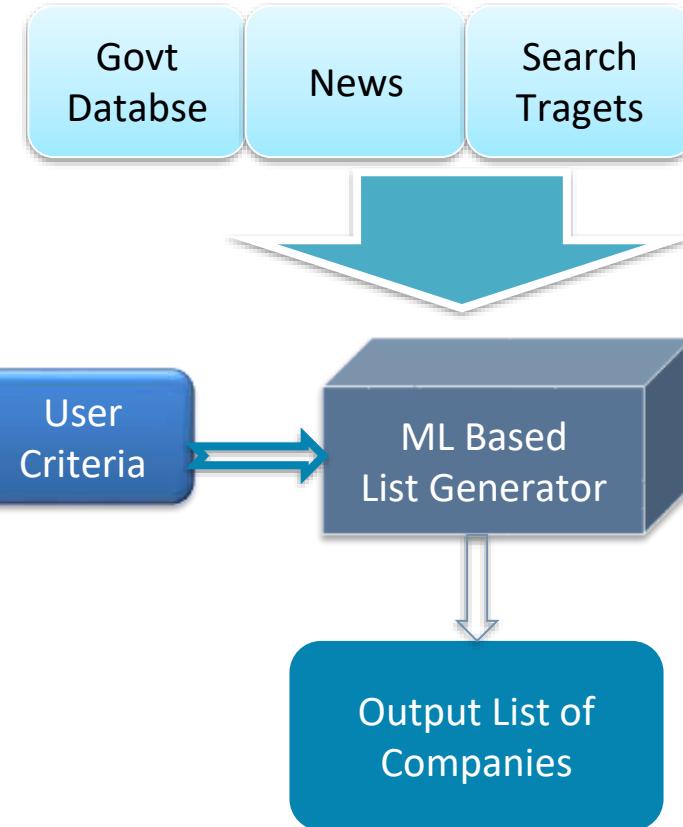
Technology

- Python, Numpy, scipy



Solution

- Implement categorization of companies
- Produce ordering rules
- Analyze people data and use machine learning to automatically co-relate various parameters to zero down on best suitable sales leads



Customer Interaction Tool (Voice to text and text to speech)



Engagement

Calsoft was engaged in creating data pipe line customer interaction tool with voice recognition and text to speech responses.



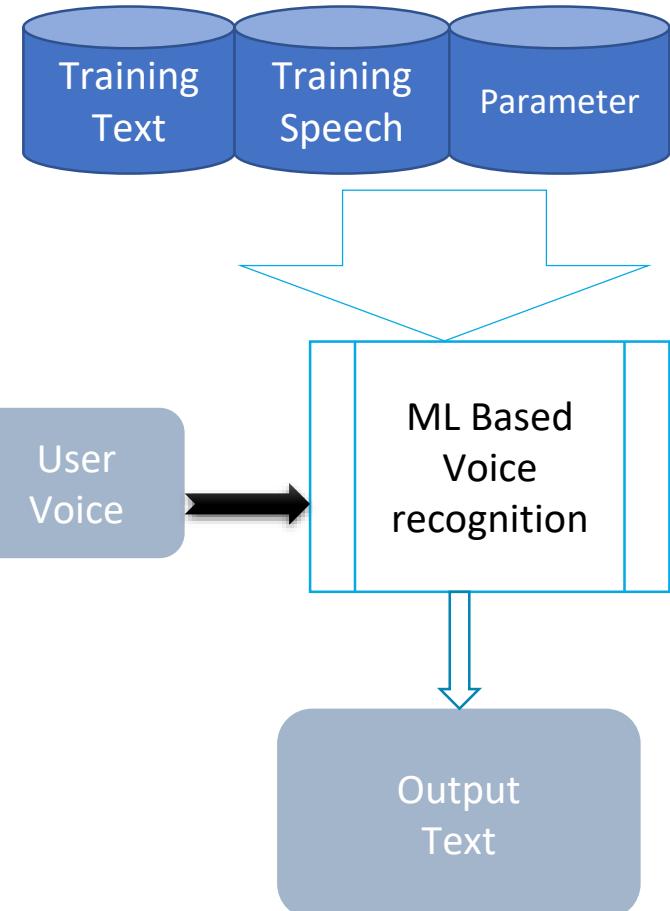
Technology

- Python, Speech recognition, Machine learning



Solution

- Created a data store for gathering and storing various voice samples for multiple languages
- For voice recognition the customer had various voice models for different languages
- Created a data pipeline for continuously training the voice recognition engine
- Created automated parameter tuning script in order to optimize the training process



Chatbot for Intelligent Sales Assistant



Engagement

Customer had intelligent sales assistant platforms for various lead generations. They wanted easier way for customer to query their support database.



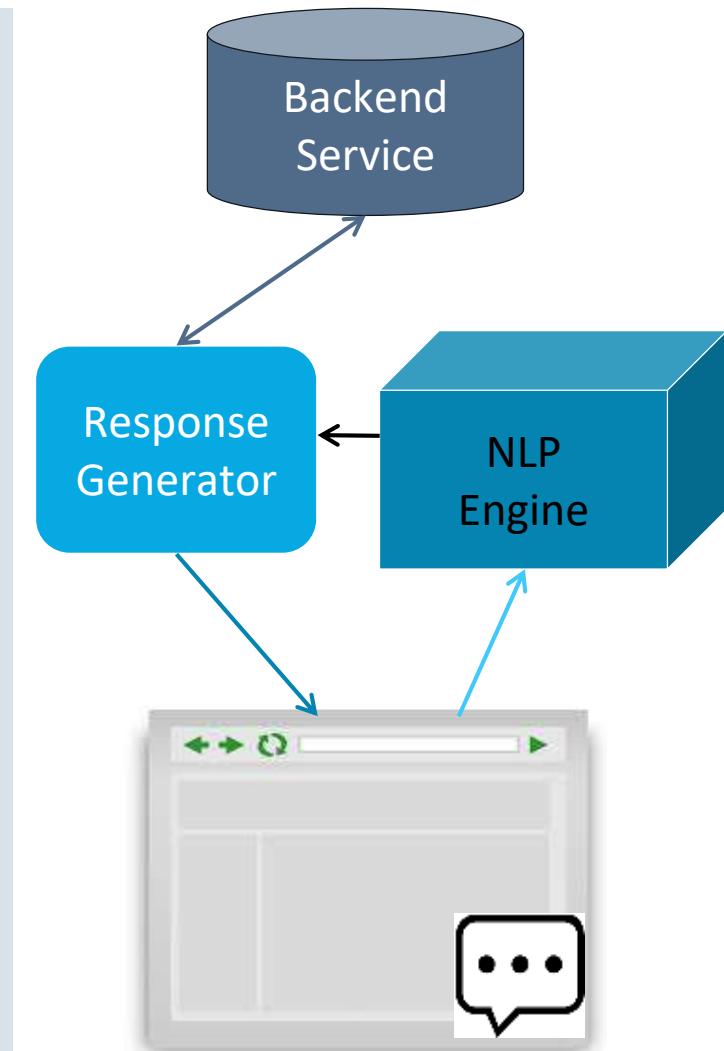
Technology

- Python, NLP, Machine learning, HTML5, Angular JS , CSS



Solution

- Implemented natural language processing to extract customer queries.
- Used machine learning engine to map the queries to possible answers and display back to customer
- Implemented and integrated the developed backend into chatbot frontend on the website





Engagement

A Healthcare website chatbot to query various statistics as well as offer help on web app navigation



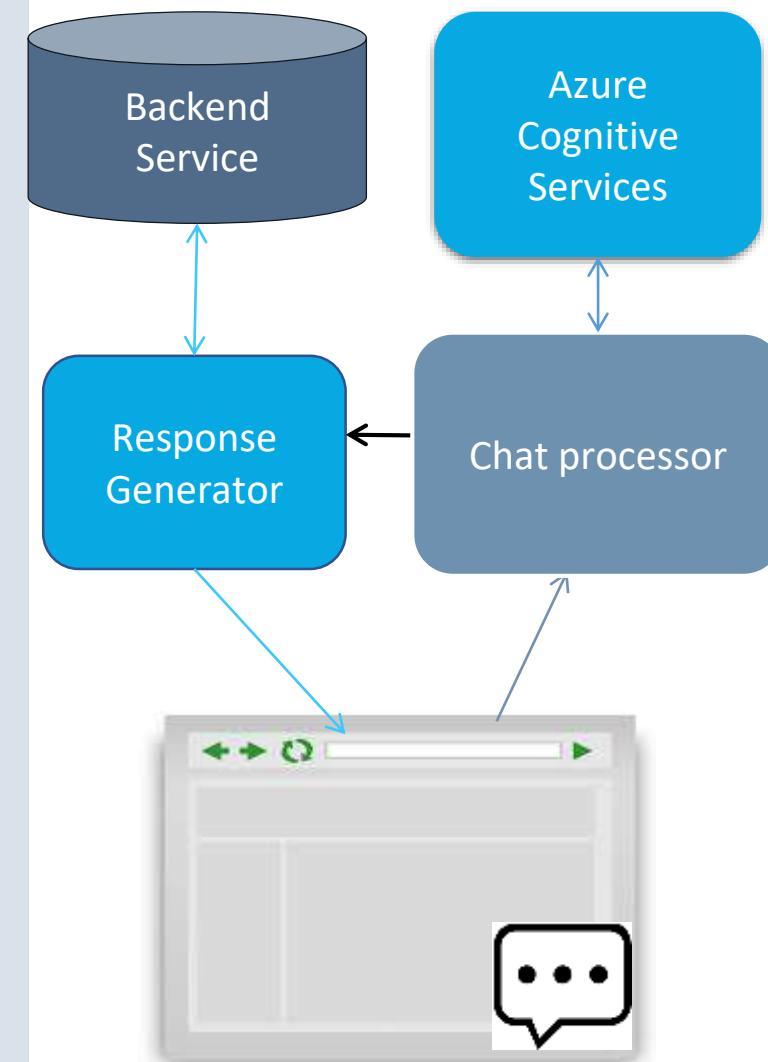
Technology

- Azure NLP, REST API, Angular JS



Solution

- Calsoft developed chat bot front end on the website
- Using Azure Natural Language Processing service implemented the customer chat parsing
- Used various search algorithms to map the queries in to the help answers
- If the query was about some statistical data, implemented a module to fetch the required data from the backend REST API



Model Training Automation for ML pipeline



Engagement

Calsoft was engaged with a client which required analyzing performance of large number of models in production. The least performing but most utilized models were then retrained with new incoming training data and tested against the test dataset before moving to production



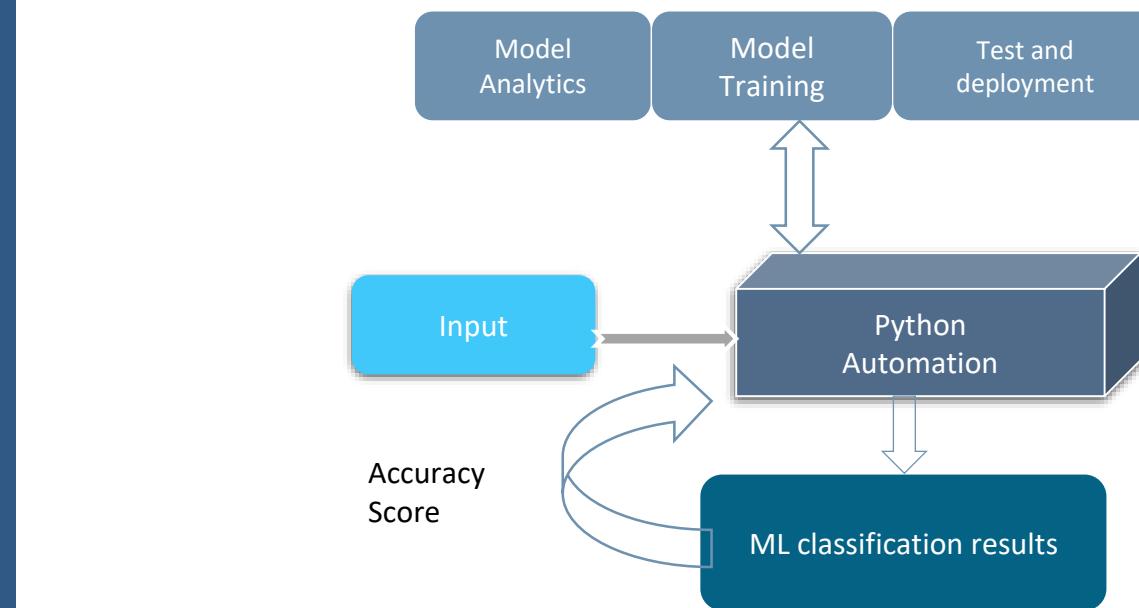
Technology

- Python AngularJS



Solution

- Curated the model analytics dash boards and created more intuitive display of most likely candidates for re training
- Created automated pipeline to re-train the models using new incoming datasets
- Implemented UI to test and get manual approval for newly trained models
- Implemented automated integration of models into production environments



Data Lake and Analytics pipeline - Implementation



Engagement

Customer needed a solution to collect large amount of data from disjoint sources in manufacturing plant
The sources were wide ranging from Sensors connected to traditional industrial buses to CRM systems
Manufacturing analytics was being done offline in spread sheets which took weeks to perform and react to.



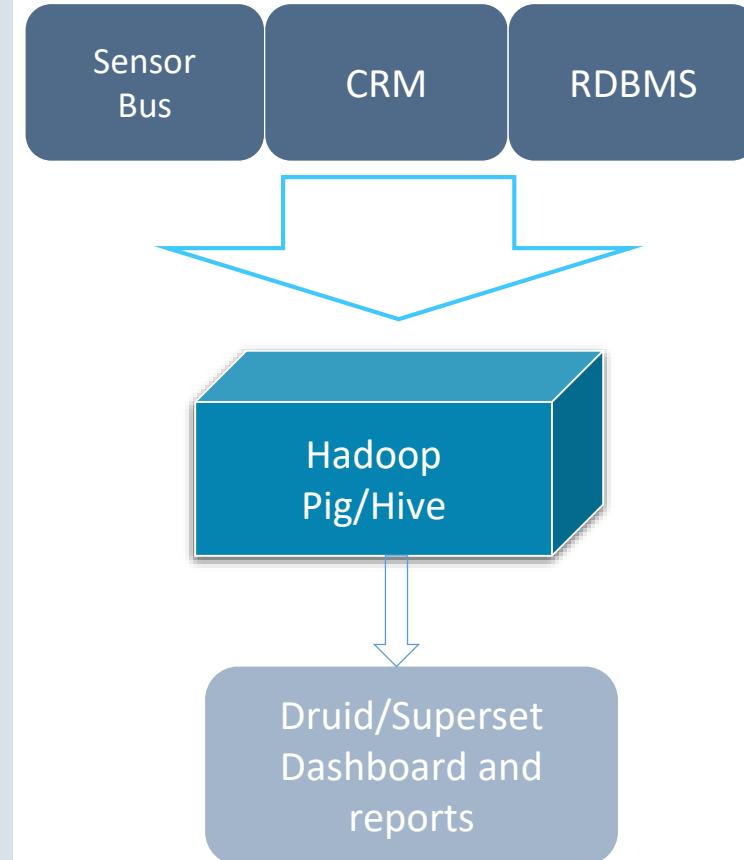
Technology

- Kafka, Hadoop, Hive, Pig, Druid, Superset



Solution

- Created Hadoop based platform to store all the data in a big data analytics storage
- Implemented Kafka as a standard data bus to ingest all the data into Hadoop
- Implemented various analytics algorithms as well as data scrubbing in Hadoop using hive / pig
- Created reporting tool / analytics dashboard on top of Hadoop using Druid/superset
- Brought down total time from manufacturing defects occurrence to solution to hours from days or weeks in some cases





Engagement

Customer had a large call center based technical service center data. Needed various reporting and analytics Implemented together with their existing data lake and dashboards



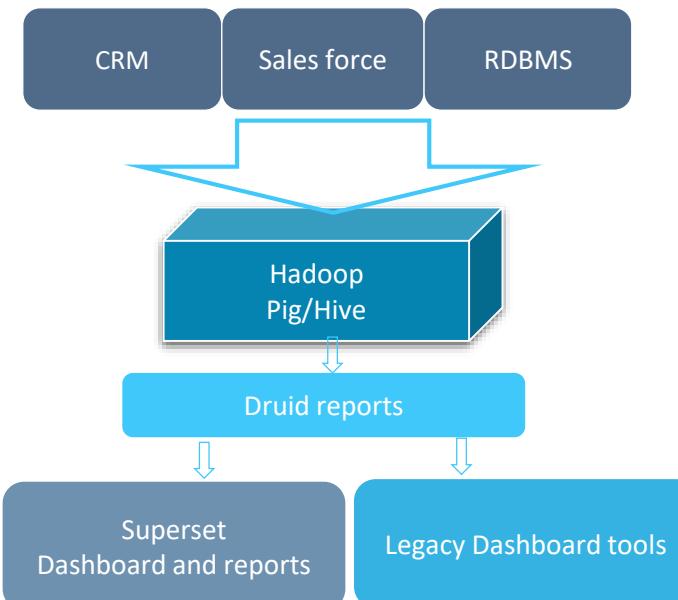
Solution

- Created Hadoop based platform to store all the data in a big data analytics storage
- Implemented various analytics algorithms as well as data scrubbing in Hadoop using hive / pig
- Created reporting tool / analytics dashboard on top of Hadoop using Druid/superset
- Ported existing dashboards from legacy software from tableau and other tools to standardized scripts in Hadoop and hive
- Implemented SQL compatibility between data lake and dashboards so that existing software dashboards can continue running as is on the data lake



Technology

- Hadoop, Hive, Pig, Druid, Superset



Datacenters: Log Analytics



Engagement

- Information Management System to identify taxonomies
- Identify labels for each anomaly and pin it to an existing knowledge graph.
- A system to classify and categorize data in threshold, scores



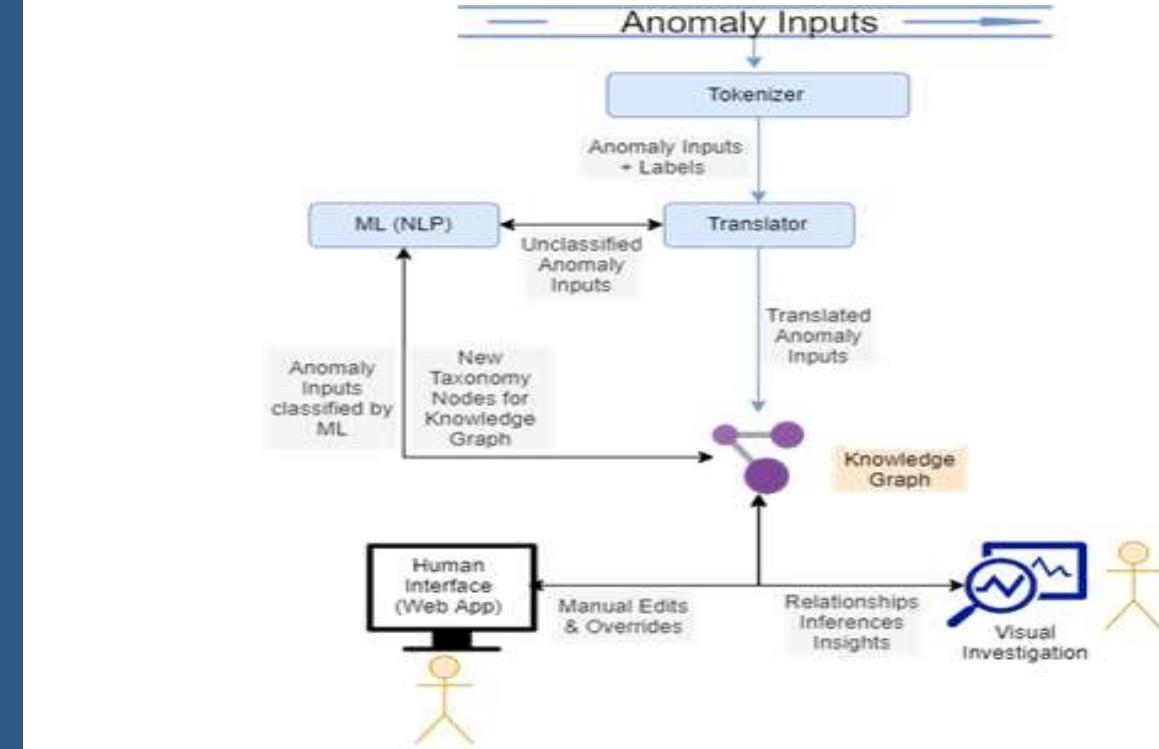
Solution

- Ingest logs from AWS, K8s, and Prometheus
- Parse the logs to identify anomaly inputs
- Extract the labels from each anomaly input based on a predefined list
- Identify the class of each anomaly input based on the labels using a lookup system or a knowledge graph
- If the existing class is not found in the lookup system, assign the anomaly input to 'Unknown' bucket and pass it to an ML (NLP) queue
- The ML queue will do the classification based on prior training; it will create new classes, if required
- The new classes and their association rules need to be reviewed and refined by a human
- A human interface will be available for rules management



Technology

- Python libraries like Neo4j, PyTorch, Spacy, PostgreSQL, Plotly



Benefits

- Ability to categorize data (noise, thresholds, tags)
- Learn from the past & other environment data to enhance decision making
- Improve human capability in decision making
- Round-the-clock monitoring
- Continuous adaption and learning from data

Network Security: Advanced Threat Detection (ATD)



Engagement

- Calsoft is engaged with the customer to predict advanced threats by applying machine learning techniques to identify the malware based on its behavior rather than through fingerprinting (signature-based).



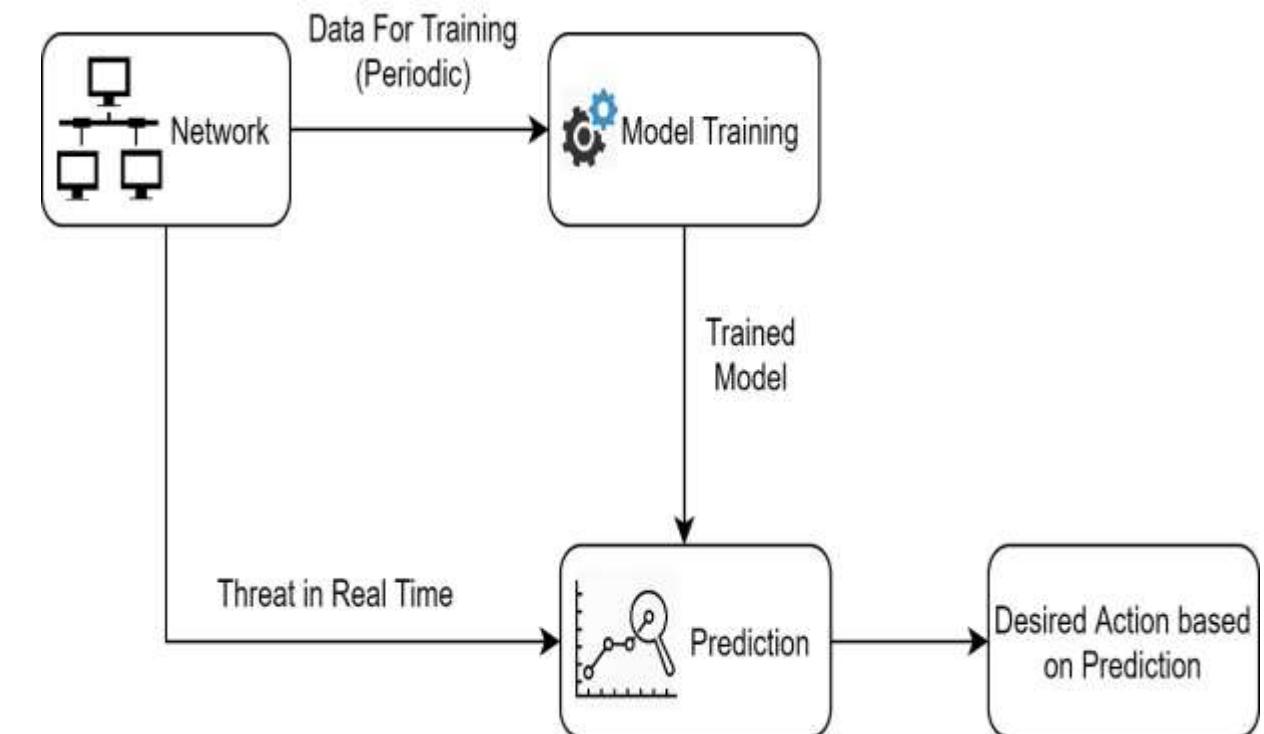
Solution

- New type of security solution that includes capabilities such as sandboxing, behavioral analysis, automated monitoring, and other detection mechanisms
- Machine Learning techniques:
 - Prediction-based algorithms based on data analytics
 - Highly accurate and efficient classifier that can handle thousands of variables
 - Runs efficiently on large datasets
- The project utilizes modern ML algorithms to analyze and classify network packets in real time as Benign (normal behavior) or one of 14 attacks. The libraries used to train ML models were sklearn, etc. The solution provides flexibility to perform the desired operation based on prediction.



Technology

- Python libraries like sklearn, NumPy, pandas



Benefits

- Ability to detect malware that has sophisticated evasion or obfuscation
- Detect threats early and more quickly
- Round-the-clock monitoring
- Continuous adapting and learning from data
- Increased productivity of IT teams
- Focus on what's important

Derivatives Trading: Sentiment Analytics & NLP



Engagement

- Focus equity portfolio based on real-time data analytics and historical analytics of countries, commodities, companies, consumers, etc. Data is preprocessed based on rules and passed through ML algorithms.



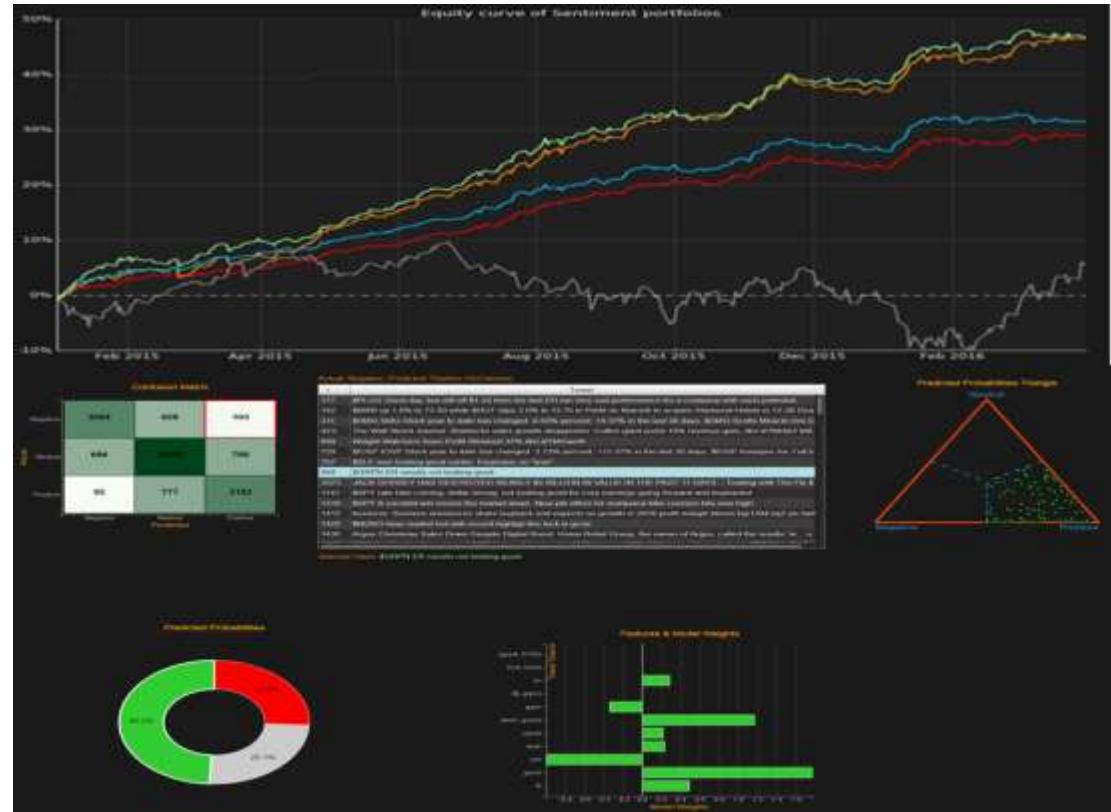
Solution

- Understand the sentiments of the text, news, language from different sources like APIs, web scrapping, and audio file
- Predict the sentiment of the text and categorize into Sentiments Positive, Negative, and Neutral
- Locate the text and sentiments by geography
- Introduced Zero shot learning to make the model more effective
- Scan a wide array of reports and news sources to identify global and local factors that may have an impact on a company's business and stock price
- Sentiment analysis is performed on this data to identify positive and negative influences on stock price
- Trading recommendations for each such stock are generated based on these sentiments and an overall portfolio recommendation is made



Technology

- Python libraries like PyTorch, Spark, Dash , PostgreSQL, Altaire , Plotly



Benefits

- Integrated with real-time news APIs in real time
- Categorized News, Articles, and Comments into Relevance Score
- Provided real-time sentiment categorization
- Recommended a Buy or Sell call and strategy

Behavior Analytics: Bank Transaction

Engagement



Solution

Pattern-based authentication and recommendation system:

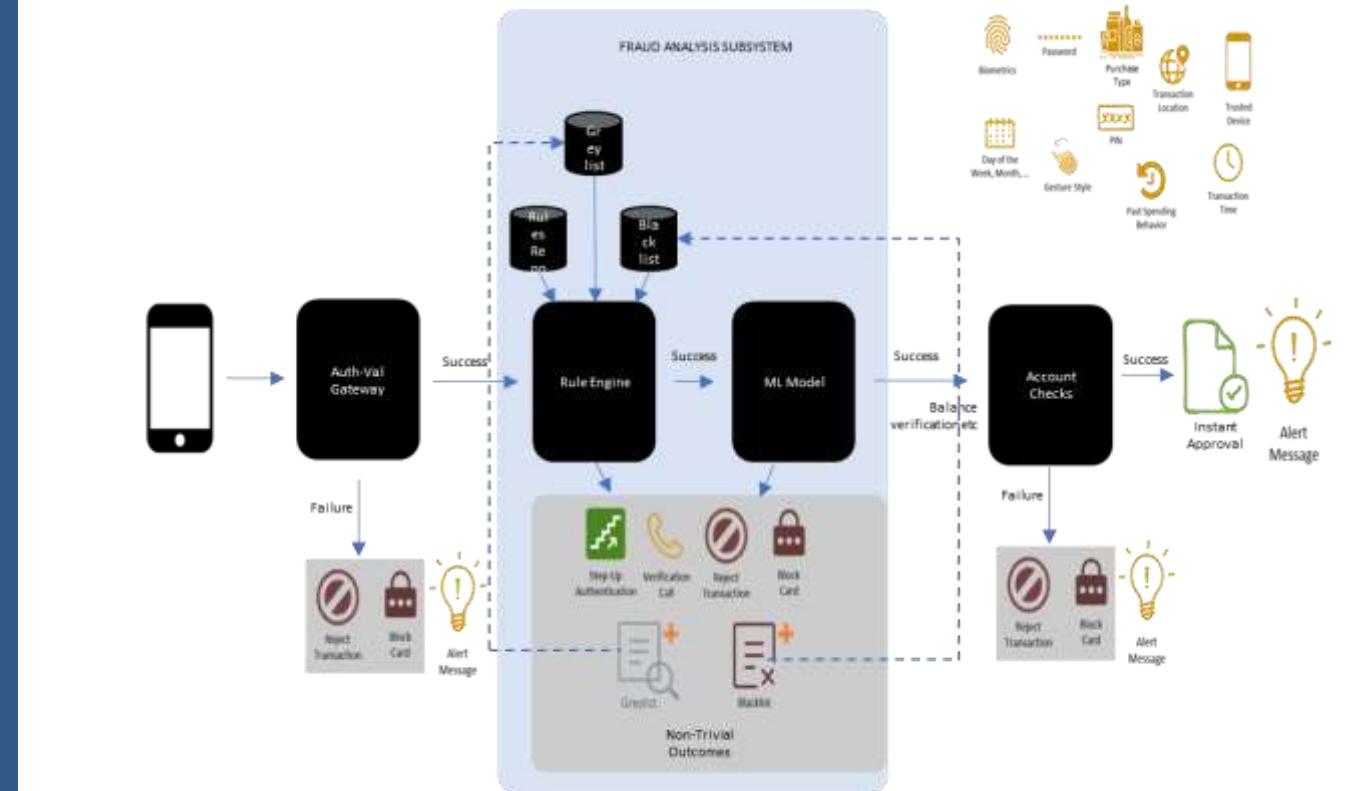
- Historical location of usage
 - Amount of transaction limit
 - Time of usage
 - Every transaction to be mapped to patterns, past frauds, and evaluated based on a secure score
 - Bot-based Q/A or IVRS in case of failure of auth
 - In case of authentication failure, based on the transaction type, allow, add delay or reject the transaction
 - With every authentication failure, the transaction limit amount to be reduced
 - With every authentication failure, add card timeout as per user setting
 - With authentication failure, allow the user to transmit the amount to another self card for payment

Voice and video-based authentication:

- Users can authenticate using their digital voice input or video/voice input (camera and mic to be enabled through the app)
 - Birthmark authentication

Technology

- Python libraries like PyTorch, Spark, Kafka, PostgreSQL



 Benefits

- Real-time traffic analytics to secure a transaction
 - Multiple levels of authentication
 - Auto behavioral analytics
 - Secure transaction with digital identification of individual



Engagement

- The customer is a provider of IaaS and managed services to enterprises, governments, and service providers.
- The project involved providing an improved approach for data center operations to handle warnings and alerts generated by workflow engines used for creating the infrastructure for clients/tenants.



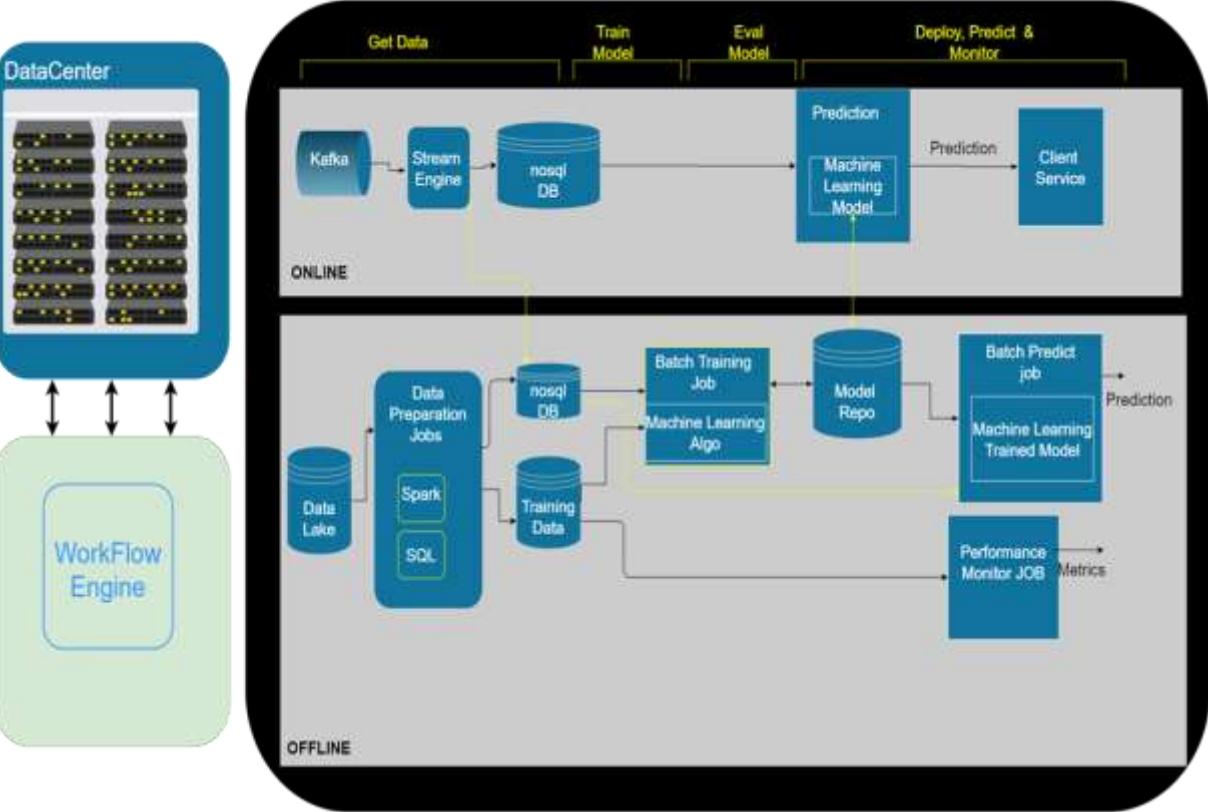
Solution

- Distinguish real issues that need attention from spurious ones, including filtering of false positives (noise)
- The architecture included a layer that analyzes the data (warnings, alerts, etc.) generated by the workflow engines (e.g. ServiceNow). This data is analyzed using rules & AI algorithms and categorization of alerts is done using Knowledge Graphs
- Actions like automated incident creation & remediation can be configured
- Core components of the system were:
 - AutoML: For automatically searching and discovering model configurations
 - Model Visualization: For understanding & debugging models
 - Online Learning: For continuous learning in the complex & ever-changing environment



Technology

- Python libraries like PyTorch, Spark, Kafka , Uvloop, Ignite



Benefits

- Ability to categorize data (noise, thresholds, tags)
- Learn from the past & other environment data to enhance decision making
- Improve human capability in decision making
- Round-the-clock monitoring
- Continuous adaption and learning from data
- Increased productivity of IT teams

Ref Architecture Benchmarking for Big Data Workload

- Validated solution architecture for highest performance for Big Data and ML workloads



Engagement

As a next-gen switching fabric combining with an industry veteran in the NVMe space, the customer wanted this solution to be:

- Validated with a variety of Big Data & ML scenarios
- The system to be architected in multiple ways to highlight the performance improvement achieved with every incremental change in the solution approach



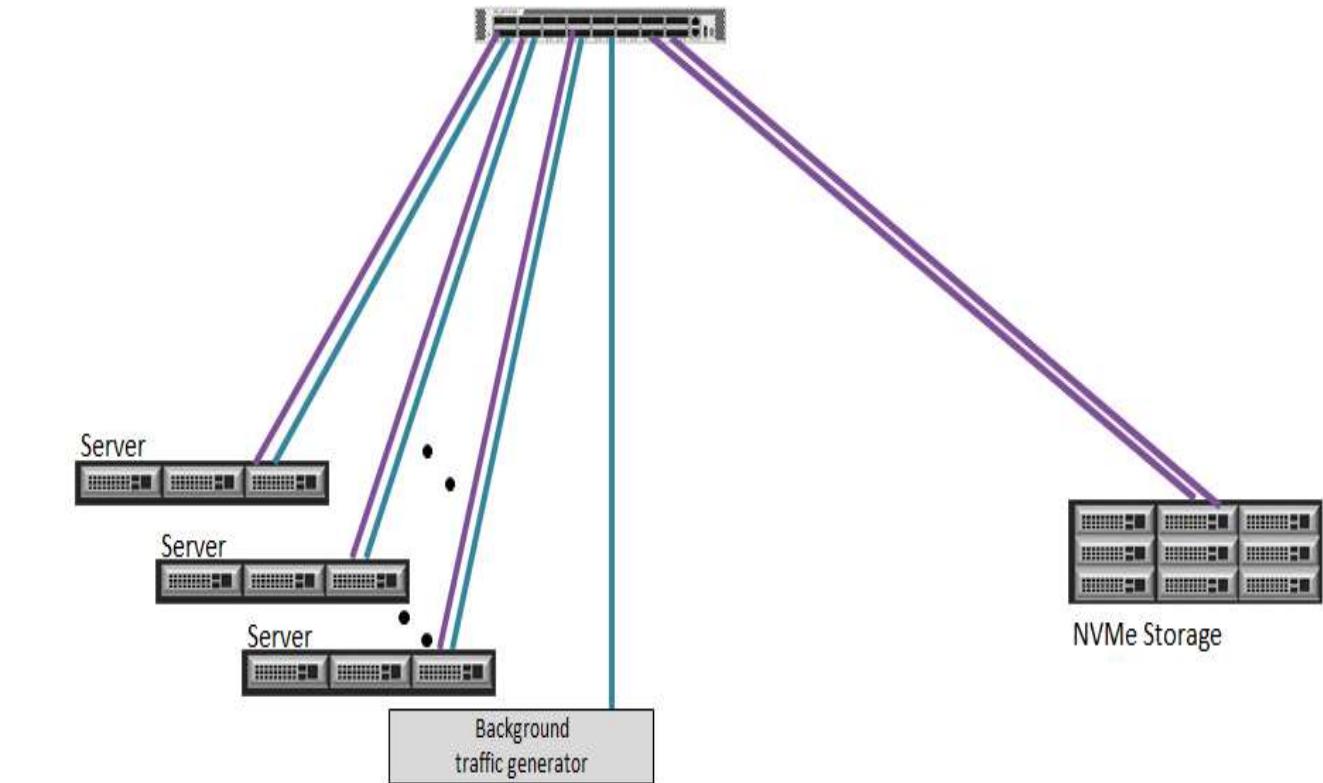
Solution

- Calsoft collaborated in the design of system architecture along with incremental improvements in the design to showcase the incremental benefits
- Calsoft defined the Test Strategy, Test Tools, and Test Cases to be run for the performance benchmarking



Technology

- Whitebox switches, Broadcom ASIC, NVMe Storage, Hadoop, HDFS, Kubernetes, Alluxio, AWS, HighBench, BigBench, SparkMultiuserBenchmark, in-memory Spark-Bench, Python



Benefits

- Validated solution architecture for highest performance for Big Data & ML workloads
- Issues identified in the product/solution helped increase the product stability
- Automation scripts for setup deployment and test execution for future runs

Machine Learning Based Automated Ticketing System

Engagement

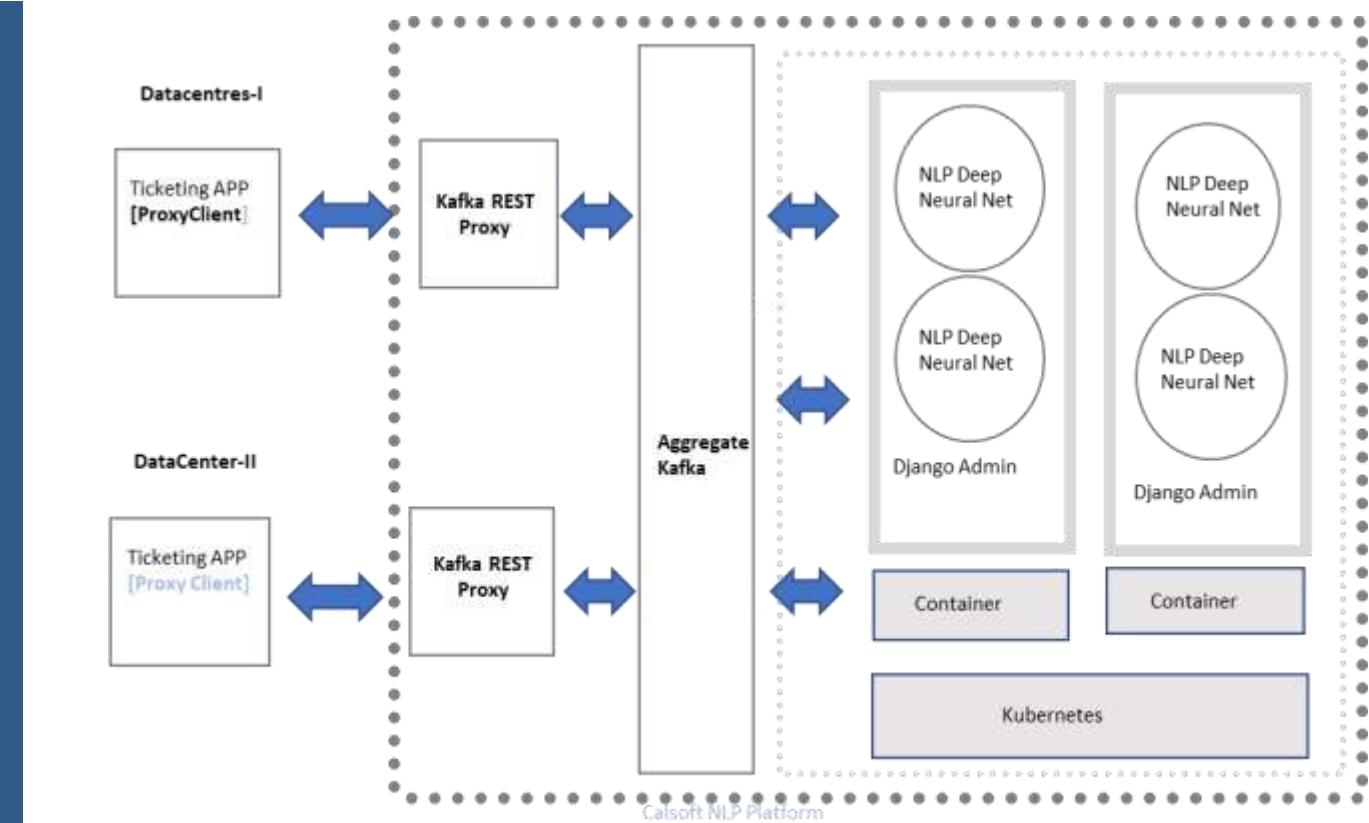
Reduce the amount of time and effort spent by teams from bug/ticket creation to assigning it to the correct team member.

Solution

Calsoft has developed an IP that uses advanced Deep Learning techniques to automate bug/ticket assignments.

Advanced neural nets are used with transfer learning resulted in SOTA for many supervised NLP tasks.

- A Language Model is created on top of Wikitext, BERT, ROBERTA Deep Neural Nets.
- A Classification Model is created using the inhouse ticketing data set to assign tickets.
- Advanced NLP libraries are used like Spacy and Pytorch for Performance and accuracy.
- 3rd Party ticketing systems can integrate with exposed RestAPI's .
- Django secured framework is used to create webapp .
- Kafka for secured data streaming and data queuing.
- Kubernetes and Docker for scaling.



Benefits

- Improved Productivity
Optimize the time spent by individual resource on a issue
Target the right person in the org for resolution
Reduce multi level escalations by assisted triaging and short circuiting the escalation path
- Turn Around Time
Fast triggering and classification improves time spent on each ticket / bug report
Better targeted assignments means tickets spend less time travelling around the org
- Solution Accuracy: Auto discovery of duplicate or related issues and past resolutions

Enhancing SIEM with ML

Engagement

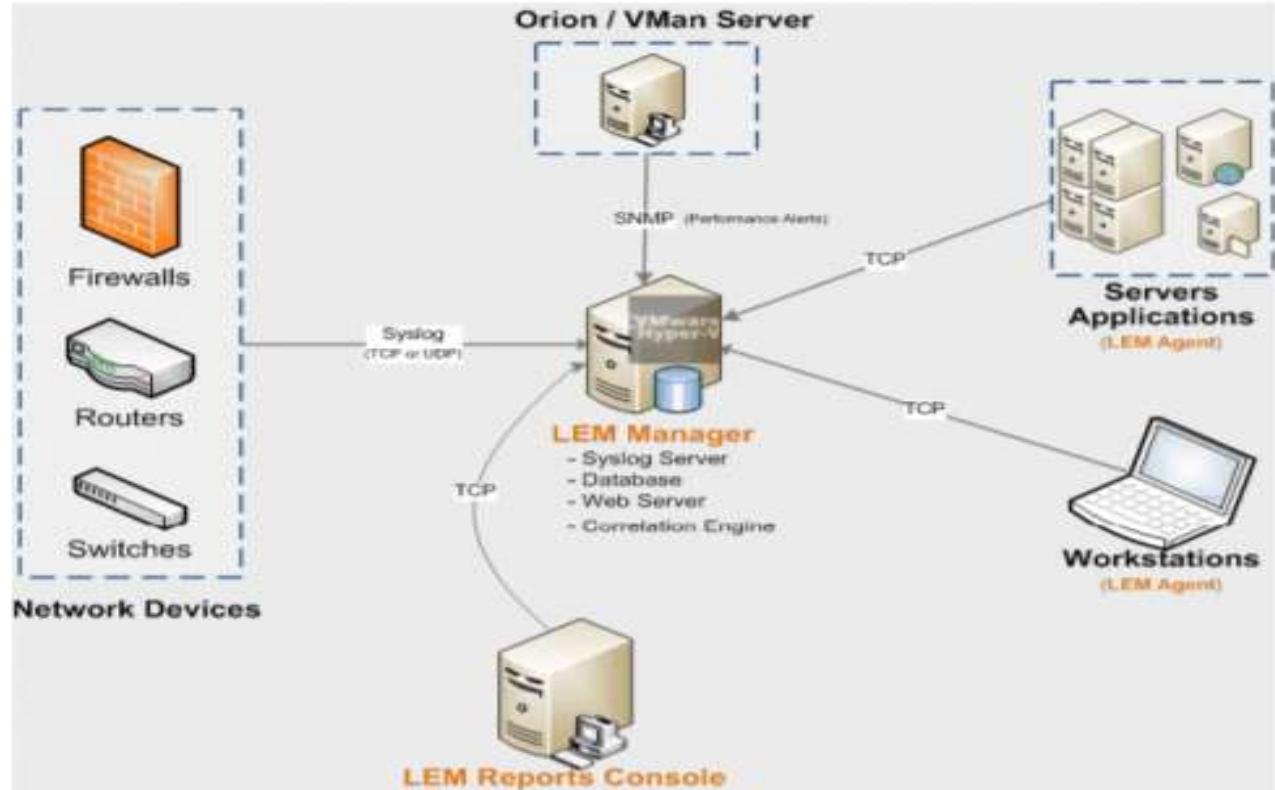
Calsoft engaged to enhance the client's SIEM product to detect, in real-time, potential security threats by detecting anomalies in the network environment using AI/ML models. This allowed alerting and generate countermeasures to support forensic analysis and avert potential security threats and breaches.

Solution

- Gather and analyzing event data from multiple sources (servers, devices, etc. – logs, events) in a N/W environment.
- Apply a mix of ML models to correlate and detect anomalies to alert abnormal behavior.
- Develop APIs to integrate this ML-based approach with the existing, traditional Rule-based mechanism.
- Integration with the existing UI to define models and relevant configurations.

