Oracle® Collaboration Suite

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Preface

This preface consists of the following topics:

- Audience
- Documentation Accessibility
- Related Documents
- Conventions

Audience

This guide is intended for administrators, developers, and others who deploy and manage Oracle Collaboration Suite with high availability requirements.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Accessibility standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For more information, visit the Oracle Accessibility Program Web site at

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Related Documents

For more information, refer to the following Oracle resources:

- The Oracle Collaboration Suite 10g Documentation Set, especially
 - Oracle Collaboration Suite Deployment Guide
 - Oracle Collaboration Suite Concepts Guide
 - Oracle Collaboration Suite Administrator's Guide
 - Oracle Collaboration Suite Installation Guide for Solaris Operating System
 - Oracle Collaboration Suite Installation Guide for Linux
 - Oracle Collaboration Suite Installation Guide for AIX Based Systems
 - Oracle Collaboration Suite Installation Guide for hp-ux
 - Oracle Collaboration Suite Installation Guide for Microsoft Windows
- The Oracle Application Server Documentation Set, especially
 - Oracle Application Server High Availability Guide

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Introduction to Oracle Collaboration Suite High Availability

This guide describes the Oracle Collaboration Suite high availability solutions. Oracle Collaboration Suite has incorporated recent advances in high availability that enable you to meet your business goals in a more efficient and affordable manner.

This chapter explains the concepts of high availability.

Overview of High Availability

Many enterprises use their information technology infrastructure to provide a competitive advantage, increase productivity, and empower users to make faster and more informed decisions. However, with these benefits come an increasing dependence on that infrastructure. If a critical application becomes unavailable, then the entire business can be in jeopardy. The business can lose customers and revenue, incur penalties, or suffer bad publicity that adversely affects its stock price and customer base. Therefore it is critical to examine how your data is protected and to maximize its availability to your users.

What is High Availability

Availability is the degree to which an application, service, or feature is available upon user demand. Availability is measured by the perception of the application user. Application users experience frustration when their data is unavailable, and they do not understand or care to differentiate between the complex components of an overall solution. Performance degradation due to higher than expected usage create the same havoc as the failure of critical components in the solution.

Reliability, recoverability, timely error detection, and continuous operations are primary characteristics of a high availability solution:

- Reliability: Reliable hardware is one component of a high availability solution. Reliable software (including the database, Web servers, and application) is an equally important component of a high availability solution.
- Recoverability: There may be many choices in recovering from a failure if one occurs. It is important to determine what types of failures may occur in your high availability environment, and how to recover from those failures in the time that meets your business requirements. For example, if a critical table is accidentally deleted from the database, then what action should you take to recover it? Does your architecture provide the ability to recover in the time specified in a service level agreement?

- Timely error detection: If a component in your architecture fails, then fast detection is another essential function in recovery. While you may be able to recover quickly from an outage, if it takes an additional 90 minutes to discover the problem, then you may not meet your service level agreement. Monitoring the health of your environment requires reliable software to view it quickly and the ability to notify the database administrator of a problem.
- Continuous operations: Continuous access to your data is essential when very little or no downtime is acceptable to perform maintenance activities. Activities such as moving a table to another location within the database, or even adding additional CPUs to your hardware, should be transparent to users in a high availability architecture.

More specifically, a high availability architecture should have the following traits:

- Be transparent to most failures
- Provide built-in preventive measures
- Provide monitoring and fast detection of failures
- Provide fast recoverability
- Automate the recovery operation
- Protect the data so that there is minimal or no data loss
- Implement the operational best practices to manage your environment
- Provide the high availability solution to meet your service level agreement

As the number of mission-critical applications deployed on the Internet and intranet environments increases, users have more demands about the quality of service and high availability of these applications. A failure that directly affects critical customers or partners is unacceptable. Some failures may result in loss of data and business transactions (for example, e-commerce and business integration systems), but some others may simply affect user productivity. In turn, these outages generally result in lost business opportunities and an increase in the total cost of ownership of IT systems. Because of the constantly increasing number of systems used by employees and partners, high availability has shifted from being an occasional requirement to a general requisite that affects all types of deployments.

Oracle makes high availability solutions available to every customer regardless of the size of the enterprise. Small workgroups and global enterprises alike can extend their critical business applications. With Oracle and the Internet, applications and their data are now more reliably accessible everywhere at any time.

Oracle Collaboration Suite is designed to provide a wide variety of high availability solutions. These ranging from load balancing and basic clustering to providing maximum system availability during catastrophic hardware and software failures.

Causes of Downtime

One of the challenges in designing a high availability solution is examining and addressing all possible causes of downtime. It is important to consider causes of both unplanned and planned downtime when designing a fault-tolerant and resilient IT infrastructure. Planned downtime can be just as disruptive to operations as unplanned downtime, especially in global enterprises that support users in multiple time zones.

Table 1–1 describes the outage categories and provides examples of each outage type.

Category	Outage Type	Description	Examples
Unplanned	Computer failure	A computer failure occurs when the system that is running the database becomes unavailable because it has shut down or is no	Database system hardware failure
			Operating system failure
		longer accessible.	Oracle instance failure
			Network interface failure
Unplanned	Storage failure	A storage failure occurs when the	Disk drive failure
		storage containing some or all of the database content becomes	Disk controller failure
		unavailable because it has shut down or is no longer accessible.	Storage array failure
Unplanned	Human error	A human error occurs when an	Dropped database object
		is committed that causes data	Inadvertent data changes
		within the database to become logically corrupt or unusable. The service-level effect of a human error may vary significantly depending on the amount and critical nature of the affected data.	Malicious data changes
Unplanned Data corruption A data corru hardware or causes corru to the databa effect of a da	A data corruption occurs when a hardware or software component causes corrupt data to be written to the database. The service level effect of a data corruption outage	Operating system or storage device driver, host bus adapter, disk controller, or volume manager error causing bad disk reads or writes	
	may vary, from a small portion of the database (down to a single database block) to a large portion of the database (making it essentially unusable).	Stray writes by the operating system or other application software	
Unplanned	Site failure	A site failure occurs when an event causes all or a significant portion of an application to stop processing or slow to an unusable service level. A site failure may affect all processing at a data	Extended sitewide power failure
			Sitewide network failure
			Natural disaster making a data center inoperable
		center, or a subset of applications supported by a data center.	Terrorist or malicious attack on operations or the site
Planned System changes Planned system changes occur during routine and periodic		Planned system changes occur during routine and periodic	Adding or removing processors to/from an SMP server
		maintenance operations and new deployments. Planned system changes include any scheduled	Adding or removing nodes to or from a cluster
		changes to the operating environment that occur outside	Adding or removing disks drives or storage arrays
		the organizational data structure within the database. The service-level effect of a planned system change varies significantly depending on the nature and scope of the planned outage, the testing and validation efforts made prior to implementing the change, and the technologies and features in place to minimize the effect.	Changing configuration parameters
			Upgrading or patching system hardware and software
			Upgrading or patching Oracle software
			Upgrading or patching application software
			System platform migration
			Database relocation

Table 1–1 Types of Outages

Category	Outage Type	Description	Examples
Planned	Data changes	Planned data changes occur when there are changes to the logical structure or physical organization of Oracle database objects. The primary objective of these changes is to improve performance or manageability.	Table definition changes Adding table partitioning Creating and rebuilding indexes

 Table 1–1 (Cont.) Types of Outages

Importance of Availability

The importance of high availability varies among applications. However, the need to deliver increasing levels of availability continues to accelerate as enterprises reengineer their solutions to gain competitive advantage. Most often, these new solutions rely on immediate access to critical business data. When data is not available, the operation can cease to function. Downtime can lead to lost productivity, lost revenue, damaged customer relationships, bad publicity, and lawsuits. Revenue losses and legal penalties incur because service level agreement objectives are not met.

