Architecture Overview

VEC 2.0 Applications Suite

Sept 29, 2016

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Application Overview

VEC/VECRM Portal Applications

VEC & VECRM Portals

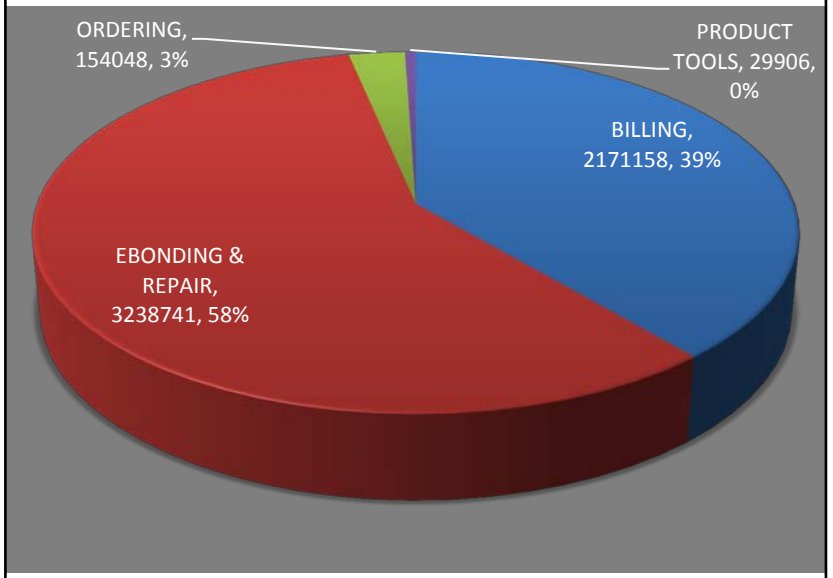
Main Drivers

- Global Capabilities especially for MNC customers
- Increase Customer Self Service
- Provide Customer specific look and Feel
- Provide dashboard view for
  - Consolidated uniform inventory view
  - Reporting and network management

Main Functionalities/Transactions

- Ordering Products and Services
- Create Trouble Tickets
- Bill enquiry and Bill Payment
- Setup and Manage Status Notifications
- Product Catalog Browsing
- View/edit customer/user profiles

Top 5 Transactions (Summary per month)



58% of online transactions are related to Service Assurance and 39% are related to Billing

NX/Custom Portals

VES provides a custom enterprise portal to Federal customers. This portal will be used to do business with VES. Customers can view, pay bills , order services , check order status and view service plans.

ICI

Integrated Customer Inquiry functionality is designed for VES center reps to assist on customer billing related inquiries/tickets /credits incl email automation inquiries

SMD, GCM

Service Management Dashboard allows its users to view service inventory and correlated alarms and IR/SR/CR tickets for Verizon enterprise customers. It allows drill downs for service details, displays services graphically on a geographical map or a topology map. Displays interactive dashboard charts for inventory and correlated events.

E-Bonding

Framework that integrates Commercial-off-the-shelf (COTS) and provider partner software for product catalog queries, quantities, ordering, service requirements, incident management and inventory

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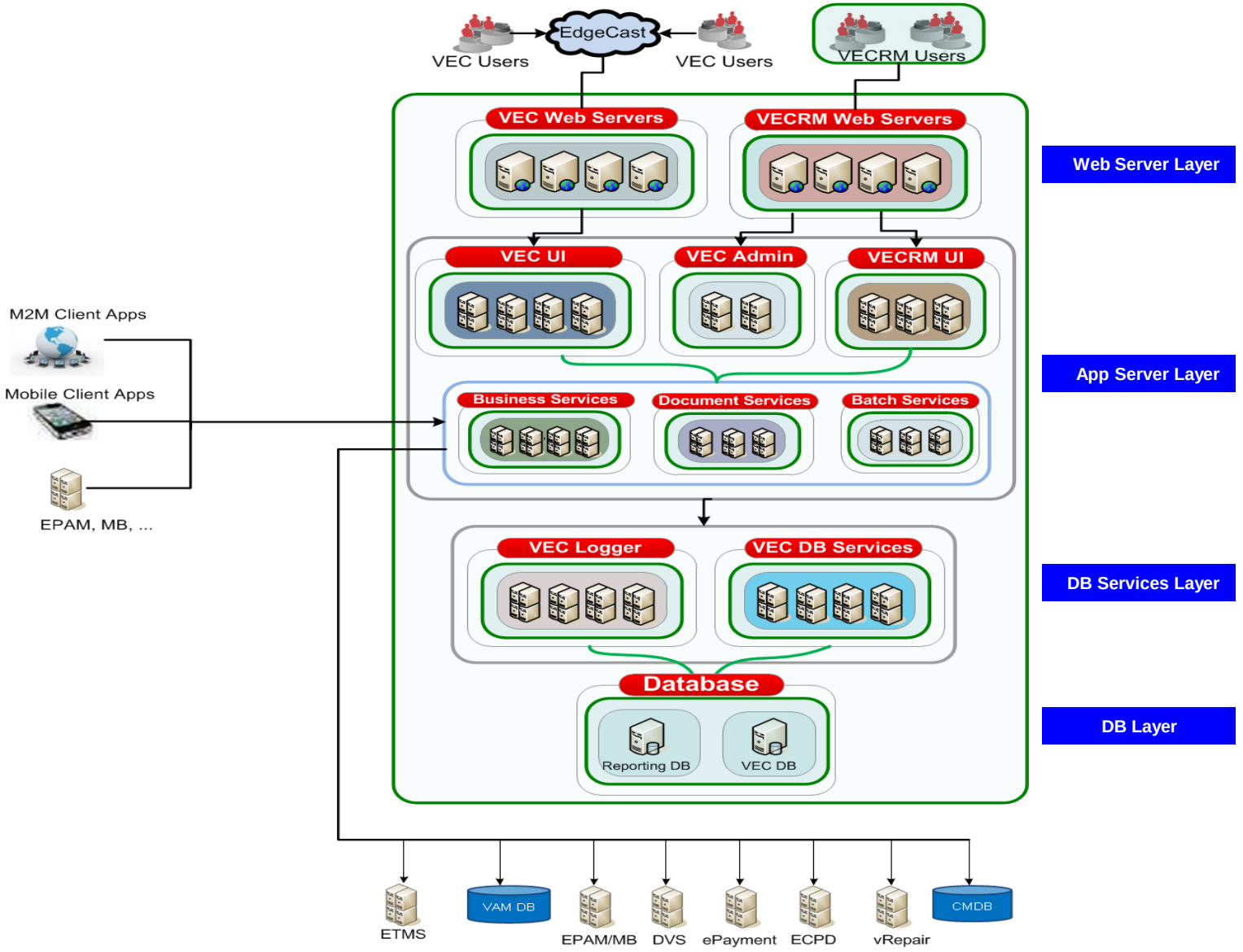
VEC Infrastructure: Domains



- Simplified Domain Architecture with Load balancer at each app layer across Fairland/Sacramento Data Centers supporting active-active traffic
- Streamlined VEC DB interactions thru VEC DB Services layer and all reporting needs are driven thru Vec Logger Domain

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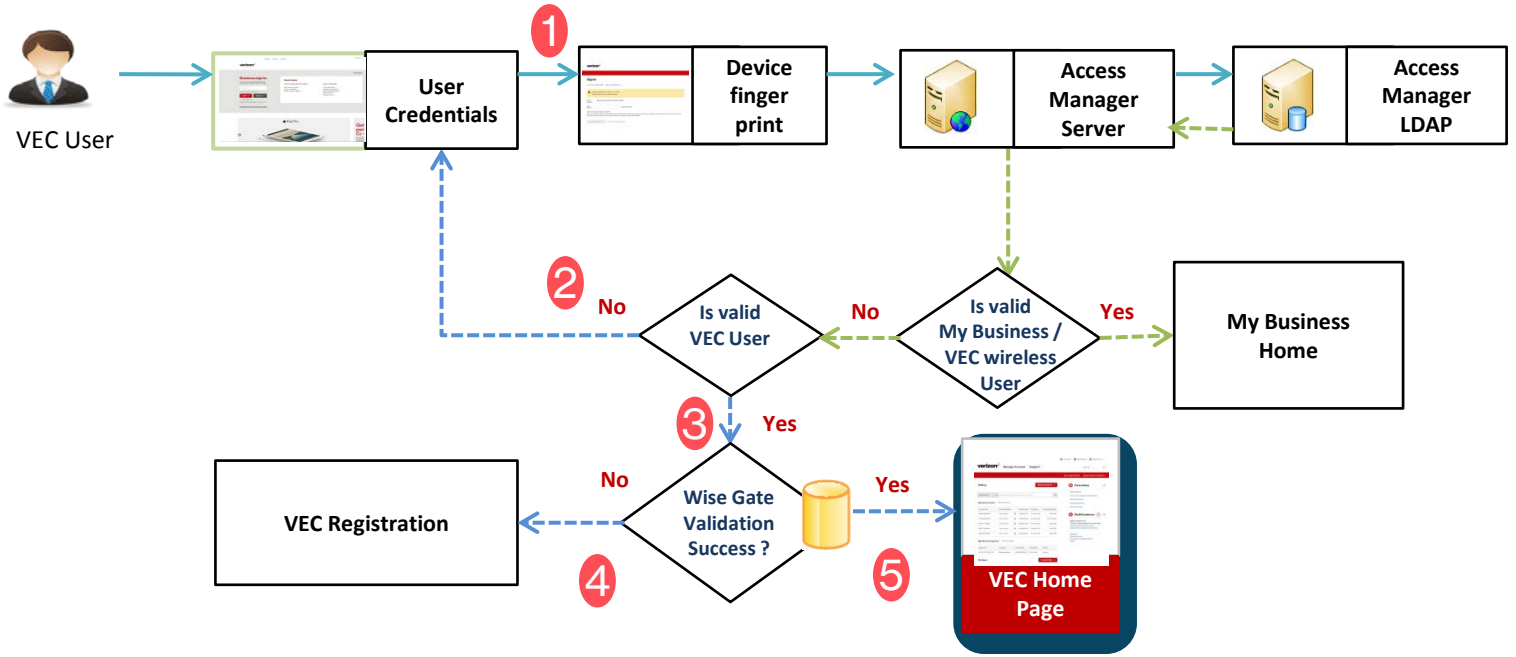
VEC Login Flow

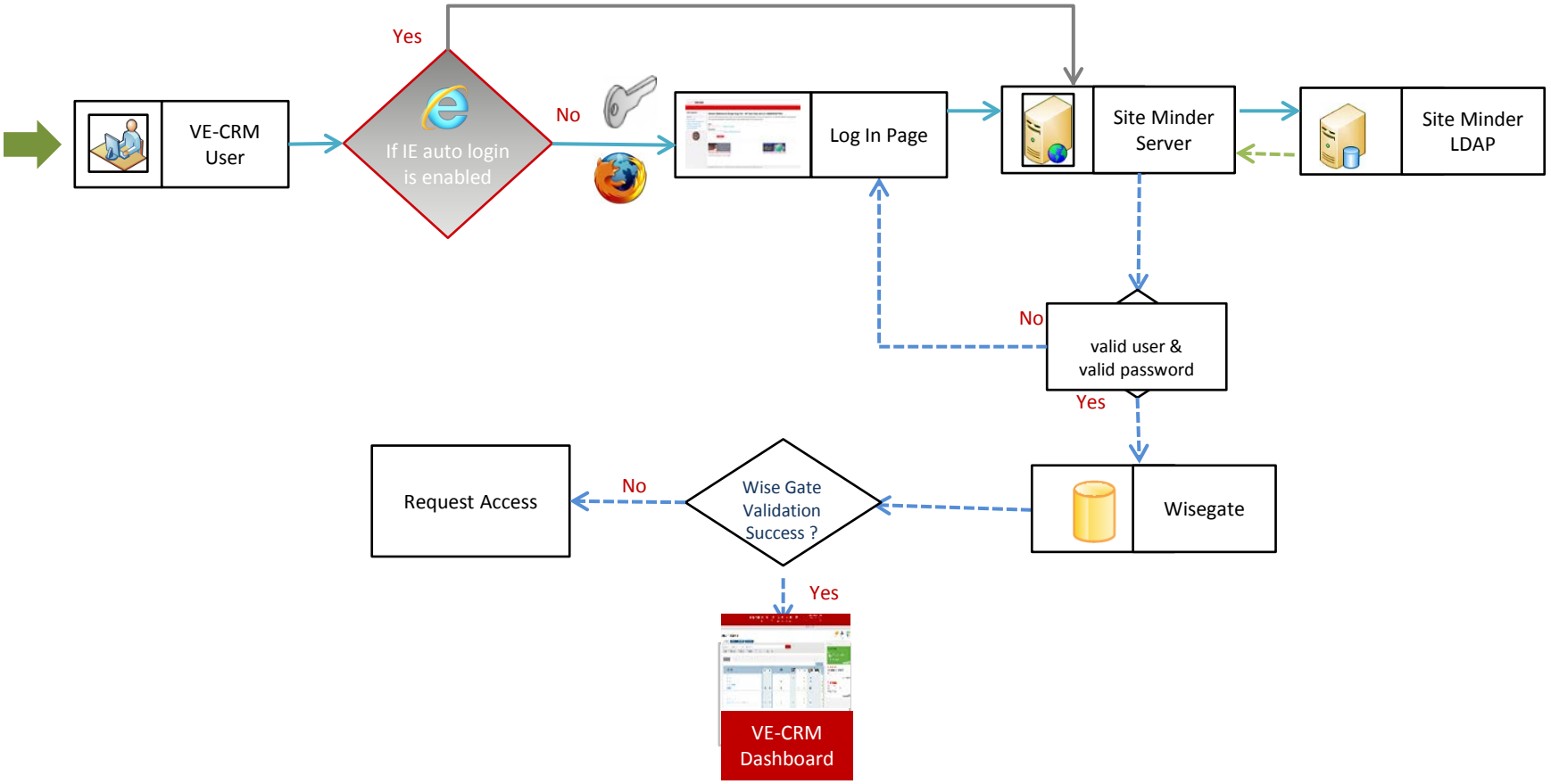


- Authentication: Access Manager (Wireless Infrastructure)
- Authorization: VEC Wisegate user profile data

- Distinct users logged in …Online portals: 13K/day
- Total Active user count in Wisegate: 530K
- # of Countries with VEC active user footprint: 122

  Top 5: United States: 372,627…United Kingdom: 1,509….India: 1,004….Germany: 751…..France: 502

VE-CRM Login



- **Authentication: Siteminder (Wireline Infrastructure)**
- **Authorization: VEC Wisegate user profile data**

- **Distinct users logged in: 2.2K/day**
- **Total Active user count: 9K**
- **# of Countries with VEC active user footprint: 39**
  - **Top 5: United States: 5,572… Phillipines: 1,236….CZE: 464….United Kingdom: 340…..India: 317**

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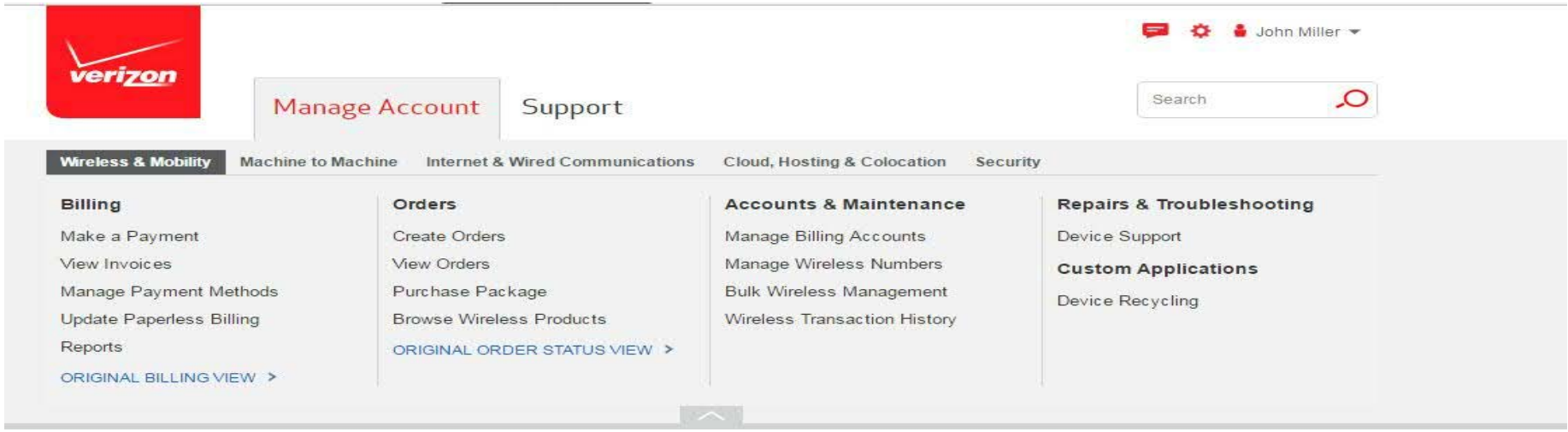
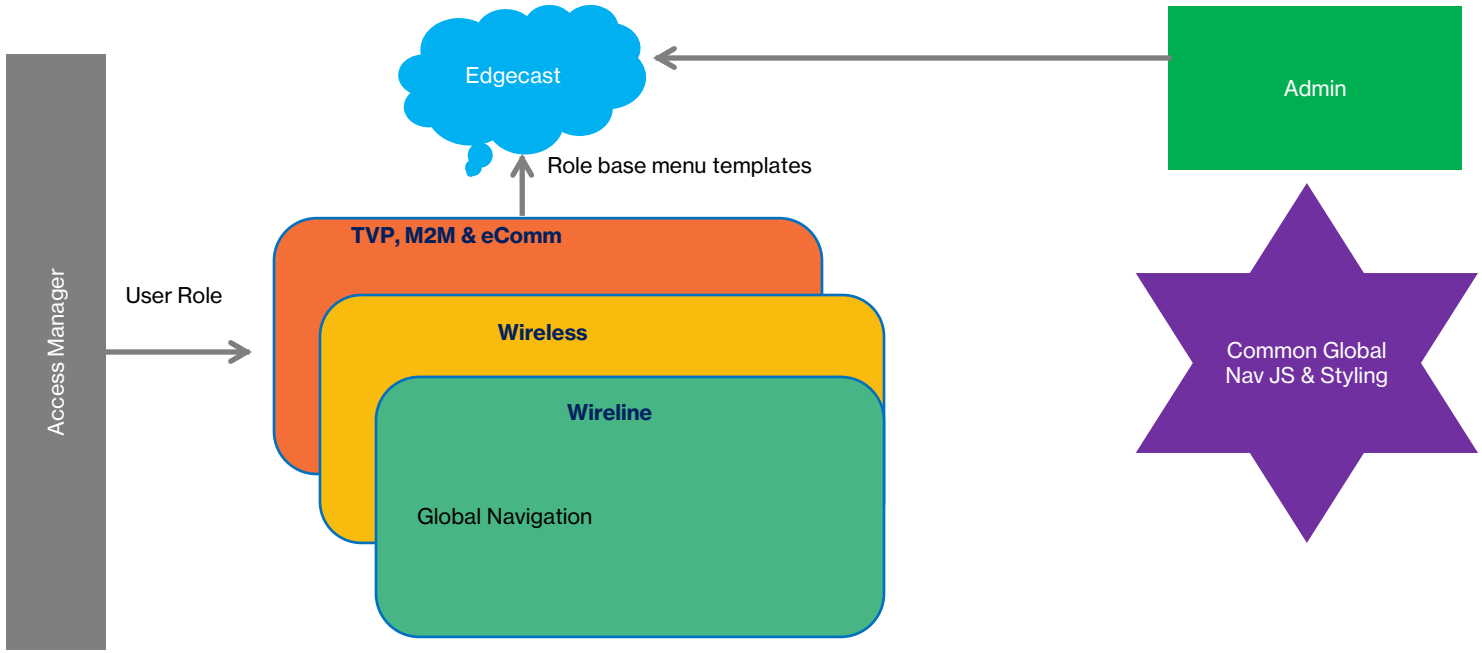
Global Navigation

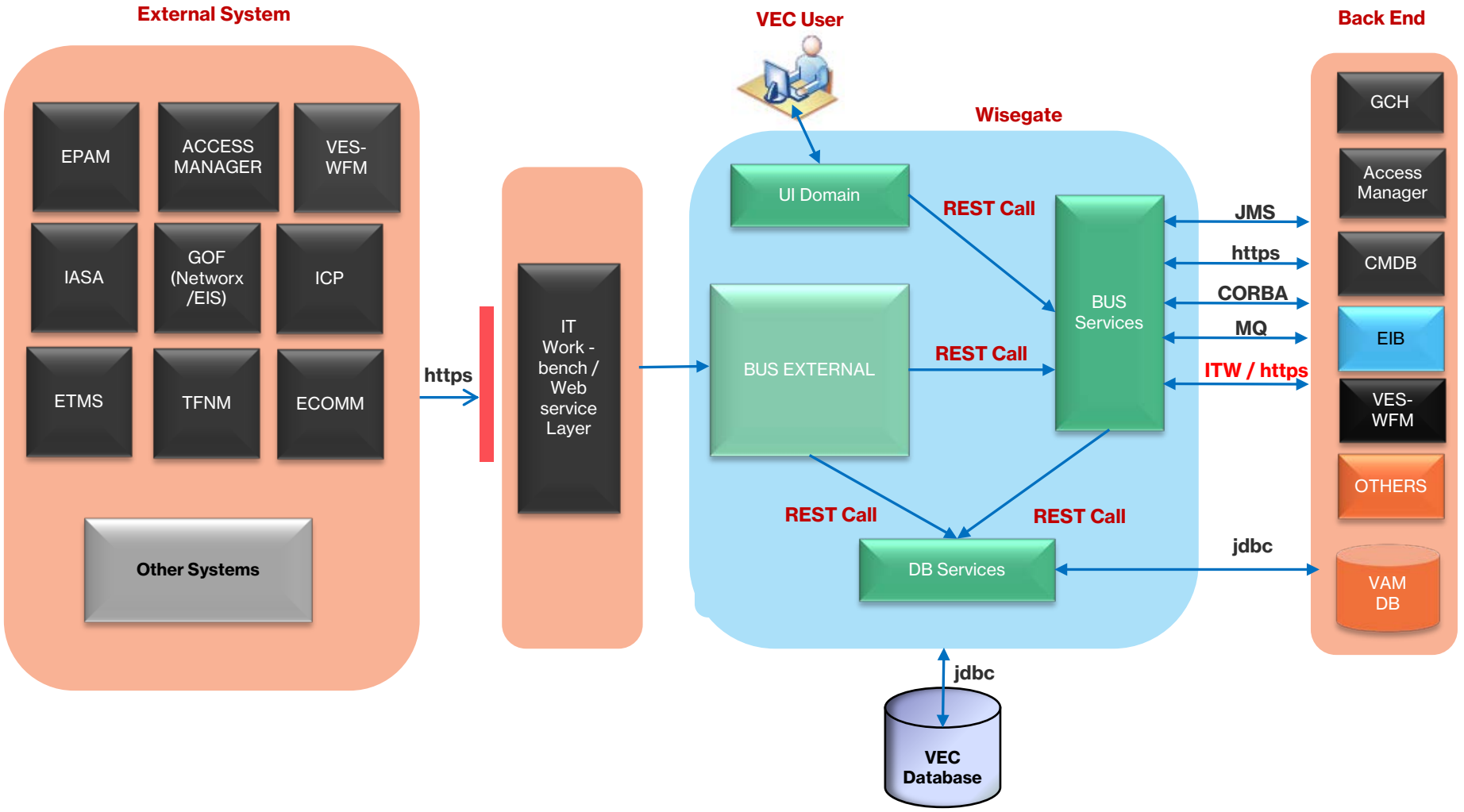




Common look and feel with ease of navigation across Online B2B portals of VES, VZW and Terremark

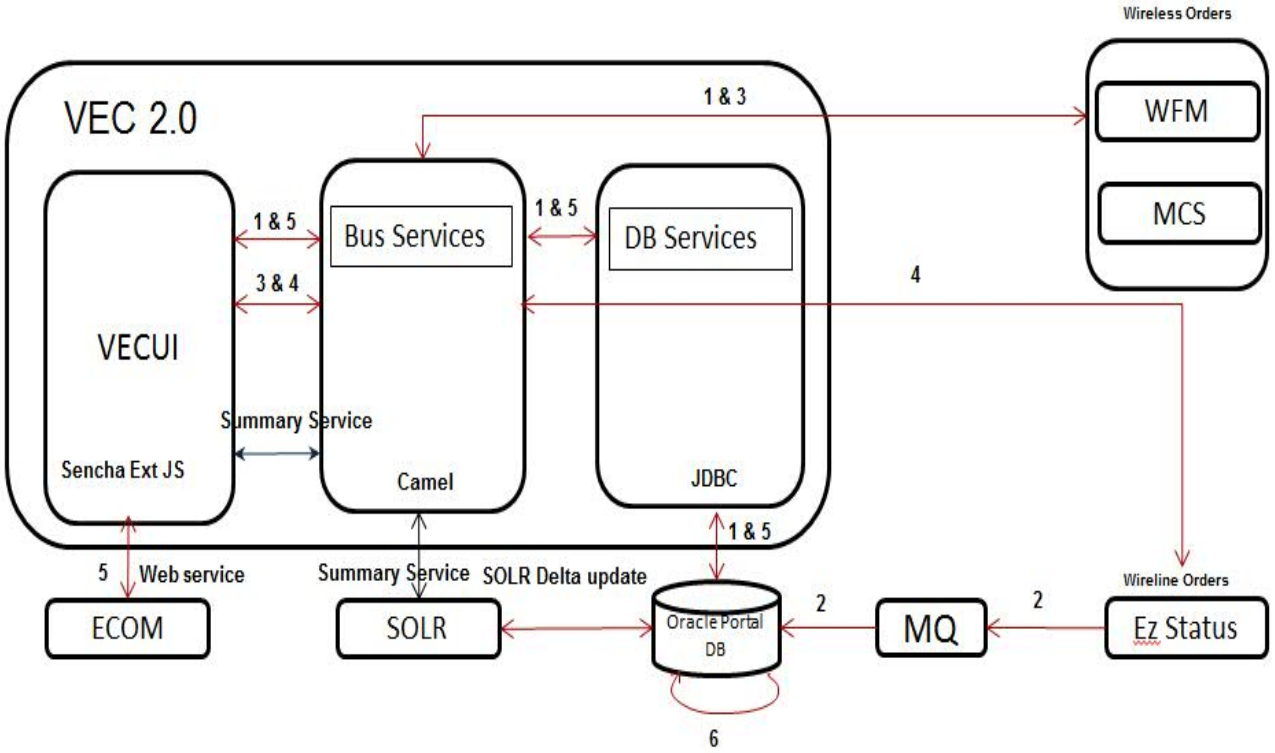
Wisegate Services Flow

Transaction Name	Transaction Count for Aug'16
AR Created	3140
AR Completed	2639
User Created	10150
IC used by External users	4621



Order Status Overview

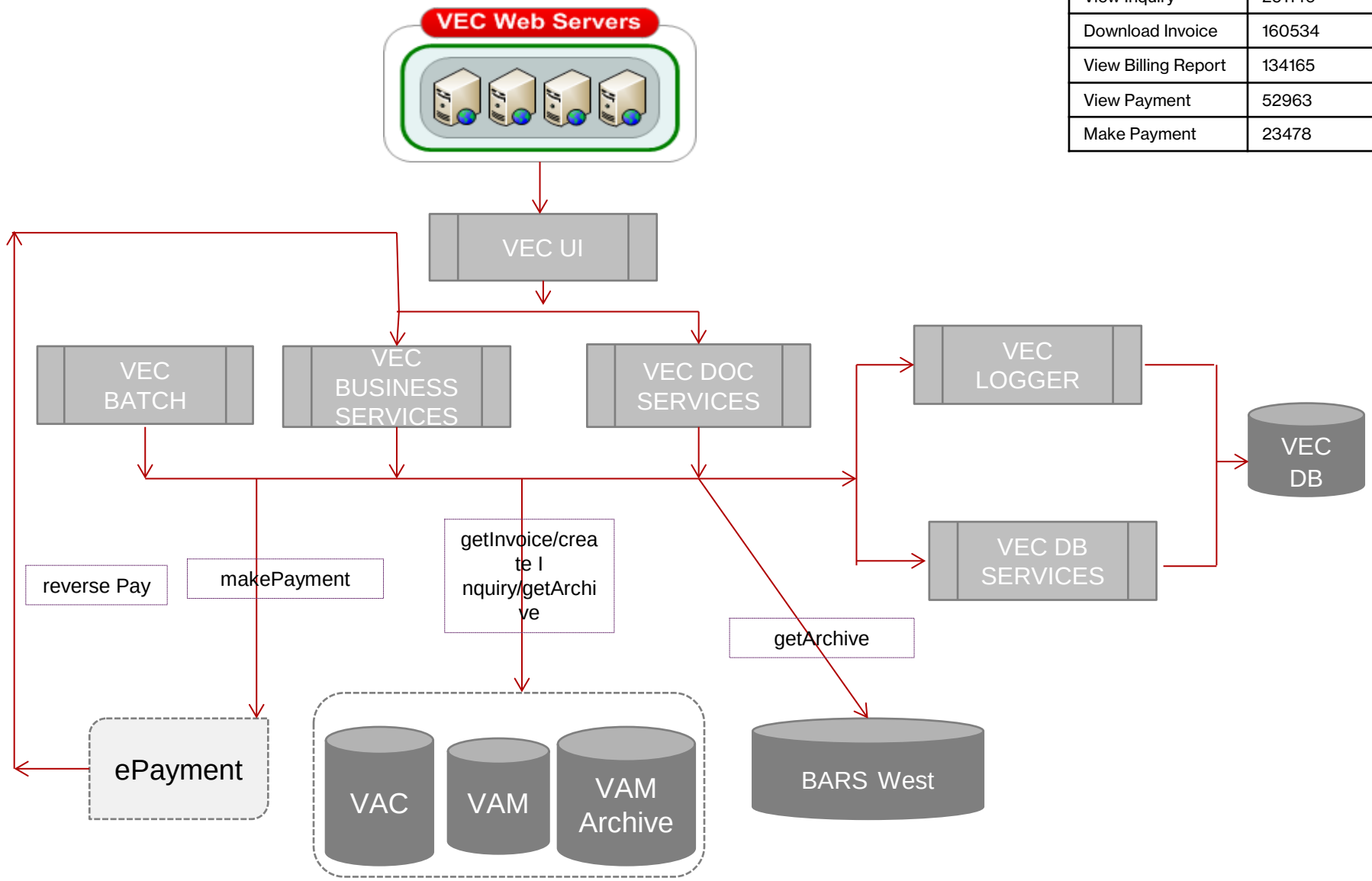
Transaction Name	Transaction Count for Aug'16
View Order Summary	61,408
Search Order	32,233
View Order	19,281
Order Download	1308



1 – Preload web service for wireless and software order summary
2 – MQ message for wireline order summary
3 – Order Details web service for Wireless and Software orders
4 – Order Details web service for Wireline orders
5 – Order summary update service for ECOM
6 – Trigger and procedure will update the online orders in order status table.

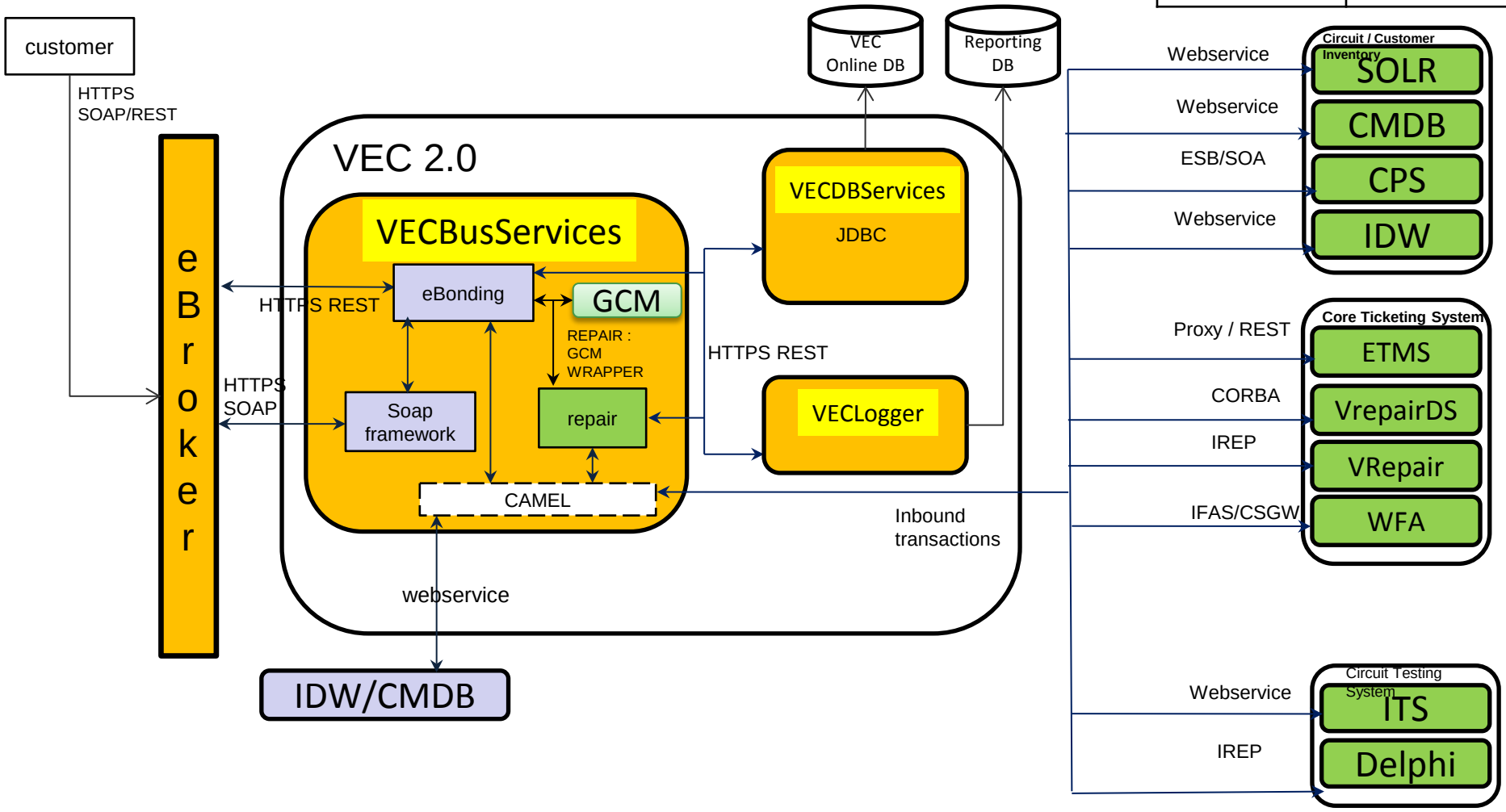
Billing Overview

Transaction Name	Transaction Count for Aug'16
View Invoice	325844
View Inquiry	291146
Download Invoice	160534
View Billing Report	134165
View Payment	52963
Make Payment	23478



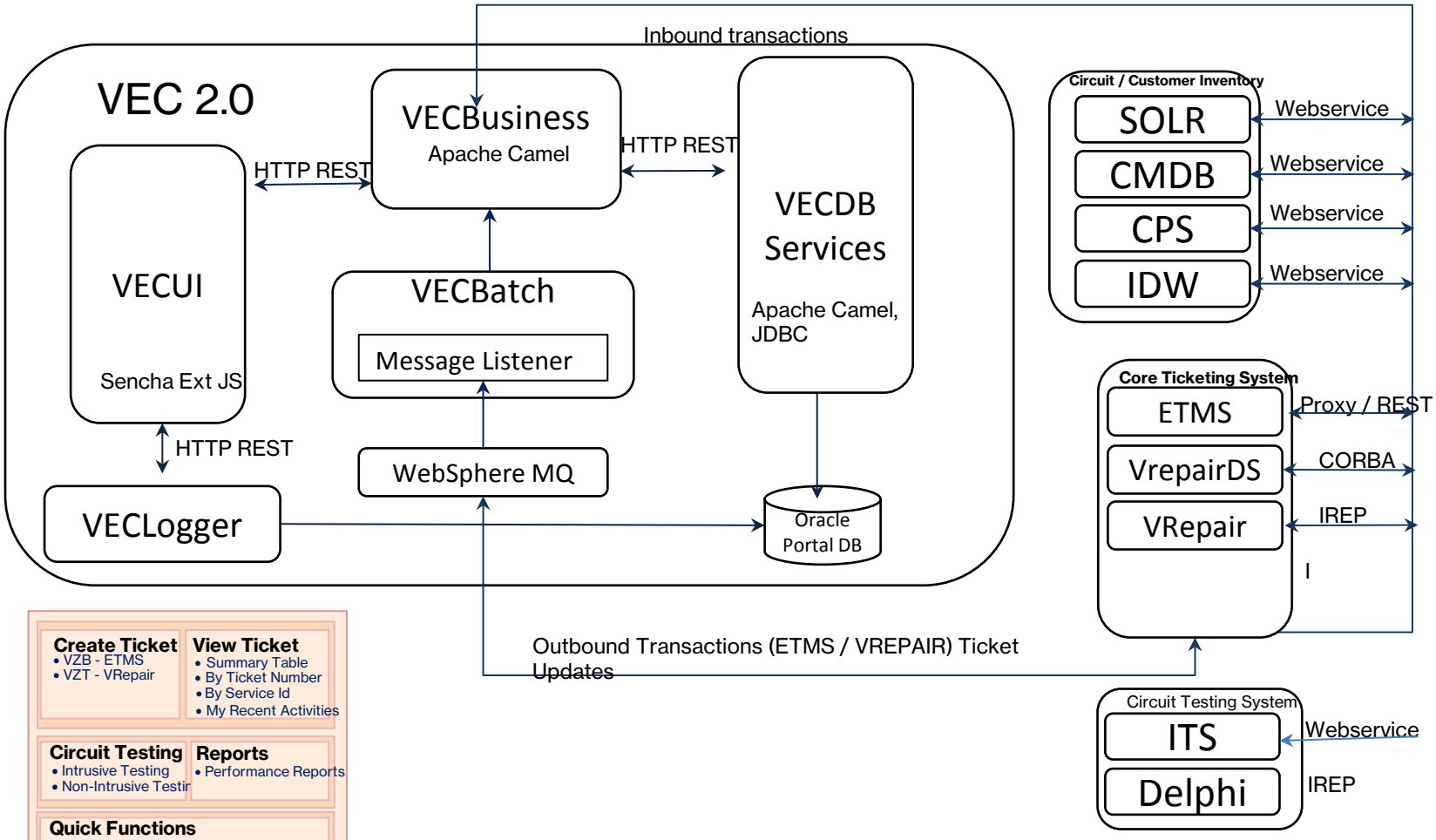
eBonding

Transaction Name	Transaction Count for Aug'16
Get Ticket	578262
Publish Incident Tic	60925
Modify Ticket	32094
Add Comment	28224
Create Ticket	19083



