Smart Assist for Oracle user’s guide
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About this document

This guide introduces the High Availability Cluster Multi-Processing for AIX (HACMP) software. This information is also available on the documentation CD that is shipped with the operating system.

Who should use this guide

System administrators, system engineers, and other information systems professionals who want to learn about features and functionality provided by the HACMP software should read this guide.

Highlighting

The following highlighting conventions are used in this book:

<table>
<thead>
<tr>
<th><strong>Bold</strong></th>
<th>Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Italics</strong></td>
<td>Identifies parameters whose actual names or values are to be supplied by the user.</td>
</tr>
<tr>
<td><strong>Monospace</strong></td>
<td>Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.</td>
</tr>
</tbody>
</table>

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

HACMP publications

The HACMP software comes with the following publications:

- HACMP for AIX Release Notes in `/usr/es/sbin/cluster/release_notes` describe issues relevant to HACMP on the AIX platform: latest hardware and software requirements, last-minute information on installation, product usage, and known issues.
- HACMP for AIX: Administration Guide, SC23-4862
- HACMP for AIX: Installation Guide, SC23-5209
- HACMP for AIX: Master Glossary, SC23-4867
- HACMP for AIX: Planning Guide, SC23-4861
- HACMP for AIX: Programming Client Applications, SC23-4865
- HACMP for AIX: Troubleshooting Guide, SC23-5177
- HACMP on Linux: Installation and Administration Guide, SC23-5211
- HACMP for AIX: Smart Assist Developer's Guide, SC23-5210
- IBM International Program License Agreement.

HACMP/XD publications

The HACMP Extended Distance (HACMP/XD) software solutions for disaster recovery, added to the base HACMP software, enable a cluster to operate over extended distances at two sites. HACMP/XD publications include the following:

HACMP Smart Assist publications

The HACMP Smart Assist software helps you quickly add an instance of certain applications to your HACMP configuration so that HACMP can manage their availability. The HACMP Smart Assist publications include the following:
- HACMP Smart Assist for DB2 User’s Guide, SC23-5179
- HACMP Smart Assist for Oracle User’s Guide, SC23-5178
- HACMP Smart Assist for WebSphere User’s Guide, SC23-4877
- HACMP for AIX: Smart Assist Developer’s Guide, SC23-5210
- HACMP Smart Assist Release Notes in /usr/es/sbin/cluster/release_notes_assist

Case-sensitivity in AIX

Everything in the AIX operating system is case-sensitive, which means that it distinguishes between uppercase and lowercase letters. For example, you can use the ls command to list files. If you type LS, the system responds that the command is not found. Likewise, FILEA, FiLea, and filea are three distinct file names, even if they reside in the same directory. To avoid causing undesirable actions to be performed, always ensure that you use the correct case.
Smart Assist for Oracle user’s guide

This guide is intended for system administrators and customer engineers, responsible for planning and configuring an HACMP™ environment for Oracle components.

Before continuing with HACMP Smart Assist for Oracle, familiarize yourself with Oracle Application Server 10g (9.0.4) and Oracle Relational Database Management System (RDBMS) (10g/11g) instances from a conceptual and functional standpoint, and IBM® AIX® and HACMP.

Note: Power HA for AIX is the new name for HACMP. This book will continue to refer to HACMP.

To view or download the PDF version of this topic, select Smart Assist for Oracle user’s guide.

Downloading Adobe Reader: You need Adobe® Reader installed on your system to view or print this PDF. You can download a free copy from the Adobe Web site (www.adobe.com/products/acrobat/readstep.html).

Getting started

HACMP Smart Assist for Oracle discovers pre-installed Oracle Application Servers and Oracle database instances. In addition, it helps you to integrate HACMP and Oracle Application Server clusters to monitor the Oracle processes and ensure that the applications remain available.

However, it does not suggest the best high availability configuration your environment. For information on choosing the optimum high availability configuration for your Oracle environment, see the Oracle documentation listed on the Oracle documentation Web site.

You must install the Oracle and HACMP software, and create and configure Oracle Application Server and database instances on all nodes before running HACMP Smart Assist for Oracle.

Oracle installations are required to be in the OFA (Optimal Flexible Architecture) form. If the Oracle installation is not in an OFA directory structure, the discovery component will not function properly.

HACMP Smart Assist for Oracle supplements the Oracle Application Server 10g Installation Guide, Part No. B13658-02’s, Chapter 9: Installing in High availability Environments. Use this document in conjunction with the Oracle installation guide during configuration.

To use HACMP Smart Assist for Oracle, install the software listed in the section Software installation prerequisites in on all nodes in the Oracle-related resource groups (which may be a subset of all cluster nodes).

Related reference

"Software installation prerequisites" on page 15
Before installing the software, there are several prerequisites that you should understand.

Related information

Oracle Documentation

Enhancing HACMP and Oracle integration

HACMP Smart Assist for Oracle is an extension of the HACMP software that helps you to make your Oracle Application Server 10g cluster configuration and Oracle database instances highly available using the features provided by HACMP.

HACMP Smart Assist for Oracle lets you:
• Discover and configure the Oracle Application Server (AS) components, make the AS components highly available, and monitor those components for failure.
• Integrate HACMP and Oracle database 10g for a Cold Failover Cluster (CFC) environment and monitor the database for failure.
• Make the resources specific to the Oracle Infrastructure highly available, such as a shared volume group, file systems, and the service IP label associated with the Oracle application.

This lets you create a mutual takeover cluster configuration and a cluster configuration with multiple nodes and resource groups with Oracle instances. HACMP ensures the availability of these instances by moving resource groups from one node to another when the conditions in the cluster change.
• Start and stop the Oracle Application Server business applications on the nodes automatically, by the means of an HACMP application server (a collection of start and stop scripts in HACMP) created for the Oracle instance in the HACMP cluster.
• Automatically monitor the Oracle database instance(s) running on the nodes as well as Oracle Application Server.
• Verify the existing configuration of the Oracle components to ensure that the Oracle and HACMP configuration is valid.

**Keeping Oracle Application server highly available**

HACMP increases the availability of Oracle Application Server instance by eliminating single points of failure. A *single point of failure* exists when a critical function relies on a single component in a configuration. If that component fails, the application dependent on that component becomes unavailable.

The primary components required to deploy an HACMP cluster for the Oracle Application Server are:
• **Middle Tier Application Server.** The Middle Tier Application Server communicates with the cluster through the *service IP virtual IP address (VIP)*.
  The middle tier hosts most of the Oracle Application Server business applications. These applications rely on Oracle AS Infrastructure for security and metadata support. The middle tier also includes a Web caching sub-tier (Oracle Application Server Web Cache), and a Web server sub-tier (Oracle HTTP Server).
• **Infrastructure Tier.** Consists of two parts: Oracle AS Metadata Repository and Oracle Identity Management (IM). Together, they provide centralized metadata, management, and security services for Oracle Application Server components.
  A highly available Oracle AS deployment requires a highly available Infrastructure service. Uninterrupted access to Oracle Identity Management, installed as part of the infrastructure, is in the critical path to the availability of other application services.

The Oracle AS infrastructure tier components are grouped into the following tiers:
• **OID tier.** Provides Oracle Internet Directory (OID) services including directory services, directory integration services to integrate OID with third-party directories, etc. The main processes in this tier are the OID (Oracle Internet Directory) and Oracle Directory Integration and Provisioning (DIP) processes.
• **SSO tier.** Provides Single Sign On (SSO) and Delegation Administration services (DAS). The main processes in this tier are the Oracle HTTP Server (OHP) and OC4j instances hosting SSO and DAS applications.
  The OID tier and SSO tier together provide the Identity Management services.
• **Database Tier.** An Oracle database serves as the metadata repository (MR). The same database may contain the metadata repository and the schemas used to hold application data. The processes in this tier are the database instance processes and the database listener.

You may group Middle-tier components and Infrastructure tier components on two separate clusters. Usually, middle tier components are configured with AFC and infrastructure components with CFC.
We recommend that you have all three tiers of Infrastructure components (OID tier, SSO tier and Database tier) in one cluster. Each tier will have its own resource group. These tiers can be distributed among multiple nodes.

HACMP views the application server as the Oracle Infrastructure Tier. HACMP Smart Assist for Oracle provides support for both the Oracle Application Server configured for a Cold Failover Cluster (CFC) - the HACMP two-node cluster with a hot standby configuration - and the Oracle Application Server configured for an Active Failover Cluster (AFC) - the HACMP two-node configuration for concurrent access.

To protect Oracle Application Servers and eliminate single points of failure, each Oracle Application Server instance that you want to make highly available must be able to run on at least two nodes. Clustering provides high availability for Oracle Application Server middle tier by uniting various Oracle Application Server components in certain permutations. This clustering offers scalable and unified functionality and redundancy should any of the individual components fail.

You can configure each of the three core Oracle Application Server components in multiple permutations (Application Server middle tier, Identity Management, metadata repository) as follows:

- All components installed on the same node
- All components installed on separate nodes
- A mix of the above, two components on one node, one on another node.
- The node mentioned in the list above is not required to be an HACMP-managed node. However, HACMP only discovers and makes highly available those components that are installed on HACMP managed AIX systems.