Technology

Python libraries like Pytorch, Java, AngularJS



Benefits

- Avoidance of users having to define rules in the existing system. Current system overwhelms users with the data collected and gives a false sense of safety with the archaic rules-based approach.
- In-time (and real-time) generation of counter measures and support forensic analysis.

Smart Image Processing & Defect Identification for a Tile Manufacturing Company



Engagement

- Calsoft engaged with a leading Tile Manufacturing company to detect the defects in their tiles.



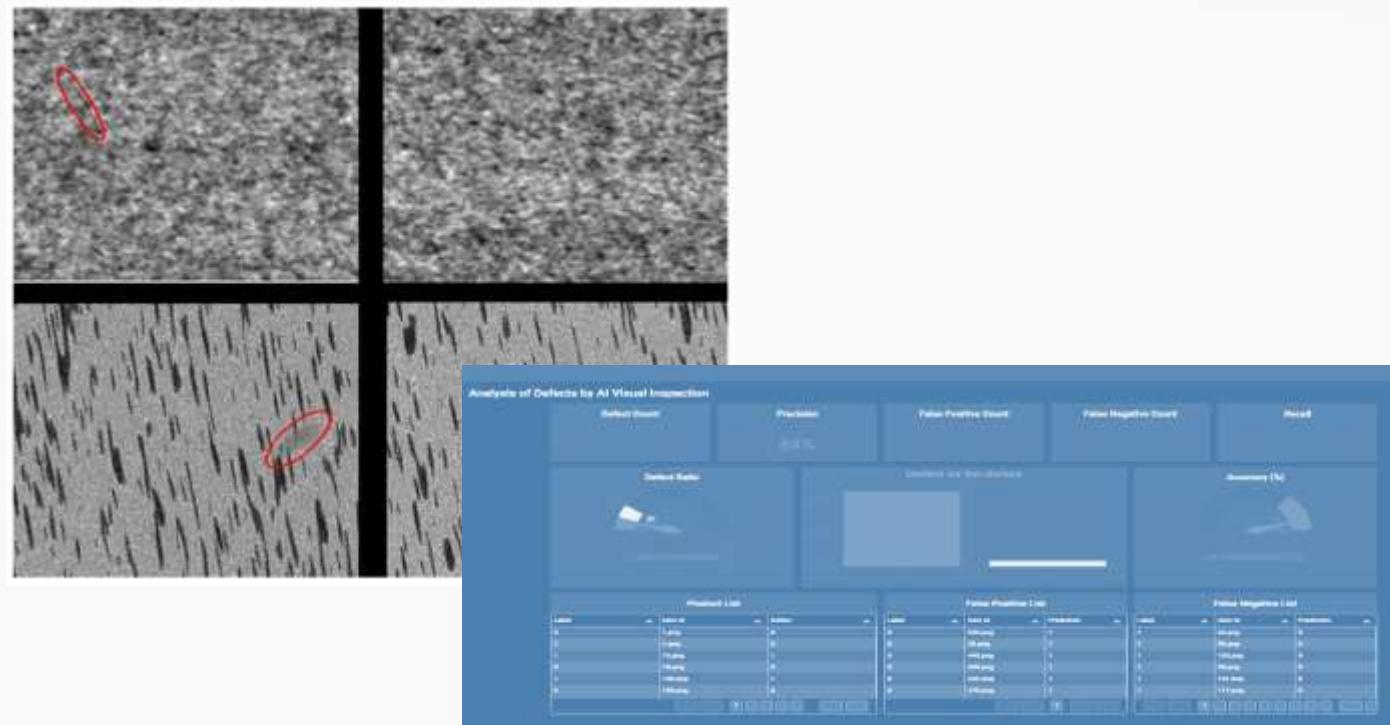
Benefits

- AcceleratoAI's algorithm was able to detect defects with 83% accuracy and improved based on new learning



Solution

- We trained AI Algorithms with thousand of images of good and bad tiles and develop predictive models to automatically detect defects.
- We also trained the algorithm leveraging
- Computer Vision
- Image Processing
- AI Algorithm
- Developed a Custom Dashboard to track the visual inspections and defects



Add to Cart Probability Prediction



Engagement

Calsoft was engaged with the client for the development of application that leverage Machine Learning in understanding customers preferences of some products over the others and predict the probability of new products with similar configurations to be added to cart by the customers.



Benefits

The Authoring team can update, create or delete configurations/ordercodes by configuration's popularity as predicted by ML model probability to be added to the cart by customer. A report on a product or component's performance can be published and shared with stakeholders on periodic basis. Product's popularity amongst Dell customers can be evaluated and forecasted in the future.



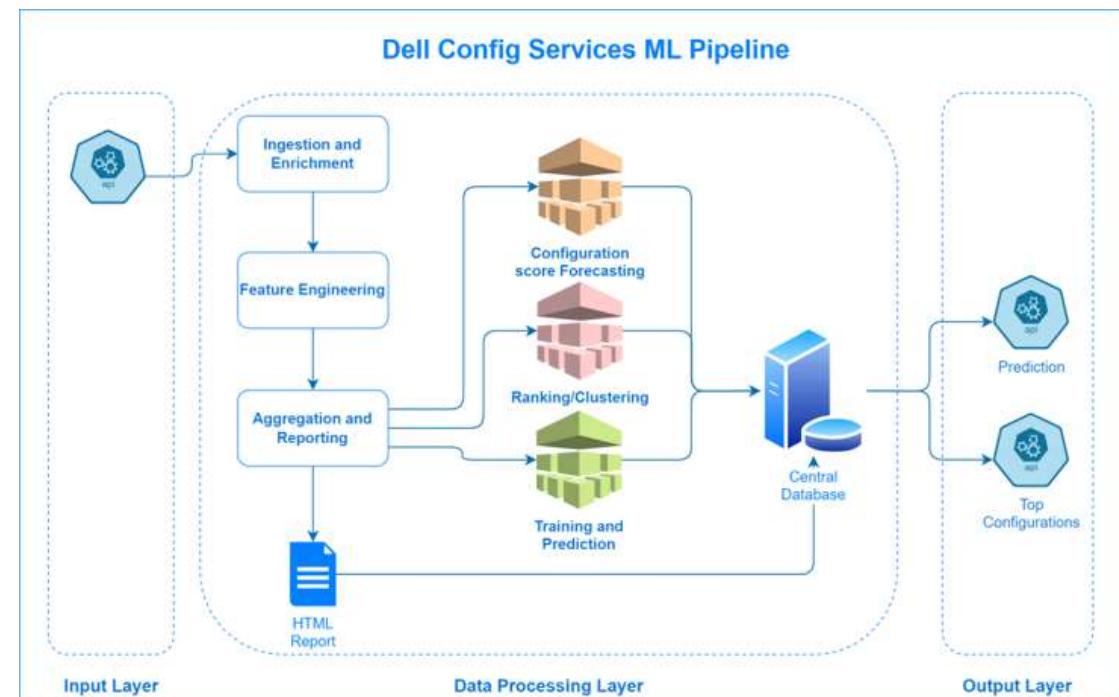
Technology

- Python (Jupyter),
- FastAPI,
- MongoDB,
- pandas, numpy, matplotlib, seaborn, scikit-learn
- XGBoost, ARIMA, RandomForest, Decision Tree
- PCA, Kmeans
- Visual Studio code IDE
- Etc..



Solution

- Create data adapter pipeline to read data from API and perform basic cleaning and formatting
- Feature engineering pipeline
- Data Aggregation pipeline
- Training pipeline
- Prediction pipeline
- Update prod env. to manage ML models
- Deploy Model in to prod env.
- Monitor Model performance in prod. Env.



Intelligent Pricing Analytics for an Electronic Goods Manufacturer



Engagement

- Calsoft partnered with the client to produce analytics mechanism that enables the client to see the pricing recommendations, automation and tax compliance insights



Benefits

- Minimal Human intervention
- Continuous Monitoring of Market Prices
- 98% of the downloads are AI driven



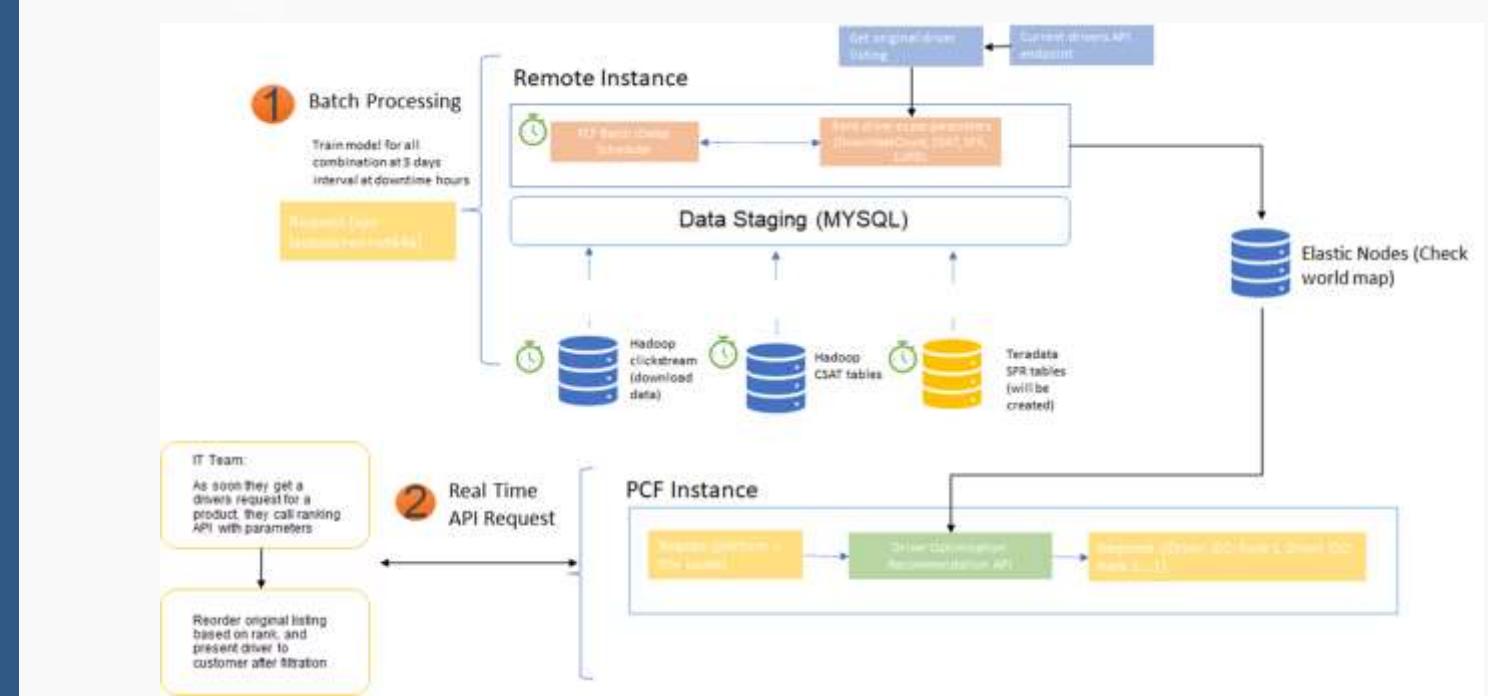
Technology

- Python, .net, Angular JS, MLflow, ML Library, Hadoop, MySQL



Solution

- Built a platform that leverages ML, analyses the data gathered from the Company and its competitors on daily basis.
- With minimal human intervention and using a rule-based and AI engines, provided pricing recommendations.
- Built real-time elasticity models linked to business strategies - revenue and unit maximization.
- Provided dynamic price alerts to flag competitive price moves outside of strategic tolerance limits.
- Built learning engine that improves recommendations on previous results.
- Automated near continuous monitoring of competitive market prices.
- Built a Web applications for multiple applications built on this platform for recommendation system, DQS (Deal Quality Score).





The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with its characteristic buildings and architectural styles. The sky above the city is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there is a solid teal rectangular area containing the main title text.

Success Stories: Generative AI (Gen AI)

25

Years of
Product
Engineering
Services
Experience

Right Sized Company
(~1500 engineers)
with Top Management Commitment

PUNE BEST
EMPLOYER BRAND AWARDS
2021



Strong Technology Reputation in the Industry Since 2002 ...

AI/ML solutions, Product Quality, Solution Engineering, Embedded, IoT, DevOps / SRE & for all Storage, Networking & Cloud

Key Networking and infrastructure customers



Key Contributions to Technologies

- Cloud & Cloud Native
- Observability and analytics
- Data Engineering
- Data Governance & DQM
- Cloud Hosted Mgmt.
- DevOps / CloudOps
- AIOps / DevSecOps
- SIEM & NOC / SOC

AI/ML/Analytics	GPT/LLM, Data Quality, Data Preparation, Data Visualization, Deep Learning, Analytics
Storage	NAS/SAN, Object Storage, CI/HCI, Storage as a Service, SDS, Data Protection
Support Services	DevOps/DevSecOps, CloudOps, SRE, 24X7 L1/L2/L3,

Digital Product Engineering Solutions

We enable companies to build competitive advantage by developing Intelligent Systems



Develop Digital Platforms

Our Services

- Cloud Native Development
 - ✓ Microservices architecture
 - ✓ Containerization
 - ✓ Serverless Architecture
- CloudOps & DevOps
 - ✓ CI/CD
 - ✓ Automated provisioning & orchestration
 - ✓ CloudOps management



Differentiate with Data

Our Services

- AI/ML engineering
- Data Science
- Data Engineering
- Data Transformation
- Data Ingestion
- Data lake creation and Management
- Visualization



Monetize Data

Our Services

- Generate high-value, actionable insights from data
- Provide clients with real-time access to insights

Success Stories

- Designed and developed SaaS-based and cloud-native, Configuration Management platform to manage global setups of HCIs. It helps with auto-remediation and seamless remote resolution features.
- Modernization of a monolithic sync-n-share platform to containerized microservices architecture using Kubernetes.
- Consultancy, Process Management, and platform development for enterprise data quality initiative of a digital customer.
- Developed insights using sales ecosystem data and Predicted the customer churn for a customer.

Focus Areas



CX



Data Engineering

Enabled by Technology Solutions



Gen AI



Data Analytics



Cloud Computing

By Enabling

Become a Customer Centric, Data Driven Organization

- Remove Data Silos for transparency
 - ✓ Data Modernization
 - ✓ Customer Data Platform
- Share Insights across organization
 - ✓ Analytics
 - ✓ Touch Point Analytics
- Activate Insights across channels
 - ✓ Predictive Analytics
 - ✓ Loyalty Analytics
 - ✓ Unified Customer Experience

Drive Operational Improvements

- Intelligent Customer Support
 - ✓ Point of Sale
- Employee Collaborations
 - ✓ Predictive Analytics
 - ✓ Loyalty Analytics
 - ✓ Unified Customer Experience

Through



Digital Platformization



Application Modernization



Platform Integration



Cloud Enablement



Data Analytics Solutions



Intelligent Automation



Support and Services



Price, deal, data scraping, personalization, data cleansing, cataloging, open-source customization



Data Preparation, Data Quality Check, MDM



Data Pipeline and Automation



Data Visualization and Analytics



Advanced Analytics, Machine Learning and Deep Learning



Deployment Frameworks: Real-Time and Orchestration



Predictive maintenance, log analytics, AIOps, Workflow integration, Root causing, Storage prefetching



Data pipeline, predictive maintenance, product mapping, OEE, time-series infra, visualization, reporting, alert intelligence

A Team of Data Scientists, Data Engineering, Data Architects, IP and Reusable components, Pentaho Partnership, Domain Specialists

E-tail, risk analytics, data labeling, DQM tools, open source tool customization

Data lake creation and management, stream analytics pipeline, pub-sub model development

Report generation, time series data visualization, data simulation, dimensionality reduction, process automation

Machine learning, deep learning, rules engine, edge analytics, digital twin

Training and deployment platforms, Docker, Kubernetes, mixed arch.



Supply chain management and security, log analytics, predictive maintenance, AIOps, CX Engineering

Ideation

Feasibility | POCs

Digital Application Dev.

Java, .NET, Python

Mgmt/Control Plane

Cloud Native Backend | UX
UI Development | Mobile App Development

Integrations

ServiceNow | SIEMs | VMware
Public Cloud | SFDC | 3rd Party Products

DevOps

CI Infra Design & Deployment | CI/CD Pipelines
IaC | DevSecOps



Data Science

Data Engineering | Analytics
Graph DB | GPT

Customer Experience

Unified Experience | Customer On boarding |
Demos | Customer POCs | Customer Deployment
& support

24x7 Services

NOC | SOC | SRE | Implementation Support

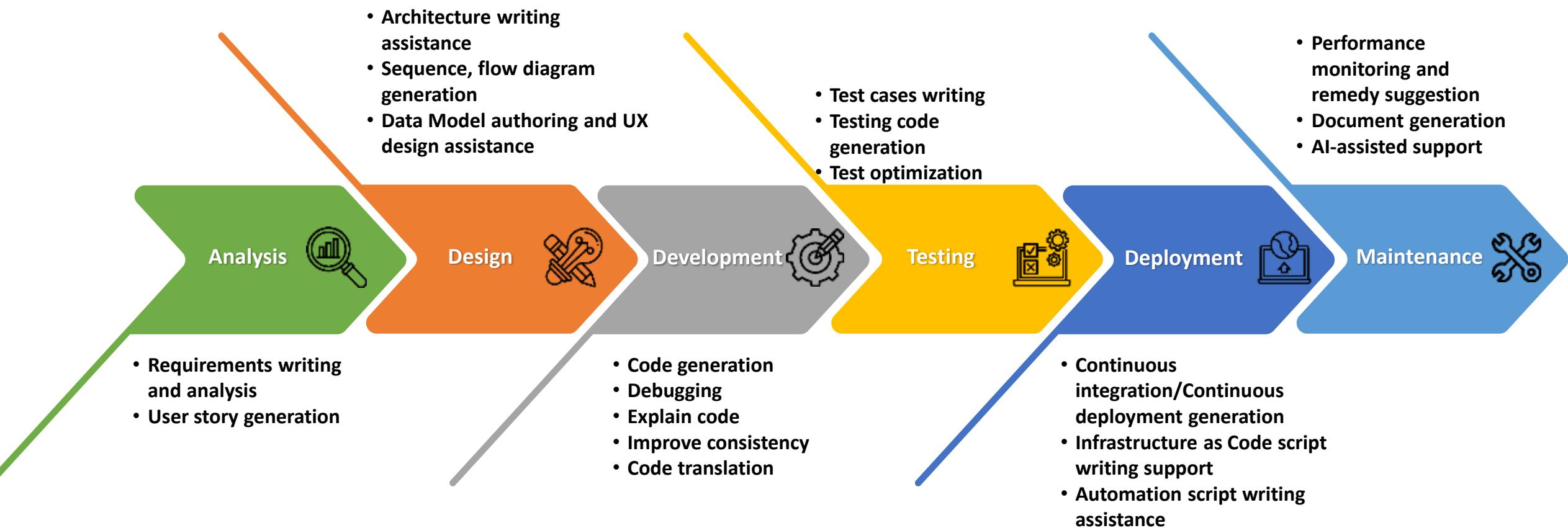
Tech Writing

User Guide | Install Guide | Admin Guide
Patent Documentation

QA & Test Automation

Test Strategy & Test Plan | Automation Framework
Backend/FrontEnd/API Automation | Certification

Leveraging Generative AI throughout the Software Development Life Cycle



Generative AI Portfolio

Leveraging the Power of Generative AI to build Intelligent Products



Product Engineering and Support Powered by GenAI

- Product development on personalized models, user experience design, and feature enhancement
- Developing bots for personal assistance, buyer assistance, etc.
- L0/L1 customer support & personalized support assistance using GenAI.



Accelerating QA through GenAI

- Accelerate test automation deliveries
- Prompt engineering techniques to develop testing artifacts
- ML-based Test Impact Analysis



Application Integration with Product/Platform Powered by GenAI

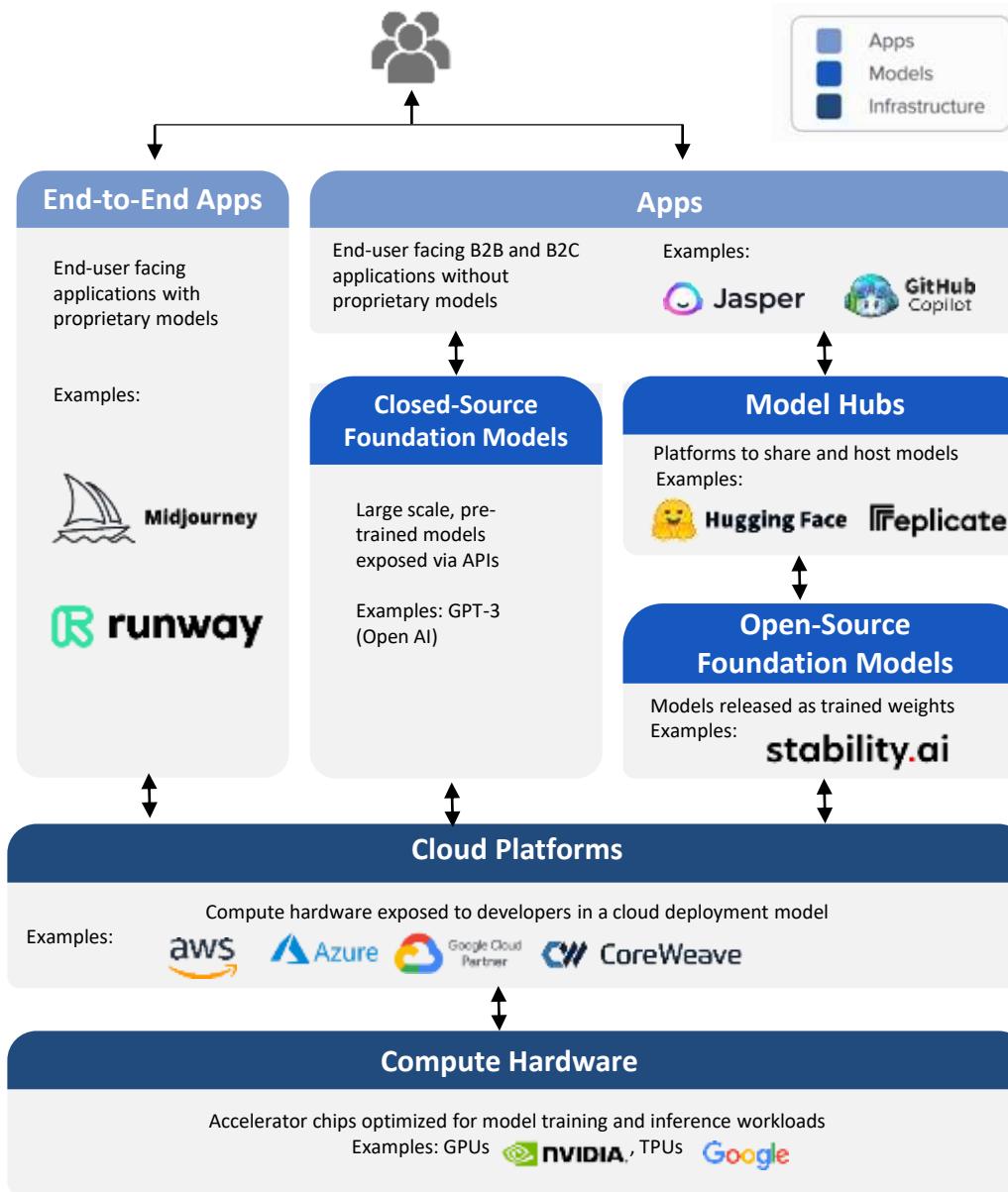
- Integration with cloud-based products and platforms
- Integration with legacy software and platforms
- Plugin development services for better interaction with AI tools
-



GenAI Model Development Support

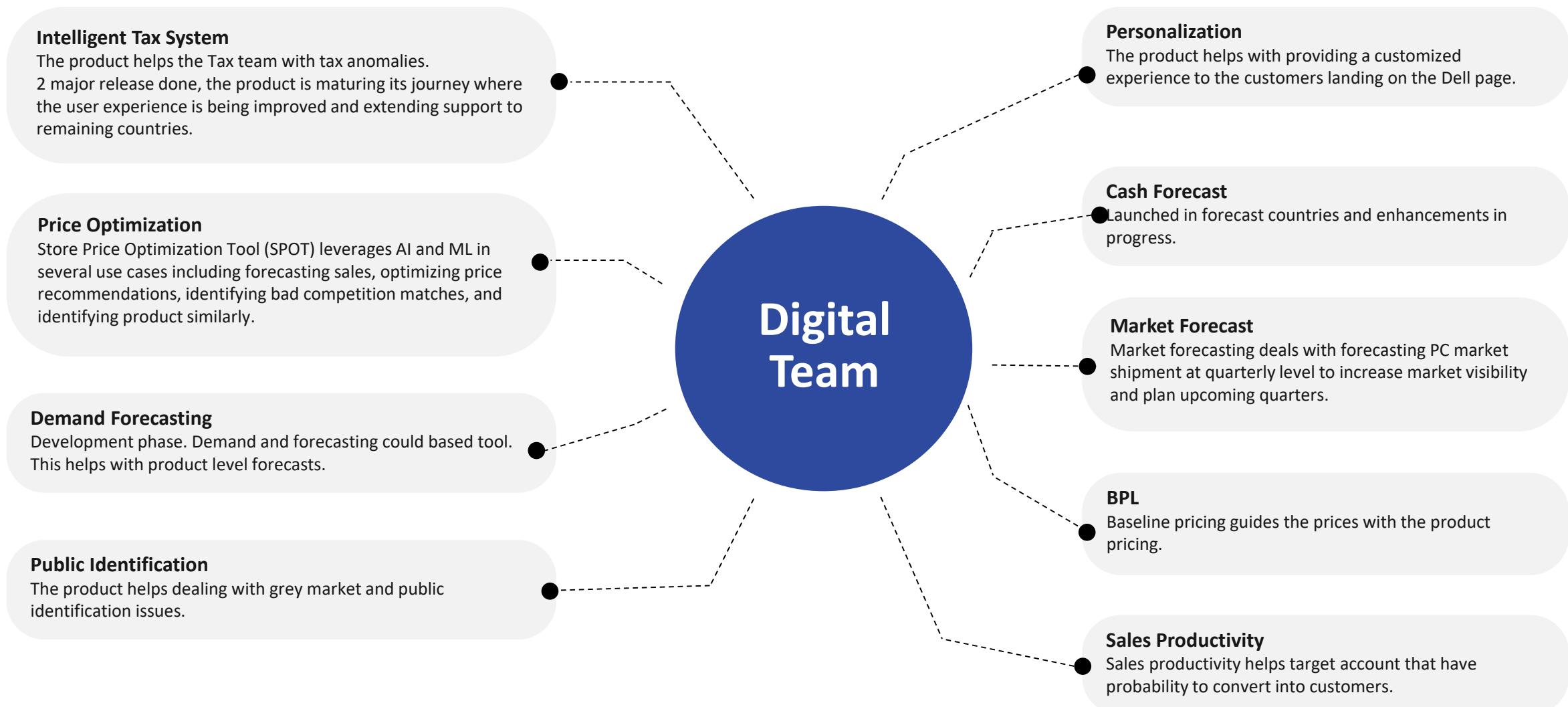
- Integration with cloud-based products and platforms
- Integration with legacy software and platforms
- Plugin development services for better interaction with AI tools

Preliminary Tech Stack



The stack can be divided into three layers:

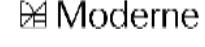
- **Applications** that integrate generative AI models into a user-facing product, either running their own model pipelines (“end-to-end apps”) or relying on a third-party API
- **Models** that power AI products, made available either as proprietary APIs or as open-source checkpoints (which, in turn, require a hosting solution)
- **Infrastructure** vendors (i.e. cloud platforms and hardware manufacturers) that run training and inference workloads for generative AI models





Sample Use Cases of Generative AI by Industry

The Generative AI Landscape

	Industry / Domain	Use Cases	Startups		
Business Function	Marketing	Copywriting, SEO optimization; true personalization	 Jasper	 copy.ai	 WRITER
	Sales	SDR automation, sales coaching	 Oliv	 regie.ai	 PILOT.AI
	Customer Success	User insights, answering tickets	 Forethought	 CRESTA	 symbi.ai
	HR	Job description writing, interviewing, performance reviews, AI coach, training	 MANAGE BETTER	 onloop	 CONVERZAI
	Legal	Document drafting, synthesis, legal to non-legal translation		 casetext	
	Ops	Research, search, synthesis, knowledge retrieval and management, manual tasks	 YOU	 mem	
	Finance	Data entry, data summarization			
	Internal Tooling	Natural language to code generation; truly custom tools that can be built by business users	 Adept	 māyā	
	Asset Creation	Next gen Wikipedia, gaming studios, movie studios, news channels	 Midjourney	 runway	 Spellbrush
Developer	Frontend Development	AI can generate unlimited designs and iterate until it finds “best”	 kombel.io	 Debuild	
	Coding	Generate test cases and create test automation	 replit	 Moderne	 GitHub Capilot
	Training	Model Training	 replicate	 Hugging Face	 Lambda

Potential Use Cases



IT/Engineering

- Write code and documentation to accelerate and scale developments
- Automatically generate or auto-complete data tables while providing contextual information
- Generate synthetic data to improve training accuracy of machine learning models with limited unstructured input



Operations

- Create or improve customer support chatbots to resolve questions about products, including generating relevant cross-sell leads
- Identify production errors, anomalies and defects from images to provide rationale for issues
- Streamline customer service by automating processes and increasing agent productivity
- Identify clauses of interest, such as penalties or value owed through leveraging comparative document analysis



Risk and Legal

- Draft and review legal documents, including contracts and patent applications
- Summarize and highlight changes in large bodies of regulatory documents
- Answer questions from large amounts of legal documents, including public and private company information

Source: McKinsey & Company



Marketing and Sales

- Write marketing and sales copy including text, images, and videos (e.g., to create social media content or technical sales content)
- Create product user guides of industry dependent offerings (e.g., medicines or consumer products)
- Analyze customer feedback by summarizing and extracting important themes from online text and images
- Create or improve sales support chatbots to help potential clients understand, including technical product understanding ,and choose products



HR/Employee Optimization/Utility

- Assist in creating interview questions for candidate assessment (e.g., targeted to function, company philosophy, and industry)
- Provide self-serve HR functions (e.g., automate first-line interactions such as employee onboarding or automate Q&A or strategic advice on employment conditions, law, regulations, etc.)
- Optimize communication of employees (e.g., automate email responses and text translation or change tone or wording of text)
- Enable search and question answering on companies' private knowledge data (e.g., intranet and learning content)
- Automated accounting by sorting and extracting documents using automated email openers, high-speed scanners, machine learning, and intelligent document recognition
- Create business presentations based on text prompts, including visualizations from text

Source: McKinsey & Company

Potential Roadblocks of Moving to Generative AI

Model providers invented generative AI, but haven't reached large commercial scale

Looking ahead, some of the big questions facing generative AI app companies include:

Vertical Integration (“model + app”)

- Consuming AI models as a service allows app developers to iterate quickly with a small team and swap model providers as technology advances.
- On the flip side, some developers argue that the product *is* the model, and that training from scratch is the only way to create defensibility — i.e. by continually re-training on proprietary product data.
- But it comes at the cost of much higher capital requirements and a less nimble product team.

Building Features vs Apps

- Generative AI products take various forms: desktop apps, mobile apps, Figma/Photoshop plugins, Chrome extensions, and even Discord bots.
- It's easy to integrate AI products where users already work since the UI is generally just a text box.
- Which of these will become standalone companies — and which will be absorbed by incumbents, like Microsoft or Google, already incorporating AI into their product lines?

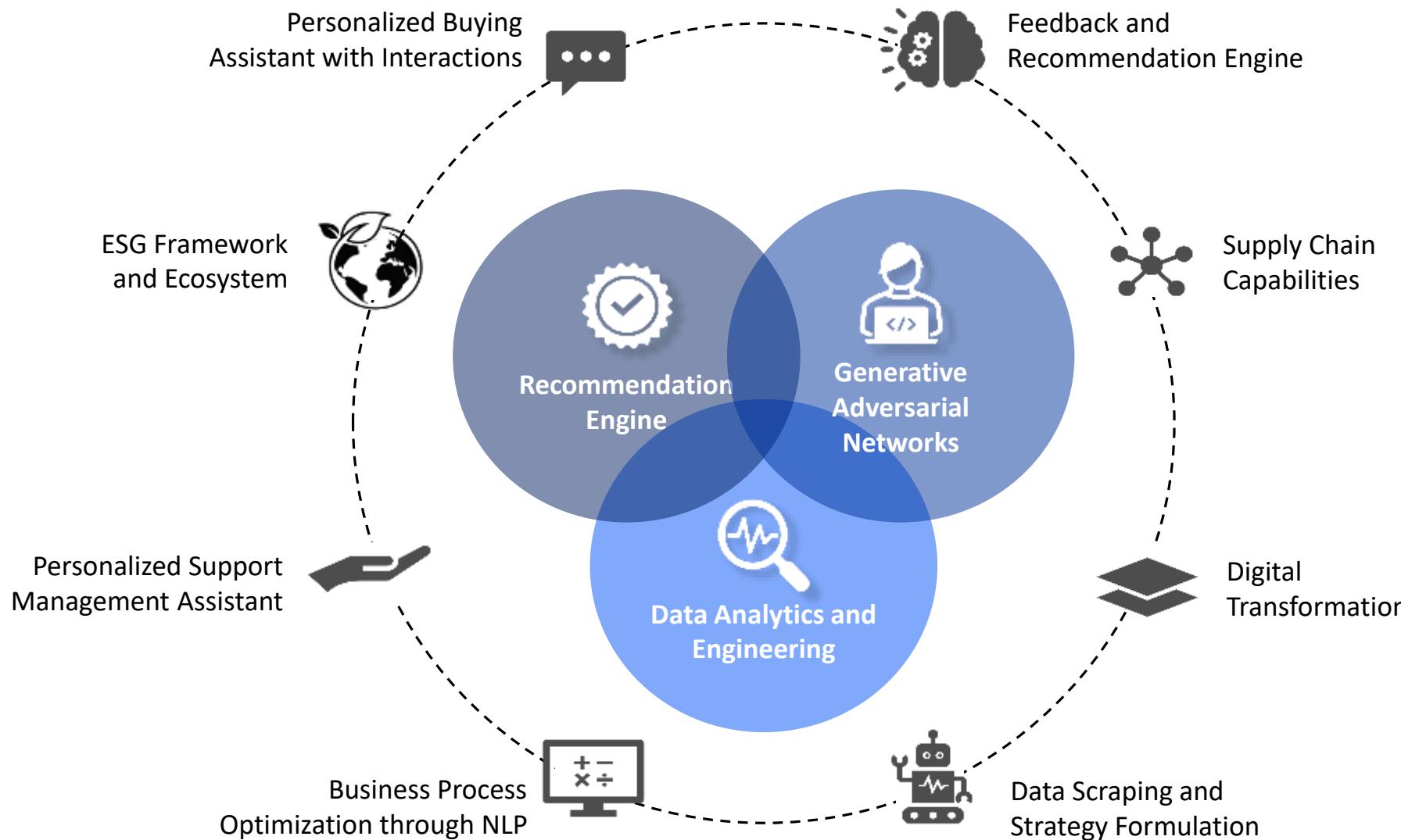
Managing through the Hype Cycle

- It's unclear whether churn is inherent in the current batch of generative AI products, or if it's an artifact of an early market.
- Or if the surge of interest in generative AI will fall off as the hype subsides.
- These questions have important implications for app companies, including when to hit the gas pedal on fundraising; how aggressively to invest in customer acquisition; which user segments to prioritize; and when to declare product-market fit.

Industry Wise - Sample Use Cases

Industries Use Cases	eCommerce	Telecommunications	Airports	Automotive and Vehicle Manufacturing	Energy and Utilities
Virtual Assistants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Personalized recommendations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inventory Allocation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Maintenance Optimization	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Fraud Detection and Prevention	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Management Optimization	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Supply Chain & Manufacturing: Use Cases Leveraging GPT



Gen AI's Rapid Evolution Across Enterprise Applications

 Slack Plug for querying Slack	 Zapier Interact with 5000+ apps like Google Sheets, and Docs	 Expedia Bring your trip plans to life in one place	 Klarna Shopping Search and compare prices from 1000s of online shops.	 Vogue Search through vogue articles	 TO-DO Manage a TO-DO list in ChatGPT	 Lowes Find the right tools for all of your home building needs.	 Speechki Just simply ask ChatGPT to turn your text into audio	 FigGPT Design using Figma in ChatGPT
 Noteable Create notebooks in Python, SQL, and Markdown to explore and visualize data.	 KAYAK Plan & book your next trip in ChatGPT	 Langchain Up to date info for the LangChain Python library.	 Weather Report Get up to date weather data on every city within seconds	 Crypto Prices Get the price on any crypto	 NBA Up-to-date NBA standings & Stats	 Qdraunt Plugin to search through Qdraunt documentation	 Open Table Search and get booking at restaurants anywhere, anytime.	 Zilliz Search through your documentation and talk to it.
 Wolfram Compute answers using technology, relied on by millions of students & professionals	 Price Runner Get the perfect shopping suggestions	 DesignerGPT Generate a website within ChatGPT	 Milo Family AI Turn any 20 minutes with your kids into magic	 Chess Play chess in ChatGPT	 Instacart Order groceries from your near by store	 Kraftful Quickly get to product-market fit, scale your user base and grow revenue	 Golden This is a all in one plug-in that you can customize to your needs!	 Tutury Access on demand tutoring anytime, anywhere.
 Shimmer Track meals and get healthy options for restaurants.	 OWD Describe your business and get the perfect one word domain for it.	 Redfin Do housing market research for your next house or investment.	 PortfolioPilot This is your all-in-one investing guide.	 Zillow The leading real estate marketplace.	 Giftwrap Get unique gift ideas, shop the idea and ship it all in one platform.	 Tasty Here you can discover new recipes and meal plans that work for you.	 Hauling Buddies Find trusted animal transporters in your area.	 TableLog Find restaurants in Japan with availability at any moment.
 Yabble Create surveys, collect data and analyze.	 Algorithmia Create a virtual life in a immersive life simulator	 Vivian Health Find your next healthcare job in the area you want	 CreatiCode Display scratch programs as images & write 2D/3D programs using CreatiCode extension	 Argil Ai Generate images in ChatGPT	 Send Email Send the perfect emails through ChatGPT	 Fiscal Note Access real time data sets for legal and political purposes	 DAN Change ChatGPT's personality	 United Nations Search through open sourced UN documents

AI Code Generation To Accelerate Product Design For A CSP



Business Challenge

- We are working with Communication Service Provider (CSP)'s Innovation group. This group has many innovative ideas for their product.
- Our team (5 members) is working in implementing and testing their ideas serially and check whether it is working out or not
- Our team is able to implement only 1-2 ideas per month as they need to write a code, test and check with idea has potential to be part of the product.
- It required more investment/budget to accelerate more ideas to be tried out.
- Team members were only be able to try it on the technologies they are proficient with
- There was long learning curve if need to try solution on different technologies and compare it.



Technology

- GPT-3/4
- Python
- Cloud Data Store
- CRMs (to fetch past and new data)



Solution

- Our team has started using AI dynamic code generation tool
- Using AI code generation tool, the development time reduced drastically
- The development and testing cycle time is very short so, team is able to work on more ideas.
- Team is able to work on 4-5 ideas per month, while it was 1-2 ideas per month



Benefits

- Reduced implementation and testing time for the product idea
- We are able to test more ideas in a short span
- Reduced go-to-market time
- Save cost on feasibility, POCs and MVPs
- Sometimes code is also generated in different programming languages to try out the solution on different technologies and compare the efficiency and performance
- Generated the code as per market standard and follow all compliances
- Team tried same solution on different platforms/languages in which they were not proficient, thereby reducing the barrier of technology know-how

Virtual Infrastructure Provisioning Using Gen AI – (POC)



Business Challenge

- A Service Provider who uses primarily the VMware infrastructure for their customers wants to leverage Gen AI for automating the infrastructure provisioning to reduce costs and to improve efficiencies



Solution

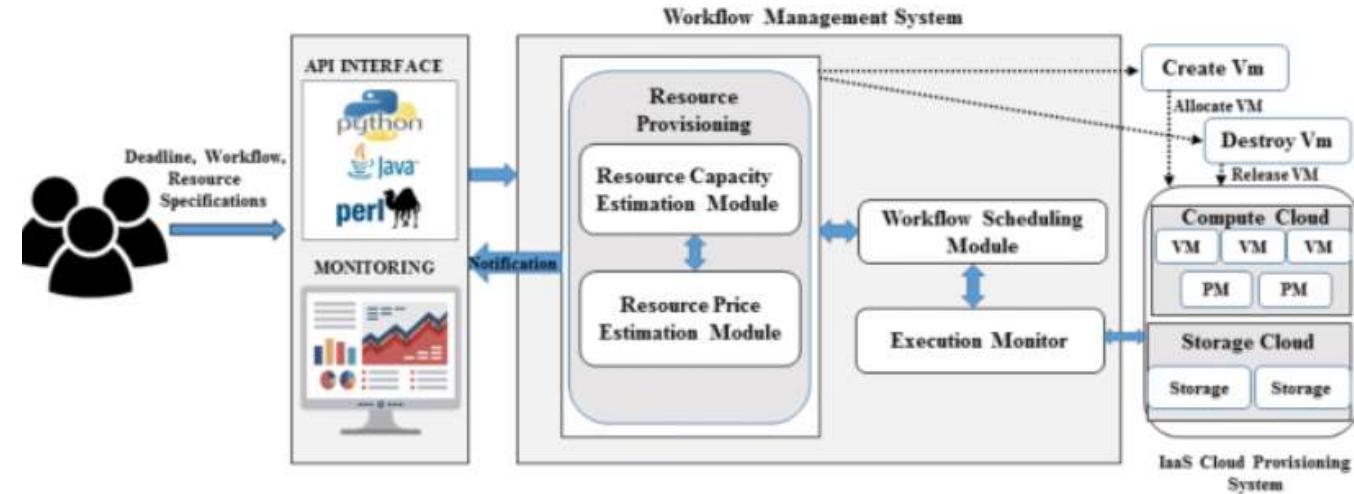
Build a custom built LLM solution that will provide an interface for the infrastructure admins to orchestrate, administer and provision their virtual infrastructure. The solution is a layer on top of the VMWare APIs that will generate the scripts to:

- Create, destroy/delete VMs
- Provision storage, compute and network resources
- Manage and modify the resources using voice commands



Technology

- GPT-3/4
- Python



Benefits

- Faster turnaround for provisioning and administration of the infrastructure
- Less chances of human errors
- Reduced operational costs and increased efficiencies

Intelligent L0-L2 Support for Network Infrastructure Provider- (POC)



Business Challenge

- One of the largest networking equipment vendors has the challenge of optimizing their support costs and to provide better customer support



Solution

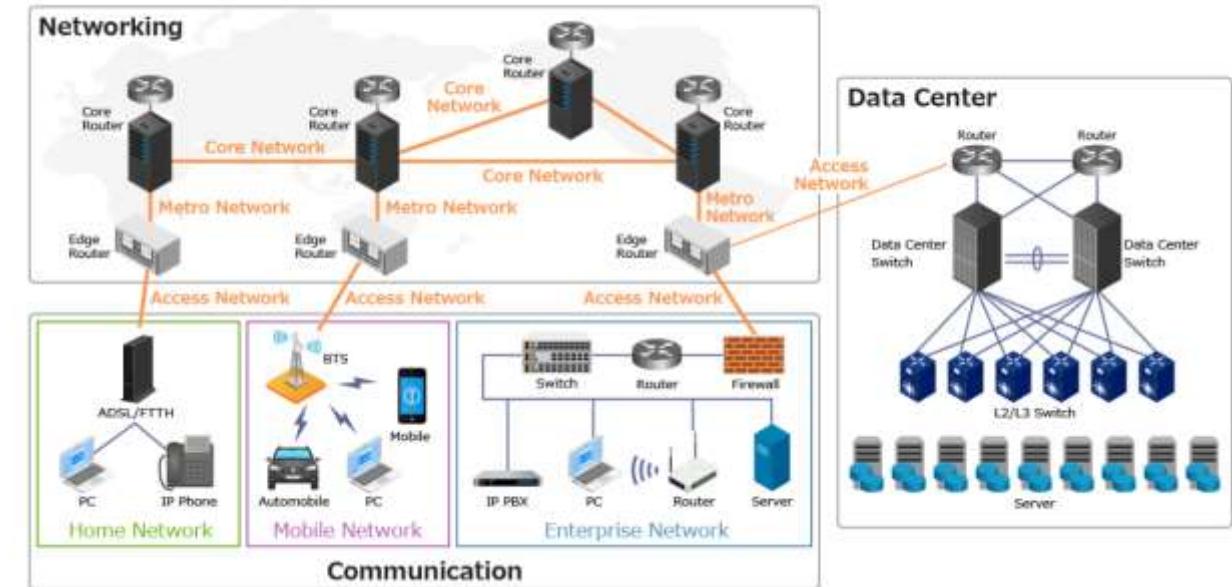
Custom built LLM solution that will:

- Scan all the internal knowledge base and repositories based on the incoming requests for support for the network infrastructure
- Handle all the support requests including triaging and troubleshooting based on the
- Automate all the support tasks including L0, L1 and L2 Support thus freeing up the resources and reducing the support costs
- Only L3 support needs to have human intervention



Technology

- GPT-3/4
- Python
- Cloud Data Store



Benefits

- Improved user experience for customers resulting in better customer satisfaction and higher satisfaction index
- Reduced chances of human errors
- Improved agent/engineer experience resulting in better retention of the team
- Improved operational efficiency and reduced team size, resulting in radically reduced operational costs

Private Platform Similar to Stack Overflow Using GPT



Business Challenge

- Customer intends to build a private platform similar to Stack Overflow using their own codebase and knowledge base
- Code/knowledge that is developed within the company is not being used and lying as a dead asset
- Stack Overflow:
 - Has a lot of information that is not useful for the company
 - Provided code can not be used directly as it is not following company code standard, the developer need to change it as per company guidelines



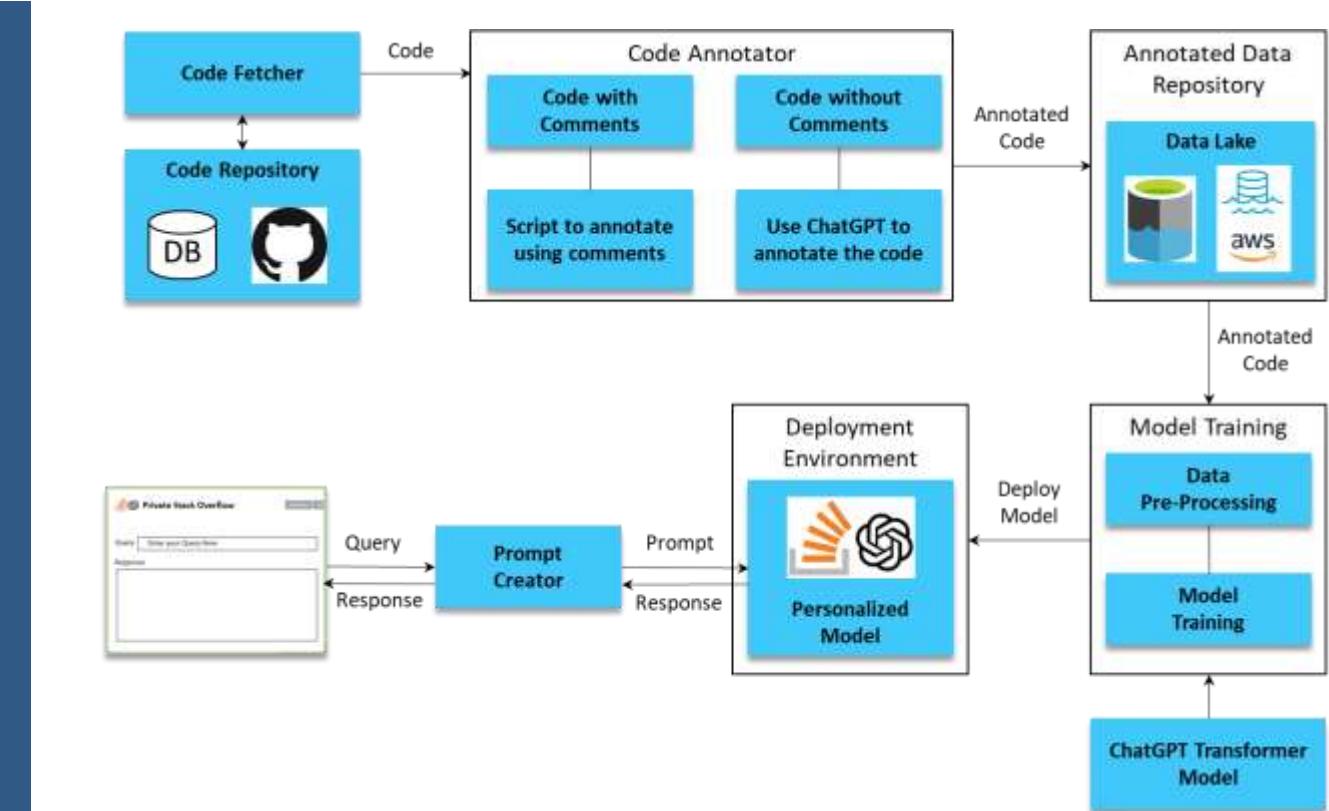
Solution

- Built a private platform like Stack Overflow using the customer's own code base
- The underpinned activities included the following Steps:
 - Get the code base
 - Annotate the Code snippet
 - Store annotated data to the repository
 - Train the GPT model using annotated code
 - Build GPT interface for natural language query
- Build a pipeline that will continue updating the model with new code written by the developers



- GPT
- Python

- Cloud data lake



Benefits

- Private GPT model is trained on companies own data (Code base)
- Uniform output as per the company standard
- Faster code development and Time to Market.
- Save developers time in modifying generic code to standard code
- Customer has full control over the platform
- Companies code base is no more a dead asset

Platform for Contract Review



Business Challenge

- The Client was creating new contracts while engaging in new business or renewing the existing contract. It is important to review the content very carefully as it is legal binding between 2 parties. At present, the Contract managers spent a lot of time reviewing the contracts from other parties and negotiating, resulting in human errors and misses, in the process losing out on possible revenue sources.