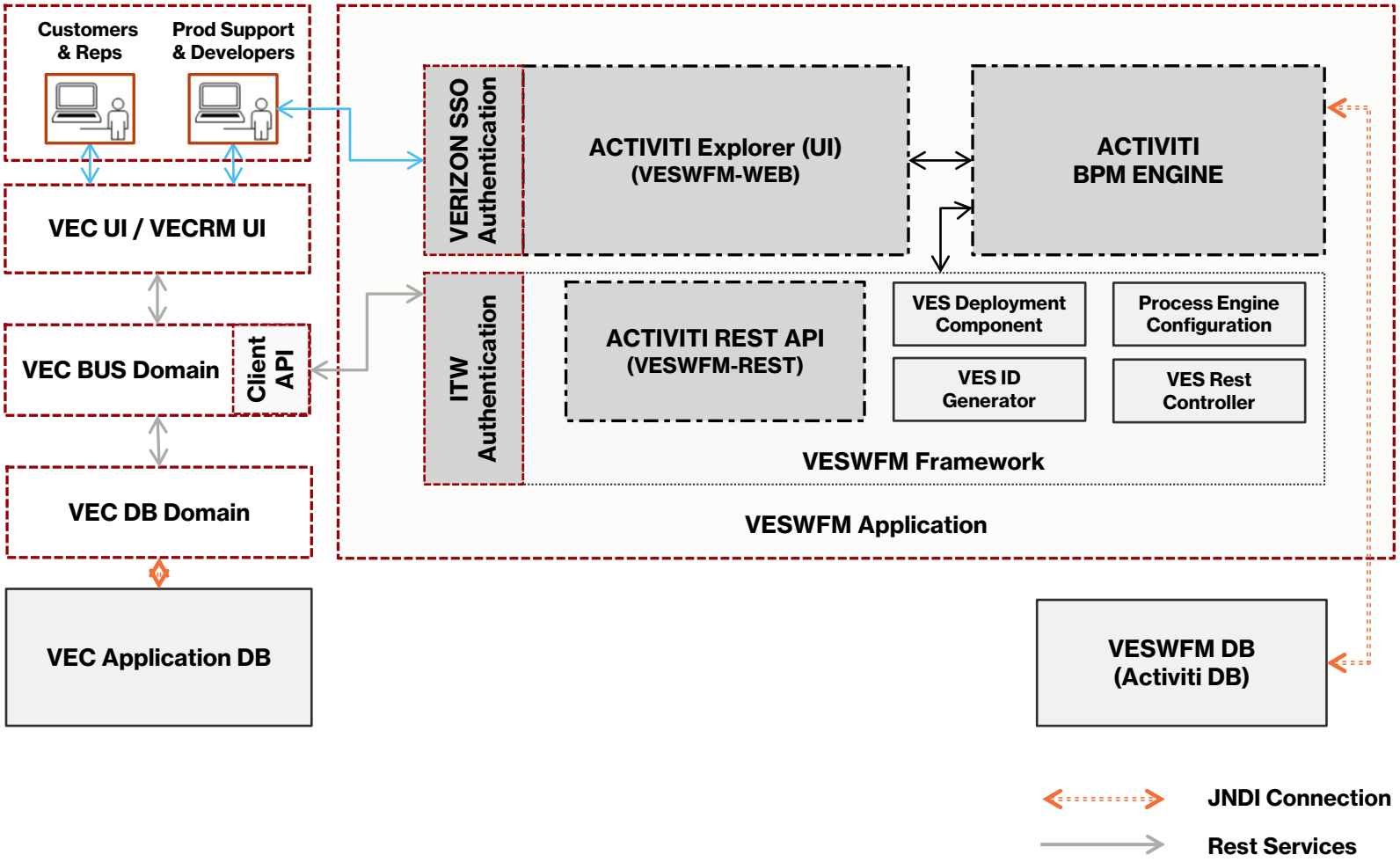
Repairs

Transaction Name	Transaction Count for Aug'16
View Ticket	711089
Quick Status View	202804
Update Ticket	202804
Validate Service	39449
Create Ticket	27499



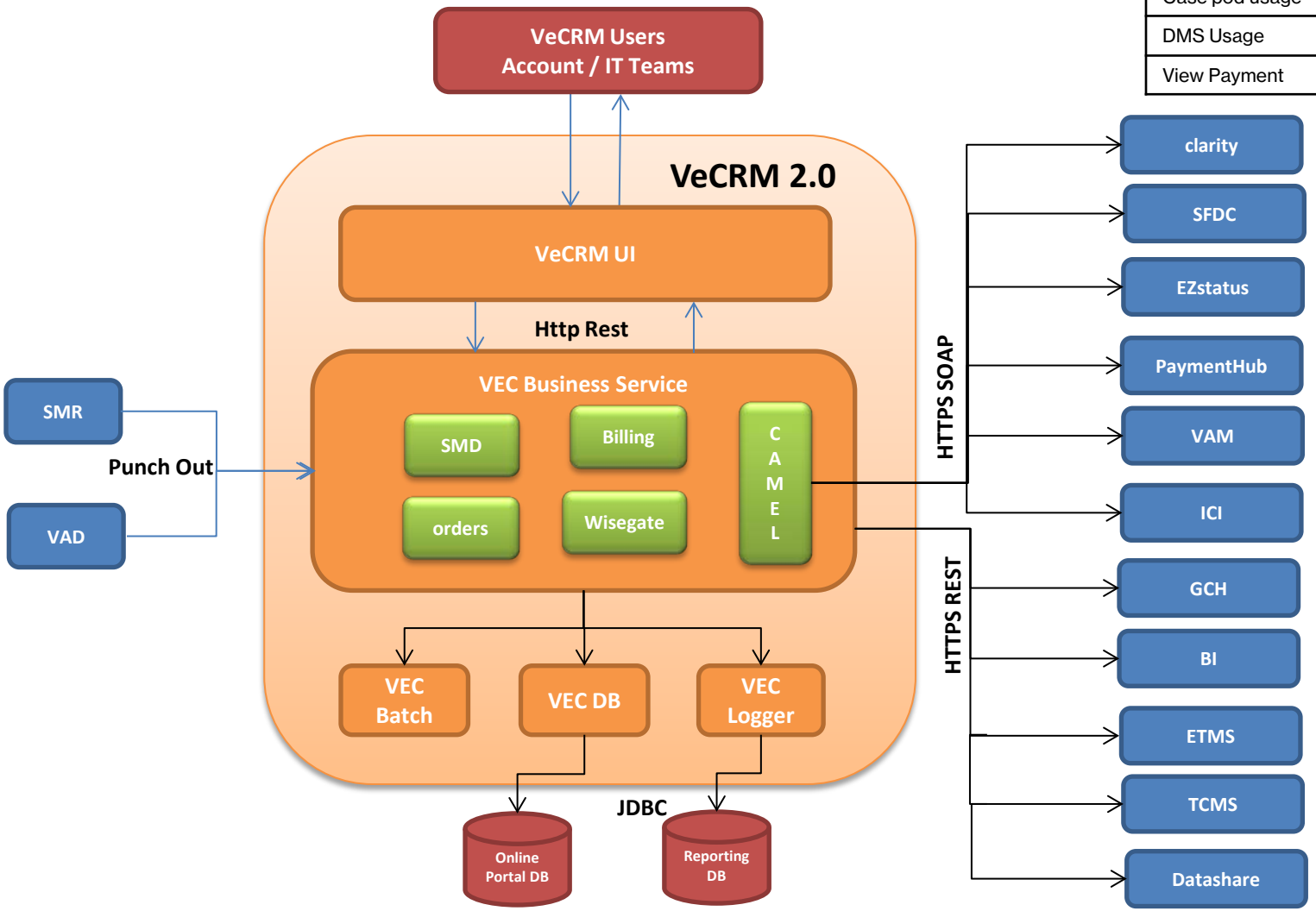
VESWFM – Workflow Overview

Transaction Name	Transaction Count for Aug'16
AM Update process	35725
Notification and Inactivation Process	56969
Email Change Process	1525



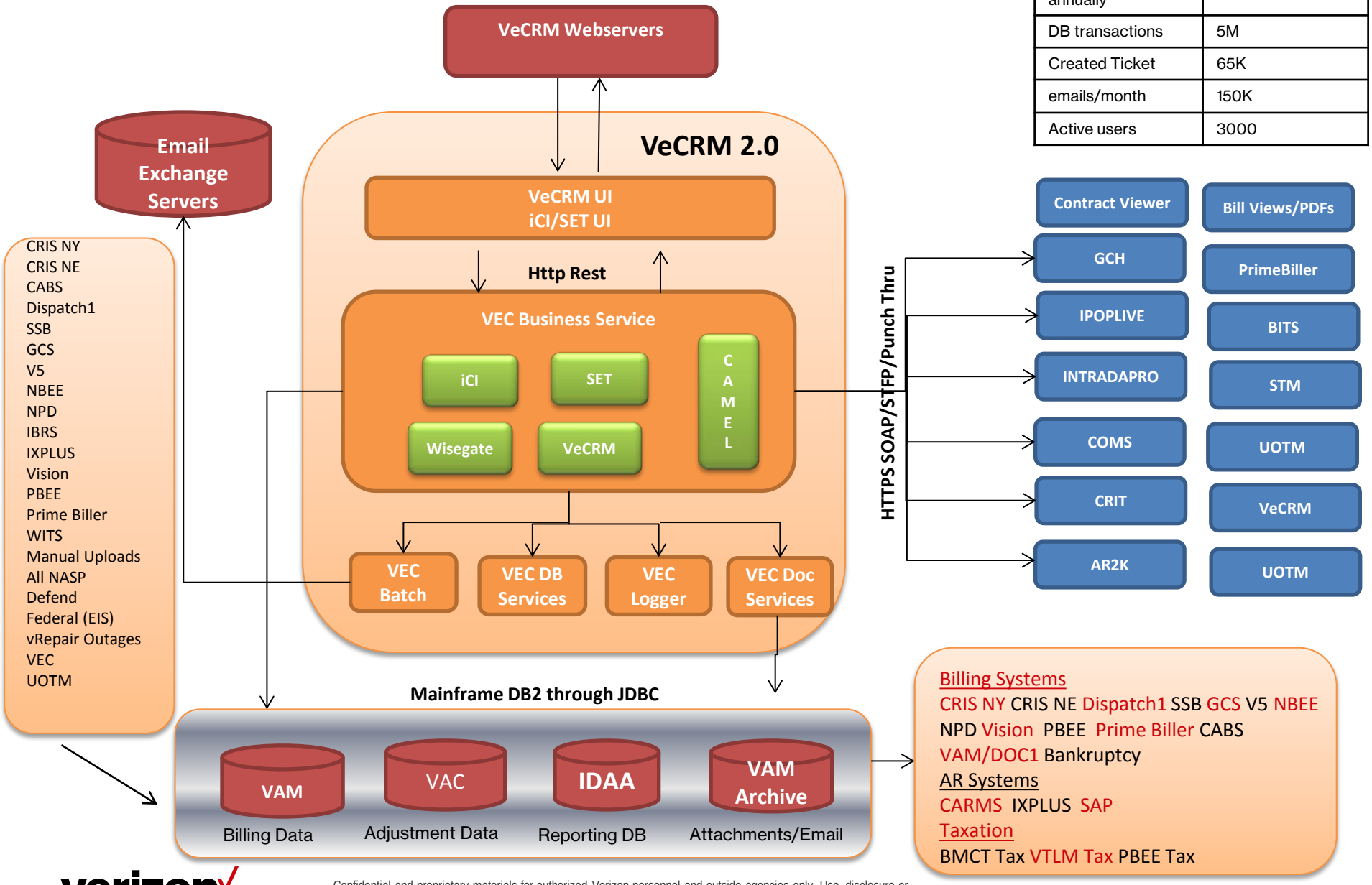
VECRM

Transaction Name	Transaction Count for Aug'16
CLE from GCH	960903
Billing enquiries	199945
Case pod usage	8024
DMS Usage	63193
View Payment	29469



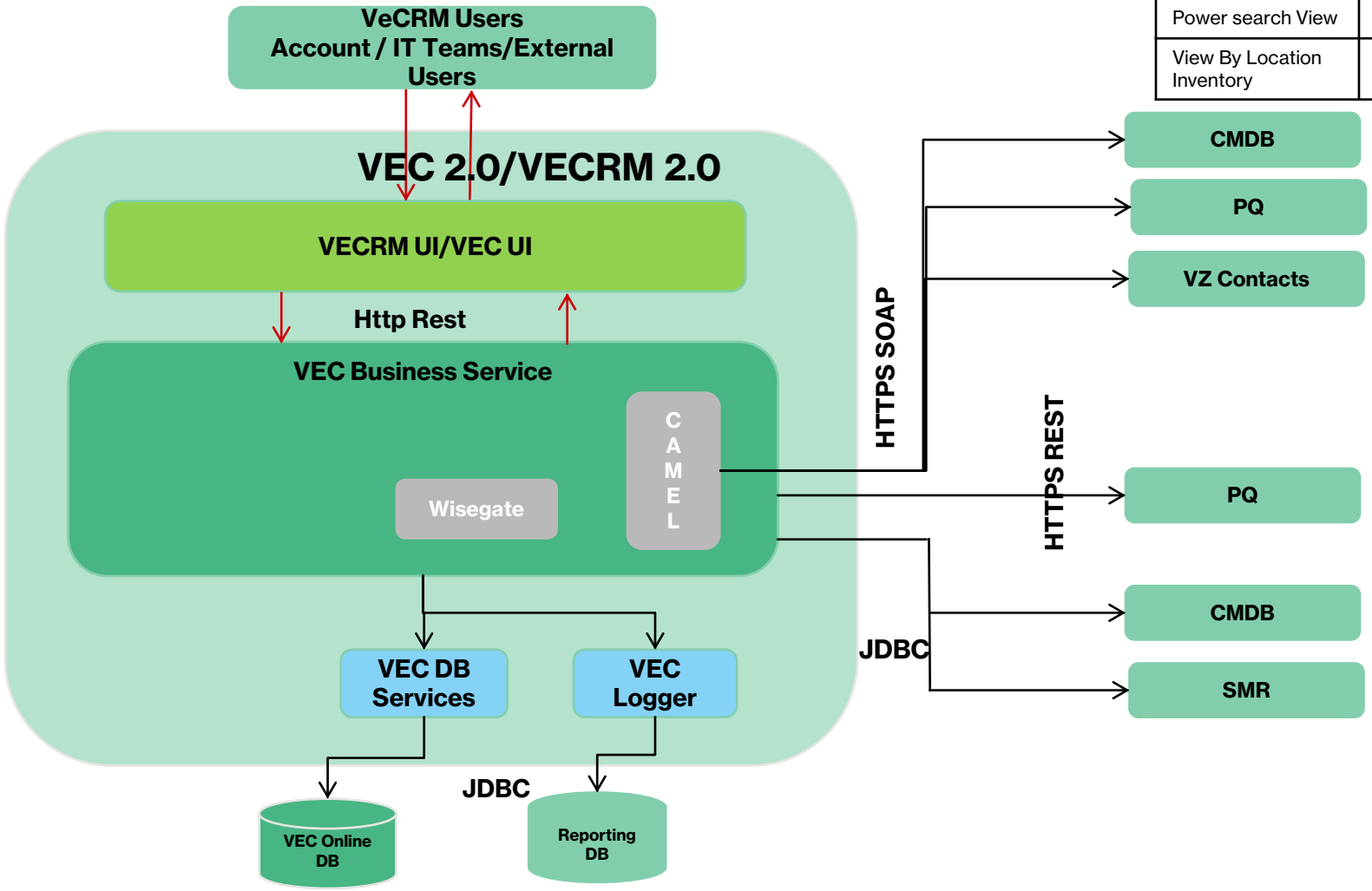
iCI – Billing Credits and Adjustments

Transaction Name	Transaction Count for Aug'16
Credits processed annually	$ 350M
DB transactions	5M
Created Ticket	65K
emails/month	150K
Active users	3000

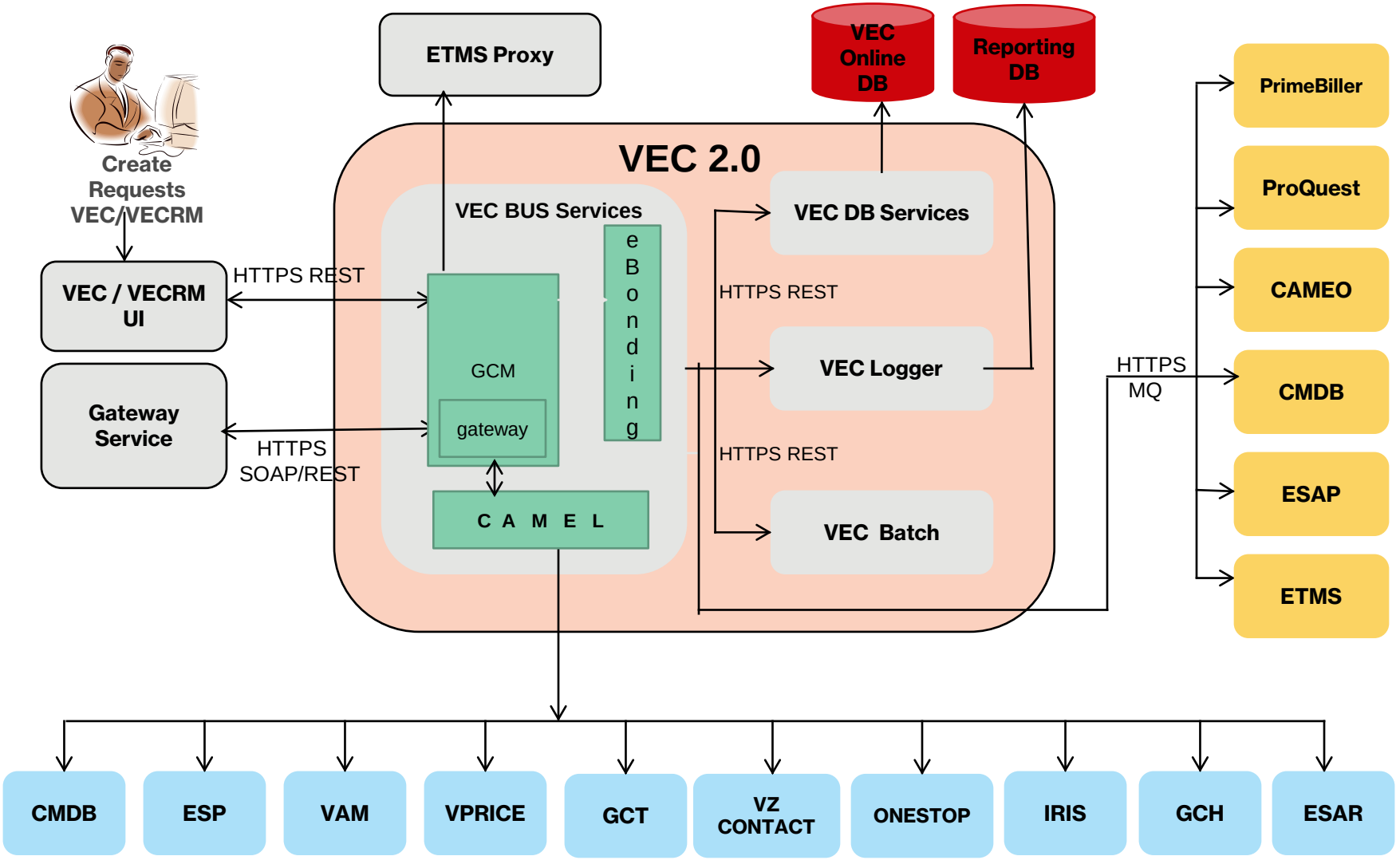


SMD (Service Management Dashboard)

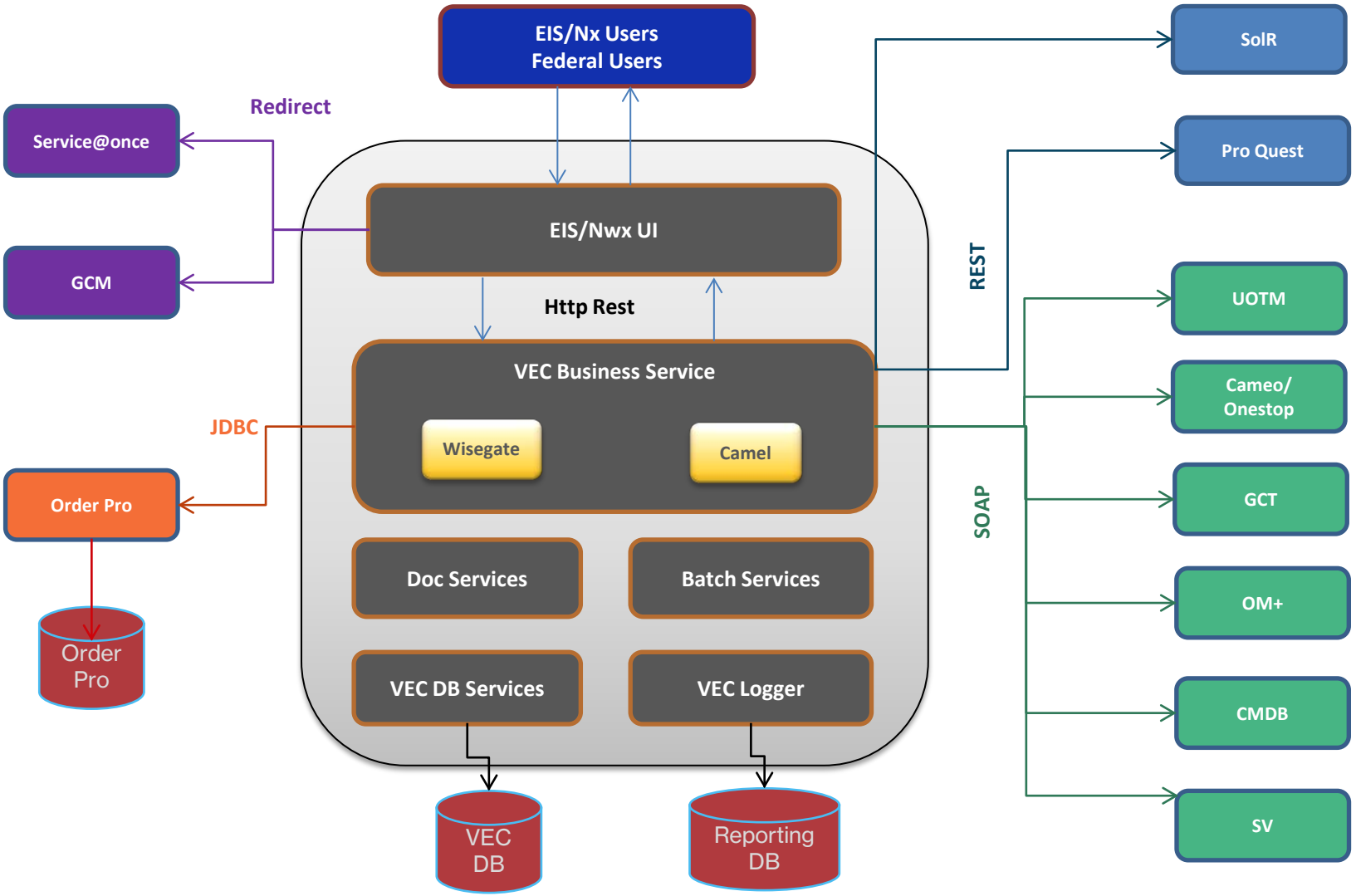
Transaction Name	Transaction Count for Aug'16
Filter on Tree Nodes	29391
View By Service Inventory	22869
View By Inventory Table	20610
Power search View	6600
View By Location Inventory	6224



GCM (Global Change Management)



Networx Portal - EIS/Nx Ordering



VEC 2.0 Applications SLA

- Application Change Control Window (Eastern time)
  - Weekly Maintenance releases
    - Thursday night into Friday morning…11:00 PM to 06:00 AM
  - Monthly VRD releases
    - Friday night prior to 3rd Saturday of the month… starts@11:00 PM
- Dev Ops: VCOP Integrated DB Delivery pipeline deployments
  - DB Pipeline Execution:
    - Every Weekday as needed…11:00 PM to 06:00 AM

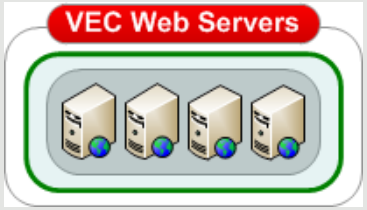
Change control will be submitted and user notification will be mailed out for any planned portal application changes/deployments.

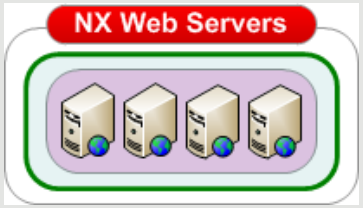
Application Overview Summary

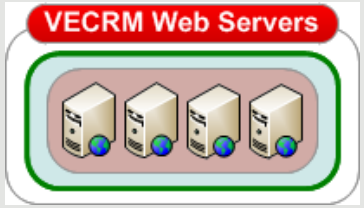
Application Overview	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
Satisfies requirements for App Svc Level					✓	
Service Level Agreement well defined					✓	
Expectations match SLA					✓	
User Base well defined					✓	
Architecture Diagrams provided					✓	

Hardware Overview

Hardware: Web Servers







- Virtualization
  - LDOM Architecture
  - 8 VMs per data center – FDC/SDC
- Hardware Configuration
  - T5240, Sun Solaris 10
  - 2 cores & 4 GB per Web Server
- Software Configuration
  - Oracle IPlanet 7.0
  - Weblogic Proxy Plug-In 12.1.2
  - OpenSSO Policy 3.0 Agent (AM) for VEC
  - SiteMinder Web Agent 6QMR6 (SSO) for Internal apps VEC Admin

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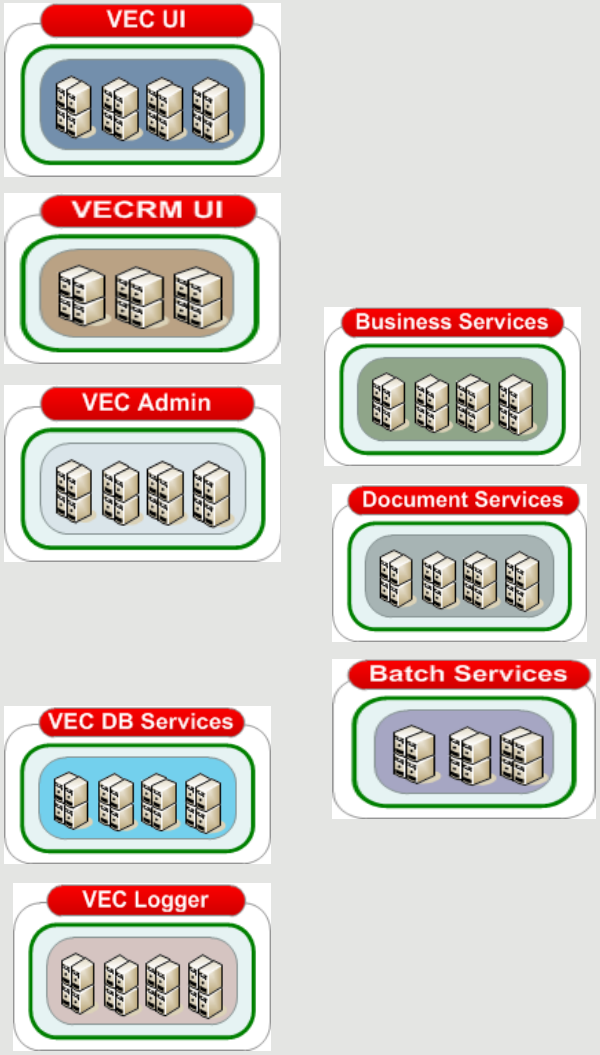
Hardware: App Servers



- Virtualization
  - 20 LDOMs per Data Center – FDC/SDC
  - Additional 4 LDOMs dedicated for failover needs per data center
- Hardware Configuration
  - T5-2, Sun Solaris 10
  - 7 Core (56 virtual CPU) x 120 GB per LDOM
- Software Configuration
  - Oracle WebLogic 12c (12.1.2)
  - Oracle Coherence 12c (12.1.2)
  - Sun JDK 1.7.0_85 (64 Bit)

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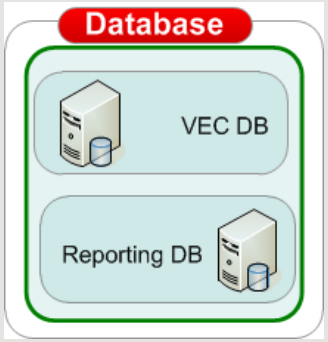
Hardware: DB Servers



- Hardware Configuration
  - Dell/HP Linux Servers R810/BL460c G6
  - OS: Red Hat Linux OS 5.11
  - VEC Online DB is Active-Active across FDC and SDC
  - Reporting DB instance is setup with FDC(Active) and in SDC (Passive)

- Software Configuration
  - VEC Primary Online DB and Reporting DB instances in FDC, SDC are on 11g RAC/ASM, Enterprise Edition11.2.0.4

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Hardware Overview Summary

Hardware Environment (Desktop, Server, Database)	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
Standard H/W deployed					✓	
Vendor supported platform(s)					✓	
Located in Core IT Datacenter(s)					✓	
Support Contract meets SLA					✓	
Storage Solution					✓	
High Availability configured & exercised					✓	
Active-Active: App Site Redundancy configured & exercised					✓	
Dev Ops: Blue/Green Infrastructure configured & exercised					✓	

✓ VEC 2.0 Application infrastructure is Active-Active with real-time traffic across Fairland and Sacramento Data centers and integrated with Edgecast

Software Overview

Software Stack – Development Tools

Module	Software / Version	Comments
Application UI	Sencha Ext JS 5.1.1.451 Sencha Architect 3.2 Sencha Cmd 5.1.3.61 Ruby 1.8.7 nodeJS: 0.12.7	
Application Middleware	Sun JDK 1.7.0_85 64bit Oracle Weblogic Server 12c *12.1.2* Oracle Coherence 12c *12.1.2* Jersey 1.17.1 Jackson 1.9.2 Oracle iPlanet 7.0 MQ 7.5.0.5	• Oracle Weblogic 12c is Java EE 6 compatible. • Oracle JDBC driver comes with Oracle Weblogic. • Jersey and Jackson comes with Oracle Weblogic.
Application Libraries	Redhat JBoss Fuse 6.0 Apache CXF 2.12.0.redhat-610379 Apache Camel 2.12.0.redhat-610379 Springframework 3.1.3.RELEASE IBM DB2 JDBC 3.69.24 VRepair 3.4 VRepairAS 1.0 ETMS Proxy 16.18.1.0 August16-SNAPSHOT Xerces 2.10.0 (OSS) JDom 2.0.5 (OSS) Slf4j 1.7.5 (OSS) Log4j 1.2.16 (OSS)	• CXF and Camel are part of Redhat JBoss Fuse. • Springframework is part of camel-spring dependenies. • Depending on which camel components, it can have other dependent libraries. For example: camel-mina2 depends on mina2; camel-netty depends on netty. • ETMS Proxy has many external dependencies, such as xstream, jamon, jettison, j2ssh and other libraries. • Repairs depends on open source software Xerces and JDom. • Slf4j and Log4j are open source software for logging only.

