Open and Intelligent Data Autonomy

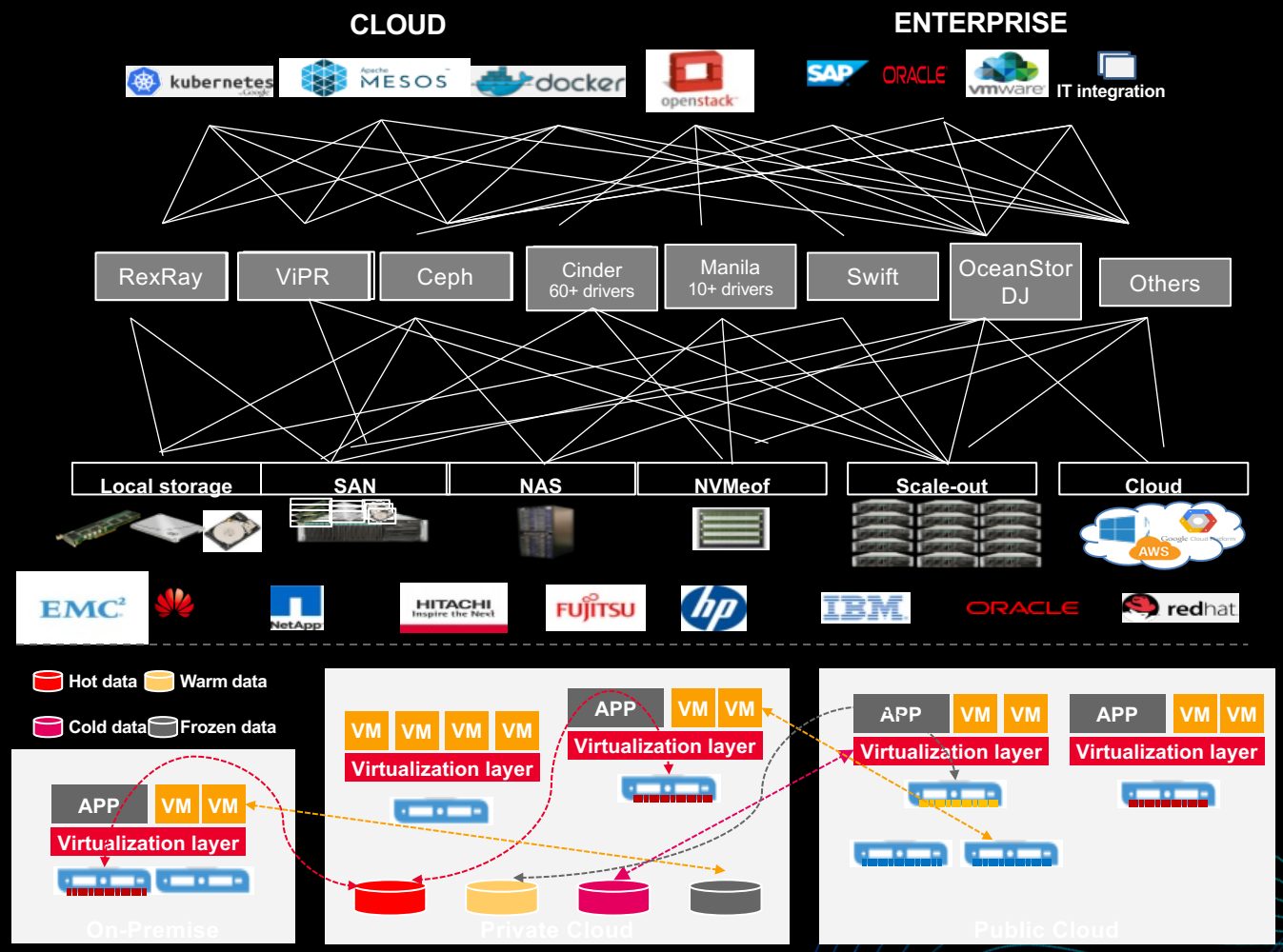
How to Efficiently Use Data Across Multiple Clouds ?

Key Customer Requirements

- Data Provisioning
- Data Operation
- Data Protection
- Data Migration

Key Challenges for Developers

- How can use data management service effectively?
- How can data be associated with applications on the cloud?
- How can data be managed in a unified manner?

