TIP4020 -Oracle GoldenGate: Best Practices for Deploying the Microservices Architecture

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Safe Harbor Statement

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Program Agenda

1. Introduction to Oracle GoldenGate
2. Microservices Overview
3. Best Practices for Deploying Microservices

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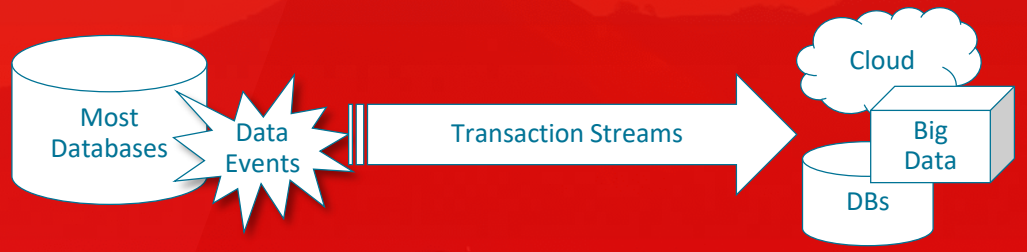
Oracle GoldenGate

Oracle GoldenGate provides low-impact capture, routing, transformation, and delivery of database transactions across homogeneous and heterogeneous environments in real-time with no distance limitations.



**** The most popular enterprise integration tool in history***

Realtime Performance

Extensible & Flexible

Proven & Reliable

Supports Databases, Big Data and NoSQL:

ORACLE · MySQL · IBM DB2 · Microsoft SQL Server · HP NonStop · SAP Sybase · IBM Informix

Hadoop HDFS · Apache Kafka · Apache · Hive · Hadoop High Performance · cloudera · Hortonworks · TEZ · Spark · Flume · Apache HBase

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How Oracle GoldenGate Works – Microservices Architecture

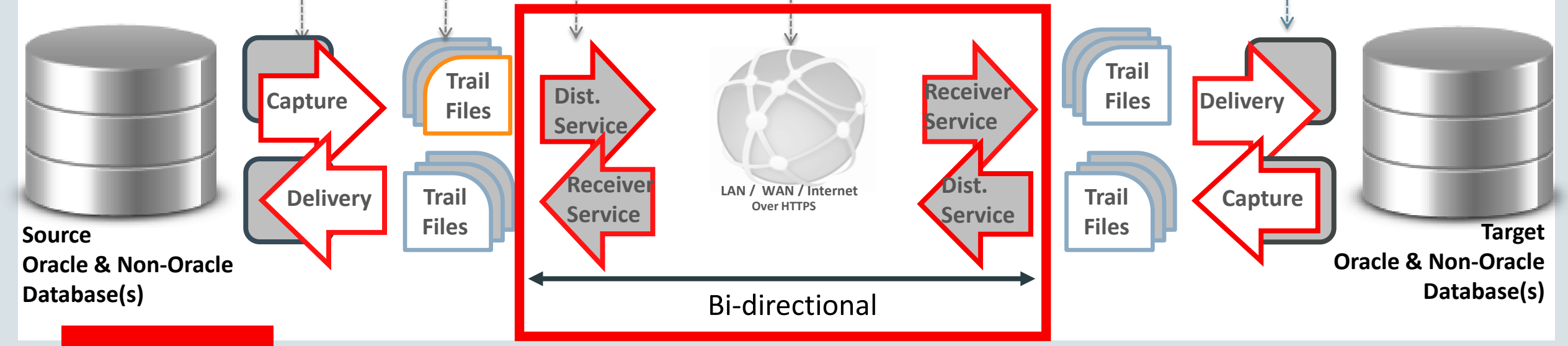
Capture: committed transactions are captured (and can be filtered) as they occur by reading the transaction logs.

Trail: stages and queues data for routing.

Distribution Server/Receiver: distributes data for routing to target(s).

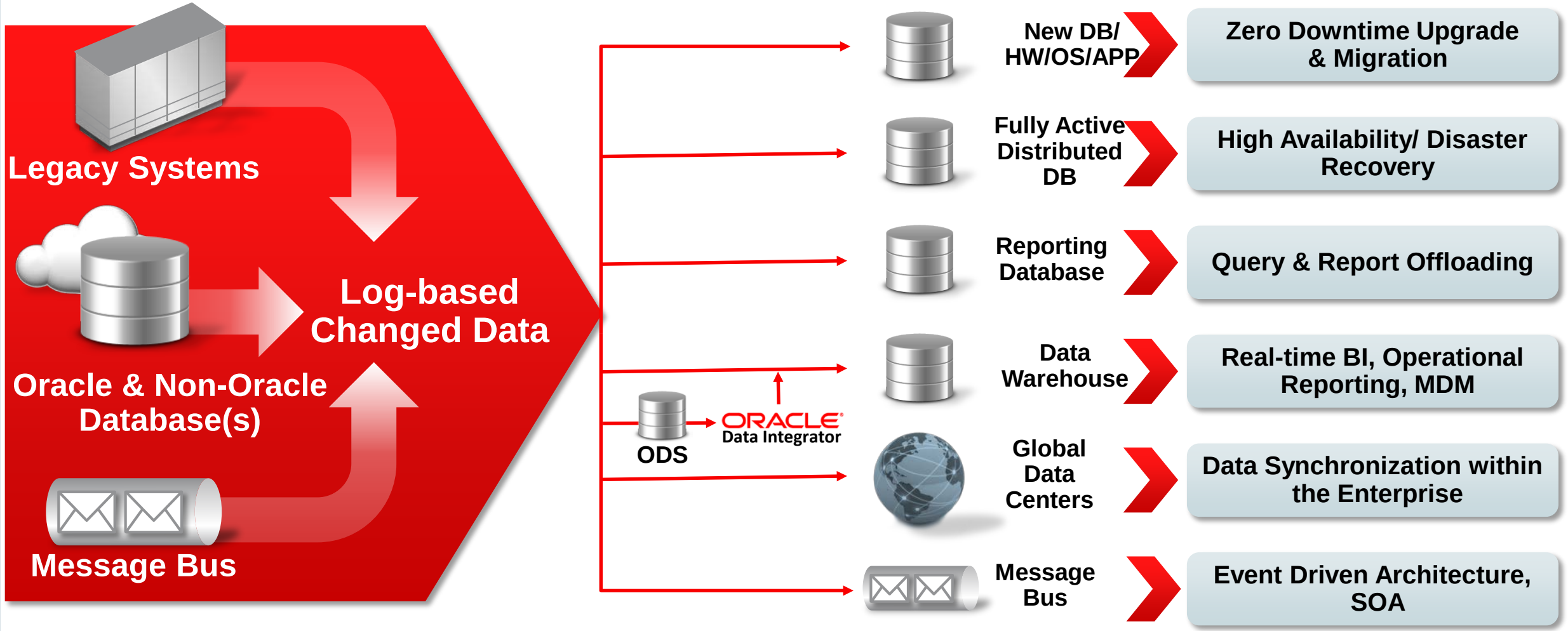
Route: data is compressed, encrypted for routing to target(s).

