2

Planning an Oracle SOA Suite 12*c* Deployment Architecture

Objectives

After completing this lesson, you should be able to:

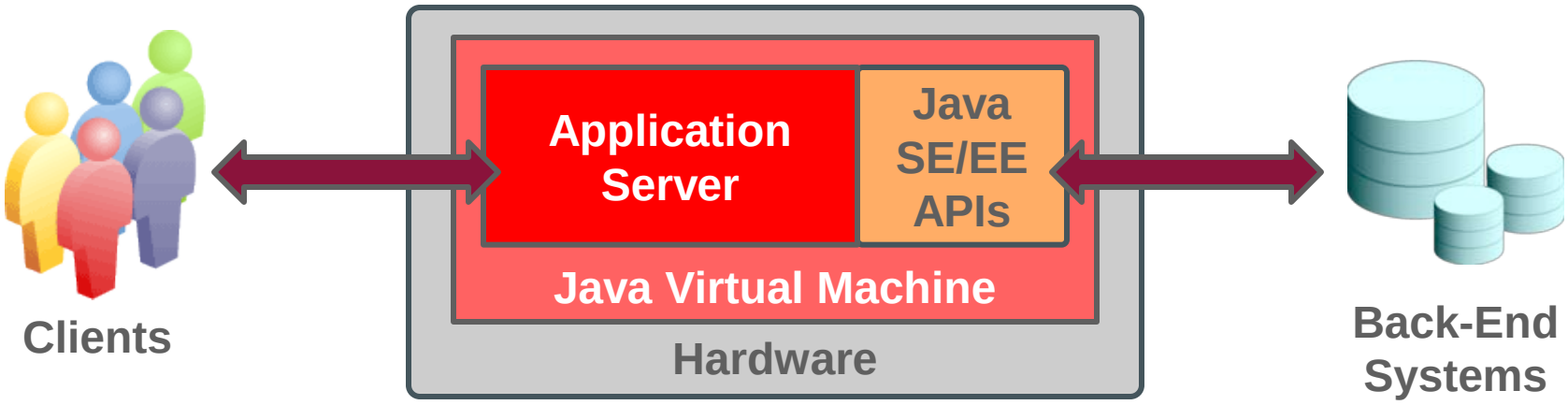
- Select a deployment topology for your environment
- Document the Enterprise Deployment architecture plan
- Prepare your network environment (firewalls, IP addresses, and host names)
- Prepare file system for deployment
- Prepare and plan the database strategy
- Plan a SOA deployment topology based on the Enterprise Deployment architecture reference model
- Plan an architecture for high availability and failover

Agenda

- Reviewing the Oracle WebLogic Server concepts
- Examining the primary deployment topologies
- Documenting the enterprise deployment plan
- Preparing the installation environment
- Installation roadmap and model for Enterprise Deployment

Java Platform Enterprise Edition

- Java Platform Enterprise Edition (Java EE) is the Java standard for distributed, enterprise computing.
- The Java EE platform consists of:
  - A Java Virtual Machine (JVM)
  - Java Platform Standard Edition (Java SE)
  - A Java EE application server
  - Java EE Application Programming Interfaces (APIs)



Oracle WebLogic Server

Oracle WebLogic Server (WLS):

- Is a Java EE application server that hosts Java EE applications (WLS 12*c* implements Java EE 6.0.)
- Provides clustering for load balancing and high availability
- Offers an extensible security realm for authentication and authorization
- Runs the “Java components” of Oracle Fusion Middleware (FMW), including:
  - Oracle SOA Suite
  - Oracle Service Bus
  - Oracle Business Process Management
  - Oracle Business Activity Monitoring
  - Some Oracle Identity Management components

WebLogic Server Domain

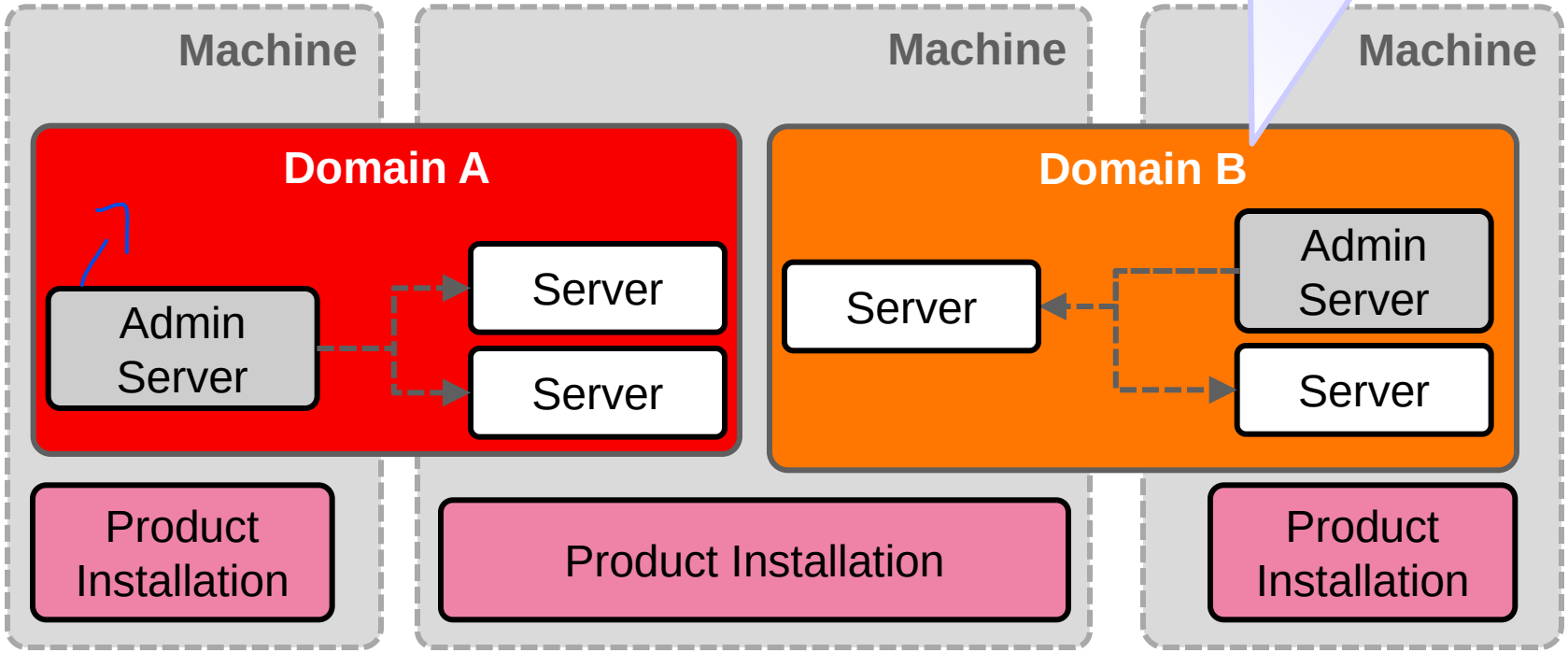
any number of domains is normal

admin server : reporting , security , user management , problem resolution

A domain is a collection of WebLogic Server resources.
You choose:

- The number of domains in your environment
- The structure of each domain (their topology)

Enterprise Deployment is based on the building blocks provided by the domain structure.

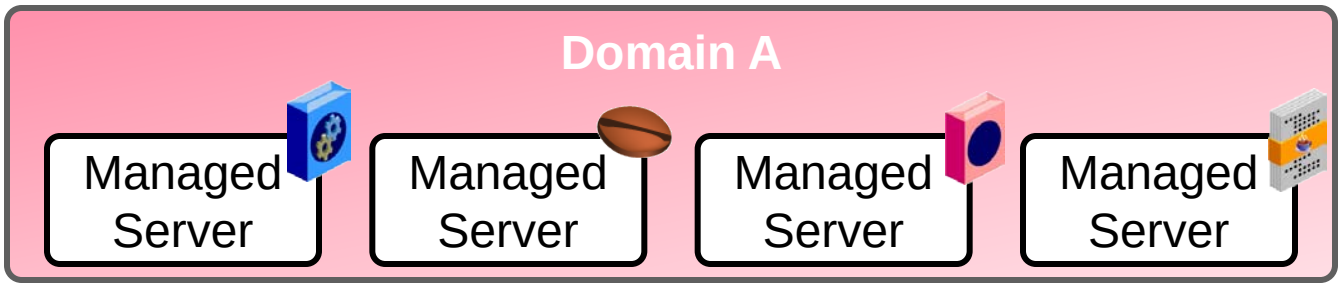


Administration Server

- A domain must have exactly one instance of WebLogic Server that acts as the *Administration Server.* An Administration Server is part of exactly one domain.
- The Administration Server is:
  - The central point for configuration and management of all domain resources
  - Solely in charge of the domain's configuration. It distributes configuration changes to other servers in the domain.
  - An instance of WebLogic Server and therefore, is a fully functional Java Enterprise Edition application server