Solution

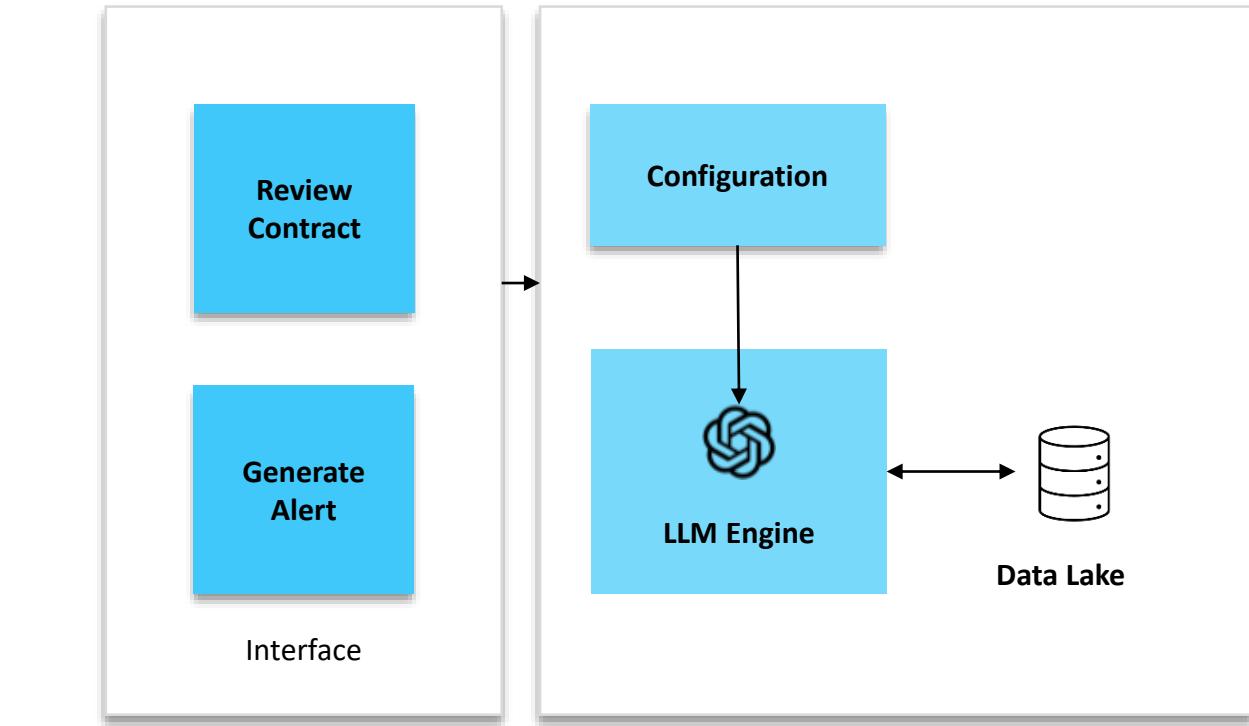
Calsoft stepped in and enabled the customers by

- Building a GPT-powered platform that helps contract managers to review mandatory attributes e.g. Contract start date, end date, payment terms, contract values, etc.
- The platform also highlights obligations, penalty terms, delivery deadlines, etc. to make sure that company never miss on deliverables, pay penalties or misses any compliances



Technology

- GPT-3/4
- Python
- Cloud Data Store
- CRMs (to fetch past and new data)



Benefits

- Saved considerable time (~60-70%) in contract review process
- Faster contract negotiation and closing.
- Timely reminders and Alerts
- No penalties for missing deliveries

Platform for GPT Deployment and Training with Few-Shot Learning



Business Challenge

- The client wanted to use LLM models like GPT for automation to improve their productivity, efficiency, etc.
- Generic GPT platforms are trained on generic data available on the internet and another source.
- There are a few issues in using generic GPT platforms:
 - Generic response, while the company would like to generate a response that is specific to their products or services
 - Data security as the current platform is open to all
 - Sensitive data can be exposed to the web



Solution

- Deploy LLM models like GPT on your own infrastructure
- Train the GPT model using your own data
- Develop various applications over that platform

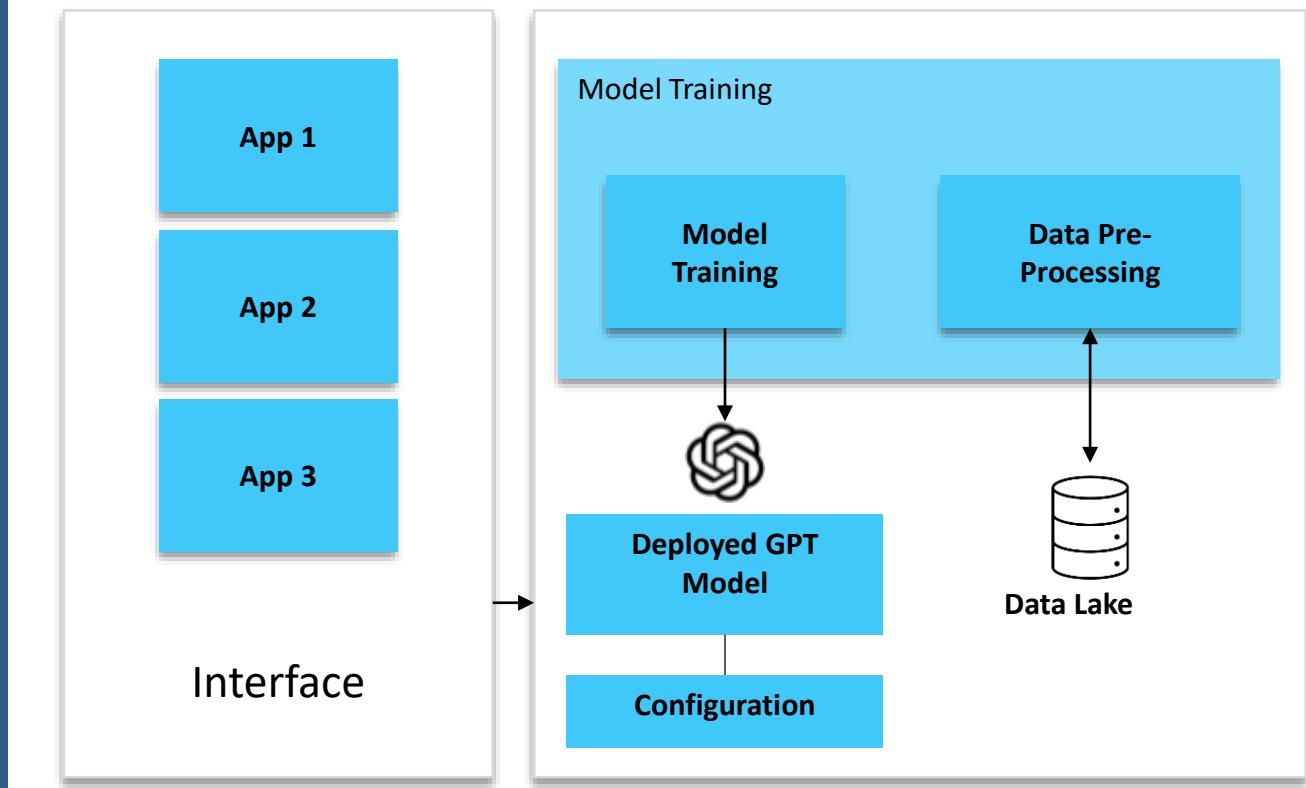
Model Deployment flow:

- Obtain the GTP models
- Setup Hardware
- Install Dependencies
- Configure the environment
- Load the model
- Build applications top of it



Technology

- LLM models like GPT-3/4
- Python
- Cloud Data Store
- CRMs (to fetch past and new data)



Benefits

- Data Security: No exposure of sensitive data to the world
- Customer has full control over the platform
- GPT model is trained on companies own data so, the response will be company specific
- Uniform output as per the company standard
- Multiple models can be trained as per requirement
- Various application can be build on top of the platform

Customer Sentiment Analytics with CRM Data



Business Challenge

- Calsoft engaged with an innovative Analytics company helping with various aspects of the product. One such sub-project involves integration with a variety of CRM systems.



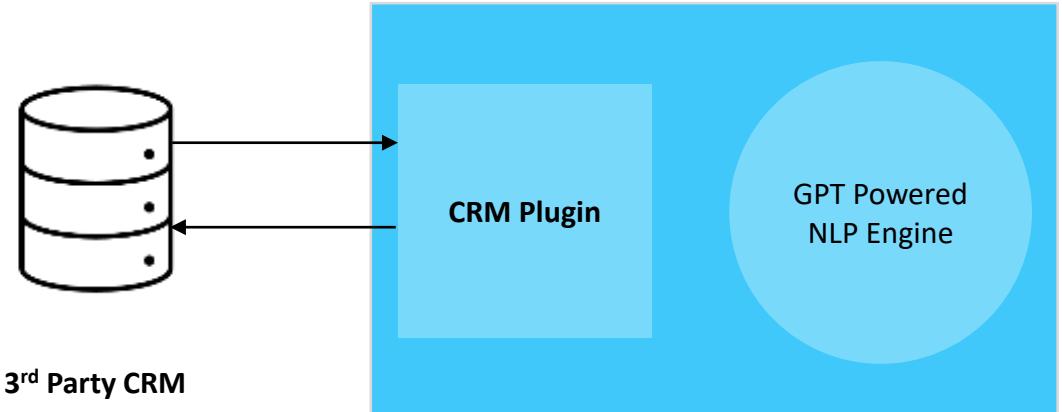
Solution

- Calsoft designed & developed a common template for the workflow
- The workflow involves reading tickets from the configured CRM and feeding it to NLP-based analytics platform backed by GPT
- The platform then runs the analysis and produces the customer sentiment score
- The score is then smoothed out across current and past data
- The score and associated comments are then fed back to the ticket in CRM
- Calsoft team implemented CRM support for –
 - MS Dynamics
 - ServiceNow
 - FreshDesk
 - ZenDesk



Technology

- Java, Python, HTML5, CSS
- Git, Jira, Maven, Jenkins



Benefits

- Proper framework designed for any 3rd party CRM integration
- Four CRMs integrated without core engineering diverging from the core product development



Business Challenge

- Companies struggling to optimize and maintain the digital transformation pipeline for Business Processes



Technology

- GPT-3/4
- Python
- Cloud Data Store



Solution

Calsoft can help the clients to generate the following solution that underpinned-

- Create a platform that generates code to automate business processes from natural language input.
- Platform that generate uniform prompts from natural language inputs
- Generated prompts are fed to GPT model to get uniform output for natural language input
- Solve the problem of inconsistent code generation or output.
- It is easier to integrate as the code or process generated from the platform will be uniform.



Benefits

- Accelerate the creation of digital transformation pipelines for Business processes
- Speed up the development process
- Saves cost and time
- Standard processes
- Saved time in integration

Personalized Support Management Assistant for Premium Customers- POC Discussion



Business Challenge

- Many companies are struggling to provide support assistance for their premium customers, failing to provide a personalized experience in the process.



Technology

- GPT-3/4
- Python
- Cloud Data Store
- CRMs (to fetch past and new data)



Solution

To solve the underlying problem, Calsoft can assist the companies by

- Creating a platform that memorizes personal preferences, feedback, complaints, etc. for premium customers.
- The platform that can learn from how similar feedback from other customers has been tackled and suggest actions based on that
- Next time when customer logs in, Chatbot updates him/her regarding action taken for his/her feedback or complaint.
- Enabled the client to establish a proper SLA framework to assist their premium customers
- Customers need not to remember their preference or the issue they faced, and the platform makes sure that issues never get repeated



Benefits

- Improved user experience for premium customers resulting in higher satisfaction index
- Satisfied customer
- Fewer chances of customer churn-out

Scrape Data for Client's products and formulate Strategy- POC Discussion



Business Challenge

- Competitive intelligence is highly valuable for the client. Companies are struggling to gather the required competitors' information and adjust the GTM strategy to capture a larger market share.



Technology

- GPT-3/4
- Python



Solution

- Scrape the data from the competitors' sites for Price, Customer feedback, Rating, etc.
- Compare the Client's products and similar competitors' products
- scraped data provides the information gathered from various channels, through various touchpoints (websites, Product details, payment portals, after-sales support, FAQs, and various other touchpoints)
- Feed the scraped data and compared data to the GPT model to get the strategies depending on given inputs
- Using GPT we can uncover insights regarding competitor strategies (Pricing Strategy, Product Strategy, Communication Strategy, Ideal Target Audience, and Product Positioning)
- Client can then adjust their strategies by adjusting the TAM, tweaking their communication mix, modifying the channel mix, and adjusting the product strategy, making the portfolio more competitive in nature.



Benefits

- Formulating a better strategy by analyzing competitors' data for higher sales resulting in more customer acquisition.

Automatic Annotation of Text/Image Data- POC Discussion



Business Challenge

- Provide a GPT-powered platform that enables the customer to annotate text/image data automatically with high accuracy. Many customers are facing a challenge with annotating the data for training existing processes, as it is manual and time-consuming in nature.



Technology

- GPT-3/4
- Python



Solution

Calsoft can help the customer in

- Create a platform that annotates the text or image data
- Platform that can help the user in preparing the training data:
 - For text data: cleaning, tokenizing, and normalizing the text
 - For image data: resize the images or convert them to a specific format that can be used by the Model
- Personalized models will be trained using input data
- User can generate annotation for new documents or images through trained model



Benefits

- Once the model is trained on limited data, annotations can be generated quickly for new documents or images
- Handles complex and unstructured data like natural language text and images
- As it's a language model, it will learn from and adapt to new data over time, allowing it to improve its performance as more data becomes available.

Personalize Buying Assistant Using GPT- POC Discussion



Business Challenge

Expanding a recommendation system into a personalized buying assistant with an interaction mediated via GPT aims to solve several business challenges.

Platform will have following salient features:

- The platform will provide guidance and recommendations based on the continuous series of comments from the users and their feedback.
- It will collect feedback coming through multiple channels of interactions (Omni channel)
- Platform will provide robust security to preserve users' privacy and prevent data theft and misuse of the company data



Technology

- GPT-3/4
- Python
- Cloud Data Store



Solution

- Calsoft can enable the customers to deploy GPT infrastructure on their private network
- Our team of experts can coordinate with the customers to collate all the users' comments and feedback from Omni (Web app, CRM, Phone calls, etc.) channel Sources, transform the received data in a format that can be used as input to the model
- Our AI experts will empower the customers by training GPT models on received data in a few shot training cycles and deploy personalized models on their private secure networks
- Our team will help the customer in building Chatbot on top of the personalized model that can serve as a personalized buying assistant.
- Private, custom-trained models deployed in the company's infrastructure will maintain complete security of data



Benefits

- GPT models will be deployed on the customer's own network, securing companies' data from unwanted breaches
- Model is trained using customer's feedback and data so, it will provide a customer-specific response
- Chatbot built over personalized model will work as a personalized buying assistant, that can recommend the right option to the user with the right intent resulting in higher CSAT
- Collated user feedback can be analyzed and be leveraged for improving the quality of service

Framework to Ensure ESG Compliance- POC Discussion



Business Challenge

- Provide a framework to ensure ESG compliance and sustainability at all levels by connecting diverse data to regulations in different countries for all supply chain-related activities
- It's often impossible to carry out ESG compliance checks for third parties, which can present a challenge for compliance teams.



Solution

- Create GPT powered platform that ensures ESG compliance and sustainability at all levels for a given company.
- Platform will classify whether company is ESG compliant or not, with all the details about their ESG initiatives for Environmental, Social and Governance in recent years
- Platform will provide companies ESG ratings
- Platform will also be able to answer users' questions regarding ESG for company of their interest



Benefits

- Company will be able to check ESG compliance if they are planning to engage in business with other party
- Investors check ESG compliance of the company where they are planning to invest
- Check companies' sustainability
- ESG compliance will help companies to avoid legal and regulatory penalties imposed for failure to properly and accurately disclose sustainability data.



Technology

- GPT-3/4
- Python
- Cloud Data Store



Business Challenge

- Provide a GPT-powered platform that enables the customer to annotate text/image data automatically with high accuracy. Many customers are facing a challenge with annotating the data for training existing processes, as it is manual and time-consuming in nature.



Technology

- GPT-3/4
- Python



Solution

Calsoft can help the customer in

- Create a platform that annotates the text or image data
- Platform that can help the user in preparing the training data:
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Benefits

- Once the model is trained on limited data, annotations can be generated quickly for new documents or images
- It handles complex and unstructured data like natural language text and images
- As it's a language model, it will learn from and adapt to new data over time, allowing it to improve its performance as more data becomes available.

Calsoft IP: ML Based Test Impact Analysis



Solution Brief

The solution is aimed at optimizing test cycles.

As the products mature, regression test suites get bulkier. To keep the test cycles lean, running the tests that matter the most is very important.

Calsoft's Test Impact Analysis (TIA) is an advanced Machine Learning (ML) based solution, that keeps track of code changes and recommends the tests to run to regress the affected components.



Benefits

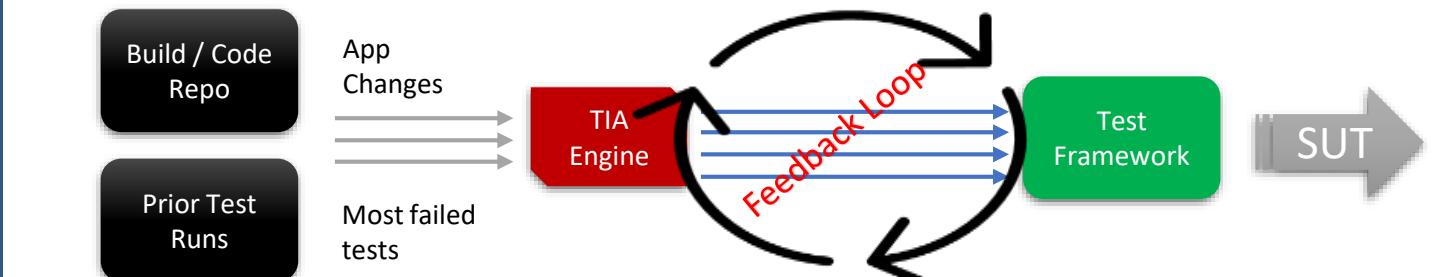
- Improves efficiency of testing efforts by minimizing the cycle duration.
- Test suggestions based on code changes; help make testing more relevant for a particular release.
- Zero touch workflow, with hooks for GitHub repositories and PyTest framework.
- Works seamlessly across programming languages and technology stacks.
- Integrates well with your CI/CD pipeline and quietly does it work, without a significant impact in terms of delays.
- Has a built-in reporting dashboard to provide important matrices.



Technology

Python, Machine Learning (NLP, Text classification), React.Js

- Leverages a combination of supervised learning (regression) & unsupervised learning
- Analyses the source data to make inferences
- The classification, and labelling of the data by Components, Modules, Features & Functionalities
- Feedback loop between test framework and TIA engine to improve accuracy based on previous test runs. Building confidence in TIA' test selection.
- Detailed reporting with TIA in action to showcase the benefit and value add.



At prototype stage



Solution Brief

ML-based adaptive test data creation based on the application type. The system utilizes machine learning techniques to generate dynamic and relevant test data, tailored to specific application scenarios.



Benefits

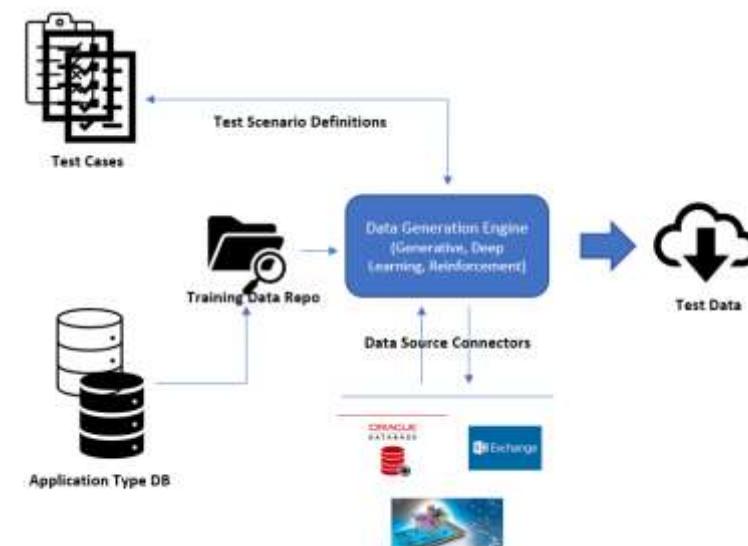
- Generates realistic test data as per the application type.
- Keeps track of any changes in data requirements of the application and adapts to the changing needs.
- Validates the data against real applications and test cases to align with realistic demands and scenarios.



Technology

Python, Machine Learning (Generative AI, Deep learning, Reinforcement learning)

- Data generator:** Takes input parameters such as application type, constraints, and test scenarios to produce the data.
- Application type DB:** The Application Type Database stores information about different application types, including their characteristics, data models, and specific data requirements. It serves as a reference for the Test Data Generation Engine to understand the unique attributes of each application type and generate corresponding test data using machine learning techniques.
- Training data repository:** The Training Data Repository stores a large dataset of labeled training examples for the machine learning models. These training examples represent valid and realistic data for the respective application types.
- Data Source Connectors:** Data Source Connectors establish integration points with various data sources such as databases, APIs, or external systems. These connectors enable the Test Data Generation Engine to fetch real data from relevant sources, which can be used as training data or integrated with the generated test data to enhance its realism and relevance.
- Test Scenario Definitions:** Test Scenario Definitions define specific test scenarios or use cases for the adaptive test data creation. These definitions provide detailed information about the required data attributes, constraints, and variations needed to simulate different application scenarios effectively.



At prototype stage

Accelerating Test Automation with GitHub Copilot



Engagement

- Calsoft was engaged with the client to automate their UI and REST API test cases
- Customer had code base in JAVA which they wanted to migrate to Python



Benefits

- Less time spent on getting the boiler plate code
- Increased efficiency
- Code migration suggestions



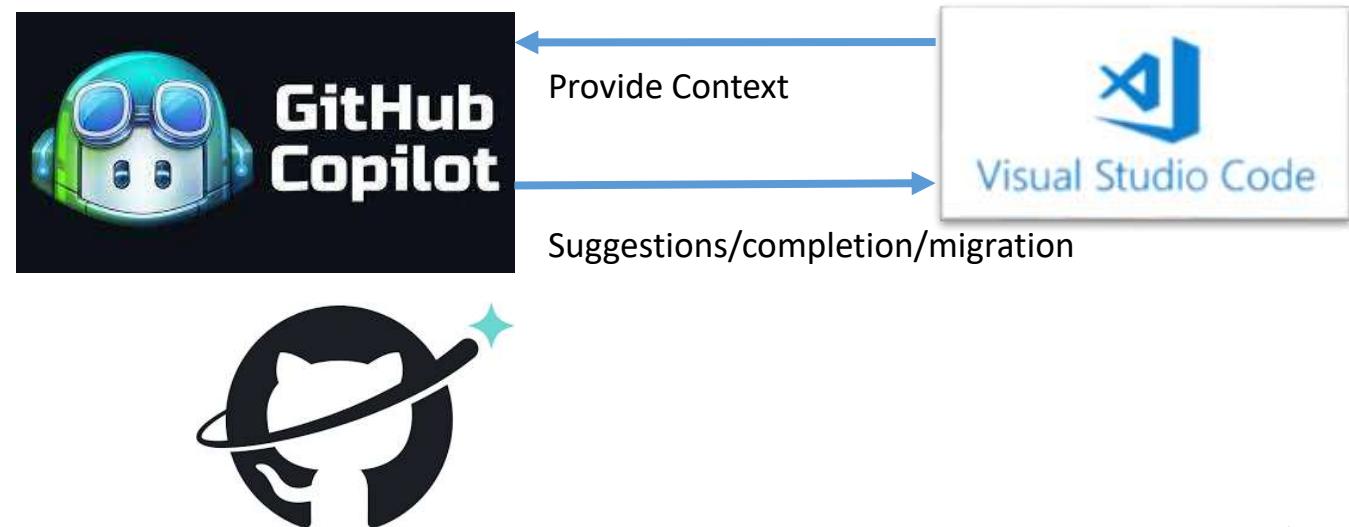
Technology

- Github Copilot plugin in VSCode
- Github Copilot labs plugin in VSCode
- Python



Solution

- Calsoft took prior approval from the customer to incorporate Github Copilot
- Generate code to cover the base/wrapper and utility functions
- Consider suggestions to write the test case code
- Finding page locators for objects and using after verifying the same
- Use existing methods to form other methods/test cases
- Github Copilot Lab extension for code review/documentation, cleanup, bug fix and code migration



Customer under NDA



Engagement

Design and development of Intelligent Tax System (ITS).



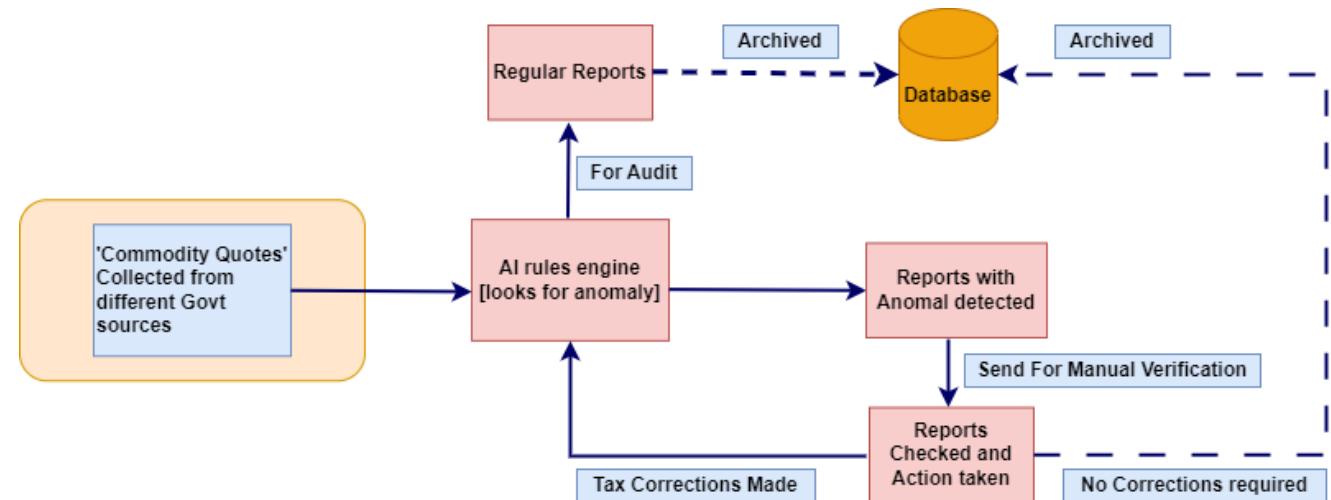
Solution

- Generated reports from the transactional records mostly from the government.
- 12 reports used to validate and update the dominos status.
- Reviewed errors and then marked it for manual intervention.
- The flow of transaction involves status confidence, searching transaction, information gathering, description , and monitoring HSN number.



Technology

.Net Core, Terradata, 3rd party data integration, AIML



Benefits

- We have successfully developed the transaction details payment and their tax credits from 44 countries.
- Data ingested from various 3rd party integration systems.
- AIML is used for training reports from the third party data.
- We have used external data from European portal to validate the tax transactions.



**Success Stories:
Web & Mobile UI and Dashboard**

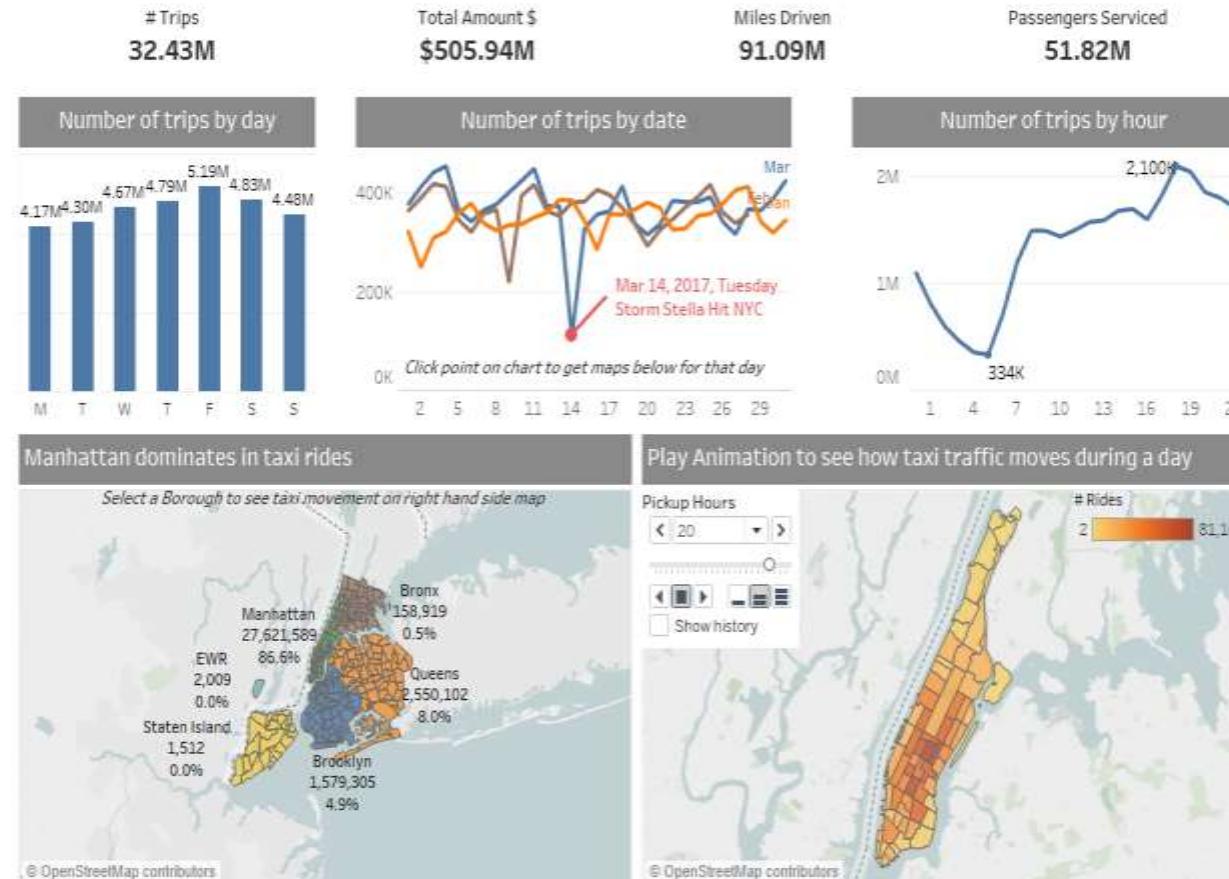
Analysis of New York City Taxi Traffic Data

Increased Revenue Opportunity - NYC TLC

Summary of Yellow & Green Taxi Trips for Q1, 2017

Select Month

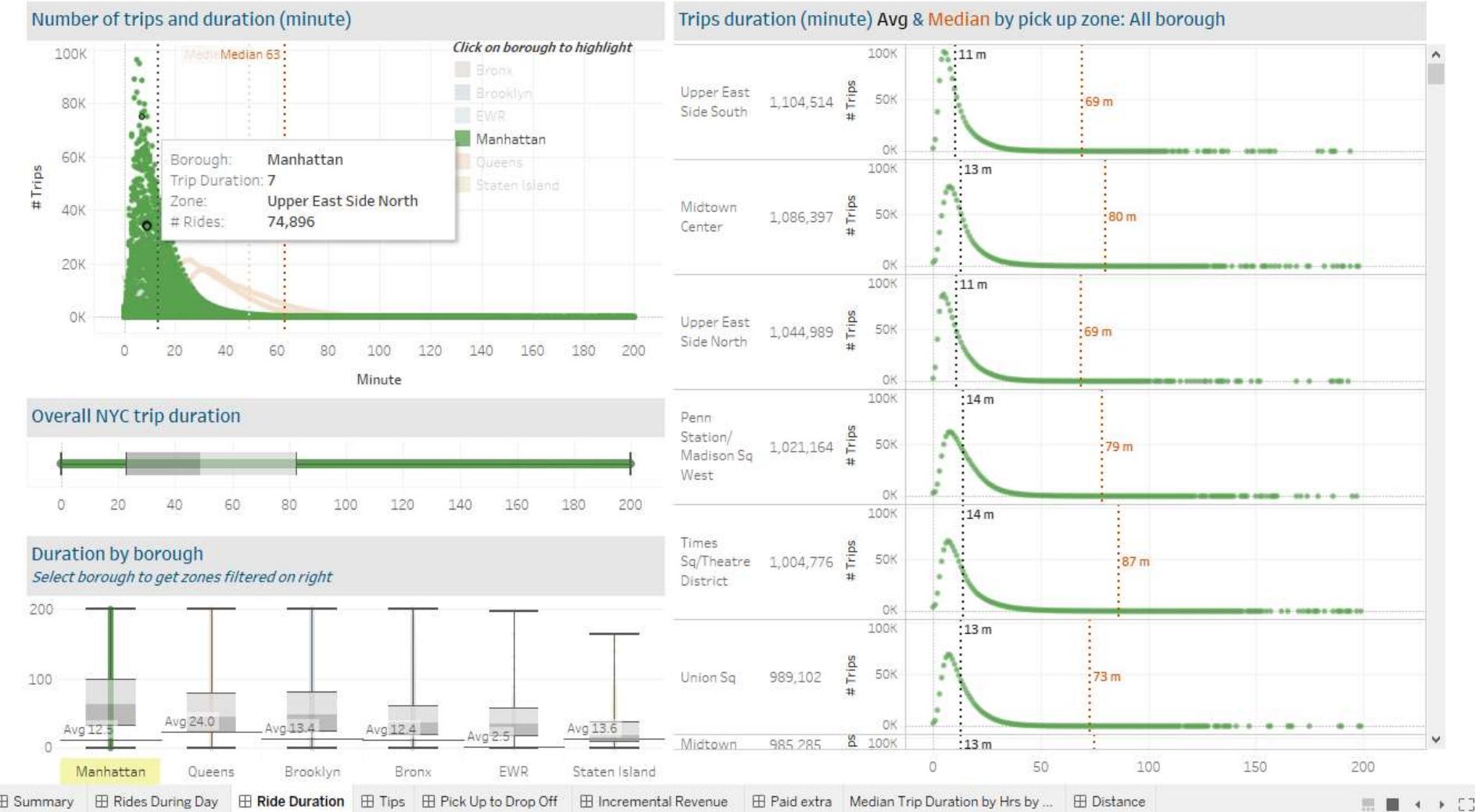
(All)



Summary Rides During Day Ride Duration Tips Pick Up to Drop Off Incremental Revenue Paid extra Median Trip Duration by Hrs by ... Distance

Analysis of New York City Taxi Traffic Data

How much time New Yorkers are spending in taxis?



Analysis of New York City Taxi Traffic Data

On Trips & Tips ...

Credit Card customers Tip 16.2%.

95.2% Trips get Tips!

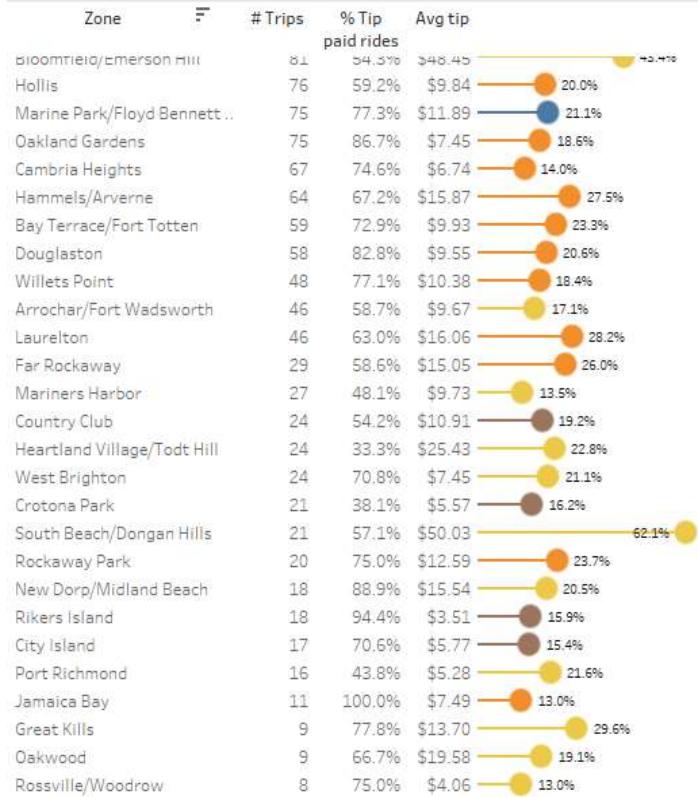
Payment Type	# Trips	Tip Paid Trips	% Tip paid rides	Tip Amount (\$)	Total Amount from Trips with Tips (\$)	% Tip to Total Amount
Credit Card	21,367,346	20,332,094	95.2%	\$6,234,294	\$348,063,764	16.2%
Cash	10,853,542	10	0.0%	\$41	\$233	17.7%
No Charge	160,800	320	0.2%	-\$369	\$1,510	-24.4%
Dispute	50,156	78	0.2%	-\$251	\$1,244	-20.1%
Unknown	147			\$0		

Credit Card customer: Percentage of Trips getting Tips and Tip % during the day



Tip by pick up zone

Bronx Brooklyn EWR Manhattan Queens Staten Island



Summary Rides During Day Ride Duration Tips Pick Up to Drop Off Incremental Revenue Paid extra Median Trip Duration by Hrs by ... Distance

Analysis of New York City Taxi Traffic Data

Volume of Business - Potential for Revenue

Trips by borough

Select borough to get details below

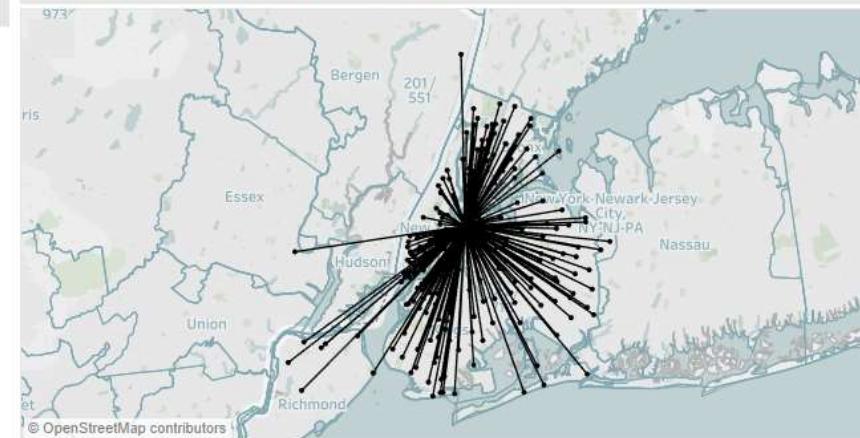
Manhattan	86.6%	27,621,589
Queens	8.0%	2,550,102
Brooklyn	4.9%	1,579,305
Bronx	0.5%	158,919
EWR	0.0%	2,009
Staten Island	0.0%	1,512

Trips by zone for Queens

Select Zone to get Drop Off details on right

Queens	LaGuardia Airport	653,385
	JFK Airport	650,428
	Astoria	220,071
	Elmhurst	144,622
	Jackson Heights	108,138
	Sunnyside	95,138
	Woodside	89,301
	Long Island City/Hunters Point	85,163
	Forest Hills	84,677
	Steinway	79,519
	Long Island City/Queens Plaza	48,637
	Jamaica	42,847
	Old Astoria	37,605
	Rego Park	30,706
	Kew Gardens	27,494
	Flushing	25,235
	Elmhurst/Maspeth	24,367
	Queensbridge/Ravenswood	22,685

Drop off zones from pick up zone: Astoria



Statistics for trips starting from zone: Astoria to all drop off zones

	# Trips	Total Amount \$	Miles Driven	Avg Distance per Trip	% Tip paid rides
Astoria	61,778	454,225	50,673	0.8	31.3%
Steinway	25,755	245,108	36,662	1.4	36.5%
Old Astoria	21,690	173,248	22,555	1.0	33.9%
Sunnyside	12,282	123,203	20,040	1.6	32.2%
Jackson Heights	10,679	133,293	25,715	2.4	23.5%
Queensbridge/Ravenswood	9,627	79,739	11,812	1.2	28.5%
Woodside	9,506	97,940	16,328	1.7	29.8%
Long Island City/Queens Plaza	8,268	68,005	9,613	1.2	32.8%

[] Summary [] Rides During Day [] Ride Duration [] Tips [] Pick Up to Drop Off [] Incremental Revenue [] Paid extra [] Median Trip Duration by Hrs by ... [] Distance



Retail: Business Intelligence Dashboard Application



- Highly Intuitive Native App built on hybrid mobile development framework (IONIC)
- Fully integrated with the SAP BI data warehousing backbone
- 'On-Demand' dynamic report generation
- Search feature ensures ease of usage
- Multiple drill downs

One of the world's largest agro food retail corporations

Retail: Business Intelligence Dashboard Application (Cont..)

Core Technology

- IONIC (v1) hybrid development framework
- Extends SAP Workflows and Document Posting process and Reporting
- SAP BI BEx query output extensions on iPAD
- ABAP and XML

CP	CF	MEAP	MCAP

iOS	Android	BB	Windows	Others

Unique / Complex Features

- BI Dashboard Integration
- Dynamic runtime based use case on boarding

Enterprise Integration

- SAP 6.0 onwards

SDLC

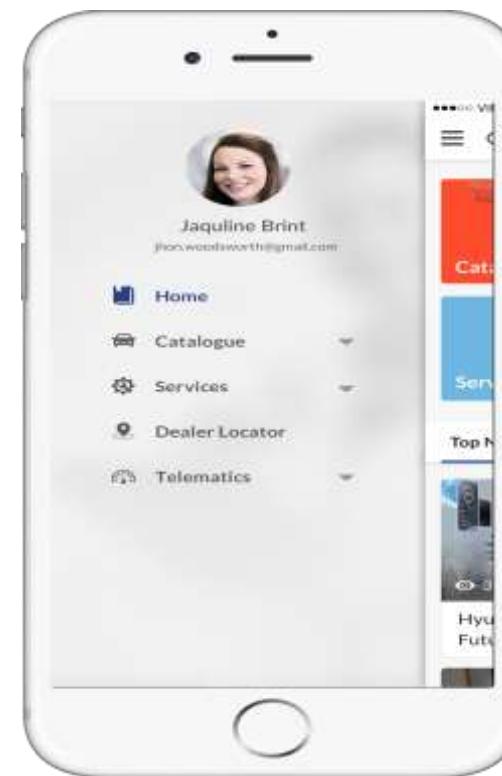
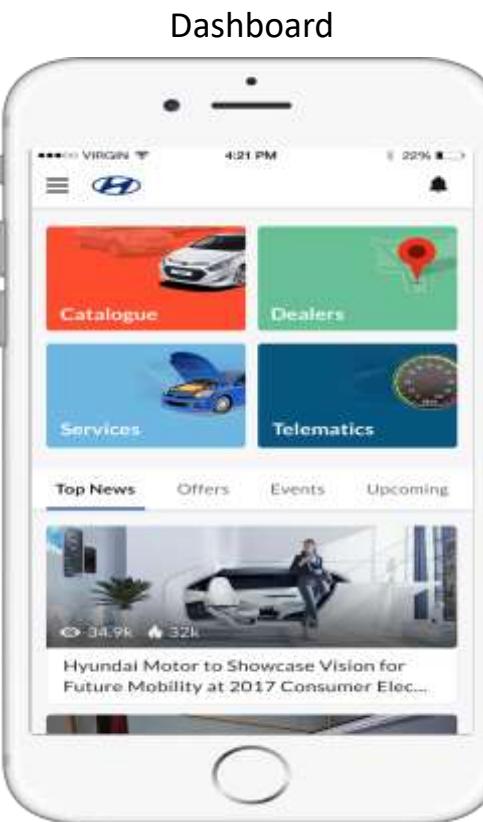
- Iterative Model
- Multiple iterations of design and development

Accelerator Used

- Concord Framework
- Data Synchronization

Telematics App

- Hyundai Connect app was conceptualised to provide a single platform for the Hyundai consumers to access the Telematics of their connected vehicle, locate dealers and manage services of their vehicle.
- This app is developed using react native framework targetting both Android and IOS platform



Real Estate: Property Search Application



- React Native app targeted for Android and IOS platform
- Faster & relevant search of property on rent and sale
- Developed web services for mobile readiness
- Location or GPS based property search
- Popular listing like new homes, property of the week, most popular locality etc.
- Social Media Integrations

No.1 destination for real estate information with more than 5.7 million unique visitors every month in UK

Real Estate: Property Search Application (Cont..)

Core Technology

- Android SDK 4.0.3 to 7.0, iOS
- Google Maps Integration
- GPS Integration
- Social Media Integration
- SOAP based Web Services

CP	CF	MEAP	MCAP

iOS	Android	BB	Windows	Others

Unique / Complex Features

- Property search – For Sale & Rent
- GPS based property search
- Social media integrations

Enterprise Integration

- MYSQL 5.5

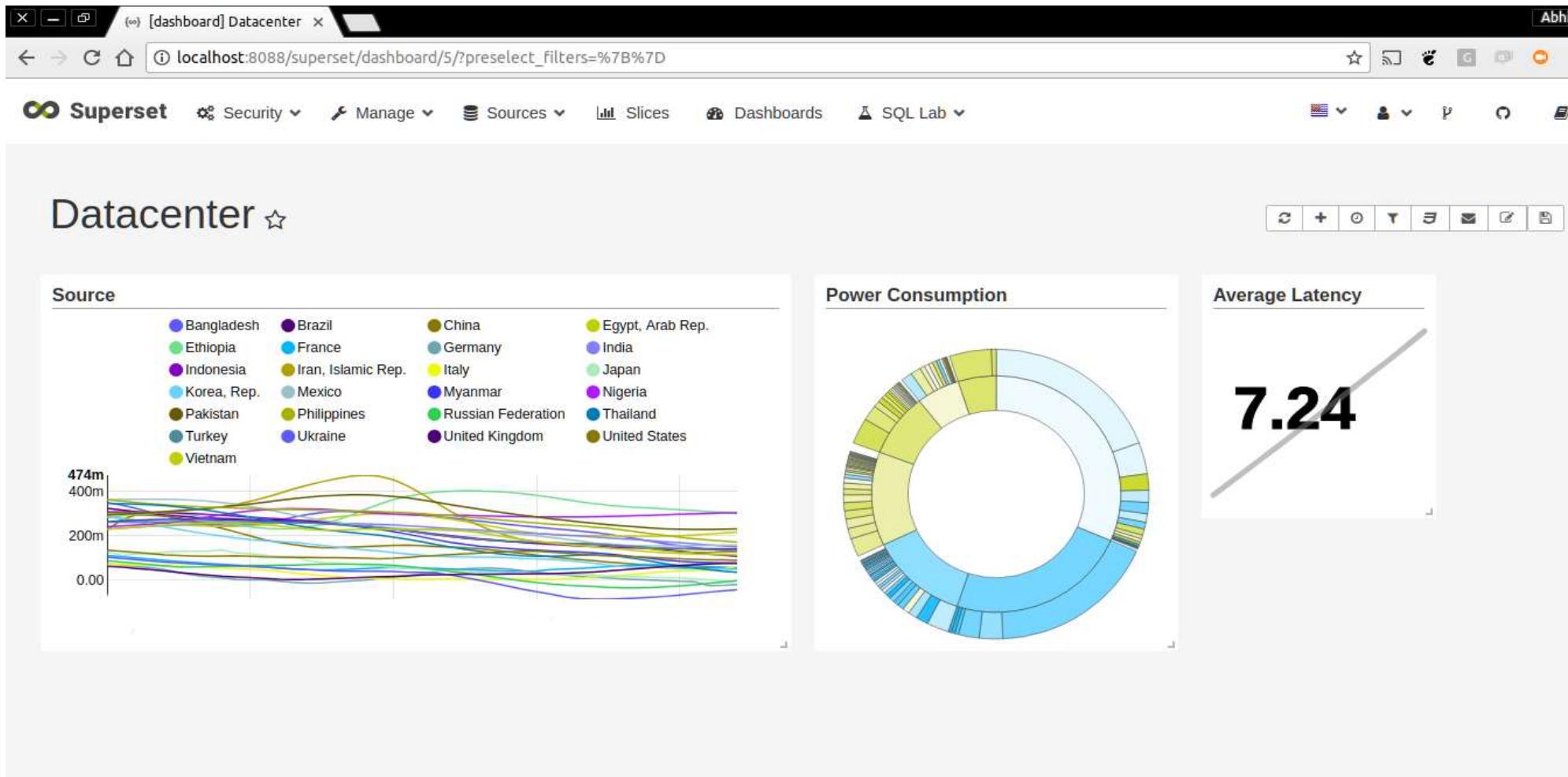
SDLC

- Iterative model

Accelerator Used

- None

Intelligent Datacenter: Monitoring and Predictive Maintenance



IaaS System Monitoring Dashboard

Administrator ▾

Select Customer Microsoft

Monthly Statistics
02/10/2012 - 02/11/2012

Disk Space: 29.35 GB (+13%)

Bandwidth: 12.5 GB (+17%)

Avg. Memory: 53 GB (-33%)

Avg. CPU: 80 % (+3%)

Disk Space Usage
58 percent
29000 MB / 50000 MB

Bandwidth
78 percent
3900 GB / 5000 GB

Memory
100 percent
64 GB / 64 GB

CPU
83 percent
3 GHz / 3.2 GHz

Usage History

Cpu Memory Disk Space Bandwidth

100

50

0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

— CPU

Virtual Machines (4)

vApps (3)

Networks (4)

Storage Volumes (2)

Open Tickets (1)

Running Tasks (1)

Dashboard

Customer

Users

Compute

Storage

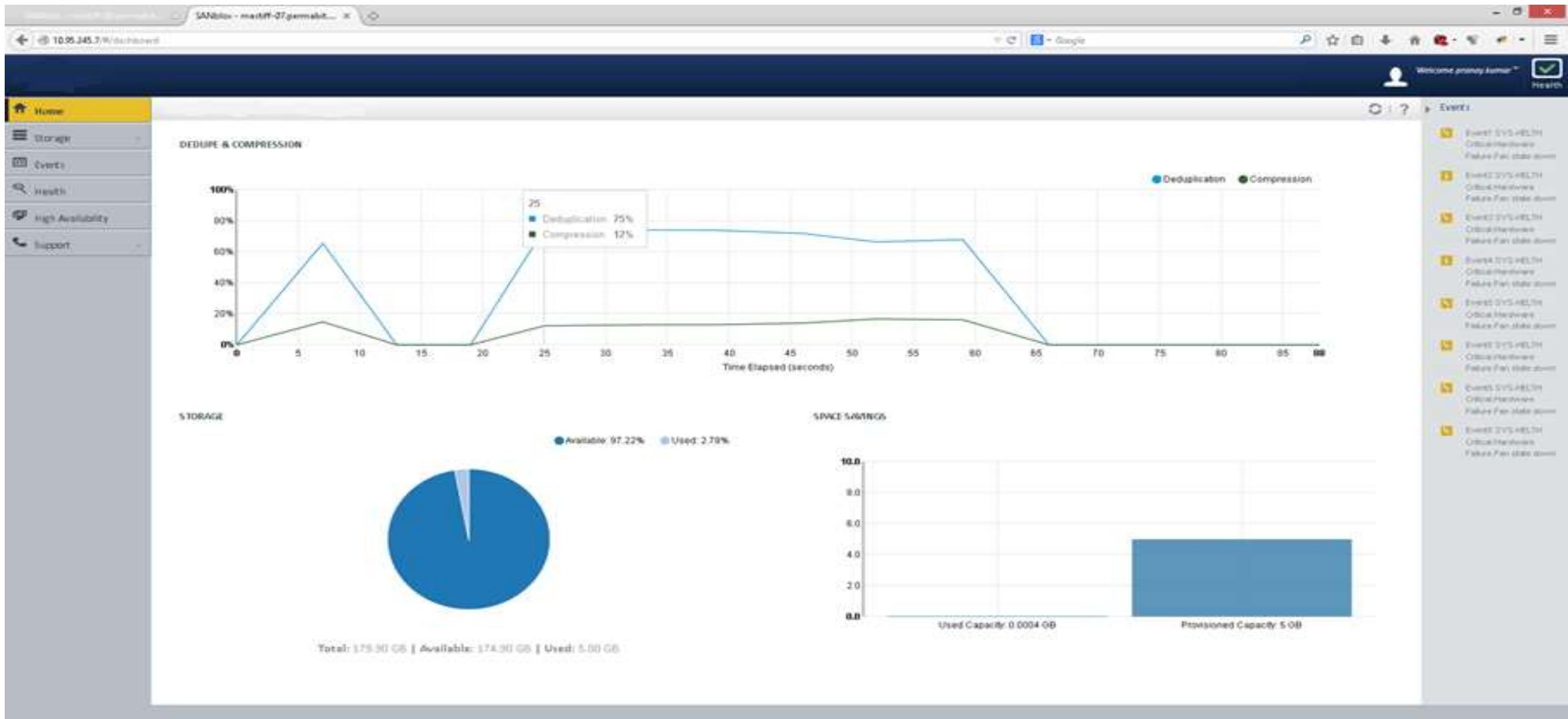
Networking

Billing

Logs

Support

Management Interfaces for Appliance



Management Dashboard

Welcome ABC

Register Initiators

Provision Storage

Provision From Template

Overall Capacity

65.2TB Total
18.7TB Hybrid
46.5TB Flash

Overall Usage

46.5TB Total
27.6TB In use
18.9TB Available

Hybrid

18.7TB Total
7.2TB In use
11.5TB Available

Flash

Current Performance

IOPS: 878

Throughput: 1876 KB/s

Latency: 10,423 µs

Performance Trend

Live

Application Instances

MySQL 34%
Database 35%
Others 31%

Total: 20

Provisioned Instances

80%
64 Online
16 Offline

Critical (1)
Warning (0)
Information (0)

Initiators

40%
8 Active
16 Inactive
20 Total

Storage Nodes

60%
12 Online
08 Offline

Critical (0)
Warning (0)
Ok (1)

Notifications

Type	Count	Last Seen
Critical	1	11:45 AM Today
Warning	0	
Information	0	

PSU Missing
HDD Missing
Storage Node in error state
Volume degraded

11:45 AM Today
07:30 AM Today
06:45 PM Yesterday
03:15 PM Yesterday

Search





Engagement

Calsoft was engaged with a Global IIOT solution provider to help them develop a comprehensive user interface, backend for administration and configuration in IIoT platform.