Delivery: applies data with transaction integrity.



Oracle GoldenGate

Low-Impact, Real-Time Data Integration & Transactional Replication



Oracle GoldenGate 18.1 & 12.3 Features

Oracle GoldenGate 18.1 - New

Patchset update for GoldenGate 12.3. Support for Oracle Database 18c. Support for identity columns and in-row archival. Microservices, ACDR, and sharding enhancements.

Support for Autonomous Database Cloud - New

Apply changes to Autonomous Data Warehouse and Autonomous Transaction Processing Cloud Service

GoldenGate Microservices Architecture

REST interfaces for Configuration, Administration and Monitoring with included HTML5 Web applications
Deploy at cloud scale with fully secure HTTPS interfaces and Secure Web Sockets for streaming data

Parallel Apply

Highly scalable client side apply engine with gains of over 5x throughput on Oracle

Automatic Conflict Detection and Resolution (CDR)

Conflict detection and resolution built directly into Oracle Database Kernel

Enhanced Big Data and NoSQL Support

Sample adapters for Oracle NoSQL, MongoDB. Support for Hive Metadata

Heterogeneous Enhancements - New

Remote capture support for MySQL. Cross endian support for DB2 LUW.

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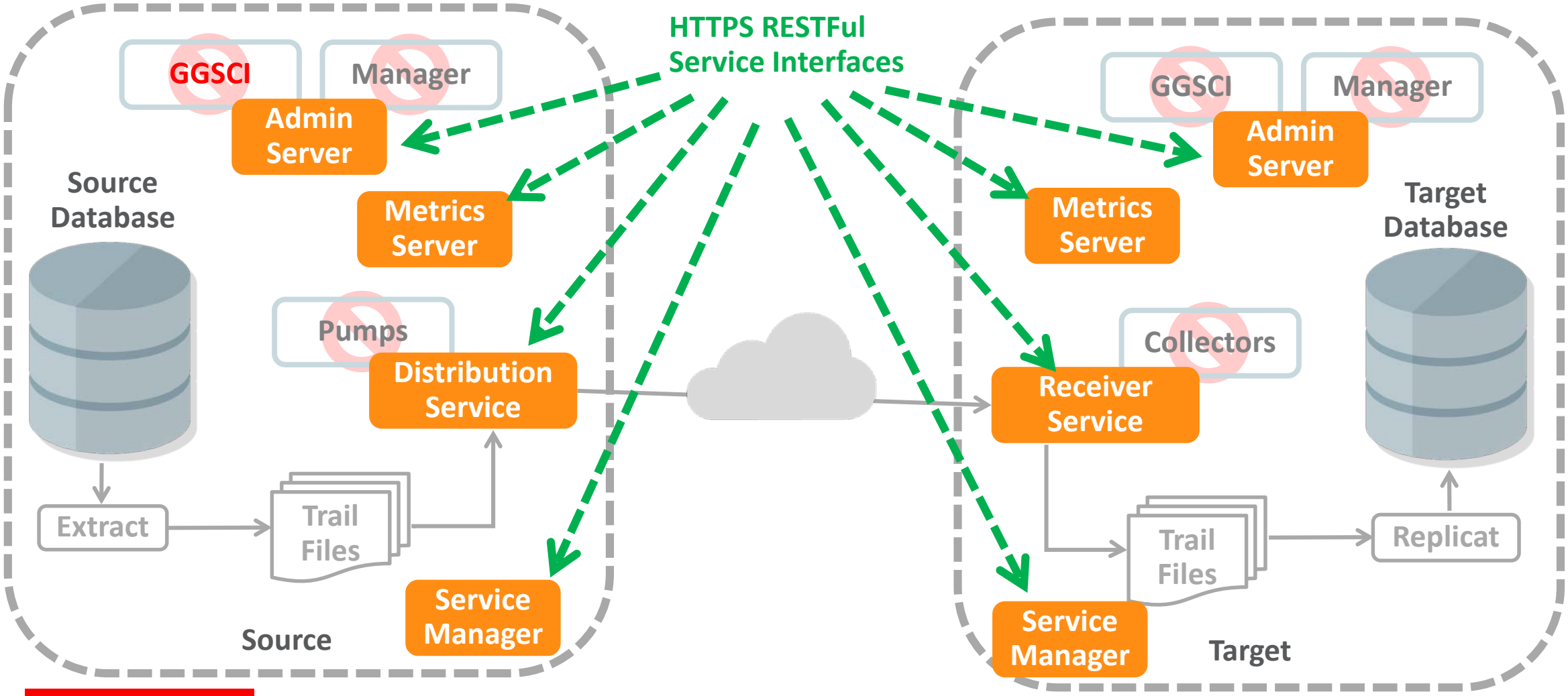
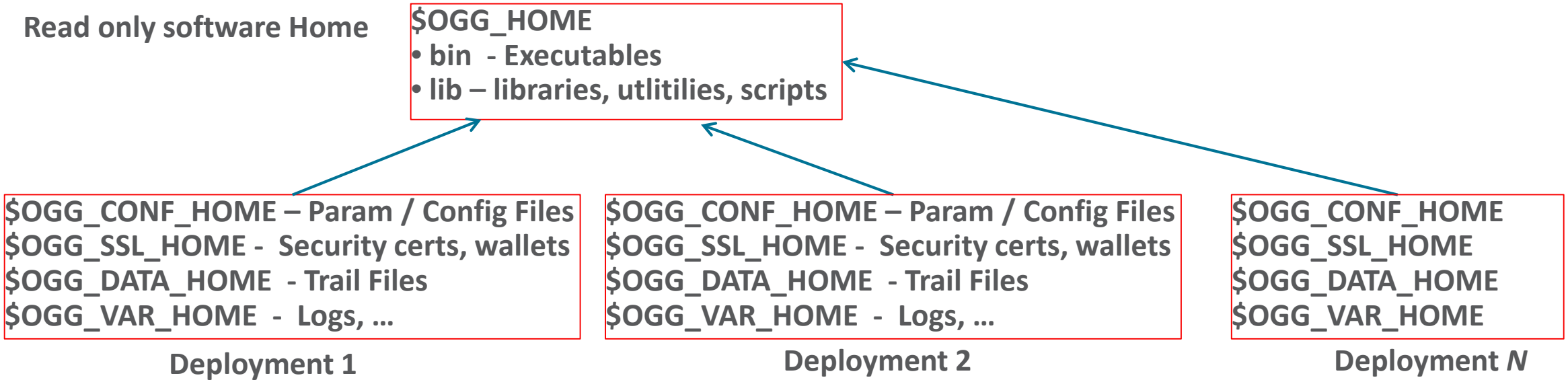
Microservices Architecture for Cloud and Large-scale Deployments