Other factors to consider in the cost of downtime are the maximum tolerable duration of a single unplanned outage, and the maximum frequency of allowable incidents. If the event lasts less than 30 seconds, then it may have a very little effect and may be barely perceptible to users. As the duration of the outage grows, the effect may grow exponentially and negatively affect the business. When designing a solution, it is important to take into account these issues. An organization should weigh the true cost of downtime and balance it with the expected availability improvement.

Oracle provides a range of high availability solutions that fit every organization regardless of size. Small workgroups and global enterprises are able to extend the reach of their critical business applications. With Oracle and the Internet, applications and their data are now more reliably accessible everywhere, at any time.

High Availability Terminology

The following terms are used to explain the concepts of high availability of Oracle Collaboration Suite:

- Active-Active: A system is active-active if all equivalent members of that system are actively servicing requests concurrently and are not on standby mode.
- Active-Passive: A system is active-passive if some members of that system are active in servicing requests and some members are inactive (passive). These passive members are not activated until one or more active nodes have failed.
- Hardware Cluster: A hardware cluster is a collection of computers that appears to clients as a single system and provides network services (for example: an IP address) or application services (for example: databases, Web servers).

A hardware cluster achieves high availability and scalability through the use of specialized hardware (cluster interconnect, shared storage) and software (health monitors, resource monitors). The **cluster interconnect** is a private link used by the hardware cluster for heartbeat information to detect node death. **Heartbeat** is the periodic message sent between nodes to detect system failure of any node. Due to the need for specialized hardware and software, hardware clusters are commonly provided by hardware vendors, such as Sun, HP, IBM, and Dell. The number of nodes that can be configured in a hardware cluster is vendor

dependent. For Oracle Collaboration Suite high availability, only two nodes are required.

- Cluster Agent: It is an application that runs on a node member of a hardware cluster that coordinates availability and performance operations with other nodes. A cluster agent can automate the service failover.
- Clusterware: It is an application that manages the operations of the members of a cluster as a system. Clusterware provides resource grouping, monitoring, and the ability to move services between cluster members.
- Primary Node: It is the node that actively carries out one or more infrastructure installations at any given time. If this node fails, then the secondary node carries out the task. Because the primary node runs the active infrastructure installations, it is considered the *hot node*.
- Secondary Node: This is the node that takes over the execution of the infrastructure if the primary node fails. Because the secondary node does not originally run the infrastructure, it is considered the *cold node*. And, because the application fails over from a *hot node* (primary) to a *cold node* (secondary), this type of failover is called **cold failover**.
- Shared Storage: The storage is termed as shared storage if it is accessed by all the nodes in a cluster. While the nodes have equal access to the storage, only the primary node has active access to the storage at any given time. The hardware cluster software grants the secondary node access to this storage if the primary node fails. In some cases, the primary node may relinquish control of the shared storage and move the control to the secondary.
- OracleAS Cluster (Identity Management): In this configuration, Oracle Identity Management components (Oracle Internet Directory, OracleAS Single Sign-On, Oracle Delegated Administration Services, Oracle Directory Integration and Provisioning, and Oracle Application Server Certificate Authority) are deployed together in two or more nodes. Each node runs all of the Oracle Identity Management components. The traffic to these nodes is load balanced by a redundant load balancer.
- Failover: In a high availability system, the transfer of operations of a failed node to an equivalent node is known as failover. This is done to ensure the continuity of services to customers.

In an active-passive system, the passive member is activated during the failover operation and requests are directed to it instead of the failed member. In an active-active system, the load balancer detects the failure and automatically redirects requests for the failed member to the surviving active members.

- Failback: After a system undergoes a successful failover operation, the process of repairing the failed node and restoring it as an active node is termed as failback. This process reverts the system to its prefailure configuration.
- Switchover: During normal operation, active members of Oracle Collaboration Suite may require maintenance or upgrading. A switchover process can be initiated to let a substitute member take over the workload of the member that requires maintenance or upgrading (scheduled outage). The switchover operation ensures continued service to clients of Oracle Collaboration Suite.
- **Switchback**: After a switchover operation, the process of activating the upgraded member is known as switchback. This process brings the system back to the preswitchover configuration.

- Physical Host Name: Physical host name is used to refer to the internal name of the current computer. In UNIX, this is the name returned by the command hostname.
- Network Host Name: Network host name is a name assigned to an IP address either through the /etc/hosts file (in UNIX) or C:\WINDOWS\system32\drivers\etc\hosts file (in Windows), or through Domain Name System (DNS) resolution. Often, the network host name and physical host name are identical. However, each system has only one physical host name but may have multiple network host names. Thus, a network host name of a system may not always be its physical host name.
- Virtual IP: It is also known as cluster virtual IP and load-balancer virtual IP. Generally, a virtual IP can be assigned to a hardware cluster or load balancer. To present a single system view of a cluster to network clients, a virtual IP serves as an entry point Internet Protocol (IP) address to the group of servers that are members of the cluster. A hardware cluster uses a cluster virtual IP to present the entry point into the cluster. It can also be set up on a standalone computer.

The software of the hardware cluster software manages the movement of this IP address between the two physical nodes of the cluster, while clients connect to this IP address without knowing on which physical node is this IP address currently active.

A load balancer also uses a virtual IP as the entry point to a set of servers. These servers tend to be active at the same time. This virtual IP address is assigned to the load balancer which acts as a proxy between servers and their clients.

• Virtual Host Name: Virtual host name is a network-addressable host name that maps to one or more computers through a load balancer or a hardware cluster. For load balancers, virtual server name is used interchangeably with virtual host name. A load balancer can hold a virtual host name on behalf of a set of servers, and clients communicate indirectly with the systems using the virtual host name.

The virtual host name is the host name associated with the virtual IP. This is the name that is chosen to give the Oracle Collaboration Suite Applications a single system view of the Oracle Collaboration Suite Infrastructure with the help of a hardware cluster or a server load balancer. This name-IP entry must be added to the DNS that the site uses, so that the nodes of Oracle Collaboration Suite Applications can associate with Oracle Collaboration Suite Infrastructure without having to add this entry to their local /etc/hosts (or equivalent) file.

For example, if the two physical host names of the hardware cluster are node1.mycompany.com and node2.mycompany.com, the single view of this cluster can be provided by the name selfservice.mycompany.com. In the DNS, selfservice.mycompany.com maps to the virtual IP address of the Oracle Collaboration Suite Infrastructure, while the Oracle Collaboration Suite Applications components connect to the IP address without knowing which physical node is active and actually servicing a particular request.

Oracle Collaboration Suite High Availability Concepts

Oracle Collaboration Suite consists of different components deployed on multiple tiers. The availability of each component directly affects availability of the system. Besides providing high availability features, Oracle Collaboration Suite must also be secure. So both the Internet and intranet users can use the system without compromising availability and security. Oracle Collaboration Suite consists of Oracle Collaboration Suite Applications and Oracle Collaboration Suite Infrastructure.

This section explains the high availability features and framework of Oracle Collaboration Suite.

Oracle Collaboration Suite High Availability Features

Oracle Collaboration Suite is equipped with high availability features that avoid or eliminate planned and unplanned downtime. Planned outages can disrupt operations, especially in global enterprises that support users in multiple time zones. In this case, it is important to design a system to minimize planned interruptions. It is important to consider not only the time to perform the upgrade but also the effect the changes may have on the overall application. Oracle Collaboration Suite provides rolling upgrades to minimize planned downtime for these activities.

A rolling upgrade is an upgrade of a software version that is performed without noticeable downtime or other disruption of services. All systems need component replacement and upgrades from time to time. The need to facilitate software upgrades is more because a system with continuous service uptime expectation cannot be just stopped for maintenance and upgrade. To provide service continuously, the software upgrades must be performed on a running system in such a way that the availability requirements are met.

Oracle Collaboration Suite supports the rolling upgrade of most Oracle Collaboration Suite components with minimal operational impact.