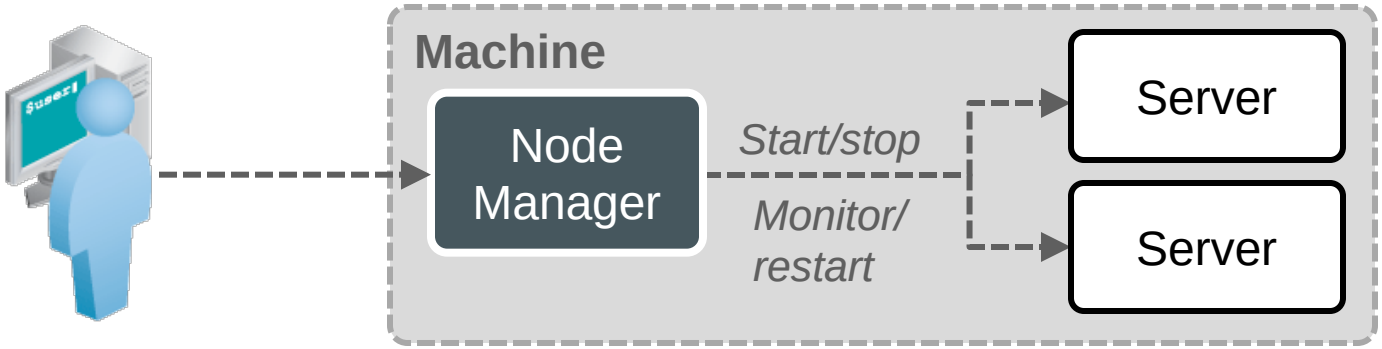
Managed Servers

- A domain can have zero or more *Managed Servers*.
- A Managed Server:
  - Is managed by the Administration Server
  - Is an instance of WebLogic Server and therefore, is a fully functional Java Enterprise Edition application server
  - Is where your SOA composite applications and Java Enterprise Edition applications run
  - Can be clustered with other cooperating Managed Servers for availability, scalability, and automatic failover



Node Manager

- Is a separate process that accepts remote commands to start, stop, or suspend servers on its machine
- Monitors server availability and can restart failed servers
- Can be used to migrate servers on a failed machine to another machine



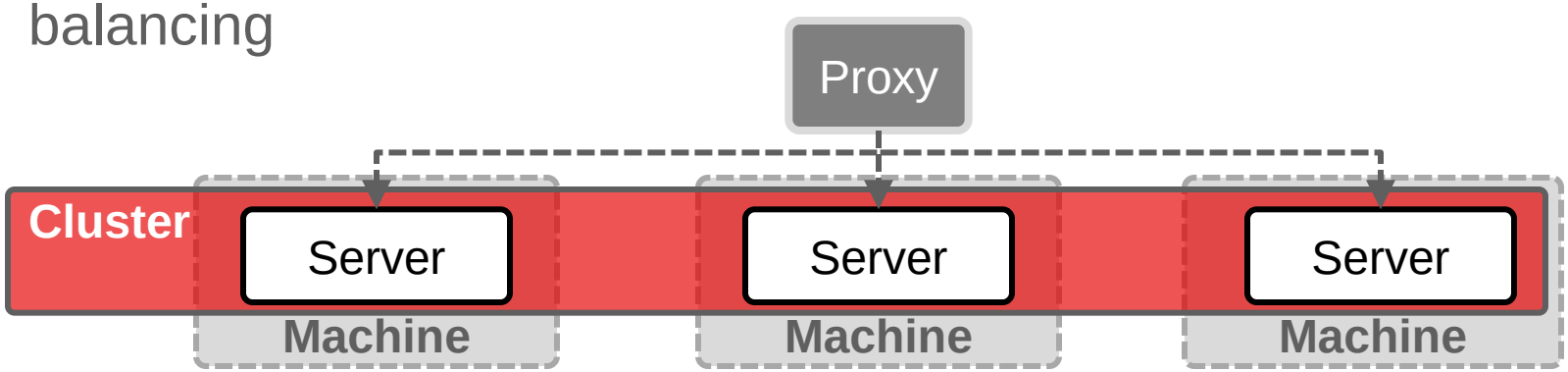
Machines and Clusters

A *machine*:

- Is defined within a domain to represent physical hardware
- Is required by Node Manager and used by clusters
- Has Managed Servers assigned to it

A *cluster*:

- Has multiple Managed Servers running cooperatively in it, which provides for failover
- With HTTP clients requires a cluster proxy that provides load balancing



WebLogic Server Administrative Tools

WebLogic Server can be administered and monitored by using:

- Oracle WebLogic Server Administration Console
- Oracle WebLogic Scripting Tool (WLST)
- Java Management Extensions (JMX) API
- Oracle Enterprise Manager Fusion Middleware Control
- Oracle Enterprise Manager Oracle Cloud Control

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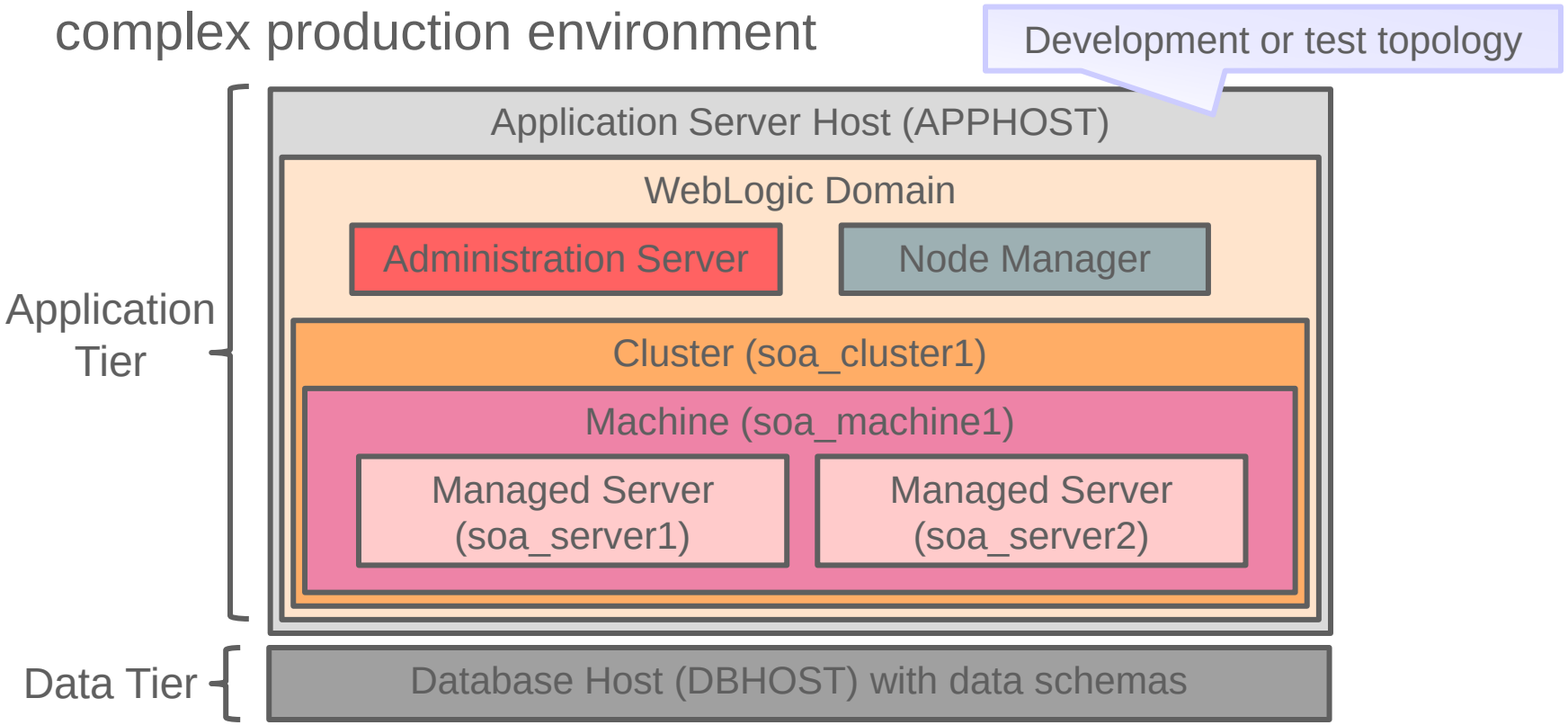
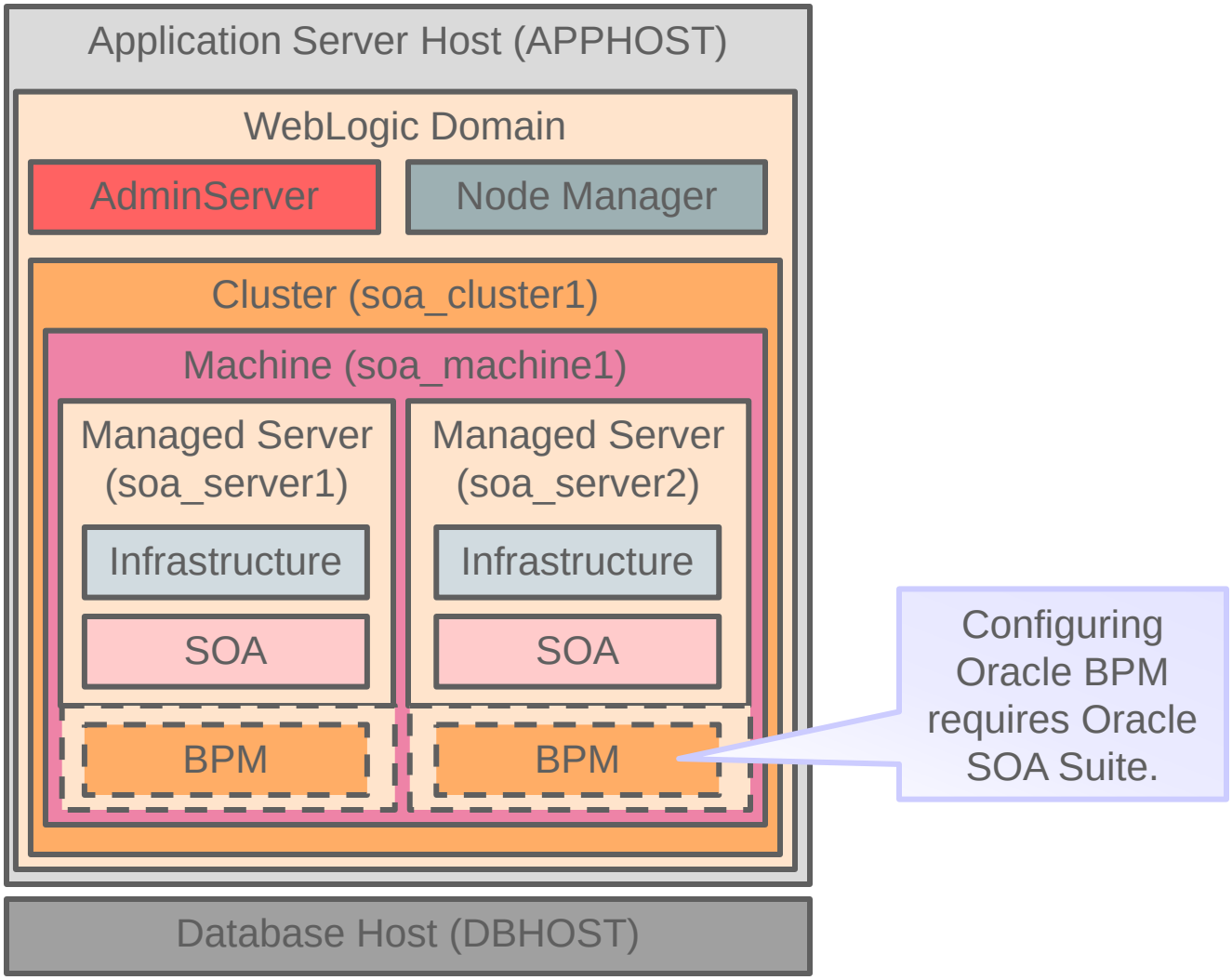
Primary (Standard) Installation Topology

