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Linux operating system

Configuring a CSA Cluster for High Availability Using a Load Balancer

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See Document Change Notes
on page 6.

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Document Change Notes

Description	Date
Initial release of this document with CSA 4.6 MR	January 2016
Added new step 4 in "Configure the TCP Communication Channel on JGroups" on page 26 .	March 2016
Updated "Configure the TCP Communication Channel on JGroups" on page 26 to modify step 4 and then combine steps 3 and 4 into 3a and 3b.	May 2016

Chapter 1: Overview

Cloud Service Automation (CSA) uses JBoss clustering technology to enable you to configure an active/active (high-availability) cluster. Clustering enables you to run CSA on several parallel servers called *nodes*. Cluster configuration improves performance on systems that handle high transaction volumes or large numbers of concurrent users. In addition to handling higher user loads and providing greater scalability, the cluster configuration supports server failover features.

Web requests to the CSA Controller or Marketplace Portal are load balanced among the nodes in the cluster. Increasing the number of nodes in the cluster will improve web request transaction throughput. Increasing the number of nodes in the cluster will also improve the response time by CSA fulfillment services to a high volume of concurrent deployment requests.

Because clustering distributes the workload across different nodes, if any node fails, CSA remains accessible through other nodes in the cluster. You can continue to improve CSA throughput by simply adding nodes to the cluster. If a node shuts down, activities such as email notifications that are scheduled to run on that node are automatically transferred to another available node. This server failover feature helps ensure that CSA remains operational.

Unsaved changes on a node that shuts down are lost and are not transferred to an available node. Users who log on to CSA after a node shuts down see only changes that were saved on that node.

In the following diagram, the example cluster configuration consists of seven different physical (or virtual) hosts: one host is running a load balancer that proxies web requests into the CSA/JBoss cluster or Node.js cluster (for the Marketplace Portal), three hosts are running CSA in standalone mode, and three hosts are running the Marketplace Portal.

Note: Content on how to use a database cluster or Oracle RAC is beyond the scope of this document.

However, configuring CSA to use a Microsoft SQL Server cluster is no different from configuring CSA to use a standalone Microsoft SQL Server. Install and configure the Microsoft SQL Server cluster according to the manufacturer's documentation and follow the instructions to install CSA using a Microsoft SQL Server in the *Cloud Service Automation Installation Guide*.

For information about configuring CSA with Oracle RAC, refer to the *Configuring CSA to Work with Oracle RAC* whitepaper.