For unplanned outages, Oracle Collaboration Suite offers high availability solutions as local solutions that provide high availability in a single data center deployment.

Process, node, and media failures and human errors can be prevented by local high availability solutions. Local physical disasters can be prevented by geographically distributed disaster recovery solutions.

In addition to architectural redundancies, the following local high availability technologies are also necessary in a comprehensive high availability system:

- Process Death Detection and Automatic Restart: Processes may die unexpectedly due to configuration or software problems. A proper process monitoring and restart system monitors all system processes constantly and restarts them should problems appear. A system process also maintains the number of restarts within a specified time interval. This is important because restarting continuously within short time periods may lead to additional faults or failures.
- **Clustering:** You can cluster the nodes together to allow the nodes to be viewed functionally as a single entity from the perspective of a client for run-time processing and manageability. A cluster is a set of processes that share the same workload, running on single computer or multiple computers.
- Configuration Management: Similar components of a clustered group often need to share a common configuration. Proper configuration management ensures that Oracle Collaboration Suite nodes provide the same reply to the same incoming request, allows these nodes to synchronize their configurations, and provides high availability configuration management to reduce administration downtime.
- Server Load Balancing and Failover: Client requests to the nodes of Oracle Collaboration Suite Applications can be load balanced to ensure that the nodes have roughly the same workload. With a load balancing mechanism in place, and a set of redundant nodes, if any of the nodes or Oracle Collaboration Suite

Applications instances fail, then the load balancer will route requests to the surviving nodes or instances.

• Oracle Collaboration Suite Recovery Manager: It is an utility to perform backup and recovery of the complete installation of Oracle Collaboration Suite, including the configuration files, the Oracle Collaboration Suite Infrastructure, and the Oracle Collaboration Suite Applications tier.

Redundant Architectures

Oracle Collaboration Suite provides support for redundant nodes as follows:

- Database node redundancy through Oracle Real Application Clusters (RAC)
- Identity Management node redundancy through an OracleAS Cluster (Identity Management)
- Middle-tier redundancy through the use of an external load balancer in front of multiple middle tiers

These redundant configurations provide increased availability either through a distributed workload, a failover setup, or both. The configuration can be an active-active configuration or an active-passive configuration. The basics of these configurations are discussed in detail as follows.

Oracle Collaboration Suite Active-Active Configurations

This configuration deploys two or more active Oracle Collaboration Suite nodes and can be used to improve scalability as well as to provide high availability. All nodes handle requests concurrently.

Active-active solutions provide a robust cluster architecture for Oracle Collaboration Suite. Because all the nodes are active, failover from one node to another is quick and requires no manual intervention. Active-active setups also provide scalability for Oracle Collaboration Suite. This configuration leverages the RAC feature of the Oracle database for running Oracle Collaboration Suite Database. Each node in the hardware cluster has its own ORACLE_HOME, which contains the configuration files and binaries needed to run Oracle Collaboration Suite on that node. Oracle Collaboration Suite installation across nodes is accomplished in one process. Additionally, all nodes access a set of shared files on the RAC database.

Features The features of an Oracle Collaboration Suite active-active configuration are as follows:

- Identical Node Configuration: The nodes are meant to serve the same workload or application. Their configuration guarantees that they deliver the same reply to the same request. Some configuration properties may be identical and others may be node-specific, such as local host name information.
- Equivalence Management: Changes made to one node will usually need to be propagated to the other nodes in an active-active configuration. This is done to maintain equivalence among all the nodes.
- Independent Operation: To provide maximum availability, the loss of one Oracle Collaboration Suite node in an active-active configuration should not affect the ability of the other nodes to serve requests.

Advantages The advantages of an Oracle Collaboration Suite active-active configuration are as follows:

- Increased Availability: An active-active configuration is a redundant configuration. Loss of one node can be tolerated because another node can continue to serve the same requests.
- Increased Scalability and Performance: Multiple identically configured nodes enable distributed workload to be shared among different computers and processes. New nodes with the same configuration can also be added as the demand of the application grows.

Oracle Collaboration Suite Active-Passive Configurations

This configuration deploys an active node of Oracle Collaboration Suite that handles requests and a passive Oracle Collaboration Suite node, which is on standby. Heartbeat mechanism is set up between these two nodes. This mechanism is provided and managed through vendor-specific clusterware. Generally, vendor-specific cluster agents are also available to automatically monitor and fail over between cluster nodes. When the active node fails, an agent shuts down the active node completely, brings up the passive node, and enables application services to successfully resume processing. As a result, the active-passive roles are now switched. Active-passive configurations in a cluster are also generally referred to as *cold failover clusters*.

Oracle Collaboration Suite supports only Oracle Calendar in this configuration.

Features The features of an Oracle Collaboration Suite active-passive configuration are as follows:

- Shared Storage: The passive Oracle Collaboration Suite node in an active-passive configuration has access to the same Oracle binaries, configuration files, and data as the active node.
- Failover Procedure: An active-passive configuration usually requires a set of scripts and procedures to detect failure of the active instance and to fail over to the passive instance while minimizing downtime.

Advantages The advantages of an Oracle Collaboration Suite active-passive configuration are as follows:

- Availability: If the active node fails for any reason or must be taken offline, an identically configured passive node is prepared to take over instantly.
- Reduced Operation Costs: In an active-passive configuration, only one set of
 processes is up and servicing requests. Managing the active node is generally less
 expensive than managing an array of active nodes.
- Application Independence: Some applications may not be suited to an active-active configuration. This includes applications that rely heavily on the application state or on information stored locally. An active-passive configuration has only one node serving requests at any particular time.

Oracle Collaboration Suite High Availability Framework

This section explains the framework of high availability of Oracle Collaboration Suite.

High Availability in Oracle Collaboration Suite Applications

Oracle Collaboration Suite provides several features for ensuring application-level high availability. Oracle Collaboration Suite Applications are installed on separate Oracle homes or on separate systems apart from the Oracle Collaboration Suite Infrastructure or on both. Each installation of Oracle Collaboration Suite Applications contains the following components:

- Oracle Mail
- Oracle Content Services
- Oracle Collaboration Suite Search
- Oracle Mobile Collaboration
- Oracle Voicemail & Fax
- Oracle Calendar
- Oracle Calendar Application System
- Oracle Collaborative Portlets
- Oracle Real-Time Collaboration
- Oracle Discussions
- Oracle Workspaces

The Oracle Collaboration Suite Applications can be installed on redundant nodes which have the same set of Oracle Collaboration Suite Applications on each node. A load balancer is placed at the front end of this set of redundant nodes. Optionally, Oracle Collaboration Suite Applications can be installed separately on different nodes.

High Availability in Oracle Collaboration Suite Infrastructure

Oracle Collaboration Suite provides a completely integrated infrastructure and framework for development and deployment of enterprise applications. Oracle Collaboration Suite Infrastructure provides centralized product metadata, security and management services, and configuration information and data repositories for Oracle Collaboration Suite Applications. The time and effort for developing enterprise applications are reduced by integrating the infrastructure services required by the applications. In turn, the total cost of developing and deploying these applications is reduced, and the deployed applications are more reliable.

Oracle Collaboration Suite Infrastructure is made up of the following components:

- Oracle Collaboration Suite Database
- Oracle Identity Management

Oracle Identity Management includes the following components:

- Oracle Internet Directory
- Oracle Directory Integration and Provisioning
- Oracle Delegated Administration Services
- OracleAS Single Sign-On
- OracleAS Certificate Authority

The OracleAS Single Sign-On tier comprises OracleAS Single Sign-On and Delegated Administration Services. The Oracle Internet Directory tier comprises Oracle Internet Directory and Oracle Directory Integration and Provisioning. The Oracle Internet Directory and OracleAS Single Sign-On tiers together provide Oracle Identity Management.