Software Stack– Build, Testing Tools

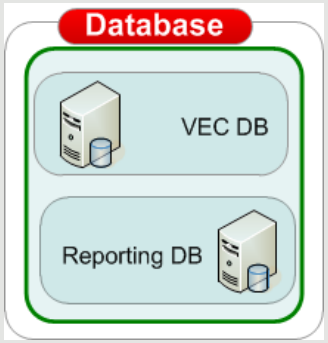
Module	Software / Version	Comments
Unit Test Libraries	JUnit 4.11 JMockit 1.13 Jasmine 2.0.3 JaCoCo 2.3.2 PhantomJS 2.0	• Libraries for unit testing only, excluded from deployment in QA and Prod • Mocking Framework • UI Testing • Java Code Coverage • Headless Browser Testing
Source Code – Build - Continuous Integration	Accurev 6.1 Maven 3.1.1 Ant 1.9.4 Sonatype Nexus 2.8.0-05 Jenkins 1.609	• Accurev is SCM. • Maven is the build tool. • Nexus is the maven repository server. • Jenkins is the continuous integration server.
Security, Code Quality and Collaboration	HP Fortify 4.2.1 HP Webinspect 10.3 SonarQube 5.1.1 JIRA 6.3.14	• Security Scan Software • Code quality check • Issue tracking software
Automation Testing	UFT 12.00 Selenium 2.5.3.0 Cucumber Core 1.2.0 Soap UI 4.6.3	• Unified Functional Testing Tool (previously known as QTP)

System Software Overview Summary

System Software Environment (OS, Middleware)	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
Standard S/W deployed					✓	
Vendor supported life cycle					✓	
Patch levels current within 1 year					✓	
Support Contract meets SLA					✓	

Database Overview

Overview



❖ Database Platform

- ➢ DELL/HP Linux Servers R810/BL460c
- ➢ Red hat Linux 5.11
- ➢ Oracle Enterprise Edition 11.2.0.4 – 64 bit
- ➢ All Databases are 2 Node RAC

❖ Database Tools

- ➢ Replication : Oracle Golden Gate, Oracle Data Guard
- ➢ Monitoring :Oracle Enterprise Manager(OEM), PATROL, Custom Scripts

❖Database Stats

- ➢ Online Database: Fairland, Sacramento
  - ✓ Active Active Traffic with 2-way replication
  - ✓ Transactions: ~14 Million/day
  - ✓ Organic Growth per year : 500 GB
  - ✓ Current size in each data center: 5.6 TB
- ➢ Reporting Database: Fairland (Active), Sacramento (Passive)
  - ✓ 1 way replication FDC to SDC
  - ✓ Transactions: ~3 Million/day
  - ✓ Organic Growth per year : 600 GB
  - ✓ Current size in each data center: 6.8 TB

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Database Schema/Application Statistics

Online

- Database Name : **vtbdb**
- Number of Schemas : **50**
- Number of Tables : **4299**
- Number of Procedures : **369**
- Number of Functions : **215**
- Number of Packages : **163**
- Number of Transactions :**14M**
- Unique SQL's/Day : **54,707**

Reporting

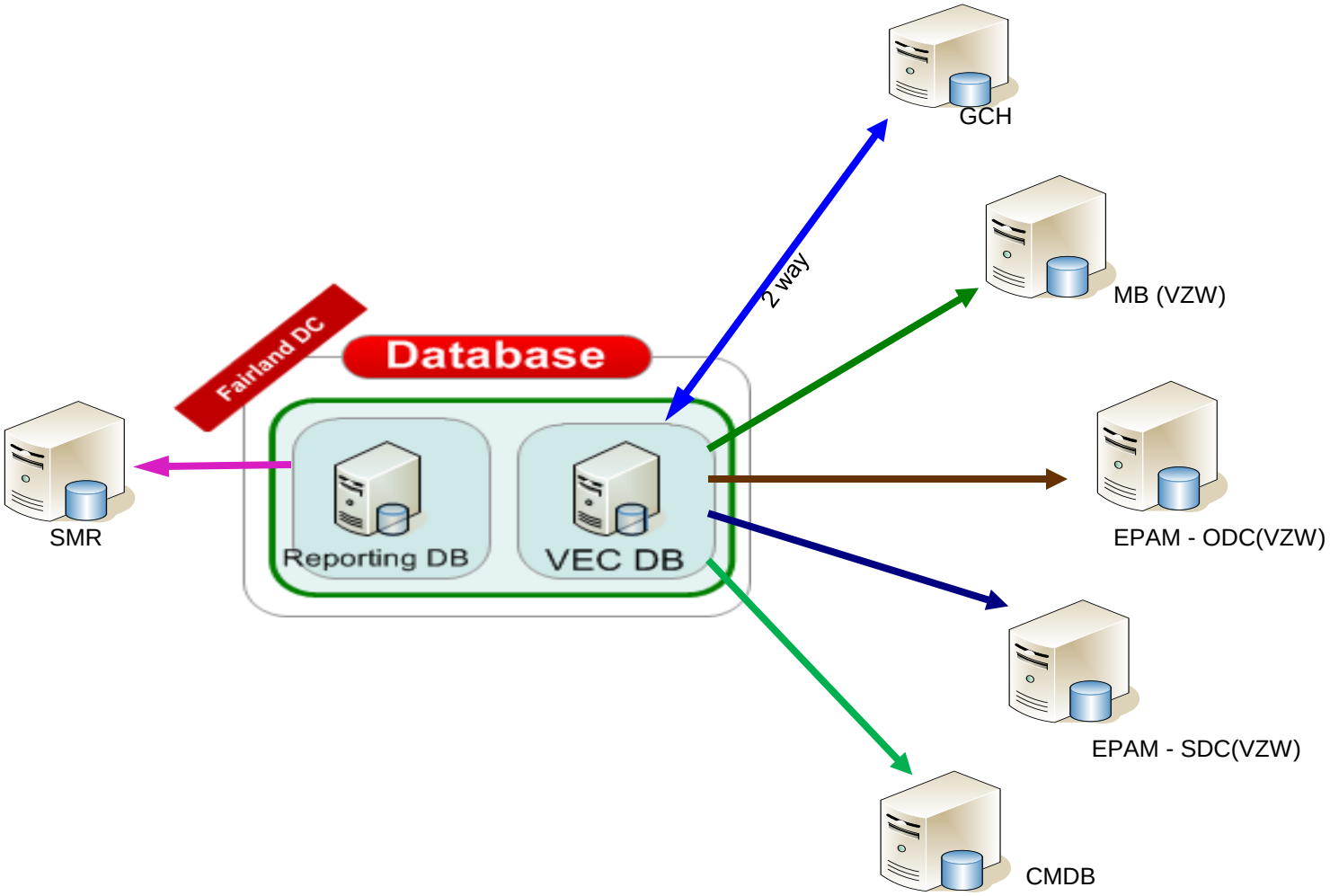
- Database Name : **vtbedb**
- Number of Schemas : **53**
- Number of Tables : **4476**
- Number of Procedures: **392**
- Number of Functions: **219**
- Number of Packages: **163**
- Number of Transactions: **3M**
- Unique SQL's/Day : **8,651**

ONLINE DB INSTANCE STATISTICS

SGA (Oracle Instance Memory) ➔**120GB.**
PGA(User process memory) ➔ **24GB**

METRIC_NAME	MAX	AVG	METRIC_UNIT
Buffer Cache Hit Ratio	100	100	%(LogRead - PhyRead)/LogRead
I/O Megabytes per Second	554	156	Megabtyes per Second
Library Cache Hit Ratio	100	99	% Hits/Pins
PGA Cache Hit %	98	98	% Bytes/TotalBytes
Physical Read Total Bytes Per Sec	575793125	153186291	Bytes Per Second
Physical Write Total Bytes Per Sec	88546728	10239239	Bytes Per Second
Redo Generated Per Sec	32597704	3653206	Bytes Per Second
Response Time Per Txn	1030	150	Milli Seconds Per Txn
Session Count	3805	3679	Sessions
Total Parse Count Per Sec	760	232	Parses Per Second
User Commits Per Sec	483	68	Commits Per Second

External Apps: Data Replication

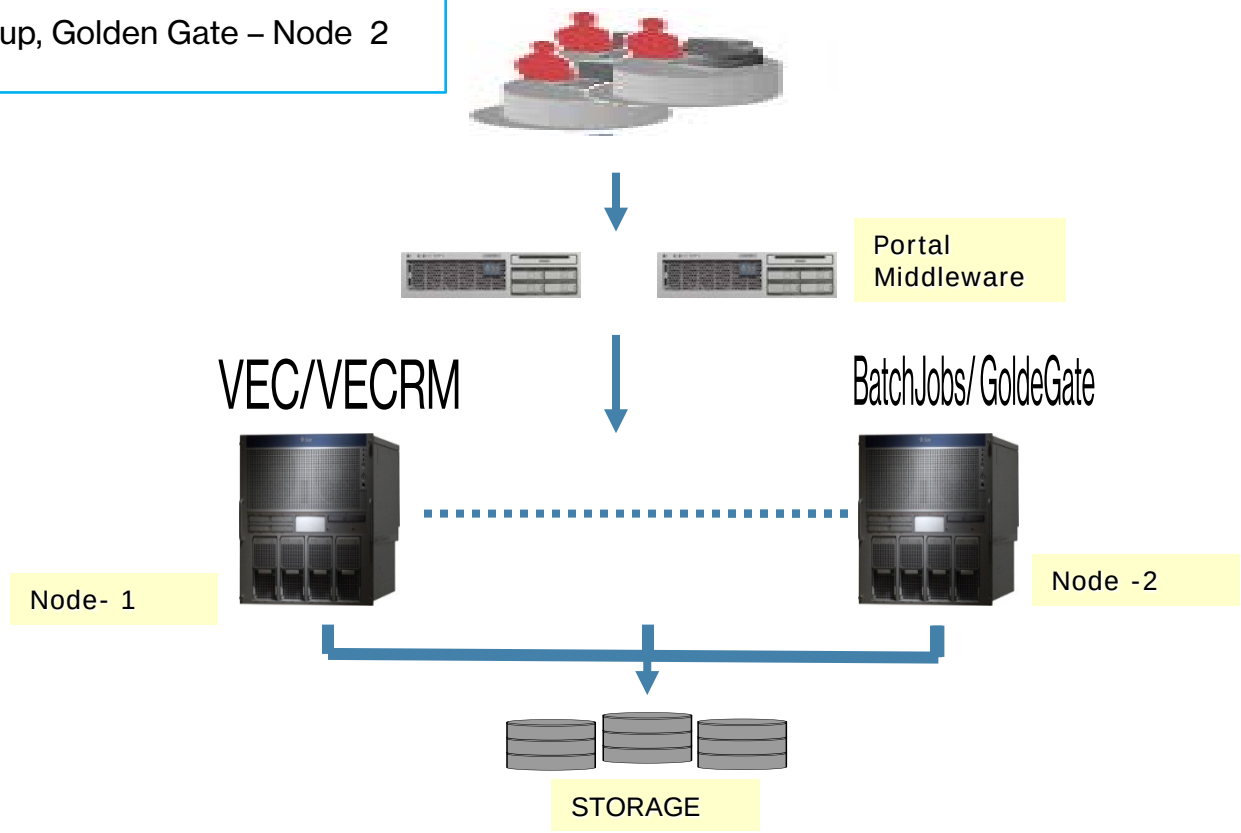


VEC Wisegate user profile Data is replicated to GCH (2 way)
VECRM data is replicated to SMR for reporting needs (1 way)

Database Architecture: RAC Nodes

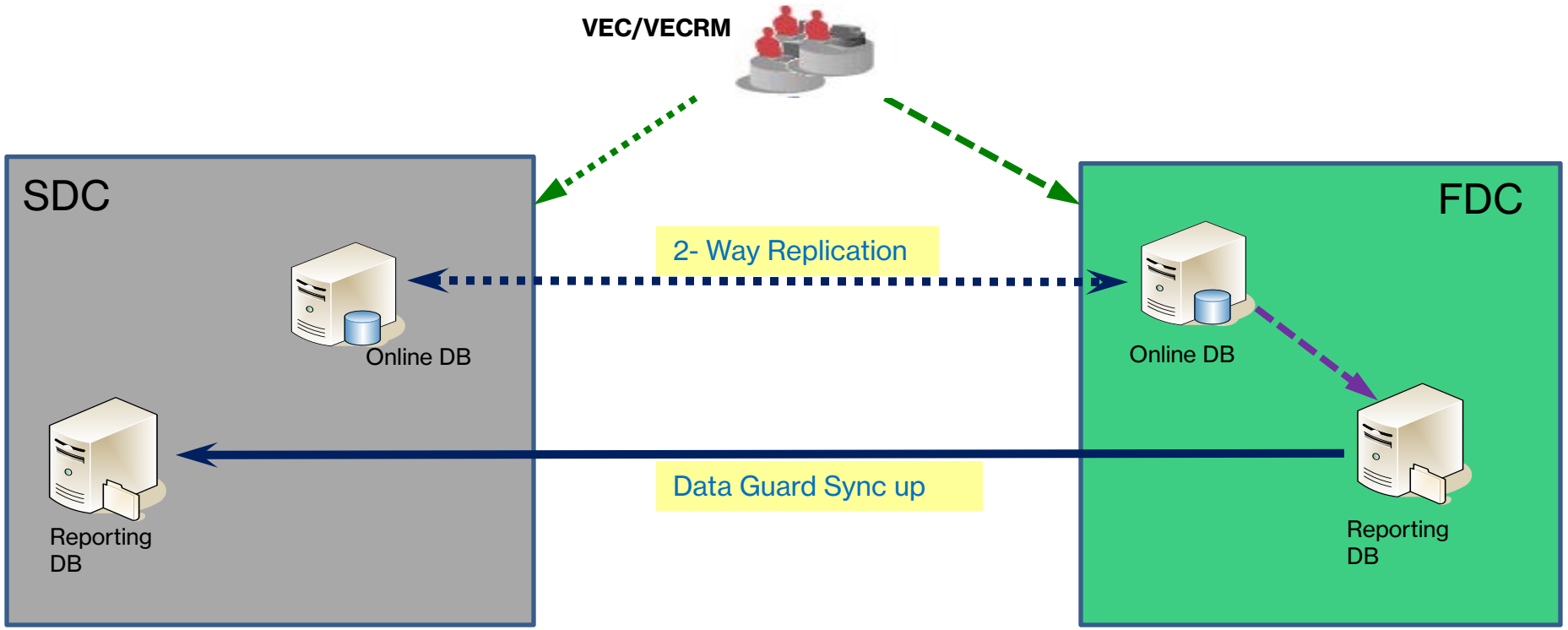
APPLICATION DISTRIBUTION

- VEC Online Applications– Node 1
- Batch, Backup, Golden Gate – Node 2



- Two nodes in each RAC cluster
- Node 1: Dedicated for Online portal applications
- Node 2: Dedicated for Batch Jobs, SOLR, Golden Gate replication and DB backup
- Application has automatic failover capability to node2 if node1 is down

Database Replication: Active-Active



- VEC online data is replicated two-way between FDC to SDC using Golden Gate.
- Online data in FDC is replicated to reporting DB in FDC
- SDC reporting DB is in sync with FDC reporting DB using data guard

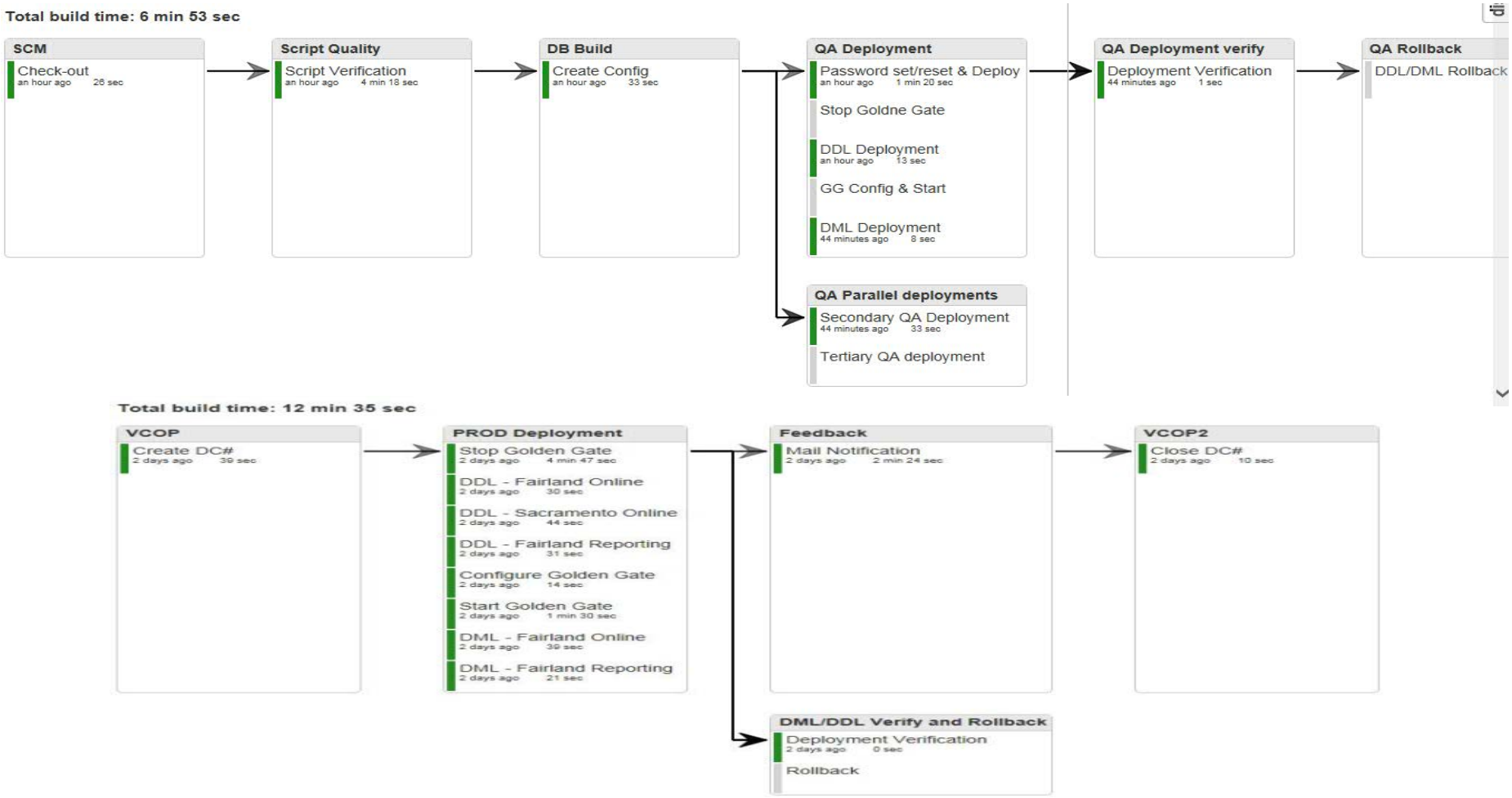
VEC Database Active-Active Benefits

- 24x7 availability to support application globally
- Increase ROI on Existing Servers and Synchronize Data Across the Datacenters
- Improving Performance by offloading heavy duty Queries from Online database to other Databases
- Ability to perform real-time reporting
- BC/Continuous Availability and Load Balancing
- Automation of releases and eliminate planned downtime reducing related business and IT costs
- Real-time Data Feeds to other Applications
- Minimum/Zero Downtime Upgrades, Migrations and Maintenance (OS/Hardware/DB)
- Database and Data Center Consolidation
- Minimizing Risk on unplanned downtime

*** Upgraded Online database from 11.2.0.3 to 11.2.0.4 in Sacramento datacenter on Thursday, 17th March without any downtime to VEC2.0 application. Application was serving the customers through Fairland datacenter**

DB Delivery Pipeline

Create Jira Ticket → Review scripts with DBA & test in DEV DB → Promote the scripts to Accurev → Deploys to QA and updates the status in JIRA Tickets → Auto CA creation using VCOP → Deploy to PROD with all Golden gate configuration → Notification to Dev and Close the JIRA ticket and update CA



DB Delivery Pipeline Benefits

Benefits:

- Reduced total deployment time and increased more number of deployments
  - **QA deployments – Scheduled 7/day + Ad-hoc (Avg. 2/day)**
  - **PRODUCTION deployments – 2-3 deployments/week**
- Deployment time reduction
  - **QA - 1 hour ➔ 8 minutes**
  - **Production ➔ 3 hours to 25-30 minutes (Multi Data Center with replication in prod)**
    - 113 SQL scripts = 38 DDL + 75 DML + OGG config, stop/start steps
    - One Simple change will take only 6-7 min
- Golden Gate configuration & startup steps are fully automated.
- Time taken for DEV/QA environment upgrade for monthly releases is reduced
  - **From 2 hours to 15 minutes without downtime**
- Automatic parallel future release QA deployments
- **Auto rollback** the changes in case of any errors and with DDL and DML separation.
- **Notification to developer:** Success/Failure/Script Quality via Mail/Jira Updates
- **Auto update of JIRA DB ticket** details to **VCOP** while creating CA
- **Jira status update:** Closing of JIRA ticket after production deployment.
- **Log files and Deploy status:** Available @Jenkins and DB table. Also notifications thro email.

Database Backup & Recovery

VEC Database :Backup and Recovery

❖Database Backups

➢Full RMAN backups to Tier 3 storage on Saturday nights, with incremental backups on Monday and Wednesday.

➢Archive logs backed up nightly.

❖Database Recovery

➢A full point-in-time recovery is possible using RMAN. In the event such a restore is necessary, Our Active-Active architecture across datacenters (FDC or SAC) will be available for our online application and no impacts to the customers

Data : Retention ,Archive & Purge

❖ Purge

- By effective purging in the last two years we brought down our online database used size from 8.5 TB to 5.2 TB.
- Year old portal users with status as Inactive/deleted are getting purged/cleaned up ongoing basis.

❖ Retention

- We have partitioned our high volume transactions tables in online database which will be holding only 1 to 2 months of data
- Reporting database will be holding 13 months of data..

❖ Archive

- All our historical data are archived in our Reporting database.
- We are in the process of migrating application unused history tables to reporting database which will be used purely for auditing purpose.

Data Purge

Online Database :

Total database size (GB)	Total Data Identified for Purge (GB)	Purge Complete (GB)	Purge Complete (%)	*Purge in progress(MB)
8092	3952	2782	70.36	1170

Year	Purge Size (GB)
2014	1128
2015	989
2016(YTD)	665
TOTAL	2782

Reporting Database :

Total database size (GB)	Total Data Identified for Purge (GB)	Purge Complete (GB)	Purge Complete (%)	*Total Purge in Progress (MB)
9380	3152	2745	87.06	407

Year	Purge Size (GB)
2016(YTD)	2745
TOTAL	2745

*** Analysis in progress for additional purge of size 1.1 TB in online and 0.4 TB in reporting DB related to historical data**

Tuning

- All the application related SQL's going as part of releases are reviewed and approved by the DBA team.
- Long running/Hard parsing SQL's are captured by the monitoring tools and fine tuned for better performance .
- Weekly schema statistics and daily histograms for tables having low cardinality columns to give optimal performance.
- Recent optimizer parameter change from 9.20 to 11.2.0.4 showed considerable improvement in application SQL response times

VEC DB Best Practices

- Enforcing best practices of SQLs and eliminated the dependency of code deployment with DB changes. Treat database as a separate backend component and don't tightly couple with application code.
- Design all the application tables with Active-Active compliance with needed audit/tracking columns
- Review all the application SQL's going as part of the release.
- Keep online database lean and mean and use reporting database for all the historical/metrics need.
- Define retention criteria for all big transaction tables and make it as partitioned tables for effective purge.
- Enforce Reporting DB usage for all historical needs of auditing usage with partition implementation for ease of maintenance on critical VEC DB tables
- Deploy databases changes thru Dedicated DB Delivery pipeline ahead of time without any downtime
- Multi-Site sequence approach to ensure VEC data is unique across FDC/SDC
- Multi-site conflict detection and resolution (CDR)
  - Create/Modified timestamp
  - Conflict rules and resolution

Database Security

Database Security – CPI 810 compliance

- VEC is on boarded to Splunk
- VEC is on boarded to RCM
- VEC2.0 functional users and sys/stem passwords will be changed every 90 days – GSA requirement
- All DB user accounts has specific profile assigned
  - Password Parameters- Password Lifetime, Failed Login attempts
  - Resource Parameters
- Second level authentication is enabled with database trigger to allow all application logins only. Any individual logins with write access will be failed.
- Failed/invalid login trigger for functional accounts in place to track and report/alert teams as GSA security requirement
- Production access is restricted only to DBA team and with read-only privilege for application team with mgmt approval on need basis.
- All non-prod databases are scrambled for CPNI and non-CPNI sensitive information.

VEC Database Auditing (SOX Compliance)

- Periodic DB users review
- SOX compliance
  - DB access clearly defined
  - Proactive approach
  - Periodic review of records/historical data
  - Consistent dialogue with auditors (procedures & policies)
  - Test to ensure efficiency & reliability
  - Develop database standards for ensuring compliance with Security Policies
  - DB security (user profiles, privileges, revoke DROP permissions)
  - Change Controls documented
  - DB users / privileges review
  - DB changes test logs (non-prod)
  - All DB changes are submitted in Accurev(SCM) and tracked thru Vectrack system

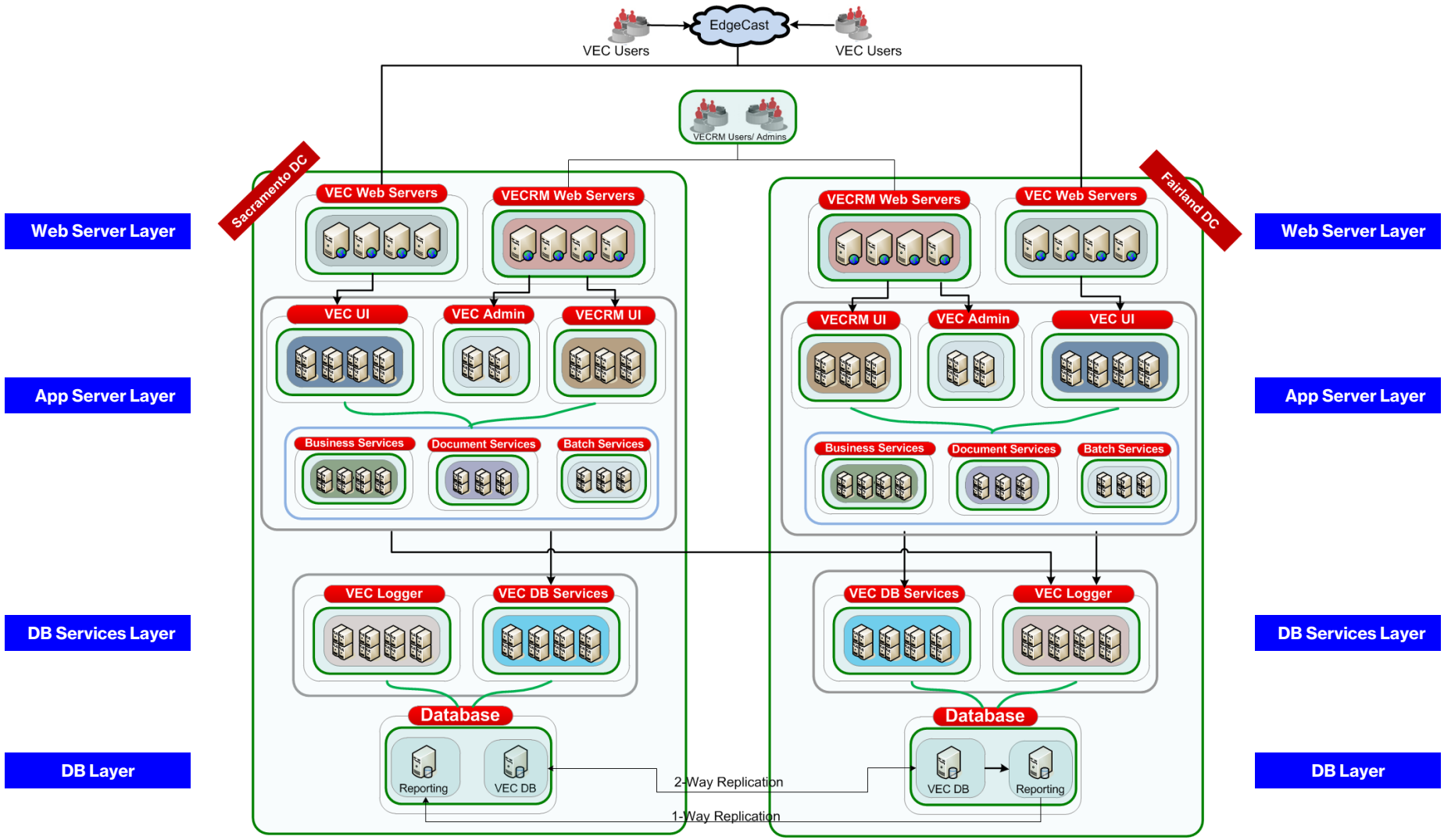
Database Overview Summary

Database	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
Database architecture					✓	
Database tuning schedule					✓	
Database Backup/Recovery timeline meets SLA				✓		
Database Backup/Recovery exercised & validated				✓		
Data Management						
Data Retention meets SLA					✓	
Data Archive/Purge process meets SLA					✓	
Conforms to Data Security					✓	
Data replication with Active-Active configuration across multi instances					✓	

✓ VEC 2.0 Application online database is setup with 2 way replication across Fairland and Sacramento DB instances

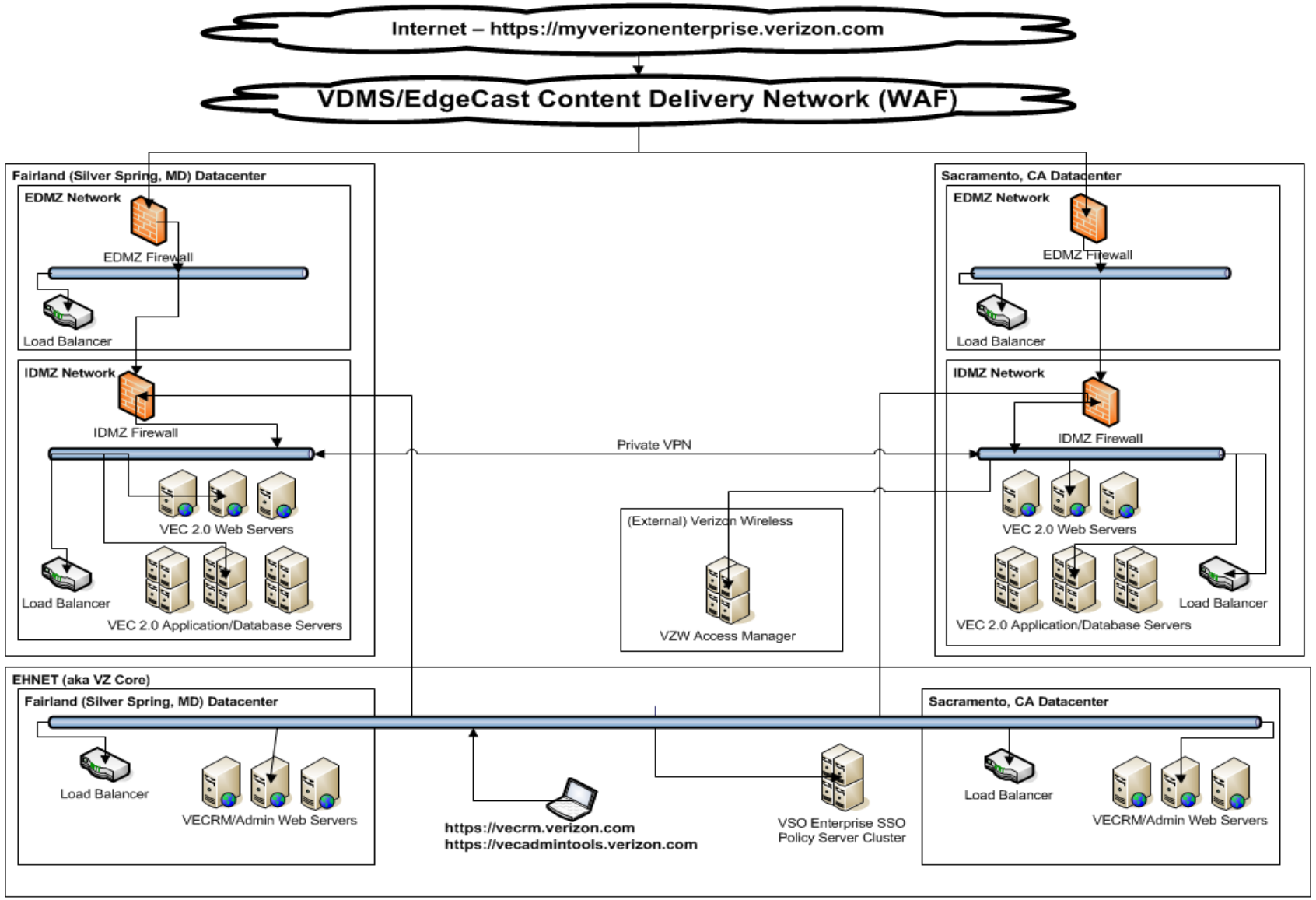
Application Design Overview

VEC 2.0: Active-Active Infrastructure



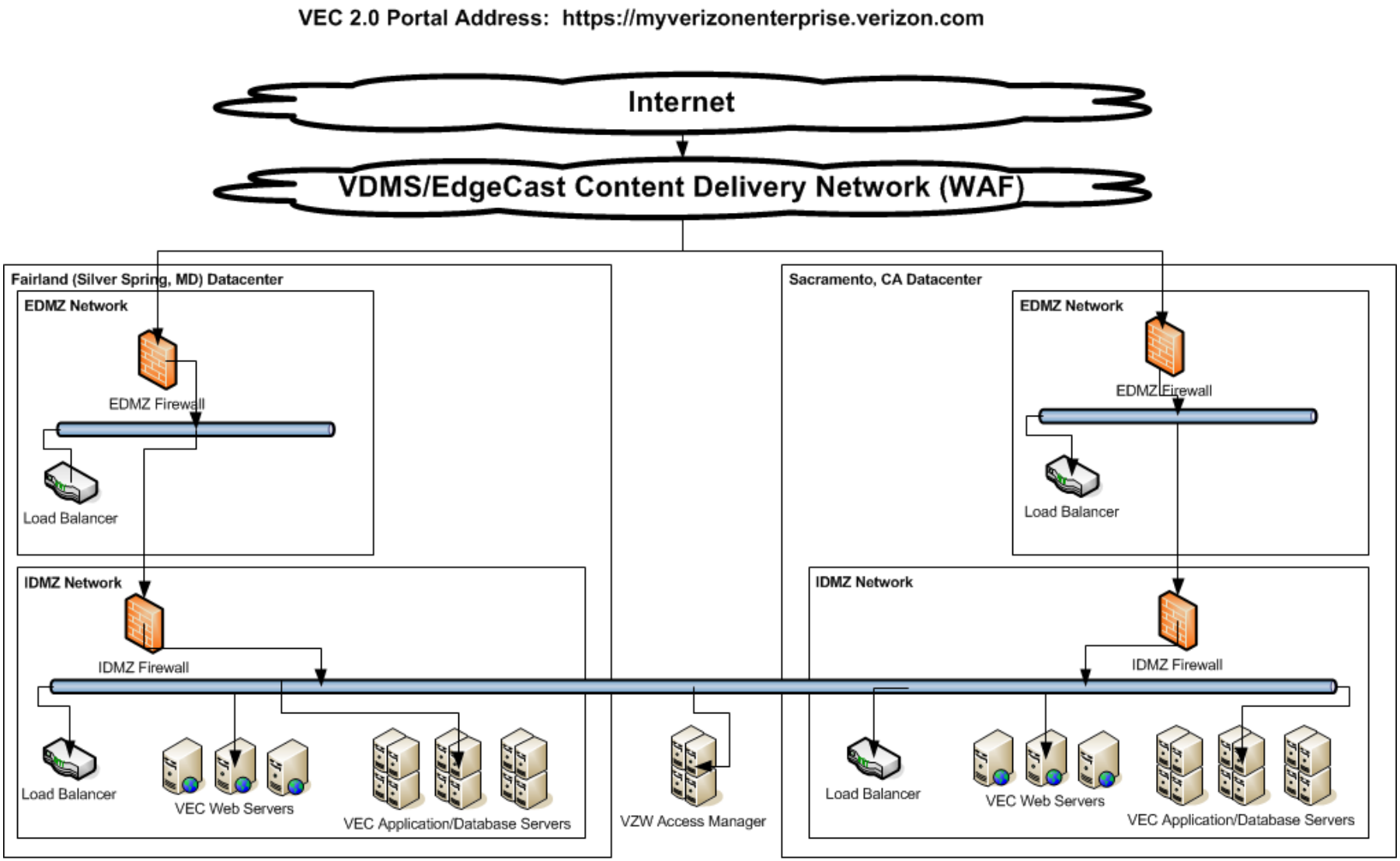
- VEC 2.0 infrastructure is Active-Active across FDC/SDC with 2 way replication for needed DB objects

Web Servers Layout: VEC/VECRM Infra



VEC/VECRM 2.0 Web servers Traffic hit count (Monday Sept 26): 1.7M

Web Servers Layout: VEC



VEC 2.0 Web servers Traffic hit count (Monday Sept 26): 1,320,661

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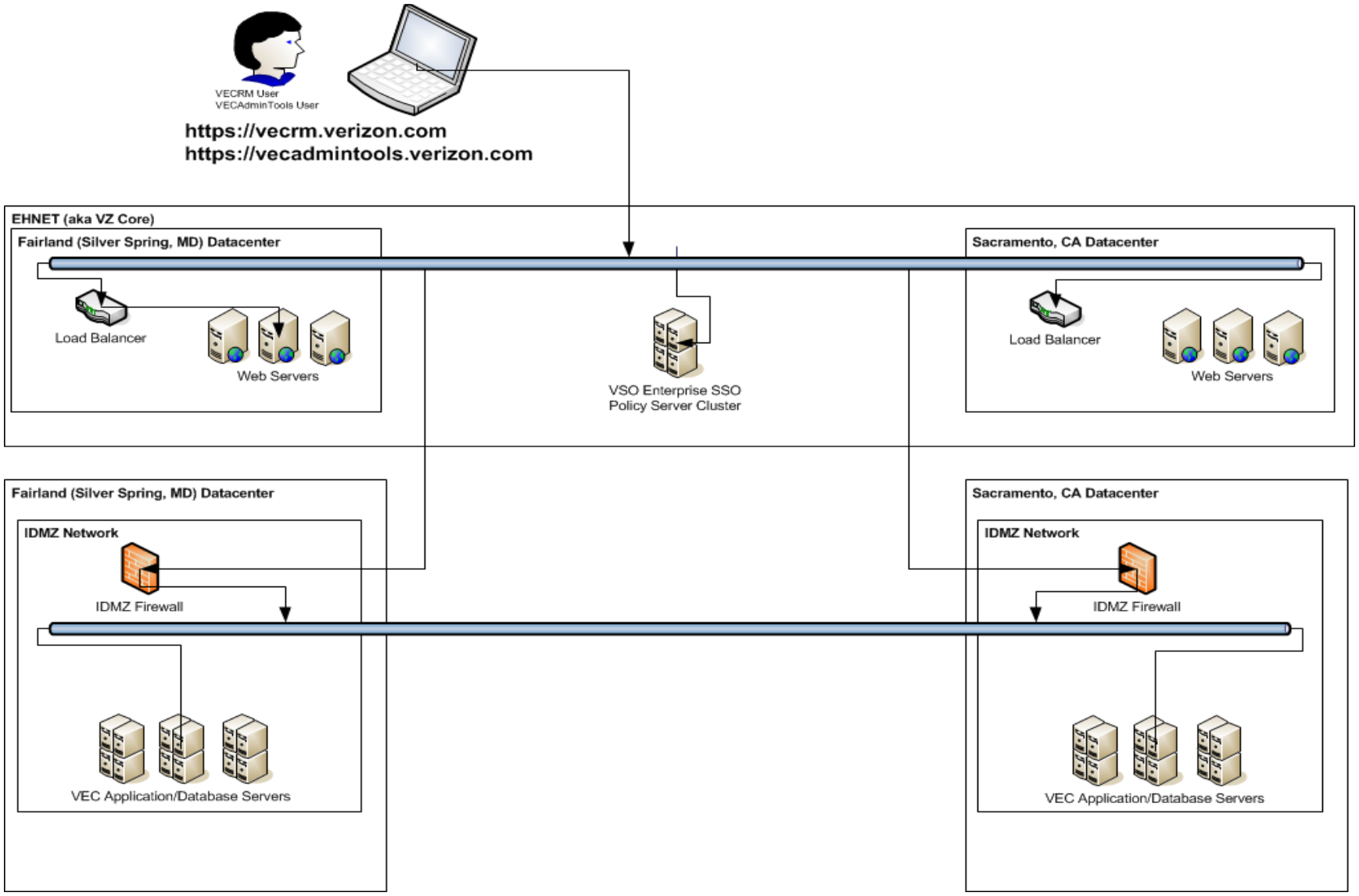
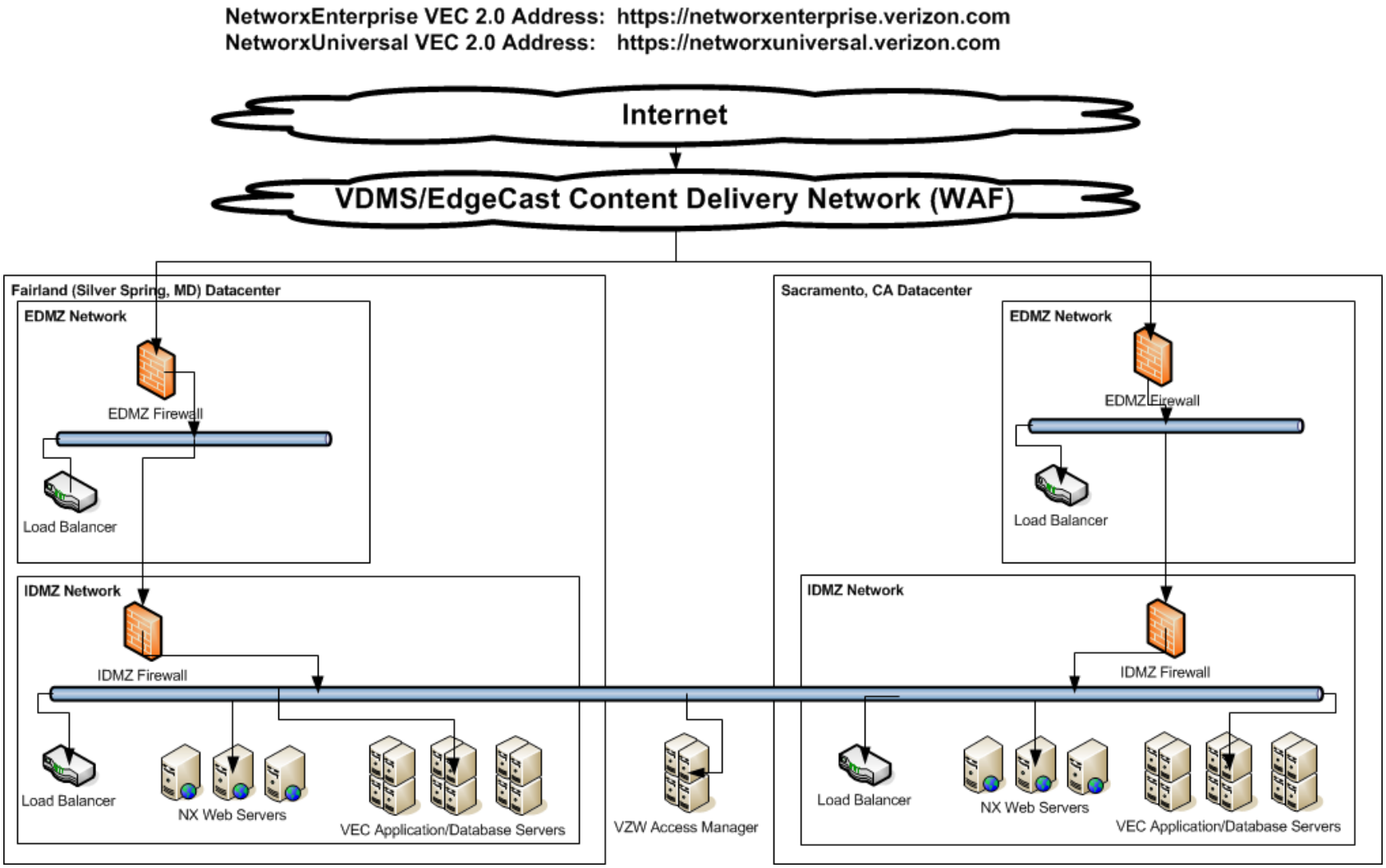
Web Servers Layout: VECRM, VEC Admin Internal Portals