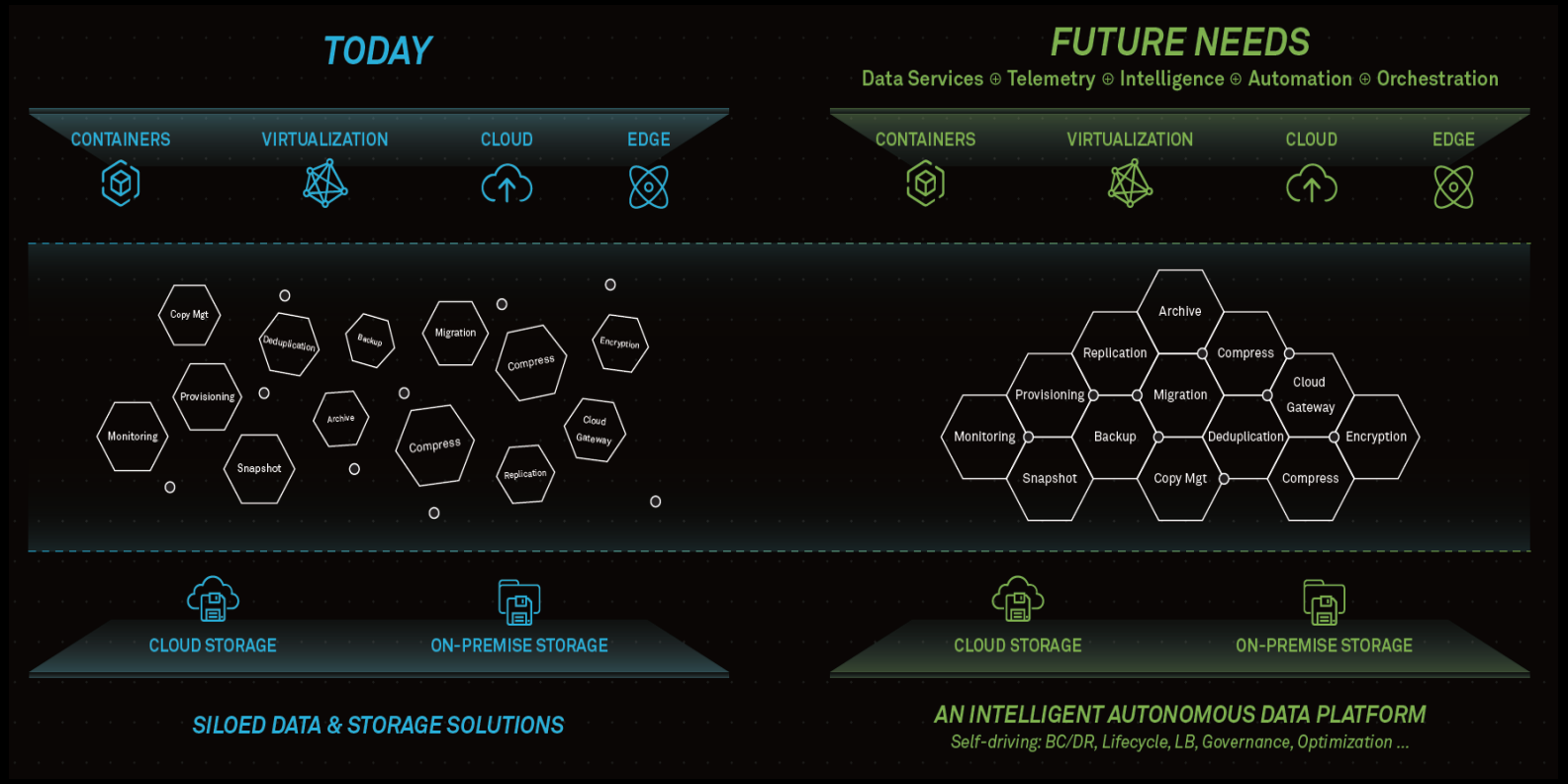


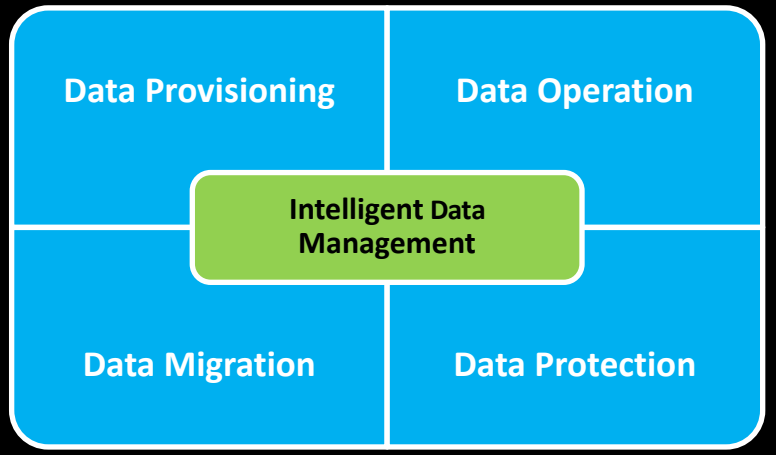
Linux Foundation's First Top-Level Project in the Data Domain

OpenSDS is the first top-level open-source project of the Linux Foundation in the Data Domain. It was jointly built by Huawei and world-leading data vendors, as well as excellent enterprises and universities. OpenSDS is aimed at addressing the data challenges in the cloud-based transformation of enterprise IT infrastructure.

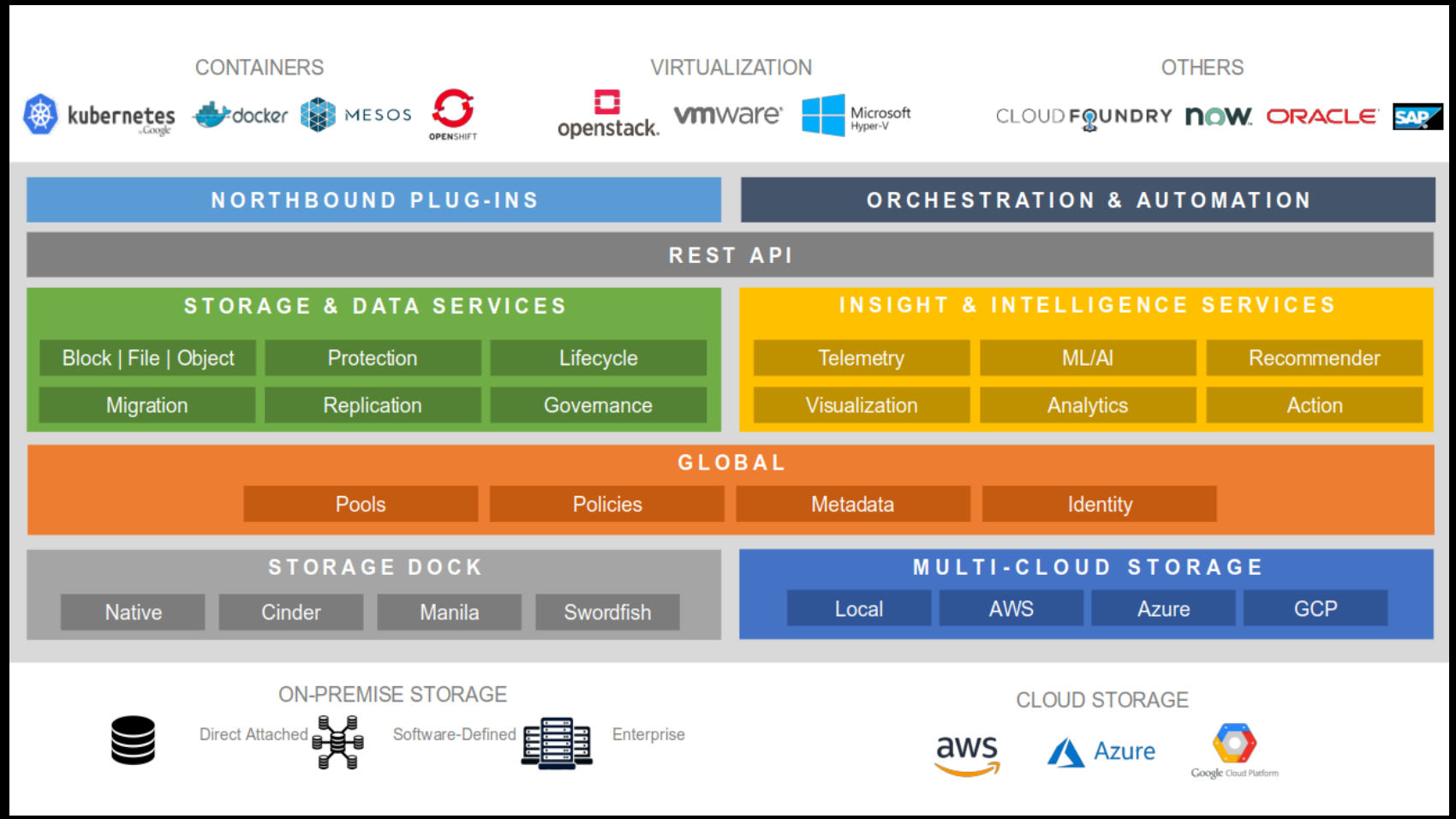
OpenSDS: Open and Intelligent Data Autonomy