For Oracle Collaboration Suite Infrastructure to provide all essential services, all of these components must be available. Any high availability solution must be able to detect and recover from software failures of the processes associated with the Oracle Collaboration Suite Infrastructure components. Solutions must also be able to detect

and recover from hardware failures on the hosts that are running Oracle Collaboration Suite Infrastructure.

To ensure high availability, Oracle Identity Management is installed separately against the Oracle Collaboration Suite Database on multiple nonclustered systems. All the components of Oracle Identity Management can either be collocated on the same system or distributed on separate systems.

In a collocated model, all Oracle Identity Management components are installed on one set of computers and all the components operate from a single Oracle home.

The distributed model is as follows:

- OracleAS Single Sign-On and Oracle Delegated Administration Services are installed and operated from one set of computers.
- Oracle Internet Directory and Oracle Directory Integration and Provisioning are installed and operated from another set of computers.

The components are separated in this manner because OracleAS Single Sign-On and Oracle Delegated Administration Services are typically the first components to be accessed directly by clients and other components. You can run these components on computers in the Demilitarized Zone (DMZ).

Oracle Collaboration Suite High Availability Configurations

This chapter gives an overview of the high availability configurations of Oracle Collaboration Suite. It explains the role of Oracle Real Application Clusters and Oracle Collaboration Suite high availability architectures.

Oracle Collaboration Suite Architecture with Oracle Real Application Clusters

An Oracle Collaboration Suite cluster is a set of Oracle Collaboration Suite nodes configured to act synchronously to deliver greater scalability and availability than a single node can provide. While a single Oracle Collaboration Suite node can only leverage the operating resources of a single host, a cluster can span multiple hosts and distribute application execution over a greater number of CPUs. While a single Oracle Collaboration Suite node is vulnerable to the failure of its host and operating system, a cluster continues to function despite the loss of an operating system or host, by hiding any such failure from clients.

Clusters leverage the combined power and reliability of multiple Oracle Collaboration Suite nodes while maintaining the simplicity of a single Oracle Collaboration Suite node. For example, browser clients of applications running in a cluster interact with the applications as if the applications were running on a single server. With appropriate front-end load balancing, any node in an Oracle Collaboration Suite cluster can serve client requests. This simplifies configuration and deployment across multiple nodes and enables fault tolerance among clustered nodes.

What are Oracle Real Application Clusters?

Oracle Real Application Clusters allows the Oracle database to run any packaged or custom application unchanged across a set of clustered servers. This capability provides the highest levels of availability and the most flexible scalability. If a clustered server fails, then the Oracle database will continue running on the surviving servers. When more processing power is needed, another server can be added without interrupting data access for users.

Oracle Real Application Clusters enables multiple instances that are linked by an interconnect to share access to an Oracle database. In a Oracle Real Application Clusters environment, the Oracle database runs on two or more systems in a cluster while concurrently accessing a single shared database. The result is a single database system that spans multiple hardware systems yet appears as a single unified database system to the application. This enables Oracle Real Application Clusters to provide high availability, scalability, and redundancy during failures within the cluster. Oracle Real Application Clusters accommodates all system types, from read-only data

warehouse (DSS) systems to update-intensive online transaction processing (OLTP) systems.

High availability configurations have redundant hardware and software that maintain continuous operations by avoiding single points-of-failure. To accomplish this, Oracle Clusterware is installed as part of the Oracle Real Application Clusters installation process. Oracle Clusterware is a portable solution that is integrated and designed specifically for the Oracle database. In a Oracle Real Application Clusters environment, Oracle Clusterware monitors all Oracle components (such as instances and listeners). If a failure occurs, then Oracle Clusterware will automatically attempt to restart the failed component. Other non-Oracle processes can also be managed by Oracle Clusterware. During outages, Oracle Clusterware relocates the processing performed by the inoperative component to a backup component. For example, if a node in the cluster fails, Oracle Clusterware will cause client processes running on the failed node to reconnect and resume running on a surviving node.

Oracle Clusterware requires two files, the Oracle Cluster Registry (OCR) and the voting disk. To avoid single points-of-failure, these Oracle Clusterware files must be on shared storage accessible to each RAC node. Oracle Clusterware also enables you to replace a damaged copy of the OCR online. The recovery processes of Oracle Clusterware remaster resources, recover partial or failed transactions, and rapidly restore the system.

Oracle Real Application Clusters provides the following benefits:

- Ability to tolerate and quickly recover from computer and instance failures
- Fast, automatic, and intelligent connection and service relocation and failover
- Rolling patch upgrades for subsequent qualified patch releases
- Rolling release upgrades of Oracle Clusterware
- Load balancing advisory
- Run-time connection load balancing
- Flexibility to scale up processing capacity using commodity hardware without downtime or changes to the application
- Comprehensive manageability integrating database and cluster features

Oracle Real Application Clusters Configuration for Oracle Collaboration Suite

The Oracle Real Application Clusters configuration for Oracle Collaboration Suite consists of Oracle Collaboration Suite Database deployed on a cluster with two or more nodes. Each Oracle Collaboration Suite Database node has a local copy of the Oracle Collaboration Suite software installed. A single Oracle Collaboration Suite Database is shared by all the nodes.

Oracle database instances exist on each node and concurrently open the database for read or write operations. All Oracle Collaboration Suite database-related processes as well as the database listener on all the nodes use the same network port numbers for any communication. Thus each node is equivalent to another in terms of configuration and is active concurrently with other nodes.

Oracle Collaboration Suite Applications requests for Oracle Collaboration Suite Database services are equally met from all the nodes.

Oracle Real Application Clusters configuration for Oracle Collaboration Suite Database does not require load balancer. Oracle Net manages all database traffic and the traffic balanced across the nodes using Oracle Net connect descriptors that map to a single database service that contains multiple addresses in its address list. Oracle Real Application Clusters uses high-speed interprocess communication for internode communications. The connect descriptors are set at install time and maintained in the Oracle Internet Directory.

Oracle Calendar uses a file system based repository. So it does not support Oracle Real Application Clusters and Oracle database. But it can be installed in active-passive configuration that is described in the later section.

Outages in Oracle Real Application Clusters

Some of the unscheduled outages in Oracle Real Application Clusters can be due to Oracle instance failure or database node failure. In these failure cases, Oracle Net load balances and routes new connection traffic to the active nodes for the database service. Existing connections of Oracle Collaboration Suite Applications to the failed node will automatically reconnect to the surviving nodes upon any subsequent access.

Some scheduled outages in Oracle Real Application Clusters can be due to configuration changes on a node or maintenance of nodes. For node maintenance, all processes on the node, including the database instance, are brought down and Oracle Network services will route all access to the active database instances. Existing connections of Oracle Collaboration suite Applications to the failed node will automatically reconnect to the surviving nodes upon any subsequent access.

Oracle Collaboration Suite High Availability Architectures

Oracle Collaboration Suite consists of different components deployed on multiple tiers. The availability of each component directly affects the availability of the system. Besides providing high availability features, Oracle Collaboration Suite must also be secure. So both intranet and the Internet users can use the system without compromising availability and security.

Common Requirements for High Availability Architectures

This section consists of the Oracle Collaboration Suite high availability requirements which are common to each Oracle Collaboration Suite architecture described later. Oracle Collaboration Suite high availability architecture consists of the following components:

- Oracle Collaboration Suite Database Tier
- Oracle Identity Management
- Oracle Calendar
- Oracle Collaboration Suite Applications

When a node contains multiple Oracle homes, a single shared oraInventory directory is used on each node except for the Oracle Calendar server cold failover cluster installation, which must have its own oraInventory.

Oracle Collaboration Suite Database Tier

For high availability, Oracle recommends that Oracle Collaboration Suite Database be deployed as a Oracle Real Application Clusters database in an active-active configuration.

An Oracle home is on each node of the hardware cluster.