The standard installation topology:

- Is installed on a single host for evaluation and testing purposes
- Can serve as a starting point for scaling out to a more complex production environment



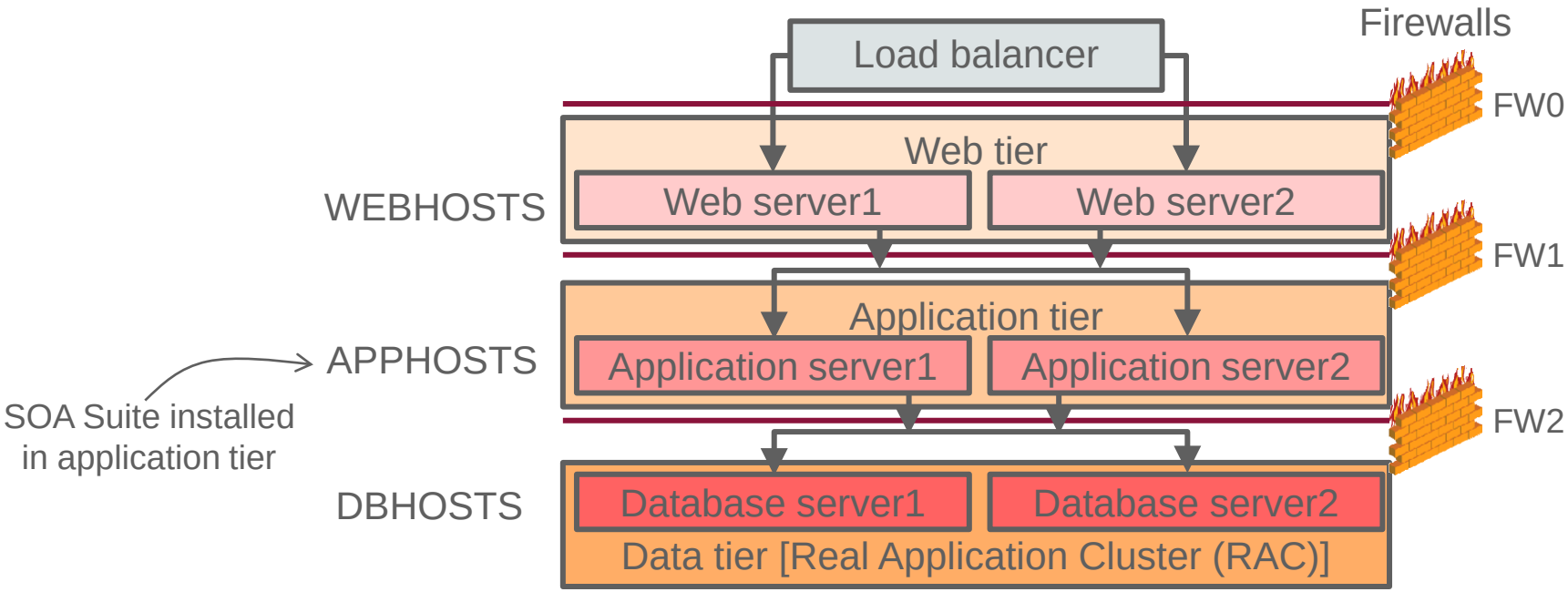
Standard SOA and BPM Topology



Enterprise Deployment: Overview

An enterprise deployment topology is:

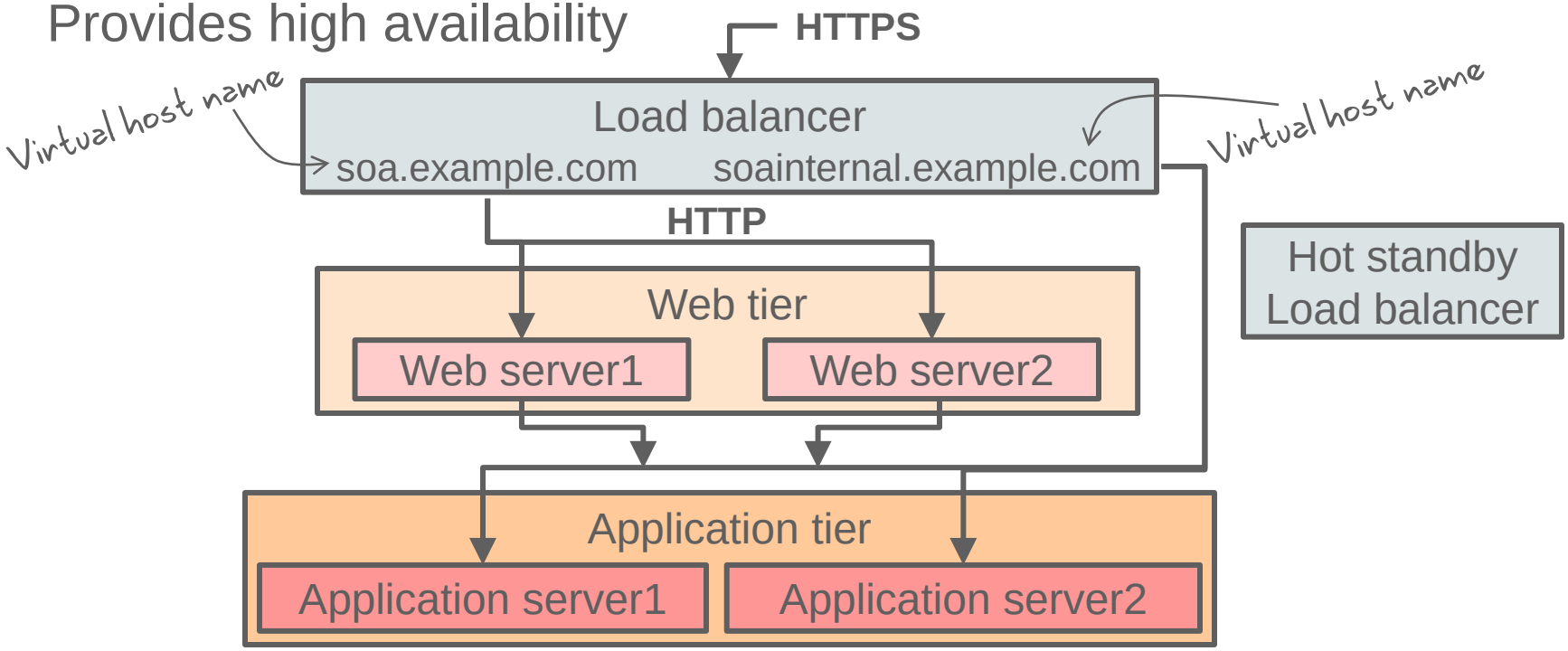
- Designed to demonstrate best practices for installing and configuring a production environment
- Based on the concept of a multi-tiered deployment that uses standard communications between software tiers



Purpose of the Hardware Load Balancer (LBR)