Administration, Distribution, Receiver, Metrics Services with RESTful Service Interfaces

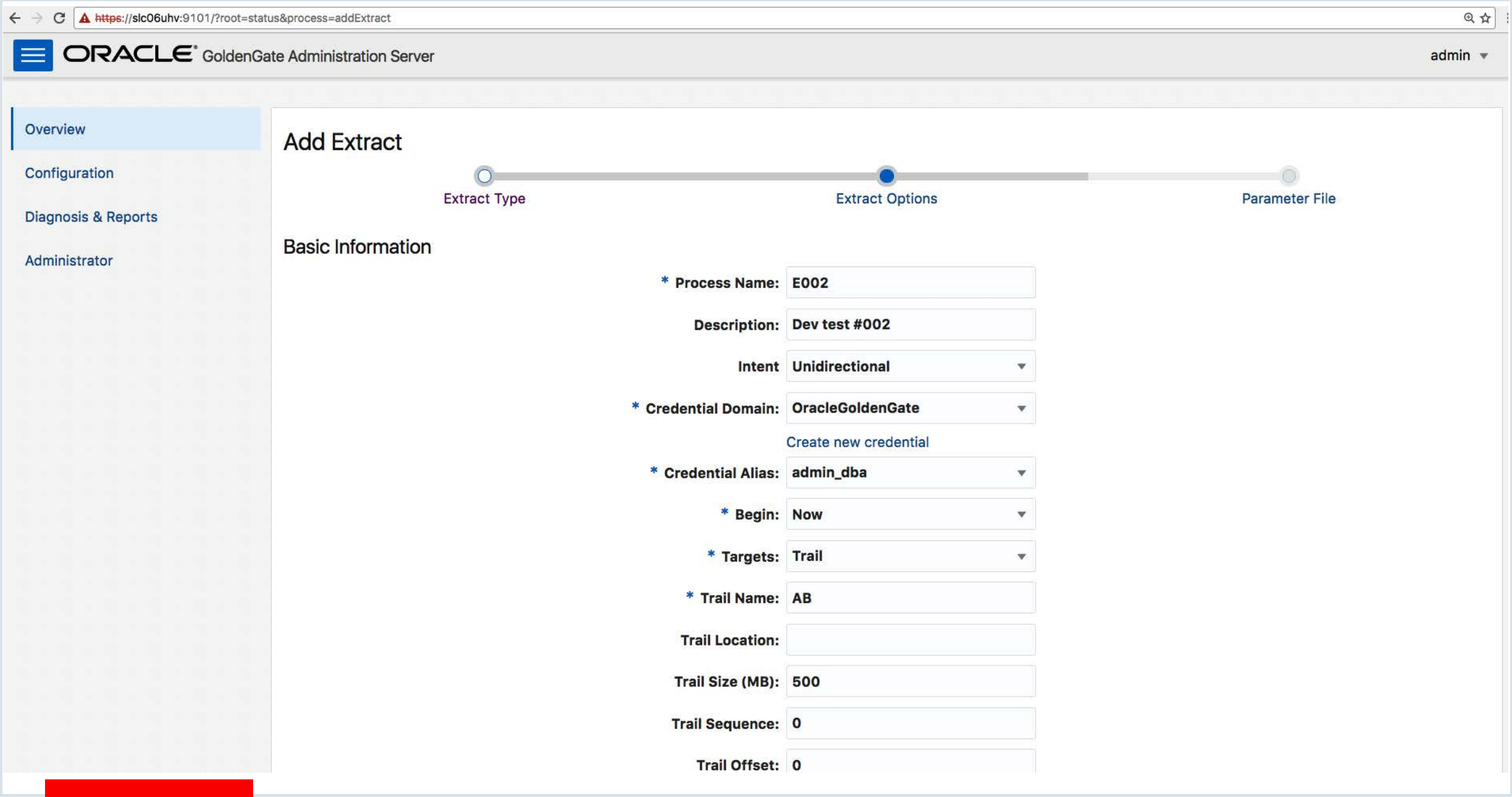


Simplified Mid-tier Deployments and Upgrades

New File System layout - Read only Software, customizable deployment directories



- Allows multiple deployments to share same read only software home
- Customize locations for trail data and other deployment specific content
- One step upgrade - Switch deployment to new version by updating $OGG_HOME to new software home in Service Manager



Example RESTful Service Call to Create Extract

Single Call to create, update parameter file, register, and start integrated Extract

POST https://xyz.us.oracle.com:9000/services/v2/processes/extracts/e001