Orchestrate data management service automatically and intelligently





OpenSDS Architecture and Projects



❖ **SUSHI**
The Northbound Plug-ins Project

Common plug-ins to enable OpenSDS storage services for cloud and application frameworks

❖ **HOTPOT**
The Storage Controller Project

Single control for block, file, and object services across storage on premise and in clouds

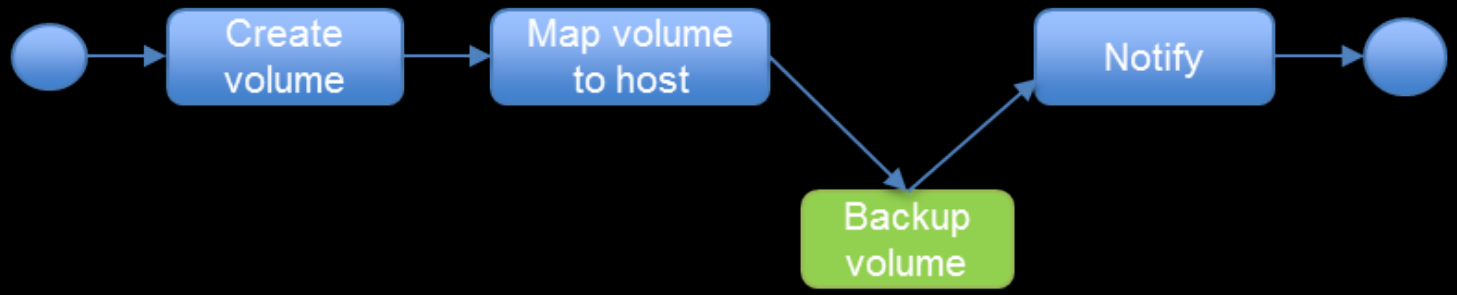
❖ **Gelato**
The Multi-Cloud Project

Policy based multi-cloud data control to enable data mobility across clouds

OpenSDS: Intelligent Data Provisioning

Automation and Orchestration provide a framework for intelligent data provisioning

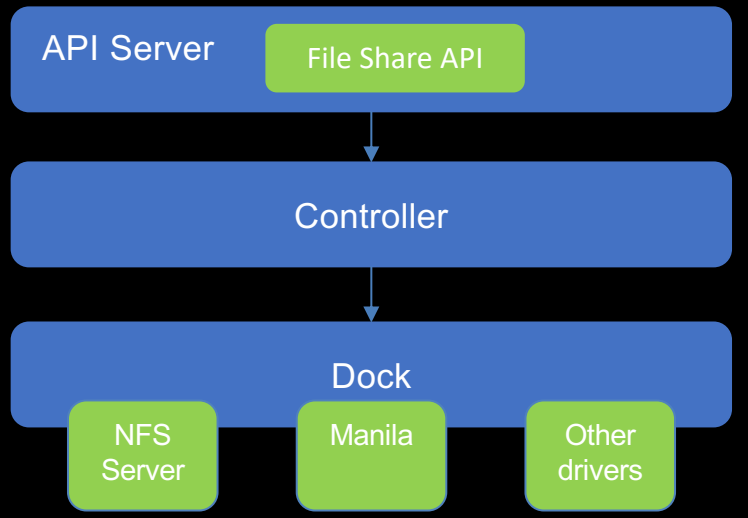
Simple Data Provisioning Workflow: Volume Creation



Key Points

- Supports Service Catalog
- Supports Customized Workflows
- Easy integration of new actions