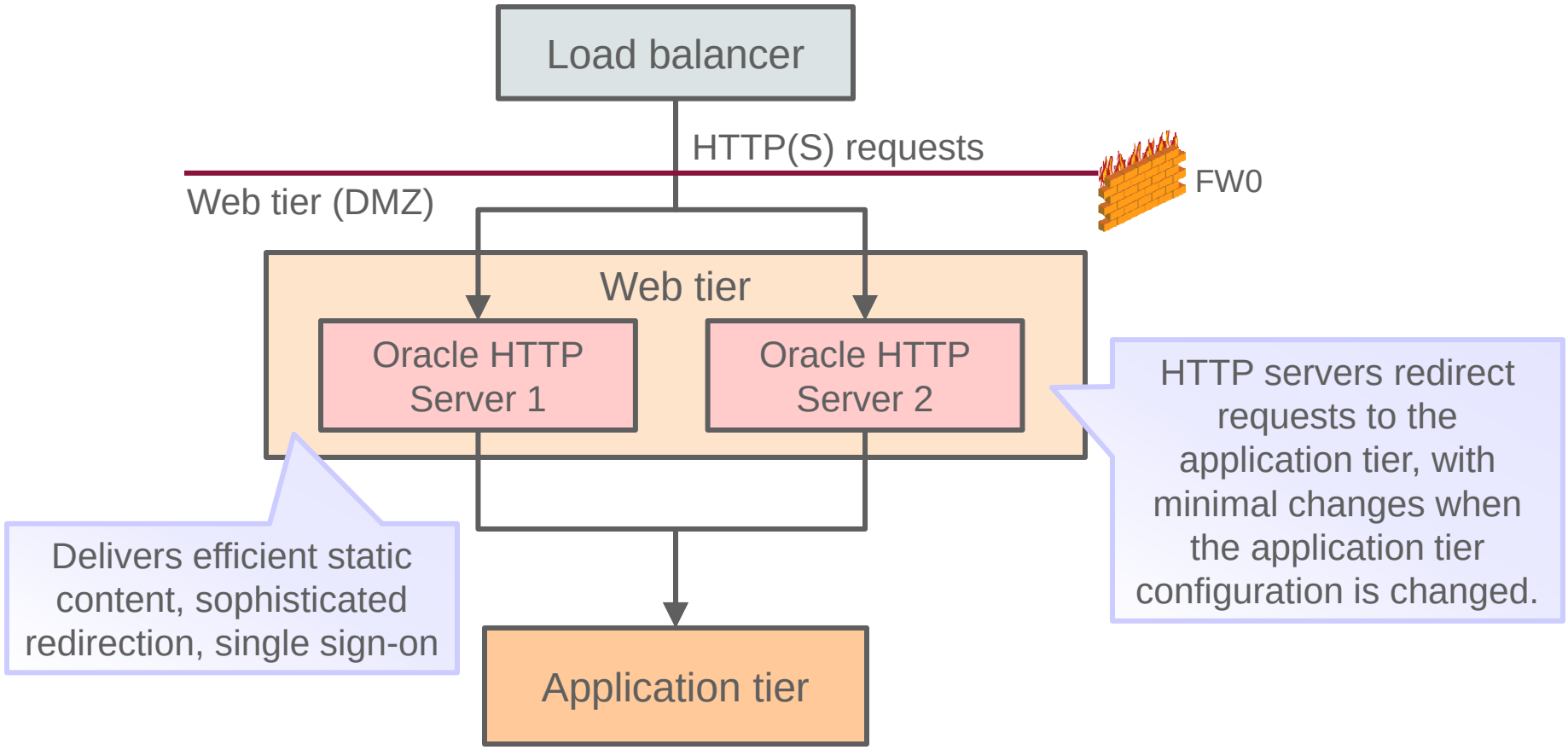
The hardware load balancer:

- Balances the load on the web tier
- Routes only HTTP requests to the web tier. Secure Sockets Layer (SSL) requests are terminated at the load balancer.
- Provides high availability

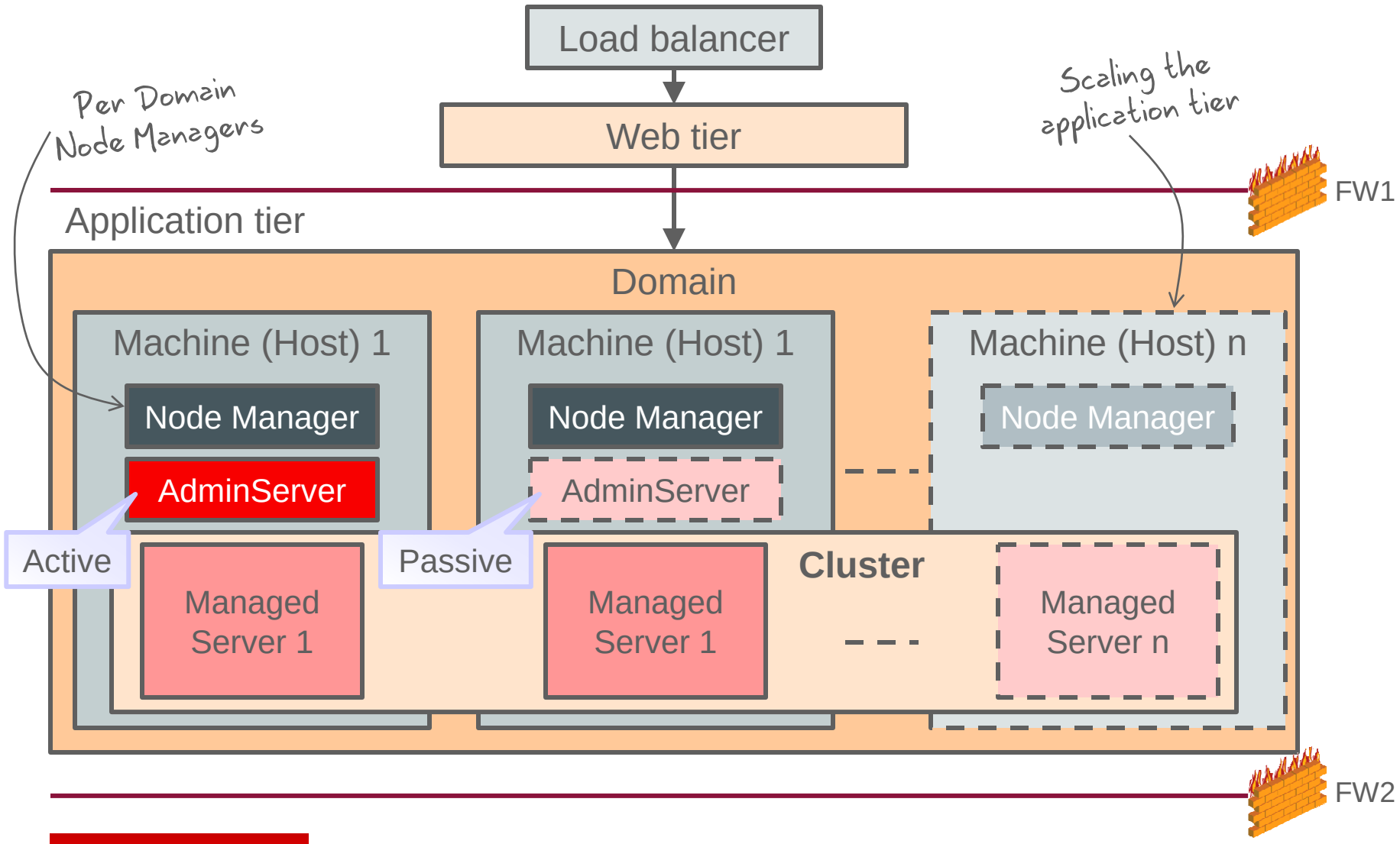


Understanding the Web Tier

An Oracle HTTP Server can be configured in an existing Oracle WebLogic Server domain.



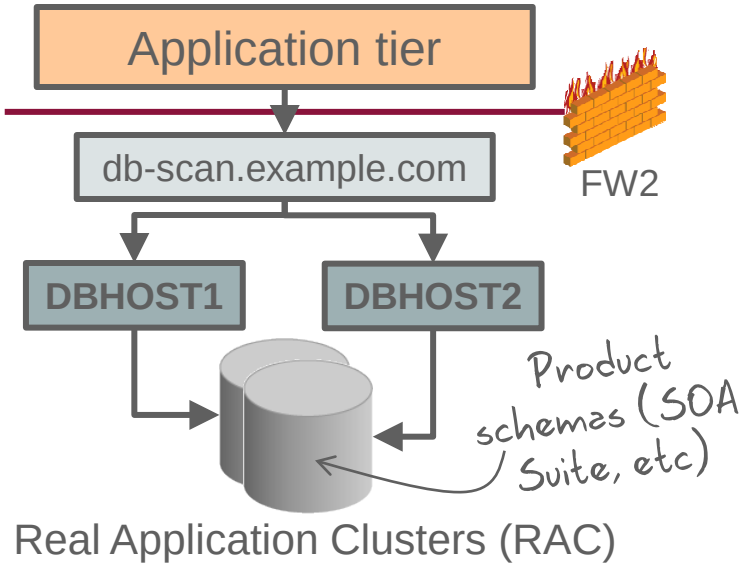
Understanding the Application Tier



The Data Tier

An Oracle Real Application Clusters (RAC) database resides in the data tier with at least two database hosts configured with:

- The database schemas required for Oracle SOA Suite, Oracle Platform Security Services (OPSS), and other components
- The database PROCESSES parameter configured to support the product components that are installed, listed in the following table as a guide:

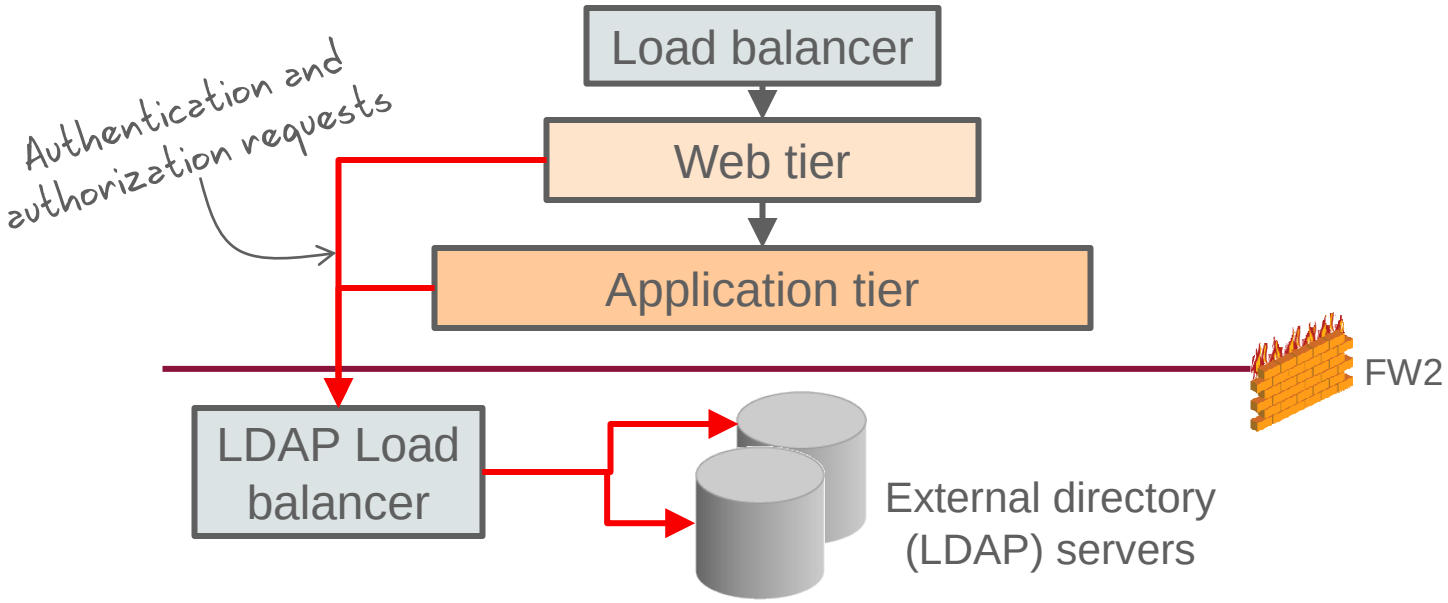


Configuration	Required Value	Parameter Class
SOA	>= 300	Static
BAM	>= 100	Static
SOA and BAM	>= 400	Static
SOA and OSB	>= 800	Static

Centralized Directory Server

Included in the data tier is a centralized LDAP server that is configured with:

- A load balancer for multiple directory server instances
- Replicated data to support failover scenarios



Note: Centralized security services are recommended for Oracle SOA Suite workflow and notification services.

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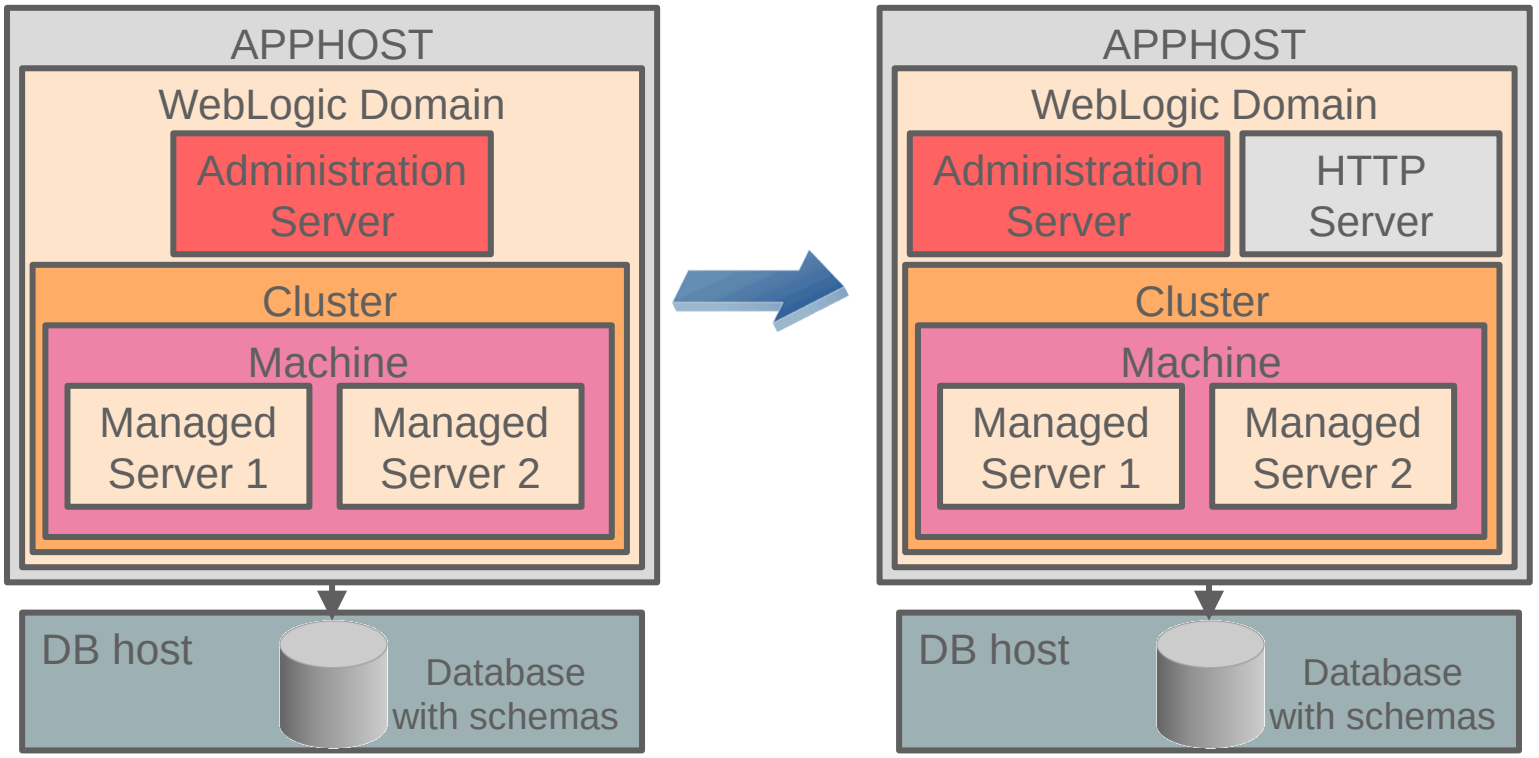
Roadmap for Planning an Enterprise Topology

Deploying an enterprise deployment topology can start here:

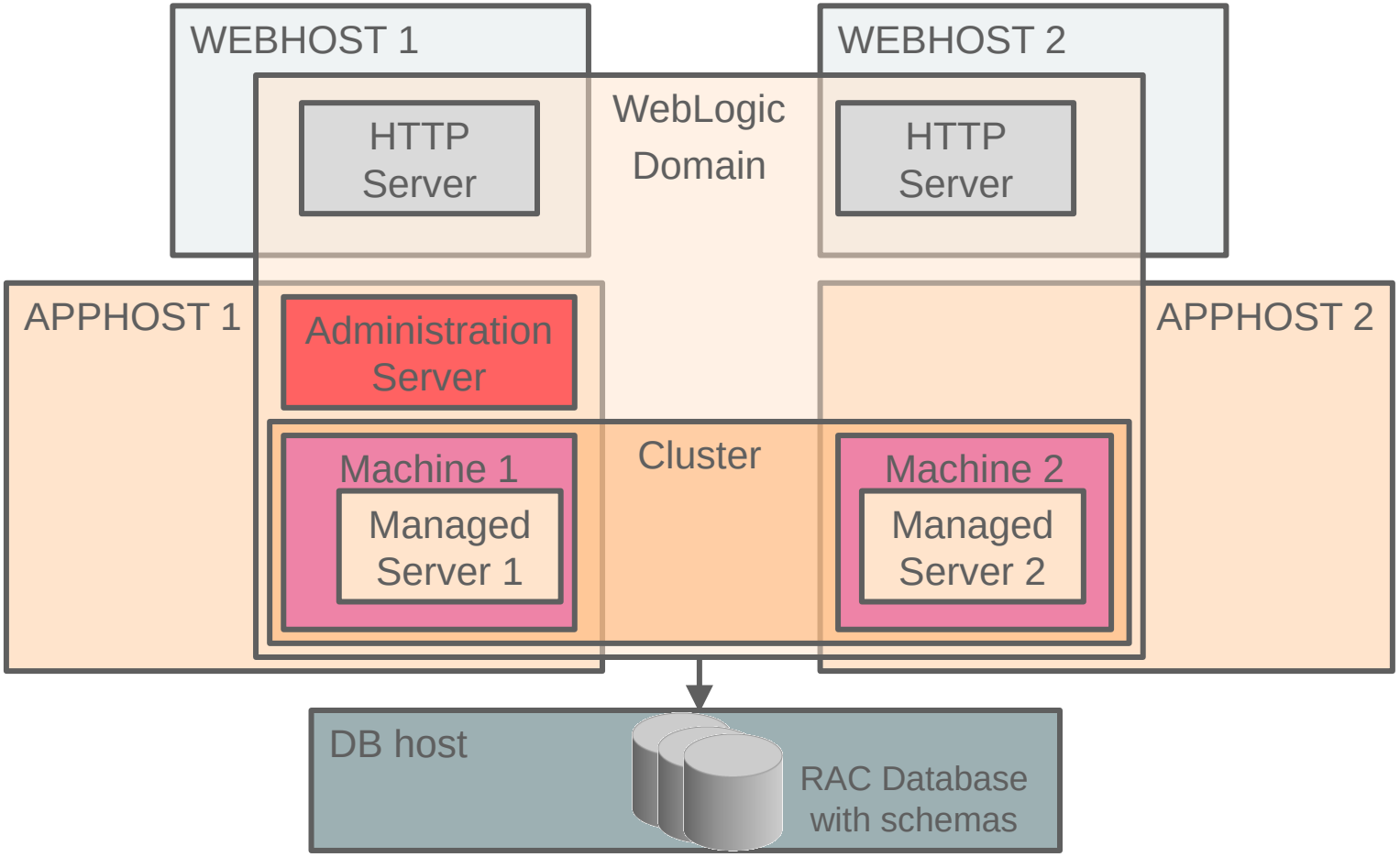
1. Install Oracle Fusion Middleware Infrastructure and configure the domain.