VECRM Web servers Traffic hit count (Monday Sept 26): 461,317

Web Servers Layout: Networx Portals



Networx Portals Migration to 2.0 codebase is in progress with target date as end of 2016

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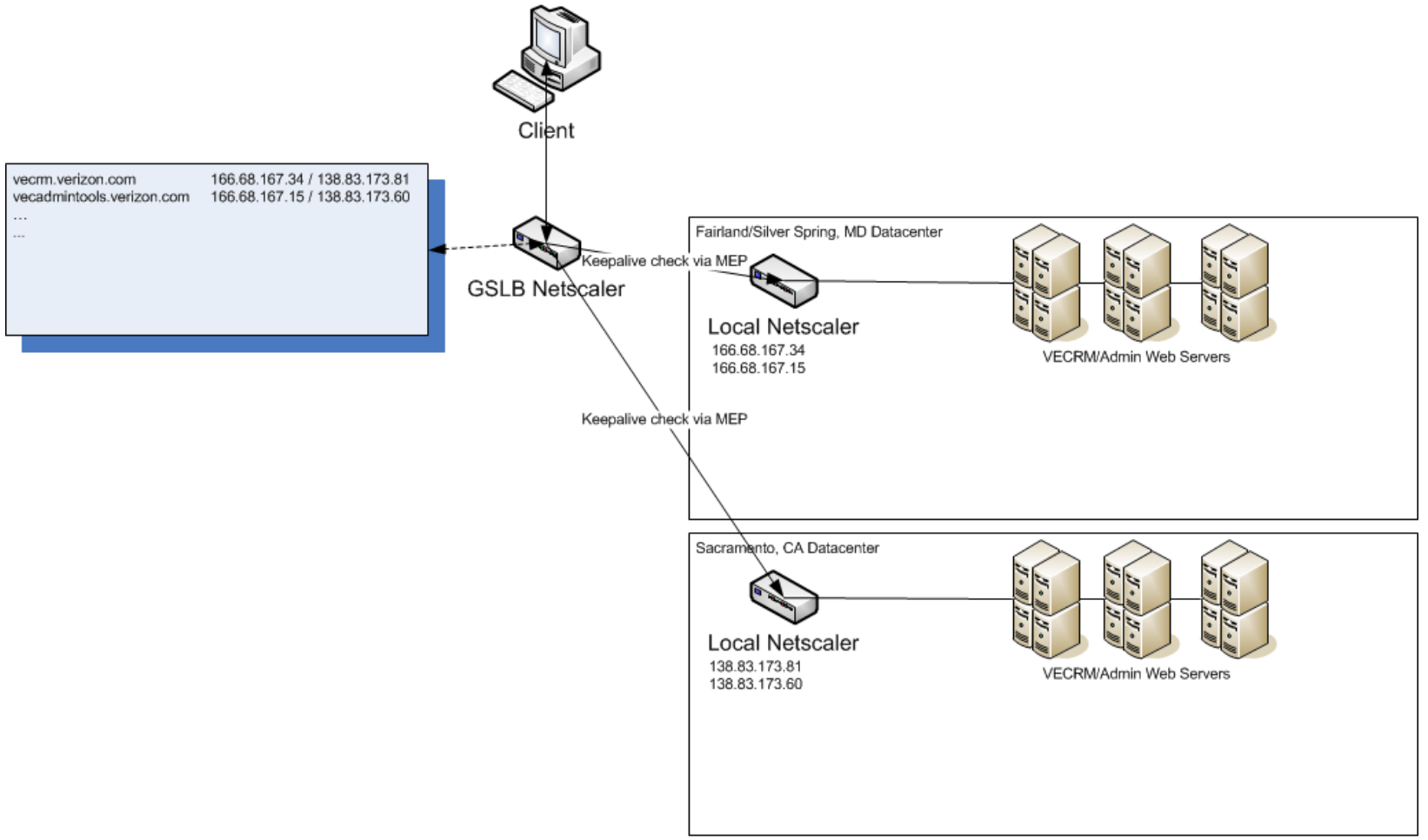
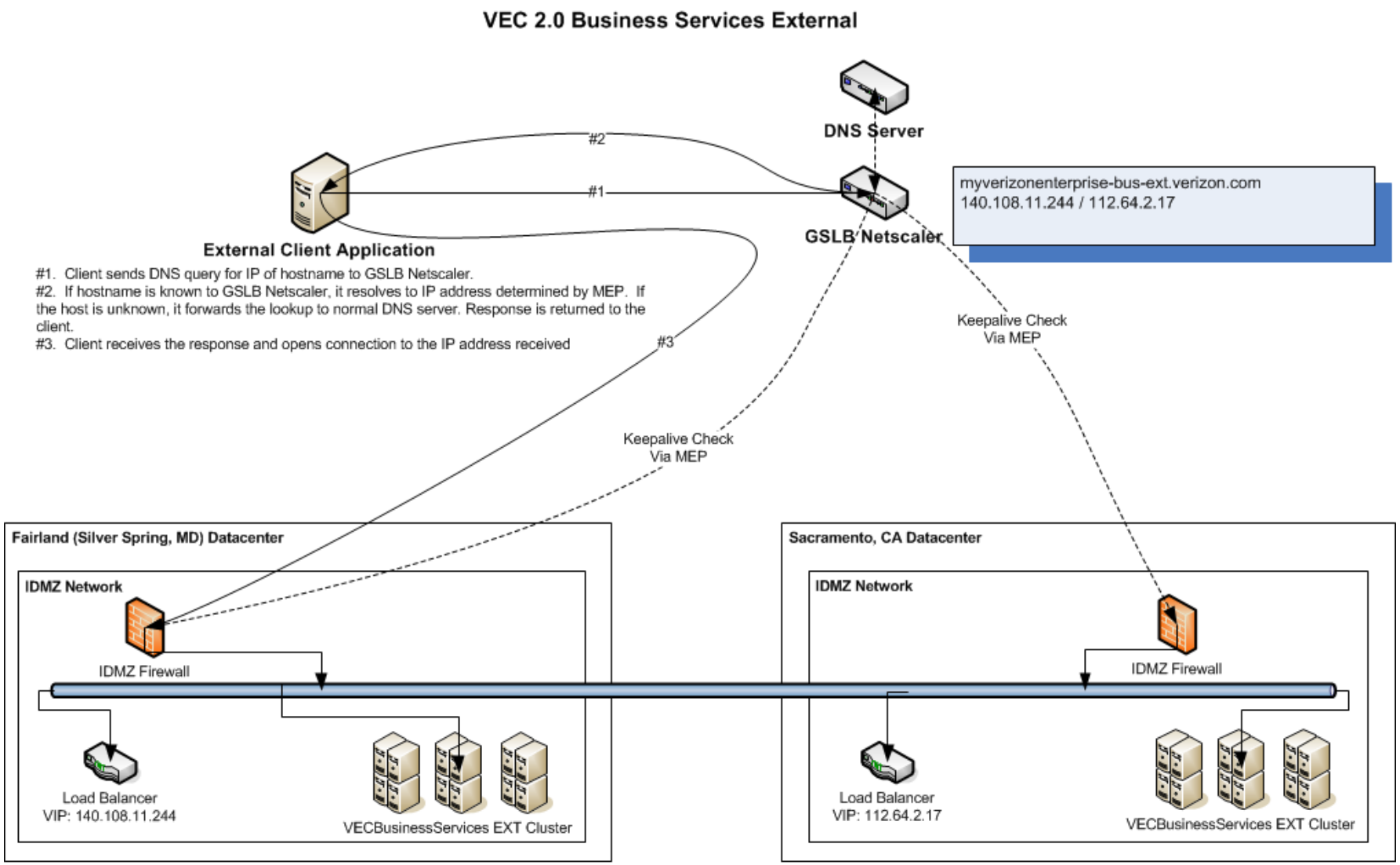
GSLB Overview: Internal Portals

Very High Level Overview of Global Server Load Balancing
(Does not accurately depict specific VZ networks)

#1. Client sends DNS query for IP of hostname to GSLB Netscaler.
#2. If hostname is known to GSLB Netscaler, it resolves to IP address determined by MEP. If the host is unknown, it forwards the lookup to normal DNS server. Response is returned to the client.
#3. Client receives the response and opens connection to the IP address received

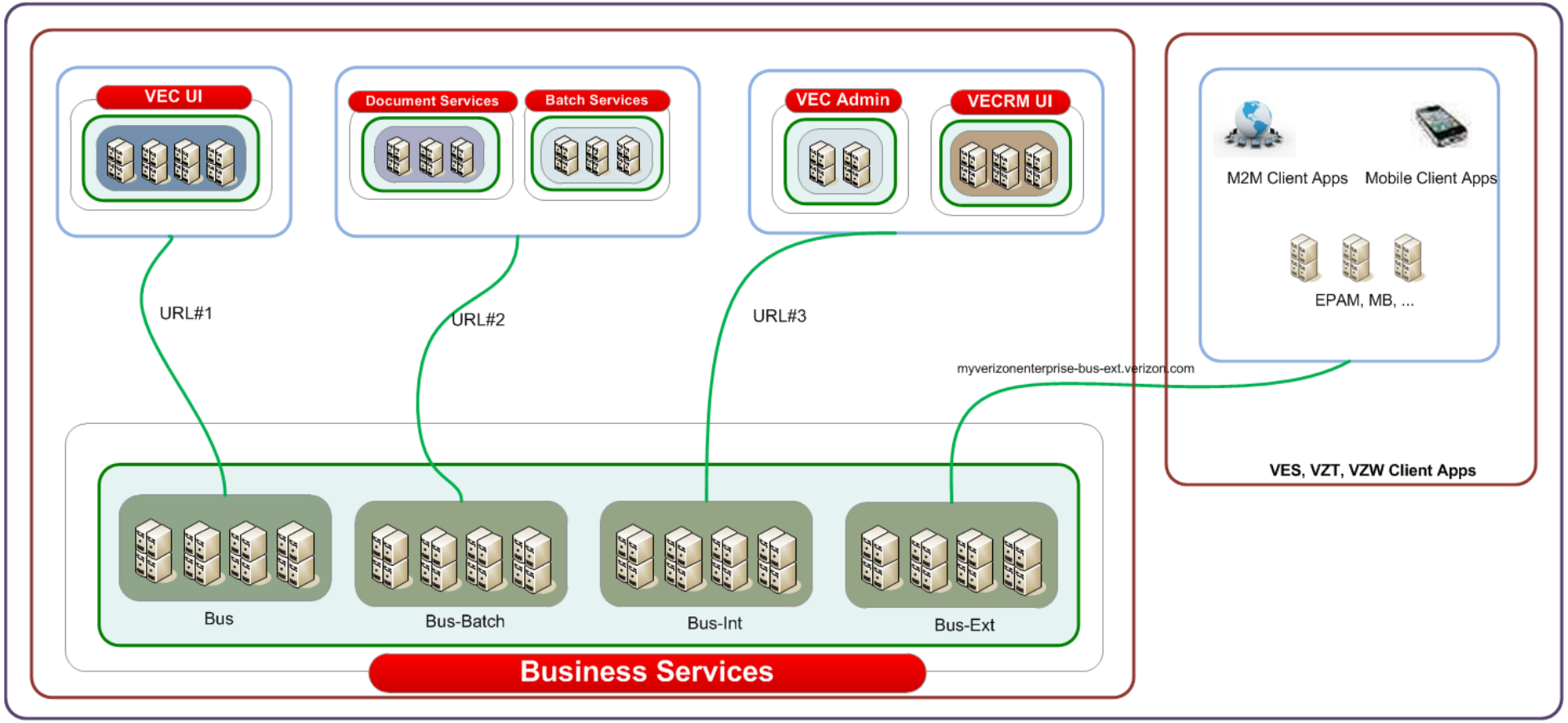


GSLB Overview: Business Services (Bus Ext)



Business External Services Layer Traffic hit count (Monday Sept 26): 308,112

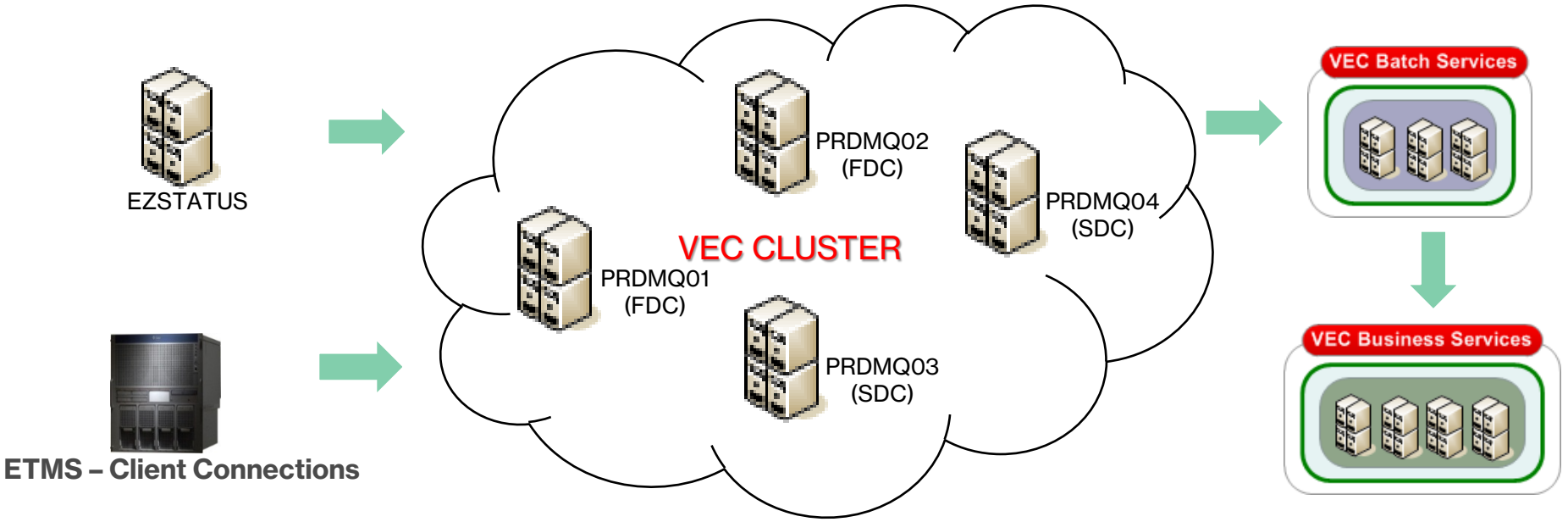
Business Services: Traffic Separation by Channel



Separation of Business services traffic by channel with dedicated sets of JVMs for VEC UI, VECRM UI, Back office Domains and External client applications

Same code and configuration for Business services across all sets of JVMs with isolation of operational logic from dev efforts

MQ Configuration : Active-Active



- Four queue managers clustered : 2 in Sacramento and 2 in Fairland with messages distributed across all four.
- Active-Active setup supporting within and Cross data center failover. Any of the queue manager in any data center go down, load is handled by other active queue managers.
- No Manual intervention is needed in the 2.0 infra if a queue manager is down
- Supports Blue/Green Infra Model with control on Batch domain

Metric	Value
Alteration Date	2016-06-28
Alteration Time	23.36.11
Current Queue Depth	0
Current Queue Depth Percentage (% Queue Full)	0
Dequeue Count	0
Dequeue Count Per 6 Hours	40355
Dequeue Count Per Day	217590
Dequeue Count Per Hour	7166

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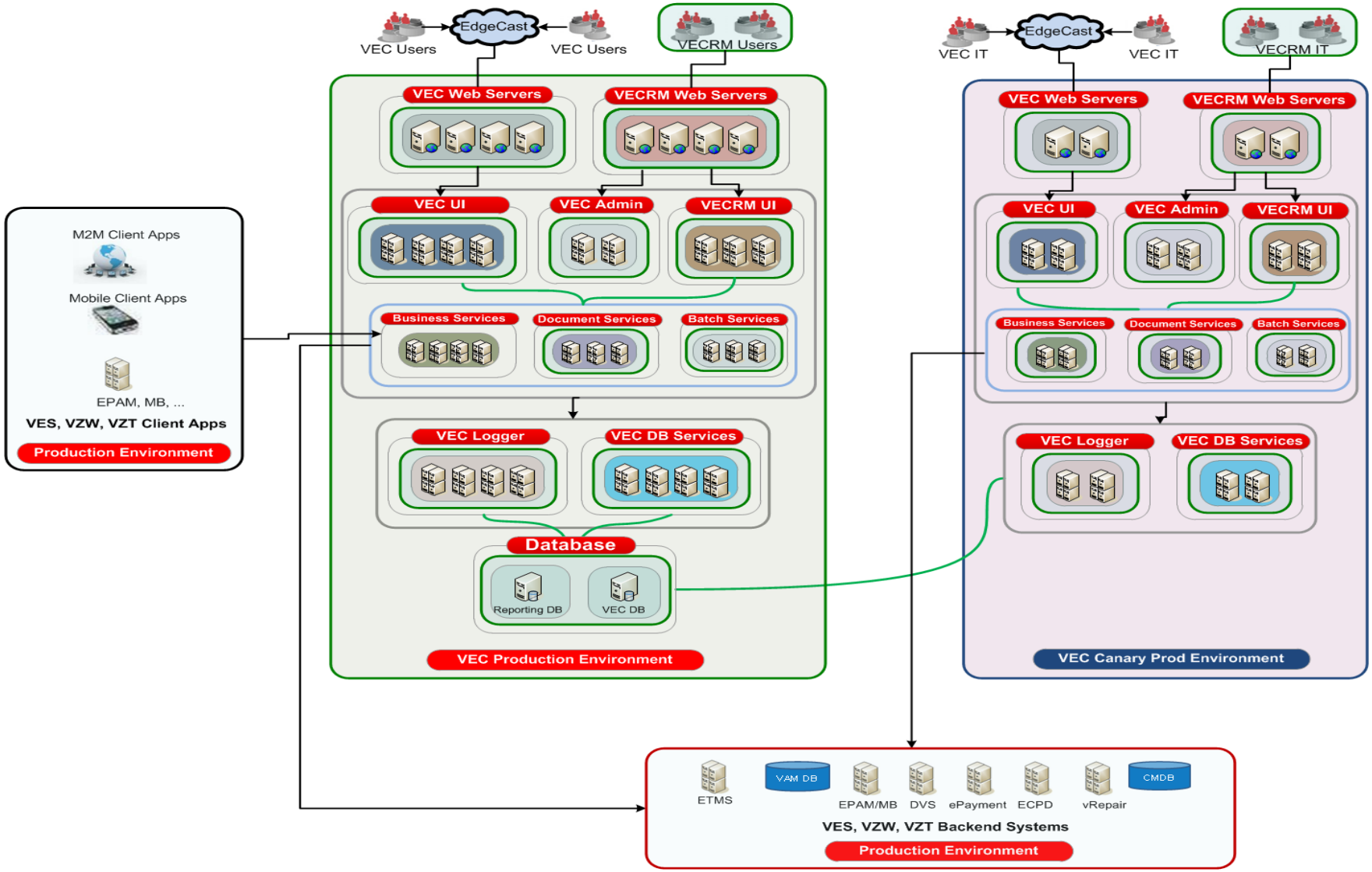
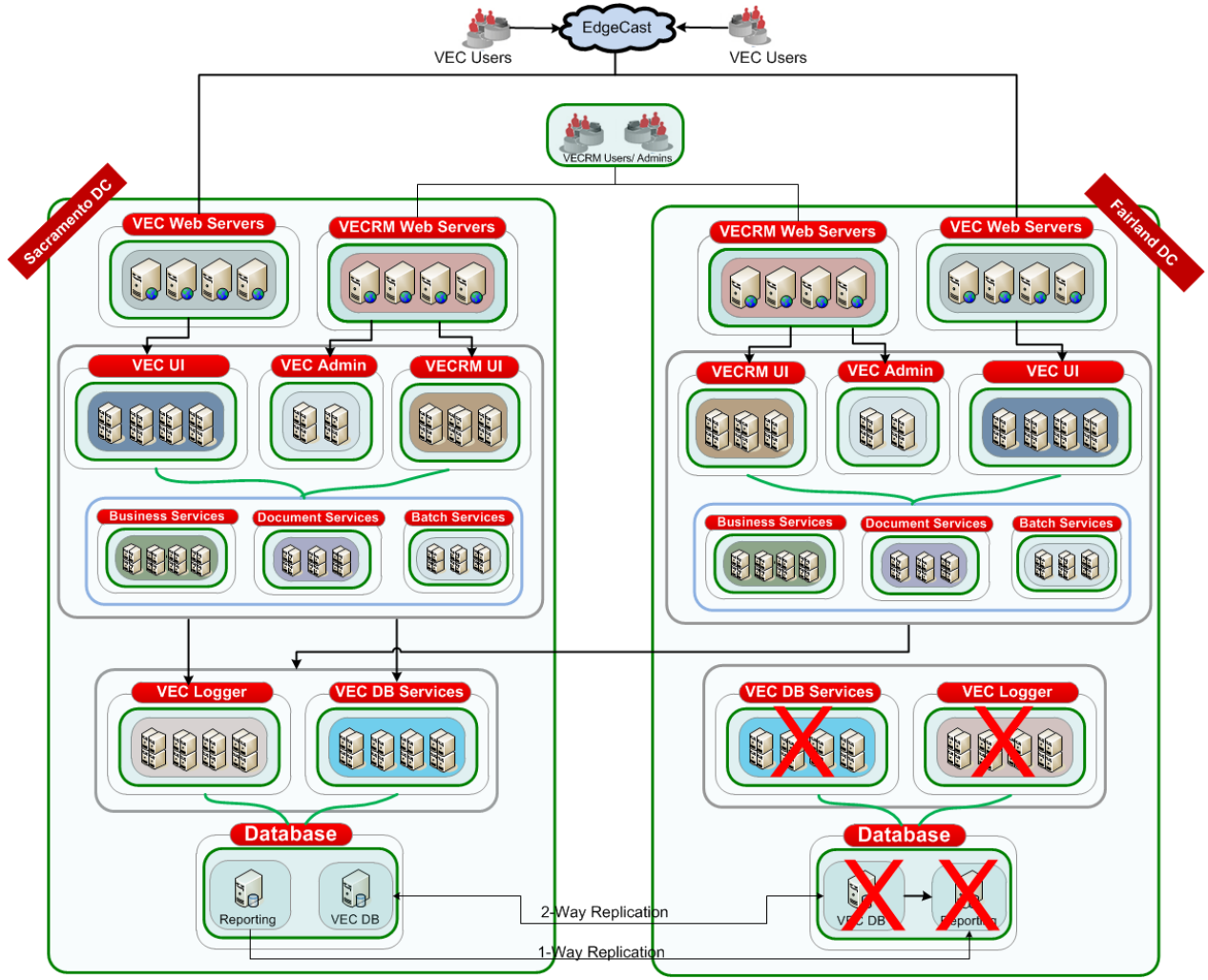
Canary Environment (Alt prod)



Scaled down middleware env for IT only testing with exact setup like prod to validate new code in advance with prod backends

VEC 2.0 Active-Active: FDC DB Failover Scenario



Web Server Layer

App Server Layer

DB Services Layer

DB Layer

Web Server Layer

App Server Layer

DB Services Layer

DB Layer

- VEC Reporting DB in SDC will be activated with reverse replication to FDC
- VEC DB Services and VEC Logger Services app JVMs in FDC will be shutdown
- VEC Logger Services will be activated in SDC to support both FDC and SDC traffic for reporting DB interactions

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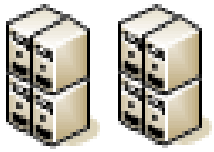
Non Prod Environments

Dev, Integration, QA & Training

Dev

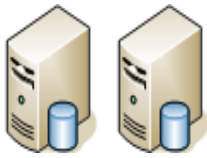
v19frdsda01
Sun Solaris 4 X120
Development Server

v19frdgda05
Sun Solaris T5240 4 X20
AccuRev V6.1.1



V19fa1lna001
v19fa1lnw001 Red Hat Linux 4 X 8
AccuSync

V19sacgta56
Sun Solaris 4 X 14
JIRA V6.3.14



V19fddd1/v19fddd2
Red Hat Linux 6.8
Oracle RAC 11.2.0.4
DB Servers

Build & Artifact

Nexus

v19frdgda01 Sun Solaris 4X16
Build Repository

Nexus

https://vecrepo.verizon.com
Load balanced Package repository

v19frdgdw02 Sun Solaris 1X16

v19sacgta23 Sun Solaris 2X8

Jenkins Slave Sun Solaris T5240 4 X 14

v19frdgda02 Sun Solaris 4 X 14
Jenkins Master V2.0

v19frdgda01

v19frdgda03

v19frdgda04

v19frdgda06

V19sacgta41
Sun Solaris 4X 14
Jenkins Master
V1.609

Jenkins Slave

v19sacgta42 Sun Solaris 4 X 14
QA1 & QA2 pipeline

v19sacgta53 Sun Solaris 4 X 14
QA3 & QA4 pipeline

v19sacgta54 Sun Solaris 4 X 14
DB & Config pipeline

v19sacgta55 Sun Solaris 4 X 14
STAGE pipeline

v19sc1lna001 Linux 8 X 24
DEV1 pipeline

v19sc1lna002 Linux 8 X 24
DEV2 pipeline

v19sc1lna003 Linux 8 X 24
DEV3 pipeline

v19sc1lna004 Linux 8 X 24
DEV4 pipeline

v19sc1WNA029 Windows
BDD testing

v19sc1WNA019 Windows
Security testing

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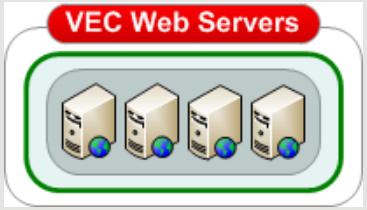
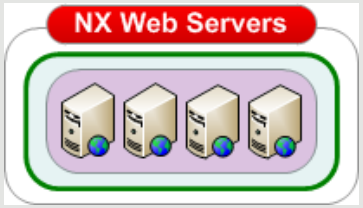
Dev/Integration Test Environments –Sacramento Data Center

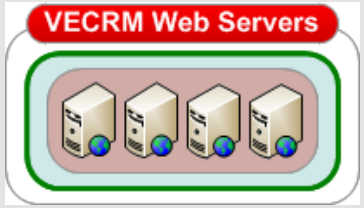
- DEV/INT Environments points to same backends & MQ as QA.
- H/W – Sun Solaris 10 T5240

	DEV1/INT1	DEV2/INT2	DEV3/INT3	DEV4/INT4	Training
web	Sun Solaris 1 X 16 V19frdgdw01 113.140.135.212	Sun Solaris 4 X 14 V19sacgta47 113.130.63.224 4 X 14	Sun Solaris 4 X 14 V19sacgta48 113.130.63.223	Sun Solaris 2 X 14 V19sacgta10 113.130.63.231	Sun Solaris 2 X 8 v19sacgta21 113.130.2.241 V19sacgta22 113.130.2.190
Services	Sun Solaris 4 X 14 V19sacgta64 113.130.2.172 V19sacgta65 113.130.2.169 V19sacgta66 113.130.2.168	Sun Solaris 4 X 14 V19sacgta57 113.130.2.188 V19sacgta67 113.130.2.166 V19sacgta70 113.130.2.163	Sun Solaris 4 X 14 V19sacgta58 113.130.2.187 V19sacgta68 113.130.2.165 V19sacgta69 113.130.2.164	Sun Solaris 4 X 14 V19sacgta13 113.130.63.235 V19sacgta16 113.130.63.232 V19sacgta72 113.130.201.147	Sun Solaris 4 X 14 v19sacgta60 113.130.2.178 V19sacgta61 113.130.2.176 v19sacgta62 113.130.2.175
MQ					Sun Solaris 1 X4 v19sacgta33 113.130.201.178 v19sacgta34 113.130.201.174

QA Hardware: Web Servers







❖Virtualization

- ➢ LDOM Architecture
- ➢12 LDOMs – Sacramento Data center

❖Hardware Configuration

- ➢T5240, Sun Solaris 10
- ➢2 cores & 4 GB per Web Server

❖Software Configuration

- ➢Oracle IPlanet 7.0
- ➢Weblogic Proxy Plug-In 12.1.2
- ➢OpenSSO Policy 3.0 Agent (AM) for VEC
- ➢SiteMinder Web Agent 6QMR6 (SSO) for Internal apps VEC Admin

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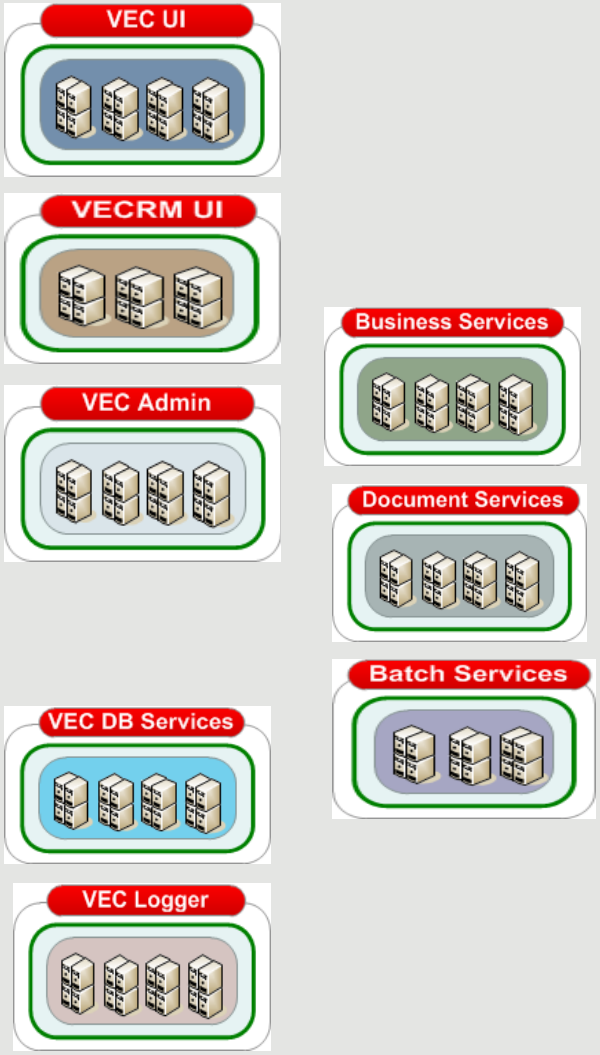
QA Hardware: App Servers



❖ Virtualization

- ➢ LDOM Architecture
- ➢ 9 LDOMs – 2 zones per LDOM. Total 18 zones in Sacramento Data Center

❖ Hardware Configuration

- ➢ T5-2, Sun Solaris 10
- ➢ LDOM 32 X 72...Each LDOM divided to 2 zones

❖ Software Configuration

- ➢ Oracle WebLogic 12c (12.1.2)
- ➢ Oracle Coherence 12c (12.1.2)
- ➢ Sun JDK 1.7.0_85 (64 Bit)

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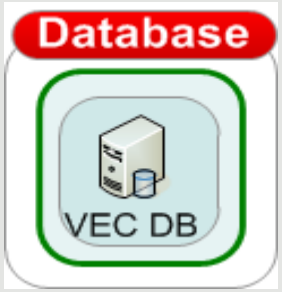
QA Hardware: DB Servers



❖ Hardware Configuration

- ➢ HP Servers R810/BL460c
- ➢ Red Hat Linux 6.8
- ➢ 12 Cores X 2 CPUs/Socket 142GB RAM

❖ Database Tools

- ➢ Replication : Oracle Golden Gate
- ➢ Monitoring : Oracle Enterprise Manager(OEM), PATROL, Custom Scripts

❖ Database Software and Stats

- ➢ Oracle 2 Node RAC Cluster
- ➢ Oracle Enterprise Edition 11.2.0.4
- ➢ Total databases -6
- ➢ QA database size - 600 GB

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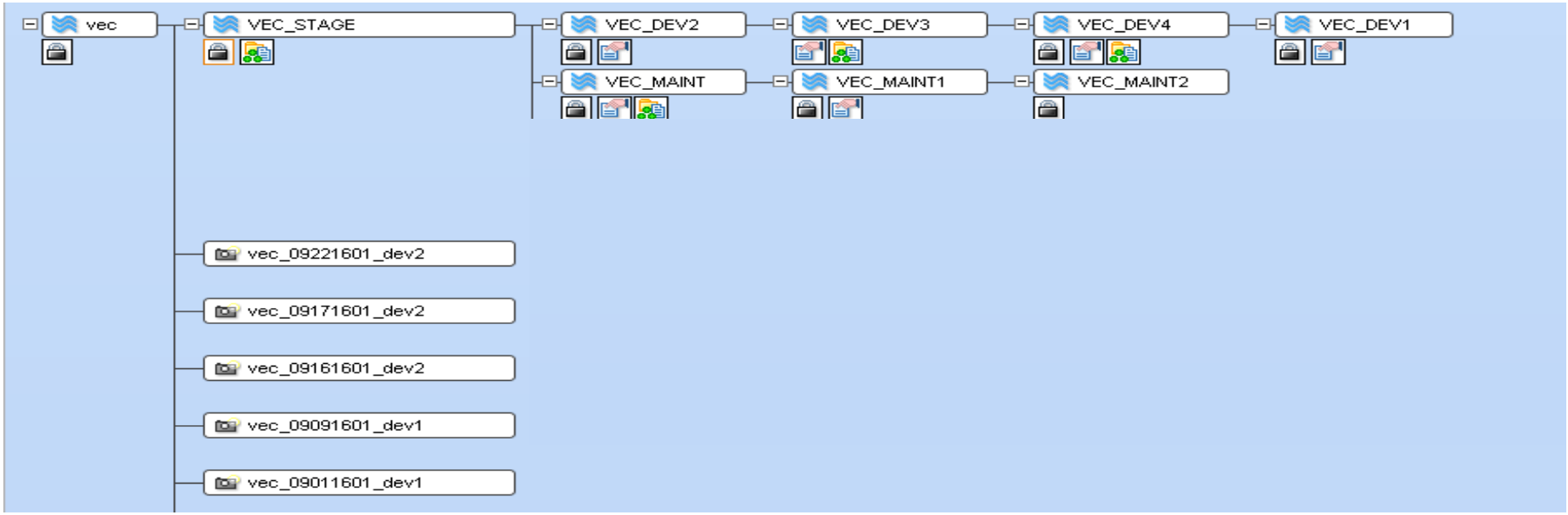
QA Environments –Sacramento Data Center

	QA1	QA2	QA3	QA4	QA5	QA6
web	V19sacgda10 113.130.230.24 V19sacgda11 113.130.230.25	V19sacgda12 113.130.230.26 V19sacgda13 113.130.230.27	V19sacgda14 113.130.230.28 V19sacgda15 113.130.230.29	V19sacgda16 113.130.230.30 V19sacgda17 113.130.230.31	V19sacgda18 113.130.230.32 V19sacgda19 113.130.230.33	V19sacgda20 113.130.230.34 V19sacgda21 113.130.230.35
UI & Services	V19saccda01 10.77.55.144 V19saccda03 10.77.55.146 V19saccda05 10.77.55.148	V19saccda02 10.77.55.145 V19saccda04 10.77.55.147 V19saccda06 10.77.55.149	V19saccda07 10.77.55.150 V19saccda09 10.77.55.152 V19saccda11 10.77.55.154	V19saccda08 10.77.55.151 V19saccda10 10.77.55.153 V19saccda12 10.77.55.155	V19saccda13 10.77.55.156 V19saccda15 10.77.55.158 V19saccda17 10.77.55.160	V19saccda14 10.77.55.157 V19saccda16 10.77.55.159 V19saccda18 10.77.55.161
MQ	V19sacgda22 113.130.230.36 V19sacgda23 113.130.230.37	V19sacgda24 113.130.230.38 V19sacgda25 113.130.230.39	V19sacgda26 113.130.230.40 V19sacgda27 113.130.230.41	V19sacgda28 113.130.230.42 V19sacgda29 113.130.230.43		
DB			v19sctd1vip.ebiz.verizon.com v19sctd2vip.ebiz.verizon.com			

Source Code Management - AccuRev



Automated Inheritance with support of Parallel streams for agile/parallel releases.