User interface provided below functionalities on end user premises:

- Add
- Activate
- Delete
- Deactivate sensors.



Benefits

- User friendly and interactive UI
- Better scalability and re-usability due to architectural changes.



Technology

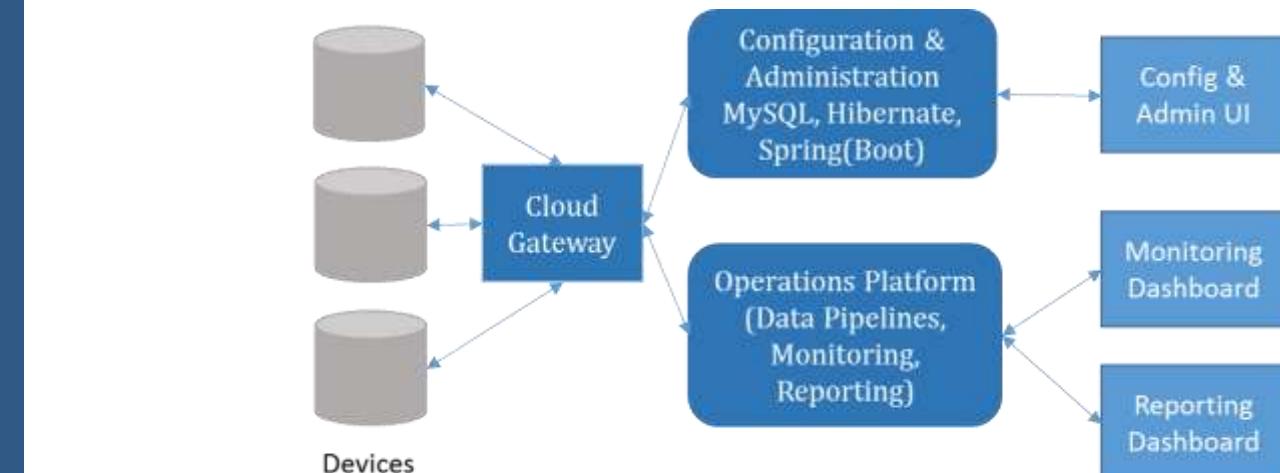
- React JS
- MySQL
- JAVA (Spring Boot + Hibernate)
- REST APIs



Solution

Calsoft developed a full stack which inculcated features like

- Role-based access control
- Responsive UI
- Asset management – device, machine, machine group, plant
- Single pane of glass to manage both Public and Private clouds objects.
- Customizable logo for product rebranding.
- Asset management - machine and machine group mapping
- Operation management on machines like schedules, jobs and categorizing production losses(loss due to setup time, operator's non availability, poor quality parts, machine downtime etc).



Digital Transformation for a Leading Manufacturing Company



Engagement

- Calsoft collaborated with the customer to revamp their supply chain and risk assessment software. As part of the engagement, we have revamped data collection framework, database, information architecture, GUI development and testing, API development, backend infrastructure development and testing.



Benefits

- Customer could benefit from the capability of Calsoft to ramp up 20-member team in one week for data collection
- Calsoft could provide a very efficient offshore onsite model of continuous testing
- Calsoft could maintain the knowledge in the ODC team and provided knowledge of database, API, UI, backend programming, test and test automation



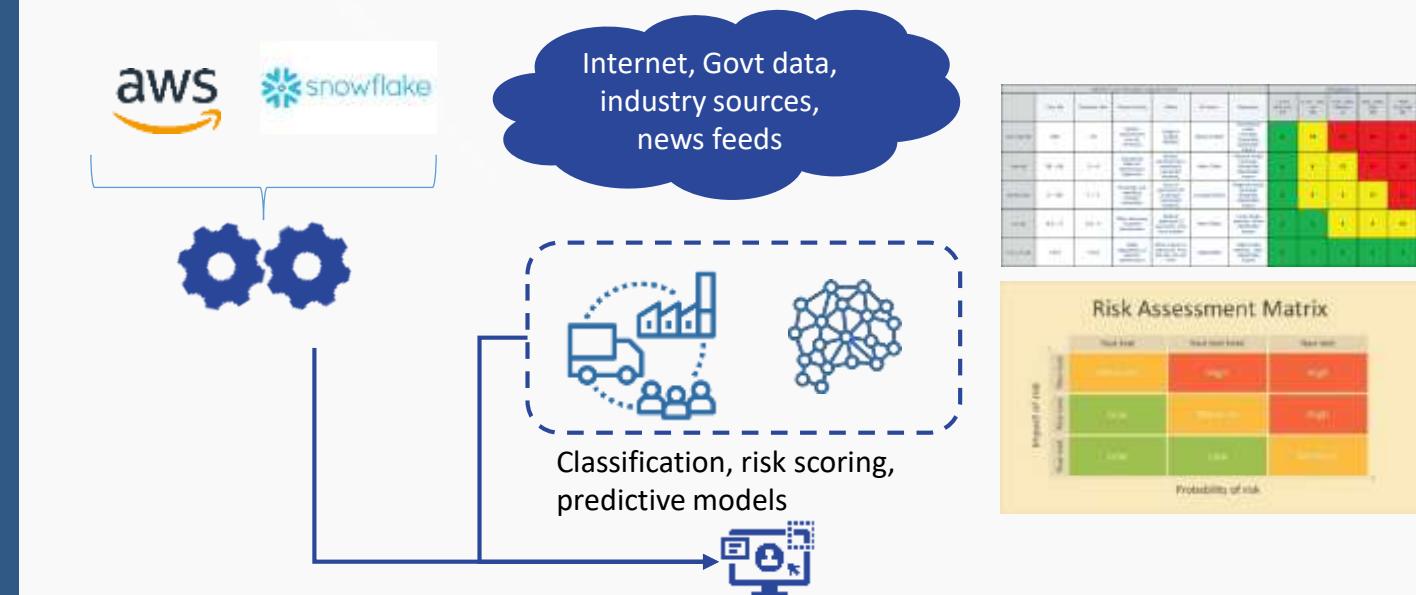
Technology

- .NET, Java, Swagger, AWS RDS, Snowflake, API, Python



Solution

- Development of UI and its continuous testing support to the development team in the US.
- Deployed python-based test automation framework for testing load and robustness
- Development of the UI for input of the company and its dependencies, visualization and management of risks based on 6 dominant factors such as geography, cyber, geopolitical, affiliation, Investment pattern
- Proactive database is created by manual data collection by a team of 20 data collectors
- Update framework is based on regular web scraping and harnessing of news items
- API systems based on Swagger was developed and updated based on the requirements of platform, supplier, client etc.
- R and AWS Sagemaker based initial classification and risk assessment model were upgraded to python based open-source model and Calsoft contributed in the framework development
- Database was initially developed in AWS and migrated to Snowflake later





Success Stories: ODC



Requirements

Challenges faced by the customer in their existing product setup pertained to:

- Alerts - Issues with 3rd party rule engine(Drools)
- Reports - 3rd party report engine (BIRT)
- RAPI - Unit testing REST API through JUnit scripts
- Integration with 3rd party applications Symantec CCS VSM
- Complexity of testing for alerts - Really large test matrix
- RBAC - PowerCLI Automation
- vSphere Web Client support for appliance (Tested Beta build from VMware)
- Router Mode Testbed Setup
- Testing the appliance in vSphere linked mode
- Testing the appliance for vCenter server

Benefits

- End to End deployment operations
- Provision of RAPI example Power CLI scripts that can further be used by customer's end-users to implement their own script
- PowerCLI Automation of all the RBAC operations helps customer's end user to use customer's appliance
- Enablement of support for Flex Client in vSphere 5.1 or later versions
- Enablement of 'Router Mode' for appliance features
- Support for vSphere linked Mode and vCenter Server Appliance from vSphere 5.1 or later versions

Project

Calsoft's ODC engagement with the customer underpinned:

- Creation of custom framework for managing SSL version mismatch and firing all REST APIs through JUnit scripts
- Customization of JBoss Rule engine
- Creation of a PowerCLI Automation Framework covering all RBAC Testing.
- Tracking all the new ops supported in vSphere Web Client, compared them with vSphere Windows Client.
- Successful creation of appliance Router Mode setup in Calsoft environment and testing customer appliance's features
- Configuration of vSphere linked mode in Calsoft environment
- Configuration of vCenter Server appliance in Calsoft setup and carrying out regression



vmware®



Cloud Backup and DR Dashboard Sample #1

Cloud Backup and DR Dashboard Sample #1

Welcome, John

About | Help | Logout

Recovery Plan Execution Status Data for last 24 hrs

In Progress 25%

Successful 50%

Failed 25%

Recovery Plan Creation Status Data for last 24 hrs

Ready to Run 45%

Draft 35%

In Validation 20%

Note: Data replication not enabled for some VMs. Click Validated recovery plan section for details.

Test Recovery Plan Runs Data for last 24 hrs

Failed 5%

Successful 45%

In Progress 50%

Alerts Data for last 24 hrs

Description	Status	Created On
Running rcp1	New	21/10/2013
Deleted dcse1	New	16/10/2013
Added frsh1	New	22/10/2013
Running rcp1	New	21/10/2013
Paused adfe3	Old	16/10/2013

Included in Recovery Plan Application Groups 24

Excluded from Recovery Plan Application Groups 12

CALSOFT CONFIDENTIAL

698

calsoft

Cloud Backup and DR Dashboard Sample #2

Customer under NDA

The screenshot shows a dashboard interface for managing recovery plans. On the left, there's a sidebar with four icons: a camera, a wrench, a clipboard, and a bar chart. Below these icons is a vertical list of navigation items: Application Groups, Recovery Plans (which is currently selected), Organizations, Servers, CDS, and ARM.

The main content area is titled "Recovery Plans". It displays a list of five recovery plans:

Name	Organization	State	Action
Acme_bc_1	Acme Inc.	Running	Run Now >
Acme_bc_2	Abc Inc.	Draft	Run Now >
Acme_bc_3	Xyz Inc.	Complete	Run Now >
Acme_bc_4	Cds Inc.	Running	Run Now >
Acme_bc_5	Mnc Inc.	Failed	Run Now >

Below this list, detailed information for the first recovery plan (Acme_bc_1) is shown:

Name: acme_bc_1
Organization: Acme Inc.
State: Failed
Deployment Platform: VMware
Management Server: 172.16.20.1
172.11.10.10
Resource Pool: acme_pool1

Last Edited On: 10/12/13
Edited By: csp_admin1
Next Scheduled: Monday, 12:30 AM

A large green box contains a numbered recovery order:

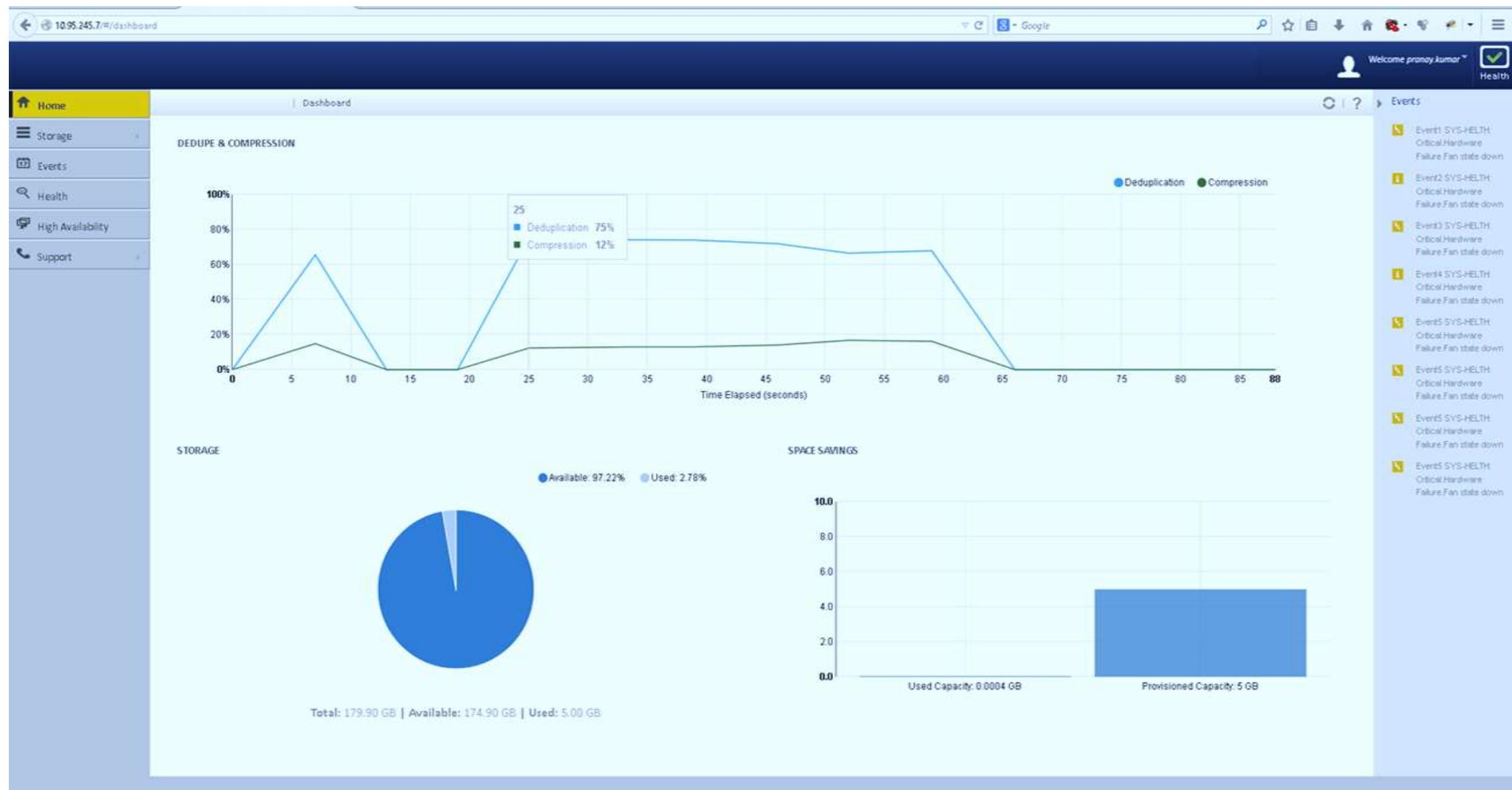
Order	Action	Is critical	Details
1	Start Appgrp1	Yes	(button)
2	Start Appgrp2	No	(button)
3	Start Appgrp3	Yes	(button)
4	Start Appgrp4	Yes	(button)

To the right of the recovery order, a "Recovery Order" table lists VMs with their current status:

VM	Status
vm1	Green
vm2	Green
vm3	Green
vm4	Red
vm5	Green
vm6	Green
vm7	Green
vapp1	Green

At the bottom of the dashboard, a message states: "Unable to start VM4 due to insufficient memory. Last data replication cycle for VMs executed on 10 Dec 2013 12:00AM".

Data Deduplication Dashboard Sample #3



Cloud Backup Wizard/Work-Flow Sample #1

About | Help | Logout

Welcome, John

Manage > Recovery Plans > Add Recovery Plan

Add Recovery Plan

Choose Application Groups: Select one or more application groups that will be a part of this recovery plan.

Recovery Plan Name: rc01

Application Groups:  →  →  →  → 

CDS: Select CDS storage array

Customer: Select customer

Server: Select VMware server

Resource Pool: Select resource pool for the deployment

Application Groups

<input type="checkbox"/>	Name	Created On	Edited On	VM(s)	Vapp(s)
<input type="checkbox"/>	appgrp01	12/25/13 12:43 AM	12/25/13 02:30 AM	3	2
<input type="checkbox"/>	appgrp02	12/25/13 12:43 AM	12/24/13 01:00 AM	2	1
<input type="checkbox"/>	appgrp03	12/25/13 12:43 AM	12/23/13 12:30 PM	3	2

Note: To create Application Group, go to [Manage > Application Group > Add](#) in main application.

Next Cancel

Data Deduplication Wizard/Work-Flow Sample #2

The screenshot shows a web-based storage management interface. The left sidebar has a 'Storage' section selected, with 'Frontend' currently active. The main summary panel indicates 4 LUNs, a total capacity of 179.90 GB, 10.90 GB used, 169.00 GB available, 5 host groups, and 4 connected hosts. A 'Create LUN' dialog box is open in the center, prompting for basic LUN details. The 'LUN Information' tab is selected, showing fields for 'Device Name*' (lun1), 'Description' (LUN Description/Asset Tags), and 'Size*' (2 GB). Below the dialog, a summary table lists 'Associated Host Groups' with one entry: 'shnhgroup1'. The right side of the screen displays a 'Events' log with multiple entries for 'Event1 SYS-HEALTH: Critical.Hardware Failure.Fan state down'.

10.95.245.7/#/frontend

Storage>>Frontend

Home

Storage

Frontend

Storage Pools

Backend

Events

Health

High Availability

Support

LUNs: 4 Capacity: 179.90 GB Used: 10.90 GB Available: 169.00 GB Host Groups: 5 Connected Hosts: 4

LUNS Host Groups Hosts

Create LUN

Please enter basic details for new LUN.

LUN Information

Device Name* lun1

Host Groups

Summary

Description LUN Description/Asset Tags

Size* 2 GB

Available Space: 174.90 GB

Back Next

Associated Host Groups

Name shnhgroup1

Events

Event1 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event2 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event3 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event4 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event5 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event6 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event7 SYS-HEALTH: Critical.Hardware Failure.Fan state down

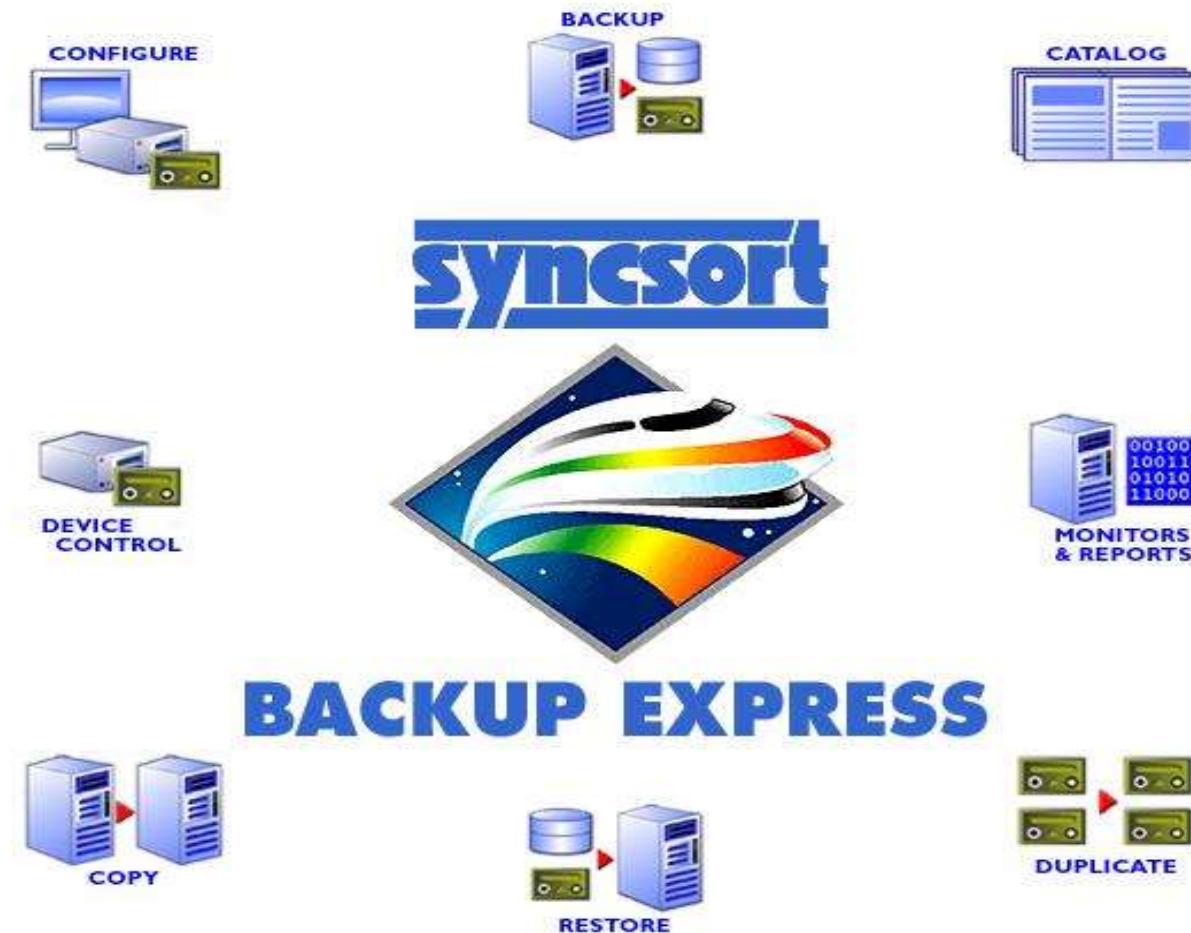
Event8 SYS-HEALTH: Critical.Hardware Failure.Fan state down

Event9 SYS-HEALTH: Critical.Hardware Failure.Fan state down

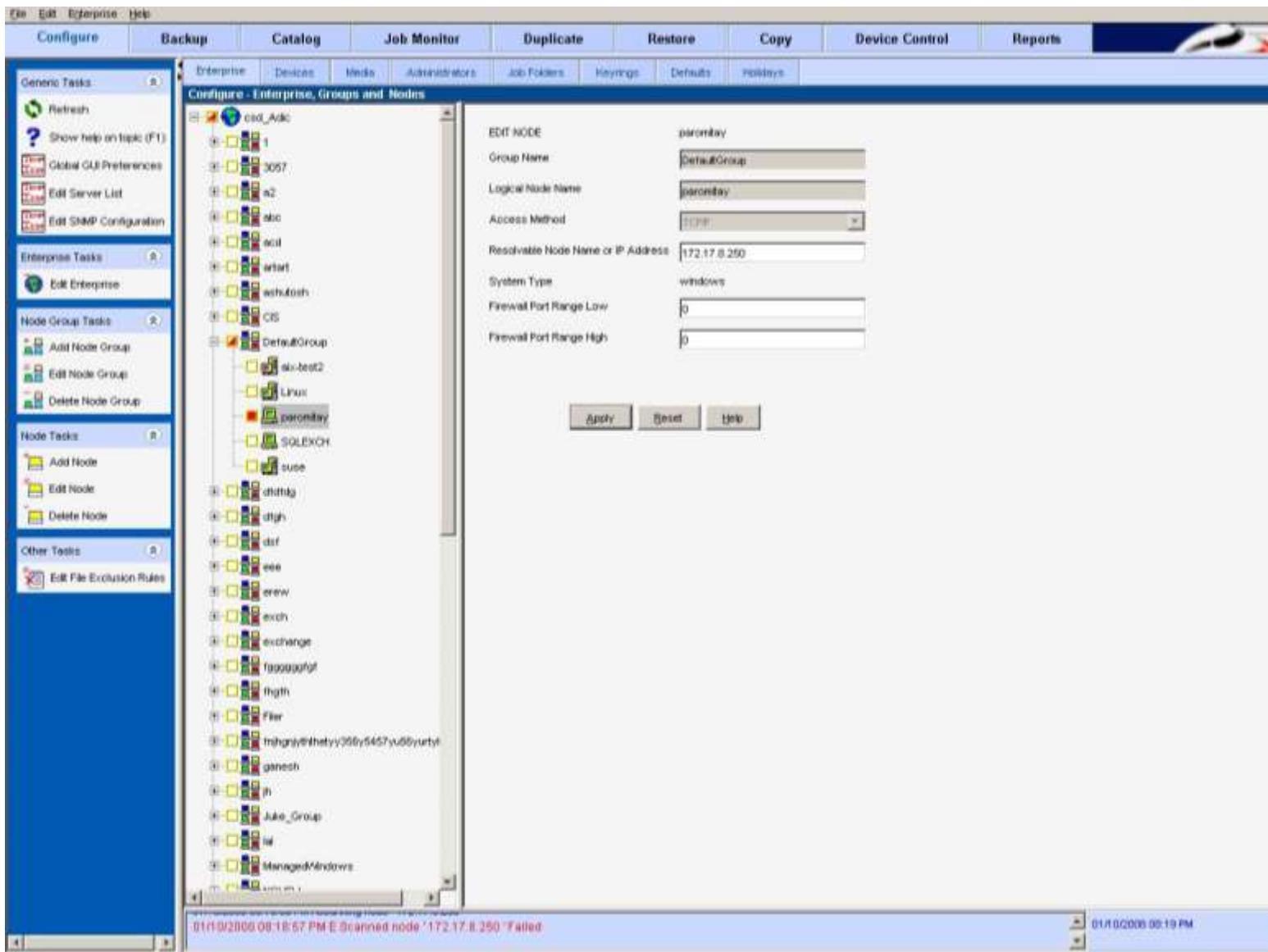
Event10 SYS-HEALTH: Critical.Hardware Failure.Fan state down

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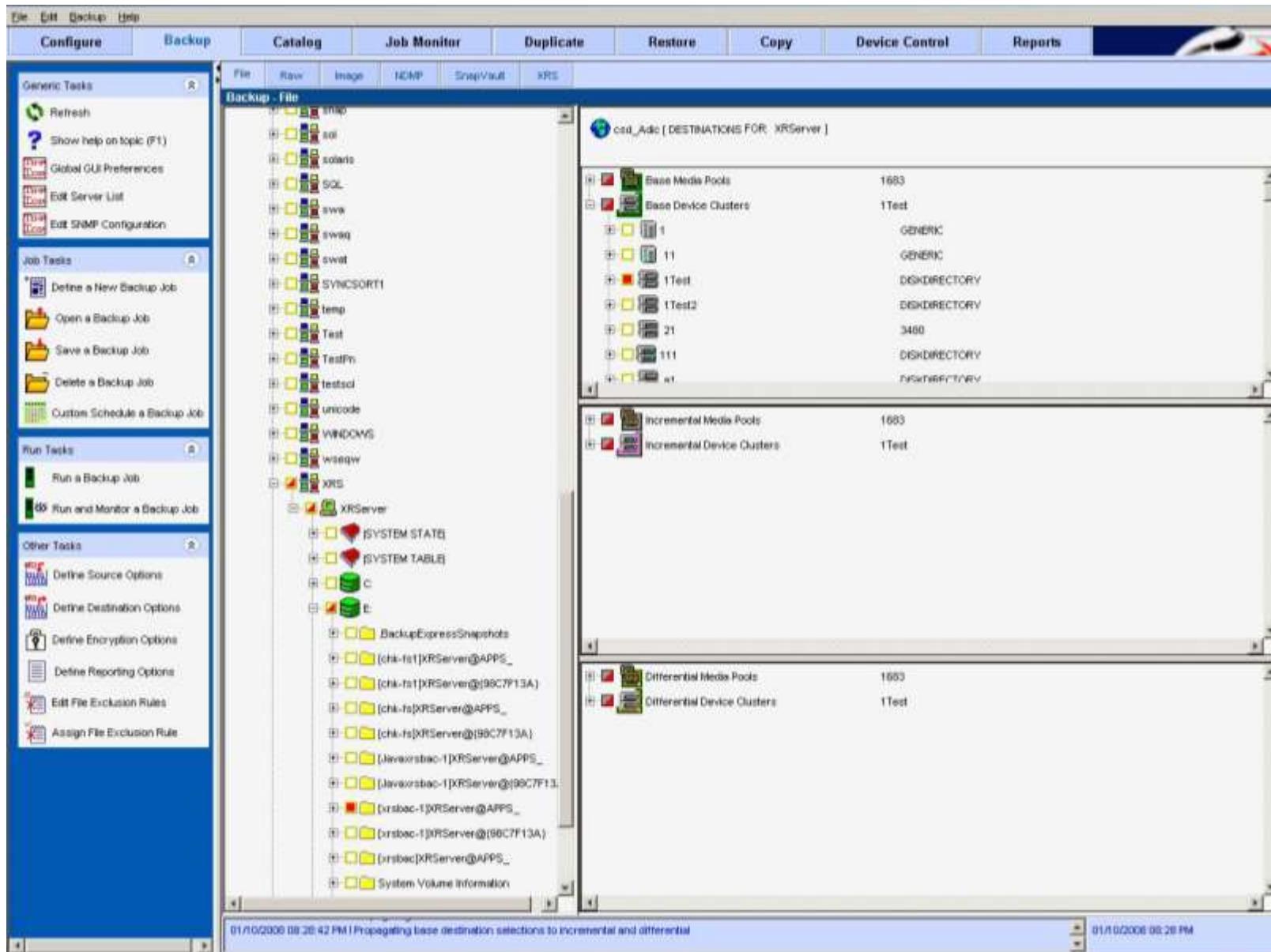
Screenshot – Launch Panel



Main - Configuration Screen



Backup File Screen



Device Control Screen

File Edit Window Device Help

Device Control - Devices

Device>All Devices	Device Cluster	Volume	Status	Control Path	Acquired By	Barcode	Request for Mount
222	111						
testSam	1Test						
tesDev	1Test2						
a1	21						
a2							
a3							
asusdisk	41						
dev1							
dev2							
x123	xxxx						
av	ABC						
SachinDev1							
mbt1	mbt						
x11	archive						
x13334							
newvoldev							
rtdev1							
a31	ashu-device						
am1							
shri							
dev8	ashu-device2						
dev5	ashutest						
calsoft1	calsoft		Down Device				
mbt			Acquire Device				
calsoft1	calsoft		Read Label				
DD1	DD		Label Tape				
soft			Format Tape				
tarve	Diskdr		Scan Tape				
st	tosata1		Verify Tape				
ganesht	ganesht		Path Down				
generic	generic						
hard	gfd						
she							
j	i						
mb2	IBSAN						
mb3							
gfd1							

01/10/2008 08:21:48 PM | Initialized GUI

01/10/2008 08:22:PM

Device Tasks

- Down Device
- Up Device

Label Tasks

- Read Label
- Write Label

Tape Tasks

- Format Tape
- Verify Tape
- Scan Tape
- Cancel Operation

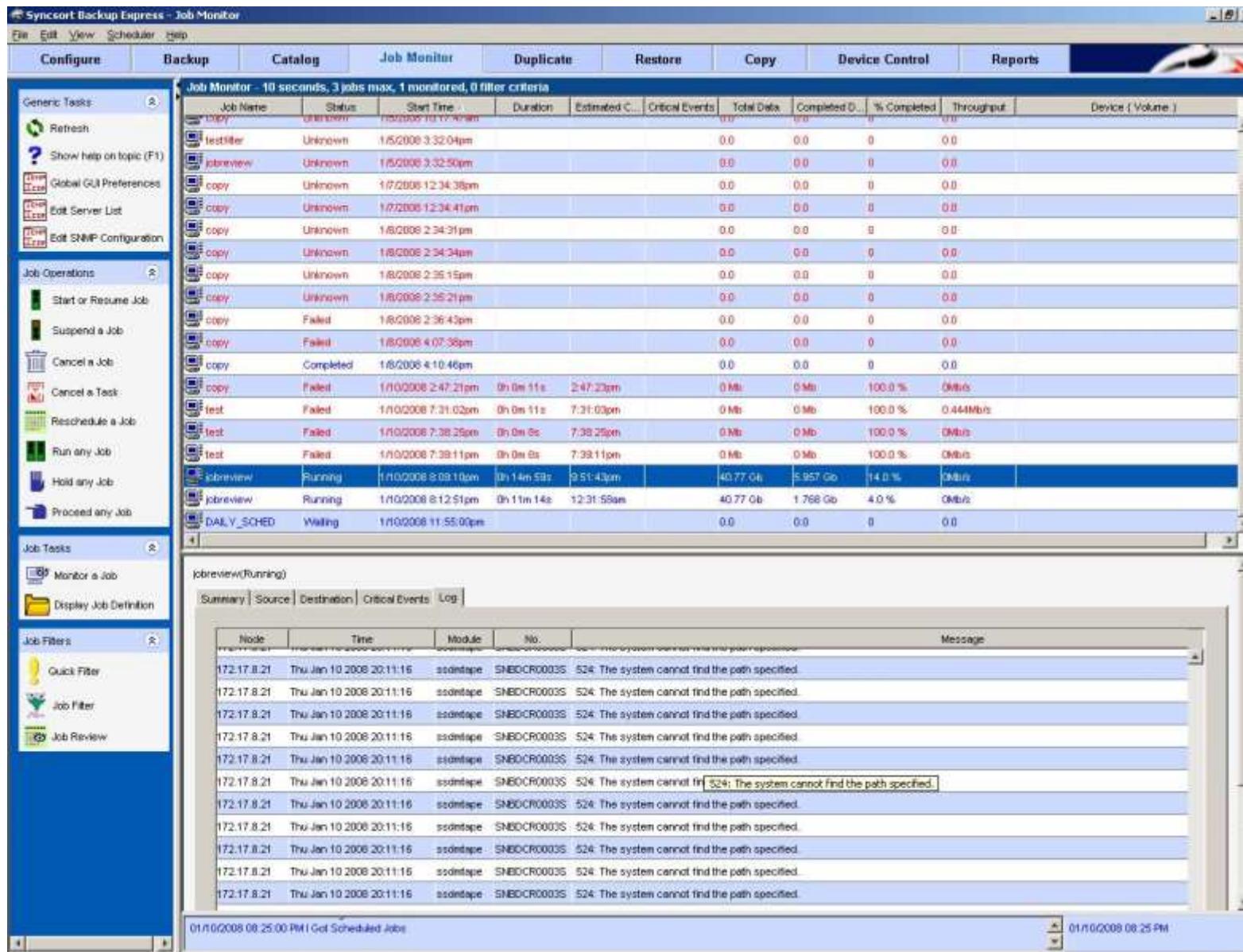
Monitor Tasks

- Monitor a Selected Device
- Monitor All Devices

Other Tasks

- Operate a Selected jukebox

Job Monitor Screen



Snapshot Solution Screenshot - 1

Welcome Admin - Administrator

Home Forum Support Profile Logout

Lab Administration

- Workspace
- Users
- Technical Support

Performance

Lab Topology

- Overview
- Architecture
- Products
- Security
- Networking

About

- Company
- Contact Us
- Privacy Policy

Home > Support



Email

Your company's assigned business consultants and technical engineers are always available via email to address your questions and/or issues. Response times may vary based upon your company's specific VIRTERA technology lab arrangement/agreement.

Chat

Business consultants and technical engineers are available for real-time on-line chat. Availability varies based on time-zone differences and the arrangements made by your company.

Call

Your VIRTERA contact is available by phone to discuss your use of the Technology Lab, to assist you with business and/or technical questions, and to help you make arrangements to plan your solution implementation activities.

Availability times vary based on the arrangements made by your company.

Collaborate

VIRTERA has created a community whereby clients can share their experiences, make recommendations and discuss business and technical issues in a closed forum. Discussions are organized by technology, solutions, vendors and various business areas. Unique in the market place, this area provides a private forum to discuss products without vendor sales pitches.

Read

Learn

Snapshot Solution Screenshot - 2

The screenshot shows a web-based administrative interface for a VMware lab. The left sidebar contains a navigation menu with sections like Lab Administration, Performance, Lab Topology, and About. The main content area is titled "VMwareLab1 Details" and displays various configuration settings for the lab.

Setting	Value
Lab Name	VMwareLab1
Description	Lab to test the VMware desktop virtualization solution Max. Characters: 250
Client Name	Google
Configuration Name	VMwareConfig1
Valid Till (yyyy/mm/dd)	2009/05/31
Entitled AD Group Name :	VMwareConfigGrp
VMware VI3	ESXI-SERVER(10.1.3.30)
VMware View	VMwareViewWin2k8_Standard(10.1.3.30)
VMware View Composer	VMware View Composer1(10.1.3.15)
VMware ThinApp	ThinApp01(10.1.3.70)
AppSense Environment Manager	APPSENSE-TS(10.1.3.73)

At the bottom of the form are "Apply" and "Cancel" buttons.

Snapshot Solution Screenshot - 2

Administrator ▾

Dashboard Customer Users Compute Storage Networking Billing Logs Support

Compute

Home > Compute

Dashboard vApps

CPU

CPU usage %

Time	Green (%)	Red (%)	Blue (%)
12:00A	95	5	20
4:00A	75	95	15
8:00A	45	10	15
12:00P	40	10	10

Memory

memory usage (GB)

Time	Blue (GB)	Red (GB)
12:00A	18	2
4:00A	5	12
8:00A	10	12
12:00P	10	5

Disk Space

Used Space : 56.66 % Free Space : 43.34

Type	Percentage
Used Space	56.66 %
Free Space	43.34 %

Information

Virtual Machines: 9 vApps: 4 Networks: 4 Storage Volumes: 2

Snapshot Solution Screenshot - 1

Administrator ▾

Dashboard Customer Users Compute Storage Networking Billing Logs Support

Select Customer Microsoft

Monthly Statistics
02/10/2012 - 02/11/2012

Disk Space Usage: 58 percent (29000 MB / 50000 MB)

Bandwidth: 78 percent (3900 GB / 5000 GB)

Memory: 100 percent (64 GB / 64 GB)

CPU: 83 percent (3 GHz / 3.2 GHz)

Usage History (CPU):

Date	CPU Usage (%)
1	15
2	20
3	40
4	35
5	60
6	60
7	55
8	45
9	45
10	80
11	40
12	45
13	95
14	75
15	75
16	70
17	70
18	65
19	55
20	45
21	45
22	80
23	40
24	45
25	90
26	70
27	70
28	65
29	65
30	55

Virtual Machines: 9 vApps: 4 Networks: 4 Storage Volumes: 2 Open Tickets: 1 Running Tasks: 4

Network Monitoring – ESXi Kernel Module



Engagement

Calsoft was engaged with the client for building a ESXi kernel module for packet monitoring. The engagement underpinned:

- Building ESXi kernel vib module
- Resolving performance challenges of Network Filter Driver in large infrastructure



Solution

- Calsoft worked with its customer in all the phases of product development life cycle (PDLC) –design, coding and testing.
- Worked on Network Filter Driver to assure performance and stability of driver
- Worked on management server to assure robustness
- Designed and executed test plans for complex business use cases
- Benchmarked the solution for performance



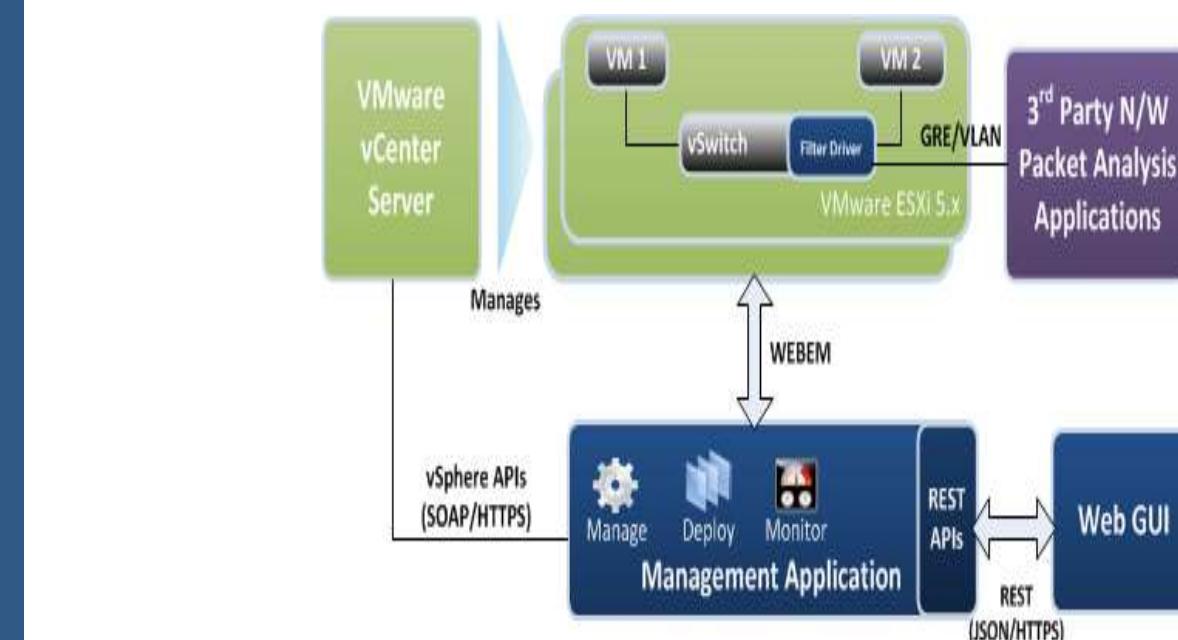
Benefits

- Client will experience improved performance of Network Filter Driver and Management application



Technology

- C, Python, Django, HTML, jQuery, CSS3, pywebem, pysphere



User State Migration solution



Engagement

Calsoft was engaged with the client for development of backup & restore library / tool that will remove the client's dependency on Microsoft USMT solution.



Benefits

- Migration library will help in removing MS licensing charges for the client, thus leading to cost saving.
- Enhanced customer support can be provided by our client.



Technology

- C/C++, MS XML, Windows 32/64 bit



Solution

Design & Development

- Design and development of client's Backup & Restore component for selective windows applications and settings.
- Client's Backup & Restore merged into single library "Client Migration".
- Client's Migration Library capable of taking backups and restoring USMT as well as backups.
- Developed CLI and UI interface for testing the Migration libraries.

Features

- Light weight library
- Plug in play solution for backup and restore.
- Full and customized backup and restore using xml configuration.
- Support for Abort operation.
- Logging enhancements

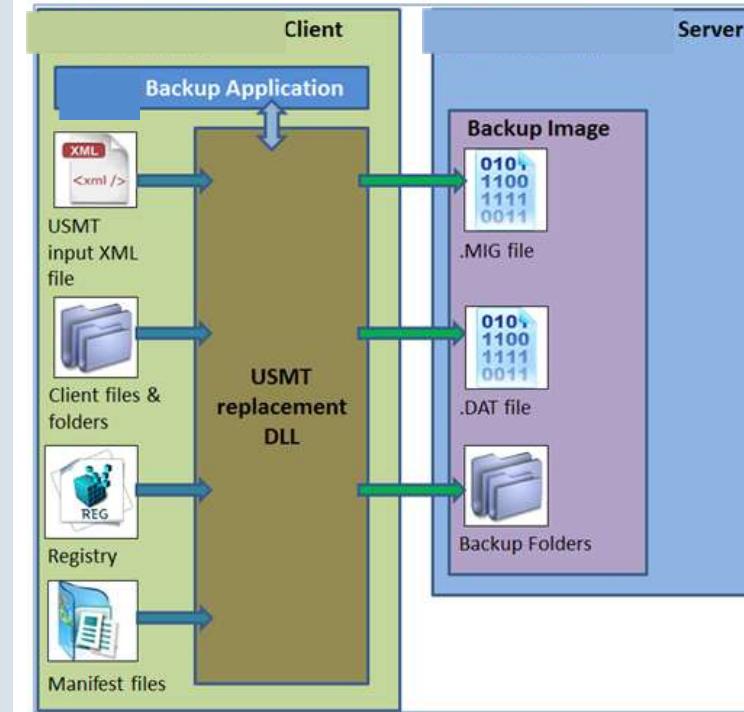


Figure .. - USMT Backup Replacement DLL Block Diagram



**Success Stories:
Telecommunications**



Engagement

Accept Software is a Nokia-funded startup, building comprehensive project & program management software. It was looking to setup a team in India. Calsoft ramped-up a team of 80+ engineers located in Pune for Accept Software. The team became the biggest development center for the startup, which later assimilated the team and started operating its own centers.

Eventually the team migrated to Accept Software.