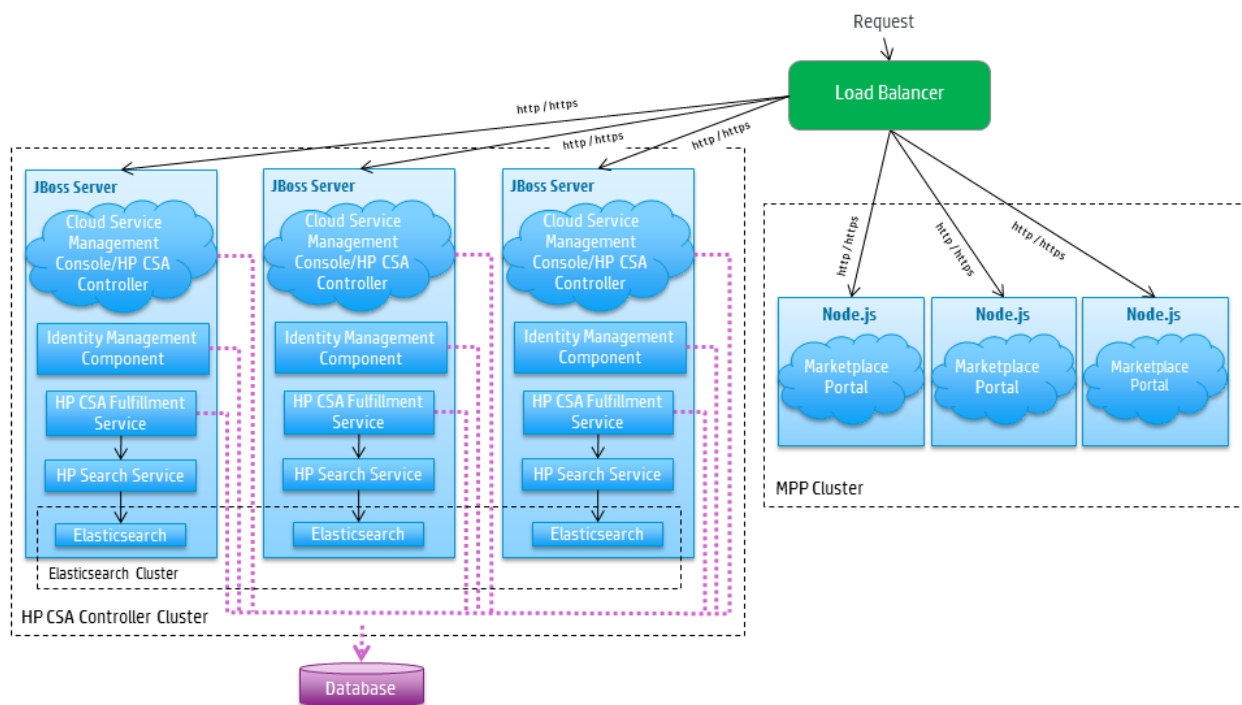


Figure 1-1. Example Cluster Configuration

The cluster uses a load balancer to distribute requests among any number of nodes. The load balancer (internal or external) listens for HTTP/S requests from standard interface clients and forwards them to one of the nodes. These nodes are transparent to users and users access only the URL to the load balancer.

Request Flow

The following diagrams show how a request (distributed from the load balancer) is processed in the clustered environment for the Cloud Service Management Console and Marketplace Portal.