Seamless File Sharing

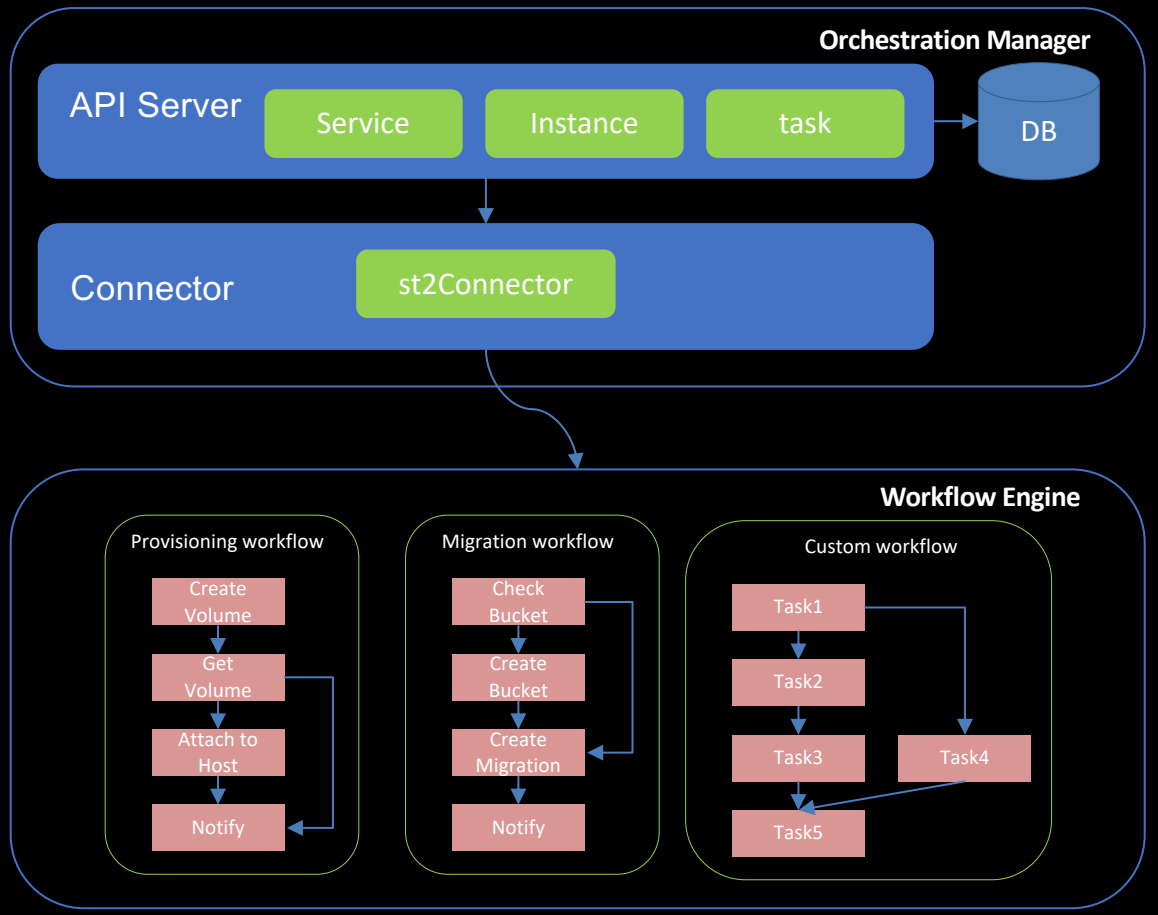


Key Points

- Supports file share in hotpot
- Supports NFS Server, Manila and etc.

Automation and Orchestration

Simplify orchestration and automation of complex workflows intelligently



BUILD WORKFLOWS

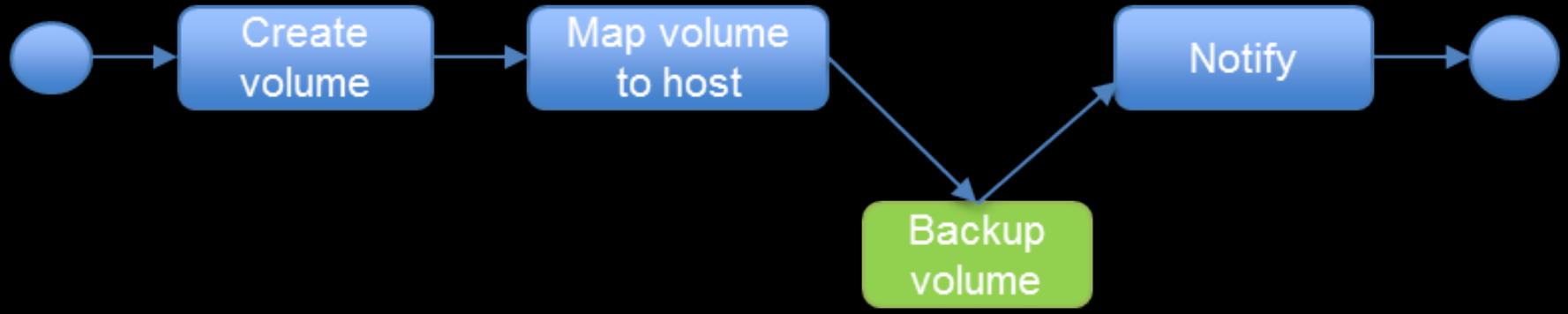
DEPLOY

AUTOMATE

- Define Actions.
- Integrate with workflow Engine
- Define generic services.
- Limitless use cases
- Customize the services

Illustration : Volume Provisioning Automation

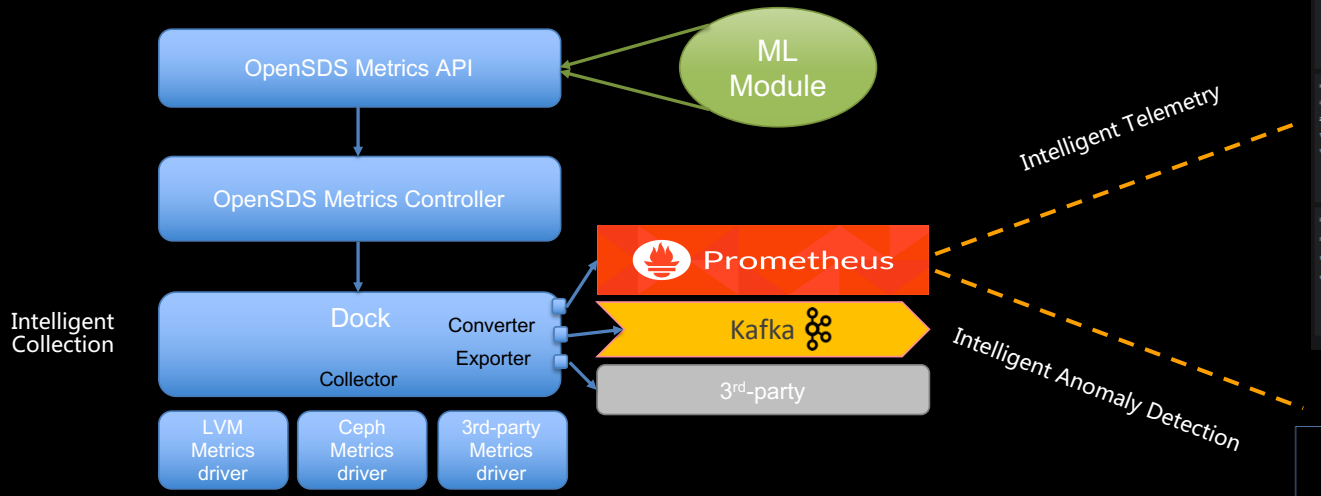
- User registers a service, e.g. volume provisioning service, by defining a template in YAML or JSON.
- Service Catalog Manager Updated
- Create Service Instance
- Schedule the service instance
- Orchestration Automatically