HACMP Smart Assist for Oracle configures each of the three Oracle Application Server components in their own resource group. You can configure each of the tiers as either a Cold Failover Cluster (CFC) or Active Failover Cluster (AFC) as follows:

- **Cold Failover Cluster.** The participating nodes share the same set of resources (volume groups, and logical volumes and file systems). HACMP ensures the availability of cluster resources by moving resource groups from one node to another when the conditions in the cluster change.
- **Active Failover Cluster.** Each node has its own resource group. HACMP monitors the resource groups for application server failure and restarts the application server on that node - no movement of resources takes place in an AFC configuration.

Note that some components may be configured in an AFC configuration and some may be configured in a CFC configuration, for example, an Oracle Application Server middle tier configured in an AFC configuration, with the metadata repository and identity management components operating on one node in a CFC configuration.

**Increasing availability for an Oracle Application server**

HACMP Smart Assist for Oracle provides several availability features for the Oracle Application server.

These features include:

- Monitors for the Oracle database instance, verifies background processes, listener-related processes, and the state of each instance.
- Monitors for Oracle Application Server use of the Oracle Process Manager and Notification (OPMN) utility. When a failure is detected by any of the components, an attempt is made to restart (up to 3 times by default).

For AFC each node has its own resource group (SSO, OID or MR) to monitor for application server failure and to restart the application server on that node - no movement of resources takes place in an AFC configuration.
configuration. If any component fails, HACMP attempts to restart it on the same node. Therefore, for all three resource groups when restart fails (up to 3 times by default), HACMP logs the failure information and makes no further restart attempts.

**Supported Oracle Application server failover configurations**

HACMP Smart Assist for Oracle supports several cluster configurations.

These configurations are:

- **Hot standby.** The Oracle Application Server CFC configuration, where one node performs the work while the other node waits as a failover location.
- **Mutual takeover.** The Oracle Application Server AFC Standard Edition configured with HACMP provides each node of the two-node cluster with a hot standby simultaneous access to process incoming requests.
- **Multiple node.** The Oracle Application Server AFC Enterprise Edition configured with HACMP allows for a maximum of 32 active/active nodes (limited by your hardware) with simultaneous access to the shared disks with all nodes owning the same disk resources.

**Related concepts**

- "Configuring a highly available Application server infrastructure"

You can configure HACMP and Oracle Application server infrastructure in different cluster configurations.

**Overview of Oracle database**

Oracle database is comprised of an instance and data storage. An instance is a set of operating-system processes and memory structures that interact with the storage.

These processes are also called as background processes or detached processes. Typical background processes include:

- DBWn (Database Writer Process)
- LGWR (Log Writer Process)
- CKPT (Checkpoint Process)
- PMON (Process Monitor)
- SMON (System Monitor).

Oracle refers to the server-side memory structure as the SGA (System Global Area). The SGA typically holds cache information like data buffers, SQL commands and user information. In addition to storage, the database consists of online redo logs (which hold transactional history). Processes can in turn be activated to archive the online redo logs into archive logs (offline redo logs), which provide the basis for data recovery.

The HACMP Smart Assist for Oracle assists you in configuring Oracle database in a Cold Failover Cluster (CFC) environment.

**Configuring a highly available Application server infrastructure**

You can configure HACMP and Oracle Application server infrastructure in different cluster configurations.

HACMP Smart Assist for Oracle helps you to integrate HACMP and your existing Oracle Application Server configured for CFC or AFC, and Oracle database instances configured for CFC. The HACMP Smart Assist for Oracle assumes these configurations are configured and running. For all other configurations listed, define the resource groups according to implementation requirements.
Basic Cold Failover Cluster

HACMP Smart Assist for Oracle supports the Oracle Application Server configured for Cold Failover Cluster (CFC).

The Oracle Application Server configured for CFC is the HACMP two-node with a hot standby configuration, where one node performs the work while the other node waits as a failover location. The HACMP nodes and a shared storage device are the primary components of the cluster. By including the Oracle application in your two-node cluster with hot standby, HACMP ensures high availability for the Identity Management (IM) and Metadata Repository (MR) components of an Oracle AS10g deployment.

In this CFC configuration, any one node of the cluster provides the infrastructure service at any given time through a virtual hostname. The virtual hostname is bound to any one node of the cluster at a time but can float over to any other node. HACMP automatically manages failover of the service across the nodes of the cluster.

Cold Failover Cluster infrastructure components

Cold Failover Cluster has several different infrastructure components.

The following table lists the infrastructure components for the Cold Failover Cluster:
Cold Failover Cluster resource groups

There are three types of resource groups for the Cold Failover Cluster (CFC) configuration.

The HACMP Smart Assist for Oracle names these resource groups as follows:

- `<App_Name>_CFC_RG_SSO`
- `<App_Name>_CFC_RG_OID`
- `<App_Name>_CFC_RG_MR`.

For RDBMS DB, the `spfile` or `pfile` is used to form the application name, for AFC/CFC Application Server, the name is derived from the `opmn.xml` ias-instance name. `<App_Name>` is user-modifiable; short names are recommended. In one node there could be two instances of Oracle. Typically one Oracle instance for production and one instance for testing. This `<App_Name>` distinguishes the multiple instances.

**Cold Failover Cluster resource group for SSO component:**

There are several attributes related to the SSO components in the Cold Failover Cluster configuration.

The following table shows the SSO components for the resource group attributes in a CFC configuration:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Group Name</td>
<td><code>&lt;App_Name&gt;_CFC_RG_SSO</code></td>
</tr>
<tr>
<td>Startup Policy</td>
<td>Online On Home Node Only</td>
</tr>
<tr>
<td>Fallover Policy</td>
<td>Fallover to Next Priority Node in the List</td>
</tr>
<tr>
<td>Fallback Policy</td>
<td>Never Fallback</td>
</tr>
<tr>
<td>Service IP Label</td>
<td>IP address used by this component</td>
</tr>
<tr>
<td>Volume Groups</td>
<td>Volume groups used by this component</td>
</tr>
<tr>
<td>Filesystem Recovery Method</td>
<td>All configured resource groups are handled sequentially</td>
</tr>
</tbody>
</table>

The following table shows HACMP Application Server name, start and stop scripts and monitor to handle the application server SSO component:
Cold Failover Cluster resource group for OID components:

Cold Failover Cluster (CFC) has several OID components.

The following table shows the OID components for the resource group attributes in a CFC configuration:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td><code>&lt;App_Name&gt;_CFC_AP_&lt;ias-comp&gt;</code></td>
</tr>
<tr>
<td>Start Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartAS</code></td>
</tr>
<tr>
<td>Stop Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopAS</code></td>
</tr>
<tr>
<td>AS Infrastructure Monitors</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorAS</code></td>
</tr>
</tbody>
</table>

The following table shows HACMP Application Server name, start and stop scripts, and monitor used to handle the application server OID component:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td><code>&lt;App_Name&gt;_CFC_AP_&lt;ias-comp&gt;</code></td>
</tr>
<tr>
<td>Start Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartAS</code></td>
</tr>
<tr>
<td>Stop Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopAS</code></td>
</tr>
<tr>
<td>AS Infrastructure Monitor</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorAS</code></td>
</tr>
</tbody>
</table>

Cold Failover Cluster resource group for MR components:

A Cold Failover Cluster (CFC) configuration has several attributes for MR components.

The following table lists the resource group for MR component of AS in a CFC configuration:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Group Name</td>
<td><code>&lt;App_Name&gt;_CFC_RG_MR</code></td>
</tr>
<tr>
<td>Startup Policy</td>
<td>Online on Home Node Only</td>
</tr>
<tr>
<td>Fallover Policy</td>
<td>Fallover to Next Priority Node (In a two-node configuration this is the standby node.)</td>
</tr>
<tr>
<td>Fallback Policy</td>
<td>Never Fallback</td>
</tr>
<tr>
<td>Service IP Label</td>
<td>IP address used by this component</td>
</tr>
<tr>
<td>Volume Groups</td>
<td>Volume groups used by this component</td>
</tr>
<tr>
<td>Filesystem Recovery Method</td>
<td>Sequential</td>
</tr>
</tbody>
</table>

The following table shows HACMP Application Server name, start and stop scripts, and monitor used to handle the application server MR component:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td><code>&lt;App_Name&gt;_CFC_AP_&lt;ias-comp&gt;</code></td>
</tr>
<tr>
<td>Start Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartAS</code></td>
</tr>
<tr>
<td>Stop Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopAS</code></td>
</tr>
<tr>
<td>AS Infrastructure Monitor</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorAS</code></td>
</tr>
</tbody>
</table>
The following table shows HACMP Application Server name, start and stop scripts and monitor to handle the application server MR component:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td><code>&lt;App_Name&gt;_CFC_AP_MR</code></td>
</tr>
<tr>
<td>Start Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartDB</code></td>
</tr>
<tr>
<td>Stop Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopDB</code></td>
</tr>
<tr>
<td>AS Infrastructure Monitor</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorDB</code></td>
</tr>
</tbody>
</table>

**Cold Failover Cluster middle tier components**
The Application Server CFC configurations of any middle tier components have resource group attributes that are almost identical to that of Application Server CFC infrastructure related resource groups.