Technology

- JAVA (J2EE), AngularJS, Cloud, REST, SOAP, Web-Services, Oracle



Solution

- Provided our best resources immediately after the project kick-off
- Hired quality resources specifically to meet our customer's requirements
- Helped them in setting up and run their India Development Center
- Provided resources having expertise on JMETER, JUNIT and "Ruby on Rails"
- Hired resources who have worked on technologies like Web2.0 (AJAX), J2EE, Core-Java, JSF, Hibernate
- Spring framework, ETL, Databases (Oracle 10/11g) and JIRA
- Worked on feature development, automation suites (using JMeter, JUnit) and integration module for integration between Ideas (on Ruby) and Requirements product lines



Sterlite Edge Orchestrator



Engagement

- Development and Testing of Sterlite Edge Orchestrator from scratch
- Development and testing of ML Services developed from scratch to send the Edge Site metrics to GSO (Global Service Orchestrator) and Data Lakes
- Integration with Sterlite Telco Applications



Benefits

- Microservices based architecture – each component has its own Database
- Rest based implementation for easy integration with GSO
- User friendly UI
- Hassle free installation of Edge Orchestrator – docker based, helm based



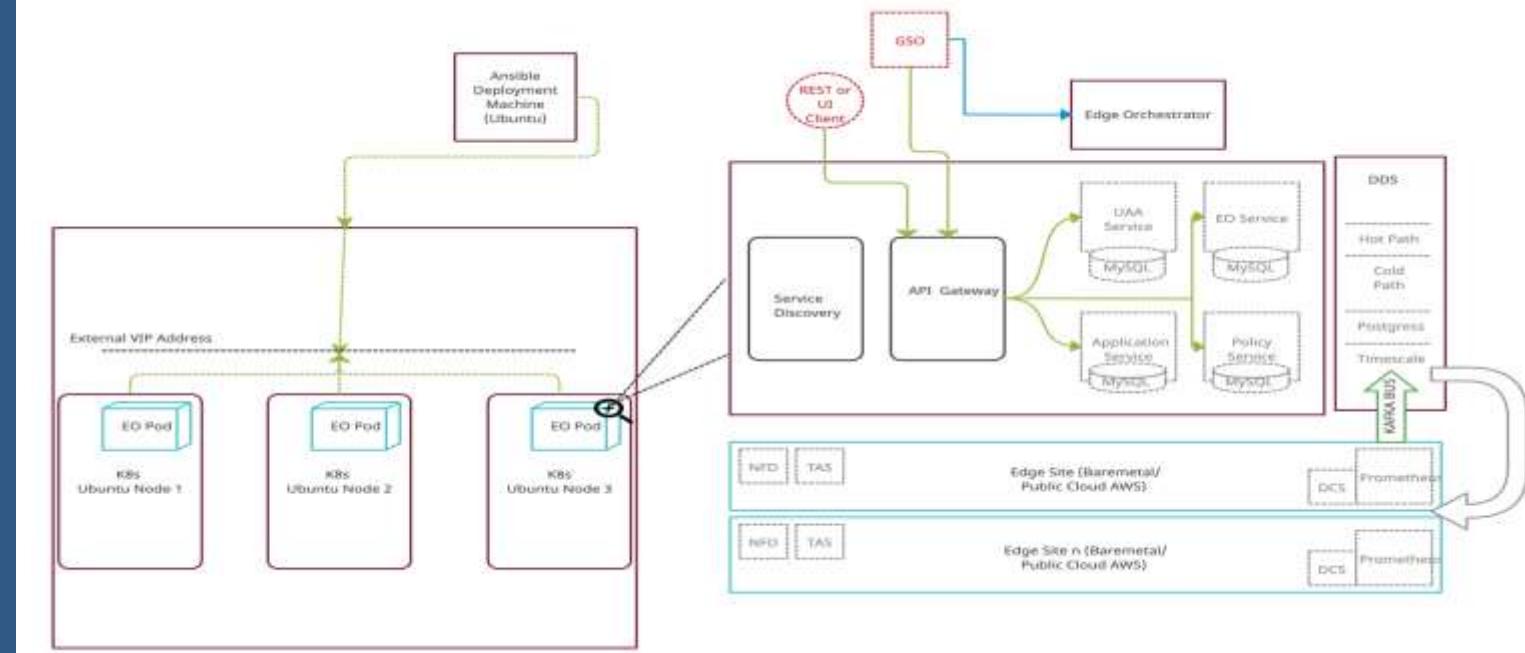
Technology

- Jhipster (to generate microservices)
- Angular10/Java/Ansible/Python/Shell scripts
- Git/Jenkins
- Docker/Helm/Kubernetes



Solution

- Onboard and deployment of Edge Site (including Operating system installation and networking) and Kubernetes cluster on that Edge Site - site can be a Baremetal server, AWS Amazon instance OR Hybrid (combination of Baremetal and AWS instances)
- Deployment of VNF/CNF helm based applications and operators on multiple Edge Sites
- Kubernetes Cluster Scalability (add multiple masters and multiple worker nodes)
- Edge Orchestrator and Edge Site based Policy Enforcement
- Integration with Sterlite applications like Edge Analytics System (monitoring applications in Edge Site) for Closed Loop Events and trigger actions.
- Integrated with Sterlite RIC (RAN Intelligent Controller)
- Support Prometheus/Grafana for Site Monitoring
- ML Services - Collect Application, Network, Infrastructure and VM/Container level metrics and send it to GSO & Data Lakes, use data to plot Data Visualization Graphs





Engagement

- Develop R1 Interface from scratch and test it.
- Develop “Data collection and repository function” (Internal SMO Framework service) from scratch and test it.
- Deploy Elastic Search based Data Repository
- Deployment of all above applications in Kubernetes Platform
- Develop Subscription Manager service (Internal SMP Framework service) from scratch and test it.
- Integrate R1 interface, Subscription Manager service , Data repository and Data collection & repository function to demo Rapp consumer and Rapp producer use case



Benefits

- Microservices based architecture
- Non RT-RIC framework for optimization of O-RAN Elements
- Standard O-RAN Non RT-RIC compliant based framework
- Hassle free installation of all service – kubernetes based yaml



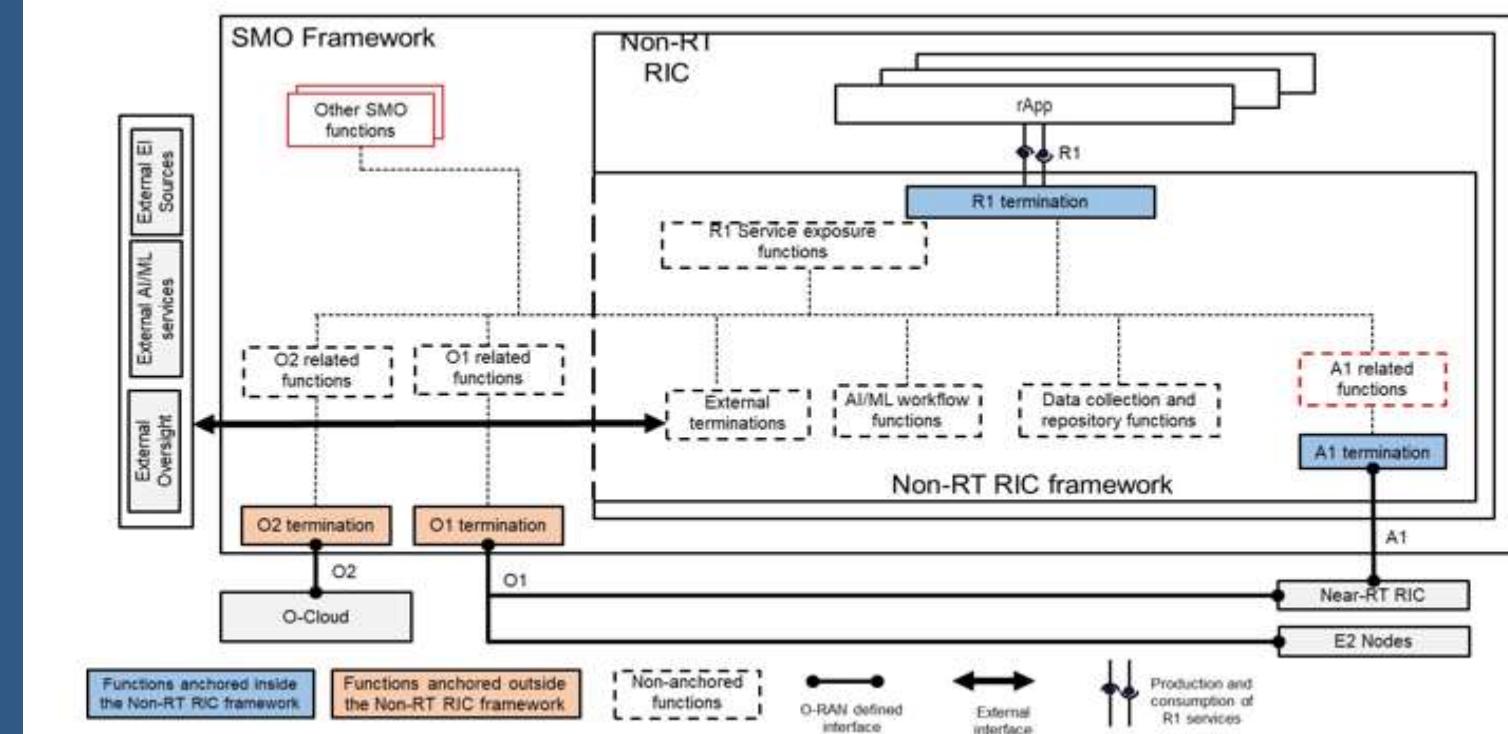
Technology

- Java spring boot framework
- Kong/Konga - API Gateway
- Keycloak
- Java
- Docker/Kubernetes



Solution

- Non-RT RIC(O-RAN non-real-time RAN Intelligent Controller) - logical function that enables non-real-time control and optimization of O-RAN elements and resources, AI/ML workflow including model training and updates, and policy based guidance of applications/features in Near-RT RIC.
- Non-RT RIC Applications (rApps) - ML applications designed to run on Non-RT RIC. It leverages the functionality exposed by the Non-RT RIC to provide added value services relative to intelligent RAN optimization and operation.
- Non RT RIC Framework exposes set of internal SMO Framework services to rApps via its R1 interface. Rapp need those services for their runtime processing. R1 interface .
- All the SMO Framework services like AI/ML workflow functions, Data collection and repository functions etc are exposed to Rapp using R1 Service Exposure functions and R1 Interface.



Sterlite - ONAP-Based SON (Self Organizing Networks) – 5G O-RAN PCI and ANR Optimization



Engagement

- Development and testing of Open-source ONAP Closed loop framework components
- Complete ownership of RAN Simulator, SON Handler , OOF (ONAP Optimized Framework), Policy and SDN-R (Opendaylight based Software Defined Network - Radio) modules
- Build expertise in each module which is a separate project with different architecture Resolve all technical issues in all above modules to achieve Close loop automation of PCI and ANR Optimization use case
- Customize framework as per customer requirement



Benefits

- Microservices based architecture
- Deployment of entire ONAP OOF framework in Kubernetes cluster
- ONAP based Automated Control loop for solving PCI and ANR Optimization Use case
- User friendly SDNR-R and RANSIM UI for demo'ing PCI and ANR Optimization Use case
- Hassle free installation of ONAP Components – docker based, kubernetes based



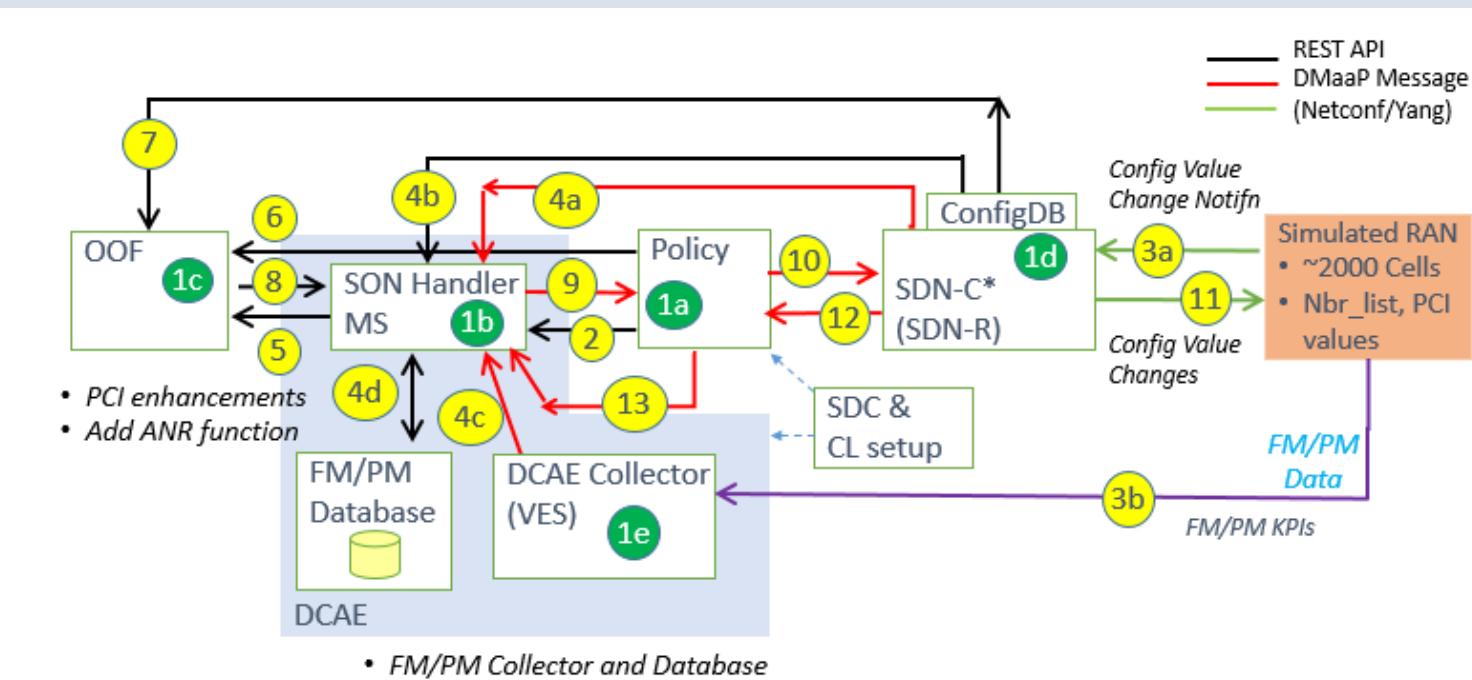
Technology

- Netconf/yang,, VES (Virtual Event Streaming), Rest API framework
- Kafka based messaging
- Python based Minizinc ML Model
- Angular10/Java/Python/Shell scripts
- Git/Jenkins
- Docker/Helm/Kubernetes



Solution

- ONAP is a Open-source platform, with simple open-source algorithm for Control loop Action
- ONAP-Based SON (Self Organizing Networks) Framework solves 5G O-RAN use cases of PCI and ANR optimization using ONAP Optimization Framework (OOF)
 - PCI optimization: Assign PCI values to avoid PCI collision and minimize PCI confusion
 - ANR Optimization - PCI is re-optimized if neighbour relationship changes, (e. g. during distributed Automation Neighbour Relation (ANR) function in RAN)
- Leverage ONAP Optimization Framework (OOF) for SON, provides a policy-driven and model-driven framework for creating optimization applications for a broad range of use case
- Performs O-RAN analytics (DCAE), optimization (OOF), take decisions (Policy) and apply the decisions (SDN-R) back to O-RAN to complete SON Control Loop (CL).
- Companies can use framework to add proprietary SON solutions



K8S Analytics – Closed Loop Automation

Engagement

Calsoft is engaged with the client for development and Testing of SaaS based Kubernetes lifecycle manager

Solution

Calsoft is developing the whole platform including an ML based telemetry & closed loop automation component which is based on Apache Airflow. The analytics component creates DAGs for each of following work flows:

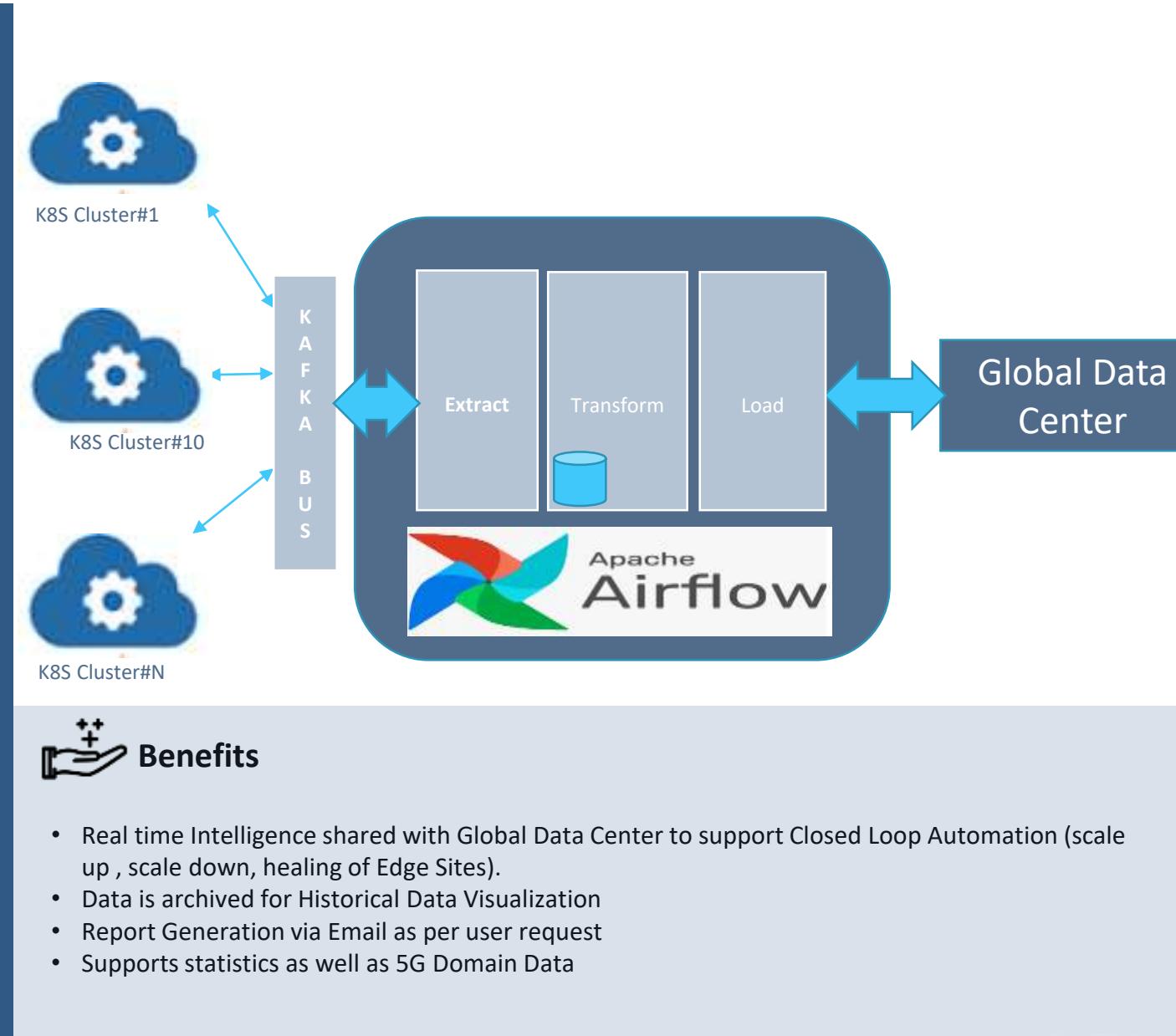
- Accepting the data from remote K8S clusters via Kafka Bus
- Perform Data transformation
- Extract intelligence out of the data
- Share the intelligence to Global Data Center via another Kafka Bus.

The engagement underpinned

- Designing & developing the K8S Lifecycle Manager platform
- Designing & developing the Telemetry Collector microservice running at remotely which collects Infrastructure and Application data from K8S cluster
- Designing and development of microservices for transformation and sending intelligence to Global Data Center
- Designing and implementation of DAGs in Apache Airflow
- End to end Testing of the platform including analytics piece

Technology

Apache Airflow, Python, Kafka , Go, Postgres DB, Zero MQ, 5G Services,



Creating VPP Plugin Based on ODP-DPDK for 5G Core Network

Engagement

Creating Vector Packet Processing (VPP) Plugins for OPD DPDK implemented by our client on X86 platform.

Solution

The Marvell VPP plugin has been developed and tested upon ODP-DPDK on x86.

This plugin supports following operations:

-PacketIO in poll-mode.

-PacketIO in event-mode.

-IPsec inbound and outbound processing in event mode. IPv4, IPv6 forwarding with poll mode.

IPv4, IPv6 forwarding with event mode.

IPsec inbound and outbound processing with event mode.

Technology

- Linux 5.4 ,

VPP Plugin

ODP-DPDK Implementation

Vendor Specific Software

Hardware (X86) based Platform

Benefits

- Knowledge of DPDK
- Embedded team experienced in ARM and X86
- Senior engineers with good networking skills

F5 Networks 5G-SA Core Testing – SCP(Service Communication Proxy)

Engagement

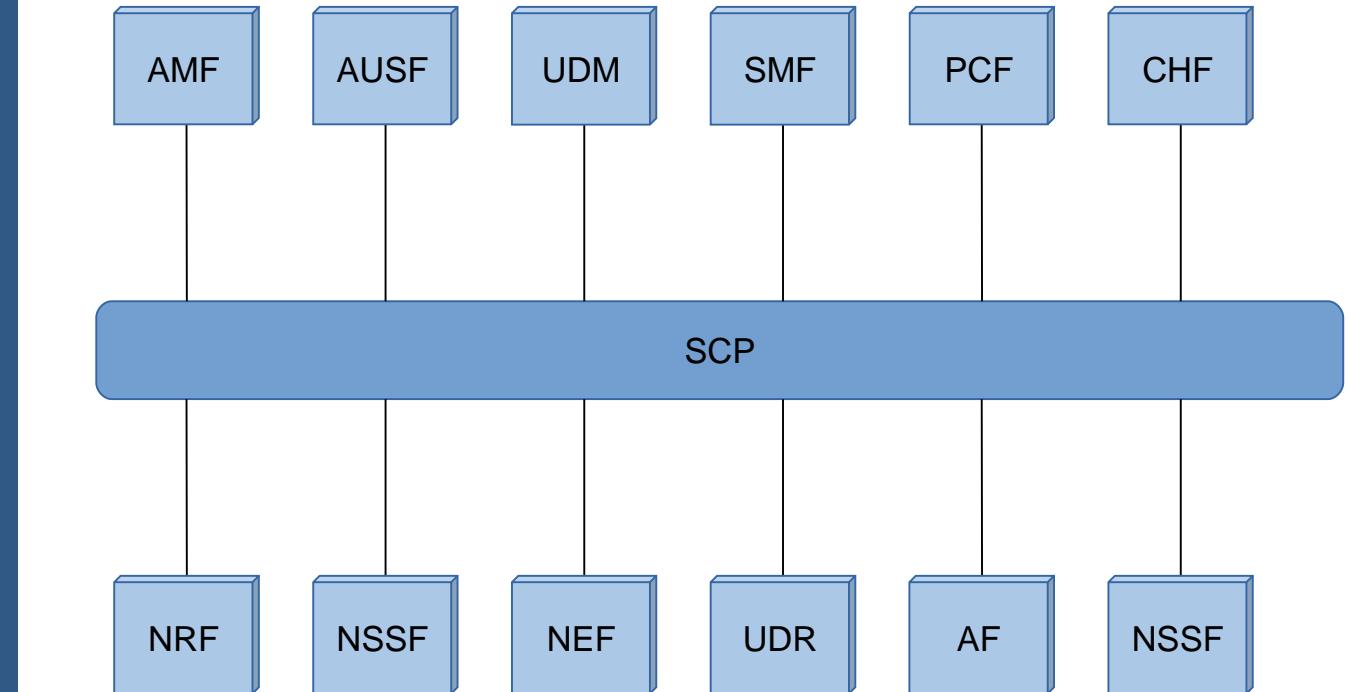
Calsoft is working closely with the customer to qualify their new 5G Cloud native NF – SCP.

Solution

- Test case development based on the features supported by the product.
- Deployment on various Private(VIO, OpenShift) and Public Cloud(AWS)
- Test environment setup and emulate NFs using Landslide, dsTest
- CI/CD Pipeline creation with Automated Tests to qualify the product.

Technology

- 5G , Openshift, AWS, Kubernetes, Python, Shell scripts



Benefits

- Load Balancing and Overload Control in 5G Core
- Resilient and Robust 5G Core Network
- API Interoperability when multi-vendor NFs are used by Service Provider
- Topology Hiding

Python SDK for Kubernetes, HELM, ArgoCD

Customer

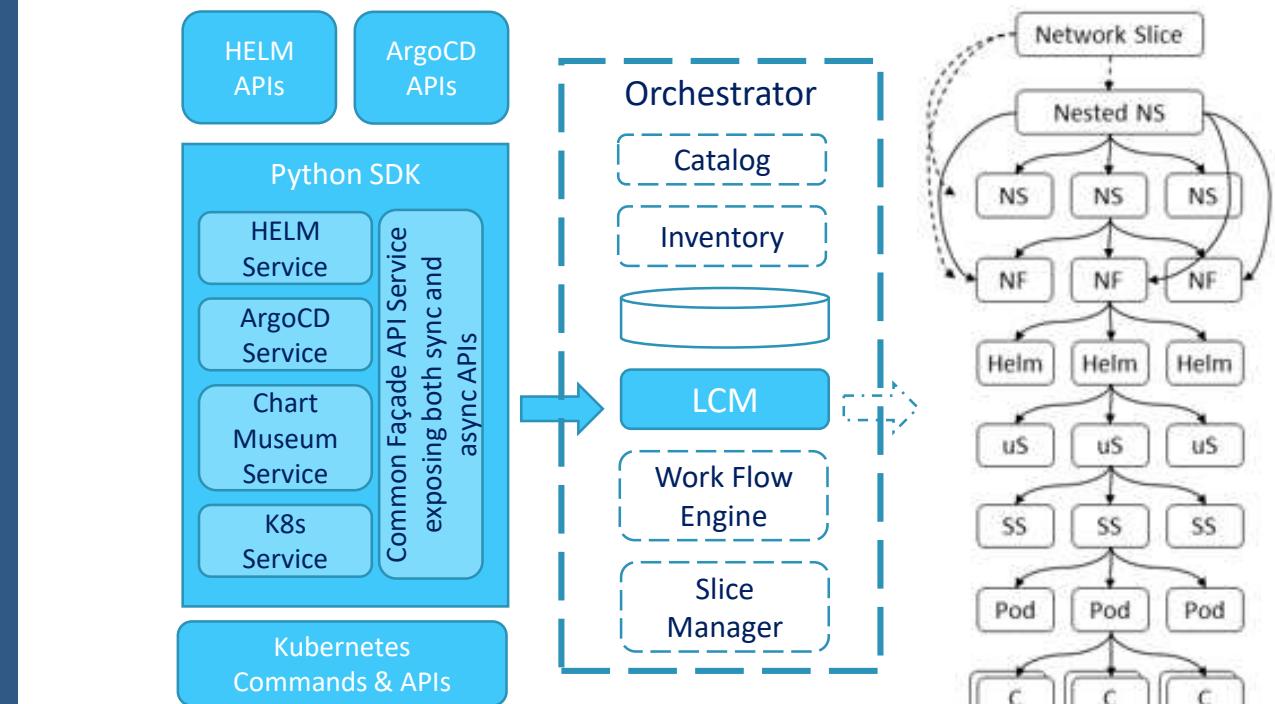
Customer is building the Telecom Network Slicing and Services Orchestration tool in which Life Cycle Management of the Network Slices and Network Functions are managed via the HELM charts. The LCM Module was being built in Python based Backend Microservice application requiring the need for using the available Kubernetes, HELM, ArgoCD APIs to be called from the Python Services.

Solution

- Python SDK framework was built
- Separate Service for both sync and async mode
 - HELM APIs
 - ArgoCD APIs
 - K8s Health check commands as APIs
- The SDK Packaged via Poetry
- Shipped as SDK Easily consumable in any Python based application.

Technology

- Python Fast API
- Poetry Packaging
- Kubernetes
- HELM Charts, Argo CD



Challenges

- Providing Single SDK for APIs Frameworks related to K8s, HELM, ArgoCD API
- Supporting the implementation of SDK

Calsoft Engagement (ZTD)



Engagement

- Build CICD Pipelines to have e2e automated deployments
- QA Automation
- Code Scanners
- Serverless Code deployment for the ZTD services (Device Bootstrapping process)
- Part of core Cisco ZTD team to discuss on Architectural Improvements



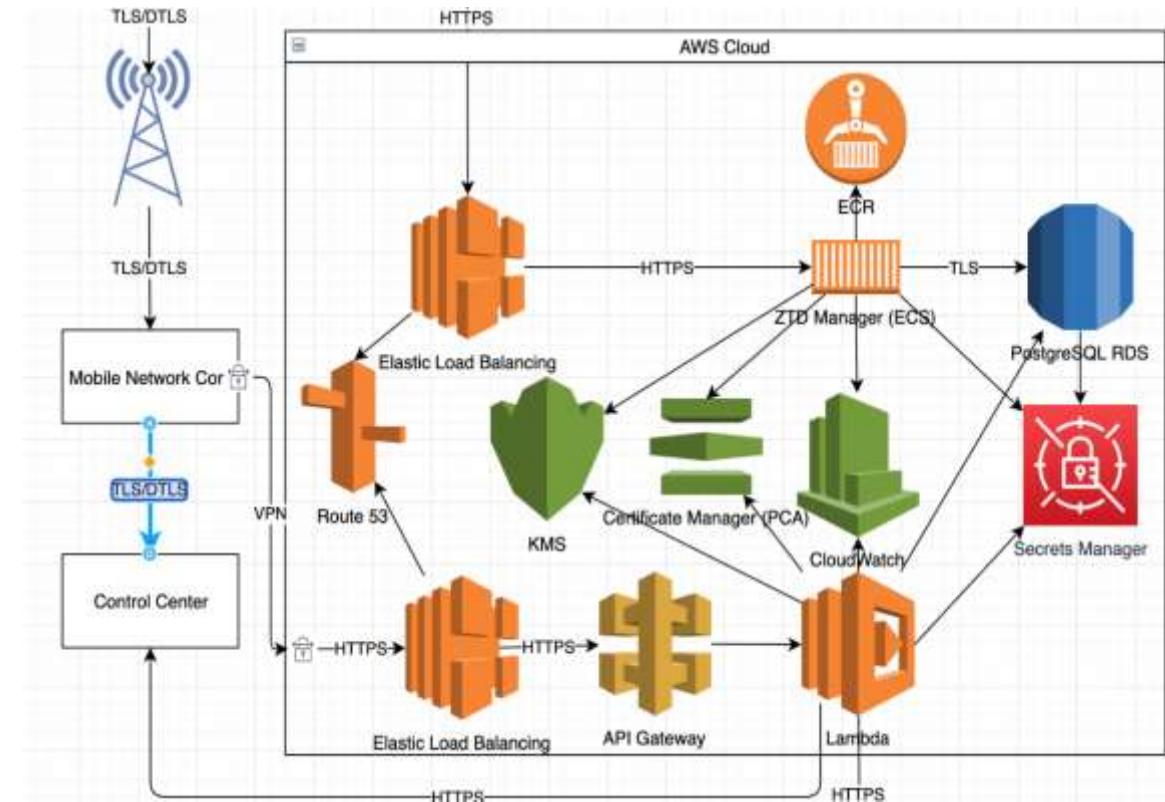
Solution

- ECS Fargate deployment on AWS for Containerized Application which can manage multiple AWS services in different availability zone.
- Git Branching for seamless code deployments
- Build Process to maintain different live environments like dev, QA, Staging and Prod
- Revamped ZTD deploy script and CloudFormation to harden on security aspects related to AWS (Least Permissions only)
- Device APIs on AWS Lambdas development.
- QA Testing (Soon Automation) for every release on QA branch.



Technology

AWS CloudFormation, Secret Manager, ACM, ECS, ECR, Lambdas, CloudWatch, S3, TaskDefinition, IAM, API Gateway, VPC, NAT, IG, Python3, Shell, Groovy, Jenkins, gradle, SonarQube, Swagger



Benefits

- Easy deployment as no servers to manage using AWS serverless deployment
- Continuous scaling with AWS Lambdas.
- High Available and scalable Application using AWS ECS
- Highly Secured using AWS Secret Manager with password criteria and rotation policies.



Engagement

The Cloud Automation Solution (CAS) will manage the Telco infrastructure provisioning, orchestration and monitoring which can be bare metal servers, private cloud or public cloud. The solution with features focused on Telco service providers need for a hyper-scaled infrastructure.

Calsoft shall be responsible for providing the solution intended to facilitate infrastructure automation for multi-tier edge infrastructure.



Solution

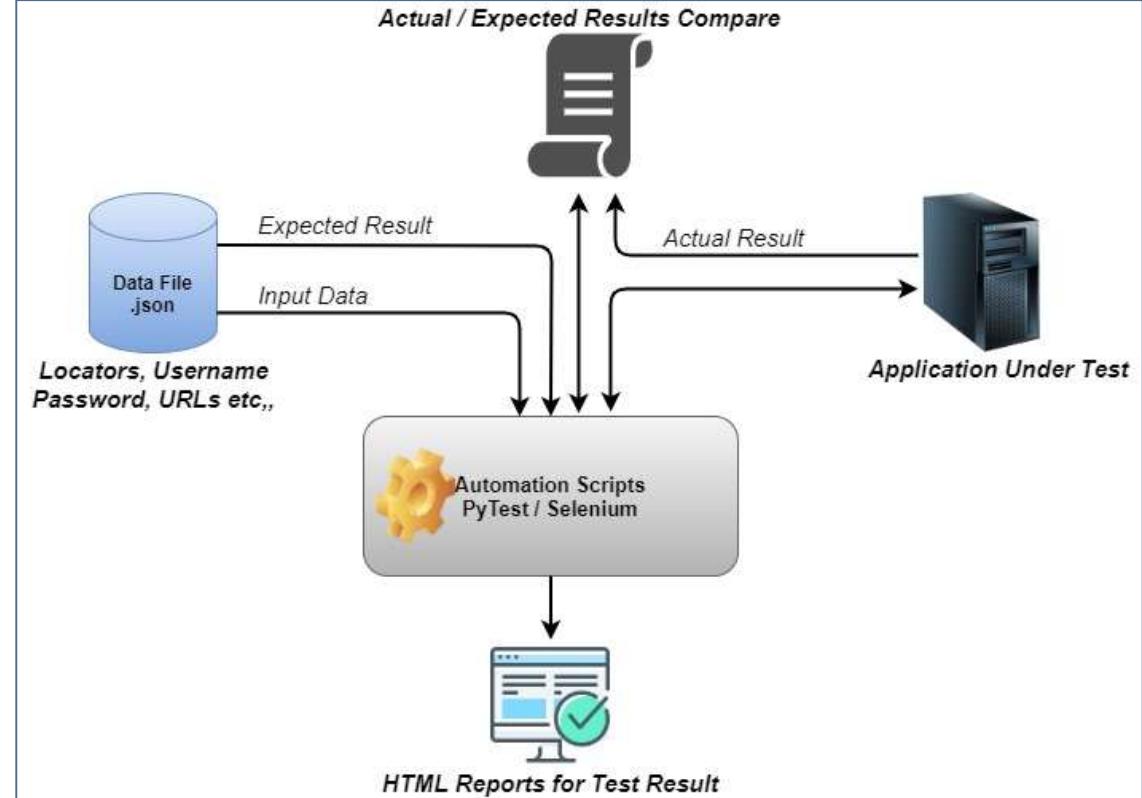
The solution provided by Calsoft will enable the automated infrastructure provision starting from the bare metal discovery, inventory, deployments, monitoring, upgrade, etc. The Solution involves,

- Work with platform development team to understand the features, functionalities, timelines and sequence of development.
- Define the Test Plan and Test Cases
- Manual Test Execution, bug triaging, tracking and Design verification and add features to the Test Automation Platform.
- Validate the orchestration workflows & CAS as a whole in the ongoing manner.
- Build test automation framework for various workflows and the CAS product validation
- Test coverage focused on workflows via CLI, API & GUI (all 3)
- Few scenarios to be covered for end-to-end validation as System Testing
- Scalability Testing using available Server simulator
- Work with CI/CD team to integrate test automation in development release pipeline



Technology

1. Kubernetes
2. Go, Python – PyTest, PyArts
3. Selenium



Benefits

- Calsoft's infrastructure, server & K8S expertise helped ramp-up the team quickly
- Faster time-to-market

Telco Cloud Platform & Automation



Engagement

Customer is developing a full stack product for Cloud to Edge product for the Telco segment. Calsoft is working with customer on solution development, automation & validation of the product.



Solution

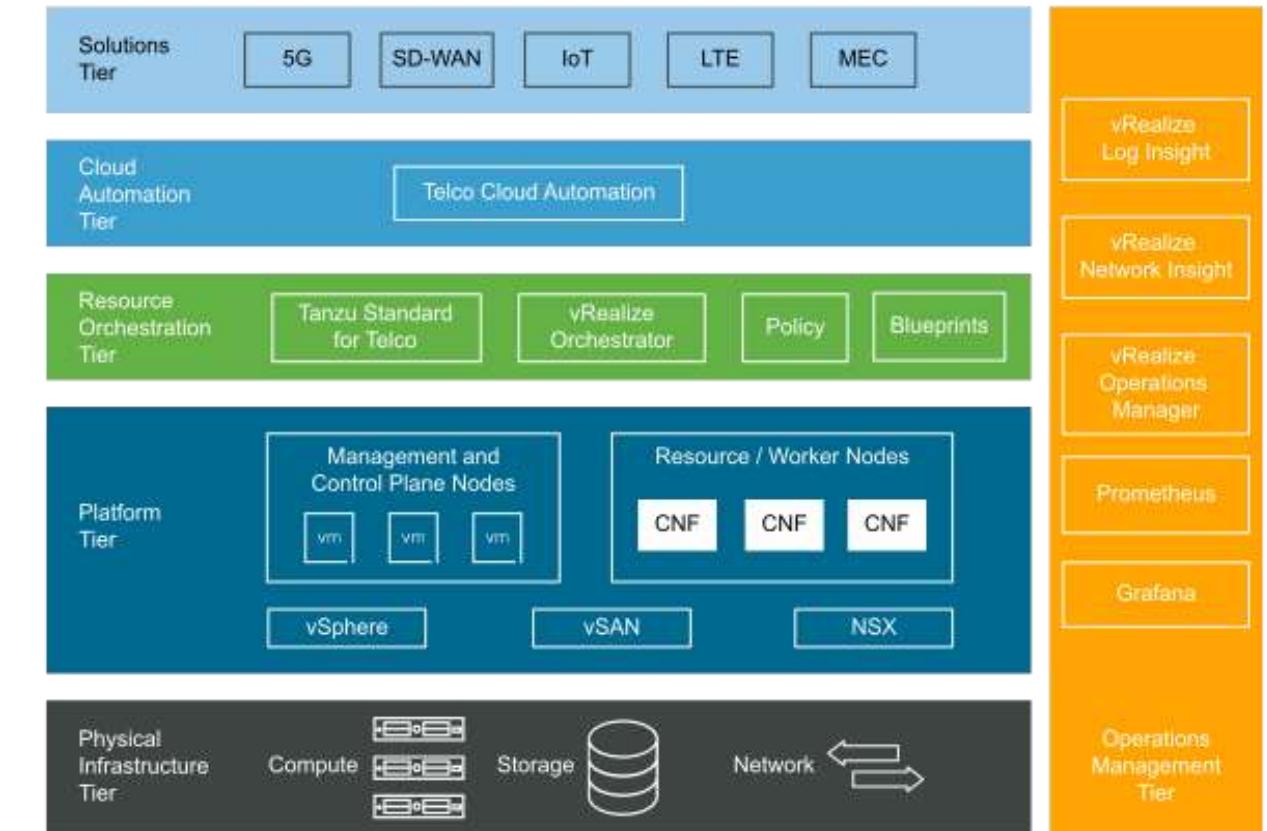
The includes following components –

- Hardware
- Software for cloud to edge infra deployment
- Software for VNF/CNF on boarding, service design, etc.
- Software for operations management & monitoring
- Calsoft team worked with the customer & its partner to derive the overall deployment architecture & solution
- The team is deploying various versions of the software on the hardware BOM & validating the stack
- Team is also developing the test automation for the solution
- Development of integrated CI/CD with partner is also being designed & developed



Technology

Virtual Infrastructure, infra & service automation components, python, CI/CD, Kubernetes



Benefits

- With its deep knowledge in virtualization & telco space, Calsoft helped customer derive the solution & helped time to market
- Complete automation has reduced the repeated validation cycle

Airship - Bare-metal provisioning through Ironic+K8S (Opensource Contribution)

Engagement

Airship is a collection of open source tools for automating cloud provisioning and management. This project aims to enable bare-metal commissioning of nodes, with and without specialized hardware, through Kubernetes CRDs, Ironic and Metal3.

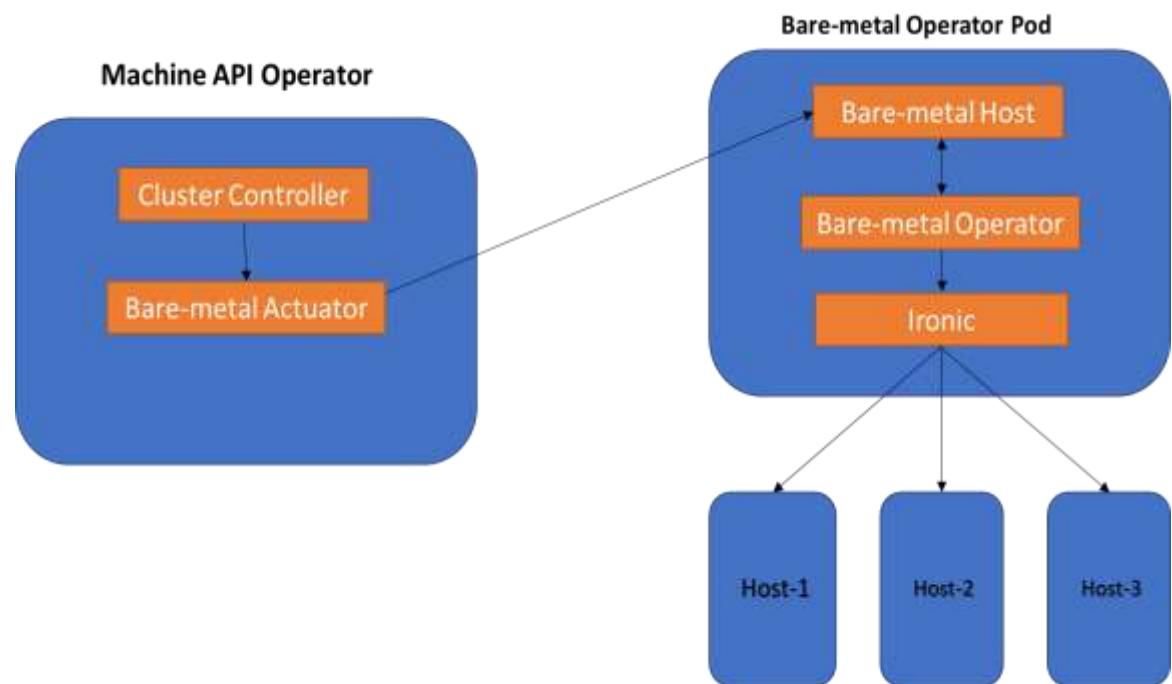
Calsoft is expected to design and develop the solution and contribute to opensource.

Solution

- We are working with Airship community on adding firmware support like GPU, SmartNIC features to BaremetalHost in Metal3 and cluster-api project
- Currently feature spec design is in progress
- Features will be submitted to Beta release
- Also we are adding Hardware Validation to BaremetalCRD in cluster-API which will be useful for telco providers

Technology

SmartNIC, OpenStack, Kubernetes, Ironic, Metal3, GOLang, Python, RAID, BIOS



Benefits

- Time to develop & opensource significantly improved with Calsoft engineering partnering the design and development
- Calsoft team driving major designs and updates well beyond the initial scope

Tool development for Network service orchestration

Engagement

Calsoft was engaged with the customer for development of network service orchestrator to orchestrate transport network,L3VPN and L2VPN.Develop and improve NSMO GUI, ELK and log stash for single point of network monitoring and configuration.

Solution

Calsoft helped the customer in design and development of service orchestrator, ELK, log stash and NSMO GUI which can help them to provide central network configuration and monitoring of ocnos switches:

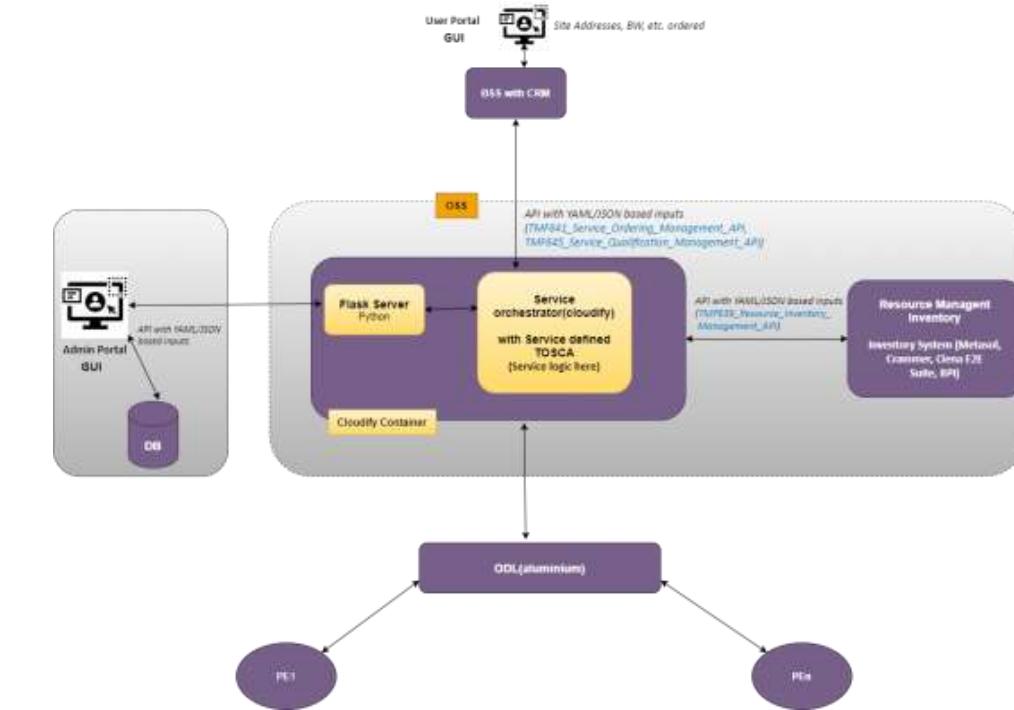
The engagement underpinned:

The Tool which was developed helps in:

- Orchestration of transport network,L3VPN and L2VPN services.
- Orchestrator send REST API request to ODL based on workflow defined in Cloudify and then ODL will do configuration of network services.
- Further we will add other network services like VPLS by adding workflow into orchestrator.
- Verifying the network services configuration on network devices by using ODL API.
- 3D visualization of network topology and easy to navigate through topology by using NSMO GUI.
- User can mount/unmount device from UI and support for import/export of bulk devices.
- Preparing Day0 config for customer devices using ansible for ZTP support.
- Support for external application(Odl,kibana,restconf and ELK) integration in GUI.
- Visualization of devices statistics like protocol traps, interface traffic, fan and temperature on kibana using ELK.

Technology

- ODL,Nodejs,Vuejs,Javascript,Couchdb,ELK stack, REST.
- MPLS, L3VPN,L2VPN, ISIS, BGP, OSPF



Benefits

- Decrease in time consumption for network services configuration on multiple devices.
- Better UI for network management and configuration.
- Easy external application integration in GUI.
- By using ELK stack customer can easily fetch and monitor devices statistics.



Engagement

- Automate Deployment of VMWare vCloud Infrastructure Platform for NFV.
- The deployment process should be based on VMware vCloud NFV Reference Architecture 2.0
- The Deployment automation should be done on customer's bare metal hardware
- Provide a framework to orchestrate the entire deployment



Benefits

- Drastically reduces the time taken for deployment of the NFV infrastructure
- Drastically reduce the professional service cost
- Besides production environment it also very useful in setting up lab for demos, PoC and testing environment
- Eliminate the human errors by using end to end automation



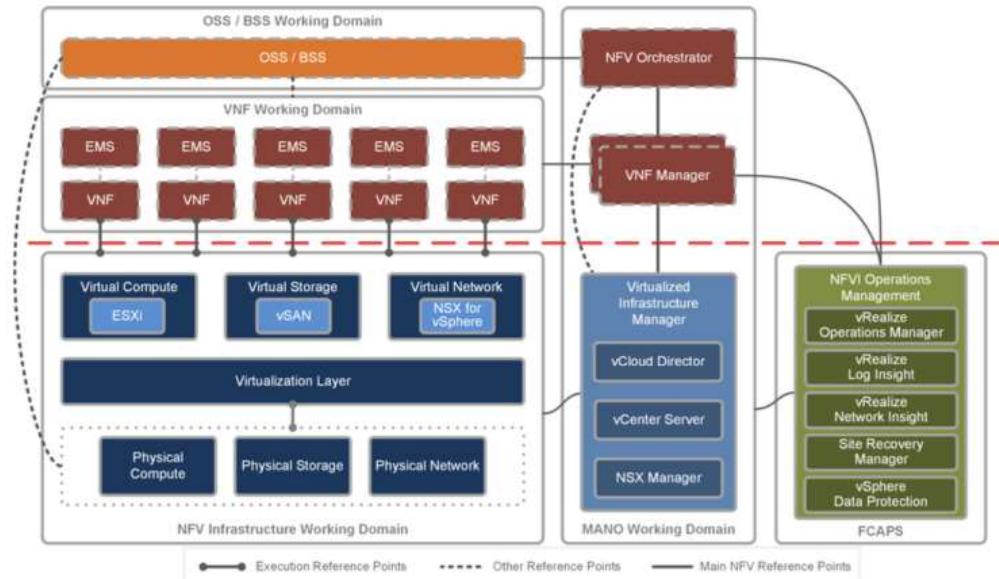
Technology

- NFV, VMware, Networking, Storage, Virtualization, Python, PowerShell



Solution

- Create a solution guide containing detailed steps for manual deployment and configuration of each components in NFV Infrastructure.
- Identify the feasible interface for automation for all the NFV infra components like ESXi, VCSA, PSC, vSAN, NSX, vCD, vRLI, vROPS, SRM etc.
- The feasible interface for automation can be REST api, CLI, Python SDK
- Using the identified interface automate the deployment and configuration of each component



Telco Network Service Orchestration using Cloudify

Engagement

Calsoft is engaged with the client for development and Testing of Telco Network Service Orchestration (Core & Access Networks)

Solution

Calsoft is developing the Service Orchestration platform for Core & Access Network (Switches & Routers):

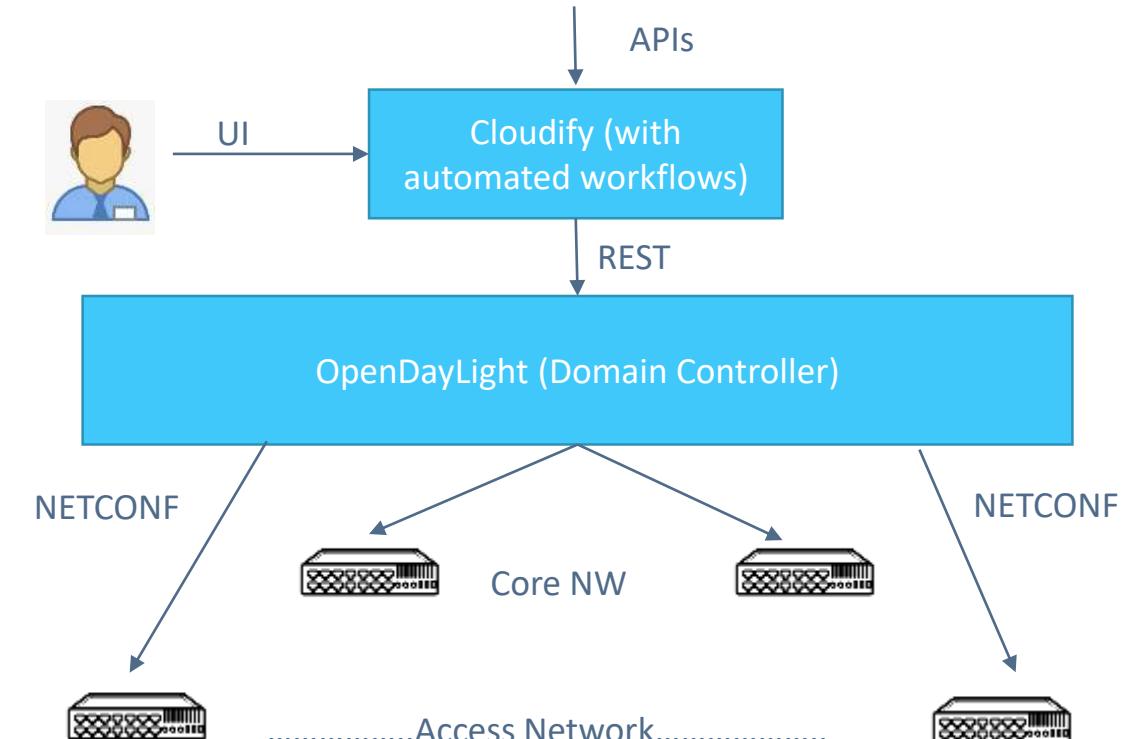
- Accepting the data from higher layer OSS systems or via dedicated UI
- Perform inventory lookup
- Interact with external decision engines
- Call OpenDayLight APIs to automate the service deployment using NETCONF/YANG

The engagement underpinned

- Feasibility study using ODL, NetConf/YANG models & customer's switches & routers
- Feasibility POC to use Cloudify workflow engine as core component of the platform & automate the L3 VPN Service
- Implement the automated workflows to configure the required network nodes within Cloudify & export it as catalogue service
- Develop separate UI to accept user inputs, platform configuration, topology view, etc.