2. Extend the domain to include the HTTP server.



Roadmap for Scaling an Enterprise Topology

Extending and configuring for high availability



Documenting the Topology Components

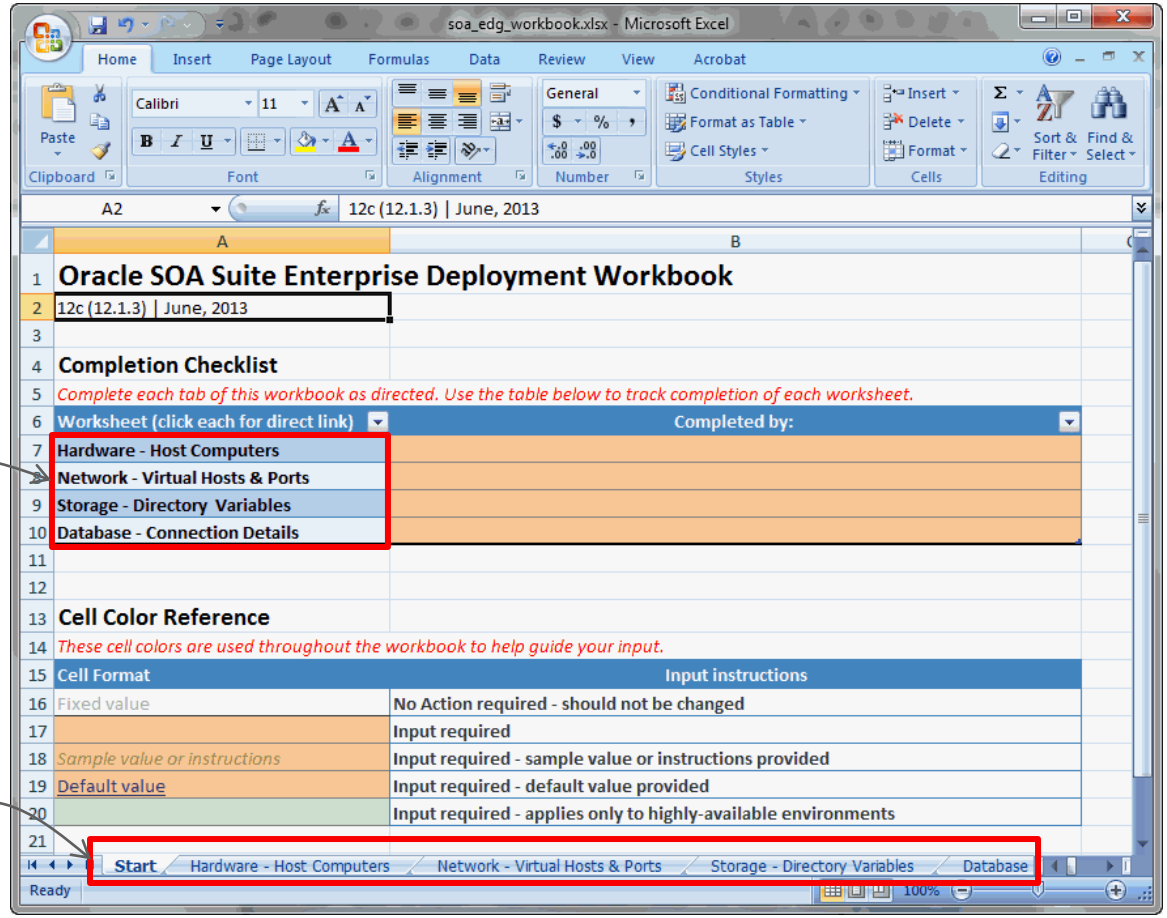
By using the Oracle Enterprise Deployment Guide (EDG) as a reference model, you can:

- Plan the architecture by selecting components that are relevant to your organizational environment
- Document the architecture components included and the reasons that you chose to exclude any component

Note: Using the reference model provides a solid base from which you can create a custom solution.

Oracle SOA Suite Enterprise Deployment Workbook

The Enterprise Deployment Workbook is an optional spreadsheet for documenting your design decisions.



Links to tab pages

Tab pages

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Planning an EDG SOA Installation

- Preparation
  - Network
  - File System
  - Database
  - Product downloads and related patches
- Installation of products
- Creating the base domains

Network Preparation

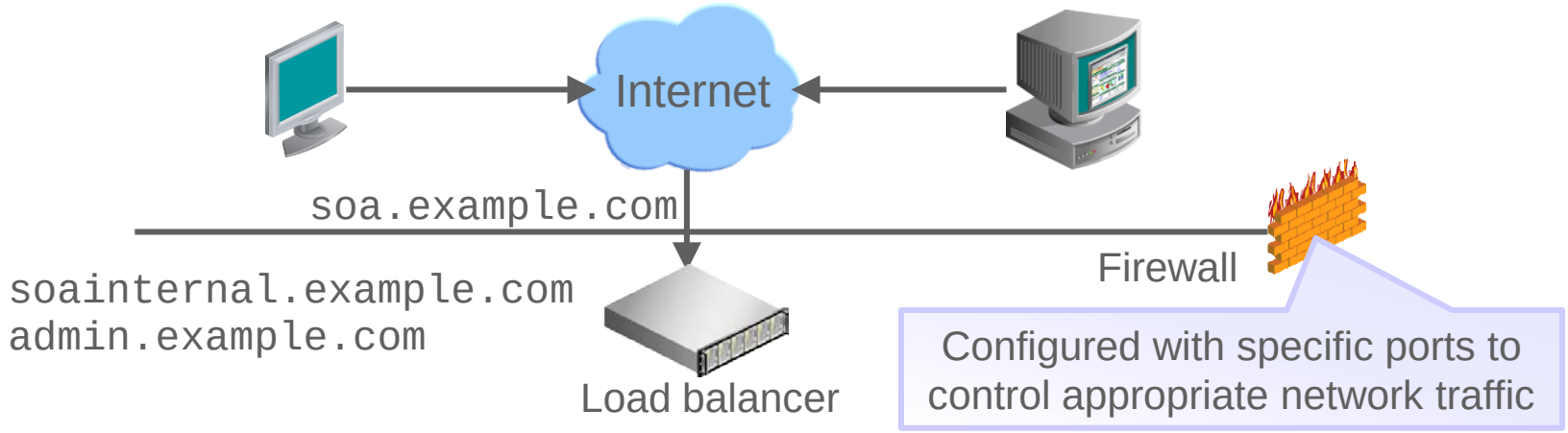
Preparing the network architecture to support enterprise deployment is important and involves:

- Configuring host names and IP addresses, typically with a Domain Name Server (DNS)
- Creating virtual IP addresses and related virtual host names to support Administration Server failover and Managed Server migration (high availability)
- Configuring firewall ports between the load balancer and the web tier, the web tier and the application tier, and the application tier and the data tier

Providing External and Internal Access Points

Network preparation includes providing:

- External access for external clients and applications
  - Set up a virtual host for the load balancer that accepts requests on HTTP Ports 80 and 443 (in class 8080, 4443).
- Internal access for administration and internal applications
  - Set up a virtual host for SOA access for internal invocations.
  - Set up a virtual host for the Administration Server.



Configuring Firewalls for Enterprise Deployment

Each firewall needs to be configured to allow access on the ports that you specify for access and to control traffic between the tiers.

- External (web tier) firewall ports (FW0)

Port/Port Range	Protocol/Application	Direction	Type
80	HTTP/Load balancer	Inbound	Browser requests
443	HTTPS/Load balancer	Inbound	Browser requests

- Firewall application tier (FW1)

Port/Port Range	Protocol/Application	Direction	Type
80	HTTP/Load balancer	Outbound	Browser requests, callbacks, and outbound invocations
443	HTTPS/Load balancer	Outbound	Browser requests, callbacks, and outbound invocations

Configuring the Application Tier Firewall

Additional firewall ports for the application tier (FW1)

Port/Port Range	Protocol/Application	Direction	Type
7777	HTTP	n/a	Load balancer to Oracle HTTP Server (OHS)
7001	HTTP/t3	Inbound and Outbound	OHS registration with the Administration Server, and Administration Console access
OHS Admin Port (7779)	TCP and HTTP, respectively	Outbound	OHS management by the Administration Server
7010 (Range: 7010 – 7999)	HTTP / WLS_WSM-PMn	Inbound	WSM-PM access, and setting the timeout to 60 seconds
8001 (Range: 8000 – 8010)	HTTP / WLS_SOAn	Inbound	SOA Server access
5556	TCP/IP	Inbound and Outbound	Node Manager

Configuring the Data Tier Firewall

Firewall ports for data-tier (FW2)

Port/Port Range	Protocol/Application	Direction	Type
1521	SQL*Net	Inbound and outbound	Database access
389	LDAP or LDAP/ssl	Inbound	LDAP directory access, such as Oracle Unified Directory
6200	ONS	Inbound and outbound	Oracle Notification Server (ONS), if Oracle Real Application Clusters (Oracle RAC) is installed for a clustered data-tier