This is displayed in the following table, where they can be one of OC4J, Webcache, Portal, Forms and Oracle Business Intelligence Beans (BI Beans):

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Group Name</td>
<td><code>&lt;App_Name&gt;_CFC_RG</code></td>
</tr>
<tr>
<td>Startup Policy</td>
<td>Online on Home Node Only</td>
</tr>
<tr>
<td>Fallover Policy</td>
<td>Fallover to Next Priority Node (In a two-node configuration this is the standby node.)</td>
</tr>
<tr>
<td>Fallback Policy</td>
<td>Never Fallback</td>
</tr>
<tr>
<td>Service IP Label</td>
<td>IP address used by this component</td>
</tr>
<tr>
<td>Volume Groups</td>
<td>Volume groups used by this component</td>
</tr>
<tr>
<td>Filesystem Recovery Method</td>
<td>Sequential</td>
</tr>
</tbody>
</table>

**Distributed Cold Failover Cluster**
The distributed Cold Failover Cluster (CFC) configuration is based on the Application Server Basic Cold Failover Cluster, but pulls out the SSO tier into the Demilitarized Zone (DMZ) - outside of the firewall.

The database tier and OID tier are co-located under HACMP in the two-node cluster configuration. The SSO tier is located on multiple non-clustered boxes. HACMP automatically manages failover of the service across the nodes of the cluster.

**Distributed Cold Failover Cluster infrastructure components**
The following table lists the infrastructure components for the Distributed Cold Failover Cluster:
Table 1.

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Passive</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Passive</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Shared storage (direct attached/NAS/SAN)</td>
</tr>
<tr>
<td></td>
<td>• Multiple non-clustered servers for SSO tier</td>
</tr>
<tr>
<td></td>
<td>• Load balancer is required for SSO tier</td>
</tr>
</tbody>
</table>

**Basic Active Failover Cluster**

The Oracle Application Server configured for Active Failover Cluster (AFC) in an active-active environment is the basic two-node mutual takeover configuration for concurrent access.

In the basic AFC configuration, all nodes of cluster are in service. Multiple active instances provide continued availability in case of one of the instances fails. The database instance processes and application server processes run on both nodes. The cluster is front-ended by a load balancer.

**Active Failover Cluster infrastructure components**

Active Failover Cluster (AFC) has several different infrastructure components.

The following table lists the infrastructure components for the Basic Active Failover Cluster:

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Active (RAC)</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Shared storage</td>
</tr>
<tr>
<td></td>
<td>• Load balancer is required to front-end OID and SSO tier on the cluster.</td>
</tr>
</tbody>
</table>

**Active Failover Cluster resource groups**

There are several types of resource groups for the Active Failover Cluster (AFC) configuration.

The following lists the three types of resource groups for the AFC configuration, as named by HACMP Smart Assist for Oracle:

- `<App_Name>_AFC_RG_SSO`
- `<App_Name>_AFC_RG_OID`
- `<App_Name>_AFC_RG_MR`.

For RDBMS DB, the name from `spfile` or `pfile` is used to form the application name. For AFC/CFC Application Server the name is derived from the `opmn.xml ias-instance` name.

For AFC configurations, if any component fails, HACMP attempts restart it on the same node but does not move resources to another node. Therefore, the SSO, OID and MR resource groups can use identical resource group policies as shown in the following table:
The following table shows HACMP Application Server name, start and stop scripts and monitor for the application server components (these can be one of either SSO, OID, or MR):

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Name</td>
<td><code>&lt;App_Name&gt;_AFC_AP_&lt;ias-comp&gt;</code></td>
</tr>
<tr>
<td>Start Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartAS</code></td>
</tr>
<tr>
<td>Stop Script</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopAS</code></td>
</tr>
<tr>
<td>AS Infrastructure Monitor</td>
<td><code>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorAS</code></td>
</tr>
</tbody>
</table>

**Active Failover Cluster middle tier components**

HACMP can monitor the OC4J, Webcache, Portal, Forms or BI Beans middle tier components. The resource groups for Active Failover Cluster (AFC) configurations for these components have identical attributes with respect to infrastructure components (OID, SSO and MR).

The following table shows attributes for the AFC middle tier components. The AFC middle tier component can be one of OC4J, Webcache, Portal, Forms or BI Beans.

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Group Name</td>
<td><code>&lt;App Name&gt;_AFC_RG</code></td>
</tr>
<tr>
<td>Startup Policy</td>
<td>Online On All Available Nodes</td>
</tr>
<tr>
<td>Fallover Policy</td>
<td>Bring Offline (on Error Node only)</td>
</tr>
<tr>
<td>Fallback Policy</td>
<td>Never Fallback</td>
</tr>
<tr>
<td>Service IP Label</td>
<td>No need for Service IP label.</td>
</tr>
<tr>
<td>Volume Groups</td>
<td>Any log volume groups that exist for AS component</td>
</tr>
<tr>
<td>Filesystem Recovery Method</td>
<td>Sequential</td>
</tr>
<tr>
<td>Participating Nodes</td>
<td>“Local” node only</td>
</tr>
</tbody>
</table>

**Distributed Active Failover cluster**

This configuration is based on the distributed two-node mutual takeover configuration for concurrent access. It is based on the Oracle Application Server configured for AFC, but pulls out the SSO tier into DMZ - outside of the firewall.

The database tier and OID tier are co-located. A load balancer front-ends this tier. The SSO tier is deployed on multiple non-clustered boxes. A load balancer front-ends this tier as well.
Distributed Active Failover Cluster infrastructure components

The following table lists the infrastructure components for the Distributed Active Failover Cluster:

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Active (RAC)</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td>• Shared storage</td>
</tr>
<tr>
<td></td>
<td>• Multiple non-clustered servers for SSO and load balancers.</td>
</tr>
</tbody>
</table>

Cold Failover Cluster IM against repCA database

The Database tier and Identity Management tier are separated in this architecture.

The Database tier is typically created with repCA (Repository Creation Agent) or it may be Metadata Repository only installed. The database tier may be Active-Passive or Active-Active (RAC). The Identity Management tier is installed separately.

Cold Failover Cluster IM against repCA database infrastructure components

The following table lists the infrastructure components for the Cold Failover Cluster IM against repCA database:

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Passive or Active-Active (RAC)</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Passive</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Passive</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td>• Shared storage</td>
</tr>
<tr>
<td></td>
<td>• No load balancer is required to configure this model.</td>
</tr>
</tbody>
</table>

Distributed Cold Failover Cluster IM against repCA database

Distributed Cold Failover Cluster IM against repCA database is similar to the Basic Cold Failover Cluster IM against repCA database configuration.

In this case, the SSO tier is pulled out and deployed in multiple non-clustered servers. A load balancer front-ends this tier.

Distributed Cold Failover Cluster IM against repCA database infrastructure components

The following table lists the infrastructure components for the distributed Cold Failover Cluster IM against repCA database:
Basic Multiple Node Cluster configuration
This configuration splits the Database tier and the IM tier.

The Database tier is typically created with repCA (Repository Creation Agent) or it may be Metadata Repository only installed. It may be Active-Passive or Active-Active (RAC). The IM tier is installed separately but is collocated on the same HACMP cluster as the database (in a separate $ORACLE_HOME). One IM installation is performed on each node in the cluster.

Basic Multiple Node Cluster infrastructure components

The following table lists the infrastructure components for the Basic Multiple Node Cluster:

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Passive or Active-Active (RAC)</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Passive</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td>• Shared storage</td>
</tr>
<tr>
<td></td>
<td>• Multiple non-clustered servers for SSO tier</td>
</tr>
<tr>
<td></td>
<td>• Load balancer is required to configure this model for SSO tier</td>
</tr>
</tbody>
</table>

Distributed Multiple Node Cluster configuration
This architecture is similar to Basic Multiple Node Cluster configuration, but can be set up in different distributed configurations.

SSO tier can be pulled out and put in non-clustered hardware in the DMZ with a front-end load balancer or the OID tier can be pulled out.

Distributed Multiple Node Cluster infrastructure components

The following table lists the infrastructure components for the Distributed Multiple Node Cluster:

<table>
<thead>
<tr>
<th>Infrastructure Component</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Tier</td>
<td>Active-Passive or Active-Active (RAC)</td>
</tr>
<tr>
<td>OID Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>SSO Tier</td>
<td>Active-Active</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td>• Shared storage</td>
</tr>
<tr>
<td></td>
<td>• Multiple non-clustered servers</td>
</tr>
<tr>
<td></td>
<td>• Load balancers.</td>
</tr>
</tbody>
</table>
Replicated IM and distributed replicated IM

HACMP is not required for these configurations.

Note that this configuration provides high availability for IM-related data of the Metadata Repository. It supports geographically distributed instances of IM for localized access. However, this solution does not provide high availability of metadata repository (other than IM related).

Monitoring Application server components

The Oracle Application Server components are managed using OPMN. In order to use OPMN, the monitoring daemon - $ORACLE_HOME/opmn/bin/opmn - is started on the system.

Use the startall argument with the $ORACLE_HOME/opmn/bin/opmn command to start all the Application Server components being monitored by OPMN.

You can start individual components using the following command:
$ORACLE_HOME/opmn/bin/opmnctl startproc process-type=<process>

Where <process> is the component such as HTTP_Server.