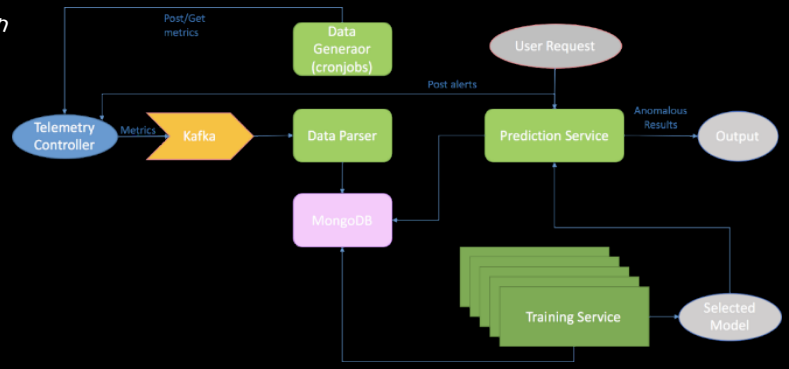


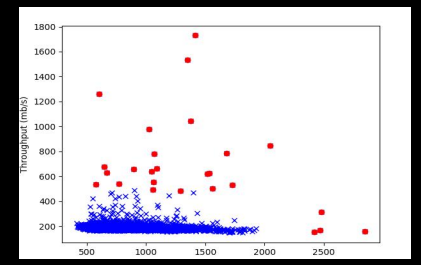

```yaml
---
version: 1.0
name: “Provisioning service”
description: “Provisioning a volume for a host”
parameters:
  “volume_name”:
    type: “string”
    description: “Name of the volume to be provisioned”
    constraints":
      allowed_pattern: "[A-Z]+[a-zA-Z0-9]*"
  “profile”:
    type: “string”
    default: “default”
    description: “Profile ID or name”
  “volume_size”:
    type: “integer”
    “default”: 1
  “host”:
    type: “string”
    description: “Name or IP address of the host”
workflows:
  “provisioning-workflow”:
    description: “This is the workflow for provisioning a volume”
    input: [“volume_name”, “profile”, “volume_size”, “host”]
    output: <json>
    tasks:
      “create-volume”:
        action: “opensds.create-volume”
          on-success:
            - “mapping-volume-to-host”
      "mapping-volume-to-host":
        action: "opensds.attach-volume"
          on-success:
            - ”notify”
      “notify”:
        action: “opensds.notify”
        "input":
              "cmd: "printf 'volume <% $.volume_id %> was attached to host successfully'"
```

OpenSDS: Intelligent Data Operation

Intelligent analysis of telemetry data and anomaly detection







Key Points

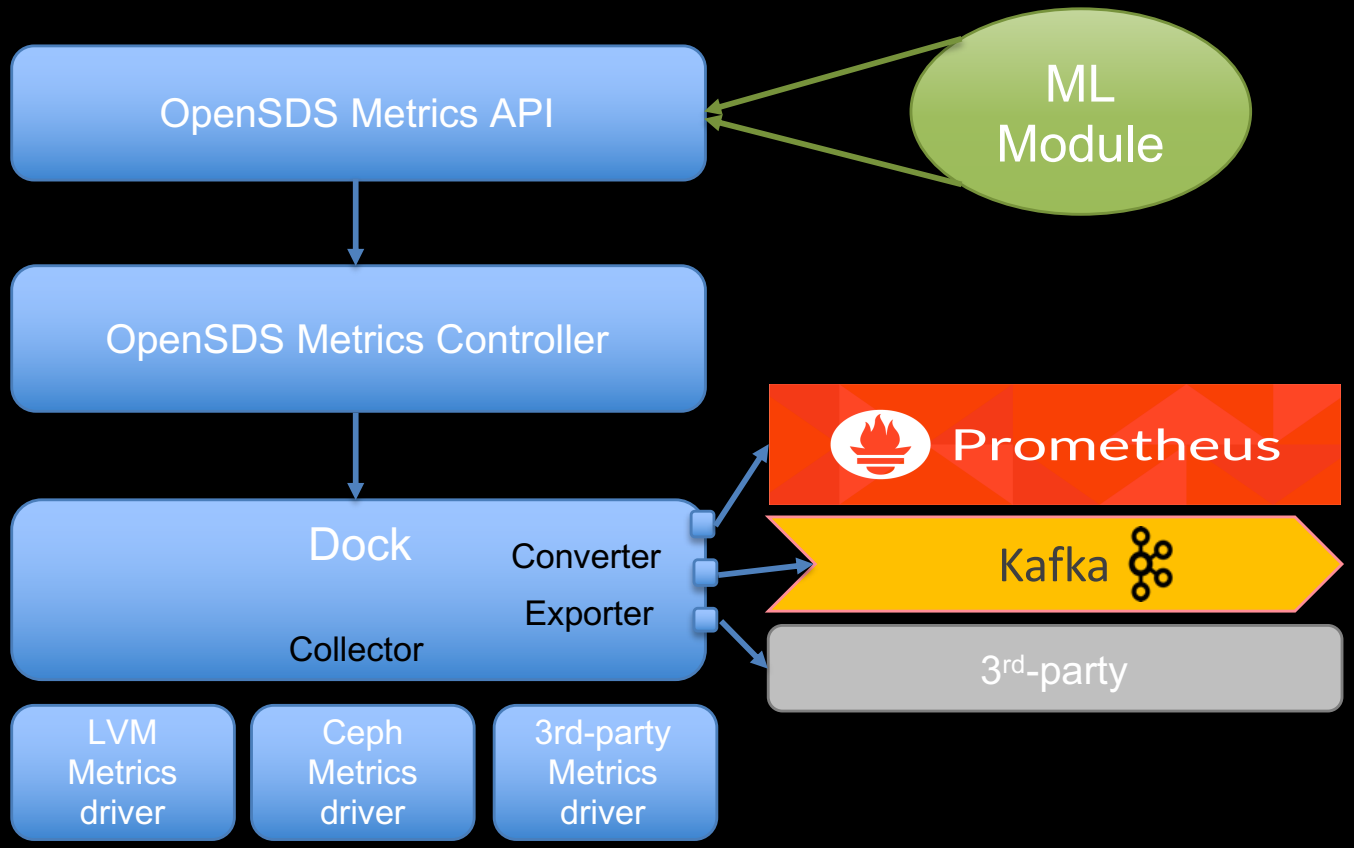
- Scalable interfaces for different data processing
- Scalable metrics driver to support heterogeneous storages