JSON Payload:

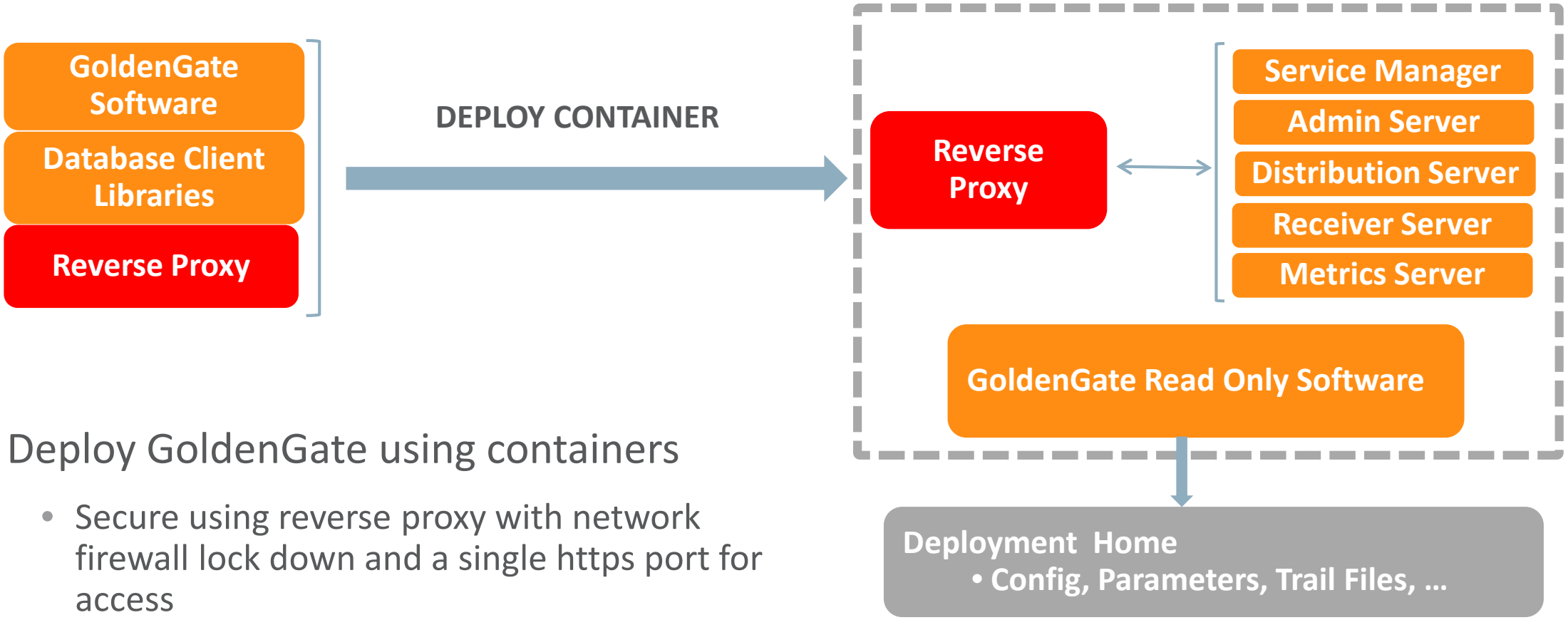
```
{
    "$schema" : "ogg:extract",
    "credentials" :
    {
      "domain" : "OracleGoldenGate",
      "alias" : "gg_2"
    },
    "config" :
    [
      "-- Parameter file for primary extract: e001",
      " extract e001",
      " useridalias gg_2",
      " exttrail dirdat/ah, format release 12.2",
      " tranlogoptions excludetag 066",
      " eofdelaycsecs 10",
      " sharding",
      " "
    ],
"status" : “running",
    "source" :
    {
      "tranlogs" : "integrated"
    },
    "registration" :
    {
      "csn" : "0.0",
      "share" : true
    },
    "targets" :
    [
      {
    "name" : "ah"
      }
    ]
  }
```