You can monitor the application server processes using the opmnctl command with status argument. To get the status of all AS processes, use the command:
$ORACLE_HOME/opmn/bin/opmnctl status

Executing the above command display results similar to the following:

<table>
<thead>
<tr>
<th>ias-component</th>
<th>process-type</th>
<th>pid</th>
<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OID</td>
<td>OID</td>
<td>479045</td>
<td>Alive</td>
</tr>
<tr>
<td>0C4J</td>
<td>home</td>
<td>483582</td>
<td>Alive</td>
</tr>
<tr>
<td>HTTP_Server</td>
<td>HTTP_Server</td>
<td>450574</td>
<td>Alive</td>
</tr>
<tr>
<td>dcm-daemon</td>
<td>dcm-daemon</td>
<td>470923</td>
<td>Alive</td>
</tr>
<tr>
<td>LogLoader</td>
<td>logloaderd</td>
<td>460932</td>
<td>Alive</td>
</tr>
</tbody>
</table>

Cluster monitor scripts

HACMP provides custom monitor scripts for Oracle AS in the form cl_oraMonitorAS.

All such scripts have certain common properties that can be listed in a tabular form, as shown below:

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Attribute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraMonitorAS</td>
</tr>
<tr>
<td>Monitor Mode</td>
<td>LONG-RUNNING MONITORING</td>
</tr>
<tr>
<td>Stabilization Interval</td>
<td>180 (- 3minutes)</td>
</tr>
<tr>
<td>Restart Count</td>
<td>3</td>
</tr>
<tr>
<td>Restart Interval</td>
<td>1 minute or 60 seconds</td>
</tr>
<tr>
<td>Action On Application Failure</td>
<td>Notify for AFC, fallover for CFC</td>
</tr>
<tr>
<td>Cleanup Method</td>
<td>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStopAS</td>
</tr>
<tr>
<td>Restart Method</td>
<td>/usr/es/sbin/cluster/sa/oracle/sbin/cl_oraStartAS</td>
</tr>
</tbody>
</table>
Planning your configuration

The HACMP Smart Assist for Oracle discovers the Oracle components.

It also assists in integrating HACMP to monitor and manage Oracle Application Server configured for CFC or AFC and Oracle database instances configured for CFC. However, it does not suggest the best high availability configuration for a user environment and automatically configure that high availability configuration.

Related information

[Oracle Documentation]

Hardware system requirements

Make sure that your system meets requirements for a successful installation.

These requirements include:
- Two IBM System p™ 650 servers (minimum). You need at least two nodes in the Infrastructure Tier for a highly available environment - if one node fails, the second node takes over for the node that fails.
- Memory:
  - 1536 MB Swap space (paging space)
  - 400 MB /tmp space
  - 25 MB /var space for cluster verification
- Disk Storage: 4.3 GB Shared Disk Storage.
- Shared disk storage is not required for an AFC configuration.

Supported software

HACMP 5.5 Smart Assist for Oracle extends and improves upon the high availability solutions that were available in HACMP 5.3.

One of these programs must be installed and configured on a system running AIX v.5.2 or higher.
- HACMP 5.5
- HACMP 5.3
- HACMP 5.5 Smart Assist for Oracle is a different piece of software than the HACMP 5.3 Smart Assist for Oracle. The former will not run with HACMP 5.3.
- Oracle Application Server 10g Release 1 (9.0.4)
- Oracle Database 10g Release 1 or 11g Release 1

License and user privilege

HACMP Smart Assist for Oracle requires specific license and user privileges for installation.

An HACMP installation requires:
- Each cluster node has its own HACMP software license.
- A user with root privileges to perform the installation.

Upgrading from HACMP 5.3

You can upgrade to HACMP 5.5 without applying changes to an existing HACMP 5.3 for Oracle Application Server configured for CFC environment.

Pre-existing script files, constructed using the 5.3 HACMP for Oracle Smart Assist, are not destroyed or removed during an upgrade. These files contain the Oracle Infrastructure Tier startup and shutdown scripts for the configured Oracle Application Server.
The HACMP 5.3 resource groups cannot be used with the HACMP 5.5 Smart Assist for Oracle SMIT interface. To modify an existing HACMP 5.3 Oracle Application Server configured for CFC using the HACMP 5.5 Smart Assist for Oracle SMIT interface, you must remove the resource groups created by the HACMP 5.3 Smart assist for Oracle using the HACMP 5.5 SMIT Extended Configuration panels and reapply the HACMP configuration using the HACMP 5.5 Smart Assist for Oracle.

**Related information**

Managing resource groups in a cluster

**Limitations**

HACMP Smart Assist for Oracle has certain limitations.

These limitations include:

- Oracle installations are required to be in the OFA (Optimal Flexible Architecture) form.
- The monitor scripts for Oracle database attempt to restart the instance if the database instance state is not OPEN. Therefore, you must suspend the instance monitor before closing and/or dismounting a particular instance for any administrative reason (such as file system backup). Otherwise, the monitor script for the database instance unnecessarily tries to restart and re-open the instance.

**Installing HACMP Smart Assist for Oracle**

You must install the Oracle and HACMP software, and create and configure Oracle Application Server and database instances before running HACMP Smart Assist for Oracle.

**Software installation prerequisites**

Before installing the software, there are several prerequisites that you should understand.

The following list shows the software versions required by HACMP Smart Assist for Oracle. Install the following on both nodes:

- HACMP 5.5 and greater for AIX
- AIX v.5.2 or higher.

**Note:** You can upgrade from HACMP 5.3 to HACMP 5.5 without applying changes to an existing HACMP 5.3 for Oracle Application Server configured for CFC environment.

You should review the Hardware system requirements section, make any necessary installations, and then apply the most current AIX maintenance level (ML) available for download.

**Where to install the software**

Install the HACMP Smart Assist for Oracle software on all cluster nodes.

**Contents of the installation media**

The media for HACMP Smart Assist for Oracle contains the following filesets:
You can upgrade to HACMP 5.5 without applying changes to an existing HACMP 5.3 for Oracle Application Server configured for CFC environment.

Make sure that your system meets requirements for a successful installation.

Installation choices
You can install the software in several ways.

Installing from an installation server
To install the HACMP Smart Assist for Oracle software in a cluster environment, you can create an HACMP Smart Assist for Oracle installation server (containing the HACMP Smart Assist for Oracle software installable images) on one node and then load the images onto the remaining cluster nodes. This is the fastest way to install HACMP Smart Assist for Oracle.

HACMP Smart Assist for Oracle supports the Network Installation Management program and Alternate Disk Migration.

Related information
- AIX installation and migration
- Network installation management

Installing from a hard disk
To install HACMP Smart Assist for Oracle software from your hard disk, copy the software from the installation medium to the hard disk prior to installation.

To copy the HACMP Smart Assist for Oracle software from your hard disk:
1. Place the HACMP Smart Assist for Oracle CD into the CD-ROM drive.
2. Enter `smit bffcreate` The Copy Software to Hard Disk for Future Installation panel displays.
3. Enter the name of the CD-ROM drive in the `INPUT device/directory for software` field and press Enter.
   If you are unsure of the input device name, select it from the picklist. Select the proper drive and press Enter to enter that value into the `INPUT device/directory` field as the valid input device.
4. Press Enter to display the Copy Software to Hard Disk for Future Installation panel.
5. Enter values for the other fields as appropriate for your site. 
   SMIT responds: **Are you sure?**
6. Press Enter again to copy the software.
7. After the HACMP Smart Assist for Oracle software has been copied to your system, install the software by following the instructions in the section Installing HACMP Smart Assist for Oracle from the CD-ROM.

**Related tasks**

"Installing HACMP Smart Assist for Oracle from the CD-ROM"

If you install the HACMP Smart Assist for Oracle software from the CD-ROM, install the software directly onto each cluster node.

**Related reference**

"Software installation prerequisites" on page 15

Before installing the software, there are several prerequisites that you should understand.

**Related information**

Installation guide

**Installing HACMP Smart Assist for Oracle from the CD-ROM**

If you install the HACMP Smart Assist for Oracle software from the CD-ROM, install the software directly onto each cluster node.

To install the HACMP Smart Assist for Oracle software on a cluster node:
1. Insert the CD into the CD-ROM drive.
2. Enter `smit install_all`
   SMIT displays the first Install and Update from ALL Available Software panel.
3. Enter the device name of the installation medium or install directory in the **INPUT device/directory for software** field and press Enter.
   If you are unsure about the input device name or about the install directory, press F4 to list available devices. Then select the proper device or directory and press Enter. The correct value is entered into the **INPUT device/directory** field as the valid input device.
4. You can accept the default settings for the following fields.
   Use the context-sensitive (F1) Help to get more information about the field.