The hardware requirements for Oracle Collaboration Suite Database tier are as follows:

Hardware cluster with Oracle Cluster Ready Services (CRS)

- Shared storage for the Oracle Real Application Clusters database files and CRS files. Oracle database files can be on raw devices, Network Attached Storage (NAS), Oracle Cluster File System (OCFS) for Linux, or use Oracle Automatic Storage Management (ASM).
- A virtual IP address for each cluster node

Oracle Identity Management

Oracle Internet Directory and OracleAS Single Sign-On tiers together provide Oracle Identity Management.

For high availability, Oracle recommends that multiple instances of Oracle Internet Directory and OracleAS Single Sign-On tiers be deployed or that the deployment be designed to failover the service to any available system. An active-active deployment of these tiers require load balancers.

An Oracle home is on multiple nodes.

The hardware requirements for Oracle Identity Management tier are as follows:

- Single node
- Local storage
- A load balancer is at the front end of the nodes to route requests to Oracle Identity Management on all nodes of the cluster.

Oracle Calendar

For high availability, the Oracle Calendar server is placed on a cold failover cluster because it is a single point of failure. This cold failover cluster installation requires shared storage for the Oracle home and oraInventory directory trees. The Oracle Calendar server file-system database is contained under the Oracle home directory tree. To facilitate a cold failover cluster, a virtual IP address and host are required.

The Oracle home and the oraInventory directory trees are located on a dedicated shared storage of the hardware cluster. This Oracle home should have a separate oraInventory directory from the Oracle home of other components, so that when the shared file system is failed over, the oraInventory is also failed over with the same mount point.

The hardware requirements for the Oracle Calendar server are as follows:

- Hardware cluster. The Oracle Calendar server can be on the same cluster as the Oracle Collaboration Suite Database, but in Linux, Oracle Cluster Ready Services and RedHat Cluster Manager cannot coexist. As a result, the failover must be manual or the Oracle Calendar server should be put on a cluster that is separate from the Real Application Clusters database.
- Shared storage for the Oracle home and oraInventory of the Oracle Calendar server
- A virtual IP address

The Oracle Calendar server can be installed on its own cluster that is separate from the Oracle Collaboration Suite Database cluster, if required.

Oracle Collaboration Suite Applications

Oracle Collaboration Suite Applications nodes can be deployed in demilitarized zone (DMZ). A load-balancer virtual server forms the front end for multiple application nodes. Client requests to the Oracle Collaboration Suite Applications nodes are load

balanced across the Oracle Collaboration Suite Applications nodes by the load balancer using the load-balancer virtual server.

An Oracle home is on each Oracle Collaboration Suite Applications node.

The hardware requirements for the Oracle Collaboration Suite Applications node are as follows:

- Single node
- Local storage
- Configured to work with a load-balancer virtual server that is at the front end to route requests to applications on both nodes

In the architectures documented in the following section, all Oracle Collaboration Suite Applications components are installed on each Oracle Collaboration Suite Applications node. As an alternative to installing all the Oracle Collaboration Suite Applications components on each Oracle Collaboration Suite Applications node, it may be necessary or desirable to separate some Oracle Collaboration Suite Applications components to their own set of nodes.

For example, when an installation has a very large number of e-mail users, you might want to separate the Oracle Mail component to its own set of nodes. This would add two nodes, both containing only the Oracle Mail component. The other two Oracle Collaboration Suite Applications nodes would contain all Oracle Collaboration Suite Applications components except for Oracle Mail. This is based on the assumption that each unique installation of Oracle Collaboration Suite Applications should have at least two nodes to ensure the availability of Oracle Collaboration Suite Applications. Therefore, if you do decide to separate an Oracle Collaboration Suite Applications component from the rest of the Oracle Collaboration Suite Applications, plan on at least two additional nodes.

Overview of High Availability Architectures

With flexible installation, deployment, and security options, Oracle Collaboration Suite provides high availability solutions for maximum protection against any kind of failure. Three sample high availability architectures for Oracle Collaboration Suite defined in this section:

- Oracle Collaboration Suite Single Cluster Architecture
- Oracle Collaboration Suite Collocated Identity Management Architecture
- Oracle Collaboration Suite Distributed Identity Management Architecture

Details of these architectures are discussed in the following subsections.

Table 2–1 summarizes the details of Oracle home in the high availability architectures.

Architecture	Oracle Collaboration Suite Database	Oracle Internet Directory/Oracle Directory Integration and Provisioning	OracleAS Single Sign-On/Oracle Delegated Administration Services	Oracle Calendar Server	Oracle Collaboration Suite Applications
Single cluster architecture with 2 nodes	Separate Oracle homes are created on Node 1 and Node 2.	Oracle homes are created on Node 1 and Node 2. Oracle Internet Directory/Directory Integration and Provisioning and Single Sign-On/Delegated Administration Services have the same Oracle homes.	Same as the previous column.	Oracle home is active on Node 1. Oracle home on Node 2 becomes active if failover occurs.	Separate Oracle homes are created on Node 1 and Node 2.
Collocated Identity Management architecture with 4 nodes Nodes 1, 2 in one cluster containing the database Nodes 3, 4 are single nodes for Identity Management and Oracle Collaboration Suite Applications	Separate Oracle homes are created on Node 1 and Node 2.	Oracle homes are created on Node 3 and Node 4. Oracle Internet Directory/Directory Integration and Provisioning and Single Sign-On/Delegated Administration Services have the same Oracle homes.	Same as the previous column.	Oracle home is active on Node 1. Oracle home on Node 2 becomes active if failover occurs. Separate Oracle homes and oraInventory are created.	Separate Oracle homes are created on Node 3 and Node 4.
 Distributed Identity Management architecture with 6 nodes Nodes 1, 2 in one cluster containing the database Nodes 3, 4, 5, and 6 are single nodes for Identity Management and Oracle Collaboration Suite Applications 	Separate Oracle homes are created on Node 1 and Node 2.	Oracle homes are created on Node 3 and Node 4.	Separate Oracle homes are created on Node 5 and Node 6.	Oracle home is active on Node 1. Oracle home on Node 2 becomes active if failover occurs. Separate Oracle homes and oraInventory are created.	Separate Oracle homes are created on Node 5 and Node 6.

Table 2–1	Oracle home details in high	n availability architectures

Oracle Collaboration Suite Single Cluster Architecture

In single cluster architecture, as shown in Figure 2–1, all the following tiers are installed on a single cluster.

Oracle Collaboration Suite Database

- Identity Management Service
- Oracle Calendar Server
- Oracle Collaboration Suite Applications

This architecture requires multiple installations of Oracle Collaboration Suite and manual postinstallation configuration. In this architecture, the high availability configuration is active-active or Oracle Real Application Clusters for Oracle Collaboration Suite Database 10.1.0.4.2. The database instance processes run on both nodes of the hardware cluster. For the Identity Management to be highly available, an active-active OracleAS Cluster for Identity Management is used and multiple active Identity Management instances provide continued availability in case of failure of one instance. The load balancer is placed at the front end of Identity Management nodes.

The cluster configuration for Oracle Collaboration Suite consists of Oracle Collaboration Suite Database deployed on a cluster with two or more nodes. Figure 2–1 shows Node1 and Node2 in the cluster. Each Oracle Collaboration Suite Database node has a local copy of the Oracle Collaboration Suite software installed. All file-system-based configuration files are local to each node as well. There is a single Oracle Collaboration Suite Database shared by all the database nodes. This Oracle Real Application Clusters database is installed on shared storage accessible to all Oracle Collaboration Suite Database instances.



Figure 2–1 Oracle Collaboration Suite single cluster architecture

Oracle database instances exist on each node and concurrently open the database for read or write operation. The database instance processes and Identity Management

processes run on both nodes of the hardware cluster. Oracle home #1 and Oracle home #2 for Oracle Collaboration Suite Database are created in Node1 and Node2.