AdminClient

Command Line client – connect and administer local and remote deployments

```
OGG (not connected)> CONNECT https://xyz.us.oracle.com:9000 DEPLOYMENT demo AS admin PASSWORD ***

OGG (https://localhost:9000 demo)> DBLOGIN USERIDALIAS gg_2 DOMAIN OracleGoldenGate
Successfully logged into database.

OGG (https://localhost:9000 demo)> ADD EXTRACT e001 INTEGRATED TRANLOG BEGIN NOW
2016-09-16T01:13:16Z  INFO   OGG-08100  EXTRACT (Integrated) added.

OGG (https://localhost:9000 demo)>  REGISTER EXTRACT e001 DATABASE
2016-09-16T01:13:33Z  INFO   OGG-02003  Extract e001 successfully registered with database at SCN 1155176.

OGG (https://localhost:9000 demo)> ADD EXTTRAIL ah EXTRACT e001
 2016-09-16T01:13:34Z  INFO   OGG-08100  EXTTRAIL added.

OGG (https://localhost:9000 demo)> START EXTRACT e001
2016-09-16T01:13:34Z  INFO   OGG-00975  EXTRACT EDBA starting
2016-09-16T01:13:34Z  INFO   OGG-15426  EXTRACT EDBA started
```

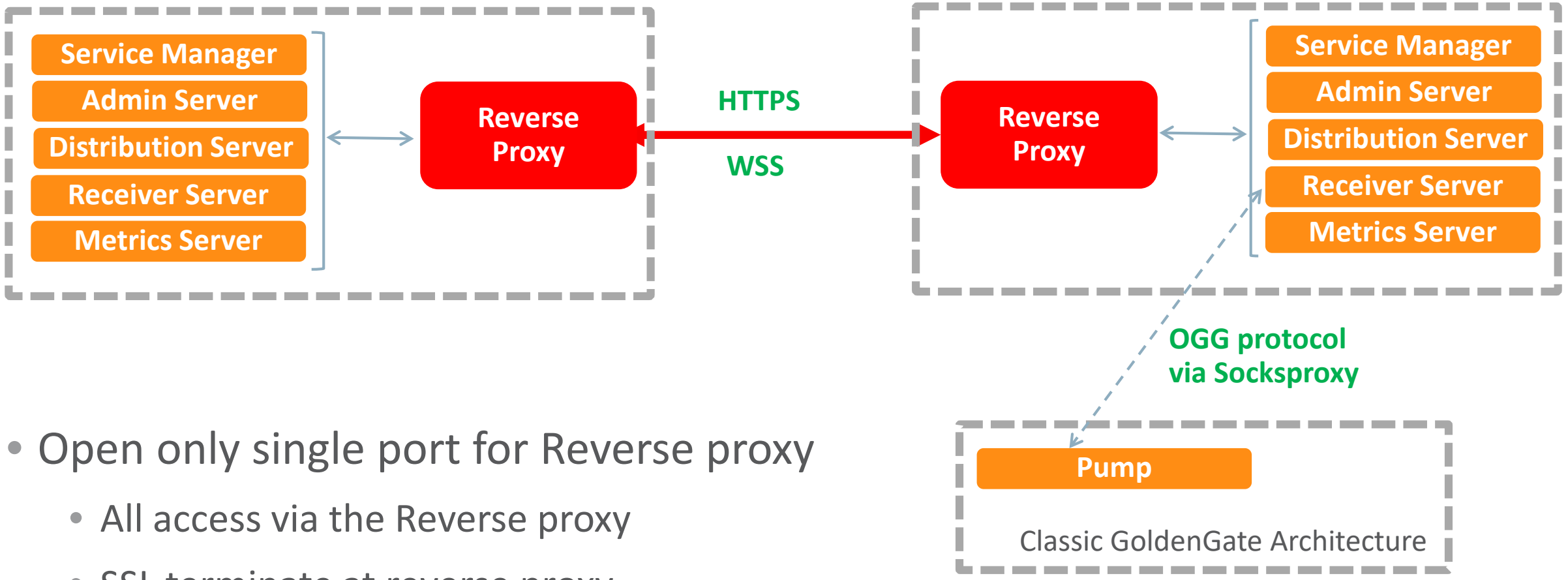
GoldenGate Microservices with standard containers



- Deploy GoldenGate using containers
  - Secure using reverse proxy with network firewall lock down and a single https port for access

Secure GoldenGate Deployments

GoldenGate services compatible with reverse proxy servers



- Open only single port for Reverse proxy
  - All access via the Reverse proxy
  - SSL terminate at reverse proxy
- Interoperate securely with classic GoldenGate architecture using socksproxy

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Best Practices for Deploying the Microservices Architecture