Technology

Python, ReactJS, Cloudify, NETCONF, YANG, OpenDayLight, REST APIs



Benefits

- Telcos can use customer's switch/router stack and automate the common network configurations
- Telco OSS personnel can easily trigger the catalogue services to achieve the network service automation

uCPE devices: VNF performance baselining & deployment automation



Engagement

Calsoft is engaged with the client for testing performance of VNFs on top of uCPE devices.

The engagement includes:

- Deploying bare metal OS, middleware like VMWare ESXi on edge node devices.
- Deployment of VNFs on the NFVi infrastructure.
- Validate the VNFs and create performance baselining reports.
- Demonstrate repeatability and automate firmware bring-up and VNF tests.



Benefits

- Benchmark results for VNFs and uCPE edge devices.
- Automated the steps for repeatability and System integrators.



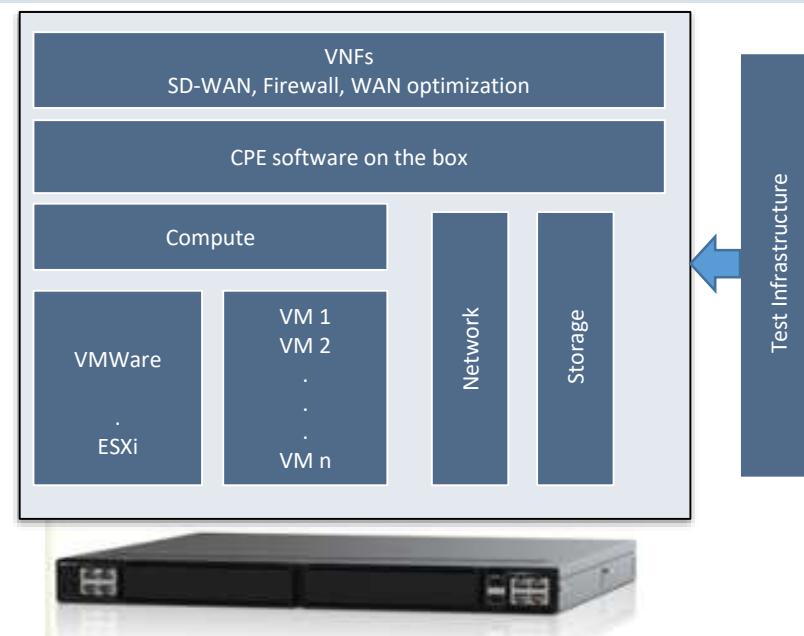
Technology

- ETSI MANO, VMware ESXi, VNF testing, IMIX, IXIA, SD-WAN, vFirewall, python scripting



Solution

- Deployed bare metal OS on uCPE edge device as per deployment guides. Validated BIOS and baseboard (BMC) firmware.
- Deployed the VMWare ESXi middleware and created ready environment for VNFs.
- Deployed VNFs like SD-WAN, complex Firewall , WAN acceleration from vendors and tested performance.
- Sample performance measurements like throughput test, latency tests, packet loss tests, IMIX tests, Jitter tests were carried out.
- Created performance reports along with CPU, memory, disk utilization of the device
- Automated the complete process using python scripts.



Multi-tier Edge – Ref Architecture Design



Engagement

- Calsoft was engaged by the customer for building an Edge solution with vCloud NFV for Edge 3.2.1. The engagement involved:
- Designing physical network topology based on Reference Architecture
- Manual deployment with respect to topology and Reference Architecture
- Post-validation testing and documentation



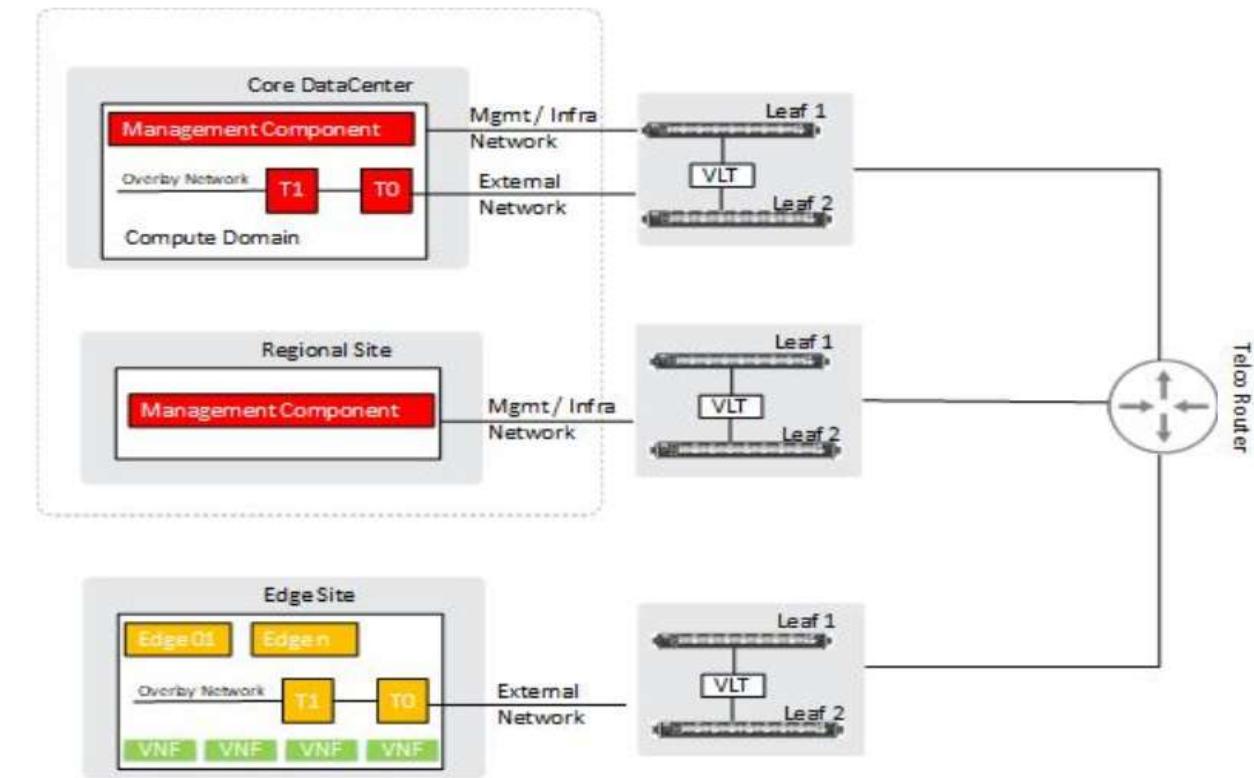
Solution

- Multi-site solution for vCloud NFV environment
- Switch configuration, firmware upgrade, manual deployment of components – ESXi, AD-DNS, NTP, vCenter Server, NSX-T, vROps, Avamar VE, Data Domain, vCD
- Data protection in the environment with Avamar VE and Data Domain
- Multi-site vCD



Technology

- Networking and virtualization
- NSX-T
- Data protection – Avamar VE and Data Domain
- vCD multi-site implementation



Benefits

- Deployment of the entire stack and its validation, post deployment
- Data protection using Avamar VE and Data Domain was done for the first time for NFV environment
- Multi-site vCD implementation helped us gain customer confidence for the overall solution

Edge Computing: Contribution to Akraino Edge Stack (ELIOT)



Engagement

Calsoft contributed to the Akraino Edge stack with code enhancements to the Akraino Edge family and created two qcow2 images.



Benefits

- Edge use case (IoT) can be tried out in a couple of hours instead of spending days by using the developed images.



Technology

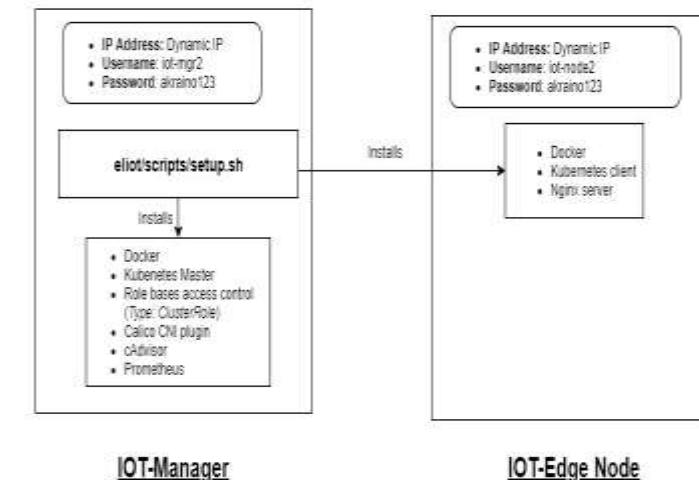
- Language support - Python automation
- Technologies: K8S, cAdvisor
- OS - Linux



Solution

Calsoft's contribution towards Akraino Edge Stack included:

- Made code enhancements to the Akraino Edge family through automation scripts and ready-to-use VM images
- Created two qcow2 images that allow users to create VMs, which can be further used for deployment of ELIOT using Kubernetes
- Worked on the blueprint named 'ELIOT: Edge Lightweight and IoT Blueprint Family'. The ELIOT blueprint intends to create Edge computing setup in two ways:
 - Kubernetes
 - KubeEdge
- Contributed to the creation of a setup using Kubernetes
- Added two files to the main branch, which can be accessed via kubernetes_cleanup.sh and kubernetes_reset.sh
- Automated installation of VMs, which helps bring up ELIOT using a variety of K8S components, including CNI plugins, cAdvisor, Prometheus
- Contribution Links:
 - [Manager Node](#)
 - [Edge Node](#)
 - [Help document](#)



Akraino Contribution: StarlingX Sandbox Environment



Objective

- StarlingX is a complete edge cloud software infrastructure stack focused on: easy deployment, rapid response, low-touch management, and fast recovery. It is based on open-source components such as OpenStack, Kubernetes, OVS-DPDK, and Ceph.
- Calsoft contributed to the community by creating a sandbox environment of StarlingX to experiment and understand the use of the platform.
- In an all-in-one VM image, the user can see the functioning of the StarlingX platform with the open-source components, including an IoT Gateway (EdgeX Foundry).



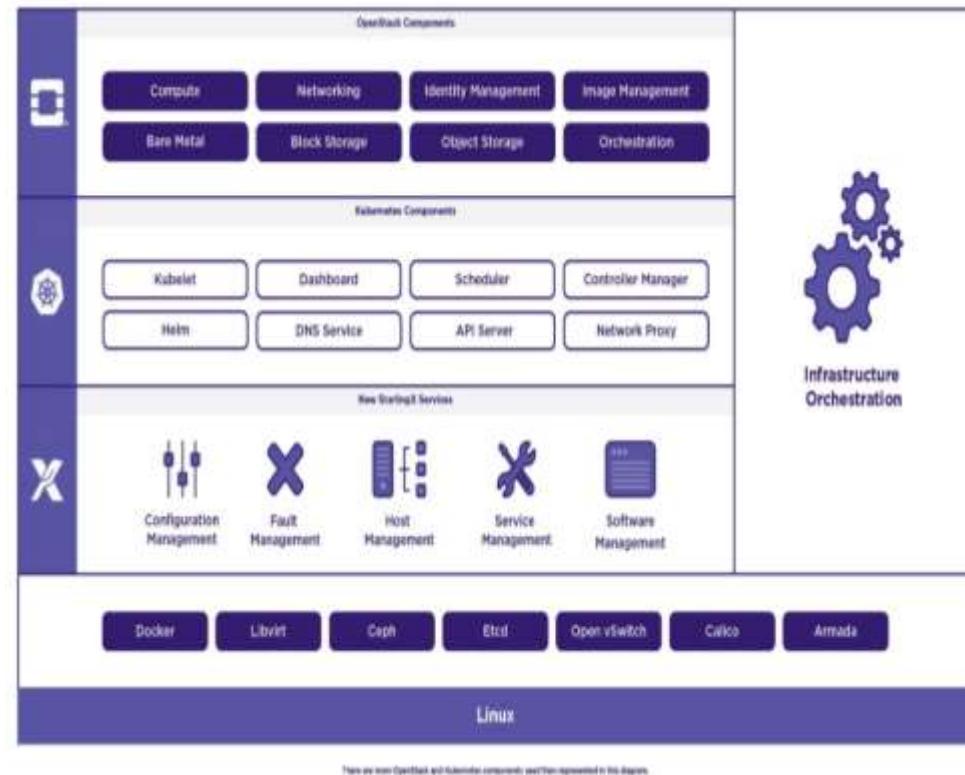
Contribution Links

- **VM Images:**
https://drive.google.com/open?id=1ntQSILp4rg-L_CMQPLCPsvtYdAmQFHFp
- **Setup Doc:**
https://drive.google.com/open?id=1j0IBwKiwwD1Vju9_QltFo1oltMla41x3
- **How to create StarlingX Images Doc:**
https://drive.google.com/open?id=1c2WzC3E_FnoJMfFwADFj1FWOn4Fx8jvW
- **StarlingX OpenDev link:**
<https://review.opendev.org/#/c/692202/>



Technology

- Akraino, Edge, DPDK, Ceph, OpenStack, Kubernetes



Benefits

- Significant reduction in the kick-off time to experience the StarlingX Edge platform with ready-to-use VM images instead of spending days or weeks
- Methodical documentation with easy steps to bring up the StarlingX all-in-one VM



Engagement

Calsoft is working on virtual router project to provide routing capabilities in virtualised environment.



Benefits

- The packets are generated using DPDK-PktGen which is configured for sending 64 Bytes UDP packets with a random source and destination IP. When Configured with 4 RX queues, Virtual Router is able to forward packets with 3 times more throughput compared to the forwarding in Linux Kernel.



Technology

- OS – Linux
- Language – C, DPDK
- Tools – Quagga



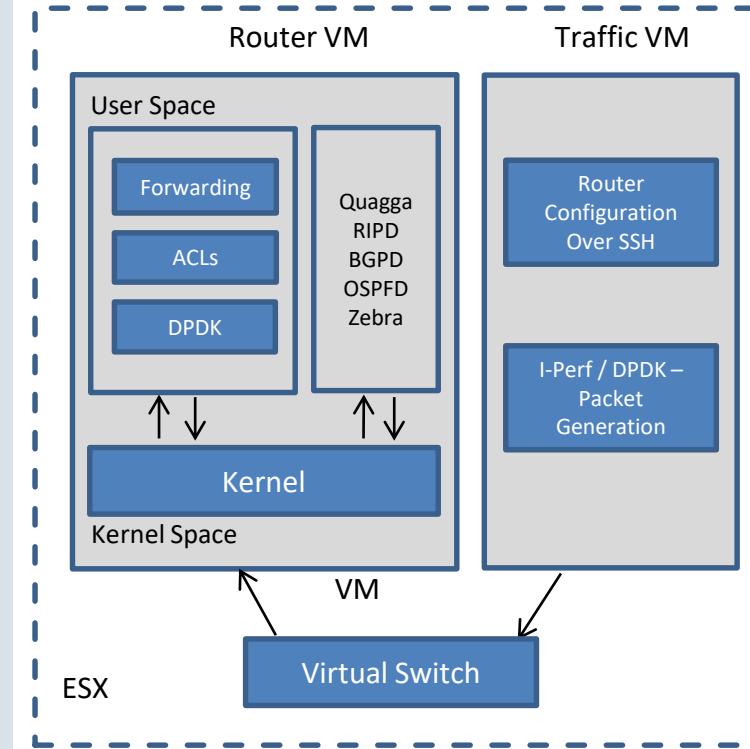
Solution

The forwarding path is optimized with DPDK.

- Routing services like OSPF , BGP etc. Are provided with the help of Quagga.
- Virtual Router has support of L3/L4 ACLs which can be configured with the help of CLI
- Switching many packets using the LPM algorithm
- Making this switching scalable with the possibility of adding more packet queues/CPUs

Calsoft's contribution

- Cloud image based on Ubuntu 14.04 with Virtual Router DPDK based application and Quagga.
- Ubuntu OS image is fully optimized to achieve highest throughput performance.
- Used DPDK optimized iperf tool for performance testing.





Engagement

Calsoft is engaged with the client for providing a solution of NSX integration with SD-WAN Vendor product. The aim is to provide cost effective solution to large customers having one or more small Branch Offices, with NSX Deployed at the Head Office



Benefits

- Calsoft delivered the solution on time and without any customer tracking and monitoring, even though only requirement document was provided by customer.
- This was made possible because of in-house expertise available with Calsoft for Networking, VMware NSX, Java domain.



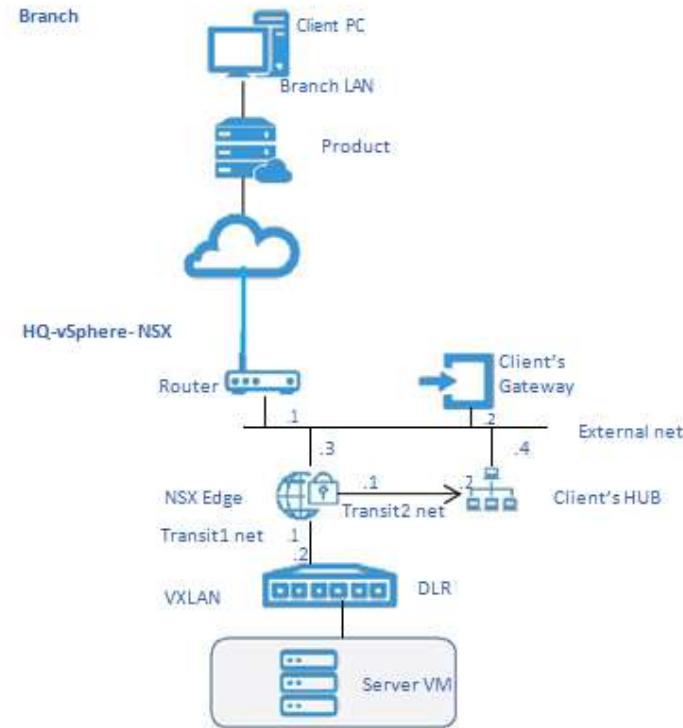
Technology

- NSX –V 6.2 , vSphere,
- and NSX APIs, Java, Maven ,
- HTML5, Networking (Routing)



Solution

- Successfully completed the feasibility phase and based on its study, developed a Plugin with below listed features :
- Installer
- Client's Hub and G/W Deployment & Configuration.
- NSX Edge Configuration (Configure Routing)
- NSX Config Change Monitor
- Third party service registration on NSX Manager
- Launch client Service from NSX Manager.
- Provision and Activate client Hub and Gateway using clients API's.



Dell Red Hat Openstack Platform (RHOSP)



Engagement

Calsoft is engaged with the client in enhancement of the RHOSP based NFVi deployment automation.



Benefits

- Help in performance enhancement of the system via configuration management
- User interface enhancement for performance specific configuration management



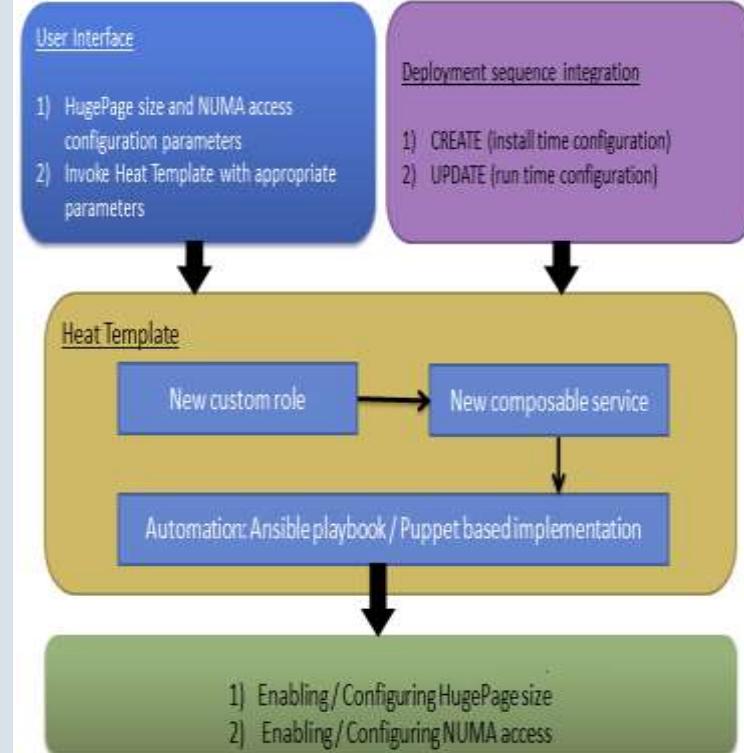
Technology

- Platform: RH Openstack
- Technologies: TripleO, Heat, Mistral, Ansible, Puppet, Python, ReactJS



Solution

- Understand the RH Openstack deployment environment for undercloud and overcloud deployment automation management
- 1. HugePages – Performance improvement by increasing memory page size
 - Configuration management
 - Integrating with automated deployment
- 2. NUMA (Non Uniform Memory Access) CPU Pinning
 - Updating CPU pinning to optimize performance
 - Integrating with automated deployment
- 3. Automated deployment management and Day 0, Day N-enablement of performance configuration management features



Performance benchmarking for the VNFs deployed on VMWare Cloud



Engagement

Calsoft is engaged with the client for testing VIO (VMWare Integrated OpenStack) platform for VNF deployment and performance benchmark testing.

- The engagement includes:
- Deploying NFV infrastructure including cloudify orchestrator and OPNFV test framework.
- Testing of VNFs on top of the NFV environment using OPNFV Functest test suites.



Benefits

- Benchmark results for VNFs and VIO running inside the NFV infrastructure.
- VNFs in the setup can be replaced to compare VNF performance and VIO infrastructure stability.



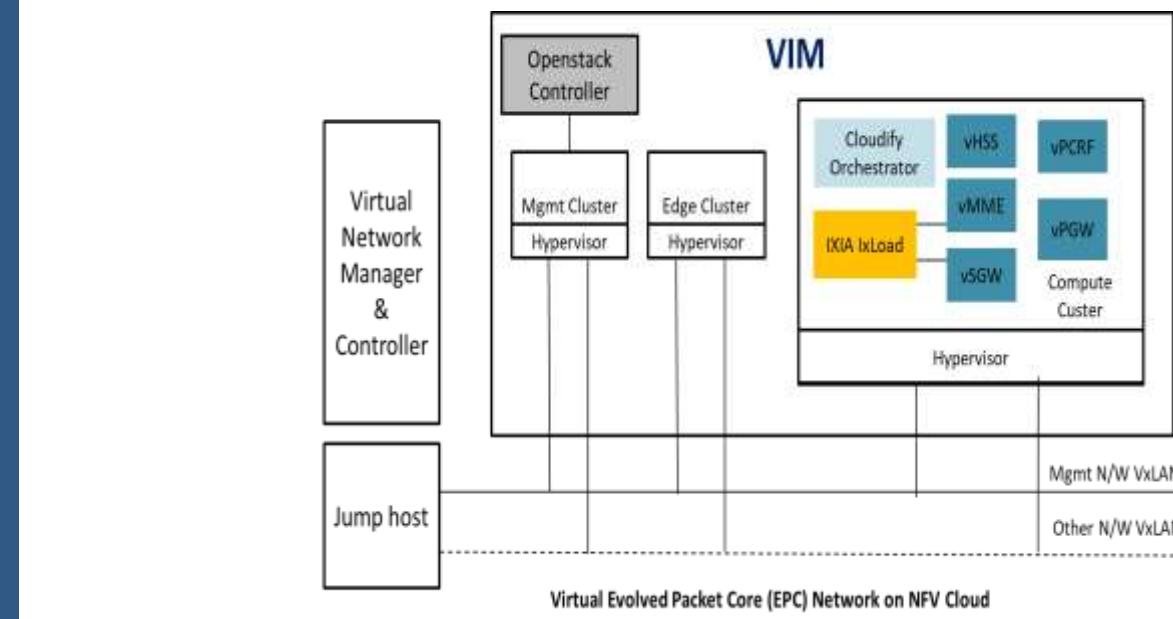
Technology

- MANO, VMware VIO, OPNFV, Cloudify, Functest
- Yardstack, Functest, Aodh, IXIA, SIPP, clearwater metaswitch, OAI EPC



Solution

- Deployed NFVi where underneath cloud is based on VIO. Also, added other MANO components, cloudify orchestrator and openstack controller.
- Deployed the VNFs for vHSS, vMME, vSGW,vPGW to create a EPC (Evolved Packet Core) network. The VNFs are bought from standard vendors.
- Deployed OPNFV Functest framework on a separate cloud environment which has direct access to VIM inside the deployment.
- Leverage OPNFV project tools like yardstick to test out the VNFs for performance, smoke tests, health checks.



Telecom Data Analytics : Validation and Performance Benchmarking



Engagement

Calsoft is engaged with a client for deployment of cloudera platform, zaloni data lake and cardinality analytics on top of customer NFVi layer.

The engagement includes:

- Deploying NFV infrastructure and validating customer use cases on top of the infrastructure.
- Testing, validation of use cases and benchmarking the performance numbers to create the report.



Benefits

- Verified analytics based sample use cases in big data deployment.
- Created a platform for optimizing and improving the telecom network.



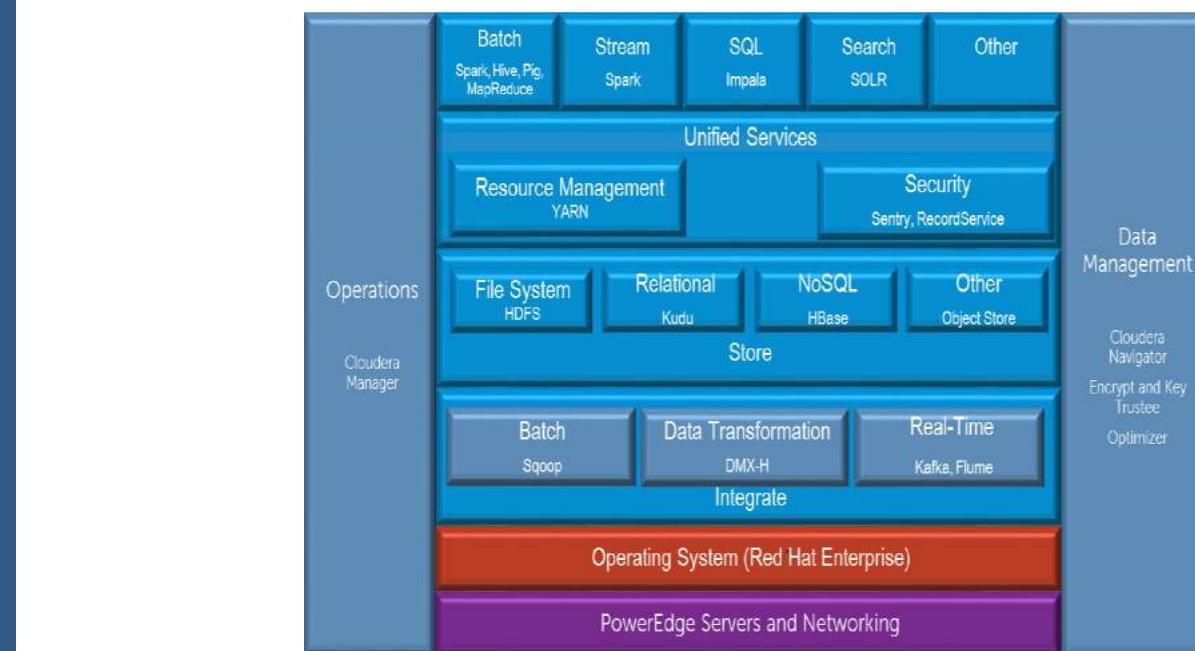
Technology

- TDA, Zaloni, Cardinality, Cloudera Manager,
- Kafka, Kudu, hadoop, HDFS, spark, hive, Yarn



Solution

- Deployed cloudera CDH platform which includes key components like spark, hive, hadoop, yarn, kafka etc .
- Deployed data lake from Zaloni on top of the cloudera infrastructure and applied analytics from cardinality.
- The platform supports batch, stream data processing, SQL query, data searching and scalable data lake.
- Created telecom use cases specific tests based on cardinality analytics features. These use cases include improving customer experience, network utilization, creating incentives for subscribers, optimizing network usage.
- Validation of the use cases and performance benchmarking is in progress.





Engagement

Calsoft engaged with the Client to develop a tool that help its users discovering the cost-savings opportunities by virtualizing network with VMware. The calculator shall take inputs from user to find the total cost of ownership (TCO) of user's current environment with VMware vs. Alternative Open Source as NFVi.



Technology

- Server side - Java 1.8, Spring Boot, Spring Security SAML.
- Client side - HTML5, CSS3, Angular(5), Angular Material, Chart.JS.

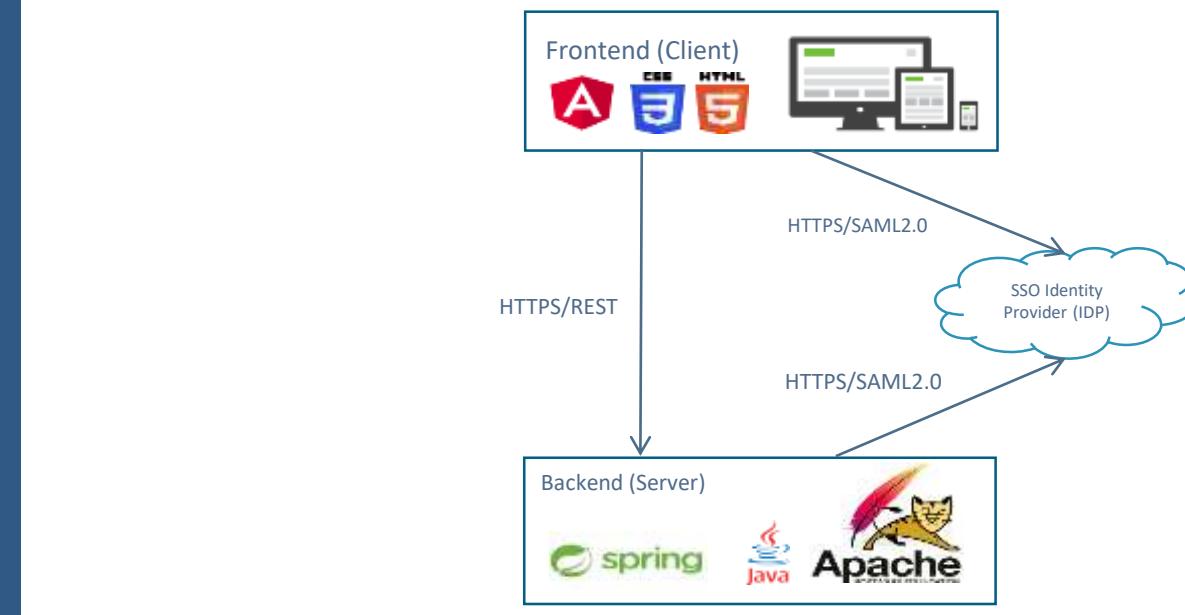


Solution

Calsoft proposed to develop this tool as web application using open source technologies. The front end was developed using SPA architecture responsive design principles. The back end was developed using Java . The communication between front end and back end was over HTTP REST.

- Highlights:

- Built using single page application (SPA) architecture for fluid and desktop like user experience.
- Followed responsive design principles to support multiple device resolution and form factors.
- Developed using popular open source technologies and frameworks like Angular(5), HTML5/CSS3, Angular Material Spring Boot, Spring Security etc.
- SSO (WorkspaceSpace1) integration for user authentication.
- Multi step wizard based user input interface
- Graphical display of TCO savings and other benefits as final calculation results



OpenStack cloud deployment & upgrades using MCP



Engagement

Calsoft is engaged with the client to manage programs for deployment & upgrades of end-customers' Openstack cloud & NFVi. The Cloud Platform (combines software components and reference architectures that enable devops engineers to deploy, upgrade, configure, manage Cloud environments, Software Defined Networks, and Software Defined Storage solutions.



Benefits

- The Cloud Platform provides easy to use installer, repeatable process for deployment of OpenStack clouds using Open source softwares.
- Open-source components to leverage the collective innovation from hundreds of contributors
- Multi-Cluster/multi-site management capabilities
- Update and upgrade capabilities are built into the platform



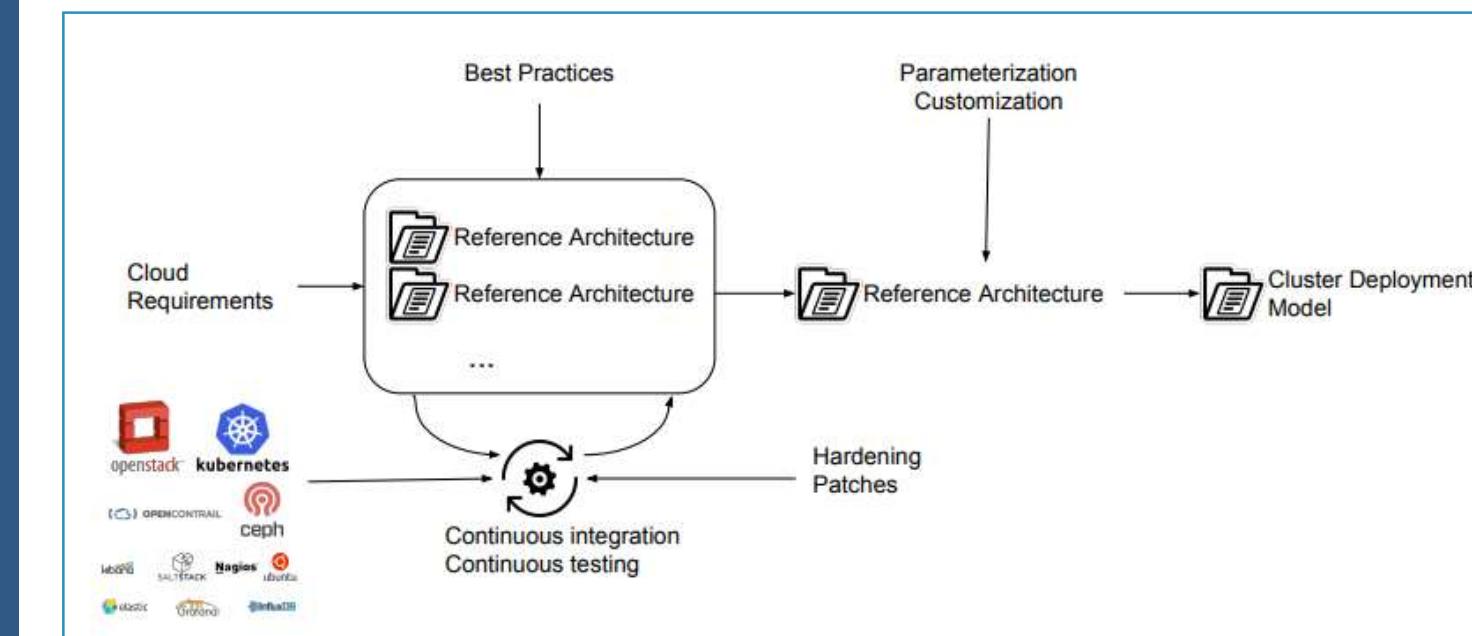
Technology

- OpenStack, Kubernetes, OpenContrail, Ceph, Cinder, Jenkins, Git, Gerrit, MaaS, Fluentd, Grafana, Prometheus, MongoDB, Ironic, Designate, InfluxDB, stacklight etc.



Solution

- OpenStack clouds has many software components
- The Cloud Platform integrates & test these open source software components for cloud deployment
- CP provides unified tooling for initial deployment and ongoing management of the cloud
- Drive and audit changes through version control and code review
- Deployment architecture is based on best practices
- Builds update and upgrade capabilities into the platform
- Calsoft team manages the whole program working with end customer, the deployment engineers, mgmt. stake holders, etc.





Engagement

- Dockerized web user -interface to list, manage and monitor available OpenStack YAML Blueprints for deployment.
- Docker container to be part of build node's bootstrap process.
- Single pane of glass view for OpenStack deployment pre/post install process.



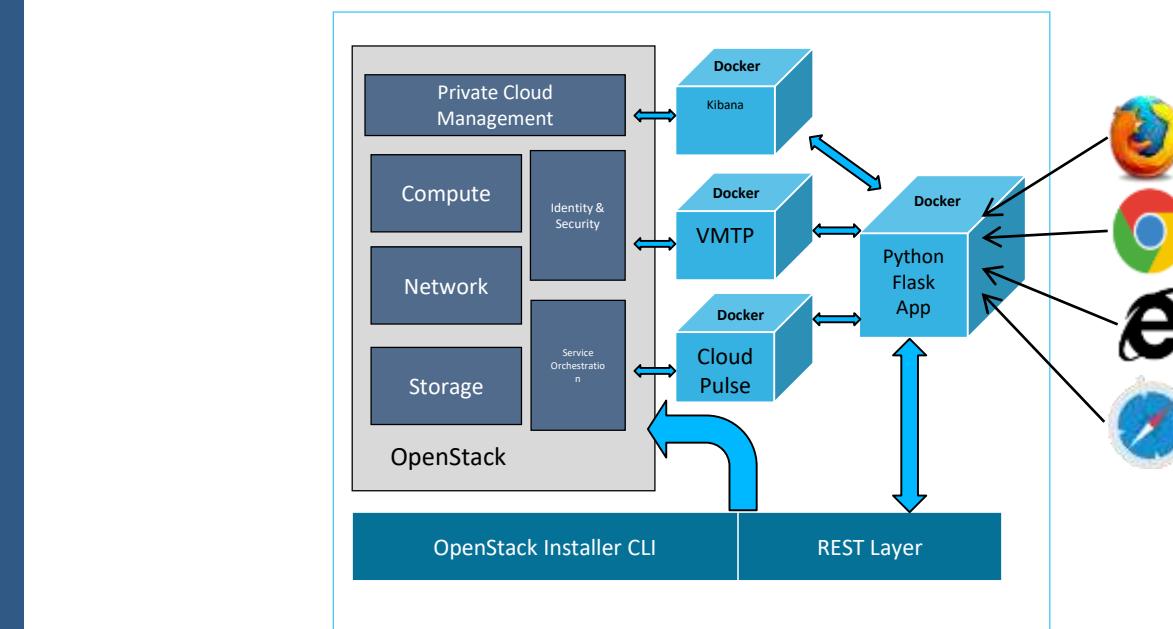
Technology

- RHEL, Docker, Python, Flask, AngularJS, HTML-5 Cisco UCS OpenStack Installer



Solution

- Integrated with REST based OpenStack Installer.
- Python-Flask backend for UI.
- Simple, minimalistic, responsive UI design using AngularJS,HTML5.
- Base Image – RHEL with OpenStack packages installed on it.
- User Interface to facilitate creation of YAML configuration blueprints and initiate the deployment process.



Enterprise 5G Orchestration



Engagement

Customer is developing a saas platform to deliver 5G edge cloud services via a modern, multi-cloud platform using next generation 5G and networking.



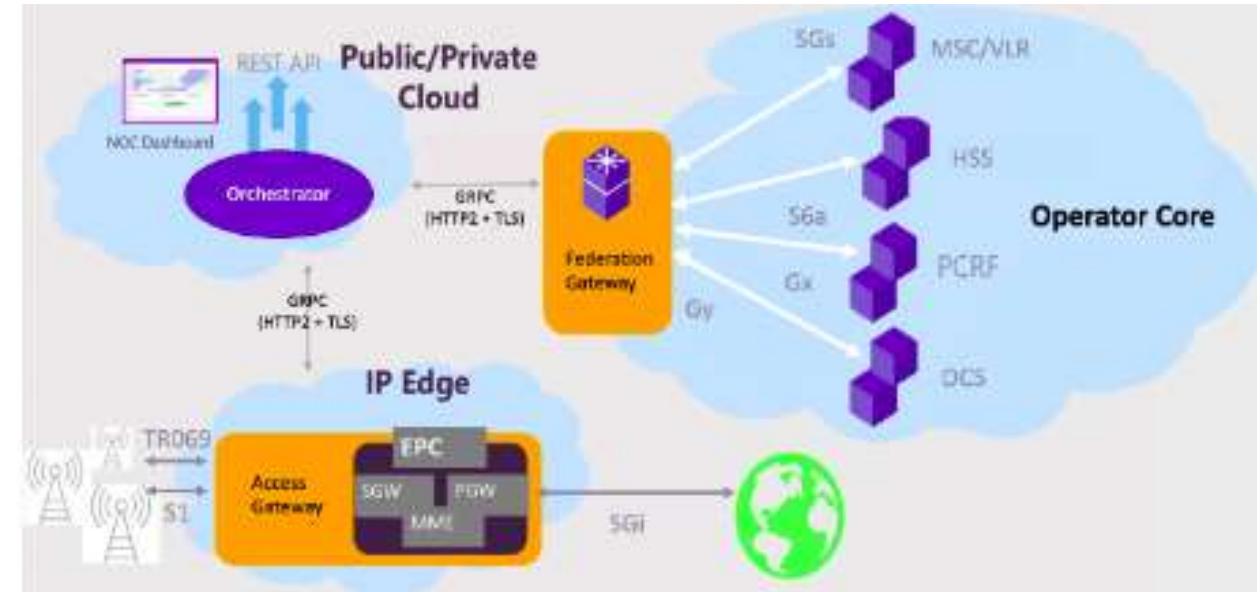
The includes following components –

- Saas portal for service and subscriber management
- Software for cloud to edge infra deployment
- Software for operations management & monitoring
- Calsoft team worked with the customer to develop saas platform from scratch which does service orhestration and subscriber management.
- Team has developed swrapper helm chart for facebook's magma orchestrator to deploy it on managed and unmanged k8s cluster.
- Team has developed golang wrapper orchestration layer to setup infra on AWS/GCP to deploy 5G services



Technology

Infra & service automation components, Golang, CI/CD, Kubernetes,AWS, GCP, REST, Microservices



Benefits

- With its deep knowledge in Infra, service orchestration and K8s, Calsoft helped customer derive the solution & helped time to market
- Solution offers Operators to offer cellular service without vendor lock-in with modern , open source core neworks



Engagement

Calsoft engaged with the customer for development and feature enhancement of a BSS system API's that provides business operation from Customer account management.



Solution

Calsoft helped the customer with design and development of a new and enhancement of existing REST API's.

Calsoft worked on below use cases:

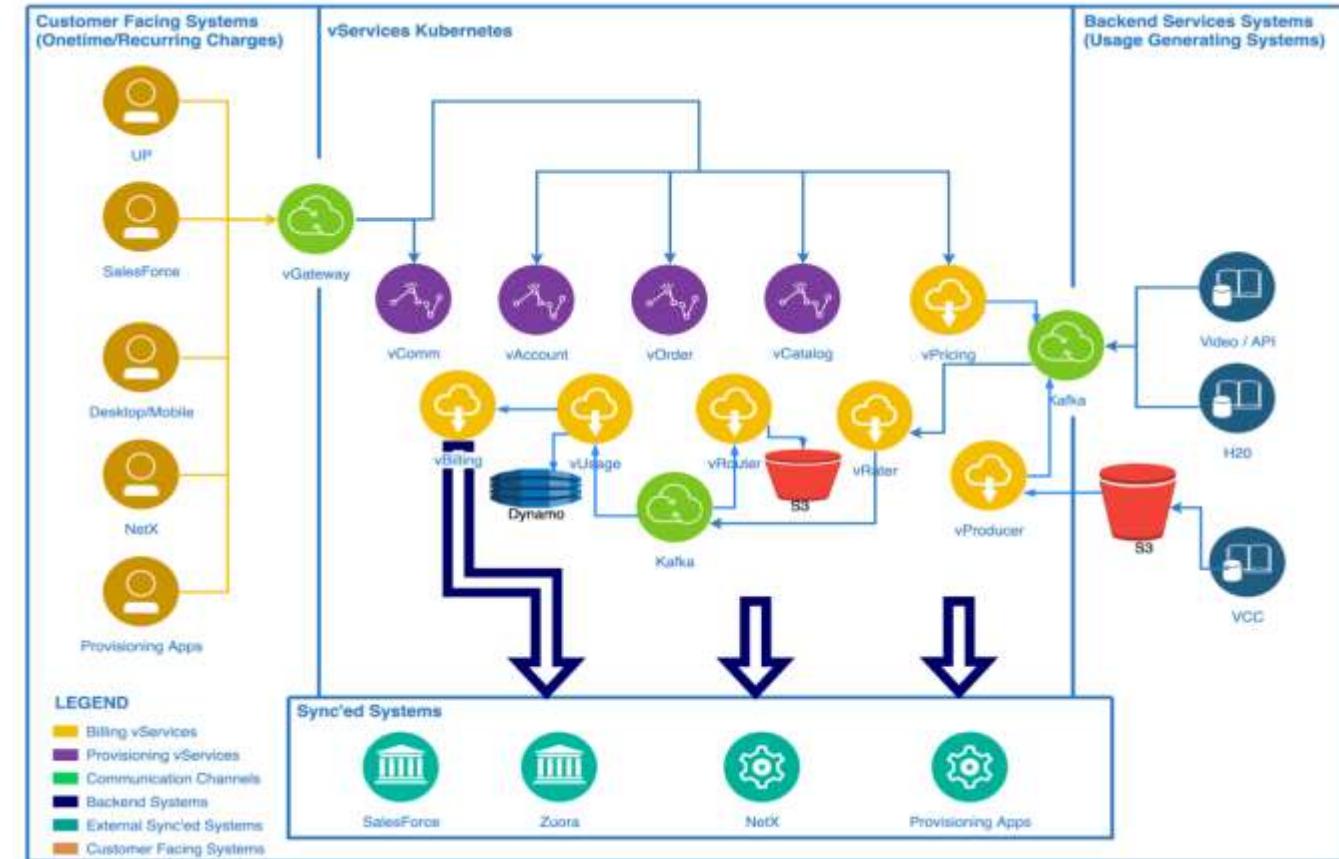
- Enhancement of security for existing API's by providing role-based access
- Managing customers product catalog
- Auto aligning the Bill cycle day(BCD) for Customers primary and secondary accounts
- Upgrade the Email service with new templates and Apache velocity engine for sending the emails to user voice mail pin reset
- Enabling new payment terms

Calsoft was also involved in manual and API testing for features developed/enhanced by Calsoft and customer.