Anomaly Detection Framework

dbscan algorithm

Telemetry: Integrate with Prometheus and Grafana

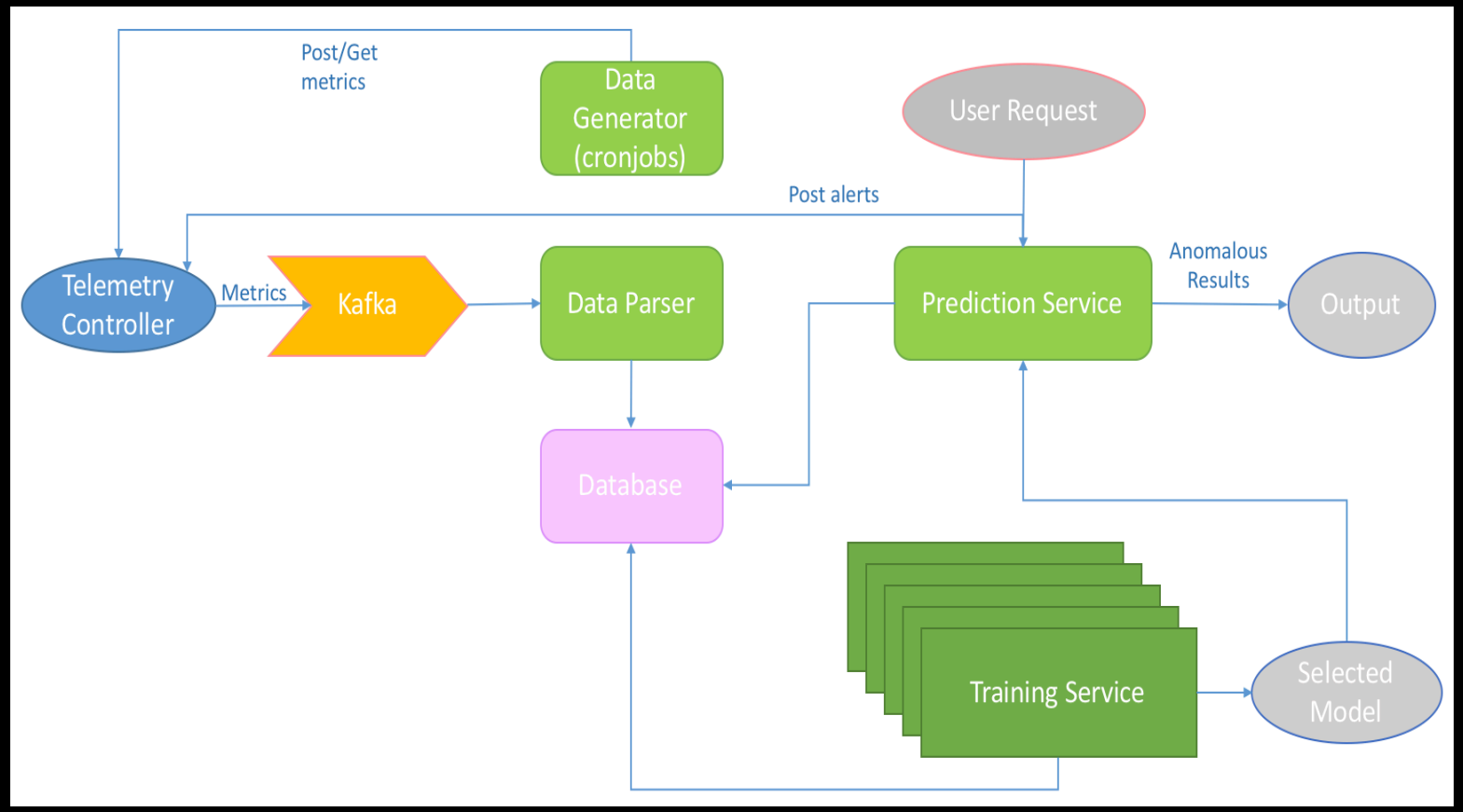
Framework Ready for Intelligent analytics



- General and Scalable API Sets
- Exporter and Converter
  - Support Various Backends
  - Support Various Third-party Telemetry and Analytics Modules
  - Custom integration support
- Easy Integration of Visualization

Anomaly Detection

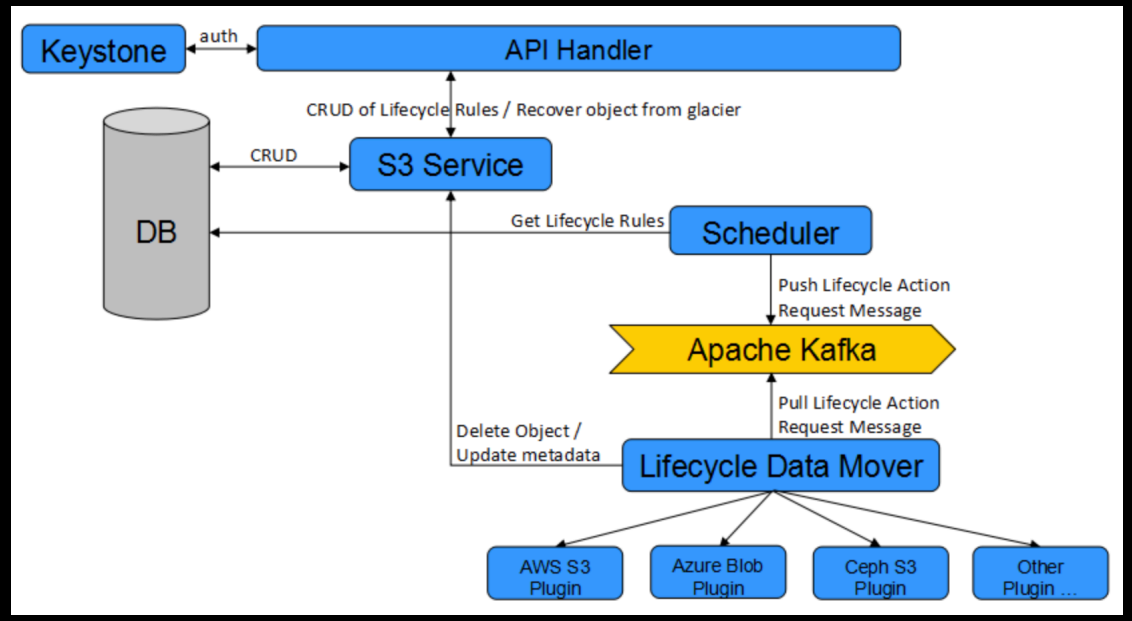
Support integrated default analytics framework



- Periodic Generation of Data
- Kafka streams of Data
- Training service to get trained Models
- Prediction Service with specific trained model
- Seamless integration with Alert Manager
- Intelligent Actions on trigger

OpenSDS: Intelligent Data Migration

Data in the past, at present, and in the future is connected and end-to-end data lifecycle management cross multi-clouds.