Integration with JIRA for issue tracking. Every code promote ties with ticket in JIRA. Two way sync between AccuRev and JIRA.

Snapshot after every release for audit trail preserving the historical foot print of the code delivered to prod

300+ Active developers from 4 countries working in parallel streams @ average of 95 changes/issues promoted per day. Total of ~4 million lines of code so far on 2.0 applications

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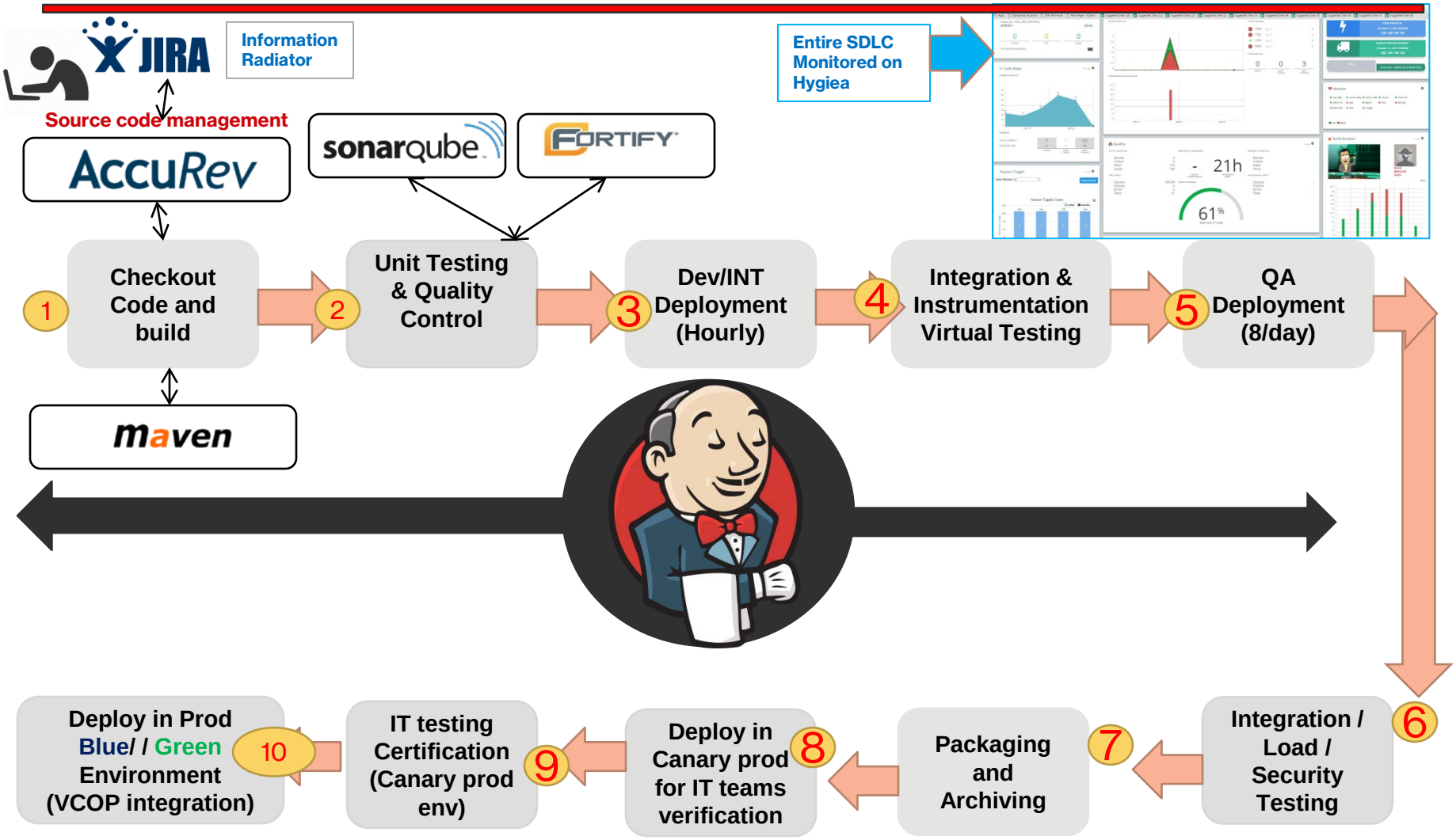
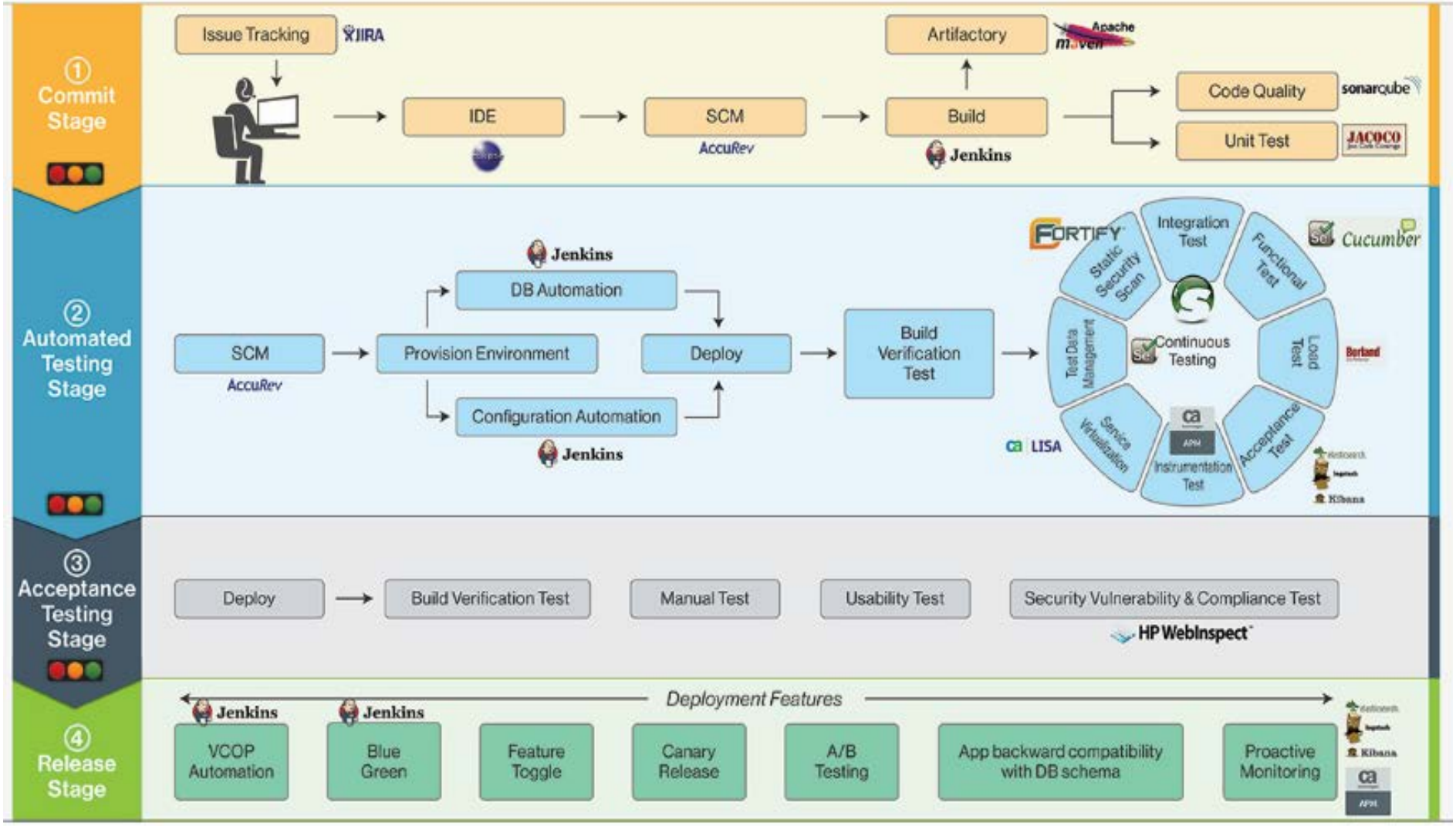
Journey of Code

Continuous Delivery

VEC 2.0 Continuous Delivery Process

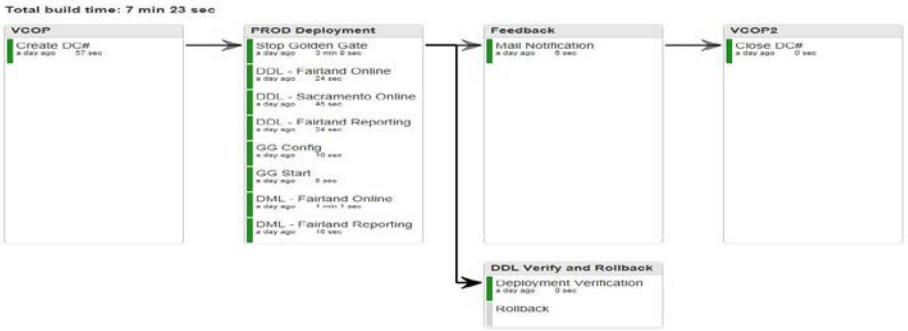


VEC Dev Ops Toolkit

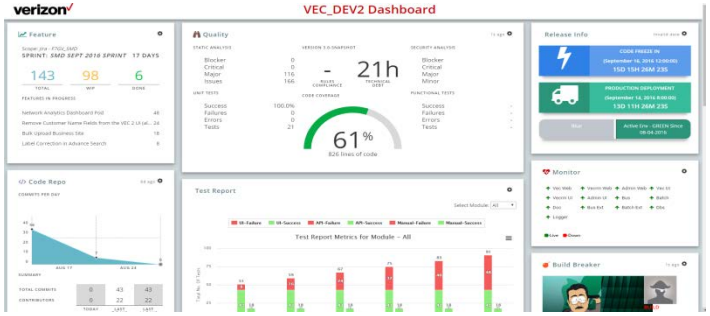


DevOps/Agile

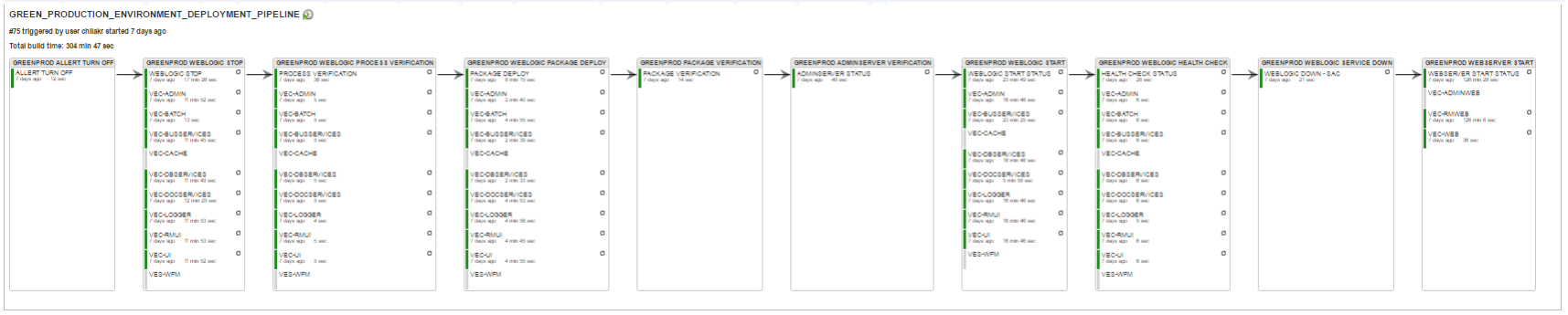
- SDLC Digitization - In Progress
  - VSAFe template Adoption
- End to End Data base Delivery pipeline



- Hygieia Dashboard – Provides health check of entire SDLC

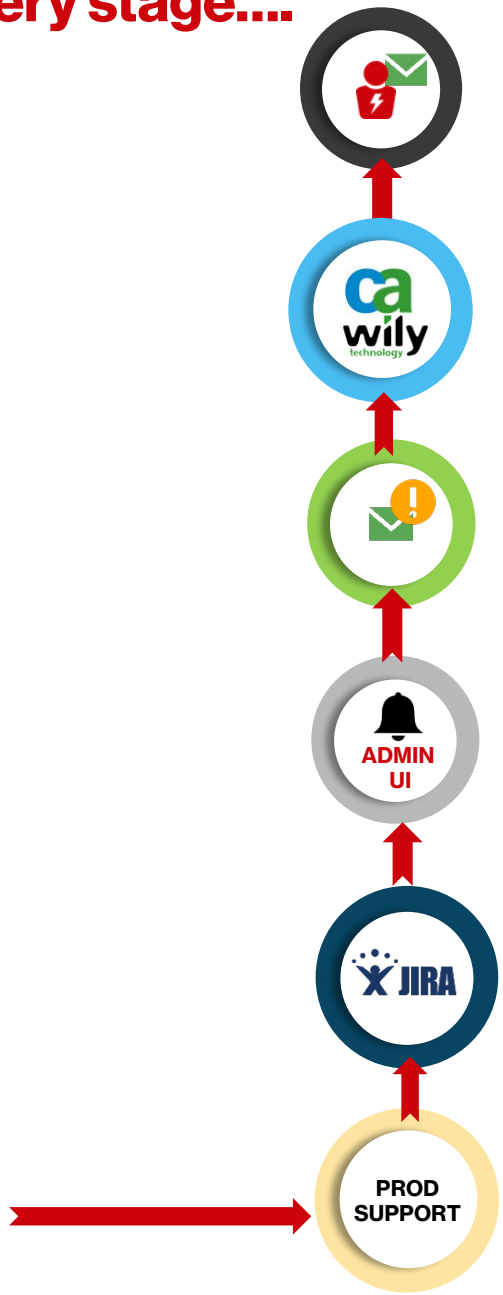


- DevOps Delivery pipeline – end to end automated with BDD security framework



Notification/Feedback.... at every stage....

- Notification of Jira Ticket create, update events and integration of issues with Accurev
- Integrated Jenkins build status notification to individual developers covering status of build/code, quality/unit test case & deployment status including compilation/build failures
- Jira ticket update after QA BVT
- Notification to testing team with detailed status of test cases.
- Automated notification for DB and config change deployments.



- Integrated Customer feedback functionality in VEC and automated notification to developer & testing teams
- Automated pro-active monitoring notifications/alerts
- Tracking exceptions and automated notifications to developers with details
- Integrated notification alerts to dev leads on all admin changes thru UI
- Jira ticket update notification after prod deployment is completed.
- Email notification to prod support team when packages are staged for deployment.

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Framework Features

Java method exposed as service

- Focus on business logic implementation
- Visibility of all services exposed.

Encryption Request/Response

- All public service request/responses encrypted
- Ability to turn on encryption on all of the services

Public Services

- Public services enabled for captcha.
- Implemented with config change, independent of service development

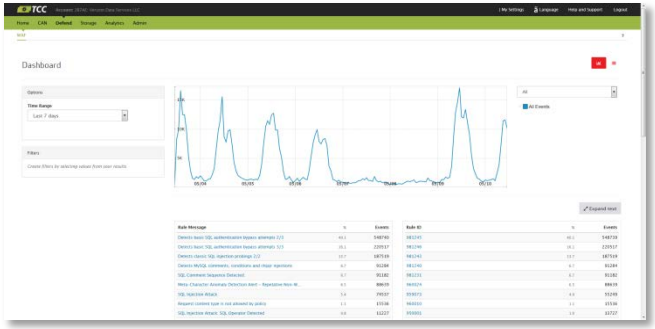
Best Practices

- Write unit test cases along with code development.
- Compile code before check-in process to detect errors.
- Run sonar for code quality in local.
- HP fortify scan to detect security vulnerabilities in code.
- Create wiki page with request/repose details for the services.
- Monitor error notifications from builds/application/runtime in prod.
- Proactive Alerts on Public urls addition during INT/QA/Prod testing cycles
- Test for negative scenarios to make sure stability of the service.

Application Security

Securing VEC

Web Application Firewall (WAF) & Web Threat Detection (WTD)



- Real Time Alert/Block
- Bash Shellshock
- TOR Exit Nodes
- Known Vulnerabilities
- IP Blacklist
- Moving from Alert to Block
- Bi-Weekly Top 5 Rules Analysis
- Pen Testing Exposures

Penetration Testing Overview

	Critical	High/Med	Status
PEN-1 April	0	17	All Fixed
PEN-2 May/June	28	59	All Fixed

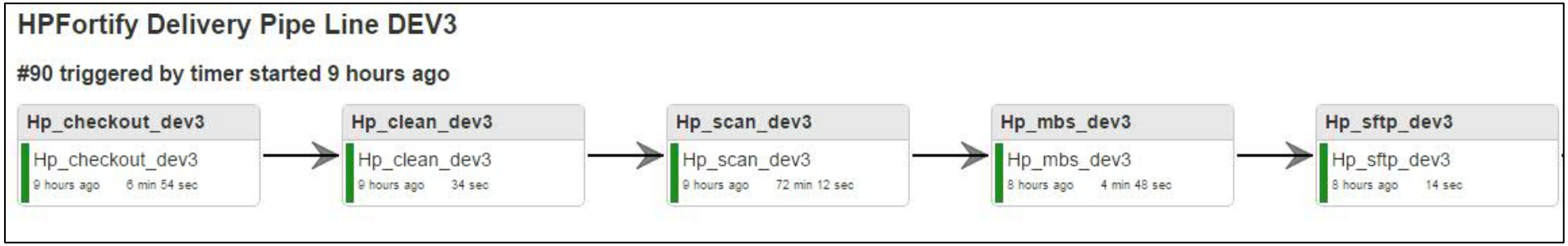
Security Automation

Hands On Training

- Web Goat Training
- Secure Code Warrior Training
- Simulation of Vulnerabilities
- VDSI Catalyst club – Black Hat Behavior demonstration

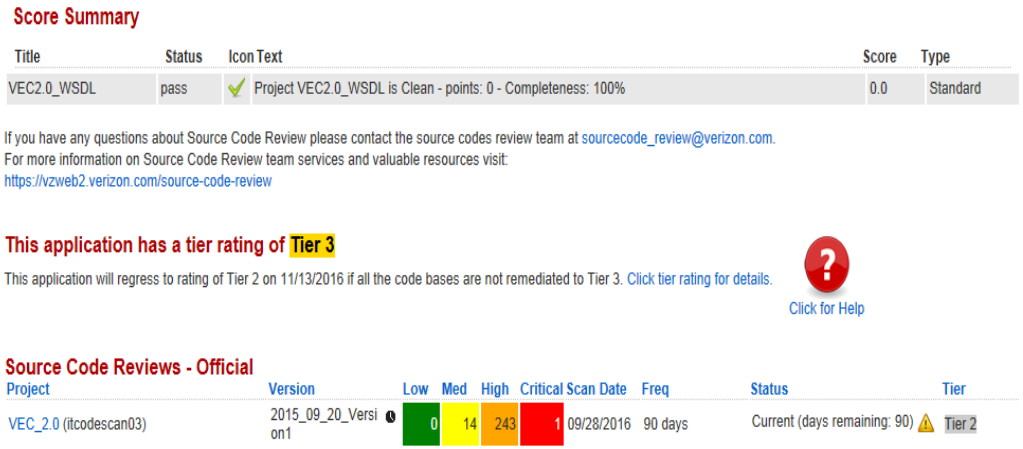
App Security Scan - Static

- Nightly scan through HP Fortify Tool
- Supporting 10+ VEC suites of applications
- Reported updated in IT Security Dashboard
- Metrics internally tracked through Hygieia Dashboard



Current Status

- Rating improved from Tier 2 to Tier 3
- Vulnerabilities reduced from 4500+ to 200+

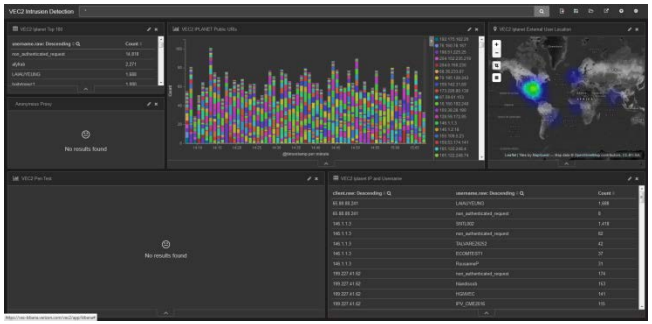


Risk Category	Critical Vulnerability	High Vulnerability	Medium Vulnerability	Grand Total
Cross-Site Request Forgery			6	6
Cross-Site Scripting: Persistent	1			1
Cross-Site Scripting: Poor Validation			2	2
Dynamic Code Evaluation: Unsafe Deserialization		1		1
Header Manipulation		203		203
Header Manipulation: SMTP		3		3
Often Misused: Authentication		2		2
Often Misused: File Upload			6	6
Path Manipulation		7		7
SQL Injection		7		7
XML External Entity Injection		7		7
Grand Total	1	230	14	245

Application Security

- Automated Static Security Scan (HP Fortify)
- Dynamic Application Security testing (DAST)
  - BDD-Security
  - SQLMAP
- Manual Security testing using ZAP
- Monthly Manual Dynamic Security Testing(WebInspect)

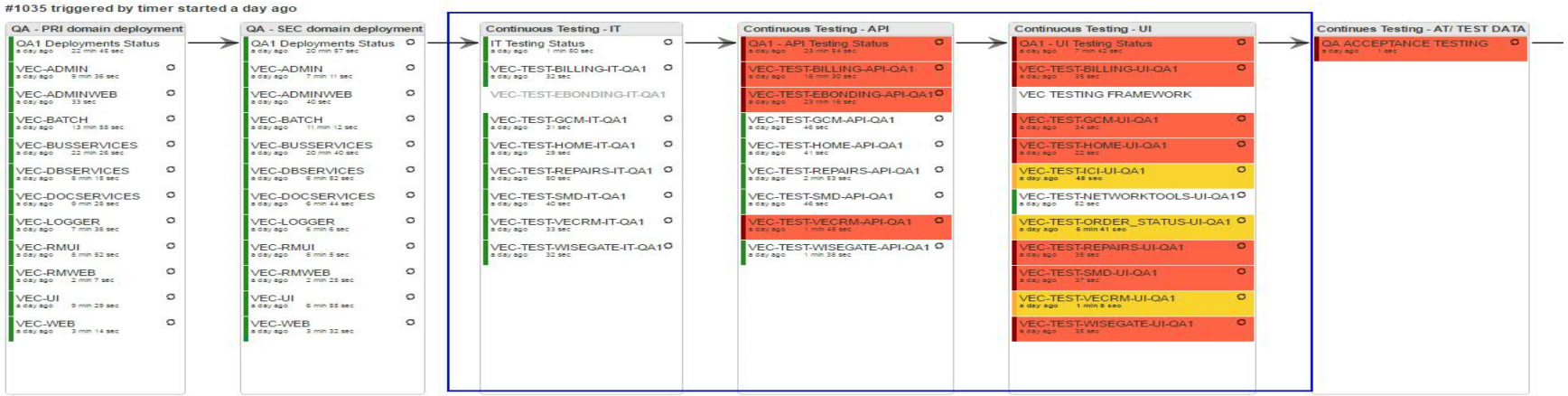
Log & Monitoring



- Log Analysis
- Intrusion Dashboard
- Alerts
- CA-APM Alerts
- Public URI Responses

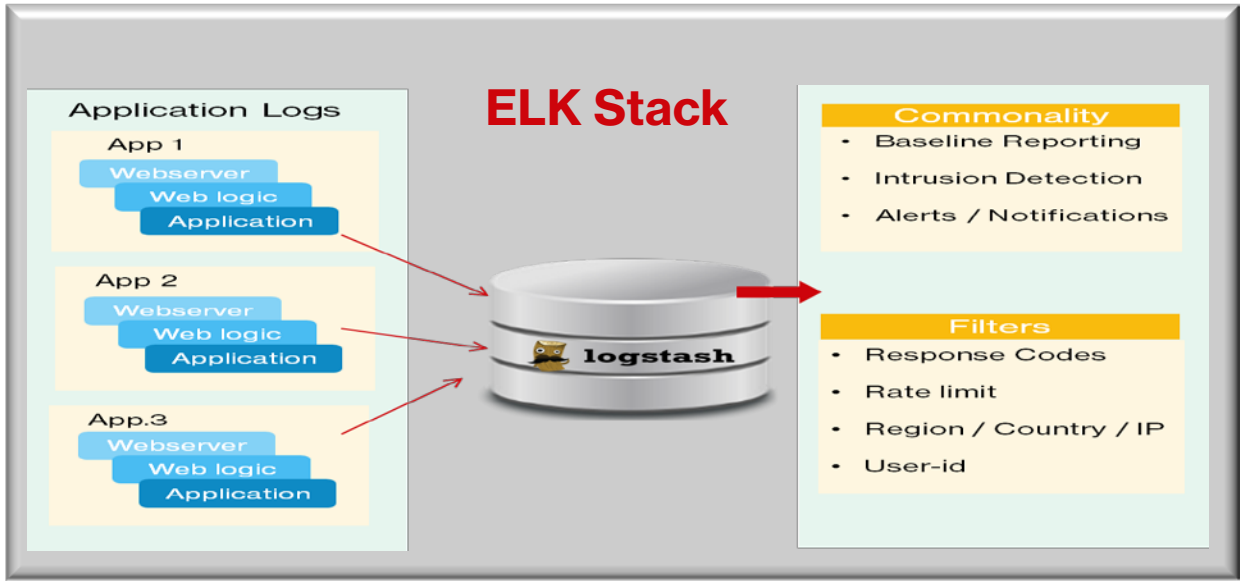
Test Automation

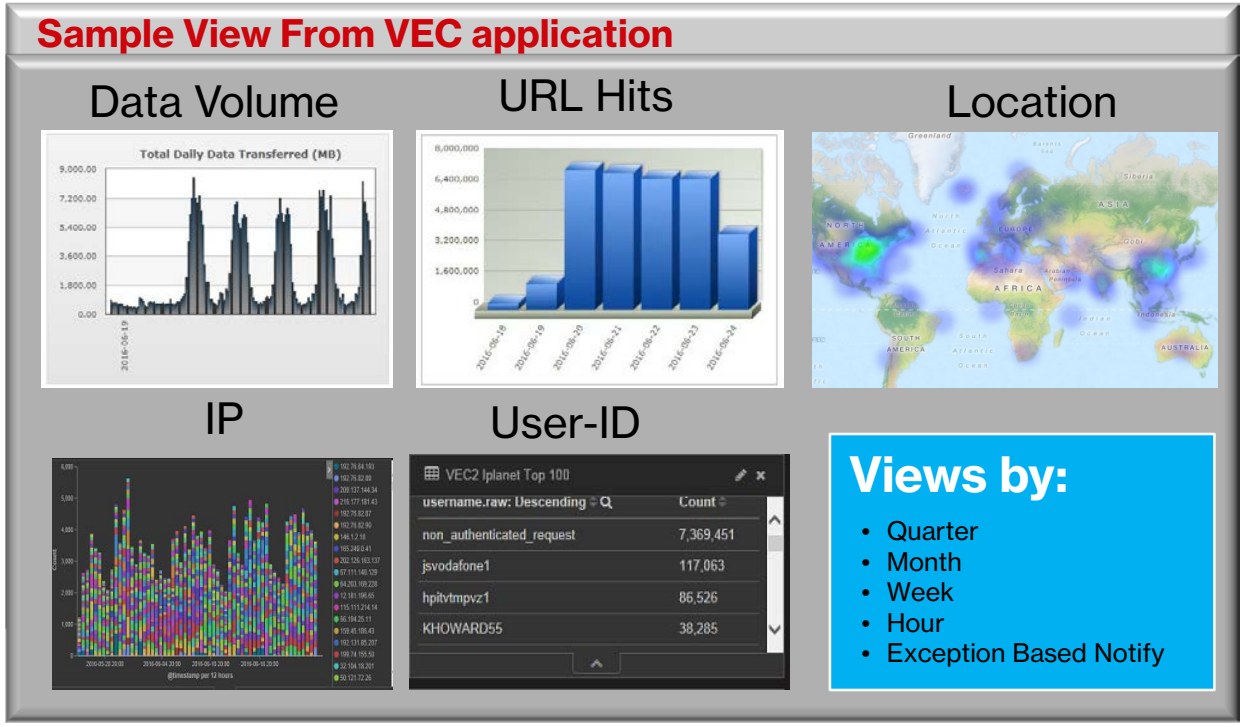
- API testing
- UI testing
- Instrumentation testing
- Integration testing
- Virtualization Testing
- Load/Performance



Streamlining & Standardizing Application Logging Practices

Daily operational monitoring of anomalous data conditions





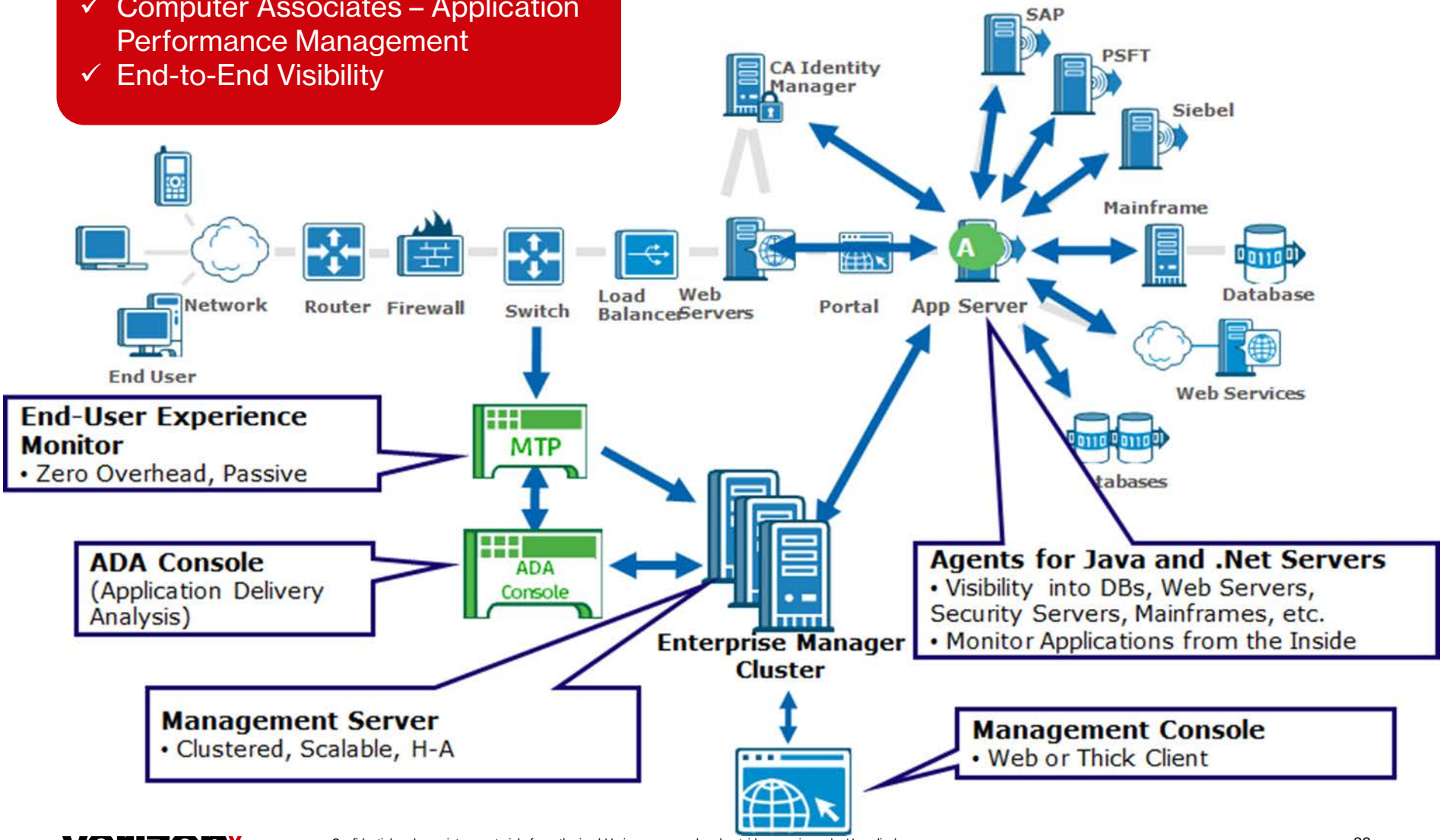
Application Design Overview Summary

Application Design	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
Standard Coding Languages					✓	
Software Version Control					✓	
Deployment Strategy					✓	
Error Handling					✓	
High Availability Failover Handling					✓	
App Site Redundancy Handling					✓	
Disaster Recovery Handling					✓	
Reference Data Caching					✓	
Process Flows Documented					✓	
Upstream App Dependencies Known					✓	
Downstream App Dependencies Known					✓	
Application Dependency Recovery Handling					✓	
Batch Processing					✓	
Load Balancing					✓	
Security					✓	

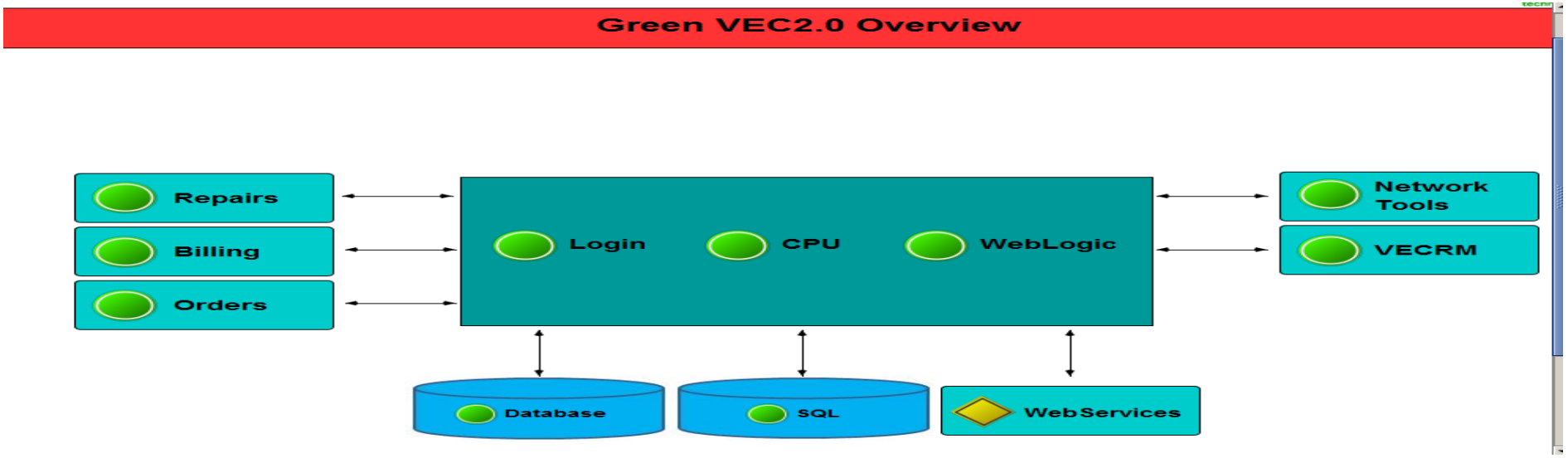
Operations Overview

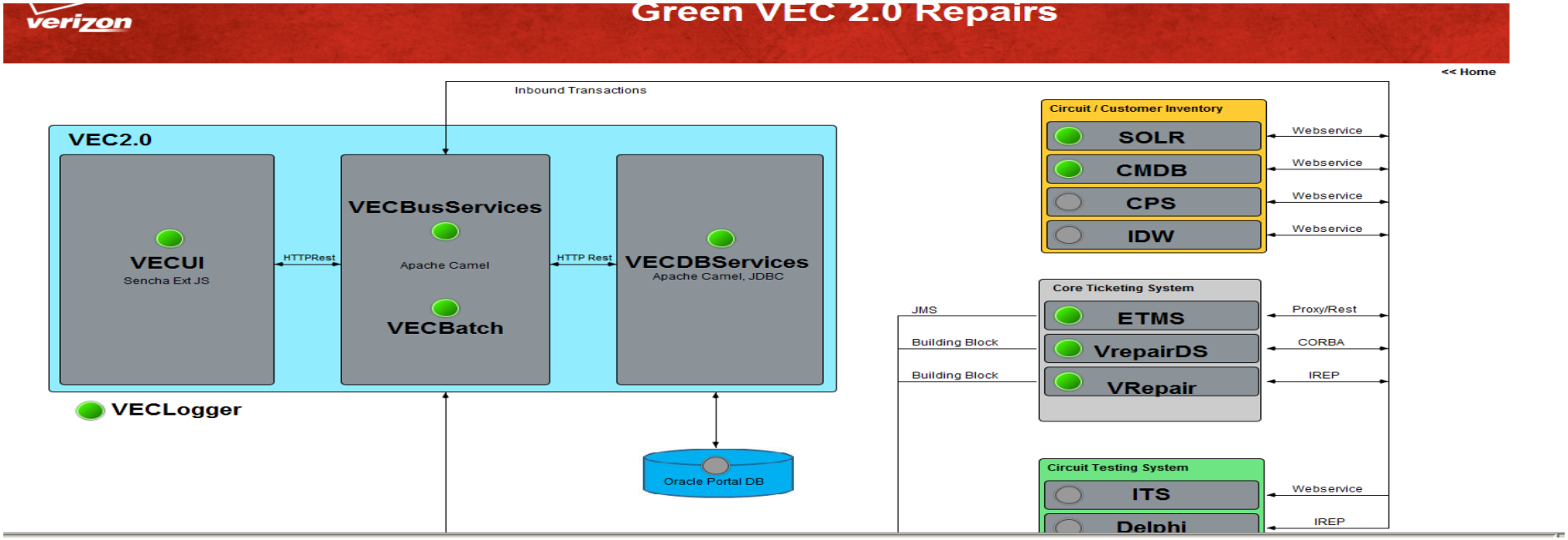
CA APM Suite

- ✓ Computer Associates – Application Performance Management
- ✓ End-to-End Visibility