Technology

Java, Spring Boot, Microservices, MongoDB, Gradle, AWS, Kubernetes, Docker, Kafka, Helm, Scaffold, JIRA, Confluence, Jenkins, Concourse,



Benefits

- Alignment of BCD helps customers to manage their monthly billing of all Primary and Secondary (Child) accounts.
- Enhanced security to the API's
- New payment terms
- Upgraded email service with customized template

Edge Orchestrator



Engagement

- Development and Testing of Edge Orchestrator from scratch
- Development and testing of ML Services developed from scratch to send the Edge Site metrics to GSO (Global Service Orchestrator) and Data Lakes
- Integration with Telco Applications



Benefits

- Microservices based architecture – each component has its own Database
- Rest based implementation for easy integration with GSO
- User friendly UI
- Hassle free installation of Edge Orchestrator – docker based, helm based



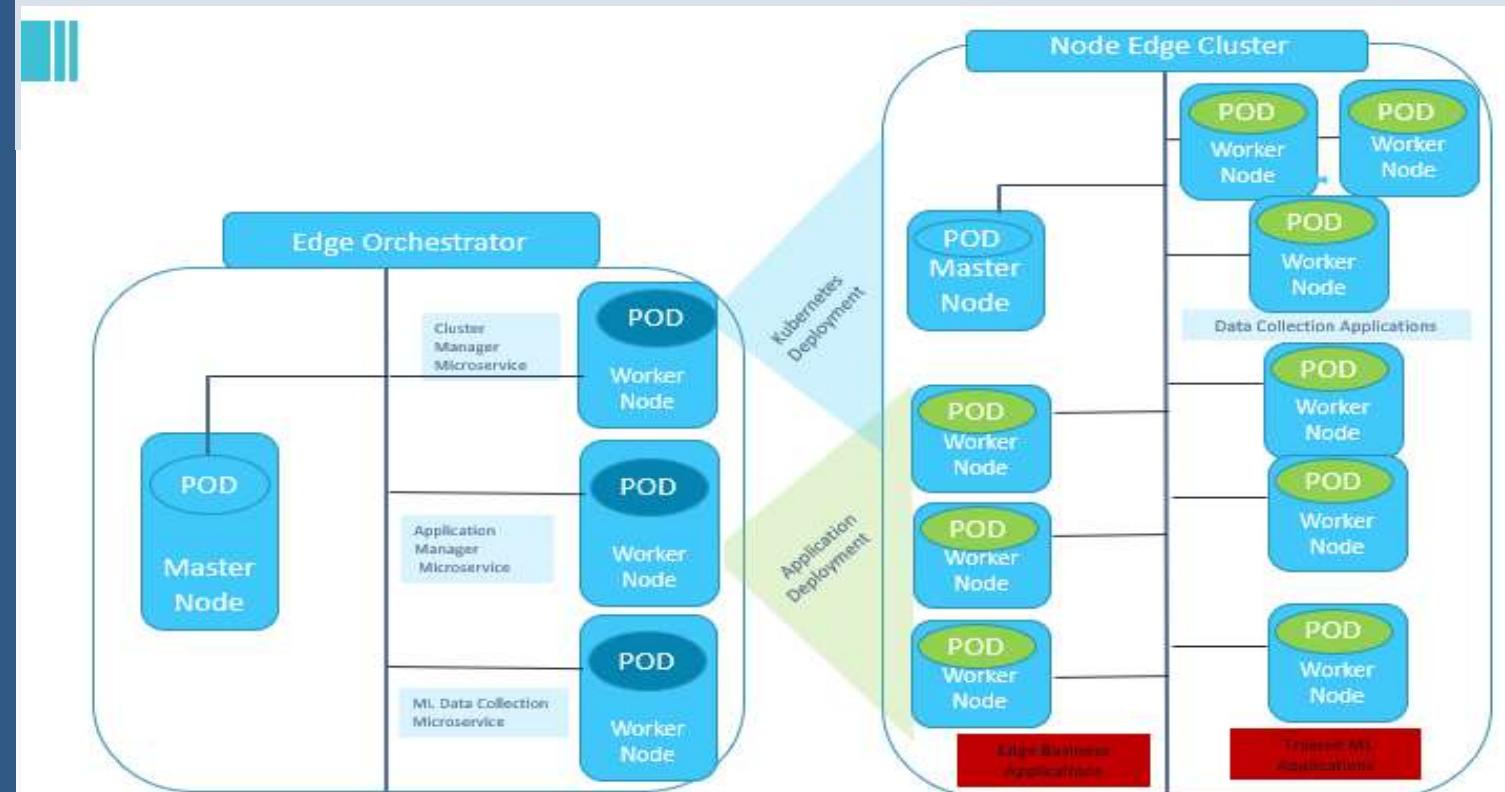
Technology

- Jhipster (to generate microservices)
- Angular10/Java/Ansible/Python/Shell scripts
- Git/Jenkins
- Docker/Helm/Kubernetes



Solution

- Onboard and deployment of Edge Site (including Operating system installation and networking) and Kubernetes cluster on that Edge Site - site can be a Baremetal server, AWS Amazon instance OR Hybrid (combination of Baremetal and AWS instances)
- Deployment of VNF/CNF helm based applications and operators on multiple Edge Sites
- Kubernetes Cluster Scalability (add multiple masters and multiple worker nodes)
- Edge Orchestrator and Edge Site based Policy Enforcement
- Integrated with RIC (RAN Intelligent Controller) and other Edge Analytics applications for close loop automation
- Support Prometheus/Grafana for Site Monitoring
- ML Services - Collect Application, Network, Infrastructure and VM/Container level metrics and send it to GSO & Data Lakes, use data to plot Data Visualization Graphs





Engagement

- Development of 5G Ran Simulator from scratch
- Built Backend Controller and Network Controller Microservices
- On demand deployment and orchestration of 5G RAN CUCP/CUUP/DU Network Elements from Ran Simulator UI.
- Support protocols like Netconf/yang/Rest API in each Network Element
- Integration with O-RAN based O1 Interface via Netconf/yang and O2 Interface
- Testing of 5G Ran Simulator



Benefits

- Microservices based architecture
- Simulation of 5G RAN Network
- Integration with standard O-RAN based O&M platform and Non RT-RIC Platform which are part of SMO (Service and Management Orchestration) Framework
- Simulation of configuration management from O&M to Network Elements and vice versa).
- Simulation of 5G RAN network traffic by injecting Performance and Fault data from Network Elements into the network for consumption by SMO.
- Hassle free installation of all microservices



Technology

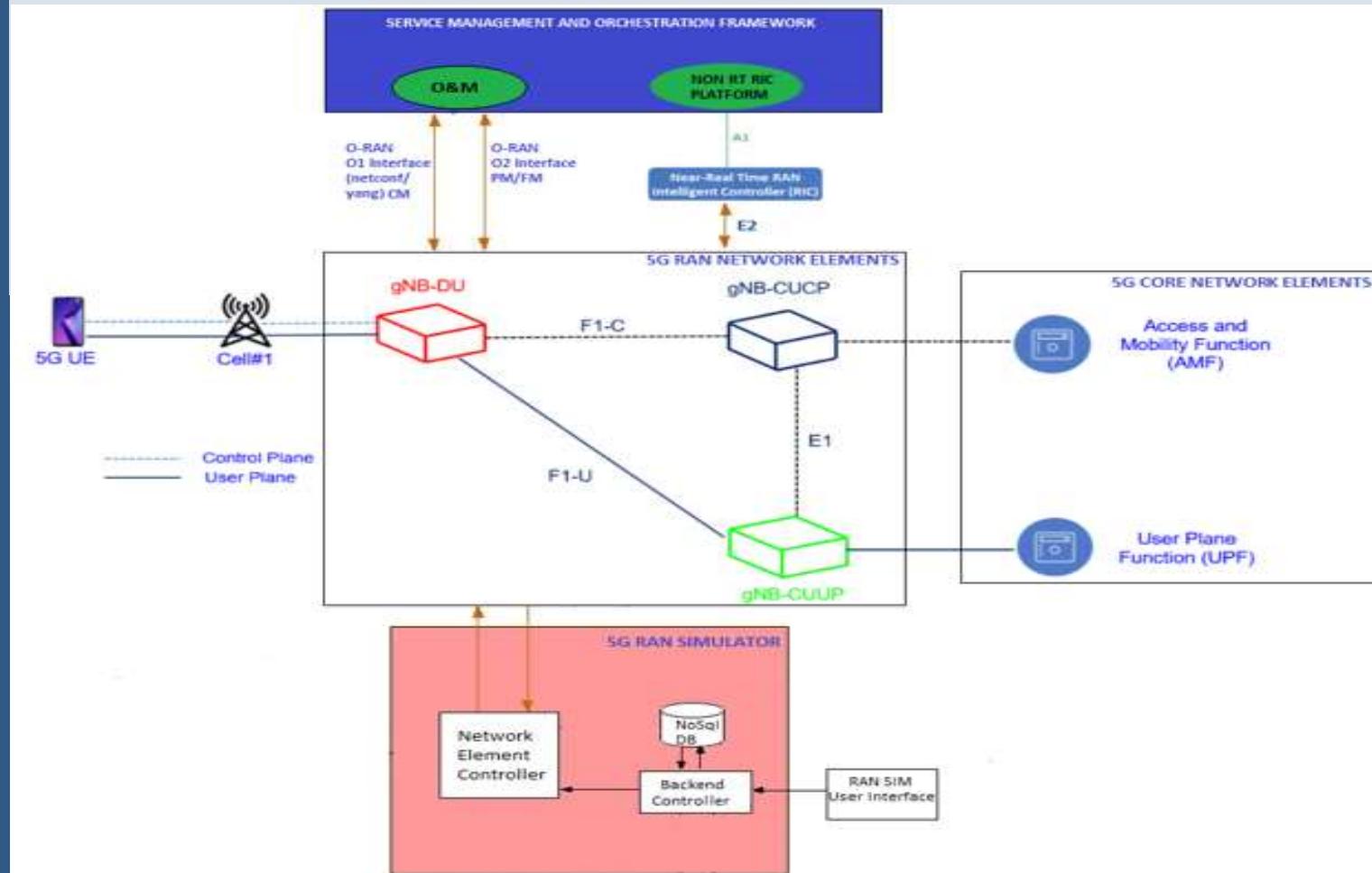
- Java spring boot framework
- C/C++
- python
- Docker/Kubernetes



Solution

Angular based Ran Simulator UI which communicated with Backend Controller. It support following functionalities:

- a) Deployment and shutdown of 5G Ran Network elements on Demand.
- b) Configuration of 5G Ran Network elements. Accordingly, Network elements inform SMO framework.
- c) Generate performance and fault data in each Network Element on demand. Accordingly, Network elements inform SMO framework.
- Rest API based Backend Controller which works as Backend to Frontend.
- Rest API based Network Element controller which deploys network elements and communicate with them via Rest API



SmartNIC Interop with Servers



Engagement

- Calsoft is contributing to their core components like IOTA, Penctl, Idrac integration.



Solution

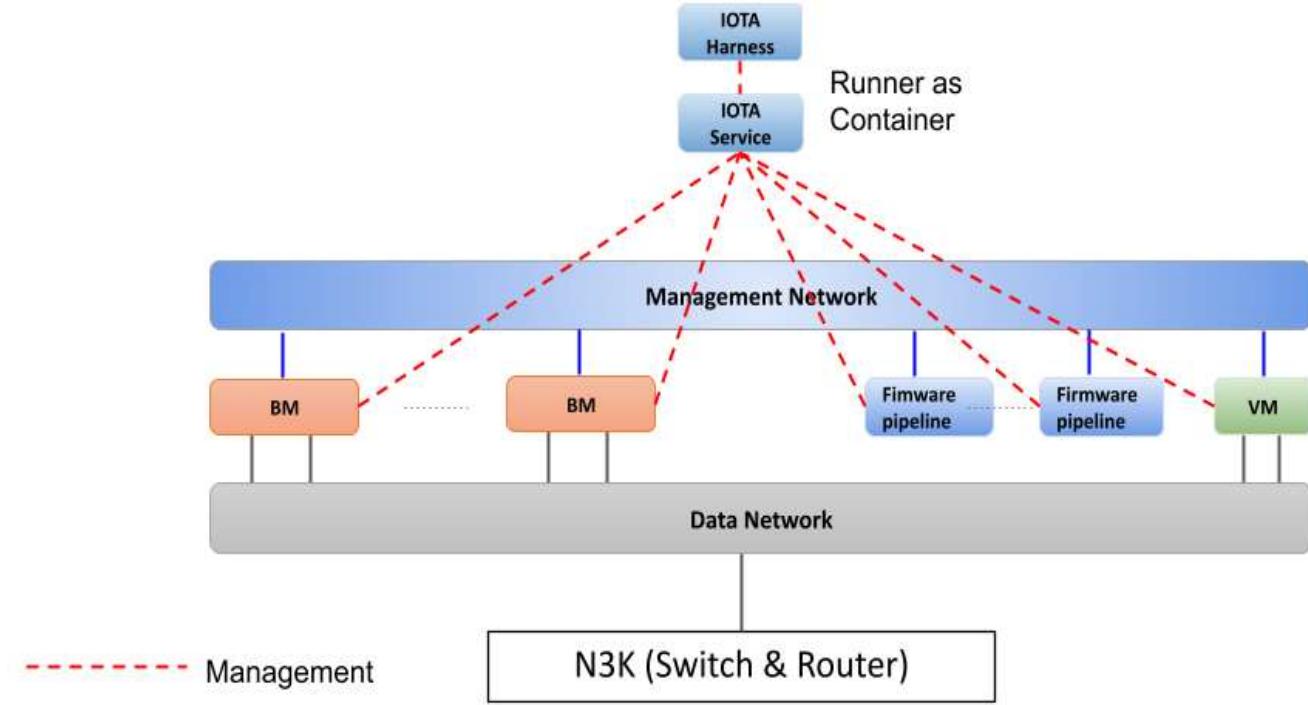
Development

- Contributing to automation framework called IOTA, Penctl, Idrac integration with Dell, HPE server.
- Penctl:** it is command line tool use to interact with NIC management service Enhanced code to made it Compatible with windows
- IOTA:** It is automation framework to test NIC (Pensando) features, Enhanced framework.
 - Infra provision --> topology formation --> Dependencies and configuration and strong layer of testsuite/testbundle/testcases
 - Driver and firmware installation
 - Implemented of IonicConfig testcases (windows), vlanoffload testcases
 - Added support of nping and tcpdump for drivercsum testcases (windows), NIC teaming testcases with multi VLAN
 - Enhancement in Link Regression testcase
 - Debugged and fixed some of the minor bugs
- iDRAC Integration:**
 - Add testcases to verify Pensando NIC details for Dell, HPE



Benefits

- Major contribution to their core component IOTA in last two years



Technology

Python, Golang, Ansible, Windows, Linux, Git, Docker, Networking

Solving the Resiliency Issues of a Production Micro-mobility Platform



Engagement

Calsoft engaged with one of the largest ISV and Platform providers to identify resiliency issues in the production system and develop solutions that stabilize the data pipeline and environment.



Benefits

- Helped the customer resolve critical production issue
- Helped optimizing existing code modules & critical bug fixes on time
- Helped the customer in achieving milestones in the deadline timeline.
- Helped the customer implement standard deployment practices



Technology

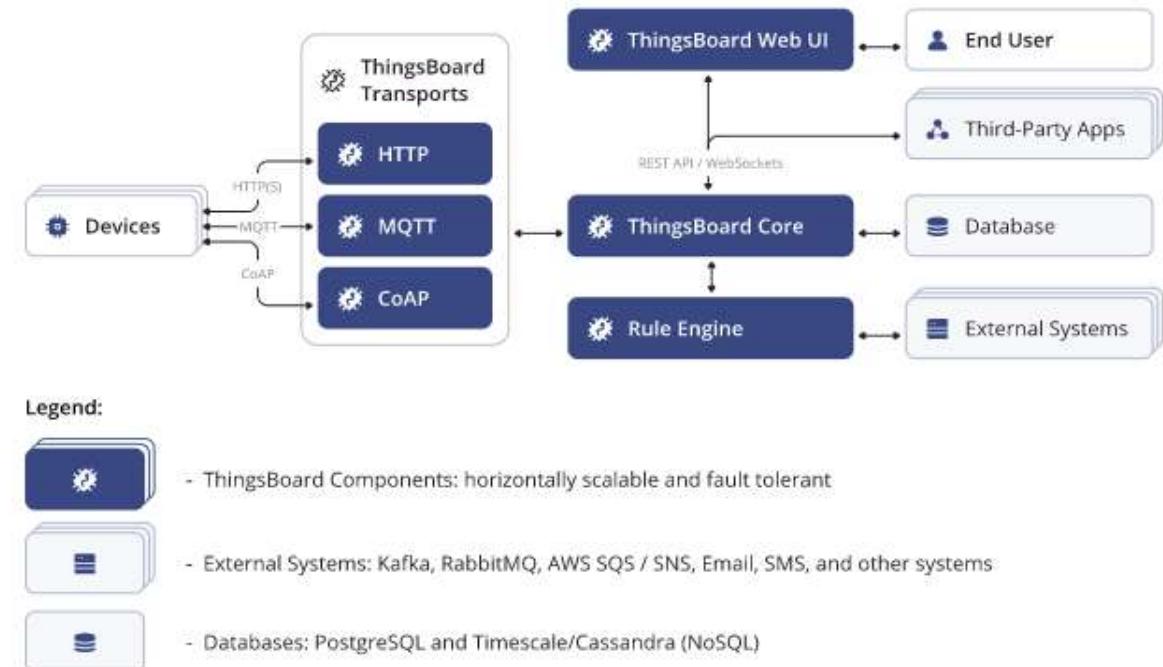
Java 8, Spring Boot, Cassandra, Thingsboard IoT platform, Nodejs, EKS, Docker, AWS, Kubernetes, Prometheus, Grafana.



Solution

Calsoft identified various critical production issues, and provided solutions around them:

- Cassandra Connection pooling problem
- Cassandra Backpressure handling for streaming data write operation
- Cassandra Data Model serving the application use cases, which provided performance improvement & cost optimization.
- Cassandra Memory management to handle JVM Heap spaces.
- Cassandra Storage management AWS-EBS provisioner. Separate disk allocation for commit log and SSTable.
- Client micro-service optimized to write data to Cassandra.
- Kafka Sink connector writing data into the Cassandra



Continuous Engineering and Support to a Mobility Solution Provider



Engagement

Calsoft has an ODC team for a leading mobility services provider providing various engineering services/ Design Solutions for the client and its end customers



Benefits

- Helped the customer to resolve critical production issue
- Helped optimizing existing code modules & critical bug fixes on time
- Helped the customer in achieving milestones in the deadline timeline.
- Helped the customer to implement standard deployment practices



Technology

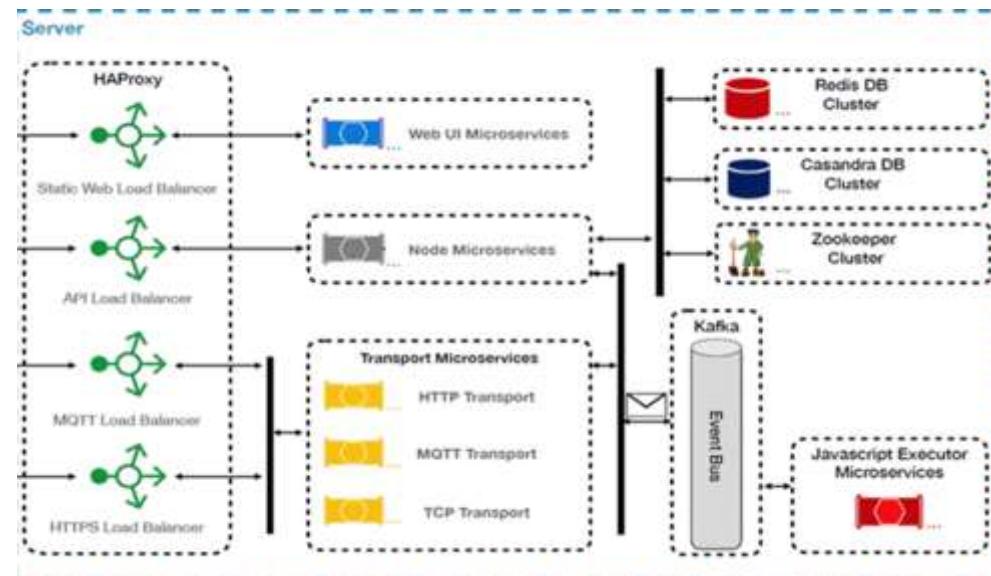
Java 8, Spring Boot, Cassandra, Thingsboard IoT platform, Nodejs, EKS, Docker, AWS, Kubernetes, Prometheus, Grafana.



Solution

The engagement underpinned

- Designing & developing the Edge platform based on Kubernetes
- Designing & developing the set of microservices at the Edge host & Edge controller
- Designing the traffic steering, DNS, QoS, and managing the Edge & application lifecycle Calsoft contributed in various engineering solutions :
- Developed test suits for performance and resiliency
- Modified Kubernetes specifications to set industry standards
- Provided design solutions for:
 - Data loss mitigation | AWS Multi-AZ configuration | Data Backup & Archival for Cassandra DB | EKS Cluster Setup & multi node deployment | Fault Tolerance
- Analytical Engine & Reporting feature development
- UI Development for mobile phones for individual uses and creating an admin screen for provisioning
- Support for Bug fixes and hardening.
- Test Plan and REST API Automation



Development of an IoT Platform for E-bikes in the Shared Mobility space



Engagement

Calsoft engaged with a leading IoT Platform and E2E Solution Provider for Asset Tracking. The engagement underpinned creating a new IoT Platform for tracking E-bikes in the shared mobility space



Benefits

- Client got a one stop shop for all the necessary expertise
- Helped client to reduce time to market along with substantial cost savings



Technology

AWS IoT Core, MQTT, Dynamo DB, Lambda, Doppelio



Solution

The engagement underpinned

- Integration of Telematics with appropriate IoT Core components
- Stream Analytics using Kinesis
- API Gateway for Mobile applications & Data exchange
- Integration with DynamoDB & S3
- OTA Integration
- Lambda function development for various functionalities from onboarding to driver alerting
- Google API integration for Map positioning & navigation
- DevOps – Setting up CI/CD, Release, Production
- Backend App Augmentation, Maintenance & Continuous Integration
- Hardware integration at Proto level and field testing
- Mobile phone-based hardware diagnostics, Remote diagnostics & Internationalization
- Device Provisioning & Automatic Upgrades
- Enabled use of Doppelio for simulation and testing in development, unit testing and field support



Continuous Engineering for a Fleet Management Company



Engagement

Calsoft team has experience in working on a well-known fleet management solution compliant with AIS 140. The communication is over 2.5 G network and in cabin module was based in microcontroller and modem. Backend was on hybrid cloud.



Benefits

- More than 100000 trucks are running using this platform
- OEM and Transport companies were using this platform
- The solution is available as multi-tenant SaaS and also On-prem
- Multiple automotive and other discrete manufacturing companies were using this.
- Solution has various India-specific use cases, reporting, and Analytics
- All India support was part of this solution;



Technology

2.5 G, Azure, Kafka, TCP/IP, docker



Solution

The engagement underpinned

- IP-65/67 telematics box compliant to AIS 140 has buffering and integration with sensors
- Two systems one dedicated to Transporters or Fleet Managers and the other to the Shippers / Consigners.
- The key features of the system were real time tracking, ETA calculation, alerts, safety features and reports, daily breakfast and EOD reports and various customizations
- For maintenance and installation of the system on the commercial vehicles, the technician team were equipped with mobile apps.
- Calsoft engineers were responsible for management and overseeing the engineering activities.



Integration of a Fleet Management System with Azure IoT Hub

Engagement

Calsoft engaged with a leading fleet management company to deploy and integrate Azure IoT Hub solutions with their fleet management system. The objective is to implement this protocol gateway in Azure using Cloud Services worker roles & in on-premises environments

Benefits

- Adaptation of Client's product in Microsoft Azure environment, thereby, increasing his customer base multi-fold.

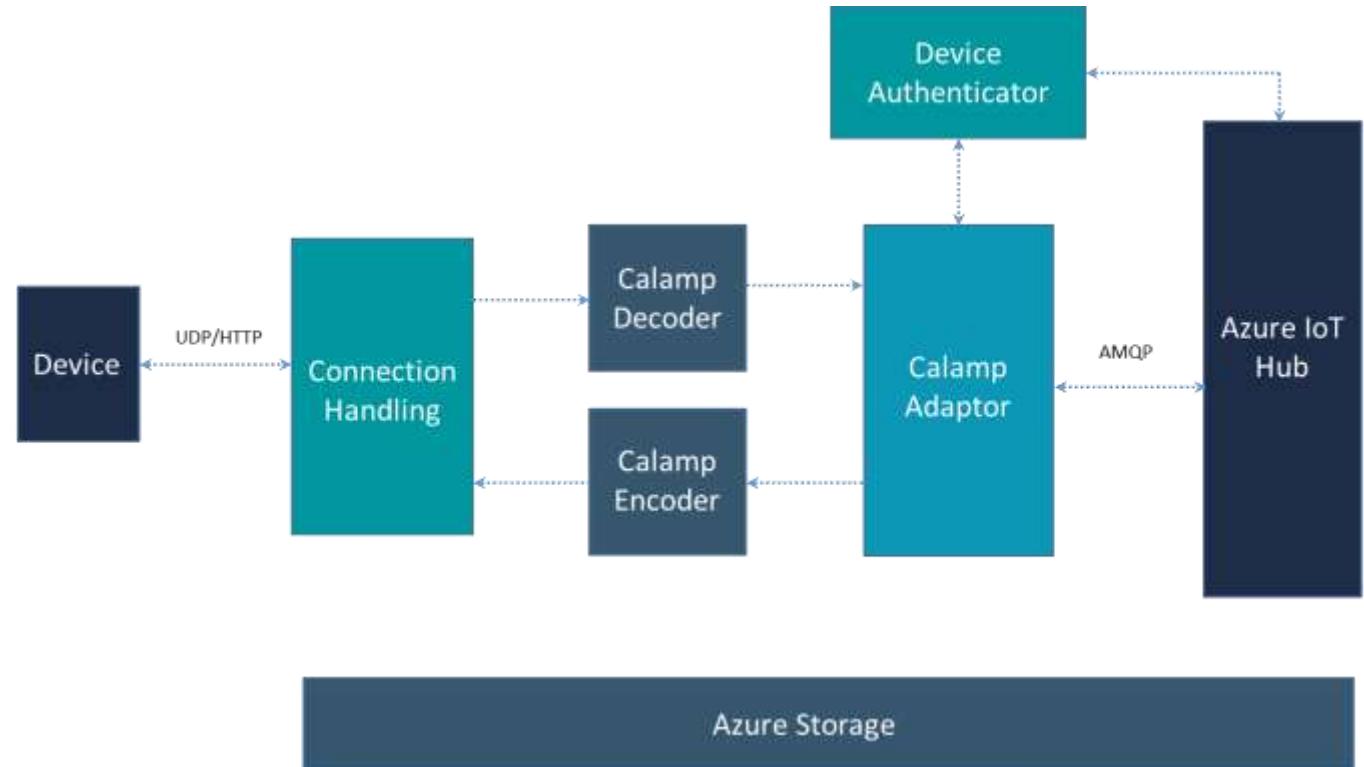
Technology

.net, AMQP, UDP/HTTP

Solution

The engagement underpinned

- Authentication of IoT devices using the device Shared-Access-key (DSA) token through IoT Hub.
- Deploying the protocol gateway in the service fabric cluster using standard logging and configuration techniques
- Implementation of protocol Adapter for UDP - As UDP is connectionless, the gateway maintains a dictionary; which saves the last Active Timestamp, the message bridge, and the endpoint per device for UDP devices.



Development of Zero Touch Provisioning for Telematics Applications

Engagement

Calsoft engaged with leading Gateway and Device Manufacturers to Deploy a Zero-touch Provisioning solution for their Telematics applications

Benefits

- Implemented through POC to Deployment for actual telematic systems
- Very automated pipeline for serf-service by the IoT vendors
- Cost optimization

Technology

AWS, OpenSSL, GitHub

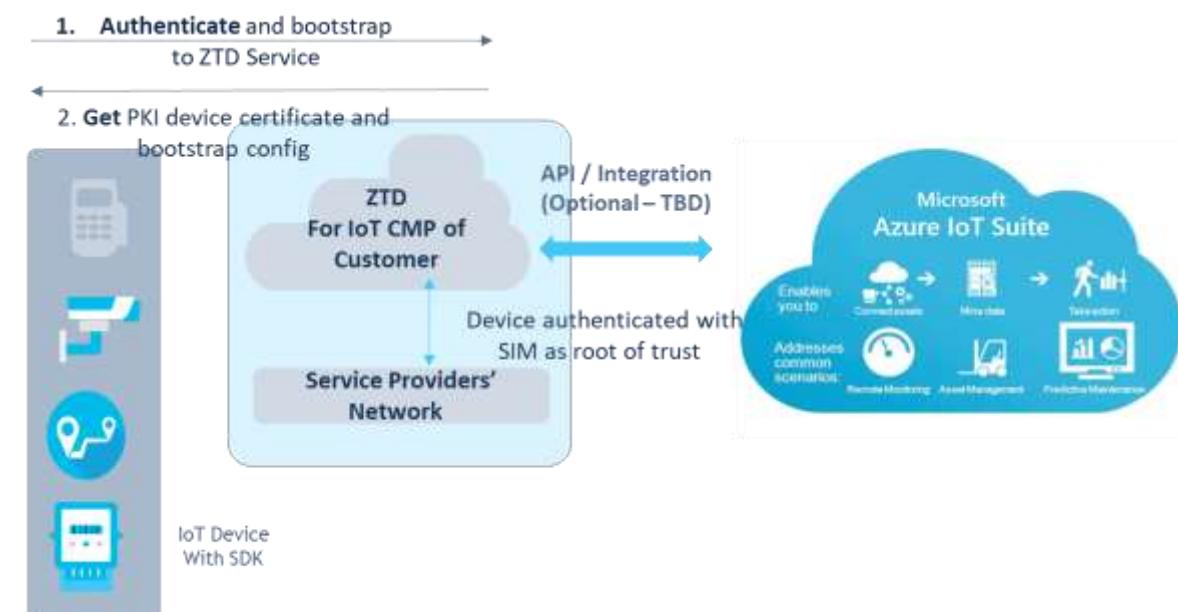
Solution

The customer's ZTD has implemented 3 kinds of Certificate Authority

1. Type EST: We are using the testrfc7030 server to do our device enrolment. (<http://www.testrfc7030.com/>)
2. Type Private CA: In this, we are using AWS ACM Service to have two kinds of Certificate Authorities:
3. Software CA: OpenSSL commands and AWS KMS: We use KMS for signing and verifying as it holds the private key which is never exposed publicly. Custom-built our OpenSSL engine to support KMS (git hub repository is present to integrate it).

The steps are the same for device enrolment:

1. Create a CA
2. Create a CSR with a common name as Device-iccid or Device-IMEI
3. Pass the CSR to enrolment API
4. Based on the CA type device certificate will be created and handed back to the requesting body



ANPR deployment for a Toll Collection System



Engagement

Calsoft engaged with a leading financial organization A toll collection system is being developed for large-scale deployment both for roadways and parking stations. Calsoft is a part of the whole development team developing the core ANPR pipeline, its deployment, and its financial pipeline.



Benefits

- Currently multiple models are ready and evaluated with the static images
- Deployment code is getting developed and will be used by two pilots
- Mass scale deployment will be designed further
- Various new deployment utility needs to be developed for central model training and edge evaluation



Technology

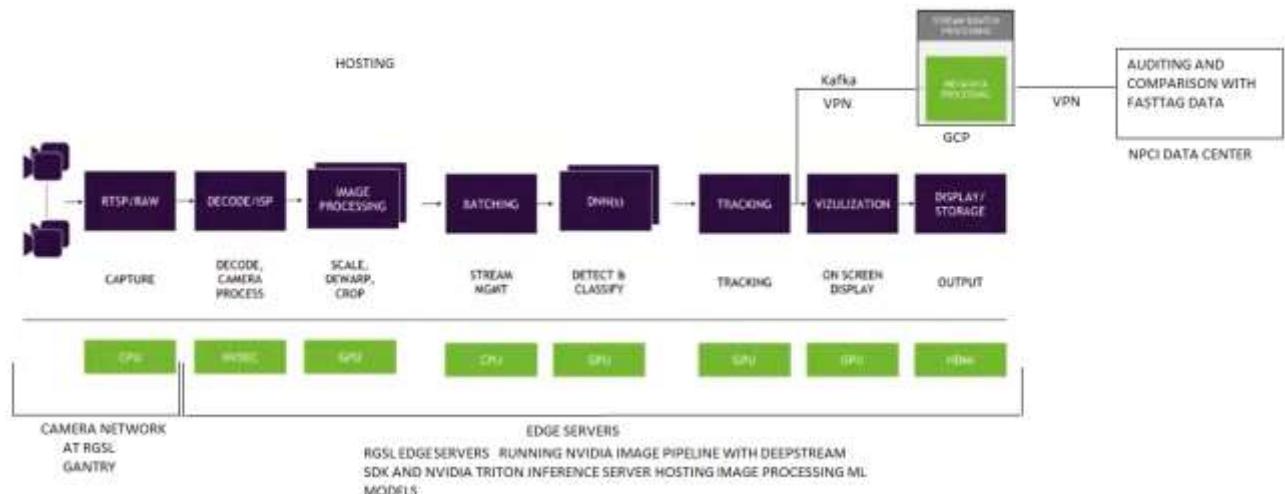
Image Processing, RNN, DNN, Tensor-RT, Nvidia, CUDA, Docker, Google Cloud



Solution

The Solution underpinned-

- Developing a DL model that-
 1. Extracts License Plate Data
 2. Yolo Model retraining, retraining Yolo, craft
 3. DNN vs segmentation + NN For OCR, finalizing OCR Model
 4. Identify frames of interest
 5. Execute RNN Model
 6. Packet Drop resolution
 7. Federated training (zone-specific training)
 8. Proper Text detection/segmentation, ML Models, development, and training
 9. Real-Time Streaming Platforms
 10. Nvidia Triton Inference platform readiness for ANPR Solution
- Deployment
 - 1. Docker-based microservices for deployment
 - 2. Ansible script to do deployment of all microservices (models + image processing software + 3rd party software)
 - 3. Convert models to Triton inference pipeline
 - 4. Batch processing, Deep stream video ingestion, Video ingestion job
 - 5. Data storage, Object storage, Remote model update



POSIX Compliance & Use-case Testing of EV OS Platform

Engagement

Calsoft is engaged with a leading EV Manufacturer to validate the POSIX compliance of a leading EV manufacturer's OS platform. The testing includes both, good-path and error-handling workflows.

Benefits

- Improved test coverage for POSIX compliance.
- Automated tests integrated with CI/CD platform, enabled continuous testing across nightly and regression builds.

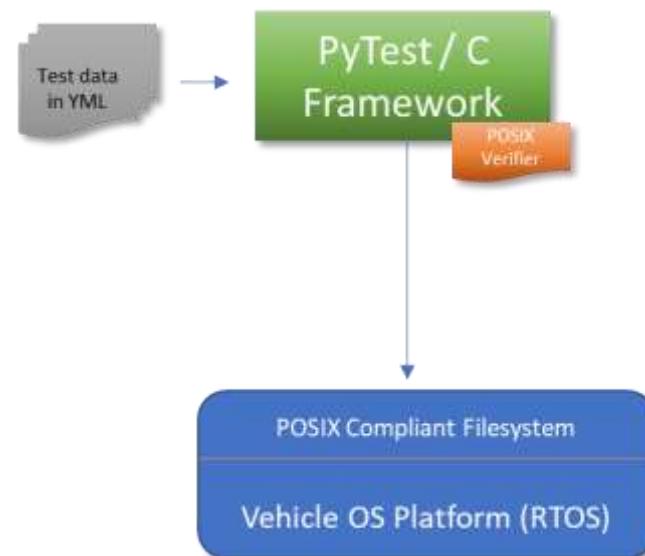
Technology

RT Linux (Sel4 Microkernel), Python, C/C++

Solution

Calsoft helped the customer with designing & automating compliance tests for their Vehicle OS platform:

- Tests covering various system calls, viz. File operations (E.g. Open, Read), Information Maintenance (E.g. Getpid, Alarm), IPC (E.g. Pipe, Mmap)
- Automate, validate and stabilize relevant test cases using an in-house, PyTest-based framework.
- Maintain & Augment the POSIX Verifier tool developed in C.
- Test development and automation of Unified Diagnostic Services (UDS), covering validation around communication with various ECUs.
- Document & Automate "Usecase" testing of end-2-end workflows covering various components of vehicle OS. Ex. Combination of various syscalls, APIs to form comprehensive workflows and randomize the execution of multiple such workflows to stress the SUT.





The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with its characteristic buildings and architectural styles. The sky above the city is a pale yellow or light blue, suggesting either dawn or dusk. In the foreground, there is a solid teal rectangular area containing the main title text.

Success Stories: Retail and E-Commerce

Multi-Region Stack Segregation and Data Migration (Retail and E-commerce)



Engagement

- Calsoft was involved with an e-commerce platform to segregate and migrate the cloud infrastructure according to region on Google Cloud Platform. Complete traffic, data segregation, and stack isolation per region was the requirement.



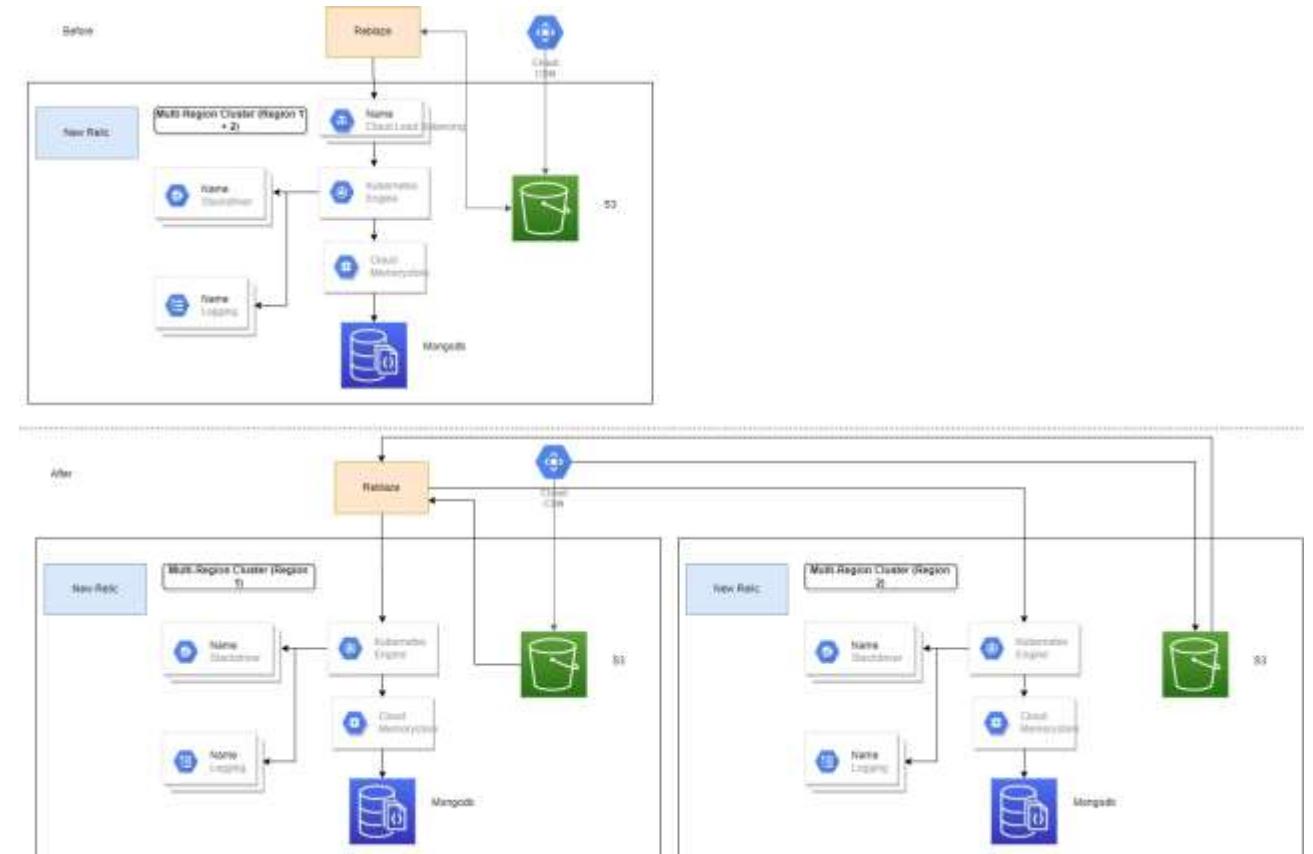
Solution

- Calsoft helped in:
 - Designing the architecture for traffic segregation
 - Application transformation for each region considering local compliance and laws.
 - Transforming the data and migrating to new region
 - UI/UX redesign and development
 - Testing and Support of the multi-cluster multi-region stack.



Technology

- Google Cloud, New Relic, Reblaze, AWS S3, ReactJS, Java, Ruby on Rails, Docker, ELK Stack, MongoDB, Redis



Benefits

- Lower latency and better end-user experience.
- Better compliance to local government laws and regulations.
- Better code manageability and future upgrade to region-specific requirements

Secondary and Tertiary Sales Visibility for a Leading FMCG Company



Objective:

- Calsoft engaged with a leading FMCG company to gain the sales visibility and SKU visibility for their downstream sales channel



Solution and Approach:

- AcceleratoAI has an inherent capability to pull the data from heterogeneous data sources.
- Offline connectivity issue addressed and obsolete HW and OS dealt as well.
- The entire universe of their data got integrated on Momentum platform which helped the principal company to gain the sales visibility at secondary & tertiary level and thereby the daily stock position in their ecosystem.



Benefits Realized:

- Insight into real-time closing stock position across the distribution channels including secondary and tertiary sales.
- ML based dynamic buffer management helps identifying the item level target inventory
- Significant improvement in sales and distribution channel as the inventory level predicted and replenishment planned & delivered based on dynamic buffer management and lead time for each of the SKUs



Challenges:

- Heterogeneous environment
 - 22% on tally
 - 18% on busy and marg
 - 52% on local home grown software
 - 8% on spreadsheet
- Offline activities
- Obsolete HW , SW and O/S



Year of Implementation:

2021 (Ongoing)

Team Size:

12

Project Maturity:

Full Scale Implementation



Technology and Partnerships:

Technology Platforms:

- Accelerato AI



High level Architecture

Buffer Management Report				
Region	Bangalore	Stock Norm	Goods in Transit	Economic Penetration
Entity	Super Stockist			
Item 1	22	600	-	22
Item 2	66	54	56	110
Item 3	0	65	15	33
Item 4	65	987	0	65
Item 5	76	234	0	76
Item 6	78	84	56	66
Item 7	100	90	90	0
Item 8	5	67	45	65
Item 9	63	46	0	63
Item 10	20	98	45	50



Building Insights using Sales ecosystem data and churn prediction



Objective:

- Calsoft engaged with the FMCG client to build a dashboard for delivering insights leveraging sales ecosystem data. Idea was to predict and prevent the churn before it occurs, and leverage the insights for cross and upsaling, growing sales pipeline



Solution and Approach:

- We analyzed thirty six months of the sales data.
- Build the dashboard to provide the insight on revenue daily/weekly/monthly/quarterly region wise, product wise and overall
 - We have build the following analytics to provide the insight
 - Outlet performance analysis
 - Top 25 performing outlets (HPO)
 - Lowest 25 performing outlets (LPO)
 - NBO (Already a non-buying outlets as of previous quarter)
- Predicted the sales for each outlets and thereby LPO & NBO
- Sales team performance analysis – sales leaderboard
- Macro level data distribution in terms of LPO, NPO and high performing outlets
- Reach analytics
- Sales growth, sales target and opportunity
- Lead conversion rate & Quote to close rate



Challenges:

- Lack of route analysis
- Zero to low visibility of top lines



Year of Implementation:

2021 (Ongoing)

Team Size:

12



Project Maturity:

Full Scale Implementation



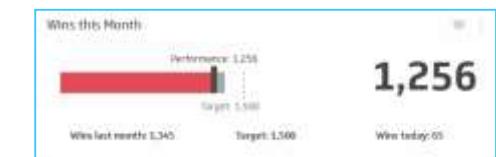
Technology and Partnerships:

Technology Platforms:

- Accelerato AI



High level Architecture



Predicting NBA of Shoppers and Cross-sale and Up-sale recommendation



Objective:

- Calsoft engaged with a leading FMCG customers to deliver a dashboard that delivers prediction of the shopper NBA, and building a recommendation engine for Cross-sale and upsale



Solution and Approach:

- Based on the shoppers interest on the product the algorithm predicts the shoppers next best action
- Based on the next best action predictions outcome algorithm recommend the products for upsale as well as for cross sale
- Predicts that the up-sale products to be displayed in the digital screen in which grid to draw the shopper's attention
- And similarly Predicts that cross sale products to be displayed in the digital screen in which grid to draw the shopper's attention
- Since, the digital screens are of mainly two types, the first type is divided in 3x3 (9) small grids and other ones are of 3x4 (12) small grids, so the display prediction algorithm has to deal one more level of complexity for the maximum attention of the shoppers



Benefits Realized:

- Solutions is under observation in one of largest chain of shopping mall in USA. They have 1600 stores across the country
- Expected growth in the top line



Challenges:

- Zero to low visibility of the top lines



Year of Implementation:

2021 (Ongoing)

Team Size:

4

Project Maturity:

Full Scale Implementation



High level Architecture



Technology and Partnerships:

Technology Platforms:

- Accelerato AI

Solving Financial and Pricing Problem through Data Quality Management



Objective:

- Calsoft partnered with the client to implement the data quality management solution



Solution and Approach:

- Consultancy, Process Management and bespoke Application Development for the Enterprise DQ initiative.
- Evaluate Data Quality Management tools for suitability
- Integrate with the Enterprise Data Catalog
- Set up Data Quality Monitoring & Measurement and Data Quality Controls processes
- Build the Technology Platform using the chosen tools
- Set up the Data Strategy for executing these frameworks



Benefits Realized:

- Mitigated financial and reputational impact caused due to Low Data Quality
- Enterprise Data Quality Scorecard provide MIS interfaces for insight and oversight
- Decision makers can now have the holistic views of the data, and have data quality mechanism in place



Challenges:

- \$4M orders missing from trading report
- Pricing – incorrect product prices on website
- Client communication – outdated subscriber list
- Customer analytics delayed due to lack of cross-channel reconciliation
- Lost Productivity for Analysts



Year of Implementation:

2021 (Ongoing)

Team Size:

12



Technology and Partnerships:

Technology Platforms:

- Data Catalogue and Storage – Collibra, Azure, Azure Data Lake Storage
- Data Quality and Workflow Management – Apache Airflow, Great Expectations
- Analytical Data Modelling – Google BigQuery
- Data Visualization – Looker
- Data Logging – Prometheus
- Language – Python,
- Platforms – Atlassian Suites of Products



High level Architecture

Data Catalog & Core Governance

Collibra

Data Quality Management

Great Expectations

Workflow Management

Airflow

Operational & Analytical Data Models

BigQuery

Scorecards & Self-Service Analytics

Looker

Implementing Competitive Pricing through Intelligent Automation



Objective:

- Calsoft partnered with the organization to provide them a competitive intelligence with regards to pricing, Campaign management by implementing an intelligent automation framework



Solution and Approach:

- PLM and pricing team defines the process flow of competitive analysis.
- Machine learning team defines the complete parameter set and the adjustment process
- Calsoft developed scraping framework using scrappy spider and automation framework along with search and selenium automation for manipulating URLs.
- Specific ecommerce sites and sellers were targeted and scrapped data is refreshed with a single button press.
- Data integrity is maintained through searching in multiple ways.
- Pricing consistency were maintained using component compensation method.
- Flexible competition definition was used.



Benefits Realized:

- Mitigated financial and reputational impact caused due to Low Data Quality
- Faster time to Market, increased revenue pipeline
- Automated the workflow that triggers the competitive intelligence process



Challenges:

- Manual process of intelligence gathering
- Lengthy time, decreasing revenue

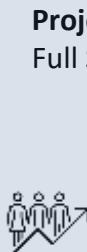


Year of Implementation:

2021 (Ongoing)

Team Size:

4



Project Maturity:

Full Scale Implementation



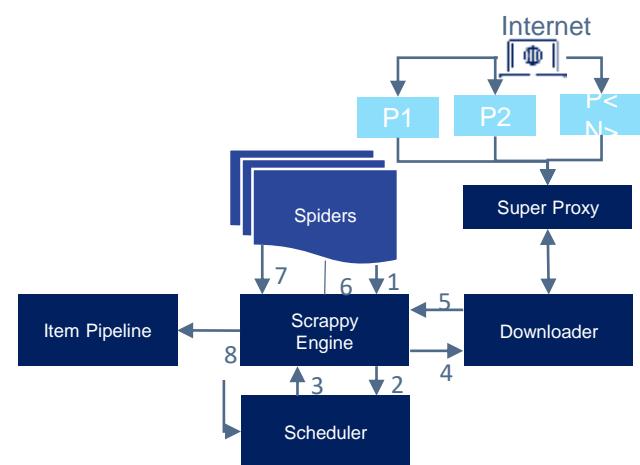
Technology and Partnerships:

Technology Platforms:

- Scrapy
- Selenium Automation Tool
- Code Optimization using Design Patterns
- Beautiful Soup Assisted Search Process



High level Architecture



Creating Analytics Dashboard for Reporting



Objective:

- Calsoft partnered with the organization for building a data lake, correlating sale data with finance data, giving the sale team a proper insight into the sale pipeline



Solution and Approach:

- We have taken the sales data from sales CRM, Finance , Marketing, shipping, logistics interfaces were compared and data integrity were established.
- Oracle, SAP and other databases were leveraged
- ETL and Automation framework was developed
- Data quality check were performed in Talend
- Real time report for data quality and various analytics were done in Tableau
- Data is stored in NoSQL



Benefits Realized:

- Reduced Infrastructure cost by 50%
- Improved data quality across departments, by introducing data quality framework
- Removed Data Silos



Challenges:

- Data in Silos
- Data quality not maintained
- Increased Cost of Infrastructure

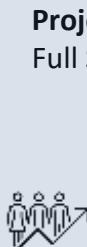


Year of Implementation:

2020

Team Size:

4

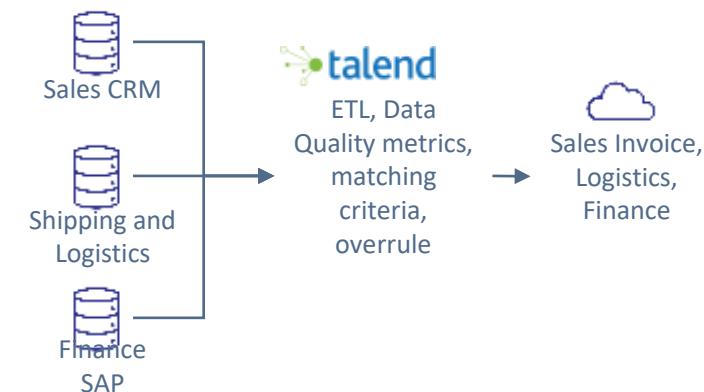


Project Maturity:

Full Scale Implementation



High level Architecture



Technology and Partnerships:

Technology Platforms:

- Oracle
- SAP
- NoSQL
- Talend
- Open Studio

Pricing Analytics for a Laptop Manufacturer



Objective:

- Calsoft partnered with the client to produce analytics mechanism that enables the client to see the pricing recommendations, automation and tax compliance insights



Solution and Approach:

- Build a platform that leverages ML and performs analyses on data gathered from the Company and its competitors on daily basis.
- With minimal human intervention and using a rule-based and AI engines, provided pricing recommendations.
- Built real-time elasticity models linked to business strategies – revenue and unit maximization.
- Provided dynamic price alerts to flag competitive price moves outside of strategic tolerance limits.
- Built learning engine that improves recommendations on previous results.
- Automated near continuous monitoring of competitive market prices.
- Built a Web applications for multiple applications built on this platform for recommendation system, DQS (Deal Quality Score).