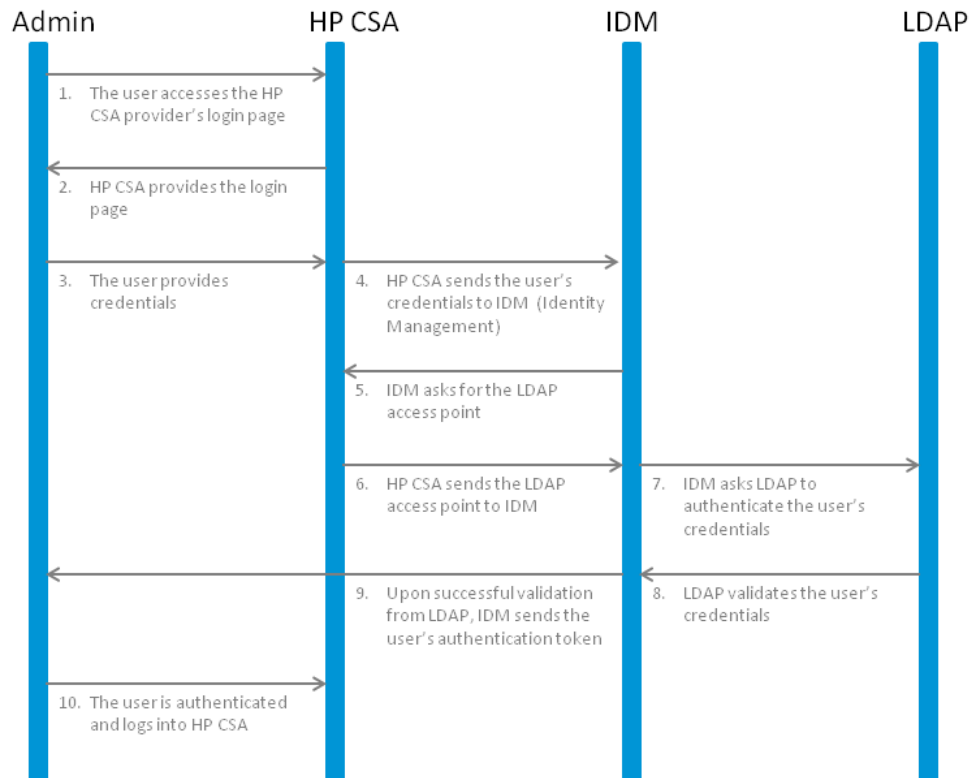


Figure 1-2. Cloud Service Management Console Request Flow

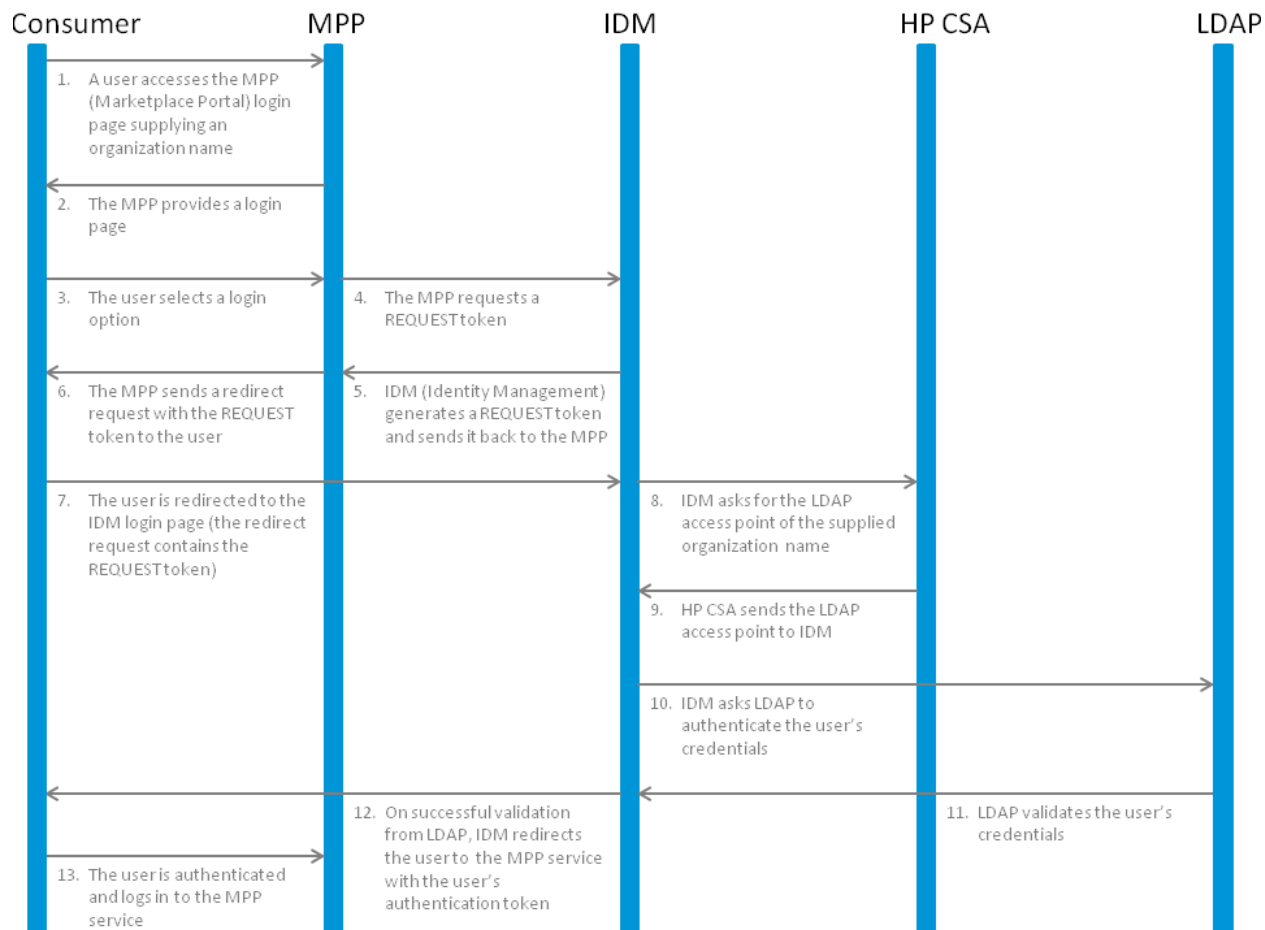


Figure 1-3. Marketplace Portal Request Flow

About the Examples

In this document, the following names are used to identify the hosts or nodes in the clustered environment:

- **Load_Balancer node:** the load balancer that distributes requests among the nodes in the clustered environment
- **CSA_Node nodes:** hosts CSA
- **MPP_Node nodes:** hosts the Marketplace Portal

In this document, an item denoted in square brackets is a placeholder for the actual value that has been configured (for example, the hostname of the "CSA_Node1" node is denoted as [CSA_NODE1_HOSTNAME]).

In the following diagram, items in parentheses are default or example values used in this document (for example, the default HTTP port used by the Cloud Service Management Console is 8081).