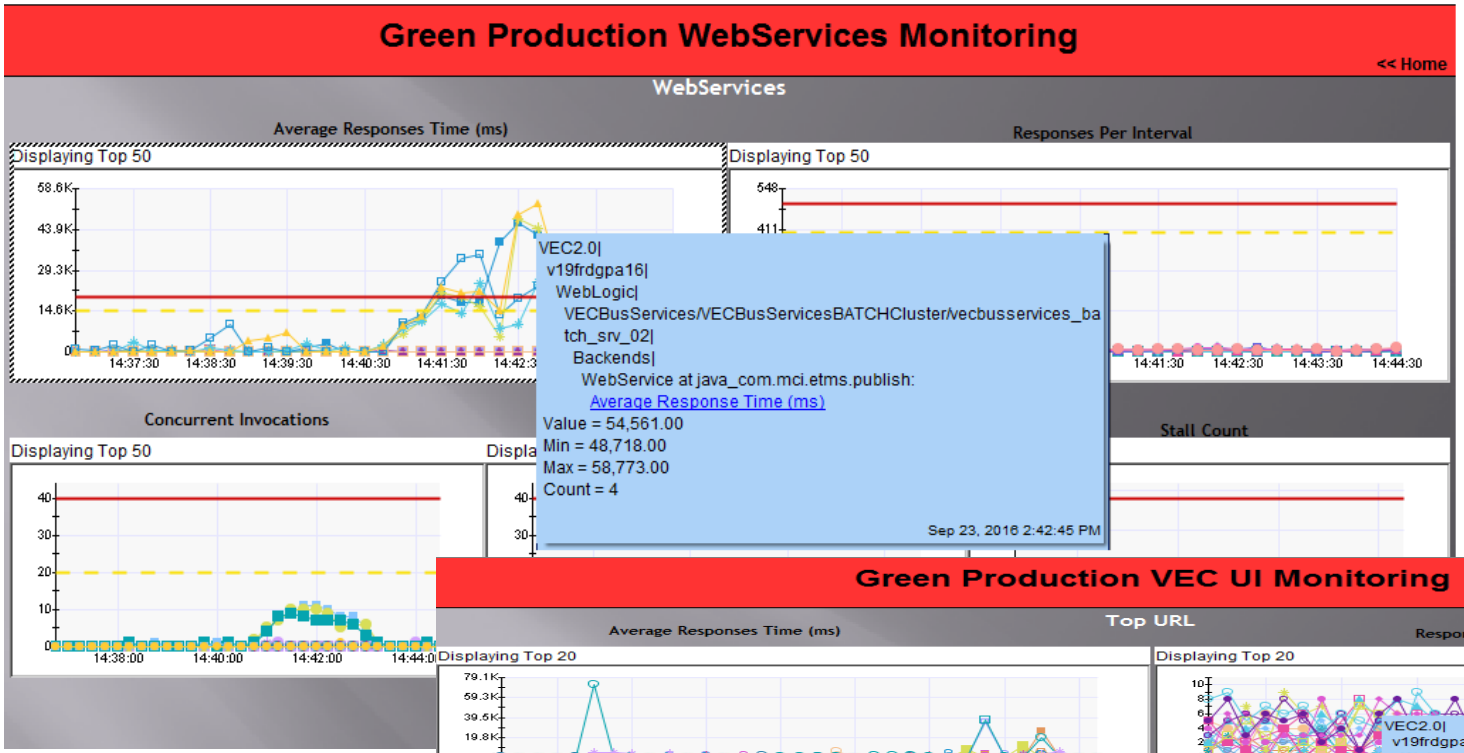


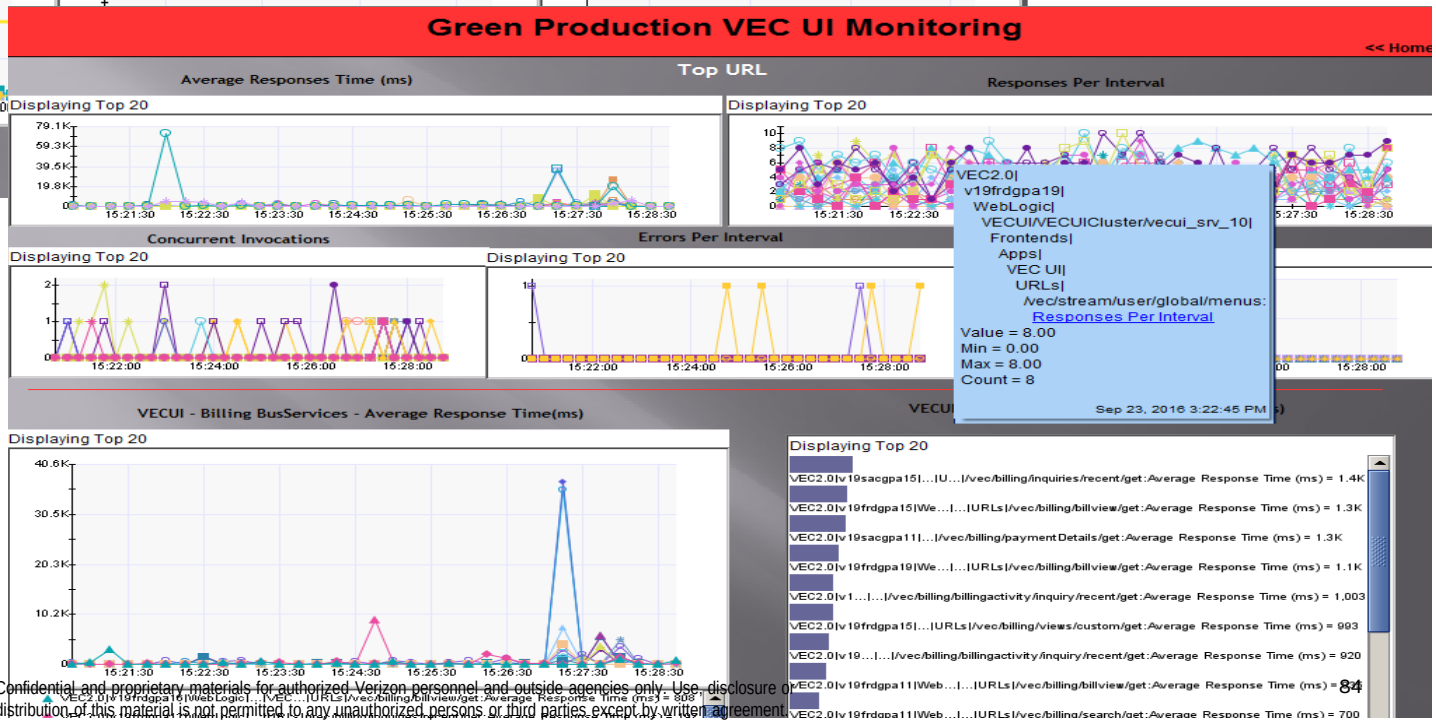
APM Monitoring: Dashboard View



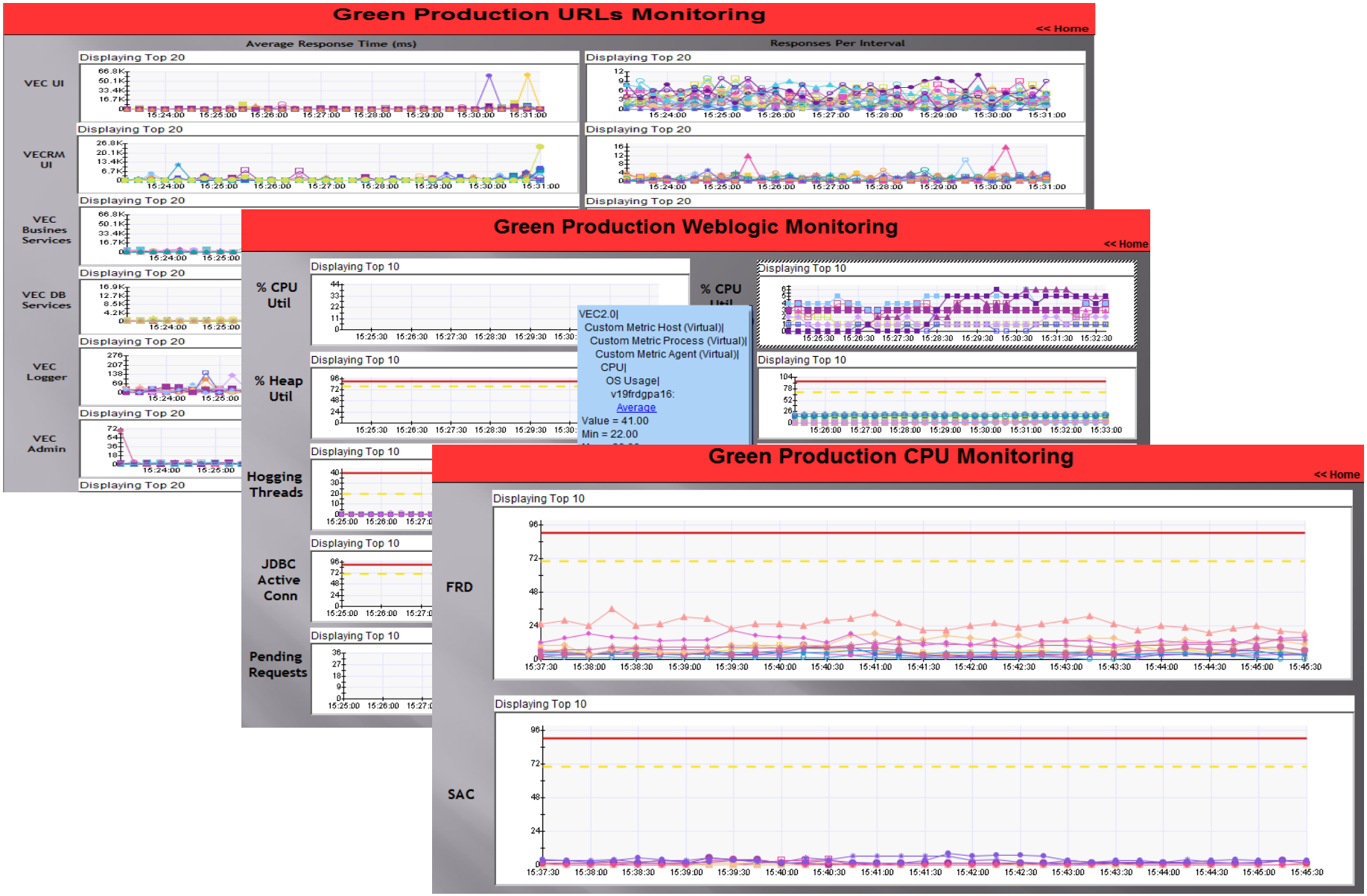


APM Monitoring: Application Servers

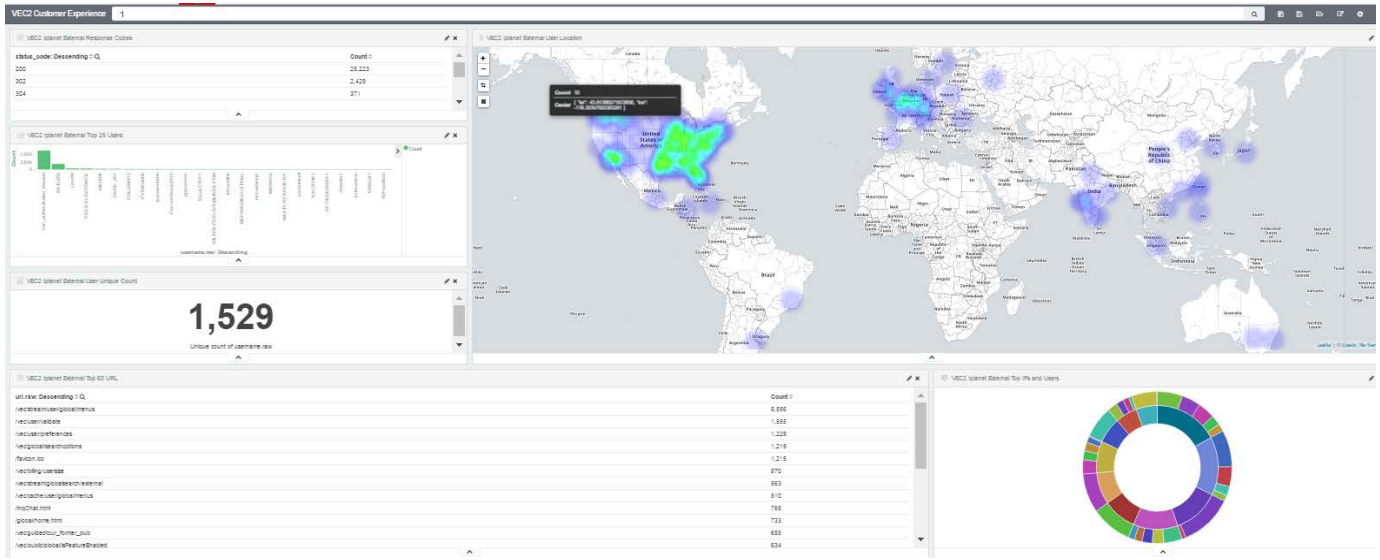


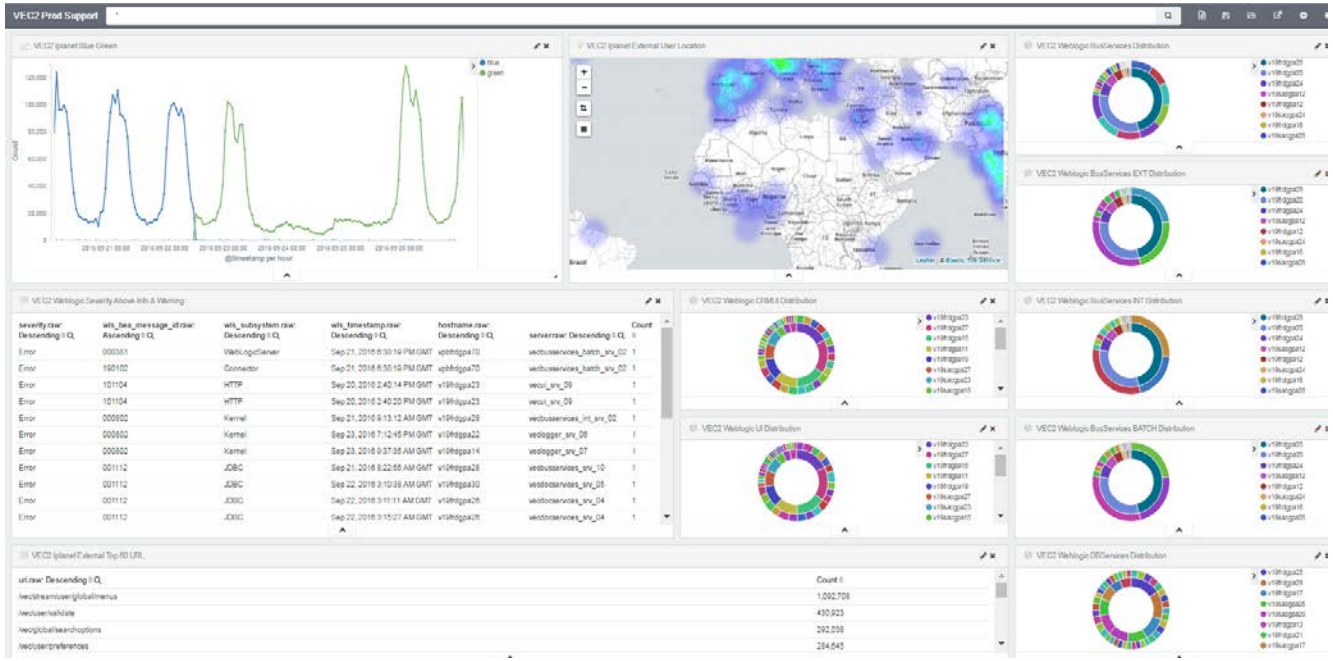


APM Monitoring: Services Layer

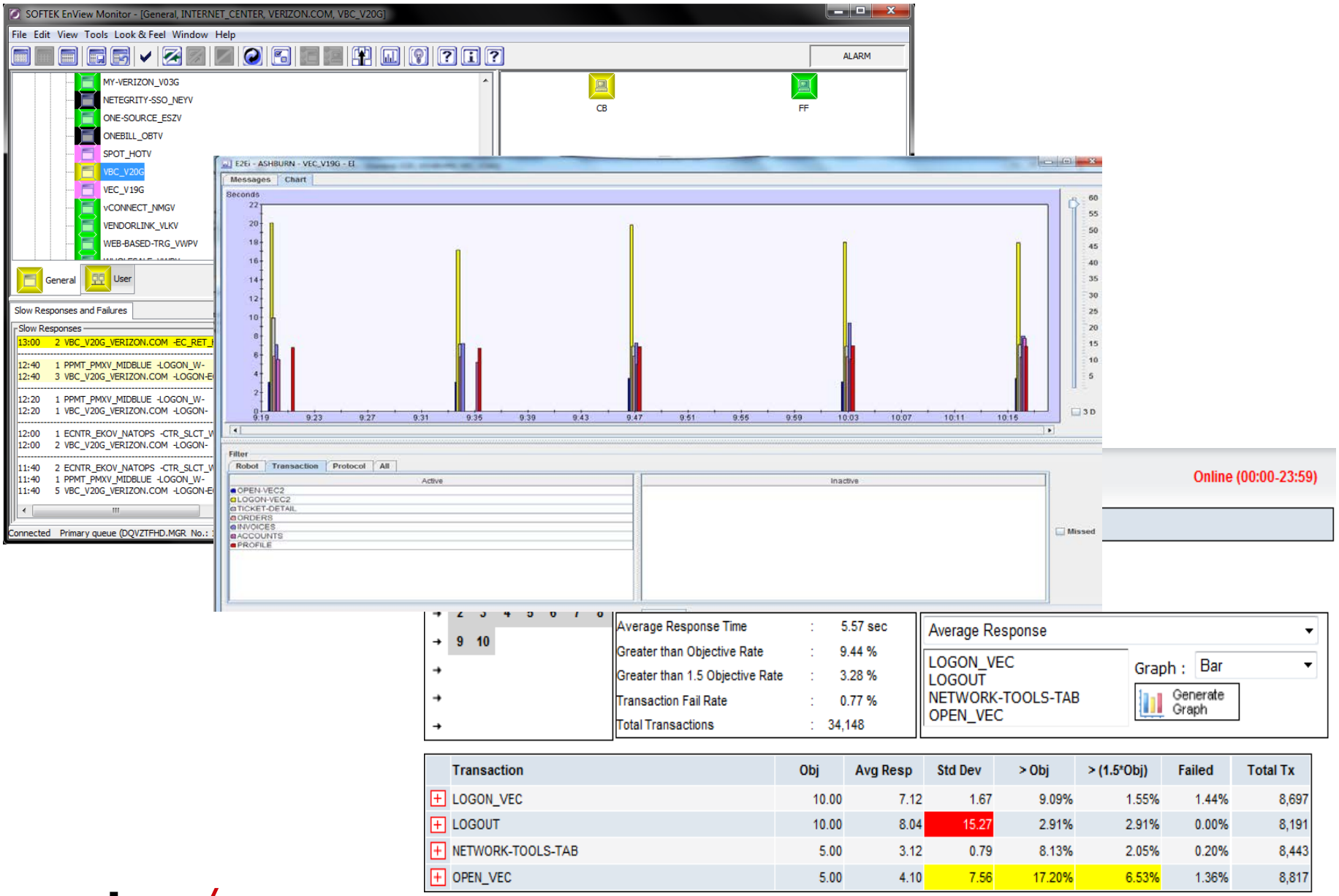


Logstash Monitoring (Contd)



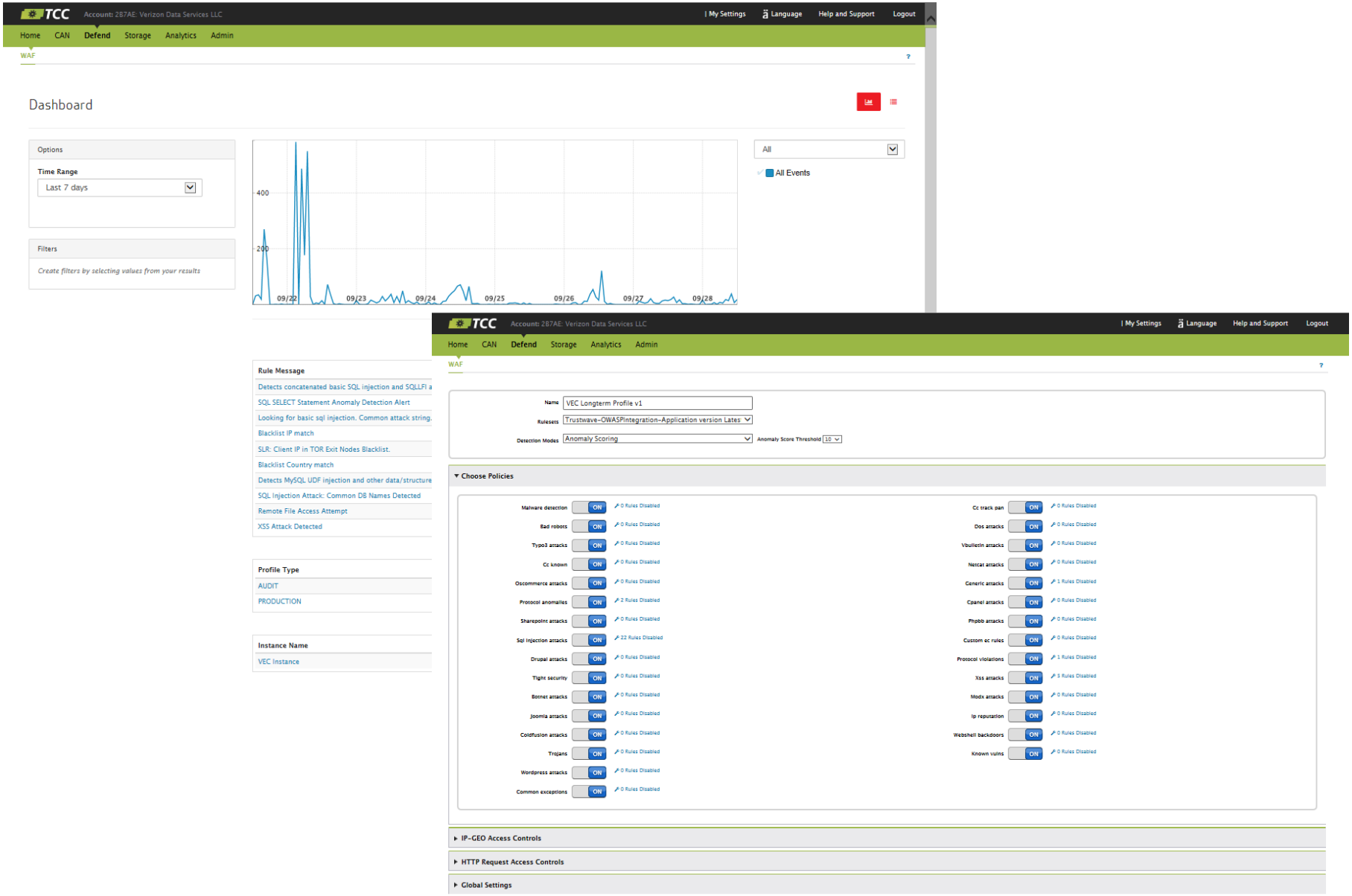


Sentinel Monitoring

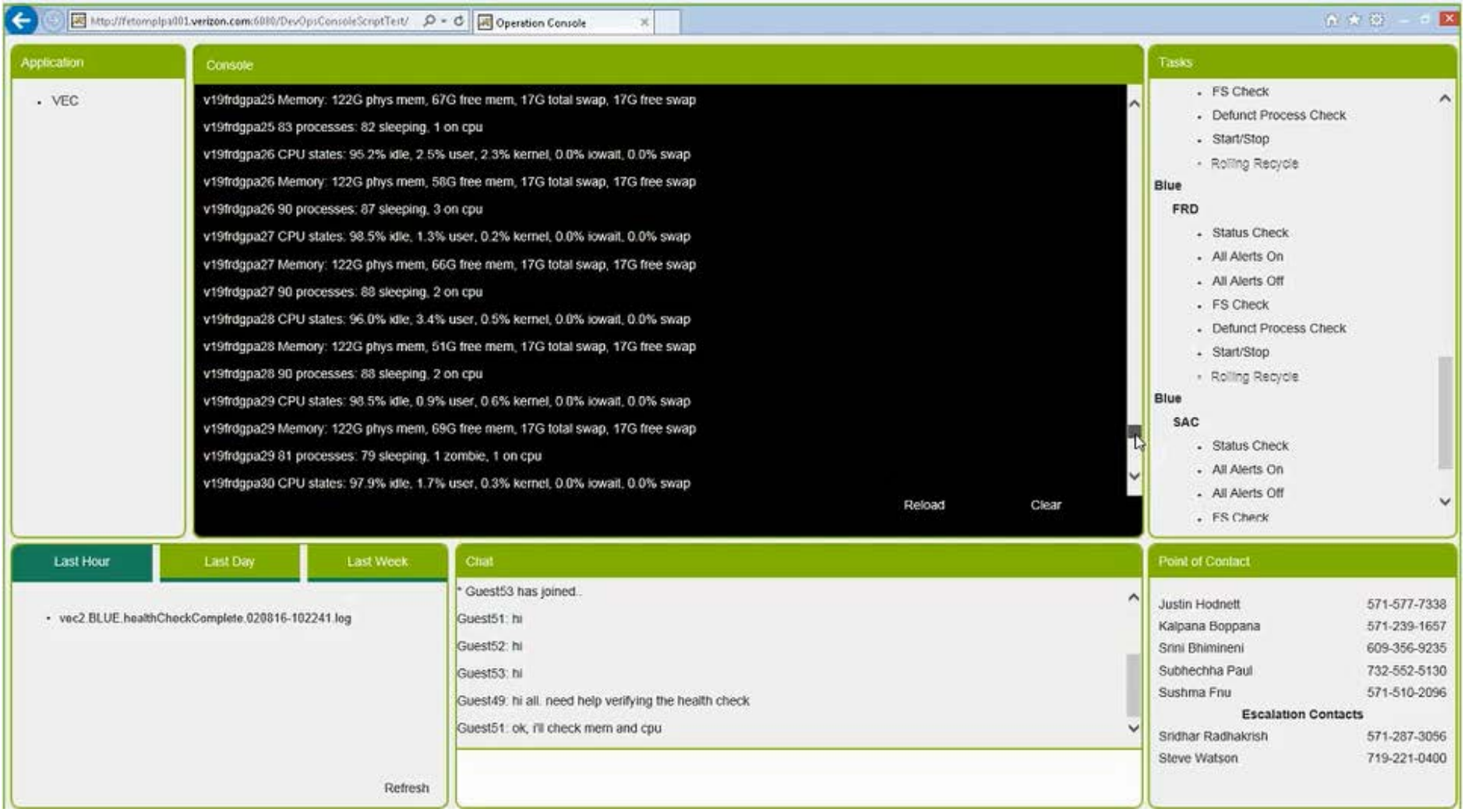


Transaction	Obj	Avg Resp	Std Dev	> Obj	> (1.5*Obj)	Failed	Total Tx
LOGON_VEC	10.00	7.12	1.67	9.09%	1.55%	1.44%	8,697
LOGOUT	10.00	8.04	15.27	2.91%	2.91%	0.00%	8,191
NETWORK-TOOLS-TAB	5.00	3.12	0.79	8.13%	2.05%	0.20%	8,443
OPEN_VEC	5.00	4.10	7.56	17.20%	6.53%	1.36%	8,817

WAF Dashboard



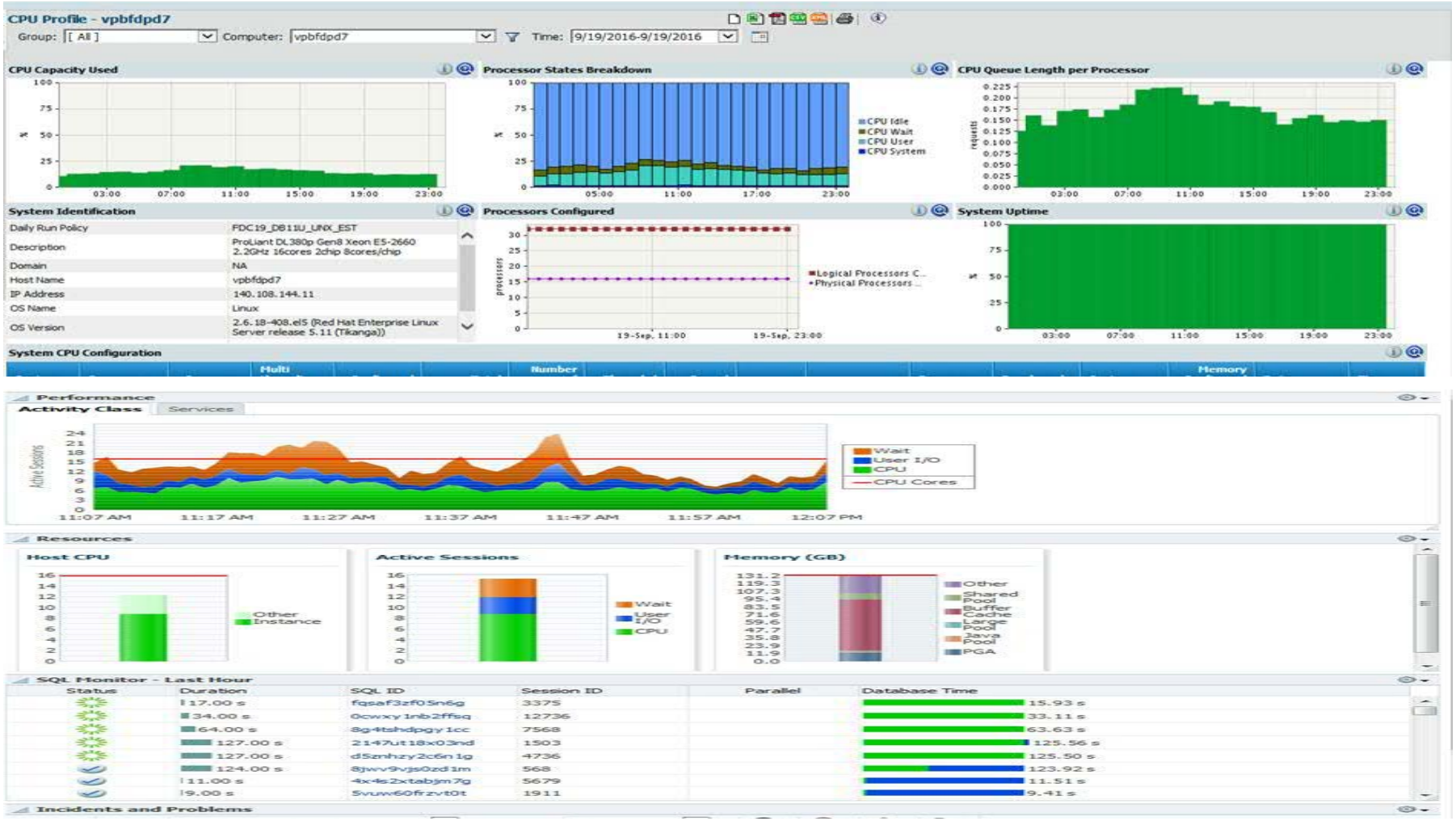
OIB: Ops In a Box



Database Monitoring/Alerts

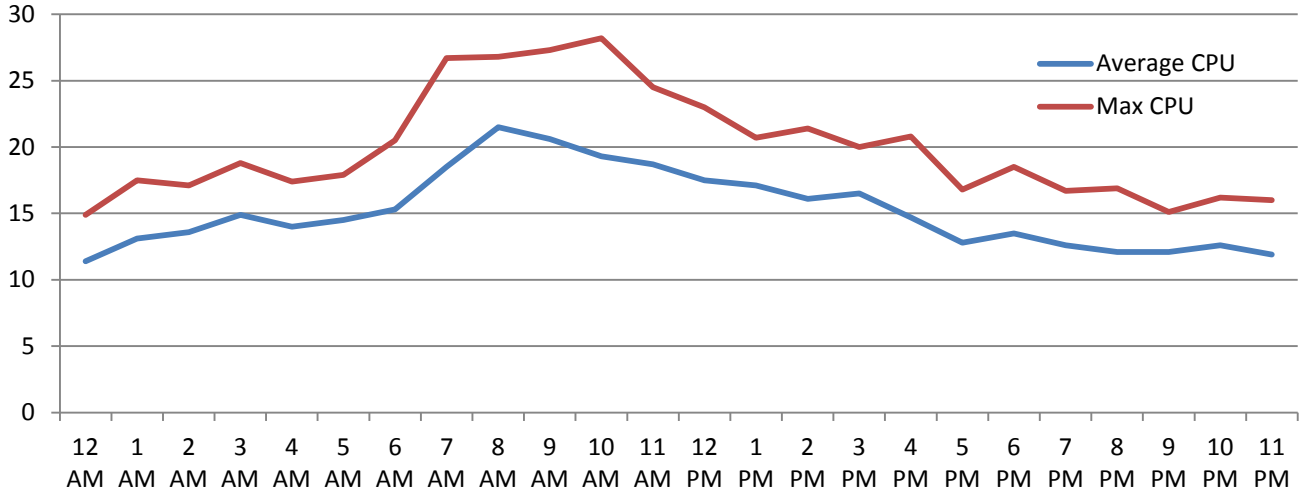
VEC DB Monitoring

- ✓ Dashboard of database Overview
- ✓ Alerts – Page (Critical) and e-mail (Warning)
- ✓ Monitor Top Activity in Database

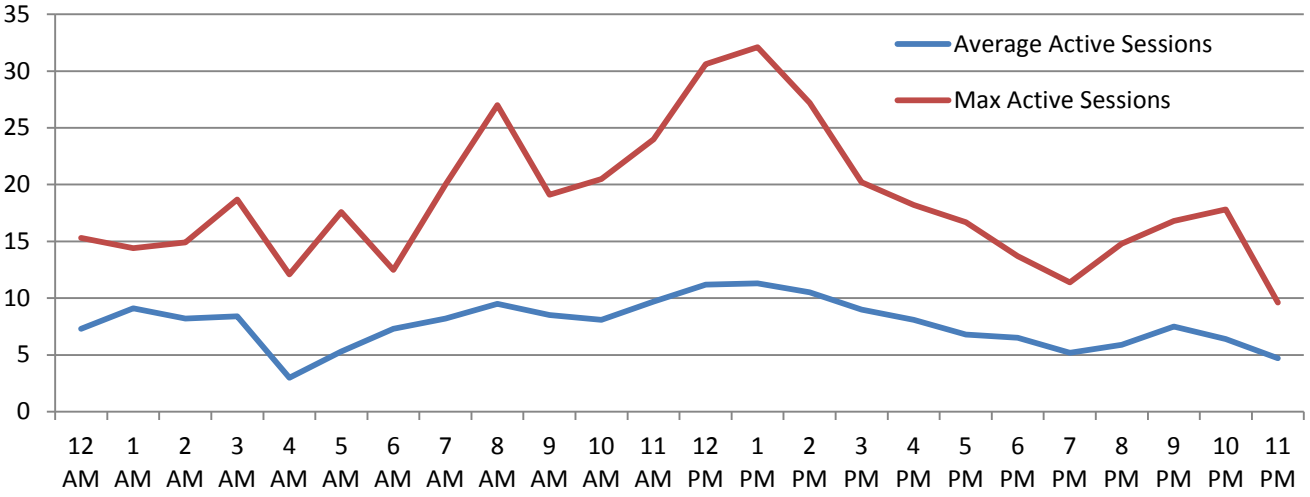


CPU & Active Session s

❖ **CPU usage – Business day – Monday**



❖ **Active sessions during Monday**



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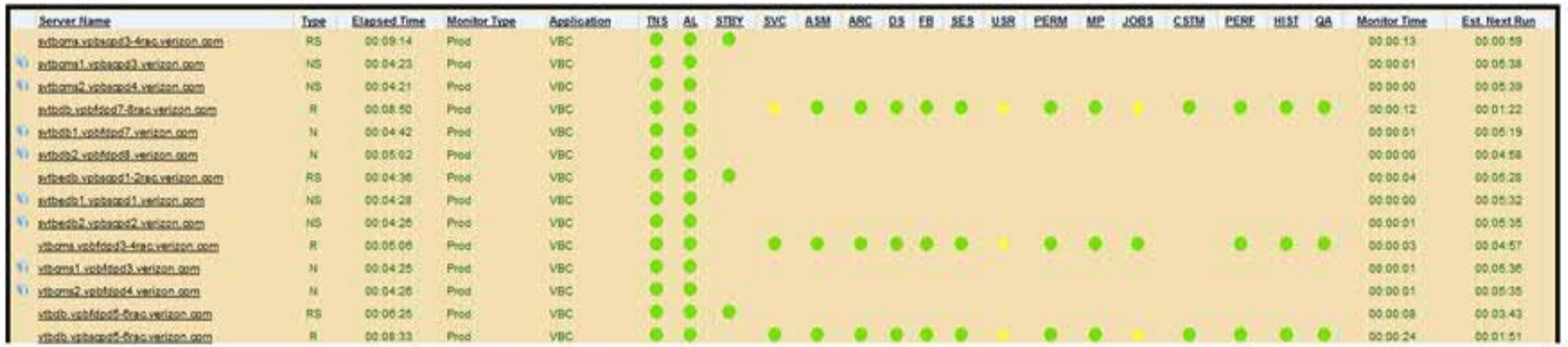
DB Monitoring - Alerts

EPS Oracle Database Monitoring

Page Last Refreshed: 2016/09/26 17:57:07 GMT



Server Name	Type	Elapsed Time	Monitor Type	Application	TNS	AL	STBY	SVC	ASM	ARC	OS	FB	SES	USR	PERM	MP	JOBS	CSTM	PERF	HIST	QA	Monitor Time	Est. Next Run
svtbcms.vpbcpd3-4rac.verizon.com	RS	00:09:14	Prod	VBC																		00:00:13	00:00:59
svtbcms1.vpbcpd3.verizon.com	NS	00:04:23	Prod	VBC																		00:00:01	00:05:38
svtbcms2.vpbcpd4.verizon.com	NS	00:04:21	Prod	VBC																		00:00:00	00:05:39
svtbdb.vpbfdpd7-8rac.verizon.com	R	00:08:50	Prod	VBC																		00:00:12	00:01:22
svtbdb1.vpbfdpd7.verizon.com	N	00:04:42	Prod	VBC																		00:00:01	00:05:19
svtbdb2.vpbfdpd8.verizon.com	N	00:05:02	Prod	VBC																		00:00:00	00:04:58
svtbedb.vpbcpd1-2rac.verizon.com	RS	00:04:36	Prod	VBC																		00:00:04	00:05:28
svtbedb1.vpbcpd1.verizon.com	NS	00:04:28	Prod	VBC																		00:00:00	00:05:32
svtbedb2.vpbcpd2.verizon.com	NS	00:04:26	Prod	VBC																		00:00:01	00:05:35
vtbcms.vpbfdpd3-4rac.verizon.com	R	00:05:06	Prod	VBC																		00:00:03	00:04:57
vtbcms1.vpbfdpd3.verizon.com	N	00:04:25	Prod	VBC																		00:00:01	00:05:36
vtbcms2.vpbfdpd4.verizon.com	N	00:04:26	Prod	VBC																		00:00:01	00:05:35
vtbdb.vpbfdpd5-6rac.verizon.com	RS	00:06:26	Prod	VBC																		00:00:08	00:03:43
vtbdb.vpbcpd5-6rac.verizon.com	R	00:08:33	Prod	VBC																		00:00:24	00:01:51

From: Functional Id <oracle@vpbfdpd1>
To: EPS-ORACLE-MON; eps-gch-dba
Cc:
Subject: Error in Alert Log on vpbfdpd1:vtbedb (chk_alert.ksh 2009.4)

```
ORA-01555 caused by SQL statement below (SQL ID: 3hvdhz0yz2mwg, Query Duration=304085 sec,

01555, 00000, "snapshot too old: rollback segment number %s with name \"%s\" too small"
// *Cause: rollback records needed by a reader for consistent read are
//      overwritten by other writers
// *Action: If in Automatic Undo Management mode, increase undo_retention
//          setting. Otherwise, use larger rollback segments
```

From: EPS_Oracle_Monitoring <eps-db-monitoring@verizon.com>
To: EPS-ORACLE-MON
Cc:
Subject: WARNING on vtbedb.vpbfdpd1-2rac.verizon.com for DiskSpace @ 2016/09/23 14:41:08

```
Tblspace VECRPTINDX2 on vtbedb.vpbfdpd1-2rac.verizon.com size 301000.00Mb has only 17191Mb free

For more information:

   https://dbmonitor.verizon.com/cgi-bin/MonitorStatus.cgi?rdbms_type=Oracle&dbname=vtbedb.vpbfd
```

WARNING on vpbfdpd7 SVTBDB1 Long running active query for more than 29 Minutes Mon Sep 26 12:15:02 EDT 2016

noreply-epsdba@verizon.com

If there are problems with how this message is displayed, click here to view it in a web browser.