<table>
<thead>
<tr>
<th><strong>INPUT device/directory for software</strong></th>
<th>This field shows the device or directory you specified earlier.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOFTWARE to install</strong></td>
<td>Press F4 for a software listing, use the arrow keys to locate all software filesets associated with an image. For a list of filesets, see the section Software installation prerequisites.</td>
</tr>
<tr>
<td></td>
<td>Press F7 to select either an image or a fileset. Then press Enter after making all selections. Your selections appear in this field.</td>
</tr>
<tr>
<td><strong>PREVIEW only?</strong></td>
<td>If set to <strong>yes</strong>, the preview option checks and verifies that installation prerequisites are met, for instance that required software is installed and sufficient disk space is available. Press F1 for details.</td>
</tr>
<tr>
<td></td>
<td>When you are ready to perform the actual installation, set this field to <strong>no</strong>.</td>
</tr>
</tbody>
</table>
5. Accept the license agreement and preview the license. Enter field values as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMIT software updates?</td>
<td>This field applies only when installing software updates (PTFs).</td>
</tr>
<tr>
<td>SAVE replaced files?</td>
<td>This field applies only when installing software updates (PTFs). If you select no to commit software updates? select yes for this field.</td>
</tr>
<tr>
<td>AUTOMATICALLY install requisite software</td>
<td>Set this field to no, if the prerequisite software is already installed or if the OVERWRITE same or newer versions? field is set to yes; otherwise, set this field to yes to install required software.</td>
</tr>
<tr>
<td>EXTEND filesystems if space needed?</td>
<td>Select yes if the system has adequate hard disk space. Select no if the system has limited disk space.</td>
</tr>
<tr>
<td>OVERWRITE same or newer versions?</td>
<td>For normal new installations, leave this field set to no. Set it to yes if you are reinstalling the software. If you set this field to yes, set the Automatically install requisite software field to no.</td>
</tr>
<tr>
<td>VERIFY install and check file sizes?</td>
<td>Select yes if you want the system to perform some checks on the software you installed.</td>
</tr>
<tr>
<td>DETAILED output?</td>
<td>Select yes if you want a detailed log of all installation messages.</td>
</tr>
<tr>
<td>Process multiple volumes?</td>
<td>Select this option if you want to enable the processing of multiple-volume CDs.</td>
</tr>
</tbody>
</table>

6. When you are satisfied with the entries, press Enter.

   SMIT responds Are you sure?

7. Press Enter again to install the software.

Read the HACMP Smart Assist for Oracle 5.5 Release Notes in the /usr/es/sbin/cluster/release_notes_assist directory for additional information that may not appear in the product documentation.

Related reference

“Software installation prerequisites” on page 15

Before installing the software, there are several prerequisites that you should understand.

Removing an HACMP Smart Assist for Oracle installation

If you remove an installation of HACMP Smart Assist for Oracle, removing the software does not remove the files generated by running the commands and scripts within HACMP Smart Assist for Oracle, and does not affect the HACMP configuration. If you want to remove the files generated by HACMP Smart Assist for Oracle, delete the files from AIX.

It is recommended to stop any Oracle instance that is running before removing the Smart Assist software. You cannot use HACMP to stop or monitor an Oracle instance once the software is removed.

To remove HACMP Smart Assist for Oracle:

1. Stop cluster services:
   a. Enter the fastpath smit cl_admin
   b. Select Manage HACMP Services > Stop Cluster Services and press Enter.
   c. Select Stop now
2. Enter smit install_remove
   The Install/Remove panel appears.
3. Enter field values as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFTWARE name</td>
<td>Use the arrow keys to locate all software you want to remove; then press F7 to select it. Remove the filesets listed in the section Software installation prerequisites. Press Enter after making all selections. Your selections appear in this field.</td>
</tr>
<tr>
<td>REMOVE dependent software?</td>
<td>Select no.</td>
</tr>
<tr>
<td>EXTEND filesystems if space needed?</td>
<td>Select yes.</td>
</tr>
<tr>
<td>DETAILED output?</td>
<td>Select no.</td>
</tr>
</tbody>
</table>

**Related reference**

“Software installation prerequisites” on page 15

**Related information**

Starting and stopping cluster services

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**Configuring Oracle in an HACMP cluster**

HACMP Smart Assist for Oracle helps you to integrate HACMP and your existing Oracle Application Server configured for CFC or AFC, and Oracle database instances configured for CFC. The HACMP Smart Assist for Oracle assumes these configurations are configured and running.

This Smart Assist for Oracle also sets up monitoring for Oracle AS and Oracle database instances and processes. In order to bring the Application Server and database under the control of HACMP, you must have pre-installed the respective Oracle components.

Once the HACMP Smart Assist for Oracle integrates HACMP and your existing Oracle Application Server configured for CFC or AFC, and Oracle database instances configured for CFC, you can extend the configuration using the regular SMIT panels.

**Configuration overview**

HACMP Smart Assist for Oracle runs the discovery process and sets up your HACMP resource configuration for you. It uses information it gathers from the application configuration, the system configuration, and information you enter to create an HACMP resource group.

An HACMP resource group contains a set of resources such as cluster nodes, volume groups, and IP labels (used by server applications to communicate with clients) that HACMP manages as a unit. HACMP uses the resource group information to protect the Oracle application and keep it highly available.

In addition to creating a resource group for the Oracle application to be made highly available, HACMP Smart Assist for Oracle performs the following tasks:

- Helps you to create the HACMP application server (a collection of the Oracle instance start and stop scripts), shared volume group and resource group, and configures the two-node cluster with shared disk(s).
- When HACMP Smart Assist for Oracle creates the HACMP resource configuration, it updates the HACMP configuration but does not change any of the supported application configurations.
- Helps you to integrate HACMP and Oracle Application Server clusters to monitor the Oracle processes and ensure that the applications remain available.
- Helps you to integrate HACMP for the Oracle database instance configured for a Cold Failover Cluster.
- Verifies the configuration, and optionally tests the cluster, and starts HACMP cluster services.
• Stores the generated HACMP configuration in the HACMP Configuration Database.

**Prerequisites**

Before configuring the HACMP two-node cluster using the Smart Assist for Oracle, ensure that you have these prerequisites completed.

Before reading this topic, you should plan your configuration and install HACMP Smart Assist for Oracle.

1. Ensure your system meets the Hardware system requirements.
2. Install AIX, HACMP and the HACMP Smart Assist for Oracle filesets on all cluster nodes.
3. Before using the Smart Assist to add or modify an application, the appropriate file system(s) must be mounted, and the ORACLE_HOME shell variable must be set and exported. Otherwise, the picklist for certain field values may not be available.
   In an AFC configuration, **ORACLE_HOME & ORACLE_SID** must be the same across all AFC nodes.
4. Add the HACMP service IP label and the standby node hostname to **/etc/hosts** on all nodes. The cluster event scripts use the **/etc/hosts** file for name resolution. You must add all cluster node IP interfaces (boot and service) to this file on each node. Note that if you do not add the service IP labels to the **/etc/hosts** file on any cluster node, then HACMP automatically adds them to this file as part of the automatic corrective action of the cluster verification process.
5. Ensure the service labels are resolvable on the local node.
6. Ensure that all participating nodes in the Oracle Application Server or database instance are accessible (running, and communication interfaces are available).
7. If HACMP cluster services are running, stop them before proceeding:
   a. Enter the fastpath smit c1_admin
   b. Select Manage HACMP Services > Stop Cluster Services
   c. Select Stop now and press Enter.

**Related concepts**

“Planning your configuration” on page 14

The HACMP Smart Assist for Oracle discovers the Oracle components.

“Installing HACMP Smart Assist for Oracle” on page 15

You must install the Oracle and HACMP software, and create and configure Oracle Application Server and database instances before running HACMP Smart Assist for Oracle.

**Related reference**

“Hardware system requirements” on page 14

Make sure that your system meets requirements for a successful installation.

**Related information**

Starting and stopping cluster services

**Oracle listener**

Oracle listener is not required but if it is present, HACMP will manage it along with the Oracle instance.

SID_NAME in **listener.ora** must be set to ORACLE_SID to be discovered by the Smart Assist for Oracle. Multiple listeners can point to the Oracle instance; however, you must ensure that all listeners fall over correctly since the Smart Assist currently can only detect one **listener.ora**. A listener that listens for more than one Oracle instance is not supported by the Smart Assist for Oracle software.

**Configuring HACMP for Oracle Application server 10g**

HACMP Smart Assist for Oracle assumes you have pre-configured your Oracle Application Server. HACMP Smart Assist for Oracle discovers and helps you to configure the Oracle application server components, make those components highly available, and monitor those components for failure.
HACMP Smart Assist for Oracle configures one resource group for each of the components outlined below:

- Middle Tier
- Oracle Internet Directory (OID) Tier
- Single Sign On Tier.

You can configure each of these tiers as either a Cold Failover Cluster (CFC) or an Active Failover Cluster (AFC) and set up the Oracle Application Server Middle Tier components for high availability in two configurations - Active-Passive and Active-Active.

You can configure each of the tiers as either CFC or AFC. The HACMP Smart Assist for Oracle helps you to add the necessary HACMP cluster components, such as a resource group and its associated resources. Configuring an Active Failover Cluster is similar to setting up Cold Failover Clusters, except with AFC where the infrastructure is active on all nodes cluster at the same time.

Related tasks

"Testing the availability of Oracle applications" on page 31

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

Related information

Oracle Documentation

Discovering and configuring Oracle components

You can use the Initialization and Standard Configuration > Make Applications Highly Available panel for the rest of the Smart Assist process.

The Smart Assist discovers the applications and prompts you for information it needs to configure them for you.

1. In SMIT, select Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available > Add an Application to the HACMP Configuration and press Enter.
   SMIT displays a list of the applications installed on the cluster.
2. Select the Oracle Smart Assist application.