Oracle home #3 and Oracle home #4 are created for Oracle Identity Management. Oracle home #5 and Oracle home #6 are created for Oracle Collaboration Suite Applications and can include the following components:

- Oracle Mail
- Oracle Content Services
- Oracle Collaboration Suite Search
- Oracle Mobile Collaboration
- Oracle Voicemail & Fax
- Oracle Calendar
- Oracle Calendar Web Client
- Oracle Calendar Application System
- Oracle Collaborative Portlets
- Oracle Real-Time Collaboration
- Oracle Discussions
- Oracle Workspaces

The Oracle Calendar Server oraInventory, ORACLE_HOME, and the Oracle Calendar Sever data (in the ORACLE_HOME directory by default) are installed on a file system residing on shared storage, which is accessed by only one node of the cluster at any given time. So the Oracle Calendar server will only be running on cluster Node1 shown in Figure 2–1. Only after a failure of the Oracle Calendar server on Node1, will the Oracle Calendar server become active on cluster Node2. Oracle home #7 is created for Oracle Calendar server. In the event of a failover, the shared file system containing Oracle home #7 and the Oracle Calendar Server oraInventory is mounted on Node2. Oracle home #7 includes the file-system-level database that stores all calendar-related data. This database is not an Oracle database.

Oracle Collaboration Suite Collocated Identity Management Architecture

Collocated Identity Management architecture, as shown in Figure 2–2, separates the Oracle Collaboration Suite Database tier and the Identity Management tier rather than sharing nodes as in the Single Cluster Architecture. This architecture requires multiple installations of Oracle Collaboration Suite and manual postinstallation configuration.

In this architecture, the high availability configuration is active-active (Oracle Real Application Clusters) for Oracle Collaboration Suite Database 10.1.0.4.2 and Oracle Identity Management.

The Oracle Collaboration Suite Database tier is created by using Metadata Repository Configuration Assistant or the Oracle Collaboration Suite Database only install option. The Oracle Identity Management tier is installed separately against the Oracle Collaboration Suite Database on multiple nonclustered nodes.

Figure 2–2 shows Node1 and Node2 in the cluster. Oracle home #1 and Oracle home #2 are created for the existing Oracle 10*g* database with Oracle Collaboration Suite Database in Node1 and Node2 respectively.



Figure 2–2 Oracle Collaboration Suite Collocated Identity Management architecture

The Oracle Calendar server will store its data on a file system residing on a shared disk, which is accessed by only one node of the cluster at any given time. So the Oracle Calendar server will only be running on cluster Node1 shown in Figure 2–2. Only after a failure of the Oracle Calendar server on Node1, will the Oracle Calendar server become active on cluster Node2. Oracle home #7 is created for the Oracle Calendar server. It includes the file-system-level database that stores all calendar-related data. This database is not an Oracle database.

Oracle home #5 and Oracle home #6 are created for Oracle Identity Management on Node3 and Node4. On this tier, Identity Management includes the following components:

- Oracle Internet Directory
- Oracle Application Server Single Sign-On
- Oracle Delegated Administration Services
- Oracle Directory Integration and Provisioning

Oracle home #5 and Oracle home #6 for Oracle Collaboration Suite Applications are created.

A hardware load balancer is placed at the front end of the Oracle Identity Management nodes to balance the Oracle Identity Management traffic load.

Oracle Collaboration Suite Applications

In Collocated Identity Management architecture, the components of the Oracle Collaboration Suite Applications tier installed on separate nodes outside Oracle Collaboration Suite Infrastructure. Each installation of Oracle Collaboration Suite Applications will contain all the following components:

- Oracle Mail
- Oracle Content Services
- Oracle Collaboration Suite Search
- Oracle Mobile Collaboration
- Oracle Voicemail & Fax
- Oracle Calendar
- Oracle Calendar Web Client
- Oracle Calendar Application System
- Oracle Collaborative Portlets
- Oracle Real-Time Collaboration
- Oracle Discussions
- Oracle Workspaces

A load balancer is at the front end of the Oracle Collaboration Suite Applications tier to load balance the requests to all the Applications tier servers.

Oracle Collaboration Suite Distributed Identity Management Architecture

Distributed Identity Management architecture, as shown in Figure 2–3, is similar to the Collocated Identity Management architecture except that the Identity Management components (Oracle Internet Directory and Oracle Application Server Single Sign-On) are distributed across multiple nonclustered servers in a DMZ.

This architecture requires multiple installations of Oracle Collaboration Suite and manual postinstallation configuration.

In this architecture, the high availability configuration is active-active (Oracle Real Application Clusters) for Oracle Collaboration Suite Database, Oracle Internet Directory and OracleAS Single Sign-On.

In this configuration, Oracle Internet Directory and Oracle Directory and Integration Provisioning are deployed on multiple nonclustered servers in the intranet. OracleAS Single Sign-On and Oracle Delegated Administration Services are installed on multiple non-clustered servers in the DMZ. This configuration requires multiple installations of Oracle Collaboration Suite Infrastructure and manual postinstallation configuration.

Figure 2–3 shows Node1 and Node2 in the cluster. Oracle home #1 and Oracle home #2 are created for the existing Oracle 10g database with Oracle Collaboration Suite Database in Node1 and Node2 respectively.



Figure 2–3 Oracle Collaboration Suite distributed Identity Management architecture

Oracle home #1 and Oracle home #2 are created for the existing Oracle 10g database with Oracle Collaboration Suite Database 10.1.0.4.2 in Node1 and Node2 respectively.

The Oracle Calendar server will store its data on a file system residing on a shared disk, which is accessed by only one node of the cluster at any given time. So the Oracle Calendar server will only be running on cluster Node1 shown in Figure 2–3. Only after a failure of the Oracle Calendar server on Node1, the Oracle Calendar server becomes active on cluster Node2. Oracle home #7 is created for the Oracle Calendar server. It

includes the file-system-level database that stores all calendar-related data. This database is not an Oracle database.

Oracle home #3 and Oracle home #4 are created for Oracle Identity Management. On the Oracle Internet Directory tier, Oracle Identity Management includes the following components:

- Oracle Internet Directory
- Oracle Directory Integration and Provisioning

Oracle home #5 and Oracle home #6 for Oracle Collaboration Suite Applications are created on Node5 and Node6.

Oracle home #8 and Oracle home #9 for Oracle Identity Management in Oracle Collaboration Suite Infrastructure are created on Node5 and Node6 as shown in Figure 2–3. On the OracleAS Single Sign-On tier, Oracle Identity Management includes the following components:

- OracleAS Single Sign-On
- Oracle Delegated Administration Services

The firewall ports to be opened are as follows:

- Oracle Net
- Oracle Internet Directory port
- Oracle Internet Directory Secure Sockets Layer port

A load balancer is placed at the front end of the Oracle Internet Directory tier nodes of Oracle Identity Management. It balances the Oracle Internet Directory traffic load. Another load balancer is placed at the front end of the OracleAS Single Sign-On tier machines to balance the HTTP traffic load.

Oracle Collaboration Suite Applications

In Distributed Identity Management Architecture, the components of the Oracle Collaboration Suite Applications tier are installed on separate nodes outside Oracle Collaboration Suite Infrastructure. Each installation of Oracle Collaboration Suite will contain all the following components:

- Oracle Mail
- Oracle Content Services
- Oracle Collaboration Suite Search
- Oracle Mobile Collaboration
- Oracle Voicemail & Fax
- Oracle Calendar
- Oracle Calendar Web Client
- Oracle Calendar Application System
- Oracle Collaborative Portlets
- Oracle Real-Time Collaboration
- Oracle Discussions
- Oracle Workspaces

A load balancer is placed at the front end of the Oracle Collaboration Suite Applications tier to load balance the requests to all the Applications tier servers.