Load Balancer Considerations

- Ability to load-balance traffic to a pool of real servers through a virtual host name
- Port translation to direct incoming requests to different back-end server ports
- Monitoring of ports to determine availability of service
- Virtual servers and port configuration:
  - Multiple virtual servers, each capable of being configured with more than one port
  - Virtual server names associated with IP addresses in the Domain Name Server (accessible to external clients)
- Detection of node failures and fault tolerance
- Sticky routing to support IP-based persistence (Oracle BAM)
- Ability to terminate SSL requests at load balancer

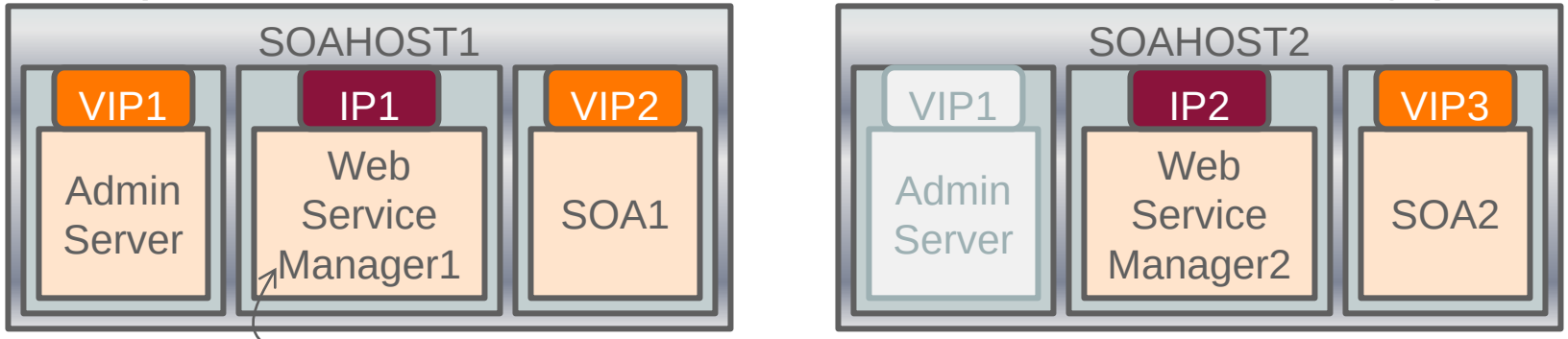
Virtual Host Names and Virtual IP Addresses

For highly available topologies, reserve IP addresses, with each:

- Host in the topology allocated a physical IP (IP) address
- Managed Server and the AdminServer assigned their own virtual IP (VIP) address in the WebLogic domain
- VIP mapped to its own virtual host name

Note: Virtual IPs and specifically **virtual host names** provide:

- Transparent failover to client systems
- Simplified restore for loss of host and disaster recovery plans



WSM does not need a VIP because one WSM instance can handle light loads, if another fails.

Configuring Virtual IP Addresses

A virtual IP address is:

- An unused IP address in the same subnet as the host primary IP address
- An essential part of an Enterprise Deployment architecture
- Assigned to individual WebLogic servers (AdminServer and Managed Servers) within a WebLogic domain
- Reserved and enabled on the corporate network
- Reassigned automatically for Managed Servers, when using the Server Migration feature of Oracle WebLogic Server
- Reassigned manually for the Administration Server, because only one Administration Server can be operational within a WebLogic domain

Load Balancer Configuration

A load balancer configuration with respect to back-end servers is shown in the following table:

Virtual Host	Server Pool	Protocol	SSL Termination/Ext
admin.example.com:80[80]	adminvh.example.com:7001	HTTP	No/No
soa.example.com:[4]443 soa.example.com:80[80] redirected to SSL port	soavh1.example.com:8001 soavh2.example.com:8001	HTTPS	Yes/Yes
soainternal.example.com:80[80]	soavh1.example.com:8001 soavh2.example.com:8001	HTTP	No/No
osb.example.com:[4]443	osbvh1.example.com:8011 osbvh2.example.com:8011	HTTPS	No/Yes

Directories for Installation and Configuration

Planning guidelines to provide locations for the following directories:

- Oracle Home for binaries on each host (can be a shared disk)
- Domain Home for Administration and Managed Servers configuration data (separate Administration domain home)
- Application Home for the Administration Server applications

  Note: Keep the configuration folder tree separate from the product binaries, to simplify product installation and upgrades.

Creating Multiple Home Directories

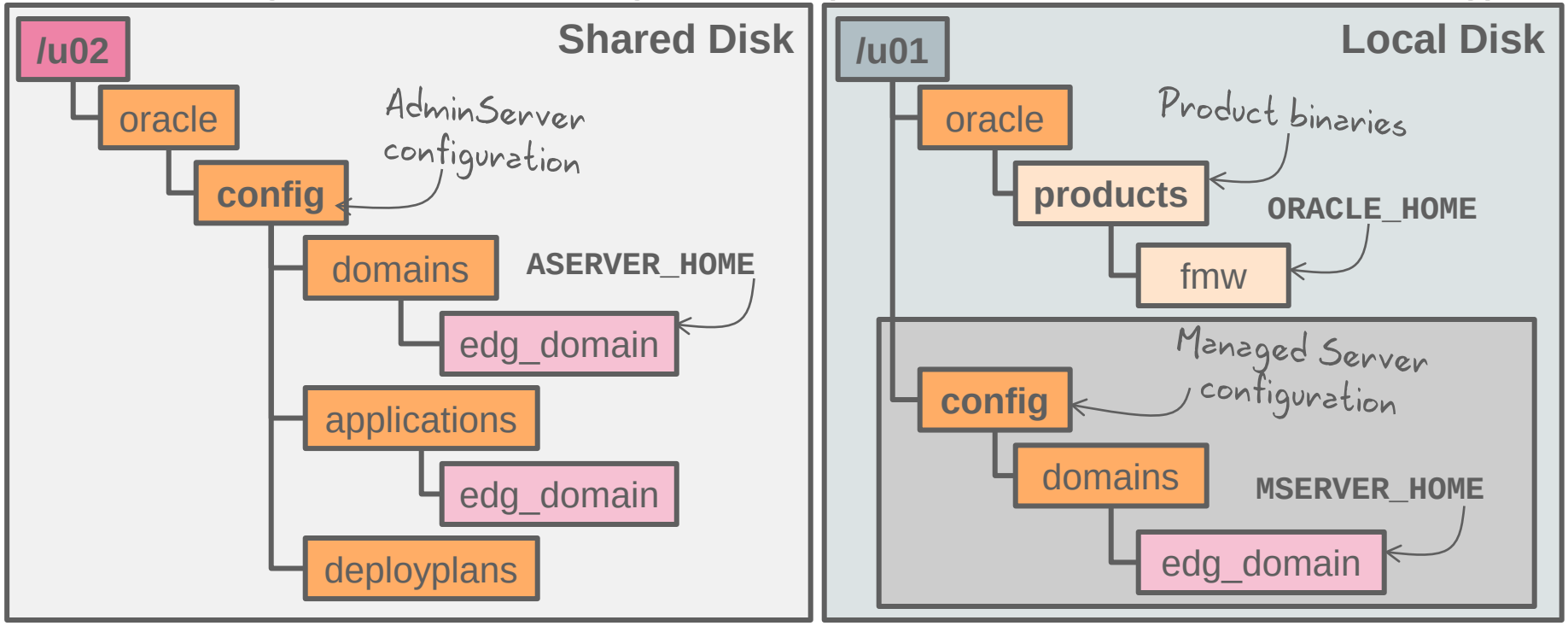
- A single Oracle home directory is sufficient for most installations.
  - Located on a shared disk for enterprise deployments
  - Duplicated on different shared disks for different hosts to eliminate a single point of failure
- Create more than one Oracle home directory in the following situations:
  - To maintain separate development and production environments, with a separate product stack for each
  - To maintain two different versions of a Fusion Middleware product at the same time and to install a new version of a product while keeping your existing version

    Note: After installation, products that are installed in different Oracle homes may not be compatible with each other.

Choosing the Installation Directory Structures

The main directory tree structures created are for:

- AdminServer configuration (shared disk - **/u02**/oracle/config)
- Product binaries (local disk - **/u01**/oracle/products)
- Managed Server configuration (local disk - **/u01**/oracle/config)



Approaches for Installing Oracle Fusion Middleware and Related Products

Approach 1 (as install guides)