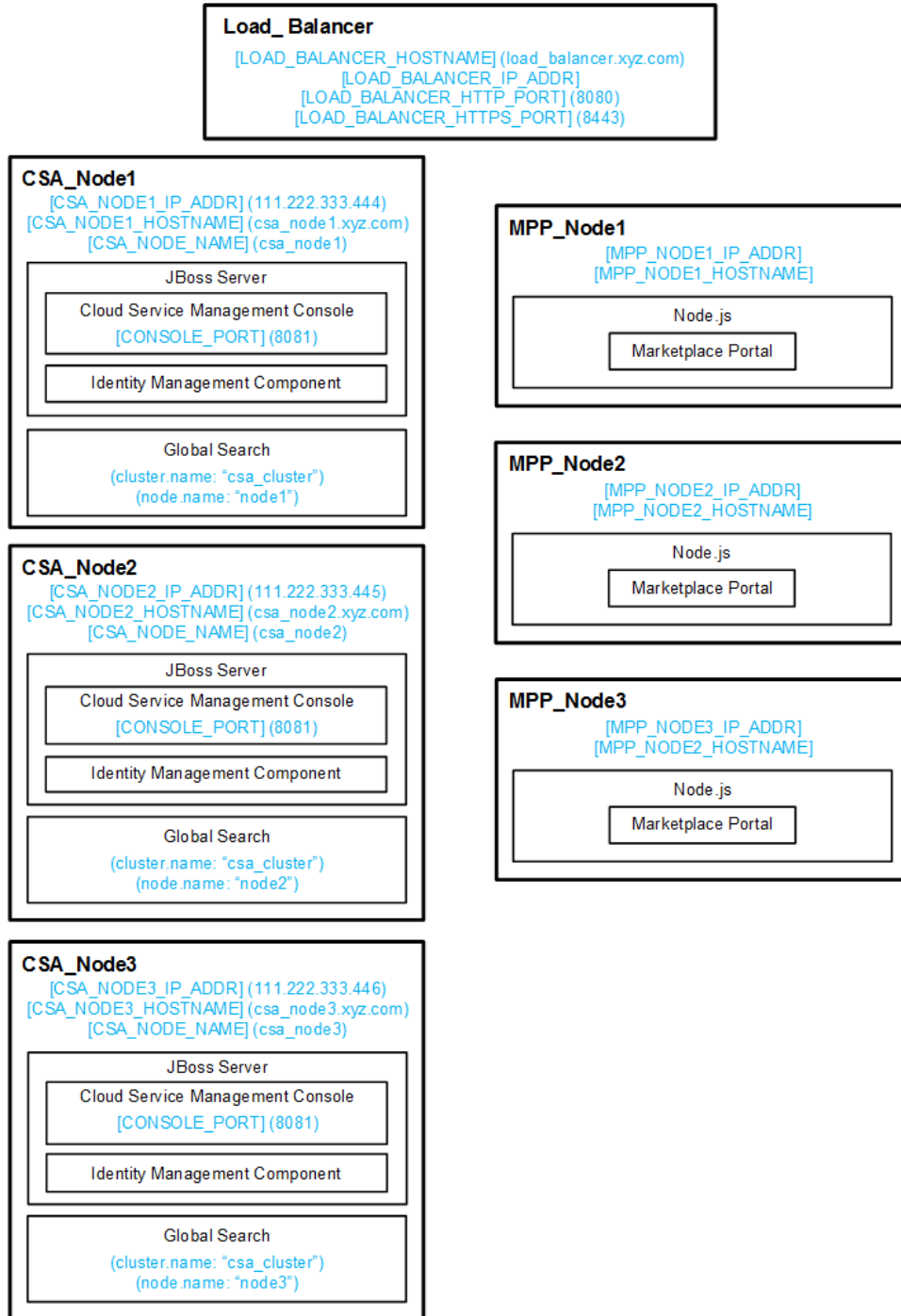


Figure 1-4. Example Values for Example Cluster Configuration

The user who sets up the nodes should have knowledge of or work with someone who has knowledge of CSA, Operations Orchestration, load balancers, JBoss, and resource providers that will be integrated with CSA.

General Notes about Configuring a Clustered Environment

The following information should be considered when configuring a clustered environment:

- It is recommended that you install and configure the nodes in the order presented in this guide. There are some tasks that are dependent on this order (such as generating certificates and importing them).
Install and configure the load balancer node first. Follow the manufacturer's recommendations to install and configure the load balancer.
- The system time among all nodes in the cluster must be synchronized. If the time is not synchronized, users may experience problems such as not being able to log in to the Marketplace Portal.
- CSA must be installed in the same directory on all nodes. Some file locations are hardcoded in configuration files and, if these file locations do not match among nodes, CSA fails to start.

Chapter 2: Configure the Load Balancer Node

Install and configure the load balancer on the load balancer node before setting up the CSA cluster configured for high availability.