Joe DiCaro
Database Analyst

October 2018

EDM / DVE at Wells Fargo

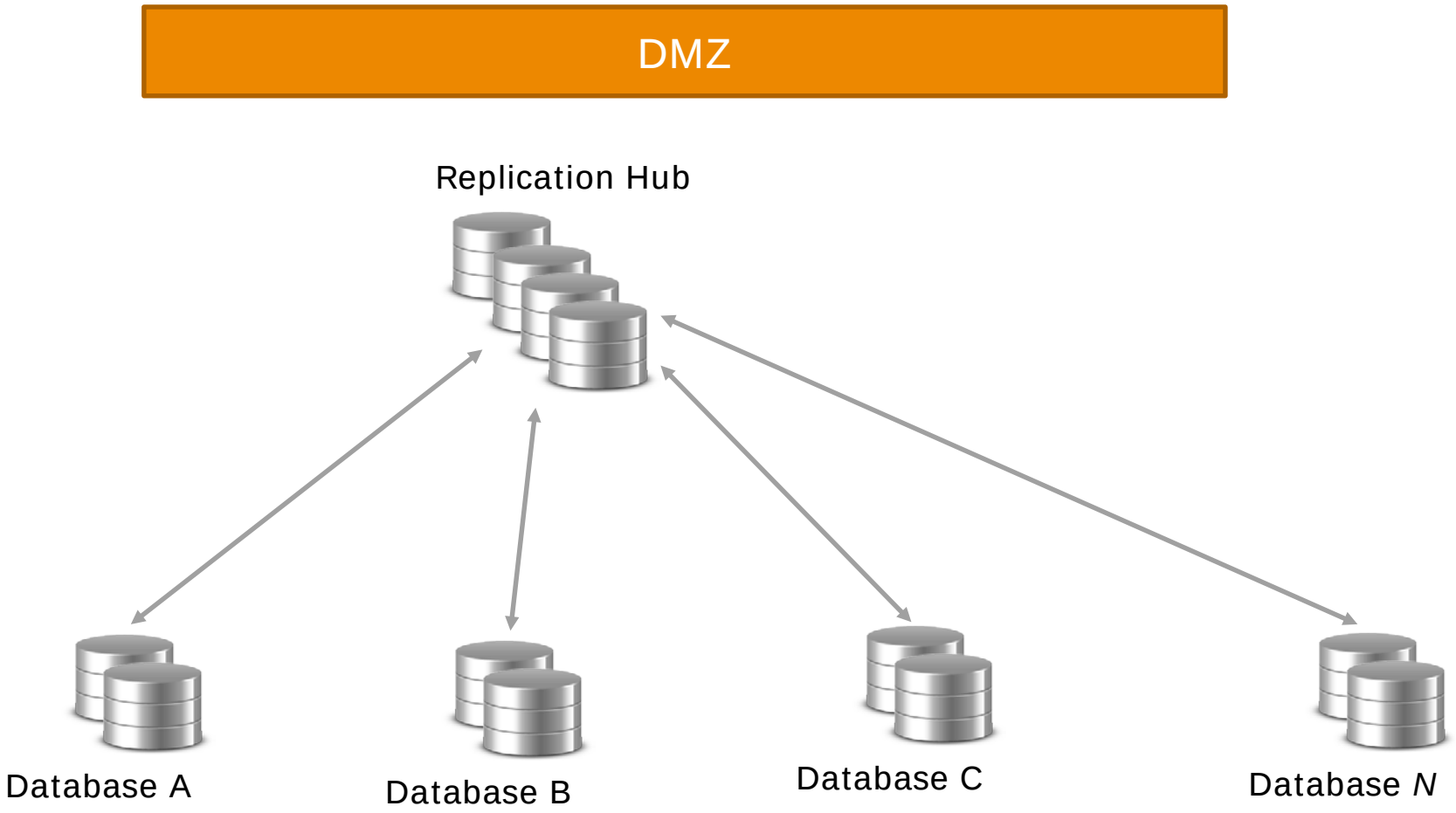
Introduction to Enterprise Database Management (EDM) – Database Virtualization and Engineering (DVE)

- Long history of managing Oracle RAC-hosted consolidation environments
- Establishes standards for multiple database products
- Sets infrastructure standards for Oracle hosting
- Responsible for database product certifications
- Manages multiple Oracle Exadata Engineered Systems
- Manages multiple Dedicated GoldenGate Replication Hubs