Configuring Oracle Application server configured for CFC

The HACMP Smart Assist for Oracle assumes you have pre-configured the Oracle Application Server. HACMP performs discovery and creates one resource group for the Middle Tier, (OID) Tier, and Single Sign On Tier.

HACMP Smart Assist for Oracle provides the add, change/show, and remove options for modifying the HACMP configuration to work with pre-installed Oracle Application Server 10g configured for CFC environments.

Adding an Oracle Application server configured for CFC

An Oracle Application Server configured for CFC must be installed for HACMP to discover the installation. After you enter the primary node, and secondary node, HACMP Smart Assist for Oracle performs discovery on the primary node in Oracle home directory. HACMP determines the Oracle Application Server processes that require monitoring and the instances that are accessible within the Oracle directory structure.

Note that Oracle installations are different from DB2® or WebSphere® installations in that there are no LPP images, and starting and or stopping the Oracle application server depends on the environment variables you set up before invoking the start and stop scripts.
With Oracle Application Server configured for CFC - the HACMP hot standby cluster configuration - the Oracle instance is hosted on one node, with the other node serving as a standby node. In case of a cluster failure, the resource group managing the Oracle instance falls over to the standby node.

To add a new Oracle Application Server configured for CFC:
1. Set and export the ORACLE_HOME shell variable on the primary node.
2. On the primary node, enter `smit hacmp`.
3. In SMIT, select Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Add an Application to the HACMP Configuration panel.
4. If discovery finds a two-node cluster configured, HACMP Smart Assist for Oracle presents the Oracle Application Server Configuration panel. If discovery does not find a two-node cluster, HACMP Smart Assist for Oracle displays the Two-Node Cluster Configuration Assistant SMIT panel.
5. Select **Oracle CFC Application Server 10g** from the list of discovered applications and press Enter.
6. Select **CFC Instance** to bring online with the Oracle Application Server configured for CFC. The default is the first Oracle instance found in the Oracle home directory.
7. The **Add an Oracle CFC Application server panel appears**. Enter field values as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle AS CFC instance Name</td>
<td>The name of the Oracle instance to bring online with the Oracle Application Server configured for CFC. The default displays the first Oracle instance found in the Oracle home directory and inserts the volume group for the instance in the Shared Volume Group field. If you select an instance different from the default, you must also specify the appropriate shared volume group for that instance in the Add an Oracle Application Server panel.</td>
</tr>
<tr>
<td>Application Name</td>
<td>The current Oracle Application name is discovered. If the name is longer than 32 characters, shorten it.</td>
</tr>
<tr>
<td>Primary Node</td>
<td>Select a node from a list of predefined cluster nodes. The HACMP Smart Assist for Oracle discovers the nodes this instance is accessible on and provides those node names. You can remove or exclude nodes from this list.</td>
</tr>
<tr>
<td>Takeover Node</td>
<td>Select a node from a list of predefined cluster nodes.</td>
</tr>
<tr>
<td></td>
<td>The takeover node acquires the Oracle instance in the event of an instance failure on the primary node. You can specify one or more takeover nodes.</td>
</tr>
<tr>
<td></td>
<td>The system uses the local cluster node and an additional node name provided by you to form the HACMP cluster topology configuration with two nodes.</td>
</tr>
<tr>
<td>Oracle Metadata Repository</td>
<td>Select the Oracle RDBMS to serve as the metadata repository (MR) from the picklist. You may use the same database to contain the metadata repository and the schemas used to hold application data.</td>
</tr>
<tr>
<td>Service IP Label</td>
<td>Enter one service IP label to use for both the Oracle listener and the Apache HTTP server. You may either:</td>
</tr>
<tr>
<td></td>
<td>• Select from the picklist of pre-configured service IP labels that are not configured to an HACMP resource group.</td>
</tr>
<tr>
<td></td>
<td>• Specify a service IP label that is not configured to HACMP; Smart Assist for Oracle adds that service IP label to the HACMP configuration and to the resultant HACMP resource group.</td>
</tr>
<tr>
<td>Shared Volume Groups</td>
<td>Select from the picklist the shared volume group(s) that contain the tablespaces, logs, etc., required for the selected Oracle SID/Instance.</td>
</tr>
<tr>
<td></td>
<td>By default, the picklist provides those volume groups associated with the first Oracle instance (displayed in the Oracle instance field). You must change the volume groups if you selected an Oracle instance different from the default.</td>
</tr>
</tbody>
</table>
Select from the picklist the OID and SSO components for the Oracle AS infrastructure tier. You may select one or more components.

8. Press Enter.

Smart Assist for Oracle constructs the resource group, application server, custom application monitors, and service IP label and associates the shared volume groups with the constructed resource group. A summary report appears indicating the Oracle Application Server components discovered, and the processes that HACMP monitors.


HACMP propagates your changes to all cluster nodes.

10. (Highly Recommended) Test your configuration.

**Related concepts**

- **“Configuring a highly available Application server infrastructure” on page 4**
  You can configure HACMP and Oracle Application server infrastructure in different cluster configurations.
- **“Basic Active Failover Cluster” on page 9**
  The Oracle Application Server configured for Active Failover Cluster (AFC) in an active-active environment is the basic two-node mutual takeover configuration for concurrent access.
- **“Getting started” on page 1**
  HACMP Smart Assist for Oracle discovers pre-installed Oracle Application Servers and Oracle database instances. In addition, it helps you to integrate HACMP and Oracle Application Server clusters to monitor the Oracle processes and ensure that the applications remain available.

**Related tasks**

- **“Testing the availability of Oracle applications” on page 31**
  Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

**Related information**

- **Using the two-node cluster configuration assistant**

**Changing or showing an Oracle Application server configured for CFC**

Using the Change/Show a CFC Oracle Application Server SMIT panel, you may view or change the Oracle instance to bring online, the service IP label, and the shared volume groups associated with the instance. Changing the Oracle instance causes HACMP to remove the existing configuration, resource group, Oracle Application Server, and custom monitors before recreating the new Oracle Application Server.

To change or show an existing Oracle Application Server configured for CFC:

1. Set and export the ORACLE_HOME shell variable on the primary node before making any changes.
2. On the primary node, enter `smit hacmp`
3. In SMIT, select **Configuration Assistants > Make Applications Highly Available (Use SmartAssists) > Change/Show an Application’s HACMP Configuration** and press Enter.
4. Select an Oracle Application Server CFC Configuration to change or show from the picklist.
5. The **Modify an Oracle CFC Application Server** panel appears. To change the configuration, enter field values as shown:
### Oracle AS CFC Instance Name
The name of the Oracle instance to bring online with the Oracle Application Server configured for CFC.
The default displays the first Oracle instance found in the Oracle home directory and inserts the volume group for the instance in the Shared Volume Group field. If you select an instance different from the default, you must also specify the appropriate shared volume group for that instance in the Add an Oracle Application Server panel.

<table>
<thead>
<tr>
<th>Application Name</th>
<th>The current Oracle Application name is discovered. If the name is longer than 32 characters, shorten it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Node</td>
<td>Select a node from a list of predefined cluster nodes. The HACMP Smart Assist for Oracle discovers the nodes this instance is accessible on and provides those node names. You can remove or exclude nodes from this list.</td>
</tr>
<tr>
<td>Takeover Node</td>
<td>Select a node from a list of predefined cluster nodes. The takeover node acquires the Oracle instance in the event of an instance failure on the primary node. You can specify one or more takeover nodes. The system uses the local cluster node and an additional node name provided by you to form the HACMP cluster topology configuration with two nodes.</td>
</tr>
<tr>
<td>Oracle Metadata Repository</td>
<td>Select the Oracle RDBMS to serve as the metadata repository (MR) from the picklist. You may use the same database to contain the metadata repository and the schemas used to hold application data.</td>
</tr>
</tbody>
</table>
| Service IP Label | Enter one service IP label to use for both the Oracle listener and the Apache HTTP server. You may either:
  - Select from the picklist of pre-configured service IP labels that are not configured to an HACMP resource group.
  - Specify a service IP label that is not configured to HACMP; Smart Assist for Oracle adds that service IP label to the HACMP configuration and to the resultant HACMP resource group. |
| Shared Volume Groups | Select from the picklist the shared volume group(s) that contain the tablespaces, logs, etc., required for the selected Oracle SID/Instance.
By default, the picklist provides those volume groups associated with the first Oracle instance (displayed in the Oracle instance field). You must change the volume groups if you selected an Oracle instance different from the default. |
| Oracle OID and SSO Components | Select from the picklist the OID and SSO components for the Oracle AS infrastructure tier. You may select one or more components. |

6. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.
HACMP propagates your changes to all cluster nodes.

7. (Highly recommended) Test your configuration.

**Related tasks**

- "Testing the availability of Oracle applications" on page 31

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

**Removing an existing Application server CFC configuration**
Removing an Oracle Application Server CFC configuration removes all of the HACMP resource groups and HACMP application servers from the HACMP cluster.

Remember to either stop cluster services or bring the resource group offline before removing the configuration.
To remove an Application Server configured for CFC from the HACMP configuration:

1. Enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Remove an Application from the HACMP Configuration** and press Enter.
   
   SMIT displays a list of available applications.