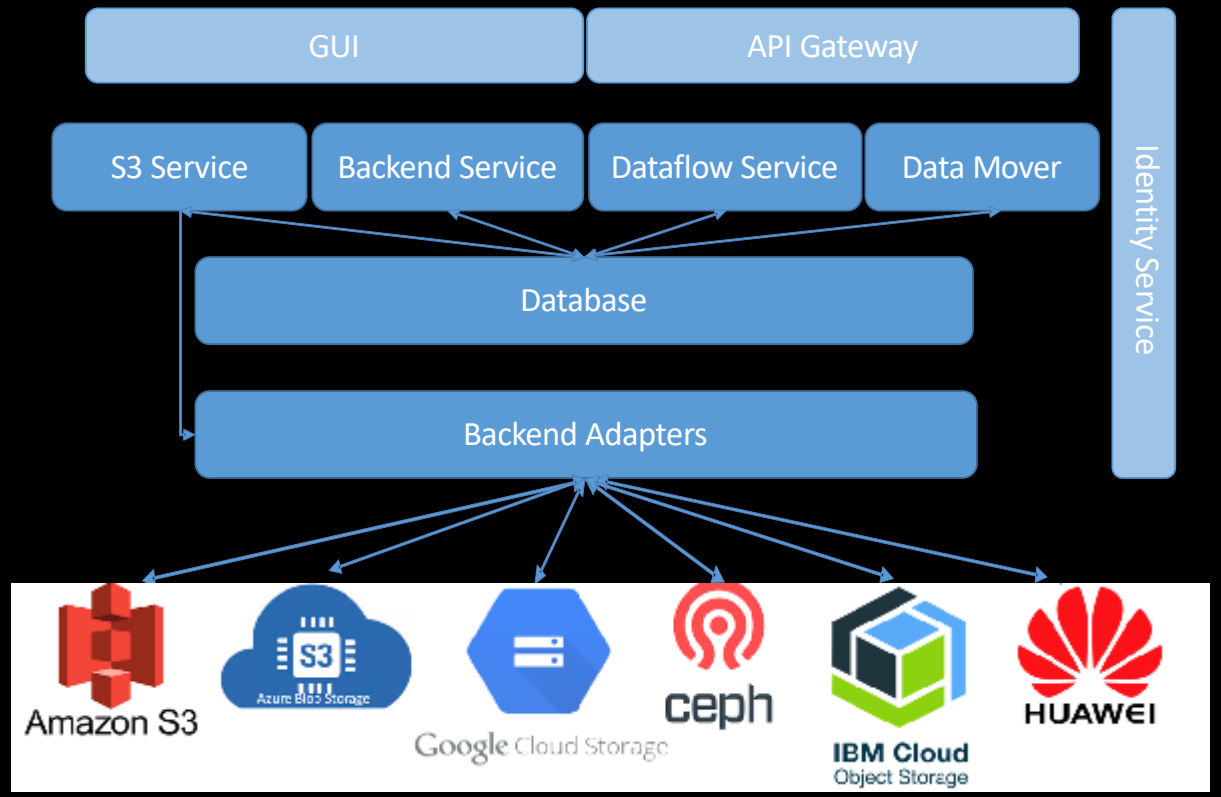
OpenSDS S3	AWS S3	Azure (blob)	Google Cloud Storage	Huawei OBS	IBM Cloud Object Storage	Ceph / Fusion Storage
Tier 1	Standard	Hot	Multi-Regional	Standard	Standard	Stardard
Tier 2	Standard_IA	Cool	NearLine	Warm	Vault	
Archive	Glacier	Archive	ColdLine	Cold	Cold Vault	

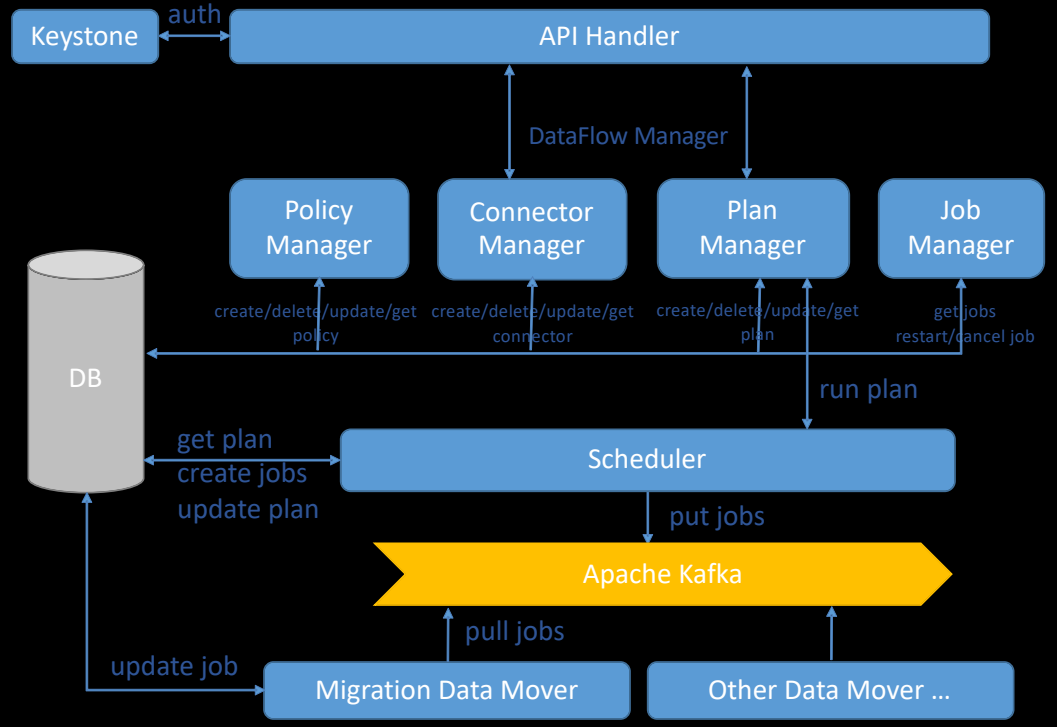
Key Points

- Support object data migration across different cloud service providers.
- Support of choosing the storage tier though the lifecycle management rules.
- Support customized Tier definition.