Sent: Mon 9/26/2016 12:15 PM
To: **eps-gch-dba; VDSI-vzb-DBA-team**

Session Details:

INST ID	SQL_ID	USERNAME	OSUSER	SID	SERIAL#	MACHINE	EVENT	SPID	Started	Duration (Min)
2	68a20js5cu1au	SQLX_USER	tomcat	3782	2297	b7yfdpwg	db file sequential read	15081	26-Sep-16 11:45:26	30

SQL Details:

SQL_ID	SQL_TEXT
	SELECT count(*) AS cnt FROM (SELECT :"SYS_B_00" typ, COUNT (DISTINCT UP.user_oid), COUNT (DISTINCT (CASE WHEN last_login_date > SYSDATE - :"SYS_B_01" THEN user_ oid ELSE NULL END)) within_1_year, COUNT (DISTINCT (CASE WHEN last_login_date > SYSDATE - :"SYS_B_02" THEN user_oid ELSE NULL END)) within_3_months, COUNT (DIS TINCT (CASE WHEN EXISTS (SELECT :"SYS_B_03" FROM esg.user_history h WHERE h.his tory_type = :"SYS_B_04" AND

DB Monitoring – using custom scripts

- Automated Work log Repository
- Automated DB snapshots every hour
- Ability to view history of DB activities.
- Various statistics – Baseline model, SQL, DB/OS metrics

- DB Cronjobs for additional monitoring health of DB
- Session count threshold check every three minutes
- Error in alert log check every 15 minutes
- Backup report is generated daily from catalog database

- Monitor Database / Listener process
- Replication Queues
- Events – Active session count, ORA- Errors.

- DB Shared pool hard parsing SQL monitoring
- Capture DB long running SQLs and tune them for better performance
- Review new SQLs that are getting changed for each release and tune them before prod implementation

Monitoring GG processes & transactions

Monitoring:

- Monitoring Capture/Pump/Replicat Goldengate processes on source and all targets
- Monitoring Replicat Lag
- Monitoring DML Activity
- Monitoring Errors
- Monitoring Exceptions
- Lag history

Method:

- Manual
- Automated Cron jobs/Shell scripts
- Monitoring Heartbeat table
- Oracle Enterprise Manager 12c

Lag on SAC DR Replicats | Lag on AA replicats on Vec Online

Refresh: 0

	EXTRACT	REPLICAT	DAYS	HOURS	MINUTES	SECONDS
1	EXT_1MIS	REP_1MIS	0	0	0	18.754251
2	EXT_DPT	REP_DPT	0	0	0	18.754251
3	EXT_ESG	R_ESG	0	0	0	18.754251
4	EXT_OTH	REP_OTH	0	0	0	18.754251
5	EXT_VEC	REP_6VEC	0	0	0	18.754251
6	EXT_VEC	REP_7VEC	0	0	0	18.754251
7	EXT_VEC1	REP_1VEC	0	0	0	18.754251

REP_NAME	TNAME	STIME	TINSERTS	TUPDATES	TDELETES	TDISCARDS	PERIOD
r_wgate	system.gg_heartbeat	08-MAY-16 23:58:09	0	2878	0	0	DAILY
r_wgate	ESG.VEC_REQUEST_PART	08-MAY-16 23:58:05	1585	20	1565	0	DAILY
r_wgate	ESG.VEC_REQUEST_DETAILS	08-MAY-16 23:58:03	24	41	0	0	DAILY
r_wgate	ESG.VEC_AR_NOTES	08-MAY-16 23:58:01	18	0	0	0	DAILY

	CREATE_DATE	REPLICAT	LAG_MIN	COMMENTS
1	21-DEC-15 06.20.01.852994000 AM -05:00	R_VECRM	11	(null)
2	11-DEC-15 03.59.02.055053000 PM -05:00	R_GCM	6	(null)

Finding failed transactions/Exceptions

Handling_data_issues : Exception Table

```
MAP ESG.TROUBLE_TICKET , TARGET gg_schema.exceptions,
EXCEPTIONSONLY,
INSERTALLRECORDS,
COLMAP ( rep_name = "R_REP"
,table_name = @GETENV ("GGHEADER", "TABLENAME")
,errno = @GETENV ("LASTERR", "DBERRNUM")
,dberrmsg = @GETENV ("LASTERR", "DBERRMSG")
,optype = @GETENV ("LASTERR", "OPTYPE")
,errtype = @GETENV ("LASTERR", "ERRTYPE")
,logrba = @GETENV ("GGHEADER", "LOGRBA")
,logposition = @GETENV ("GGHEADER", "LOGPOSITION")
,modified_date = modified_date
,create_date = @DATENOW(),
uk1 = trouble_ticket_oid    -- Primary key to track failed transactions
,uk2 = SERVICE_ID
```

```
GGSCI (vpbscpd6) 1> stats r_rep, table esg.trouble_ticket, reportcdr
Replicating from ESG.TROUBLE_TICKET to ESG.TROUBLE_TICKET:

*** Total statistics since 2016-05-01 10:31:01 ***
        Total inserts                                 30112.00
        Total updates                               1234897.00
        Total deletes                                 19127.00
        Total discards                                    0.00
        Total operations                            1284136.00
        Total CDR conflicts                           20289.00
        CDR resolutions succeeded                     20289.00
        CDR INSERTROWEXISTS conflicts                   232.00
        CDR UPDATEROWEXISTS conflicts                 19917.00
        CDR DELETEROWEXISTS conflicts                   140.00
```

	TABLE_NAME	STATUS	COUNT(*)
1	ESG.VEC_REQUEST_DETAILS	SQL COMPUPDATE CHECK	1
2	ESG.VEC_REQUEST_PART	SQL COMPUPDATE CHECK	1
3	VECRM.DMS_USER_APPLICATION	INSERT CHECK	1
4	ESG.VEC_ACCESS_REQUEST	SQL COMPUPDATE CHECK	2

```
select oid, rep_name, table_name, dberrmsg, OPTYPE,COMMITTIMESTAMP,UK1 from gg_schema.exceptions where table_name='ESG.VEC_ACCESS_REQUEST'  order by create_date desc
```

OID	REP_NAME	TABLE_NAME	DBERRMSG	OPTYPE	COMMITTIMESTAMP	UK1
11434260	R_WGATE	ESG.VEC_ACCESS_REQUEST	OCI Error ORA-01403: no data found, SQL <UPDATE "ESG"...	SQL COMPUPDATE	05-MAY-16 06.16.05.037026000 PM	2533777
11434261	R_WGATE	ESG.VEC_ACCESS_REQUEST	OCI Error ORA-01403: no data found, SQL <UPDATE "ESG"...	SQL COMPUPDATE	05-MAY-16 06.16.05.037026000 PM	2533777
11430966	R_WGATE	ESG.VEC_ACCESS_REQUEST	OCI Error ORA-01403: no data found, SQL <UPDATE "ESG"...	SQL COMPUPDATE	05-MAY-16 11.45.24.108014000 AM	2533801
11421964	R_WGATE	ESG.VEC_ACCESS_REQUEST	OCI Error ORA-01403: no data found, SQL <UPDATE "ESG"...	SQL COMPUPDATE	04-MAY-16 02.51.50.105185000 PM	2533787

Operations Overview Summary

Operations	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	Best of Best	N/A
System Monitoring					✓	
Network Monitoring					✓	
Application Monitoring					✓	
Application Process Automation in-place					✓	
End-to-End Interface Monitoring					✓	
Application Response Time Monitoring					✓	
Application Alarm Processing					✓	
Database Monitoring					✓	
Performance Monitoring					✓	
Capacity Planning					✓	
Job Scheduling					✓	
High Availability monitoring					✓	
Active-Active Replication monitoring					✓	

End User Support Overview

Availability Management

Root Cause Determination History -

- 2 outages in last 9 months (YTD)
  - Both of these outages owned by towers or interfacing applications

Date/ CR RNID/ CA RNID/ XRef RNID Depend XREF Depend	Total Event Impact Duration	Total Event Duration	Score IT Impact	VP Owner/ RC Mgr/Dir	Crisis Lvl Event Status Monitor	Cause/ Sub Cause/ Culprit/ Comp. Inst. / Related Comp	Problem Description	Resolution	Root Cause	Eff Weight Mins
01-27-2016 07:47 CR217444 CA462642 T3079946	140	214	Y	Bell, Lawrence Stauffer, Ronald	SEV2 CLOSED	Procedure Network Router OMAJNEPBV-B160100 EKHV	Production support is reporting VEC Portal customers are unable to make payments or view real time balance inquiries via EDI Payments.	IT NOC updated the ACL configuration on the Omaha tie point router OMAJNEPBV-B160100 to resolve the VEC Portal wireless accounts billing issue.	Root cause was determined to be the fVZT NAT pool ACL had IP addresses associated with the fVZW network following Common Core tie point migration activity, resulting in the	0
									Wireless EDI payment flow using an invalid NAT	0
									Total	**0**
07-19-2016 15:46 CR226699 TABLE CHANGE	88	97	Y	Jain, Archana Bolster, Jeff	SEV2 CLOSED	Procedure Application VGWV D69X_FH	Internal end users at multiple locations are reporting VEC is unavailable.	DBA restored BMGVZP.PARM table, cleared VAM queued transactions in DB2 and production support recycled WebLogic on VEC servers VPBFRDGPA17/18/28.	Root cause was determined to be the VAM general purpose parameter database table became corrupt following an update to set the current VZ450 version number, resulting in the	0
									failure of multiple DB2 stored procedures and	0
									Total	**0**

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vSMART Availability

Application Name	AppID	Owning Entity	SVP	VP	#Month Events	September ZODs	MTD ZODs	MTD MTTR	#Year Events	2016 ZODs	YTD ZODs	YTD MTTR
VEC	V19G	VES	RAJEEV CHANDRASEKHARAN	RAJEEV CHANDRASEKHARAN	0	30	28	0.00	0	366	272	0.00

Availability, Crisis and Change Management Overview Summary

Crisis Management	Needs Immediate Attention	Meets Minimal Requirements	Meets Many Requirements	Meets Majority of Requirements	✓ Best of Best	N/A
Crisis Notification Lists Current					✓	
First Response Teams Identified					✓	
Notification Escalation Lists Current					✓	
Fast path Recovery Plan					✓	
Availability Management	**Needs Immediate Attention**	**Meets Minimal Requirements**	**Meets Many Requirements**	**Meets Majority of Requirements**	**✓ Best of Best**	**N/A**
Root Cause Determination History					✓	
Action Record Performance					✓	
Availability Impact Assessment					✓	
Business Impact Assessment					✓	
Change Management	**Needs Immediate Attention**	**Meets Minimal Requirements**	**Meets Many Requirements**	**Meets Majority of Requirements**	**✓ Best of Best**	**N/A**
Number of Changes					✓	
Emergency Change Rate				✓		
Failed Change Rate					✓	
Failed Change with Impact Rate					✓	

- YTD Application/Infrastructure VCOP records on V19G: 175
  - Standard: **151** Emergency: **15** Emergency (under 24h): **9**

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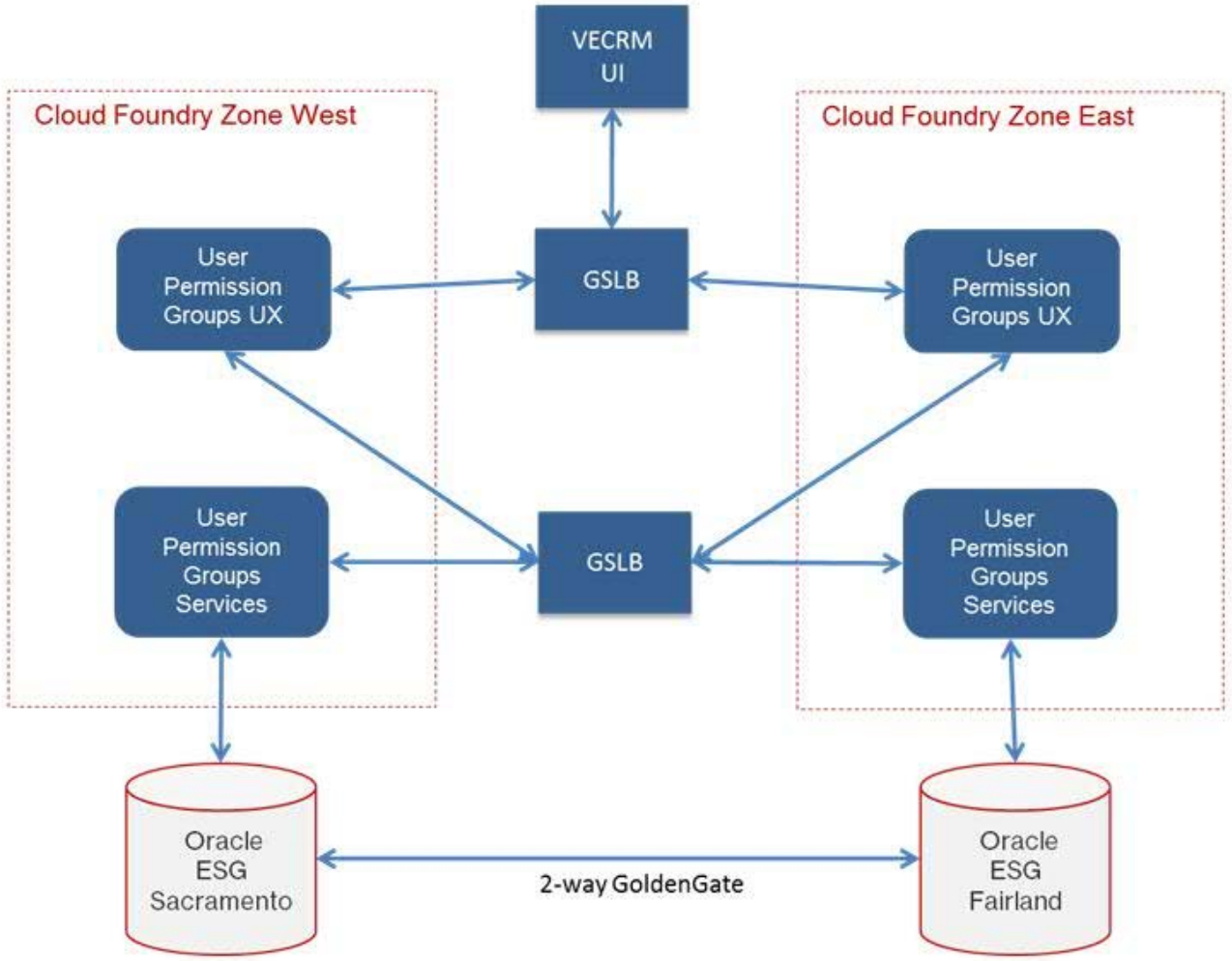
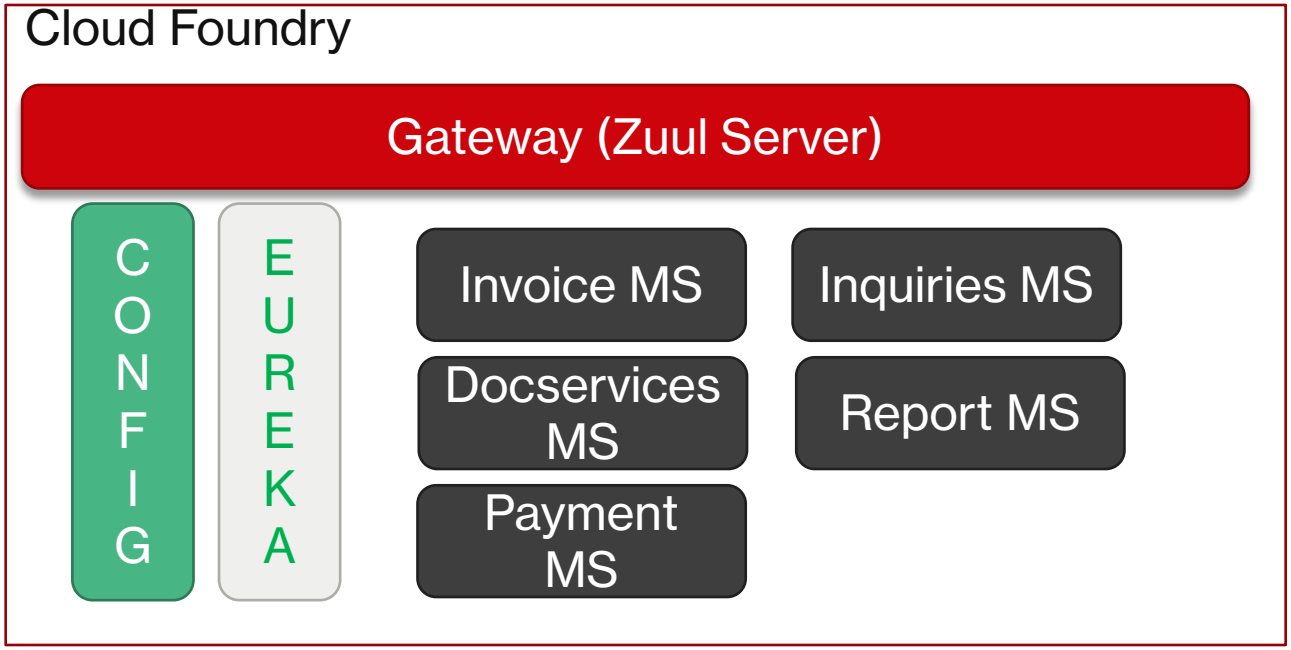
Roadmap

Wisegate Services/Admin to Cloud Foundry

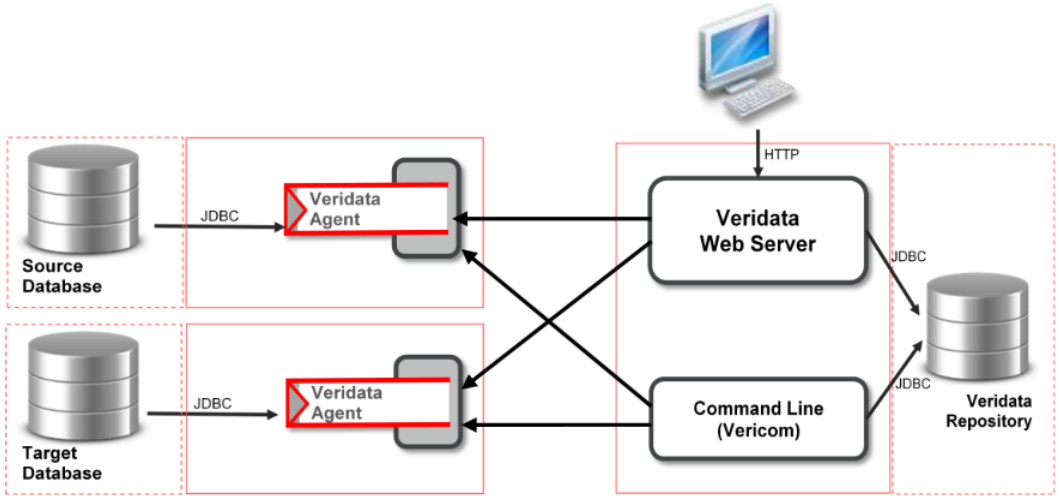


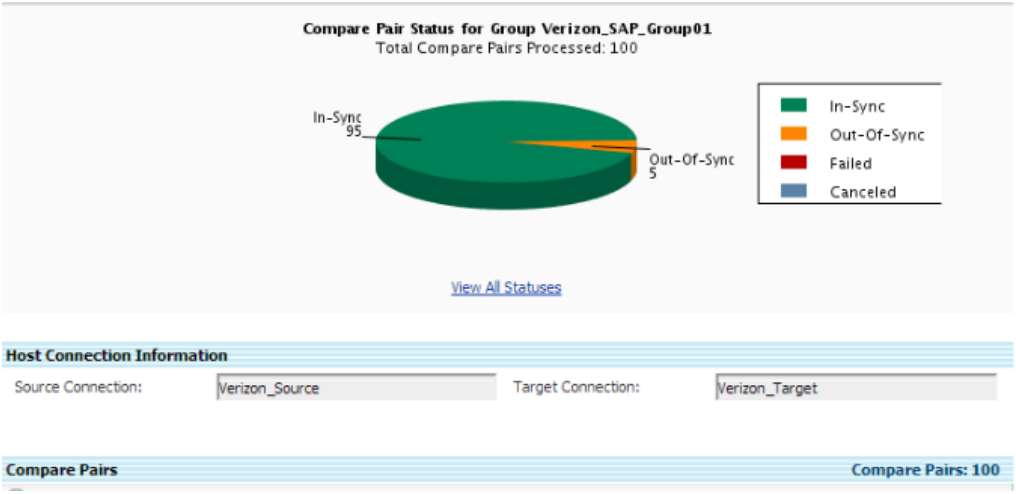
Billing Micro services



- Microservice register is in eureka server
- Eureka creates a library of available services
- Gateway register itself in eureka server and ask for available services
- Gateway create a list of routes to redirect the calls
- Every REST call will be through the Gateway and redirected to the correct microservice instance

Veridata (Replication Data Comparison without Downtime)





POC established on QA and installed on Prod.

Used to compare and fix data issues between tables in FD & SAC

Upcoming DB Initiatives

- Convert our online database character set from US7ASCII to UTF-8
- Decommission the ePortal databases with 1.0 GCM/SMD application retirement
- Setup pending replication queue process from SDC online to SDC Reporting to assist in scenarios of Fairland goes down for logger domain and/or reporting DB failover needs.
- Enable replication from SDC DB Online/Reporting instances to external systems covering Fairland failover scenarios
- Continue cleanup activities of the online database to make it further Lean & Mean.
- Onboard veridata for fixing GG out of sync issues
- Move/Migrate DB to cloud or any other open source database
- Ongoing DB upgrade initiatives

eBroker - Apigee

eBroker + Dev Portal (90-0)

- SOA governance.
- Supports Proxy (Soap, Rest, MQ or JMS)
- Out of the box REST security
  - Basic authentication
  - 2 way SSL.
- Gateway for vendor ebonding exposing backend WPG (MQ) as SOAP services in ebroker
- eBroker supports about 80+ customers using SOAP interface.
- Dev Portal (90-0) provides the documentation, testing resources for Rest API's

Apigee

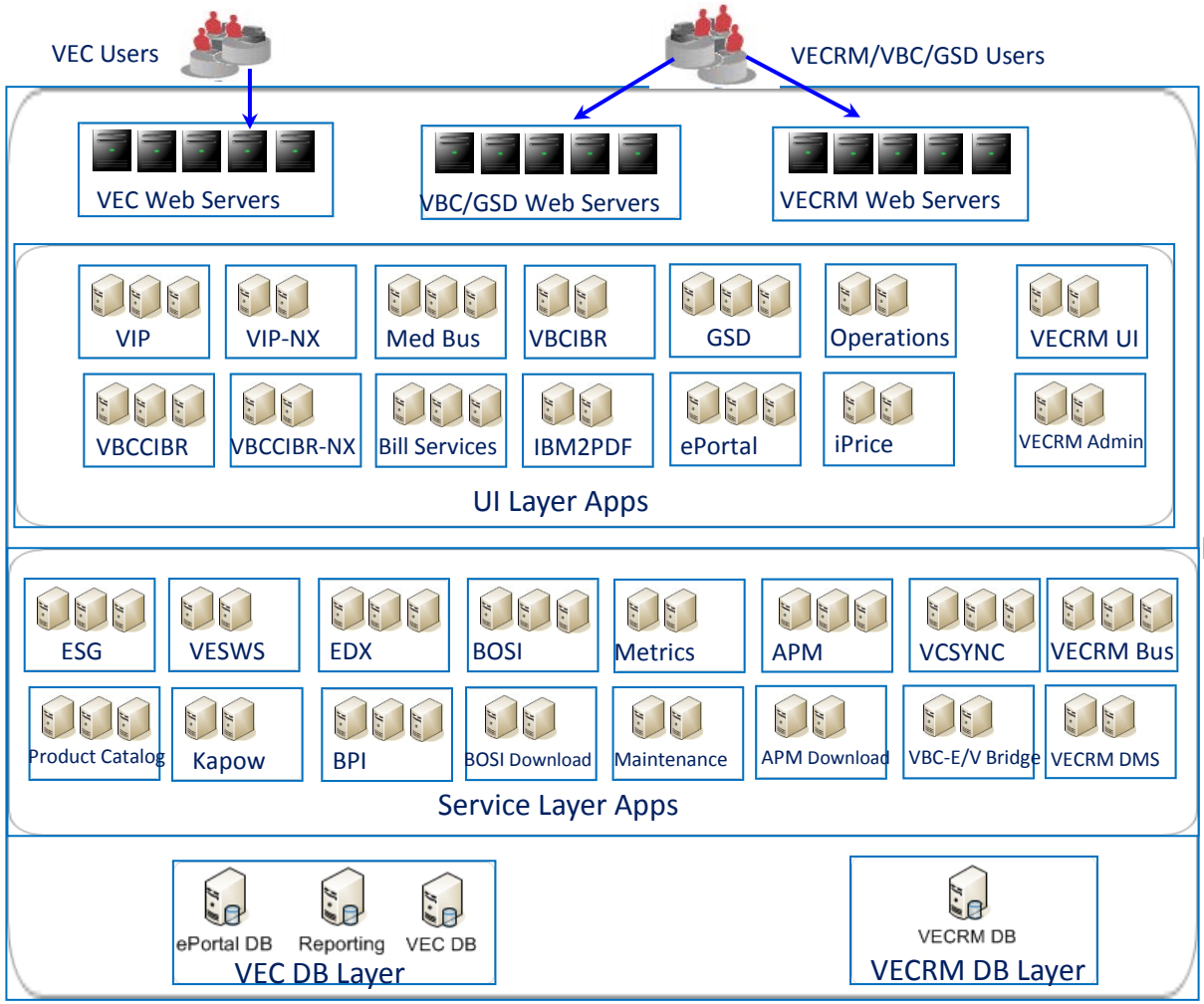
- Supports Proxy (Soap, Rest, [MQ or JMS] in Private Cloud)
- Supported Security standards
  - Oauth 1.0 , 2.0
  - API key verification
  - Basic auth and 2way SSL.
  - Role based authorization.
- Integrated Developer portal
  - Registration,
  - API keys management
  - Testing
- Comprehensive Analytics suite
- Integrated API documentation tools

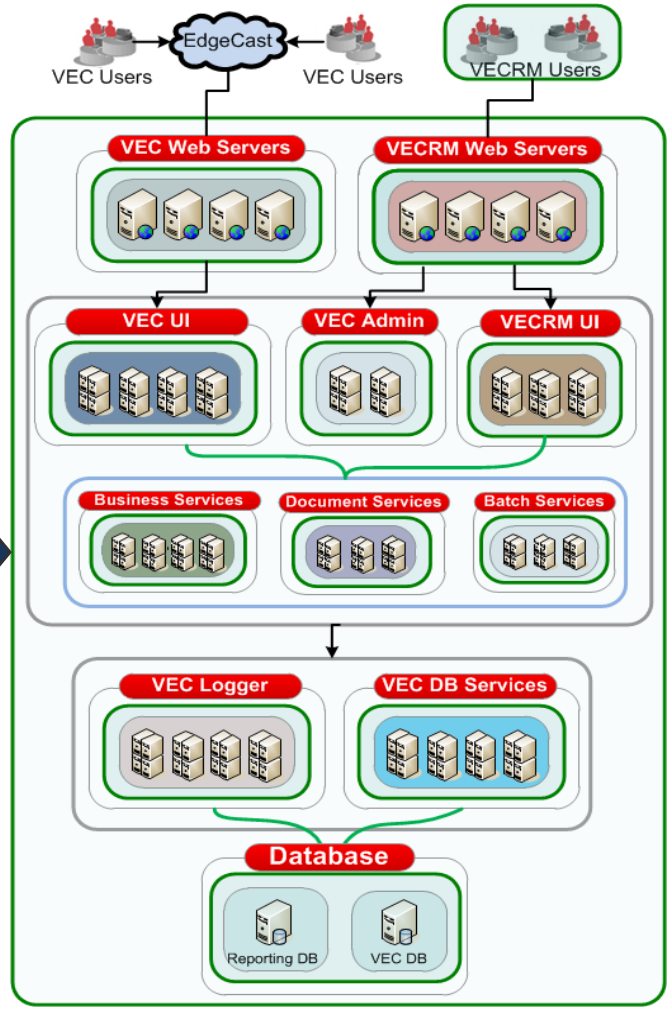
Appendix

VEC Domains

Detailed Overview & Design Guidelines

Simplification of VEC, VBC, GSD, VECRM





VEC 2.0 has a simplified architecture that is easier to maintain

VEC, VECRM Rewrite Objectives

Usability

- Unified Customer Experience
- Fewer clicks for mostly used functionality in the application
- Optimized response times with streamlined and asynchronous calls to interfacing systems
- Global Navigation
- SSO & Access Authorization
- Consolidation of Portals

Simplicity

- Simplified architecture across portal domains
- < 10 Application Domains
- Reusability with true Services Layer – Business/DB
- Streamlined DB connections thru DB services layer
- Simplified infrastructure layout
- Source code management thru Accurev

Maintainability

- Load Balancer at each app layer across data centers
- Active-Active solution with 24/7 availability
- Centralize application config in Database
- Admin UI to control critical app configuration
- Standardized software stack
- Blue/Green infrastructure

Simplified Application & Infrastructure with Active-Active Architecture

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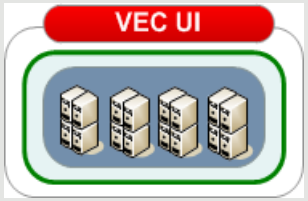
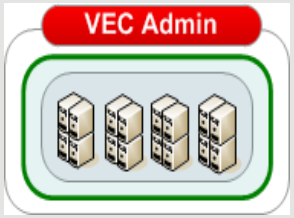
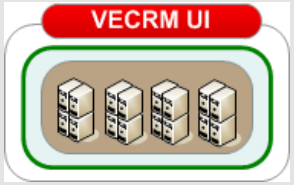
UI Domains



- ❖ Presentation Layer for VEC functionality
- ❖ Landing Domain for External customers
- ❖ Authentication with Access Manager and Authorization is managed internally by VEC
- ❖ Interacts with VEC Business, DB Services and Logger Domains



- ❑ Admin Tool to manage Application Configuration
- ❑ Authentication with Enterprise SSO - Site minder
- ❑ Authorization is managed by VEC
- ❑ Interacts with VEC DB, Logger Services Domain
- ❑ Hosts Admin functionality for Feedback tool, Guided tour setup process
- ❑ Extended functionality for Helpdesk/IT Security Admins to manage User profiles and Entitlements



- ➢ Presentation Layer for VECRM functionality (including all GCM/GSD/ICI related functional areas)
- ➢ Landing Domain for Internal customer service agents
- ➢ Authentication with Enterprise SSO - Site minder and Authorization is managed internally by VECRM
- ➢ Interacts with Business, DB Services and Logger Domain

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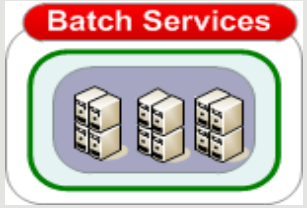
Service Domains

- Hosts business logic and related services covering Billing, Repair, Account Management, Wisegate, Case management and other portal functionalities
- Interfaces with several backend systems across VES, VZT and VZW applications
- Provides true services for UI and external client applications
- Domain Interactions with DB Services and Logger Domains
- Additional separate Load Balancer urls for each channel - Internal, External clients, Batch applications

- Hosts services associated with document conversion – AFP2PDF routines etc., for VEC portal billing, reporting and other document storage, retrieval needs
- Domain Interactions with VEC DB Services and Logger Domains



- Back office processing domain hosting services supporting off-line processing needs
- Provides batch services for UI and external client applications
- Domain Interactions with Business Services, DB Services and Logger Services Domains

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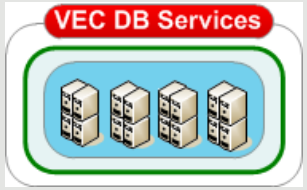
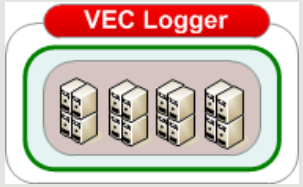
DB Service Domains