3. Select the Oracle Application Server configured for CFC to remove from the picklist.
   
   SMIT displays: Are you sure?

4. Press Enter to remove the Oracle Application Server.

**Configuring the Oracle Application server for AFC**

In an Oracle Application Server configured for an Active Failover Cluster, each node has its own resource group. HACMP monitors the resource groups for application server failure and restarts the application server on that node - no movement of resources takes place in an AFC configuration.

HACMP Smart Assist for Oracle provides the add, change/show and remove options for modifying the HACMP configuration to work with pre-installed Oracle Application Server configured for AFC installations.

**Adding an Oracle Application server configured for AFC**

An Oracle Application Server configured for AFC must be installed for HACMP to discover the installation. HACMP determines the Oracle Application Server processes that require monitoring and the instances that are accessible within the Oracle directory structure.

To add an Oracle Application Server configured for AFC, specify all nodes that participate in the AFC configuration. Each node must have its own resource group, with application start and stop scripts, and a monitor to determine if the AFC processes have died on the node and require a restart. If a failure occurs, HACMP restarts the Oracle application server on that node. After the restart count has been exhausted the resource group goes into the error state, the resources do not move to another node in an AFC configuration.

To add a new Oracle Application Server AFC configuration:

1. Set and export the `ORACLE_HOME` shell variable on the primary node.
2. On the primary node, enter `smit hacmp`
3. In SMIT, select **Initialization and Standard Configuration > Make Applications Highly Available (Use Smart Assists) > Add an Application Server to the HACMP Configuration** and press Enter.
   
   **Note:** If the cluster is not configured, HACMP displays the Two-Node Cluster Configuration Assistant. Using this tool, you supply the minimum information required to define a cluster, and HACMP discovers the remainder of the information for you.

4. Select the application from the **Oracle AFC Application Server 10g** list of discovered applications and press Enter.
   
   The Add an Oracle AFC Application server panel appears.

5. Enter field values as follows:
Application Name | The name of the Oracle AFC application. Use less than 32 characters for the name.
--- | ---
Participating Node or Communication Paths | Select all cluster node names participating in the Oracle Application Server AFC configuration, or alternatively, one or more communication paths. When you specify a communication path, the node is discovered and added to the cluster configuration. You may select a combination of communication paths (previously defined to HACMP) and pre-existing HACMP cluster node names:
- An existing HACMP cluster node name
- An IP address
- A fully qualified domain name
- A resolvable IP label.

6. Press Enter.
7. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.

   HACMP propagates your changes to all cluster nodes.
8. (Highly recommended) Test your configuration.

**Related tasks**

"Testing the availability of Oracle applications" on page 31

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

**Changing or showing an existing Application server AFC configuration**

When you change or show an application configuration using the **Change/Show an Application’s HACMP Configuration SMIT panel**, HACMP Smart Assist for Oracle adds or changes the appropriate resource group in the HACMP cluster configuration.

To change or show an existing Oracle Application Server configured for AFC:

1. Set and export the ORACLE_HOME shell variable on the primary node.
2. On the primary node, enter `smit hacmp`
3. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Change/Show an Application’s HACMP Configuration** and press Enter.

4. Select an Oracle Application Server AFC Configuration to change or show from the picklist.
5. The Modify an Oracle AFC Application Server panel appears. To change the configuration, enter field values as shown in:

<table>
<thead>
<tr>
<th>Application Name</th>
<th>The name of the Oracle AFC application. Use less than 32 characters for the name.</th>
</tr>
</thead>
</table>
| Participating Node or Communication Paths | Select all cluster node names participating in the Oracle Application Server AFC configuration, or alternatively, one or more communication paths. When you specify a communication path, the node is discovered and added to the cluster configuration. You may select a combination of communication paths (previously defined to HACMP) and pre-existing HACMP cluster node names:
- An existing HACMP cluster node name
- An IP address
- A fully qualified domain name
- A resolvable IP label. |

6. Press Enter.
7. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.
   HACMP propagates your changes to all cluster nodes.

8. (Highly recommended) Test your configuration.

Related tasks
[“Testing the availability of Oracle applications” on page 31](#)

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

**Removing an existing Application server AFC configuration**
Removing an Oracle Application Server AFC configuration removes all of the HACMP resource groups and HACMP application servers from the HACMP cluster.

Remember to either stop cluster services or bring the resource group offline before removing the configuration.

To remove a Application Server configured for AFC from the HACMP configuration:

1. Enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants Make Applications Highly Available (Use Smart Assists) > Remove An Application from the HACMP Configuration** and press Enter.
   SMIT displays a list of available applications.
3. Select an Oracle Application Server AFC configuration to remove from the picklist.
   SMIT displays: Are you sure?
4. Press Enter to remove the Oracle Application Server.

**Configuring the Oracle database instance**
The HACMP Smart Assist for Oracle helps you to configure the database instances as CFC components.

You may configure the service IP label (virtual IP), shared volumes, primary and takeover nodes for each defined Oracle database instance. You may also specify more than one Oracle database instance per cluster. However, the participating nodes cannot be the same as those nodes combined in another Oracle database instance.

The Oracle CFC database instance component may be used without an Oracle Application Server, or may be integrated with an Oracle Application Server configured for CFC or AFC.

The Cold Failover Cluster database can use the same machines as the Oracle Application Server configured for Cold Failover Cluster environment. In this scenario, use an extra pair of virtual hostname and virtual IP for the database Cold Failover Cluster.

**Adding an Oracle database instance**
To add an Oracle database instance, you specify the primary and takeover nodes, a maximum of one node per field (hot-standby), and the Oracle home directory where the OFA directory structure resides.

HACMP discovers the `spfiles` or `pfiles`. The discovery process determines which Oracle database instances are accessible and displays a list of those instances.

If there are no accessible instances, or no `pfiles` or `spfiles` discovered, then an error displays and the process of adding an instance fails.
The default value for the Oracle home Directory is the value of the environment variable
${ORACLE_HOME}. This variable must be set and exported before adding or modifying an instance.

To add a new Oracle database instance to the HACMP configuration:
1. On the primary node, enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Add an Application to the HACMP Configuration** and press Enter.
3. Select **Oracle RDBMS Database** from the list of discovered applications and press Enter.
4. Select the **Oracle RDBMS Instance** to make highly available from the list of discovered Oracle RDBMS Instance/SID and press Enter.
   The instances available in the selector above are only those instances that are available via the OFA directory structure in **pfile** or **spfiles** on the primary node specified in the first SMIT screen. The secondary node is not searched.
5. Enter field values as follows:

<table>
<thead>
<tr>
<th>Application Name</th>
<th>The name of the Oracle RDBMS Instance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Node</td>
<td>Select a node from the list of predefined HACMP cluster nodes.</td>
</tr>
<tr>
<td>Takeover Node(s)</td>
<td>Select a node from the list of predefined HACMP cluster nodes If the node where the Oracle database instance resides is not currently part of the cluster configuration, you must add the node to the cluster so that it appears in this picklist.</td>
</tr>
</tbody>
</table>
| Service IP label | Specify the service IP label used by the Oracle listener to communicate with remote clients and other application tiers. If the service IP label does not already exist, the specified IP label must be resolvable. Please provide one of the following for the service IP label:  
  - An existing HACMP service IP label  
  - An IP address  
  - A resolvable IP label. |
| Shared Volume Group | Select the shared volume from the list of discovered shared volumes that are accessible between the primary and takeover node. These are the shared volumes required for the database instance to function properly. All file systems that reside on the specified shared volumes will also be made highly available. |

6. Press Enter. The HACMP discovery process executes on the primary node and determines all of the available Oracle database instances using the OFA directory structure to search for **pfile** and **spfiles**. If no **pfile** or **spfiles** are found, an error message is issued and the SMIT session terminates.
7. Press Enter to add the Oracle database instance to the HACMP configuration.
8. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.  
   HACMP propagates your changes to all cluster nodes.
9. (Highly recommended) Test your configuration.
Related tasks

"Testing the availability of Oracle applications" on page 31

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

Changing or showing an Oracle database instance

The Change/Show an Oracle RDBMS Instance SMIT panel for the Oracle database instance allows you to view or change certain parameters of a configured database instance.

These parameters include:

- Service IP label
- Shared Volume Groups.

The default value for the Oracle home Directory is the value of the environment variable ${ORACLE_HOME}. This variable must be set and exported before adding or modifying an instance.

To change or show an existing Oracle database instance:

1. On the primary node, enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Change/Show An Application’s HACMP Configuration** and press Enter.
3. The **Modify an Oracle RDBMS Instance** panel appears. To change the configuration, enter field values as:

<table>
<thead>
<tr>
<th>Application Name</th>
<th>The name of the Oracle RDBMS Instance.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Node</td>
<td>Select a node from the list of predefined HACMP cluster nodes.</td>
</tr>
<tr>
<td>Takeover Node(s)</td>
<td>Select a node from the list of predefined HACMP cluster nodes. If the node where the Oracle database instance resides is not currently part of the cluster configuration, you must add the node to the cluster so that it appears in this picklist.</td>
</tr>
</tbody>
</table>
| Service IP label | Specify the service IP label used by the Oracle listener to communicate with remote clients and other application tiers. If the service IP label does not already exist, the specified IP label must be resolvable. Please provide one of the following for the service IP label:  
  - An existing HACMP service IP label  
  - An IP address  
  - A resolvable IP label. |
| Shared Volume Group | Select the shared volume from the list of discovered shared volumes that are accessible between the primary and takeover node. These are the shared volumes required for the database instance to function properly. All file systems that reside on the specified shared volumes will also be made highly available. |

4. Select the **Oracle database instance** to change or show from the Oracle RDBMS Instance/SID picklist. Enter field values as follows:
Specify the service IP label used by the Oracle listener to communicate with remote clients and other application tiers. If the service IP label does not already exist, you must go back and add it to the cluster before you can select it here.