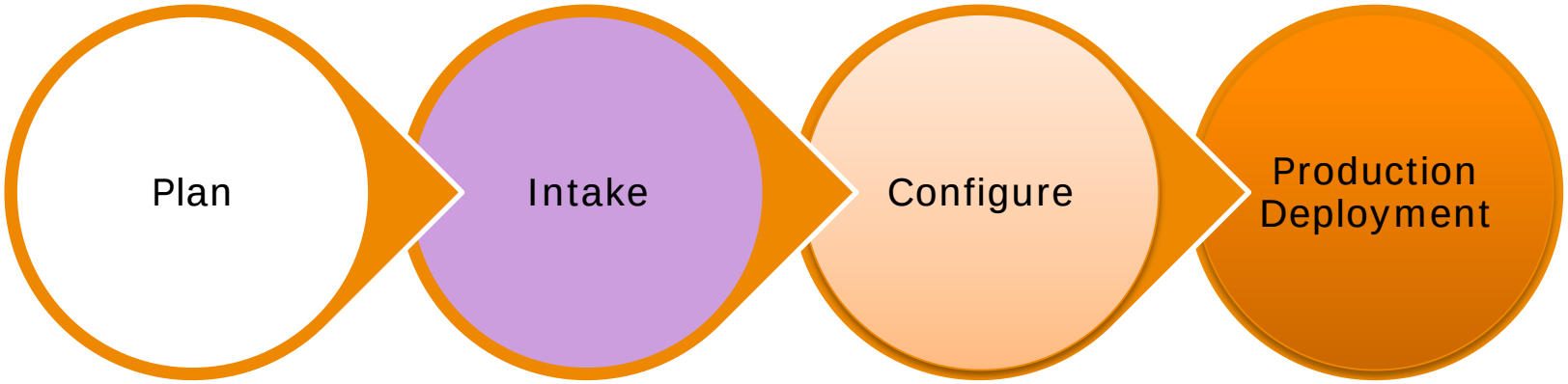
GoldenGate Replication Hub Environment

- Shared Consolidated and Geographically Dispersed
- Consists of multiple 4-Way Oracle RAC Clusters
- XAG Cluster Integration for HA Management and ACFS
- Monitoring – GG Monitor Agent thru Oracle GoldenGate Plug-In
- GoldenGate 12.2 for Oracle 12c and 11g RDBMS (MT and Non-Container)
- GoldenGate 12.2/12.3 Java Adapters to downstream JMS
- GoldenGate 12.2 for Sybase 16
- GoldenGate 12.2 Replicats for Oracle 12c From SQL Server
- GoldenGate 12.3 Classic for 12c RDBMS version only
- Currently In Development for early 2019 production deployment
  - GoldenGate 12.3 For BigData
  - GoldenGate 12.3 For DB2 (Waiting on Oracle's DB2 12 Certification)
  - **GoldenGate 12.3 Microservices Architecture**

GoldenGate Replication Hub Environment



GoldenGate Phased Deployment Process



Identify Replication Candidates

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- Enterprise replication inventory is vital!
  - Required for all patching and maintenance activities
  - Ability to define replication to an ecosystem for communications
  - Required for metrics reporting
  - Chargeback and labor
  - Drives the decommission list

Application ID	Application mnemonic (2 char)
Replication Type	Business Unit
Trail file space amount	Current Configuration (OS, CPU, storage)
Replication Category	Maintenance Window
Isolation Requirements	Physical Location
Monitor/Support Groups	DDL/STREAMS_POOL_SIZE/MINKEEPDAYS

Highly Standardized

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- Select a uniform hardware platform
  - GG installs are standardized (same filesystem location, same patch level, no-drift environments)
  - Consistent Naming Standards: Evars, service managers, homes, ACFS filesystems all managed by engineering
  - Provides a consistent user experience on each cluster
  - Clearly define support roles and responsibilities between groups
  - Checks and balances – Engineering defines standards, Container DBAs enforces standards, Application DBA supports replication according to standards
  - Mandatory two character mnemonic guarantees unique checkpoint file naming
  - All replication MUST employ credential stores and trail file encryption
- Be firm; limit exceptions, enforce standards to the defined stack.

Highly Consolidated Replication Hubs

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- Segment By Business Unit and Monitoring Group
  - 4-way RAC allows for two, 2-node Allocation Units For each manager
  - Requested trail space limits the dedicated ACFS resource to the ask
  - Service manager is assigned to only two nodes of 4-way replication hub cluster
  - GG VIP is assigned to manager
  - Support Groups alerting assigned to service manager in OEM
  - Service manager home ➔ Dedicated ACFS ➔ Service manager Business Unit

Example:

OGG_HOME: /app/ora/software/ogg/12c

ACFS Name: /ggacfs_bizunit01

XAG 9.1 Cluster Resource: xag.ggbizunit01.oracle

Install 12.3 MA

- MA Software install is different than classic
- Software homes are separate from deployments
- Utilize response file method to automate your install
- Patched homes now can be preinstalled without disrupting operations
- Install simplification allow us easily meet our compliance requirements

Patching

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- Peak Enterprise GoldenGate reached ~1400 GoldenGate Homes
- Highly Standardized Hub consolidation ~500 GoldenGate Homes
- 12.3 MA, expected home count levels ~250 GoldenGate Homes
- Current pathing is rolling (failover,patch,failback,patch)
- Patched MA software home will be auto-deployed in advance using the response file install
- ServiceManager will be stopped, repoint, and restarted
- Extremely efficient model operating on far less homes.

Planning and Intake

- Establish enterprise replication use cases
- Hold periodic intake meetings to review new replication
- Create a standardized questionnaire to gather necessary info for configuration and deployment
- Identify two character application mnemonic for each application
- Have published replication standards document for configuration and deployment
- Obtain signoff before deployment

User Management

- Expect LDAP Integration in future GA release
- Standardize C## container replication database user
- Standardize non-container replication database user
- Develop role separation document
- Establish clear ownership of tasks based on role
- Have a plan to manage users manually anticipating future LDAP support

SSL Setup

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- EM 13c, 12c: How to Configure the Enterprise Manager Cloud Control Management Agent for Secure Socket Layer (SSL) Certificates (Doc ID 2213661.1)
- Subject Alternative Name (SAN) necessary for Cluster HA
- GoldenGate Virtual IP will be Service Manager URL for HA
  - https://lab01ga.wellsfargo.com:18000/
- SAN setup with orapki
  - $OGG_HOME/bin/orapki wallet add -wallet $GG_WALLET_LOC/lab01 -dn "CN=lab01.acme.com, OU=EDM, O=Acme, L=San Francisco, ST=California, C=US" -keysize 2048 -addext_san DNS:lab01,DNS:lab02.acme.com,DNS:lab02,DNS:lab01ga.acme.com,DNS:lab01ga,DNS:lab01gb.acme.com,DNS:lab01gb -pwd abc123
- Auto login wallet will need to be staged
- XAG relocation testing is working well using Virtual IP

Software Install

- Software is now separate from the deployment
- Software version is variable
- One software install per server for all SMs on the cluster
- Standardized response file
  - INSTALL_OPTION=ORA12c
  - SOFTWARE_LOCATION=/app/ora/software/ogg/12c
  - START_MANAGER=false
  - INVENTORY_LOCATION=/app/orainv/inv
  - UNIX_GROUP_NAME=orainst
- Limit the database version to 12c
- Keep master response file in known location or software repository
- Only do silent installs
- Automate install and response file generation