- ❖ Hosts Services for all VEC Online DB Functionality
- ❖ Only domain with connectivity to online VEC DB
- ❖ Active-Active across data centers with no cross DB dependency. Fairland and Sacramento DB Service layer jvms interacts with respective data center Online DB instance with 2 way replicated data across data centers
- ❖ Ease of failover with any DB failures across data centers



- ❑ VEC Logger Domain manages logging, metrics and other audit/finger print recording services
- ❑ Logger Domain interfaces with VEC Reporting DB
- ❑ Only domain with reporting DB interface
- ❑ Single Site domain Architecture supporting both data centers traffic for all reporting DB needs and ease of failover with GSLB/LB rules defined across both data centers

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Design Guidelines

- Unified UI domain for VEC
- No session hopping between internal domains on VEC Infra
- Avoid implementation of less frequently used functionality
- Enforce encryption of PCI, CPNI and sensitive data elements in transit and at rest(logs, DB)
- Retrieve reference data on first need basis and cache it as needed
- No usage of unsupported and nonstandard software
- All calls to interfacing systems should use as far as possible XML/REST over https.
- Avoid direct JDBC calls to external DBs so can prevent cross data center response delay and failover issues

Simplify

- VEC Portal Online DB interactions are allowed only thru DB Services domain. And Logger Services domain for all reporting DB need interactions
- Services should generic and simple with ease of maintenance
- Optimize number of calls to backend systems and DB with asynchronous calls
- Dynamic lookup of config and avoid recycle needs to refresh cache for config info
- Do not include external apps Jar files in VEC code
- Do not duplicate functionality across Services Domains.
- Adhere to best practices of Java and SQL development guidelines

Simplify

- Application need to be active-active compliant at every layer
- All Services are published over https endpoint
- Document all VEC Services with functional description along with inputs, outputs, error messages and interactions with interfacing systems/DB
- All functional scenarios should have a design document and should be reviewed
- Error messages are driven thru DB tables for easy maintenance
- No properties will be maintained in source code and all app config should be maintained in DB with no duplicate entries for interfacing systems
- UI design should not be tied to backend data retrieval process

Simplify

To ***make something*** look ***simple***, you ***have*** to ***master the complex***

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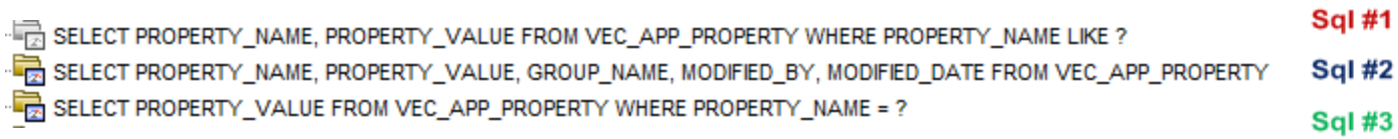
Simplified DB Services



We can reduce number of services by combining actions. For example, to support above listed SQL execution in the code, we can develop a service like
ServiceName: AppPropertyMaintenace
Actions Supported: **Create/Read/Update/Delete/List**
Inputs (Optional)
<PropertyName>
<PropertyValue>
<GroupName>
<ModifiedBy>
<ModifiedDate>

Client app (VEC or any app) can call this service with Action=Read with providing <PropertyName> (Sql #3 in above example)
or
call with Action=List with providing <PropertyName> (Sql #1 to get like condition)
or
call with Action=Read without providing any <PropertyName> as the tag is optional (Sql #2)
or
call with Action=Update by changed value and key value as <PropertyName> from VEC UI Admin Screen when admin is performing update
or
call with Action=Create by providing all needed values including key value <PropertyName>from VEC UI Admin when admin is creating new property

Simplify Services with combining actions and related functionalities

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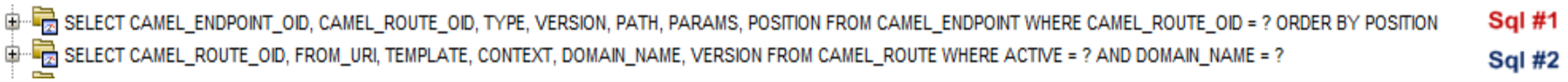
Combined Reference Services



We can reduce number of services by combining related functional objects. For example, to support above listed SQL execution in the code, we can develop a reference service to support retrieval of data from CAMEL_ENDPOINT and CAMEL_ROUTE objects

ServiceName: RefCamelInfo
Actions Supported: **Read**
SubServiceName: < CamelEndPointInfo>

Inputs (Optional): <CamelRouteOID>

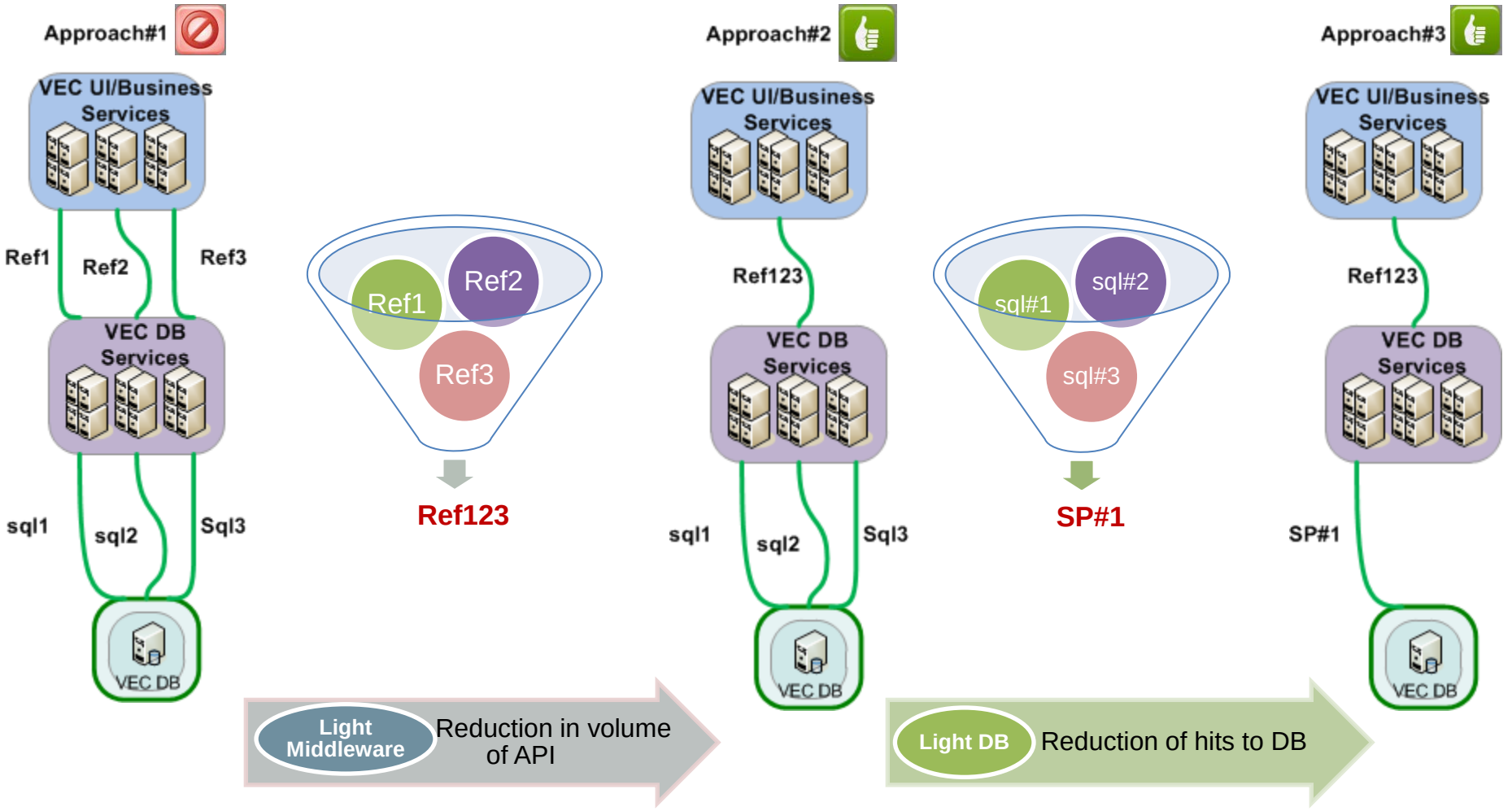
SubServiceName: < CamelRouteInfo >

Inputs (Optional): < DomainName>
<Active>

Client app (VEC or any app) can call this service with Action=Read with combinations of **SubServiceName** as needed.

Reduce the volume of calls from layer to layer with combined Services

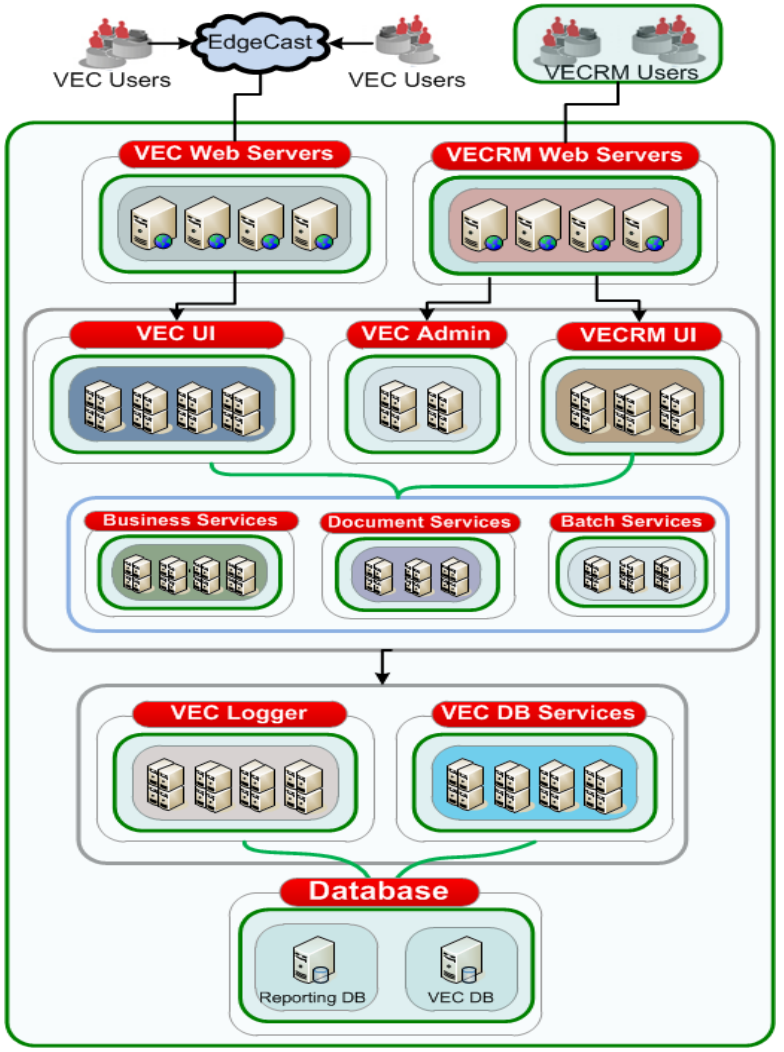
Simplified Reference Services



Develop Services by functional area with scalability and maintainability

VEC 2.0 Infrastructure: Active JVM Count

VEC Domains	JVM Count (FDC+SDC)
VEC Web Servers	6
NX Web Servers	6
VECRM/Admin Web Servers	4
VEC UI	20
VECRM UI	20
Admin UI	10
Business Services	50 (20 Bus;10 BusInt;10BusBat;10BusExt)
Batch Services	20
Document Services	10
VEC DB Services	20
VEC Logger	10(Active)+10(Passive)



VEC 2.0 is setup with Blue/Green Dev Ops Model with similar infrastructure supporting env toggle per release

Production Environment JVM Layout in Fairland: Green

V19frdgpa11	V19frdgpa15	V19frdgpa19
VECUI (A – 4001, M1-4002, M3 - 4003, M7 - 4004) VECRM UI (A- 12001, M1-12002, M3 – 12003, M7 – 12004) VECBatch (M2 – 8002, M4 - 8003)	VECUI (M2-4002, M4-4003, M8-4004 ,M9 - 4005) VECRM UI (M2-12002 ,M4-12003 ,M8-12004 ,M9 - 12005) VECBatch (A - 8001, M1 - 8002)	VECUI (M5 – 4002, M6 – 4003, M10 - 4004) VECRM UI (M5 – 12002 ,M6 – 12003, M10 - 12004) VECBatch (M3 - 8002, M5 – 8003)
V19frdgpa12 VECBusinessServices (A – 5001 ,M1 – 5002 , M3 - 5003, M7 - 5004) Cache JVM1 – 11002 ExtBusServices ExtM1-5102, ExtM3-5103 Ext Cache JVM1 – 11102 IntBusServices IntM1-5202, IntM3-5203 Int Cache JVM1 – 11202 BatchBusServices BatchM1-5302, BatchM3-5303 Batch Cache JVM1 – 11302	**V19frdgpa16** VECBusinessServices (M2 - 5002, M4 - 5003, M8 - 5004, M9 - 5005) Cache JVM2 – 11002 ExtBusServices ExtM2-5102, ExtM4-5103 Ext Cache JVM2 – 11102 IntBusServices IntM2-5202, IntM4-5203 Int Cache JVM2 – 11202 BatchBusServices BatchM2-5302, BatchM4-5303 Batch Cache JVM2 – 11302	**V19frdgpa20** VECBusinessServices (M5 - 5002, M6 - 5003, M10 - 5004) Cache JVM3 – 11002 ExtBusServices ExtM5-5102 Ext Cache JVM3 – 11102 IntBusServices IntM5-5202 Int Cache JVM3 – 11202 BatchBusServices BatchM5-5303 Batch Cache JVM3– 11302
V19frdgpa13 VECDBServices (A – 6001, M1 – 6002, M3 – 6003, M7 - 6004)	**V19frdgpa17** VECDBServices (M2 – 6002, M4 – 6003, M8 – 6004, M9 - 6005)	**V19frdgpa21** VECDBServices (M5 - 6002, M6 - 6003, M10 - 6004)
V19frdgpa14 VECAdmin (A – 7001, M1 - 7002) VECLogger (A – 10001, M1 – 10002, M3 – 10003, M7 - 10004) VECDocServices (M2 – 9002, M4 - 9003)	**V19frdgpa18** VECAdmin (M2 – 7002, M4 - 7003) VECLogger (M2 – 10002, M4 – 10003, M8 – 10004, M9 - 10005) VECDocServices (A – 9001, M1 - 9002)	**V19frdgpa22** VECAdmin (M3 – 7002, M5 - 7003) VECLogger (M5 – 10002, M6 – 10003, M10 - 10004) VECDocServices (M3 – 9002, M5 - 9003)

Production Environment JVM Layout in Sacramento: Green

V19sacgpa11	V19sacgpa15	V19sacgpa19
VECUI (A – 4001, M1-4002, M3 - 4003, M7 - 4004) VECRM UI (A- 12001, M1-12002, M3 – 12003, M7 – 12004) VECBatch (M2 – 8002, M4 - 8003)	VECUI (M2-4002, M4-4003, M8-4004 ,M9 - 4005) VECRM UI (M2-12002 ,M4-12003 ,M8-12004 ,M9 - 12005) VECBatch (A - 8001, M1 - 8002)	VECUI (M5 – 4002, M6 – 4003, M10 - 4004) VECRM UI (M5 – 12002 ,M6 – 12003, M10 - 12004) VECBatch (M3 - 8002, M5 – 8003)
V19sacgpa12 VECBusinessServices (A – 5001 ,M1 – 5002 , M3 - 5003, M7 - 5004) Cache JVM1 – 11002 ExtBusServices ExtM1-5102, ExtM3-5103 Ext Cache JVM1 – 11102 IntBusServices IntM1-5202, IntM3-5203 Int Cache JVM1 – 11202 BatchBusServices BatchM1-5302, BatchM3-5303 Batch Cache JVM1 – 11302	**V19sacgpa16** VECBusinessServices (M2 - 5002, M4 - 5003, M8 - 5004, M9 - 5005) Cache JVM2 – 11002 ExtBusServices ExtM2-5102, ExtM4-5103 Ext Cache JVM2 – 11102 IntBusServices IntM2-5202, IntM4-5203 Int Cache JVM2 – 11202 BatchBusServices BatchM2-5302, BatchM4-5303 Batch Cache JVM2 – 11302	**V19sacgpa20** VECBusinessServices (M5 - 5002, M6 - 5003, M10 - 5004) Cache JVM3 – 11002 ExtBusServices ExtM5-5102 Ext Cache JVM3 – 11102 IntBusServices IntM5-5202 Int Cache JVM3 – 11202 BatchBusServices BatchM5-5303 Batch Cache JVM3– 11302
V19sacgpa13 VECDBServices (A – 6001, M1 – 6002, M3 – 6003, M7 - 6004)	**V19sacgpa17** VECDBServices (M2 – 6002, M4 – 6003, M8 – 6004, M9 - 6005)	**V19sacgpa21** VECDBServices (M5 - 6002, M6 - 6003, M10 - 6004)
V19sacgpa14 VECAdmin (A – 7001, M1 - 7002) VECLogger (A – 10001, M1 – 10002, M3 – 10003, M7 - 10004) VECDocServices (M2 – 9002, M4 - 9003)	**V19sacgpa18** VECAdmin (M2 – 7002, M4 - 7003) VECLogger (M2 – 10002, M4 – 10003, M8 – 10004, M9 - 10005) VECDocServices (A – 9001, M1 - 9002)	**V19sacgpa22** VECAdmin (M3 – 7002, M5 - 7003) VECLogger (M5 – 10002, M6 – 10003, M10 - 10004) VECDocServices (M3 – 9002, M5 - 9003)

Alternate Production Environment - JVM Layout

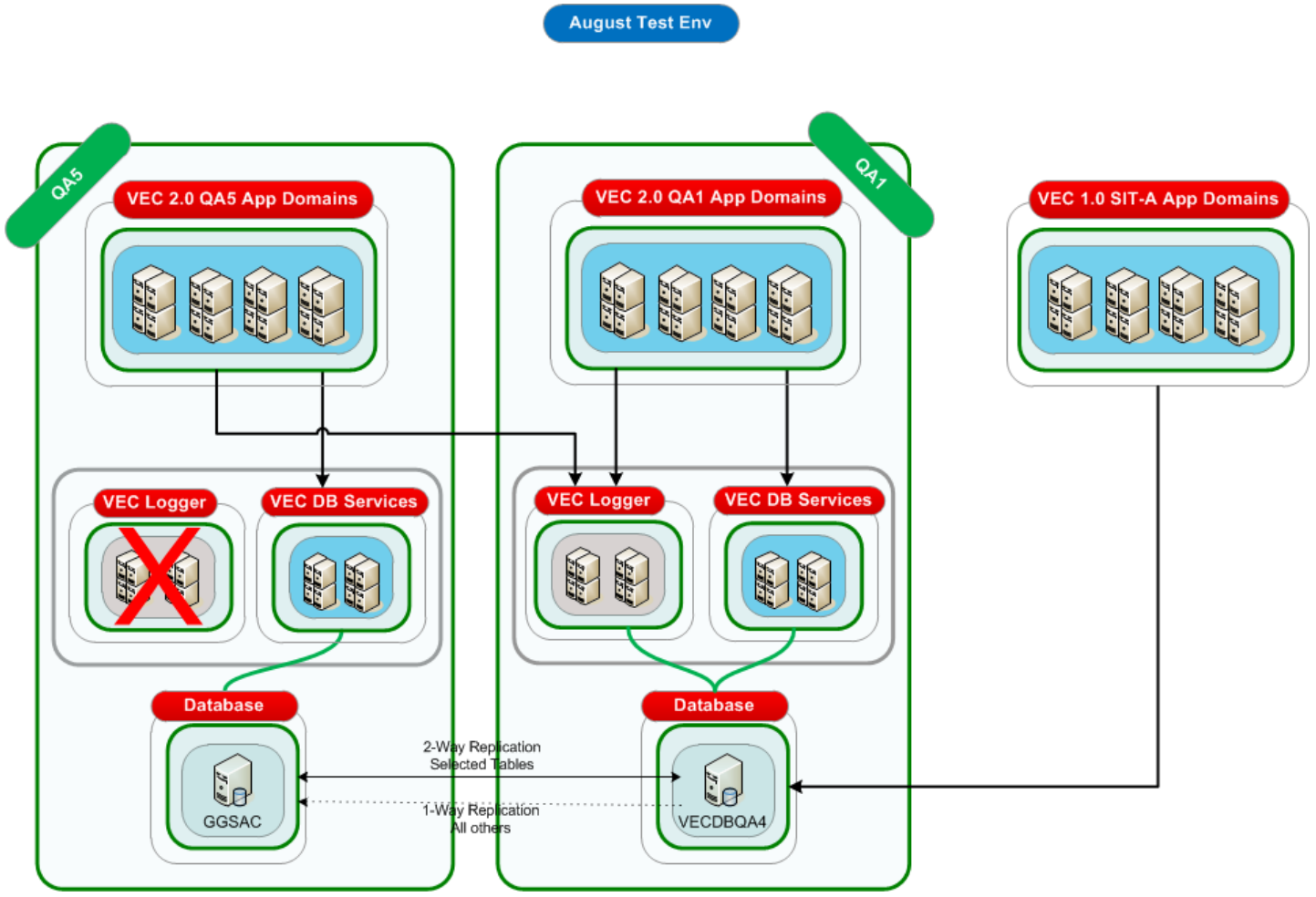
Sacramento

vpbsacgpa65 VECUI: A – 4001, M1-4002 VECRM UI: A – 12001, M1-12002	**vpbsacgpa66** VECUI: M2-4002 VECRMUI: M2-4002
vpbsacgpa69 VECBusinessServices: A–5001 ,M1 – 5002 Cache JVM1 : 11002 ExtBusinessServices: Ext M1 – 5102 ExtCache JVM 1: 11102 IntBusinessServices: IntM1 – 5202 IntCache JVM1: 11202 BatchBusinessServices: BatchM1 – 5302 BatchCache JVM1: 11302	**vpbsacgpa70** VECBusinessServices: M2 - 5002 Cache JVM2: 11002 ExtBusinessServices: Ext M2 – 5102 ExtCache JVM 2: 11102 IntBusinessServices: IntM2 – 5202 IntCache JVM2: 11202 BatchBusinessServices: BatchM2 – 5302 BatchCache JVM2: 11302
Vpbsacgpa71 VECDBServices: A – 6001, M1 – 6002	**Vpbsacgpa72** VECDBServices: M2 – 6002
Vpbsacgpa73 VECAdmin: A – 7001, M1 - 7002 VECLogger: A – 10001, M1 – 10002	**Vpbsacgpa74** VECAdmin: M2 – 7002 VECLogger: M2 – 10002
vpbsacgpa67 VECBatch: M2 – 8002 VECDocServices: M2 – 9002	**vpbsacgpa68** VECBatch: A - 8001, M1 - 8002 VECDocServices: A – 9001, M1 - 9002

Fairland

vpbfrdgpa65 VECUI: A – 4001, M1-4002 VECRM UI: A – 12001, M1-12002	**vpbfrdgpa66** VECUI: M2-4002 VECRMUI: M2-4002
vpbfrdgpa69 VECBusinessServices: A–5001 ,M1 – 5002 Cache JVM1 : 11002 ExtBusinessServices: Ext M1 – 5102 ExtCache JVM 1: 11102 IntBusinessServices: IntM1 – 5202 IntCache JVM1: 11202 BatchBusinessServices: BatchM1 – 5302 BatchCache JVM1: 11302	**vpbfrdgpa70** VECBusinessServices: M2 - 5002 Cache JVM2: 11002 ExtBusinessServices: Ext M2 – 5102 ExtCache JVM 2: 11102 IntBusinessServices: IntM2 – 5202 IntCache JVM2: 11202 BatchBusinessServices: BatchM2 – 5302 BatchCache JVM2: 11302
Vpbfrdgpa71 VECDBServices: A – 6001, M1 – 6002	**vpbfrdgpa72** VECDBServices: M2 – 6002
Vpbfrdgpa73 VECAdmin: A – 7001, M1 - 7002 VECLogger: A – 10001, M1 – 10002	**Vpbfrdgpa74** VECAdmin: M2 – 7002 VECLogger: M2 – 10002
vpbfrdgpa67 VECBatch: M2 – 8002 VECDocServices: M2 – 9002	**vpbfrdgpa68** VECBatch: A - 8001, M1 - 8002 VECDocServices: A – 9001, M1 - 9002

Active-Active Setup – August Test Environment (QA1)



Active-Active DB setup in QA Environment with bi-directional Golden Gate data replication for needed DB objects

Dev Ops:

Blue/Green Deployment

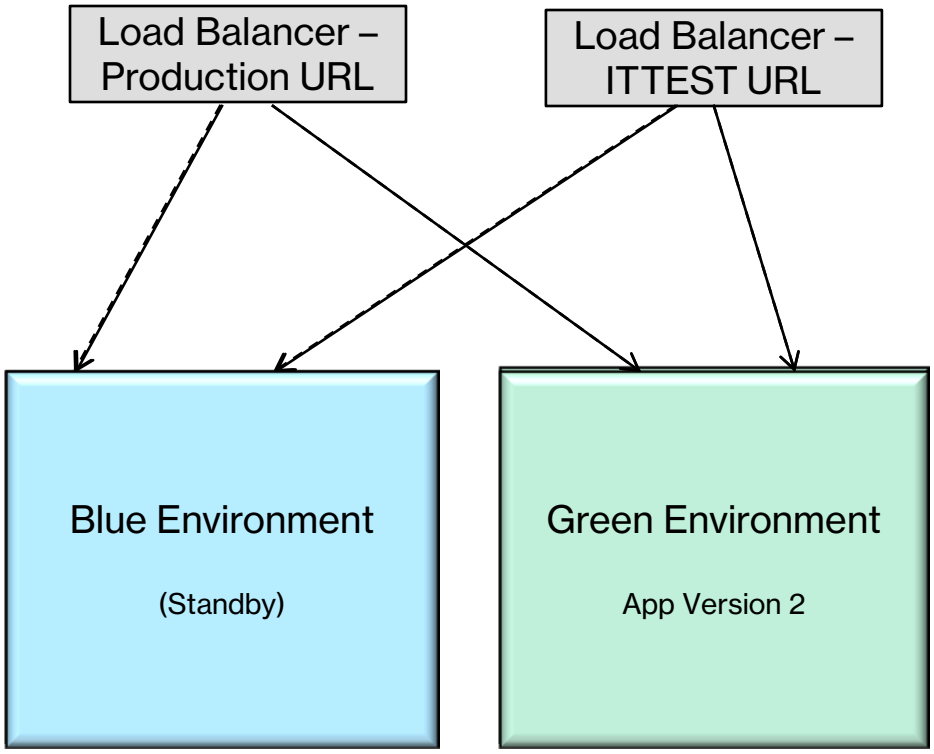
Dev Ops: What is Blue Green?

- Two identical production environments – one referred as **Blue** and other called **Green**.
- At any moment, only one environment is live and serving production traffic across with active-active configuration across both data centers.
- For example, at this moment (Thursday 9/28@3 PM ET), on VEC infra... **Green** is live and **Blue** is standby.
- When we want to deploy a new build to production, we deploy it on **Blue** stack and do thorough testing
- Once new build seems to work fine, the **Blue** stack goes live and **Green** becomes standby.
- Code version has + 1 difference between both environments

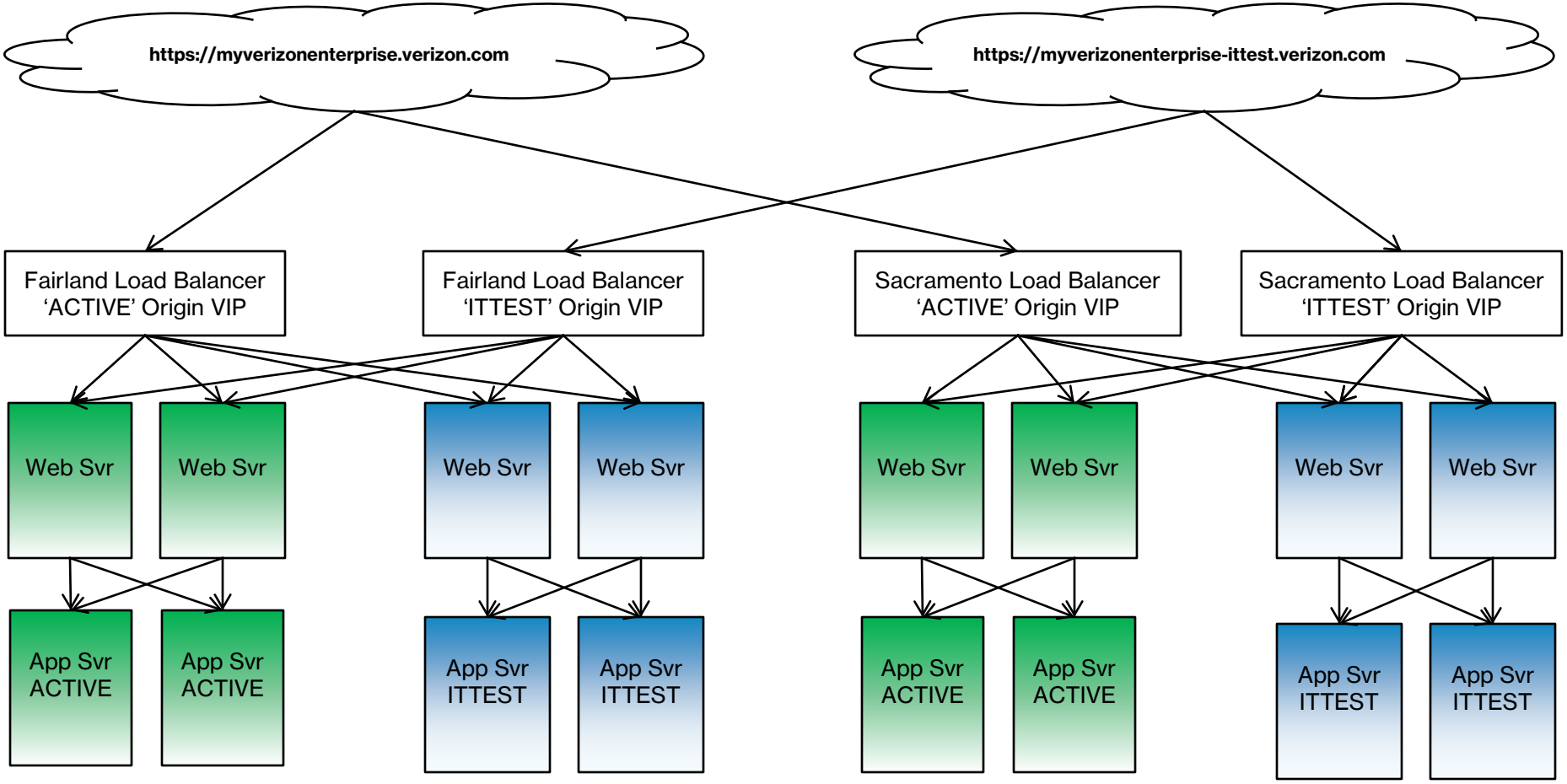
Benefits of Blue Green

- Next level to Active-Active with two sets of prod environment with multi data center live traffic
- Zero to minimal downtime during application deployment.
- Easy rollback to the standby environment with no downtime
- Improved flexibility in rolling out operating system patches, software upgrades, code changes with minimal or no client impact

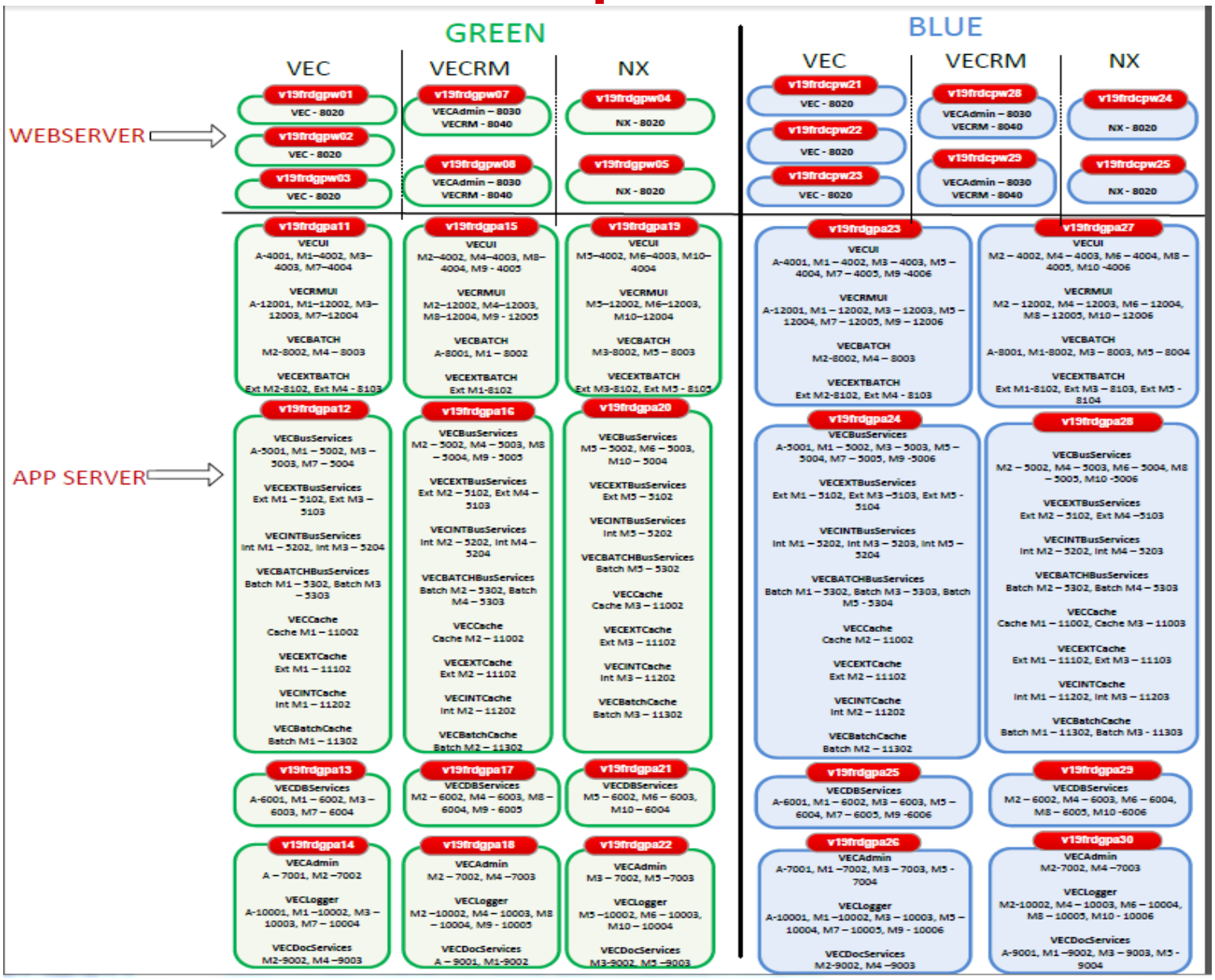
Blue – Green Flow



Production / IT Test URL set up - VEC



Application / Webserver set up - VEC



Blue Green Switch Configuration

Step 1 : Created two Sys. V packages, one with ACTIVE keep alive and other with ITTEST keep alive page

VZVECHealthcheckActive.ds_1.3.Z

```
<HTML>
<TITLE>Public Test Page </TITLE>
<H1> Enterprise Solutions</H1>
ACTIVE Public Test Page
</HTML>
```

VZVECHealthcheckITTest.ds_1.3.Z

```
<HTML>
<TITLE>Public Test Page </TITLE>
<H1> Enterprise Solutions</H1>
ITTEST Public Test Page
</HTML>
```

Step 2 : Deployed the web application in Weblogic on all the JVM servicing clients

```
<app-deployment>
  <name>healthcheck</name>
  <target>VECUICluster</target>
  <module-type>war</module-type>
  <source-path>/apps/opt/VECUI/healthcheck</source-path>
  <security-dd-model>Advanced</security-dd-model>
  <staging-mode>nostage</staging-mode>
</app-deployment>
```

Step 3 : Updated the load balancer rules as shown below:

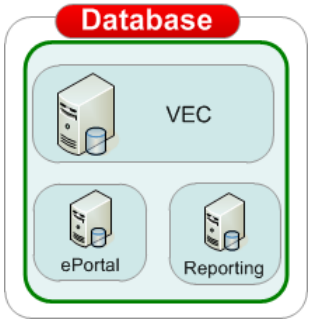
For myverizonenterprise.verizon.com --- Look for 'ACTIVE' content in response

For myverizonenterprise-ittest.verizon.com – Look for 'ITTEST' content in response

Database (ePortal)

Retirement of ePortal of DB

- Hardware Configuration
  - Dell/HP Linux Servers R810/BL460c G6
  - OS: Red Hat Linux OS 5.11
  - VEC Online DB is Active-Active across FDC and SDC
  - ePortal and Reporting DB instances are setup with FDC(Active)/SDC(Passive)



- Software Configuration
  - VEC Primary Online DB, ePortal and Reporting DB instances in FDC, SDC are on 11g RAC/ASM, Enterprise Edition11.2.0.4
- DB Realignment
  - VECRM functionality and related data objects were migrated to VEC platform in July 2015. VECRM DB is set for decommission.
  - SMD application related data objects in ePortal DB were migrated to VEC online DB. ePortal DB will be retired once SMD online functionality is migrated to VEC 2.0 platform (Target: 4Q 2016)