Select the shared volume from the list of discovered shared volumes that are accessible between the primary and takeover node. These are the shared volumes required for the database instance to function properly. All file systems that reside on the specified shared volumes will also be made highly available.

5. Press Enter to change the Oracle database instance.
6. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.
   
   HACMP propagates your changes to all cluster nodes.

7. (Highly recommended) Test your configuration.

**Related tasks**

"Testing the availability of Oracle applications" on page 31

Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

**Removing an Oracle RDBMS instance**

You can remove all of the constructed HACMP components by removing an Oracle database instance from the HACMP configuration. This includes the resource group, service IP label, application server and application monitor.

Stop cluster services or move the resource group offline before removing the instance.

To remove a Oracle database instance from the HACMP configuration:

1. Enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available (Use Smart Assists) > Remove An Application from the HACMP Configuration** and press Enter.
   
   SMIT displays a list of available applications
3. Select an Oracle database instance to remove from the picklist.
   
   SMIT displays: Are you sure?
4. Press Enter to remove the Oracle RDBMS instance.

HACMP displays a summary indicating all of the components that were removed from the HACMP configuration.

**Verifying and completing your configuration setup**

When you have finished configuring your Oracle database instance, you need to verify and complete your setup.

To confirm your HACMP Smart Assist for Oracle configuration is valid:

1. In SMIT, select **Initialization and Standard Configuration > Verify and Synchronize HACMP Configuration** and press Enter.
   
   HACMP propagates your changes to all cluster nodes.
2. Start cluster services.
   
   a. Enter the fastpath `smit cl_admin`
   b. Select **Manage HACMP Services > Start Cluster Services** and press Enter.
3. Review the cluster configuration from SMIT.
4. Make sure that the cluster is stable and running as expected.

**Related information**
- Verifying and synchronizing an HACMP cluster
- Monitoring an HACMP cluster
- Starting and stopping cluster services

**Testing the availability of Oracle applications**
Testing the availability of an application after you have it configured is optional but is recommended. If there are problems with the configuration, the test tool gives you helpful information for making adjustments.

To test your HACMP Smart Assist for Oracle configuration

1. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available > Test Your Application for Availability** and press Enter.
   SMIT displays a list of applications.
2. Select the application you want to test and press Enter.
   You are prompted to confirm the action by pressing Enter again.
3. Press Enter to continue with the test of the selected application.

SMIT displays output to the display as the Cluster Test Tool runs.

**Related information**
- Administration guide

**Changing or showing Oracle HACMP resource**
You can display or change an Oracle application server or Oracle RDBMC instance configured as an HACMP resource.

1. Enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available > Change/Show an Application’s HACMP Configuration** and press Enter.
   SMIT displays a list of available applications.
3. Select the Oracle Application Server or Oracle RDBMS instance to change or show and press Enter.
4. Make the changes as needed in the field(s) for the selected application and press Enter.

**Changing or showing the HACMP resources associated with your application**
You may want to add resources such as file systems and volume groups to the resource group. These resources are always acquired and released as a single entity. If you want a set of resources to be acquired by one node and another set acquired by a different node, create separate resource groups for each set.

To change or show the resources associated with your application:

1. Enter `smit hacmp`
2. In SMIT, select **Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available > Change/Show the Resources Associated with your Application** and press Enter.
   SMIT displays a list of available applications.
3. Select the application and press Enter.
SMIT displays the Change/Show Resources Associated with your Application for the application’s resource group.

4. Make the changes as needed and press Enter.

Related information
Managing resource groups in a cluster

Managing your applications
If the Smart Assist used to make your application highly available has unique configuration tasks, you can do them from the Make Applications Highly Available SMIT menu.

Note: This menu currently has no options.

To manage the HACMP Oracle Application Server or Oracle RDBMS instance:
1. Enter smit hacmp
2. In SMIT, select Initialization and Standard Configuration > Configuration Assistants > Make Applications Highly Available > Manage Your Applications and press Enter.
   SMIT displays a list of available applications.
3. Select the Oracle Application Server or Oracle RDBMS instance and press Enter.

Troubleshooting the installation
Use this topic to find troubleshooting information directly related to the HACMP Smart Assist for Oracle.

Related information
Troubleshooting guide

Using the log files
The hacmp.out file is the most helpful log file (once the cluster is running). The hacmp.out file captures information on the activity and location of resource groups after cluster events. For instance, the hacmp.out file captures details of resource group parallel processing that other logs (such as the cluster history log) cannot report. The event summaries included in this log make it easier to quickly see the events that have recently occurred in the cluster.

The following list describes the log files into which the HACMP software writes messages and the types of cluster messages they contain. The list also provides recommendations for using the different log files. Note that the default log directories are listed here; you have the option of redirecting log files to a chosen directory.

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/var/hacmp/log/oraclesa.log</td>
<td>The HACMP Smart Assist for Oracle software writes the messages it generates to the oraclesa.log. The oraclesa.log on the primary node contains results of internal commands and variables used by the Smart Assist for Oracle. The oraclesa.log on the secondary node contains only basic checks and information about that node. This file provides an unconfigure path which allows you to remove each part of the configuration individually.</td>
</tr>
<tr>
<td>/var/hacmp/clverify/clverify.log</td>
<td>The /var/hacmp/clverify/clverify.log file contains the verbose messages output by the cluster verification. The messages indicate the node(s), devices, command, and such, in which any verification error occurred.</td>
</tr>
</tbody>
</table>
/tmp/cspoc.log

Contains time-stamped, formatted messages generated by HACMP C-SPOC commands. The /tmp/cspoc.log file resides on the node that invokes the C-SPOC command.

Recommended Use: Use the C-SPOC log file when tracing a C-SPOC command's execution on cluster nodes.

/tmp/hacmp.out

Contains time-stamped, formatted messages generated by HACMP scripts on the current day.

In verbose mode (recommended), this log file contains a line-by-line record of every command executed by scripts, including the values of all arguments to each command. An event summary of each high-level event is included at the end of each event's details.

Related information

- Verifying and synchronizing an HACMP cluster
- Understanding the hacmp.out log file

Miscellaneous problems

This topic collection helps you understand, analyze and resolve miscellaneous problems that you are having with your HACMP Smart Assist for Oracle installation.

Unable to start the Oracle interactive installer

This topic explains what to do if you are unable to start the Oracle interactive installer.

Problem

The Smart Assist for Oracle fails to start and displays the following error message:

Unable to start an interactive install session because of the following error: Can't connect to X11 window server using '9.49.162.47:0.0' as the value of the DISPLAY variable. The DISPLAY environment variable should be set to <hostname or IP address>:<screen>, where the <screen> is usually '0.0'.

Solution

Depending on the Unix shell, use one of the following commands as examples to set the DISPLAY environment variable:

For csh: % setenv DISPLAY 192.168.1.128:0.0

For sh, ksh and bash:$ DISPLAY=192.168.1.128:0.0; export DISPLAY

Use the following command to see the shell being used:

echo $SHELL

Use the following command to view the current DISPLAY environment variable setting:

echo $DISPLAY

Make sure that client users are authorized to connect to the X Server.

To enable client users to access the X Server, open an xterm, dtterm, or xconsole session as the user that started the session and type the following command:

% xhost Name

# Where Name defines the host name to be added to the X Server access list.

To test that the DISPLAY environment variable is set correctly, run a X11-based program that comes with the native operating system, such as xclock.
If you are not able to run `xclock` successfully, please refer to your PC-X Server or OS vendor for further assistance.

Typical path for `xclock`: `/usr/bin/X11/xclock`

**Incorrect dependency error messages display with AIX v.5.2**

Use this topic when you are receiving an error message about incorrect dependencies.

The following error message displays when installing Oracle on AIX v.5.2.

Incorrect dependency on `bos.rte 5.3` and `RSCT 2.4`.

With AIX v.5.2, you must install the prerequisite RSCT 2.3.6 filesets:
- `prereq bos.rte 5.2.0.30`
- `prereq rsct.core.rmc 2.3.6.1 (or higher)`
- `prereq rsct.core.sec 2.3.6.1 (or higher)`
- `prereq rsct.compat.basic.hacmp 2.3.6.0 (or higher)`
- `prereq rsct.compat.clients.hacmp 2.3.6.0. (or higher)`

With these prerequisite RSCT filesets installed, you can safely ignore the incorrect-dependency error messages.

**Verification and synchronization does not complete successfully**

HACMP Smart Assist for Oracle provides configuration status as each command runs.

Verification and synchronization runs at command completion and displays information about the process. If verification and synchronization does not finish successfully, review the messages and remedy any issues. Then run HACMP Smart Assist for Oracle again.
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