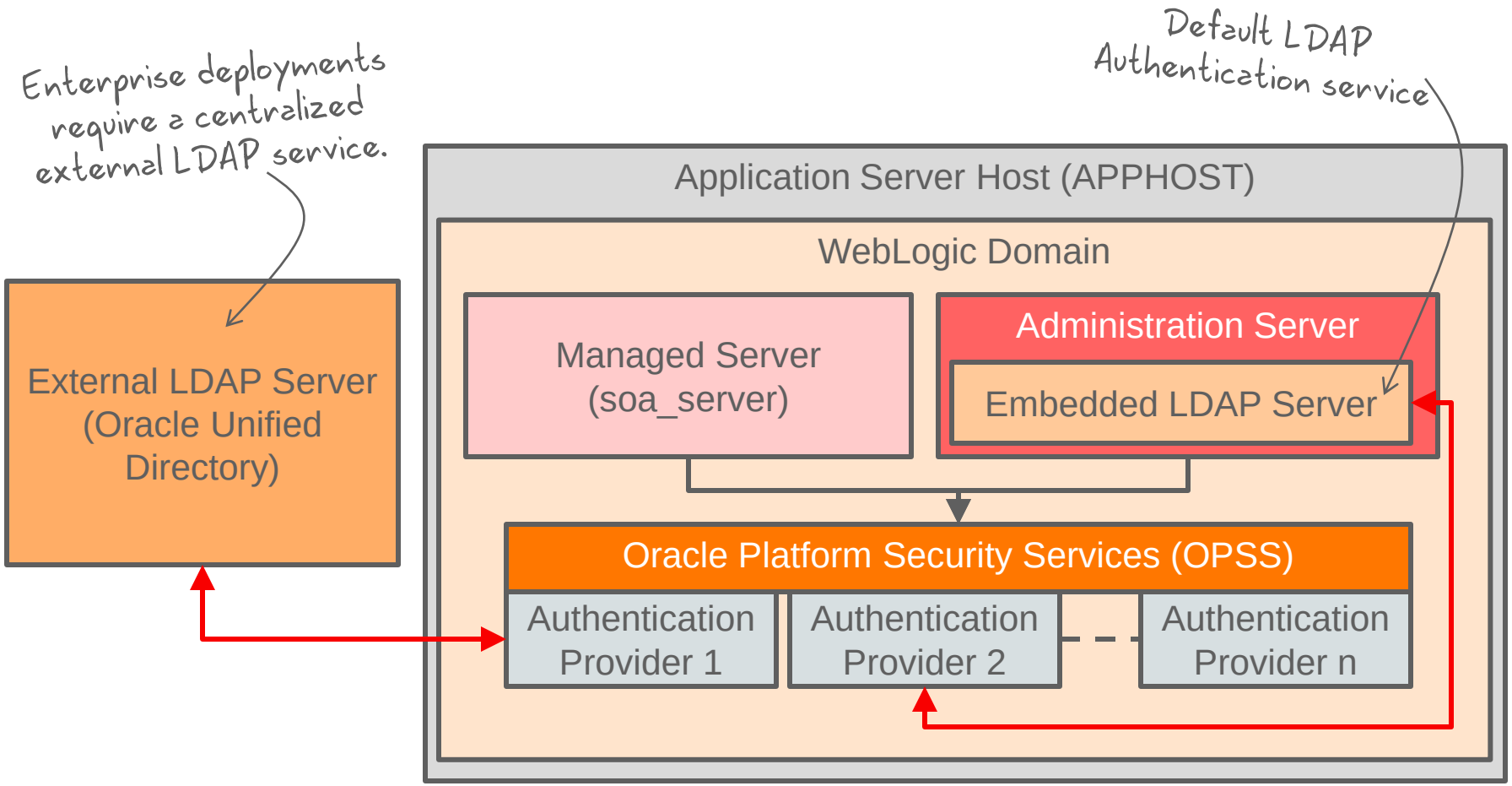
- Install Product A (Fusion Middleware Infrastructure).
  - Create the schemas.
  - Configure the domain.
  - Start all the servers.
- Install Product B (SOA)
  - Stop all the servers and processes (not database).
  - Create the Product B schemas.
  - Extend Product A domain to include Product B.
  - Start all servers again.

Approach 2 (not documented)

- Install all the necessary products (do not configure).
- Create the schemas for all the products.
- Configure the domain by selecting all the necessary product templates.
- Start all the servers.

Note: Product schemas refer to the database schemas (created in the data tier) required by products such as Oracle SOA Suite and other components.

Understanding OPSS and Security Requests



Resource Planning

Before you install products, consult the product documentation for capacity planning and size calculations for your operating system environments for:

- Memory consumption, file descriptors, and processes
- Disk space required for installed products
- Database sizes and potential growth

For example:

Managed Server, Utility or Service	Approximate Top Memory	Number of File Descriptors	Processes and Tasks
AdminServer	3.5Gb	3500	165
Web Services Manager	3.0Gb	2000	130
Oracle SOA Suite	4.0Gb	3100	240
Enterprise Scheduler Service	3.5G	1300	35

Typical Disk Space Requirements

Server	Disk
Database	nXm n = Number of disks, at least 4 (striped as one disk) m= size of the disk (minimum of 30 Gb)
WEBHOSTn	10 Gb per host
SOAHOSTn (SOA Only)	10 Gb per host (see note below)
SOAHOSTn (SOA and OSB)	11 Gb per host (see following note)

Note: For example, a shared storage middleware home configuration with two installations would require a total of 20 Gb of disk space.

Sizing Guidelines (Approximations)

The Database Profile selected (Small, Medium, Large) is based on two metrics:

- The composite space persisted daily
- The minimum retention space

Database Profile	Composite Space Persisted Daily	Minimum Retention of Space
Small	< 10 GB	< 100 GB
Medium	10-30 GB	100-300GB
Large	> 30 GB	> 300 GB

Note: The two metrics are related. For example, the retention policy may hold several days of data, with high instance inflow.

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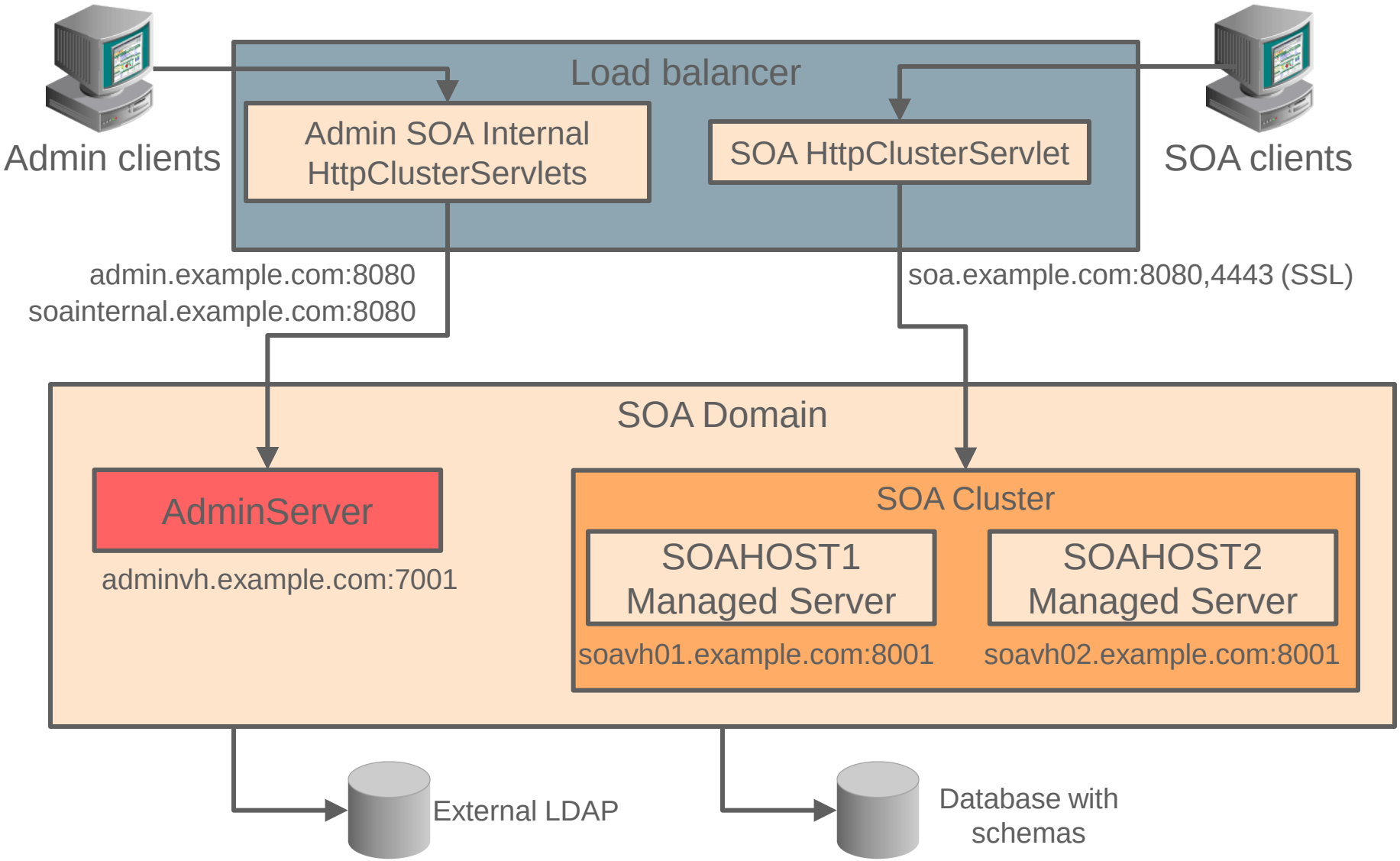
Course Enterprise Deployment Architecture



Roadmap for Arriving at High Availability

- Verify pre-installation requirements.
- Install Java Development Kit (JDK).
- Install the database.
- Install Oracle Fusion Middleware Infrastructure.
- Create and configure a domain with Oracle Fusion Middleware Infrastructure.
- Optionally, install a web tier or extend the domain to include Oracle HTTP Server.
- Configure an external LDAP integration.
- Install Oracle SOA Suite (or other components such as Oracle BPM Suite).
- Extend the domain to include Oracle SOA Suite.
- Configure the load balancer.

Summary

In this lesson, you should have learned how to:

- Choose a deployment topology for your environment
- Document the Enterprise Deployment architecture plan
- Prepare your network environment (firewalls, IP addresses, and host names)
- Prepare the file system for deployment
- Prepare and plan the database strategy
- Plan a SOA deployment topology based on the Enterprise Deployment architecture reference model
- Plan an architecture for high availability and failover

Practice 2: Overview

This practice covers the following topics:

- 2-1: Planning an Enterprise Deployment of Oracle SOA Suite 12*c*
- 2-2: Performing Pre-Installation Checks and Setup