Note: For installation details of the Single Cluster architecture, Collocated Identity Management architecture and Distributed Identity Management architecture, refer to Chapter 9 in the following guides:

- Oracle Collaboration Suite Installation Guide for AIX Based Systems
- Oracle Collaboration Suite Installation Guide for Solaris Operating System
- Oracle Collaboration Suite Installation Guide for Linux
- Oracle Collaboration Suite Installation Guide for Microsoft Windows
- Oracle Collaboration Suite Installation Guide for hp-ux

Comparison of High Availability Architectures

Each high availability architecture option offers advantages and disadvantages. Table 2–2 summarizes the differences among the high availability architectures.

	Single Cluster Architecture	Collocated Identity Management Architecture	Distributed Identity Management Architecture
Type of Configuration	In this configuration, all the tiers are installed on a single cluster.	Oracle Collaboration Suite Database tier, Oracle Collaboration Suite Applications tier and Oracle Identity Management tier are deployed separately.	Oracle Collaboration Suite Database tier, Oracle Collaboration Suite Applications tier, Oracle Internet Directory and OracleAS Single Sign-On are deployed separately.
Management	More system resources are required because everything runs on only two nodes. Also, it is not easy to secure this setup.	System usage is distributed because the Oracle Collaboration Suite Database tier is separated and network security can be stronger.	System usage is distributed even further than Collocated because the Oracle Collaboration Suite Database tier, Oracle Internet Directory tier, and OracleAS Single Sign-On tier are separated and network security can be stronger.
Cost	Cheapest solution	Cheaper than Distributed architecture.	Expensive solution

Table 2–2 Comparison of Architectures

Configuration of Load Balancers in High Availability Architectures

Load balancers play a key role in all the high availability architectures. Not only can load balancers balance the load across nodes, but they can also detect when a node or the necessary application on a node is down and reroute traffic to an active node. Where a hardware load balancer is required, it will be configured to direct incoming requests for OracleAS Single Sign-On, Oracle Internet Directory, and Oracle Collaboration Suite Applications. The load balancer will only be used for non-Oracle Net traffic such as HTTP, Lightweight Directory Access Protocol (LDAP), HTTPS and so on. It is configured with three virtual servers as indicated in the preceding figures:

- Oracle Internet Directory or Oracle Directory Integration and Provisioning: Virtual server A, ldap.mydomain.com
- OracleAS Single Sign-On or Oracle Delegated Administration Services: Virtual server B, sso.mydomain.com
- Oracle Collaboration Suite Applications: Virtual server C, ocs_ app.mydomain.com

This section describes the configuration requirements for the load balancer for all the high availability configurations of Oracle Collaboration Suite. For high availability, the recommendations for load balancers are as follows:

- The load balancer should be deployed in a fault-tolerant configuration. Two load balancers should be used. These fault-tolerant load balancers should be identical in their configuration and capacity. Their failover should be automatic and seamless.
- The load balancer type used should be able to handle both HTTP and LDAP traffic in the high availability configurations described in this chapter. Any load balancing mechanism that supports only one of the protocols cannot be used in the default configuration.
- The load balancer should not drop idle connections. Any timeouts associated with dropping of connections should be eliminated.

Two load balancer settings are of primary importance for the high availability configuration:

- The nodes to which the load balancer directs traffic
- The persistence setting of the load balancer

The persistence mechanism used should provide session-level persistence. By default, HTTP and Oracle Internet Directory requests both use the same virtual host address configured for the load balancer. Hence, the persistence mechanism used is available for both kinds of requests.

The only virtual server that requires persistence is the OracleAS Single Sign-On or Oracle Delegated Administration Services load-balancer virtual server. Ideally, the Oracle Delegated Administration Services Uniform Resource Identifier (URI), /oiddas, is the only access point that requires active cookie persistence with the insert method and not a rewrite method with session-level timeout. These are common load balancer options that should be described in your load balancer documentation. If the load balancer allows for the configuration of different persistence mechanisms for different URIs for the same virtual server, then this is the recommended strategy. If the load balancer does not allow specification of different persistence mechanisms, then the recommended default persistence timeout is 60 seconds. It should be adjusted based on the nature of the deployment and the load balancing achieved across the Oracle Collaboration Suite nodes. It should be increased if session timeouts are experienced by Oracle Delegated Administration Services users. It should be decreased even if load balancing is not achieved.

Load balancers come in many types and each may have its own configuration mechanism. Consult your load balancer documentation for the specific instructions to achieve these configurations.

3

Management of High Availability Environments

This chapter describes how to manage the high availability environments in Oracle Collaboration Suite. Managing high availability environments primarily consists of managing nodes of Oracle Real Application Clusters and Oracle Collaboration Suite Applications. The chapter consists of the following sections:

- Performing Oracle Collaboration Suite Specific Steps After Adding or Deleting Nodes from the Oracle Collaboration Suite Database
- Adding or Removing Oracle Collaboration Suite Applications Nodes
- Configuring Manual Cold Failover for the Oracle Calendar Server
- Starting and Stopping Oracle Collaboration Suite in a High Availability Environment

Note: For information about adding and removing nodes and instances in Oracle Real Application Clusters Database, refer to Chapter 5 in *Real Application Clusters Administrator's Guide 10g Release* 1 (10.1).

Performing Oracle Collaboration Suite Specific Steps After Adding or Deleting Nodes from the Oracle Collaboration Suite Database

This section describes the steps required in Oracle Collaboration Suite after adding or removing nodes from Oracle Collaboration Suite Database. The steps are as follows:

- Step 1: Modify the Oracle Real Application Clusters Database Connect String in Oracle Internet Directory
- Step 2: Modify the Connect String of the Crawler Through the Search Admin Application
- Step 3: Bounce the Oracle Collaboration Suite Application Tier Processes

Step 1: Modify the Oracle Real Application Clusters Database Connect String in Oracle Internet Directory

The step to modify the Oracle Real Application Clusters database connect string in Oracle Internet Directory to include the new database instance node or remove the deleted database instance node is as follows:

 In Oracle Internet Directory, navigate to dn:cn=OCSDB, cn=OracleContext and modify orclnetdesctring accordingly. This implies that if you add a database node, then add the new node specification to the connect string and if you delete a node, then remove the node specification from the connect string. An example for adding a database instance (this would all be on a single line in oidadmin but is split for legibility) is as follows.

If a third database instance had been added to a new node with the database name of ocsdb, dbnode3vip1.us.oracle.com, then you would modify dn:cn=OCSDB, cn=OracleContext orclnetdesctring value as follows (the line to be added is shown in bold in the following example):

```
(DESCRIPTION=(ADDRESS_
LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=dbnode1vip1.us.oracle.com)(PORT=1521))
(ADDRESS=(PROTOCOL=TCP)
(HOST=dbnode2vip1.us.oracle.com)(PORT=1521))
(HOST=dbnode3vip1.us.oracle.com)(PORT=1521))
(LOAD_BALANCE=yes))(CONNECT_DATA=(SERVICE_NAME=ocsdb.us.oracle.com)))
```

Step 2: Modify the Connect String of the Crawler Through the Search Admin Application

When Oracle Real Application Clusters uses the Cluster File System (CFS), the Oracle Collaboration Suite Search crawler can be started from any of the Oracle Real Application Clusters nodes, as long as at least one Oracle Real Application Clusters node is up and running. When Oracle Real Application Clusters is not using CFS, the Oracle Collaboration Suite Search crawler always runs on a specified node. If this node stops operating, then you must run the wk0reconfig.sql script to move Oracle Collaboration Suite Search to another Oracle Real Application Clusters node. In the wk0reconfig.sql script, instance_name is the name of the Oracle Real Application Clusters instance that Oracle Collaboration Suite Search uses for crawling. After connecting to the database, to get the name of the current instance, run the following command:

SELECT instance_name FROM v\$instance

connect_url is the JDBC connection string that guarantees a connection only to the specified instance. An example is as follows:

```
(DESCRIPTION=
    (ADDRESS_LIST=
        (ADDRESS=(PROTOCOL=TCP)
            (HOST=<nodename>)
            (PORT=<listener_port>)))
    (CONNECT_DATA=(SERVICE_NAME=<service_name>)))
```

Step 3: Bounce the Oracle Collaboration Suite Application Tier Processes

For versions before 10.1.2.2, run the following commands from the Oracle Collaboration Suite Application tier.

```
$ORACLE_HOME/opmn/bin/opmnctl stopall
$ORACLE_HOME/ocas/bin/ocasctl -stopall
$ORACLE_HOME/opmn/bin/opmnctl startall
$ORACLE_HOME/ocas/bin/ocasctl -start -t ochecklet -p 8020 -n 1
$ORACLE_HOME/ocas/bin/ocasctl -start -t ocas -p 8010 -n 5
```

For 10.1.2.2, run the following commands from the Oracle Collaboration Suite Application tier.

```
$ORACLE_HOME/opmn/bin/opmnctl stopall
$ORACLE_HOME/ocas/bin/ocasctl -stopall
$ORACLE_HOME/opmn/bin/opmnctl startall
$ORACLE_HOME/ocas/bin/ocasctl -startall
```

The default ports are 8010 and 8020. The valid range is 8010 to 8020.

Adding or Removing Oracle Collaboration Suite Applications Nodes

This section describes how to add and delete Oracle Collboration Suite Applications nodes. The topics in this section are:

- Removing Oracle Collaboration Suite Nodes
- Adding Oracle Collaboration Suite Applications Nodes

Removing Oracle Collaboration Suite Nodes

The steps for removing nodes from multiple Oracle Collaboration Suite Applications tiers that have a load balancer at the front end are as follows:

 Shut down all Oracle Collaboration Suite Applications on the node of the Oracle Collaboration Suite Applications tier that must be removed, as follows:

opmnctl stopall

After shutting down Oracle Collaboration Suite Applications, the load balancer routes all requests to the active nodes assuming that the load balancer monitors have been set up correctly.

2. Remove the node from the load-balancer virtual server node pool.

Adding Oracle Collaboration Suite Applications Nodes

The steps for adding nodes from multiple Oracle Collaboration Suite Applications are as follows:

- 1. Follow the steps listed in the "Installing Subsequent Instance of Oracle Collaboration Suite 10g Applications" section in Chapter 9 in the following guides:
 - Oracle Collaboration Suite Installation Guide for AIX Based Systems
 - Oracle Collaboration Suite Installation Guide for Solaris Operating System
 - Oracle Collaboration Suite Installation Guide for Linux
 - Oracle Collaboration Suite Installation Guide for Microsoft Windows
 - Oracle Collaboration Suite Installation Guide for hp-ux
- 2. Add the new node to the load balancer configuration

Configuring Manual Cold Failover for the Oracle Calendar Server

In an Oracle Collaboration Suite high availability environment, the Oracle Calendar server can be set up in an active-passive configuration, also known as cold failover cluster configuration.

In an Oracle Calendar server cold failover cluster configuration, if an active node fails and if you want an automated cold failover for Oracle Calendar Server, then you must use vendor clusterware. Manual cold failover is done when the vendor clusterware is not installed. The steps for manual cold failover configuration are as follows:

- 1. Ensure that the Oracle Calendar server virtual IP address is inaccessible by pinging it. If it is still accessible, then it may not be necessary to execute a cold failover. Validate that the system is truly down and also that it requires a cold failover before proceeding. If it is necessary and the Oracle Calendar server virtual IP is still accessible, then bring down the virtual IP address on the node where it is active.
 - **a.** Register the Oracle Calendar Server Oracle home with the central inventory. From the Oracle Calendar Server Oracle home, run the following command at the prompt:

\$ORACLE_HOME/oui/bin/runInstaller -attachHome
ORACLE_HOME=<Oracle_Home_Location> ORACLE_HOME_NAME=<Oracle_Home_Name>

After attaching the Oracle home, you can verify the success of the operation by verifying the contents of the log files present in the <central_ inventory>/logs directory. You can also view the contents of the inventory.xml file under <central_inventory>/ContentsXML directory to verify that the Oracle home is registered.

- **b.** Mount the Oracle Calendar server shared storage containing the ORACLE_ HOME of Oracle Calendar Server on the destination node.
- 2. Bring up the virtual IP address on the destination node.
- 3. Start the Oracle Calendar server.

Starting and Stopping Oracle Collaboration Suite in a High Availability Environment

This section describes how to stop and start Oracle Collaboration Suite in a high availability environment. Set up the environment for the correct ORACLE_HOME when you log on to each tier before the stop and start processes. A database ORACLE_HOME will include the ORACLE_SID.

Stopping Oracle Collaboration Suite in a High Availability Environment

The steps for stopping Oracle Collaboration Suite in a high availability environment are as follows:

1. Log on to each Applications tier node and run the following commands:

\$OH/opmn/bin/opmnctl stopall \$OH/ocas/bin/ocasctl -stopall \$OH/bin/emctl stop iasconsole \$OH/bin/lsnrctl stop listener_es

2. For the Oracle Calendar server node, run the following commands:

\$OH/opmn/bin/opmnctl stopall \$OH/bin/emctl stop iasconsole

3. For each of the Identity Management tiers, do the following:

\$OH/opmn/bin/opmnctl stopall \$OH/bin/emctl stop iasconsole **4.** In each Oracle Real Application Clusters database tier, run the following command:

emctl stop dbconsole

From any Oracle Real Application Clusters database node, run the command:

\$OH/bin/srvctl stop database -d \$dbname \$OH/bin/svrctl stop nodeapps -n \$nodename

In the preceding commands, \$dbname is the name of the database and \$nodename is the node name.

Starting Oracle Collaboration Suite in a High Availability Environment

The steps for starting Oracle Collaboration Suite in a high availability environment are as follows:

1. In each Oracle Real Application Clusters database tier, run the following command:

emctl start dbconsole

From any Oracle Real Application Clusters database node, run the command:

```
$0H/bin/svrctl start nodeapps -n $nodename
$0H/bin/srvctl start database -d $dbname
```

In the preceding commands, \$dbname is the name of the database and \$nodename is the node name.

2. Log on to each Identity Management tier to do the following:

```
$OH/opmn/bin/opmnctl startall
$OH/bin/emctl start iasconsole
```

In a Distributed Identity Management Architecture, ensure that the Oracle Internet Directory tier is started before the OracleAS Single Sign-On tier.

3. The Oracle Calendar server is set up separately from the Applications tier in its own ORACLE_HOME. For the Oracle Calendar server node, ensure that the virtual IP is up and run the following commands:

```
$OH/opmn/bin/opmnctl startall
$OH/bin/emctl start iasconsole
```

4. For each of the Applications tier instances, log in as root to start the listener_ es process, ensure that port 25 is not in use and then run the following commands.

\$0H/bin/tnslsnr listener_es -user \$uid -group \$gid

Log in as the owner of the Oracle Collaboration Suite software and perform the following steps for versions before 10.1.2.2:

```
$0H/ocas/bin/ocasctl -start -t ochecklet -p 8020 -n 1
$0H/ocas/bin/ocasctl -start -t ocas -p 8010 -n 5
$0H/opmn/bin/opmnctl startall
$0H/bin/emctl start iasconsole
```

Log in as the owner of the Oracle Collaboration Suite software and perform the following steps for 10.1.2.2:

\$OH/ocas/bin/ocasctl -startall \$OH/opmn/bin/opmnctl startall \$OH/bin/emctl start iasconsole

Note: This step assumes that you are using the default port (port 25) for the Oracle Mail listener. On UNIX systems, port 25 is a privileged port, so you must log in as root. If you have installed the listener on a non-privileged port, then you do not need to log in as root. On Windows systems, you do not need to log in as root.

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