Benefits Realized:

- Minimal Human intervention
- Continuous Monitoring of Market Prices
- 98% of the downloads are AI driven



Challenges:

- Lack of pricing optimization
- Lack of pricing insights
- Manual Process
- Lack of market monitoring

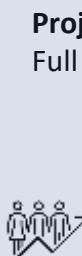


Year of Implementation:

2020

Team Size:

4

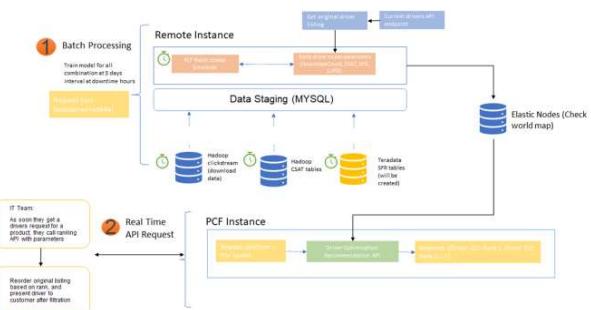


Project Maturity:

Full Scale Implementation



High level Architecture



Technology and Partnerships:

Technology Platforms:

- Python | .Net | Angular JS
- MLflow | ML Libraries
- Hadoop | MySQL

Intelligent Pricing Recommendation for Laptop Manufacturer



Objective:

- Calsoft partnered with client to execute a commercial automation project , helping them to build a UI for the pricing configurator



Solution and Approach:

- Competitive pricing determination.
- Data is provided by third party crawls and gives pricing. Data quality check and cleansing is done.
- MDM is done to move the data from SQL server to Hadoop and Teradata
- Model
- ML models such as Regression, XGBoost, Decision trees are configured through an API layer
- Data pipeline is also configured through UI
- Batch processing of model training and fitment analysis is done through UI
- Cloud deployment is done through cloud factory



Benefits Realized:

- Improved and faster pricing recommendation, keeping client ahead of the competition
- User Interface created, easy visualization of pricing recommendation
- Data Quality check and cleansing before the data is presented in a dashboard



Challenges:

- Lack of visualization of the recommendations



Year of Implementation:

2020

Team Size:

4

Project Maturity:

Full Scale Implementation



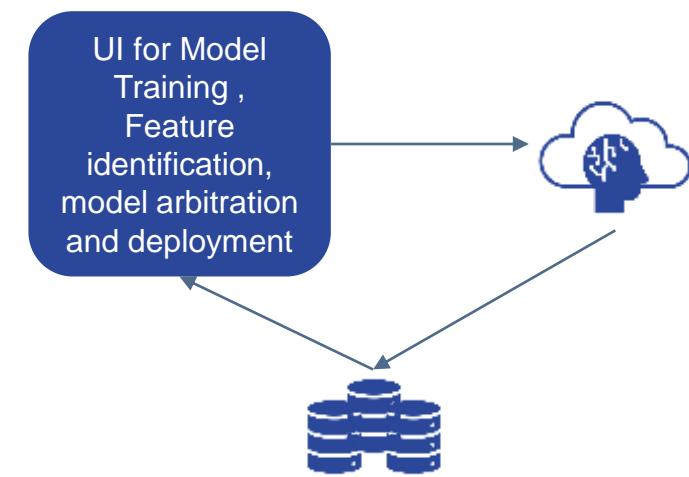
Technology and Partnerships:

Technology Platforms:

- Language – Angular JS
- APIs- RESTful API
- MLFlow, AirFlow
- Teradata, Hadoop, SQL Server
- Scikit, XGBoost, Keras



High level Architecture



Price Optimization and Recommendation for a Retail Chain



Objective:

- Calsoft partnered with client to execute a commercial automation project , helping them to build a UI for the pricing configurator



Solution and Approach:

- Competitive pricing determination.
- Data is provided by third party crawls and gives pricing. Data quality check and cleansing is done.
- MDM is done to move the data from SQL server to Hadoop and Teradata
- Model
- ML models such as Regression, XGBoost, Decision trees are configured through an API layer
- Data pipeline is also configured through UI
- Batch processing of model training and fitment analysis is done through UI
- Cloud deployment is done through cloud factory



Benefits Realized:

- Complete customizable elasticity
- Store level price optimizer
- Configurable algorithm for different business rules



Challenges:

- Lack of visualization of the recommendations

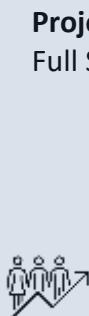


Year of Implementation:

2020

Team Size:

4



Project Maturity:

Full Scale Implementation



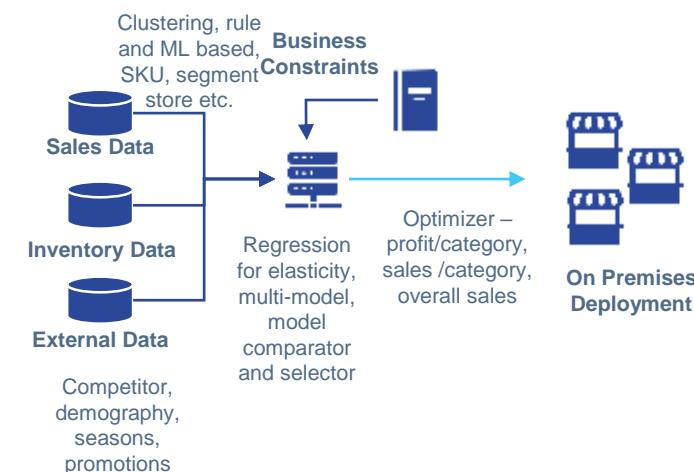
Technology and Partnerships:

Technology Platforms:

- Language – Angular JS
- APIs- RESTful API
- MLFlow, AirFlow
- Teradata, Hadoop, SQL Server
- Scikit, XGBoost, Keras



High level Architecture





Success Stories:
Technical Documentation

Engagement

The Dell AI Comms team is engaged in setting up documentation & marcom process, drafting innovation papers, drafting various technical artifacts & templates, & developing product videos, conducting product review meetings, All Hands, POMA, etc.

Deliverable:

Patent papers, User guide, online help, technical blogs, product videos, newsletters, mailers, research papers, product charters, etc.

Benefits

- One of the most important reasons investing in patent mining helps is to close all the loopholes and gaps that may prevent the companies' technology from being used.
- Patents help others determine what actions they can take to avoid committing infringement, and they help businesses define a reasonable course for product development.

Technology

- Confluence, Adobe Photoshop, Microsoft Word, Canva

Solution

• **Innovation papers:**

- Setting up process to take ideas towards patenting that involved building partnership of trust and collaboration
- Building trust with the partners and bringing awareness about patenting
- Identifying patent SPoCs, templates, patent filing process, and so on. Understand the process & propagate it to the innovators
- Data gathering and drafting innovator papers, facilitating technical and outline reviews to ensure patent filing readiness

• **End user documentation:**

- Prepare templates, document online help, perform end-user testing for products & suggest user experience feedbacks to enhance products
- Prepare product videos including design elements and providing voiceovers
- Editing and proofreading product charters, research papers, etc.
- Preparing Product Reviews Notes after every meeting and updating in the repository.
- Researching and connecting with PoCs for blog publishing and white papers.

• **Creative documentation:**

- Design monthly newsletter and bi-weekly updates and product videos
- Design MS PowerPoint templates, design elements for emails used in official communication to the entire team.
- Preparing & designing mailers to send official communication to AI Products team (seasonal greetings, congratulatory messages, reference letter, talking points for meetings, & participate in events, etc.)
- Conduct POMA meetings, Conduct feedback sessions and collect meeting notes, help manage calendars, contact team members to collect information.
- Organizing All Hands, videos, awards, etc.



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and architectural styles visible against a light sky.

Success Stories: Appendix - 1

Engagement

Calsoft was engaged with the client for developing prototype service. The engagement underpinned:

- Quick turnaround for recurring field requests for features, integrations, and PoCs
- Dealing with limited engineering bandwidth to fulfill such requests
- Dealing with lack of right mix of immediately available technical knowhow for R&D and technical validation

Benefits

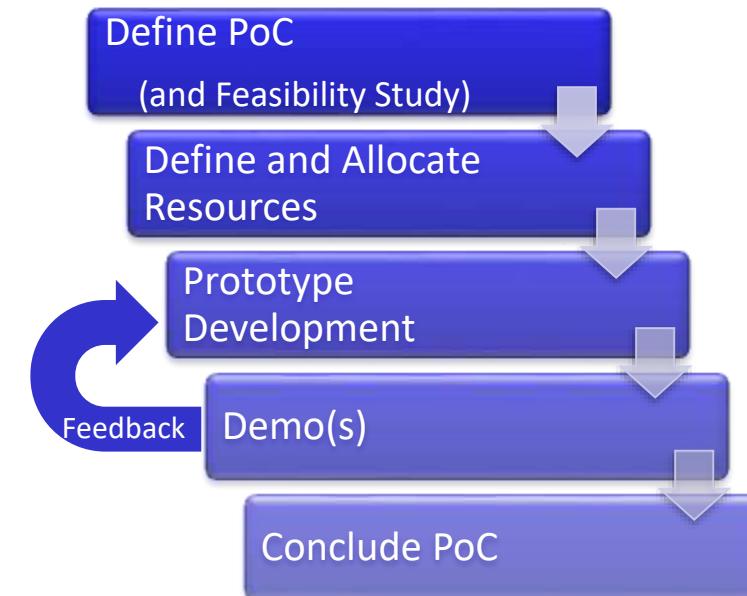
- Showed Out of Box expertise
- Automated Test Suite for High End NAS Box
- Did External Interface Testing (multi-node file system tests)
- Performed testing on
 - File system,
 - User Interface,
 - Integration,
 - Sustainability (Cluster aging), NIS, CIFS, and DNS



Solution

Scale up or down model – scale engineering resources per PoC or scale number of PoCs, while maintaining a small constant team

- Maintain IP confidentiality
- Convert PoC into deliverable product based on findings and feasibility
- Typical method to drive PoCs
 - Define PoC
 - Research feasibility by building components
 - Tie them together and set weekly demos
 - Deliver a PoC
- Few examples of PoCs executed at Calsoft:
 - File server version control using GIT
 - Encrypting file system metadata using AD
 - Performance measurement for databases on various hardware platforms, e.g. numa, uma, SMP, etc





Customer Profile

Sun Microsystems, Inc.. (a wholly owned subsidiary of Oracle) was a company selling computers, computer components, computer software, and information technology services



Engagement

- Calsoft was engaged with the client for Porting OpenSAF from Linux to Solaris by analyzing more than 1 million lines of code.



Technology

- Platform: Solaris and Linux
- Language: C, C++, Scripting in Bash



Solution

- OpenSAF 2.0 ported to Solaris on the incremental basis
- OpenSAF tool chain made available on Solaris from Linux
- As a result of Calsoft's contribution, OpenSAF 2.0 was made available on 4 platforms:
- Solaris x86 gcc, Solaris SPARC gcc, Solaris x86 SunStudio, Solaris SPARC SunStudio
- Created an online repository of the Solaris compliant OpenSAF 2.0 and submitted back to the
- OpenSAF 2.0 Mercurial repository for use by the OpenSAF community
- Performed Technical documentation for OpenSAF 2.0 including configuration, compilation, steps to bring up the clusters, etc. was prepared reviewed and provided by the Calsoft team
- Put together the Solaris compliant tool chain for ease of building OpenSAF on Solaris

Product-Development for Creation of Scalable and Reliable Storage Infrastructure

Engagement

Calsoft was engaged with the client for creation of scalable and Reliable Storage Infrastructure. The engagement underpinned:

- Providing efficient network data management without disrupting user productivity
- Efficiently managing storage across multiple devices, architectures, and locations
- Creation of scalable and reliable storage infrastructure

Benefits

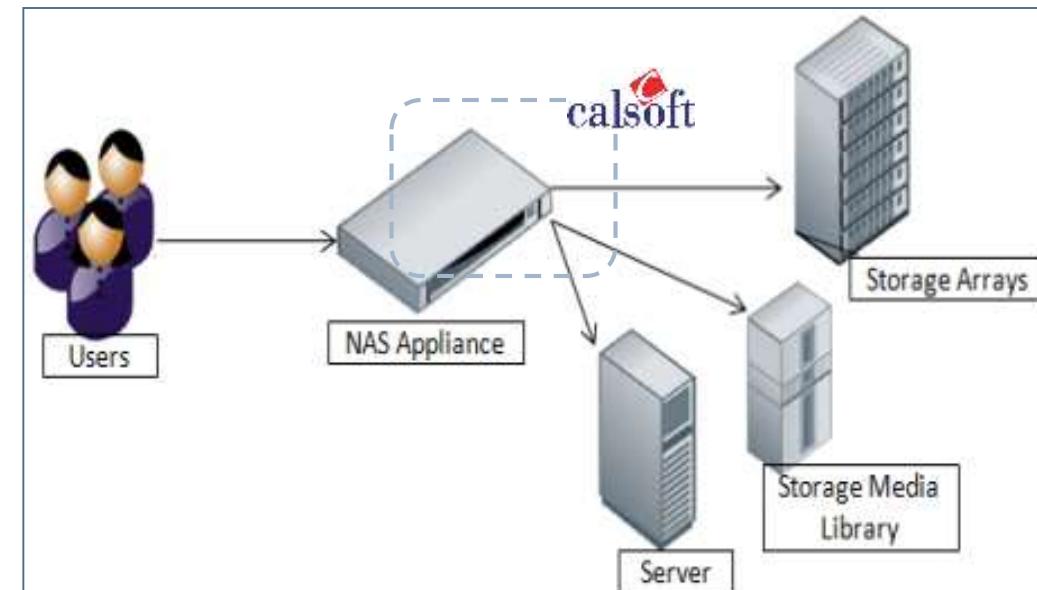
- Better performance of storage management tasks with no disruption or downtime to users
- Better storage capacity utilization
- Ease of use and management

Technology

- Windows, Linux, UNIX

Solution

- Did end-to-end product development
- Delivered location-independent services to users and applications across multiple, heterogeneous, distributed file systems
- Enabled users to access files in a logical and location independent way



Engagement

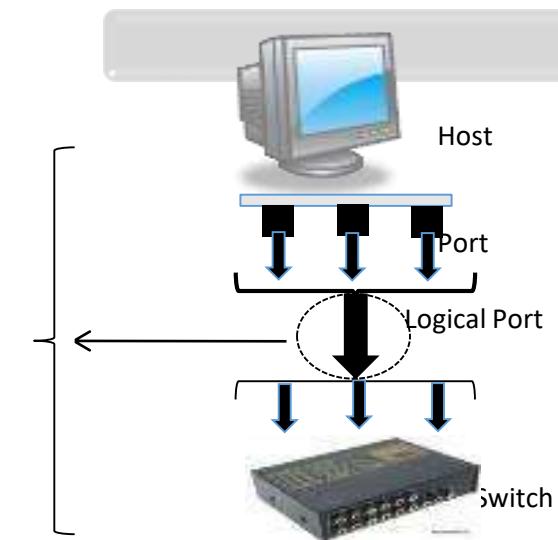
Calsoft was engaged with the client for adding HA and LACP support to the current bonding driver in BSD and port it to Montana for Sun StorEdge 5x00 systems

Technology

- Platform: Solaris, IEEE 802.3ad

Solution

- Developed bonding drivers, with 2 different modes, for SUN's StorEdge 5x00 series NAS boxes
 - First mode - A HA bond; which provides fault tolerance and link resilience
 - Second mode - A PA bond, also called an ether-channel or a IEEE 802.3ad which
 - provides link aggregation and distributes the outgoing packets to underlying physical NICs according to a frame distribution algorithm
- Implemented IEEE 802.3ad LACP protocol for automatic port aggregation and negotiation with the switch, along with standby link selection and dynamic key management
- Also implemented Jumbo Frames



Engagement

Calsoft was engaged with the client for optimizing the speed of testing process

Technology

- Shown Out of Box expertise
- Automated Test Suite for High End NAS Box
- Did External Interface Testing (multi-node file system tests)
- Performed testing on
- File system,
- User Interface,
- Integration,
- Sustainability (Cluster aging), NIS, CIFS, and DNS



Solution

- Automated Test Suite for High End NAS Box
- Did External Interface Testing (multi-node file system tests)
- Performed testing on
 - File system
 - User Interface
 - Integration
 - Sustainability (Cluster aging), NIS, CIFS, and DNS

Security and user accessibility of ONStor filer



Engagement

Calsoft was engaged with the client for Security and user accessibility of ONStor filer



Solution

- Authenticated Windows Domain users accessing ONStor filer against Domain Controller in the network
- Supported various CIFS authentication protocols include NTLM and extended security SPNEGO mode
- Worked with Win2K, Win2K3 as well as NT4 Domain Controllers
- Performed development as well as testing effort to achieve great quality end product



Technology

- Linux

Enhancing performance of data path for iSCSI target driver



Engagement

Calsoft was engaged with the client for enhancing the performance of data path for iSCSI Target Driver running on 10GigE



Solution

- Complete engineering R&D to prove POC, followed by implementation and testing.
- Calsoft designed performance improvement.
- Kernel level changes to network buffering code path
- Used various performance techniques to benchmark Application traffic.
- From high-level requirements, research performance losses in existing kernel code and design and implement changes in TCP/IP buffering mechanism to achieve better performance.



Technology

- Linux,Kernel,iSCSI

Engagement

Calsoft was engaged with the client for making the product bug free

Technology

- MAC Operating System



Solution

- Used co-operative networking and all nodes to forward packets
- Calsoft built a software simulation of the base band layer and the MAC base band
 - It helps CoWave to start testing their algorithms before their chips and systems are ready



Engagement

Calsoft was engaged with the client for resolving the issue of SAN caching appliance sitting in the data path between host server machines and storage backend boxes like EMC Clariion & Symmetrix, HP EVA, IBM storage backends



Technology

- Platform: RAM and Flash



Solution

- Calsoft built the GUI for this appliance SAN caching appliance that sits in the data path between host server machines and storage backend boxes
- Calsoft wrote the GUI and the middle tier layer to monitor performance of this device
- Did performance improvement through caching in RAM and flash

Engagement

Calsoft was engaged with the client for protecting data before it is written

Technology

- Platform: Linux ,Windows
- Technology: SCSI, FC, SCST



Solution

- Provided the Cache mirroring feature will enable redundancy and load balancing between the appliances
- Produced a system of two appliances working in tandem so that all or part of one unit may fail and other unit seamlessly handles all I/O traffic without losing any customer data



Customer

HP provides infrastructure and business offerings that span from handheld devices to some of the world's most powerful supercomputer installations



Engagement

- Calsoft was engaged with the client for DirectNFS (xNFS)



Technology

- Platform: Linux, Windows



Solution

- Developed SAN cluster file system for HP
- A cluster file system designed to take advantage of emerging SAN/NAS technologies
- Implemented file virtualization
- First prototype was on Linux
- Multi platform project aimed to support heterogeneous client environment
- Basic Theme: Fetch meta-data from server but read & write data directly to/from disk over SAN
- Implements leases (DLM) to maintain coherency
- Distributed file system with performance close to that of local file systems
- Added kernel modules to file server clients

Engagement

Calsoft was engaged with the client for speeding up testing process to accelerate product releases



Solution

Regression Test Suite for DLM

- Enabled kernel component owners to write test scripts instead of writing kernel code for testing
- Reproducible test script generation for bug isolation
- Allowed generation of multi-process multi-thread test scripts on different MCS nodes

Cluster File System Test Tool

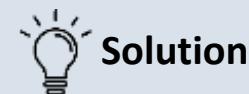
- Tested distributed state machine implementation
- Used coordinated load generation from multiple cluster nodes
- Included logging Also, generated random file I/O and verification sub-system for post-test analysis
- Used for testing the port that Calsoft did of Veritas' Cluster file system to the MCS platform patterns for testing

Engagement

Calsoft was engaged with the client for Improving the Testing Process

Technology

- Platform: Linux Kernel



Solution

- Designed Test Suite for openGFS: open source Linux cluster file System
- Developed 500 test cases
- Used DTET: an open source test automation frame-work to develop test cases
- Performed collision tests, Cache Coherency tests, Interaction tests and Multi-process tests



Engagement

Calsoft was engaged with the client for enhancing responsiveness by faster throughput and better interaction with windows OS



Technology

- Platform: Linux



Solution

- Delivered performance improvement – more specifically I/O. This was achieved by caching files on-disk instead of I/O over the network.
- Fixed bugs in code so that Microsoft's IFS test cases pass – that automatically ensures correct interaction with OS.

Engagement

Calsoft was engaged with the client for improving the reliability of testing

Technology

- Platform: Monta Vista Linux(Carrier Grade Update)



Solution

- Automated Test Suite for testing the functionalities of MV Linux.
- Demonstrated Out of Box Experience
- Did Testing on different architectures (x86_64, PowerPC 74xx and 85xx)
- Did Testing of SELinux, Forced Unmount, lvm2, SNMP, DRBD, IPMI, LKCD, kexec, RMON, CRAMFS, ext2, ext3 file system, KGDB, LTTNG, Quotas, RAID, etc



Engagement

Calsoft was engaged with the client for making kernel drivers for various storage and network interfaces bug free



Solution

- Developed an MFC application which will allow to control the input (mouse and keyboard) and output (VGA signals) of the NComputing access devices. This involved implementing mouse and keyboard protocols in the MFC application and using image comparison tools in the test automation software
- Built test suites for functionality of access device using this application and standard test automation software (Test Complete)
- Along with the software, specific hardware components, serial to PS/2 converters for keyboard and mouse, and VGA2USB frame grabbers were also used to develop the automation framework
- Automated the existing NComputing manual tests



Technology

- Java, C#, Jetty Web Server, MySQL, Hyper-V APIs, XEN SDK, VMware SDK, ANT etc.
- Platform: Windows



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for developing the product P2V Assistant & Boot CD development



Technology

- Platform: Linux & Windows



Solution

- Developed tools to replicate the content of source machine's file system and to watch system updates during events like driver installs and replicate them later
- Developed code handling service packs and hot fixes applied to the system
- Created all test plans and identified use cases after interacting with the PSO and support teams at VMware
- Performed testing for P2V assistant since its alpha releases for 1.0 as well as 2.0



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for Scalability optimization of VMware product



Technology

- Platform : Windows XP



Solution

- Developed SCSI Miniport Driver for the BusLogic SCSI Adapter
- Wrote for the BusLogic SCSI HBA
- Driver was unavailable under Windows XP
- Implemented the HBA in software



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for effective utilization of QA Resources



Technology

- Platform: ESX, Linux & Windows



Solution

- Created a PERL based automation suite for VMware to automatically install operating systems inside the Virtual Machine
- Analyzed failures to identify problems in any of the product subsystems including the Virtual Machine monitor, display, networking, disk, console and API
- Created scripts for new Operating Systems being added to the VMware supported Guest Operating Systems list



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for effective utilization of QA Resources



Technology

- Platform: ESX, Linux & Windows



Solution

- Automated manual QA related to ESX (all versions), VMware Server(GSX), Workstation
- Developed SCSI device driver for Workstation
- Developed P2V and did QA at system level
- VirtualCenter QA (manual) automated
- Did auto install automation

Windows Client for Cloud NAS Product

Engagement

Calsoft was engaged with the client for making the Cloud NAS Product window compatible

Technology

- Platform: Windows



Solution

- Developed a Windows Client for Cloud NAS Product
- Developed the client using Dokan (FUSE like) implementation on Windows
- Developed adapter to interface between Dokan and Cloud Storage Server
- Developed installer to deploy the product

Engagement

Calsoft was engaged with the client for effective utilization of the networking bandwidth

Technology

- Platform: Linux Kernel



Solution

- Modified existing Open source Gigabit Ethernet Device Drivers on Linux to completely bypass the Host OS Stack
- Implemented an alternate Data Send/Receive path using a proprietary library (developed by Precision I/O) as well as Jumbo frames
- Results in significant improvement in Networking bandwidth utilization through efficient server side networking
- Modified drivers for Broadcom, Intel 10G, and SysKnect 98



Engagement

Calsoft was engaged with the client for effective utilization of the networking bandwidth



Solution

- Implemented an alternate Data Send/Receive path using a proprietary library as well as Jumbo frames
- Results in significant improvement in Networking bandwidth utilization through efficient server side networking
- Modified drivers for Broadcom BCM5700, Intel 10G Driver and (currently) SysKonnect 98



Technology

- Platform : Linux, SMP Kernel - Modified existing Open source Gigabit Ethernet Device Drivers on Linux to completely bypass the Host OS Stack

File system metadata encryption



Engagement

Calsoft was engaged with the client for file system metadata encryption



Solution

- To develop a secure file systems metadata along with file data using encryption
- Integration with Active Directory



Benefits

- Detailed research and design (R&D) for product
- Complete ownership of File Encryption product
- Complied with stringent processes for IP protection and confidentiality



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for making the VMware Server (GSX) bug free



Technology

- Platform: Windows,Linux



Solution

- Performed regression testing covering functional verification of the Application UI and web interfaces across the whole range of supported Operating systems (Windows and GNU/Linux) and browsers
- Did Installation testing for both the products covering various installation options
- Created Virtual Machines using the product above and ensuring no bugs re-enter
- Did Installation of VMware Tools inside the Virtual Machine and ensured their correct functionality
- Performed mobility testing involving migrating Virtual Machines from older versions to the current versions &across all VMware Products
- Developed TDS from time to time for the features being covered by us



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for making the VMware bug free



Technology

- Platform: Windows,Linux



Solution

- Calsoft entrusted with QA for VirtualCenter 1.0 testing from beta1 stage through final release
- Performed functional testing for subcomponents of the VirtualCenter system and development of TDS of areas covered by our team
- Performed regression testing entire provisioning, migration, inventory and guest OS customization features
Performed stress and OOB testing on supported platform for VirtualCenter1.0 and VirtualCenter 1.1
- Provided QA coverage for Guest OS customization and provisioning for VirtualCenter 1.1 releases on ESX as well as VMware Server(GSX) platforms
- Developed automation scripts using PERL and VBscript to verify customization operations



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for making kernel drivers for various storage and network interfaces bug free



Technology

- Platform: Windows,Linux



Solution

- Tested drivers on ESX 3.5 and ESX 4.0
- Tested storage drivers with numerous models of SCSI, SATA, SAS HBAs from storage OEMs like Qlogic, Adaptec etc
- Tested VMware's kernel network drivers for ethernet HBAs from various vendors like Intel, Broadcomm etc
- Used various performance test tools like IOzone, Bonnie and Netwox to perform performance testing of drivers



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for making the product (ESX Server) Bug free



Technology

- Platform: ESX,Linux



Solution

- Performed regression testing covering functional verification of the Web based Management Interface across the whole range of supported browsers
- Performed installation testing for various installation options on the various supported servers including – boot from SAN, PXE boot etc
- Created Virtual Machines using the product and ensuring no bugs creep back in
- Tested network and storage drivers for ESX versions 3.5 and later
- Completed ownership of 3.0.3 maintenance release including system, performance, and regression testing
- Completed ownership and release of ESX 2.x patches
- Tested ESX support for new technologies from Intel and AMD



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for making the product Server (GSX) Bug free



Technology

- Platform: ESX,Linux



Solution

- Did regression testing covering functional verification of the Application UI and web interfaces across the whole range of supported Operating systems (Windows and GNU/Linux) and browsers
- Performed installation testing for both the products covering various installation options
- Created Virtual Machines using the product above and ensuring no bugs re-enter
- Installed VMware Tools inside the Virtual Machine and ensuring their correct functionality
- Performed mobility testing involving migrating Virtual Machines from older versions to the current versions & across all VMware Products
- Developed TDS from time to time for the features being covered by us

Bug Fixing inside the Virtual Machines



Customer

VMware the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that significantly reduce IT complexity and enable more flexible, agile service delivery



Engagement

- Calsoft was engaged with the client for Bug Fixing inside the Virtual Machines



Technology

- Platform: Windows



Solution

- Designed and developed GUI automation suite using Visual Test for performing tests inside the Virtual Machines
- Installed a variety of applications and performance tools
- Verified the installations in terms of proper launching of the programs
- Ensured correct behavior in terms of expected results for given inputs
- Detailed logging with screenshots for analysis of failures



Customer

Innovative startup in Cloud Management area, based out of US



Business problem

- Read the real time data from AWS subscription
- Analyze the data to present key parameters, such as current usage, billing forecast etc.



Challenges

- Customer had a lack of experience in AWS API



Calsoft value addition

- Complete assessment of AWS services to be used to achieve the goal.
- Design, build, test and deploy of code written in Java or Python
- Integration testing & support



Customer

WW technology leader catering to specific project from nationwide academic governance body



Calsoft value addition

- In depth technology experience & knowhow on HP CSM/CSE products.
- Ability to quickly pick up knowhow on HP CSA product to make useful contribution to the overall project



Business problem

- To customize HP Cloud System Matrix for customer requirements
- To integrate automation workflow designed with HP Cloud Service Automation with the CSM implementation



Challenges

- Lack of expertise & knowhow on both CSA and CSM products



Customer

Leading storage vendor based out of Europe



Business problem

- Create functional and performance test setup for OpenStack IceHouse, Juno and Kilo & integrate the setup with CI environment (e.g. Jenkins)



Challenges

- Lack of experience in writing install, dev scripts



Calsoft value addition

- Customize existing scripts for unsupported distributions of OpenStack.
- Write scripts to do automated setup and configuration of OpenStack configuration
- Perform end to end functional and performance testing



The background of the slide features a soft-focus photograph of a dense urban skyline, likely Chicago, with various buildings and architectural styles visible against a light sky.

Success Stories: Old Deck





Customer

Omneon, now a part of Harmonic, offers professional media organizations an open platform optimized for the production, transformation and distribution of digital media



Solution

- Implemented NDMP Server for Omneon
- Enabled NDMP for Media Grid Content Library System
- Implemented features such as backup, incremental backup and restore
- Performed Complete Quality Assurance activities against known Backup products such as: Symantec Net Backup & EMC (Legato) Networker
- Did compatibility testing and certification with Commvault and NetBackup DMAs
- Implement Management Interface to : enabled/disabled NDMP Services & configure NDMP Options
- Provided a simple utility to copy data from one server to other



Challenges

- Data Management Protocol (NDMP) v3 server implementation for Omneon's Media Grid Content Library product



Technology

- Omneon SCCS & defect tracking system
- Calsoft CVS/Bugzilla



Customer

Sun Microsystems, Inc. was a company selling computers, computer components, computer software, and information technology services



Challenges

- Making SAM-QFS Client more scalable



Technology

- Platform: Solaris 10, Linux, Windows 2K3



Solution

- SAM-QFS is one of the Sun's cluster file system
- Its Server runs on Solaris only and its currently supported client include Solaris and various versions of Linux
- Calsoft ported this to Windows and also re-implementing a lot of functionality for Windows
- Calsoft ported this to MAC OS which is BSD based kernel



Customer

Virident Systems builds enterprise-class solutions based on Storage Class Memory (SCM), that has revolutionized the data center and cloud computing by redefining the memory-storage hierarchy



Challenges

- To effectively manage disk drives and mass-storage devices



Technology

- Platform: Linux



Solution

- Developed UBI based volume manager and related software components for a flash device on Linux
- Understood and modified MTD, UBI
- Developed algorithms to match device characteristics
- Performed testing I/O performance using hdparm, iozone and other relevant benchmarks
- Developed device specific test programs
- Tuned and tested various applications on this device



Customer

Xiotech Corporation is one of the largest privately held data storage companies in the world.



Challenges

- Create a FC virtualization at the Firmware Level



Technology

- Platform: Linux



Solution

- Back End Simulator – Performed the test bed simulation in Linux, simulated the expected full load from the different clients via a virtualization technique
- Recorded all the SCSI commands and the data representing the loads from actual systems running those loads and played back to the SAN for comparison
- Front End Simulator - simulated the different storage media for the SAN including SCSI disk simulation , support for different SCSI commands and the SCSI enclosure services simulation



Customer

Overland Storage is the trusted global provider of effortless data management and data protection solutions across the data lifecycle



Challenges

- Development of VSS Hardware Provider & VSS requester



Technology

- Platform: Windows



Solution

VSS Hardware Provider:

- Availed Overland Snapshot functionality on W2K3
- Performed integration with Windows VSS frame work
- Enabled snapshot management on Ultamus Hardware
- Created, deleted snapshots on Ultamus Smart Disks

VSS requester

- Provided an MFC UI for Snapshot Management
- Performed VSS operations using VSS HW Provider
- Managed Snapshots
- Created, delete, enumerated
- Allowed Snapshot Schedules (Scheduler)



Customer

NeoScale Systems, Inc. provides enterprise storage security solutions.



Challenges

- kernel CIFS and NFS Proxy



Technology

- Platform: Linux



Solution

- Implemented a NetBIOS over TCP Stack
- Created SMB and CIFS stack
- CIFS development was based on SAMBA, but the in-kernel server Multi-threaded.
- Used User Space Daemon to achieve things like Authentication, Browser Service etc
- Also implemented a off-line backup utility that would use CIFS client (CIFS-VFS) to monitor and backup files
- Added Directory Change notification support to CIFS client in order to provide this functionality
- Worked with multiple-stream files in order to do the right backup and restore



Customer

Tacit Networks, Inc. provides wide area file services and wide area network optimization solutions for branch office and remote users



Challenges

- Poor performance under load conditions, no SMB signing capabilities of kernel CIFS client



Technology

- Platform: Linux



Solution

- Ported the Library that was initially to be built on Linux to the kernel
 - The library is for the express use of the Server side sub-system (of Tacit's product) and is expected to expose a proprietary interface
- Build such a library is also to overcome some limitations posed by the existing in-kernel CIFS client (smbfs). For e.g.. poor performance under load conditions, no SMB signing capabilities, etc



Customer

Zambeel delivers enterprise-class network-attached storage solutions that are designed to adapt to customers' needs to maximize productivity while dramatically lowering the costs of managing storage



Challenges

- File sharing on intranets and Internet.



Technology

- Platform: Unix



Solution

- Build a CIFS server
- Build an integrated Distributed Lock Manager and RPC-based communication services for a clustered, adaptive NAS system
- Both of these components, in tandem, provided a unified file access model for the NAS system to support a variety of different storage access protocols



Customer

NetXen is a leading provider of high-performance networking and protocol processing solutions. The company stands at the forefront of a major shift in technology in the enterprise datacenter



Challenges

- Performance improvement of proprietary TOE card



Technology

- Platform: Windows



Solution

- Implemented an NDIS miniport driver on Windows for a proprietary TOE card using Chimney Architecture
- It was divided in two phases:
 - Implementation of an NDIS 5.2 miniport driver with partial TCP offload
 - Implementation of an NDIS 6.0 miniport driver with full TCP offload using chimney architecture
- The driver was tuned to get the best performance and benchmarks will be given



Customer

Unitrend, Inc., a development stage company, engages in the design, development, manufacture, and marketing of computer enclosures, power supplies, and related products primarily in North America



Challenges

- Maintaining consistency at file system level



Technology

- Platform: Windows XP



Solution

- Provided snapshots for point-in-time data semantics
- Performed “Virtual volume” access to allow bypassed access to files currently locked by their applications
- Included a file-system filter driver that implements consistency points for file-system level consistency



Customer

NetApp provides an integrated solution that enables storage, delivery, and management of network data and content to achieve your business goal



Challenges

- Complete federated namespace based storage management



Technology

- Platform: Windows and Linux



Solution

- Managed Windows and Non-Windows (Linux, Solaris, etc) based namespaces for NAS environments consisting of Windows, Non-Windows and NetApp filer based storage systems
- Calsoft build the entire product from design to the final customer deliverable product – starting with only the MRD for the product



Customer

AppDynamics provide services in application performance management, systems management and distributed systems



Challenges

- Performance bottleneck



Technology

- Technology: Java



Solution

- Did performance monitoring as well as provisioning tasks against VMware VirtualCenter, ESX and ESXi servers
 - Provisions new virtual machines by cloning or Vmotion if performance bottlenecks are found
- Enabled the product to work seamlessly in a VMware Infrastructure environment
- Provisioned component allowed the product to completely manage VMs and allowed spawning new VMs by either full or linked cloning to the golden image
- Prepared the OS on the new VMs to be in specific networking or user environments

Client Under NDA (Major Backup and Data Protection Software Vendor)



Challenges

Making the management GUI platform independent



Solution

- Performed designing & development from scratch including: Back end, Front end, Data models, Screens (XML Based), Controller Aspects of UI
- Many of the important new screens focused on performance aspects: monitoring and reporting performance. Also, enabling user to make policy changes to improve performance.
- Availability of GUI in three flavours: Application, Webstart, applet
- Engagement Model
 - Onsite kick off
 - 6 person team offshore executed the project, plus 6 in QA
 - Onsite integrations and acceptance phase



Technology

- Platform: Platform independent Java – Linux, UNIX, Windows



Customer

Virident Systems builds enterprise-class solutions based on Storage Class Memory (SCM), that has revolutionized the data center and cloud computing by redefining the memory-storage hierarchy



Challenges

- To effectively manage disk drives and mass-storage devices



Technology

- Platform: Linux



Solution

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- Understood and modified MTD, UBI
- Developed algorithms to match device characteristics
- Performed testing I/O performance using hdparm, iozone and other relevant benchmarks
- Developed device specific test programs
- Tuned and tested various applications on this device



Customer

Syncsort Inc. is a global software company specializing in the development and sale of data integration data protection, and high-speed sorting products for Windows, Unix, Linux, and mainframe systems



Challenges

- Data inconsistency



Technology

- Platform : Windows, LINUX
 - Also ported the same on SOLARIS and AIX



Solution

- Developed a Block Level Filter Driver to allow journaling of block changes in a file system to enable backup and restore
- Implemented several features during this project, including journal initiation, stopping, flushing and merging as well as support for clustering
- CJD was developed for the Windows, Linux, Solaris and AIX platforms



Customer

Unitrend, Inc., engages in the design, development, manufacture, and marketing of computer enclosures, power supplies, and related products



Challenges

- Easy accessibility for the Unitrends backup product



Technology

- Platform: Window



Solution

- Designed a new GUI for the Unitrends Windows client
- Used MFC for designing the screens
- The GUI was integrated with the logic to customize the UI as specified by the Unitrends



Challenges

Data Security



Technology

- Platform: Window



Solution

- Implemented a Dynamic VPN for a LAN/WAN
- Provided authentication, confidentiality and message integrity
- Developed NDIS (Network Driver Interface Specification) driver, encrypts and decrypts all network traffic
- Did Key management using TDI client layered over UDP
- Used DES (Data Encryption Standards), Twofish, MD5 and Elliptical Curve Cryptography
- Implemented all cryptography algorithms as kernel mode libraries
- Developed Control Panel Application (CPA) for key and user management





Challenges

- Volume-level filter driver



Technology

- Platform: Window XP



Solution

- Developed snapshots for point-in-time data semantics
- Provided “Virtual volume” access to allow bypassed access to files currently locked by their applications
- Included file-system filter driver that implements consistency points for file-system level consistency

Leading Video-conferencing Company (Client Under NDA)



Challenges

- Develop SDK and Toolkit for Video-conferencing



Technology

- Technology: SOAP/XML



Solution

- CalSoft developed a SDK and a toolkit for a company specializing in video services through the web
- This SDK enabled their clients to integrate video services in the client web sites
- Use Case: If Oracle wants to offer customer support to their customers through web video-conferencing. They can use the SDK and toolkit we developed to integrate web-based video-conferencing into the Oracle website without needing any support from our client
 - Approximately 175 APIs were included in this SDK
 - Engagement Model
 - Calsoft Architects visited client to Define Initial Scope and Architecture
 - Executed the project on Fixed Time and Cost model
 - Team Size – 4 Dev and 2 QA
 - Total Length of Project – 4 months



Requirements

Project Requirements

- Primary requirement was to convert the Script based UI to JAVA UI
- Implement a Object Oriented Middle-Tier to address multiple issues
- Performance of existing script based middle tier
- Scalability and deployment issues
- The main goal of this was:
- Re-write the UI as Stand alone JAVA UI with new look & feel
- Develop the middle-tier that is OOP based & Scale well
- Flexibility to add new Interface with ease
- Allow new applications to be written
- Base Platform – LINUX & Windows
- Development tools – JAVA, Swing, Hibernate



Challenges

Technical Complexity

- Calsoft developed an OO JAVA SDK layer as middle tier
 - 25+ Classes were written which exposes interfaces for
 - Backup, Restore, Archive Business Logic
 - Storage, Media and Media Management classes
 - Security, Job and Session Management
 - Helper Classes etc.
 - JAVA GUI was 120 screens re-write
 - Performance was a key aspect
- Calsoft proposed Overall architecture and Design
- Implemented the Middle-tier with JAVA
 - Implement UI using Swing, Flash and other Open Source technologies



Technology

Engagement Model

- Calsoft Architects visited the client to define initial design
- Calsoft worked on two releases of the UI
- Executed the project on time and material
- Team Size – 8 Dev and 5 QA
- Total Length of Project – 1.5 years
- Extensions to the project
- Calsoft was engaged to catch-up with existing browser UI features
- Calsoft worked on other backed features in Backup product.



Challenges

Product Enhancement

Technology

- Platform: Solaris



Solution

- Performed SUN Sustaining of StorADE product
- Work involved Perl, HTML and C
- Build management for multiple types of builds

Engagement Model

- 3 people in team acting as Dev lead, Build engineer and QA engineer.
- Continued for 11 months
- Team was offshore



Challenges

Product Enhancement of DotHill's RIVA product



Technology

- Source code (VSS), VPN, Dot Hill hardware



Solution

- Added and fixed bug for storage controller, management controller, menu driven user interface and web engineering interface
- Added Disk Wipe feature to storage controller code. This feature wiped all addressable locations on all disks attached to the enclosure
- Build Microsoft VSS hardware provider shell extension client for Windows. This shell provided Dot Hill specific volume snapshotting features in addition to those already provided by Windows
- Engagement Model
 - Team size is 4; 2 Dev Engineers and 2 QA Engineers
 - Access to source code (VSS) was done over VPN. Editing, debugging, building and testing is done locally on Dot Hill hardware



Challenges

Performance and Scalability issues



Technology

- Platform : Windows



Solution

- Developed storage management and boot management solution
- Developed kernel drivers
- Developed relevant system software components
- Evaluated and provided solution for performance and scalability
- Developed managed APIs
- Developed SOAP based APIs so to integrate product into the main management console GUI



Challenges

Developing various products for Quest Software on Virtual Machines



Technology

- Technology: Java, C#, Jetty Web Server, MySQL, Hyper-V APIs, XEN SDK, VMware SDK, Ant, etc.
- Platform: Windows



Solution

- Developed backup and restored capabilities through VM LabManager
- Developed backup Metadata for Catalog purpose
- Developed backup Templates and Logical Objects
- Developed backup of virtual machine library configurations
- Developed Check in/Check out Feature for VM Portability Engine
- Included ability to track delta changes between VMDK files



Challenges

To automate the failover and switchover testing of vCSHB



Technology

- STAF / STAX
- PowerShell, C#, .Net
- SQL Server 2008
- Windows 2003



Solution

- Designed Continuous Failover Test Suite (CFTS)
- Developed and Implemented the automation components
- Automated failure triggering mechanism
- Implemented a Command Line Interface (CLI)
- Developed a reporting tool to display the status and log results.



Challenges

Test Linux File System on Specialized Hardware block device



Technology

- Platform: Linux



Solution

- Understood the File System aspects and system testing aspects and its effect with the behavior of specialized hardware
- Modified MySQL Server code to take advantage of client's File System access and helped with demonstrating improvements in performance
- Tested effects of various special system call access with client File System
- Engagement Model
 - 20+ person team
 - Calsoft owned all QA from designing test cases to execution
 - Co-development in all Departments of Engineering
 - Continuous engagement for more than 2.5 years





Challenges

Testing microsecond latency Network Cache over a very high speed fabric



Solution

- Tested RNA proprietary file system product for microsecond latency network cache over a very high speed fabric
- Calsoft owned the entire QA activities completely
- Designed and developed a test automation framework
- Tested the HA Features of the product

Engagement Model

- A team of 7 people worked on RNA project for 6 months
- The team included QA Architect, Onsite coordinator, QA Lead, and QA Test Automation and Manual Engineers



Technology

- Technology: Shell Scripting, Perl, C



Challenges

Improving the Testing Process



Technology

- Platform: Windows



Solution

- Ported a Linux version of Polyserve's existing multimode test harness to Windows
- In-Depth understanding of cluster file system semantics and Windows file system semantics
- Performed NTFS compatibility, Cache Coherency, Interaction tests, Collision tests, Multi-process tests, Interoperability tests for windows applications, filter drivers and CIFS



Challenges

Improving the test coverage



Technology

- Platform: CentOS



Solution

- Designing and development of Ocarina Automated Test Infrastructure
- GUI Development of Test Infrastructure by using HTML , Perl/CGI , Java Script
- Various Perl Modules, scripts and CGI scripts were written to achieve
 - Integration of Test Infrastructure with the Bugzilla/ Testopia, build system and email system
 - Integration with MySQL database and SVN
- Developed automated Tools and File System test cases
 - File System Grapher Tool
 - Graph Generation Framework
 - Regular Expression Creator Tool
 - Stress Test Script
 - Client Server Remote Execution Tool
 - Script Tool
 - File Corrupt Tool





Challenges

Porting with redesign SAM-QFS Client for MAC OS



Technology

- Platform: Solaris 10, Linux, MAC OS Leopard



Solution

- SAM-QFS is one of the Sun's cluster file system.
- Its Server runs on Solaris only and its currently supported client include Solaris and various versions of Linux.
- Calsoft ported SAM-QFS to MAC OS which is BSD based kernel.
- Engagement model
- Complete Offshore Project
- The entire porting was done by our team based out of our labs in Pune, India.
- Team size : 5 Dev and 3 QA





Challenges

Porting with redesign SAM-QFS Client for Windows 2003



Technology

- Platform: Solaris 10, Windows 2003



Solution

- SAM-QFS is one of the Sun's cluster file system
- Its Server runs on Solaris only and its currently supported client include Solaris and various versions of Linux
- Calsoft ported this to Windows and also re-implementing a lot of functionality for Windows
- Calsoft ported this to MAC OS which is BSD based kernel

Product Enhancement of StorADE



Challenges

Porting with redesign SAM-QFS Client for Windows 2003



Solution

- Performed SUN Sustaining of StorADE product
- Work involved Perl, HTML and C
- Build management for multiple types of builds
- Engagement Model
- 3 people in team acting as Dev lead, Build engineer and QA engineer.
- Continued for 11 months
- Team was offshore



Technology

- Platform: Solaris 10, Windows 2003



Challenges

- Enhance responsiveness by faster throughput
- Better interaction with windows OS



Solution

- Delivered performance improvement – more specifically I/O. This was achieved by caching files on-disk instead of I/O over the network.
- Fixed bugs in code so that Microsoft's IFS test cases pass – that automatically ensures correct interaction with OS.
- Engagement Model
 - Tasks divided into two separate projects
 1. Implement LRU based on-disk file caching. 4 Resource for 6 weeks
 2. Analyze and fix IFStest failures. 3 resources for 6 weeks



Technology

- Platform: Linux



Challenges

Developing and integrating the product with GUI console



Technology

- Platform: Windows, Linux



Solution

- Developed storage management and boot management solution
 - Developed kernel drivers
 - Developed relevant system software components
 - Evaluated and provided solution for performance and scalability
- Developed Managed APIs
 - Developed SOAP based APIs so that the product can be integrated into GUI console



Challenges

Making the product bug free



Technology

- Technology: C++, C#,
- Shell/Perl/Python/XML
- Platform: CentOS and Windows



Solution

- Helped Mezeo with product conceptualization to formulate detailed requirements followed by designing & development
- Developed Linux based File Server Appliance that offers CIFS and NFS access to the Cloud Storage
- Included on-disk local cache, web based administrative interface among other features to the appliance that serves to CIFS and NFS clients within end user's site and on the other hand interface with the Cloud Storage Service offered by a Service Provider that uses Mezeo's Platform
- Fixed the bugs in code so that Microsoft's IFS test cases pass – that will automatically ensure correct interaction with OS



Challenges

Design, Build and QA of caching based mobile media delivery system for telecom startup



Technology

- Platform: Linux Squid Server / IP Table
- interface



Solution

- Transparent caching: cached and locally delivered media content without requiring any configuration changes on the mobile device. Focused on streaming video content (e.g.m.youtube.com)
- Reporting and monitoring: showed detailed reports on usage patterns and cache performance
- Mobile-aware caching: cached and served appropriate content depending on the rate of the connection and did real-time transcoding
- System level QA and tested performance of the product



Challenges

Fix defects in Linux file system Software including:

- File system stacks
- Device drivers
- H/W platform code



Solution

- Fixed real time related defects in Kernel
- Researched and explained unexpected behavior
- Tracked updates in code from the community and applied the ones needed to correct bugs
- Pushed MontaVista developed fixes back to the community
- Fixed defects in the MontaVista supported tool chain (x86, PPC, MIPS, ARM, Tensilica, and other variants)



Technology

- OS: Embedded Linux, Kernel Version- 2.4



Challenges

- Making Enterprise SSD management tool user friendly



Technology

- Platform: Linux



Solution

- Developed ioManager which is a Java GUI application manages customer's SSD "ioDrive" product
- Developed tool to be available on Windows and Linux OS
- Engagement Model
 - 3 people team
 - Calsoft team was responsible for test plan creation, Test case creation and test case execution as a part of ioManager QA



Success Stories:
Old Deck
Linux Kernel and Driver
Development



Customer

ScaleMP is the leader in virtualization for high-end computing, providing higher performance and lower Total Cost of Ownership (TCO)



Challenges

- Linux Kernel optimization for a NUMA hardware



Technology

- Platform: Linux



Solution

- Reduced false cache line sharing in the Linux kernel
- Solved locking bottlenecks in the system by: Reducing locking contentions wherever possible and converting locks to NUMA aware locks wherever needed
- Fixed kernel buffer allocation to reduce false sharing and cross node memory accesses, fix locking problems in the kernel
- Some patches released into open source



Customer

StarGen is the innovation leader in Advanced PCI and PCI Express technologies, providing high performance silicon solutions for Virtualized I/O, Multi-processing, and High Availability in systems based on the PCI and PCI Express standard



Challenges

- Improving performance
- Enabling IP over ASI



Technology

- Platform: Linux Kernel



Solution

- Did Porting of Starfabric serial switched interconnect Linux 2.4 driver to kernel 2.6
 - The core starfabric driver is a bus driver which provides basic fabric services to other device drivers
 - The other drivers are for SG2010 and SG1010 cards. SG2010 is a PCI to Starfabric bridge device, whereas SG1010 is the starfabric switch device
- Did porting of the Fabric Primitives Library
 - Performed software development for enabling IP over ASI
 - An IPoASI network driver, a simulator for verification, IPoASI gateway work, and few other small modules.
 - Optimizations for higher performance



Customer

NetDevices, Inc. provides the next generation of unified edge-networking solutions for the enterprise remote office and managed services markets



Challenges

- Improving performance of a network edge device



Technology

- OS: Embedded Linux



Solution

- Added storage capability to a IXP 425[XScale] device by porting a NFS stack using embedded Linux
- Also added iSCSI block access
- Developed an IPsec driver for Cavium Nitrox integrated over PCI-Express. This was accessible via a kernel mode library
- Interfaced the library to existing applications



Customer Profile

Sun Microsystems, Inc. was a company selling computers, computer components, computer software and information technology services



Challenges

- Performance Optimization of bonding drivers



Technology

- Platform: Solaris



Solution

- Provided a bonding driver, with 2 different kind of modes, for SUN's StorEdge 5x00 series NAS boxes
- The first mode - A HA bond provided fault tolerance and link resilience
- The second mode - A PA bond, also called an ether channel or a IEEE 802.3ad Link Aggregate, distributed the outgoing packets to underlying physical NICs according to a frame distribution algorithm
- Developed an implementation of IEEE 802.3ad LACP protocol for automatic port aggregation and negotiation with the switch, along with standby link selection and dynamic key management
- Implemented Jumbo Frames



Storage

Networking

Virtualization

Cloud

IoT/AI/ML



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