Multi-Cloud Data Management

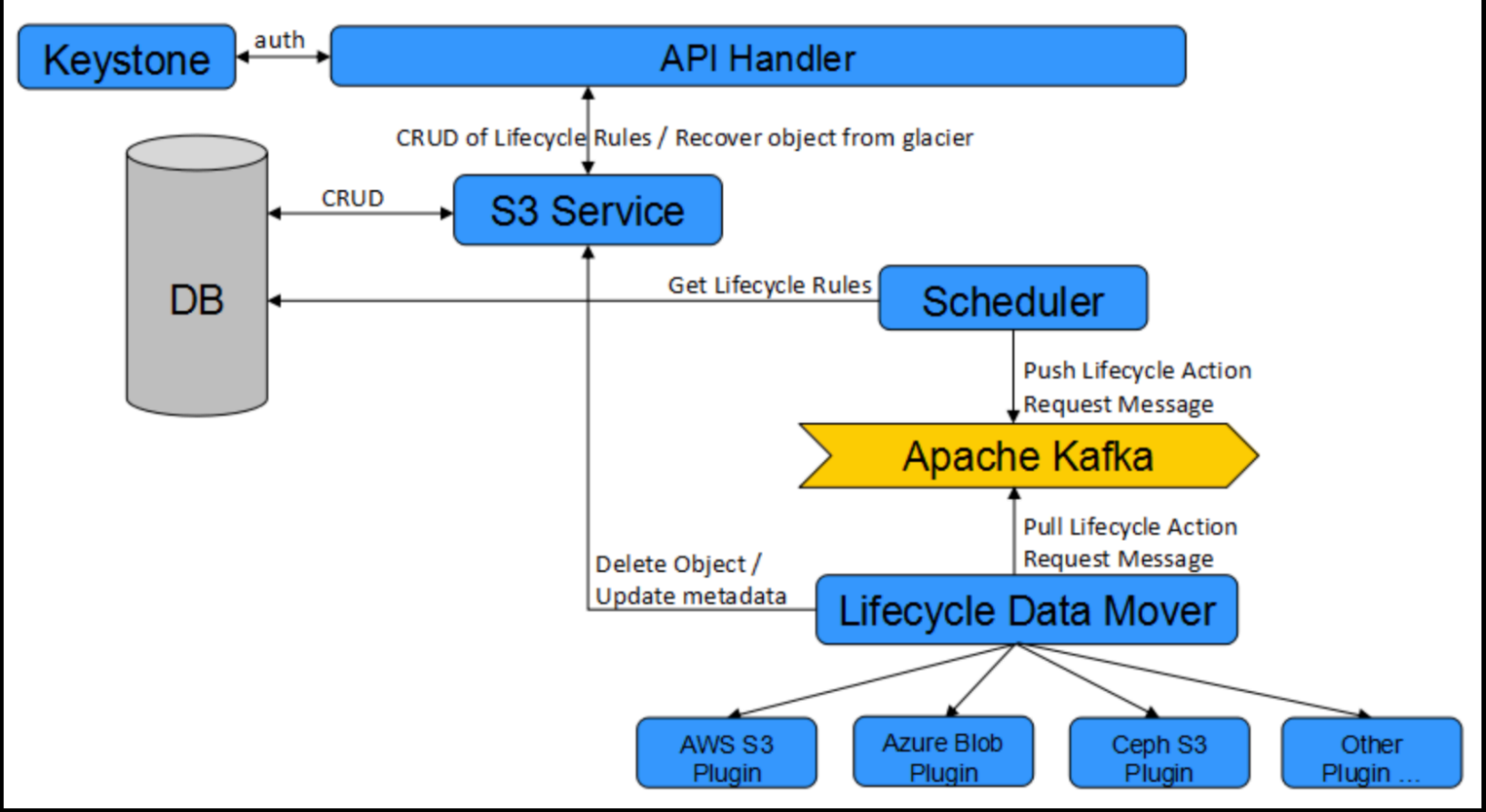
Scalable Framework for Multi-Cloud Data Management





Framework for Object Lifecycle Management

Smart Data Lifecycle Management across cloud across storage tiers



- Scalable and Generic API Life Cycle Configurations
- Schedule and Orchestrate
- Smart Storage Tier Management across Multiple Cloud.
- Inter and Intra Cloud Lifecycle Management

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Roadmap v0.25

2017H2 ZEALAND

- Kubernetes FlexVolume
- Vol CRUD
- Standalone Cinder Integration
- CSI Support
- Ceph, LVM

2018H1 ARUBA

- OpenStack
- Replication
  Array-Based, Host-Based
- Dashboard
- Storage Profiles
- Enumeration
- Block Storage
  - Cinder Drivers
  - Ceph
  - LVM
  - Huawei: Dorado

2018H2 BALI

- S3 Object
- Multi-Cloud
  AWS, Azure, Ceph, Huawei
- Multi-OpenStack
- CSI v1.0

2019H1 CAPRI*

- **Object Lifecycle**
- **Telemetry**
- **Anomaly Detection**
- **Orchestration & Automation**
- **File Share**
- **NVMeoF**
- **Multi-Cloud: GCP, IBM**
- **Storage**
  - **Fujitsu**
  - **HPE Nimble**

2019H2 DAITO*

- Data Protection
- …more

OpenSDS

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SODA

The Open Autonomous Data Project

To build an open autonomous data storage platform with **self-driving protection, availability, security and optimization** capabilities for real world uses; to provide a neutral platform for **open source data storage projects collaboration**, and to **build a multi-vendor ecosystem** of products, solutions and services

PROJECT REBRANDING

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