Software Install - Evars

- Standard environment variables
  - **OGG Software Install Location**
    - export OGG_HOME="/app/ora/software/ogg/12c"
  - **Service Manager deployment home**
    - export SM_DEPLOYMENT_HOME="/ggapp_<BU name><BU Number>/sm"
  - **Service Manager registry location**
    - export SM_REGISTRY_LOCATION="${SM_DEPLOYMENT_HOME}/etc/conf"
  - **Service Manager registry filename**
    - export SM_REGISTRY_FILE="${SM_REGISTRY_LOCATION}/deploymentRegistry.dat"
  - **OGG registry location**
    - export OGG_CONF_HOME="${SM_REGISTRY_LOCATION}"
  - **ORACLE_HOME**
    - export ORACLE_HOME=/app/ora/software/db/18c
  - **LD_LIBRARY_PATH**
    - export LD_LIBRARY_PATH=$ORACLE_HOME/lib:$LD_LIBRARY_PATH

Deployment – Best Practice Guidelines

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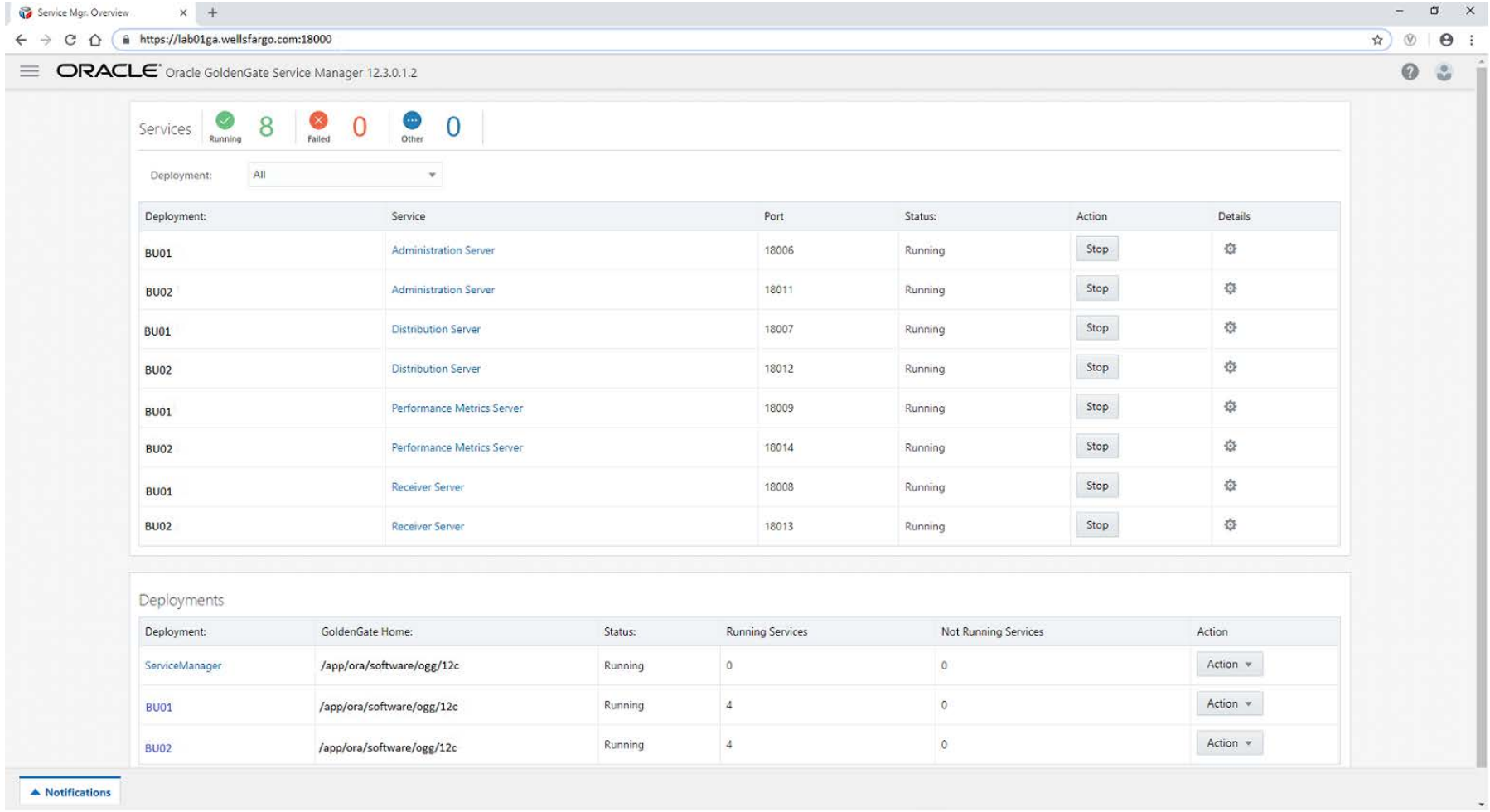
- Separate Service Managers by business unit or funding source
- Divide RAC cluster into allocation units
- Use ACFS to enforce budgeted resource limits
- Multiple deployments within the same SM should be part of the same replication ecosystem

GG Deployment – Best Practice

- There should be a well documented standard to manage a deployment
- Keep master SM response file in known location or software repository
- Automate install and response file generation
- Initial deployment will require a minimum of ~24 parameter values
- Subsequent deployments in the same Service Manager will require ~10 parameter values
- Naming standards, Ports, Service Managers, Deployment configuration should be managed and enforced by a central authority
- Actual replication should be managed by users according to the published standards

Deployment – Shared



Thank you for attending

GoldenGate Microservices

Questions and Answers