Install the Load Balancer

Install the load balancer following the manufacturer's recommendations. Refer to the manufacturer's documentation for more information.

Configure the Load Balancer

The load balancer should be configured to balance the workload among the nodes in the CSA/JBoss cluster and the nodes in the Marketplace Portal/Node.js cluster.

Configure the load balancer following the manufacturer's recommendations (refer to the manufacturer's documentation for more information) with the following exceptions:

- When configuring the load balancer for the Marketplace Portal/Node.js cluster, configure sticky sessions. Sticky sessions are required for session persistence between the load balancer and the Marketplace Portal in a clustered environment.
- CSA only supports secure connections over TLSv1. The load balancer should be configured for this connection protocol.

Generate the Certificate

If you will be configuring a secure connection (using a protocol such as TLS) to communicate from the load balancer to the CSA and Marketplace Portal nodes, you will need to generate the load balancer's certificate (in this document, it will be referred to as `load_balancer.crt`). Copy this certificate to the `$CSA_HOME/jboss-as/standalone/configuration` directory on the CSA nodes and to the `$CSA_HOME/portal/conf/` directory on the Marketplace Portal nodes.

Note: When configuring CSA, if you intend to refer to the load balancer system by its IP address rather than its fully-qualified domain name, you must generate the certificate with the `Subject Alt Name` attribute set to the IP address of the load balancer system.

Start the Load Balancer

You can start the load balancer now (following the manufacturer's recommendations) or after configuring the CSA cluster.

Chapter 3: Configure the CSA Node

This chapter describes how to install, upgrade, and configure a CSA node (for example, `csa_node1`, `csa_node2`, or `csa_node3`) in a CSA cluster configured for high availability.

The CSA node consists of:

- CSA
- Global search
- Identity Management component

To configure the CSA node, do the following:

- Install or upgrade the CSA node
- Configure CSA

Install CSA

Install CSA on each CSA node as described in the *Cloud Service Automation Installation Guide* with the following exceptions:

- You must install the same version of CSA on each node (including the Marketplace Portal nodes).
- Install CSA in the same location in which you installed or will be installing CSA on all CSA nodes.
- Install CSA database components and create the database schema for one and only one of the CSA nodes. It is recommended that you create the schema when you install CSA on the first CSA node. Then, you do not need to create the schema when you install CSA on the other nodes.

Note: All CSA nodes must connect to the same database schema. However, you only need to create the database schema once.

- You can only use the installer to install sample content on the node on which database components have been installed and the database schema has been created. On the other nodes in the cluster, use the Cloud Content Capsule Installer to install the sample content after the database schema has been created. See the *Cloud Service Automation Content Installation Guide* for more information.
- Use an external (existing) instance of Operations Orchestration.

Note: You cannot configure CSA in a clustered environment using the embedded Operations Orchestration instance.

Note: It is recommended that you install Operations Orchestration in its own cluster configured for high availability. Refer to the Operations Orchestration documentation for more information.

- You must configure a secure protocol connection (such as TLS) between Operations Orchestration and all CSA nodes.
- If you are configuring Operations Orchestration for sequential designs, set the **Property Value** of the **CSA_REST_URI** System Property to `https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_CSA_HTTPS_PORT]/csa/rest`.

For example:

`https://load_balancer.xyz.com:8443/csa/rest`

The *Cloud Service Automation Installation Guide* can be downloaded from the HPE Software Support Web site at <http://h20230.www2.hp.com/selfsolve/manuals/> (this site requires a Passport ID).

Upgrade CSA

To upgrade CSA, on each CSA node, do the following:

1. If you are using the JRE that is installed with CSA (OpenJRE), back up the truststore (`<csa_jre>/lib/security/cacerts`) and/or the load balancer certificate outside of `$CSA_HOME`. Because the JRE will be upgraded, the truststore is also upgraded. Any certificates you manually imported into the truststore will be lost unless you back up the truststore or the certificates. Do not re-use the truststore from the old version of the JRE (in case it contains public Certificate Authority certificates that are no longer trusted). Instead, you must export any root and/or self-signed certificates from the old truststore (certificates that you had manually imported into the old truststore) and import them into the new JRE truststore after running the upgrade installer.
2. Upgrade CSA as described in the *Cloud Service Automation Upgrade Guide* with the following exceptions:
 - When running the upgrade installer, install CSA database components and upgrade the database schema on one and only one of the CSA nodes. It is recommended that you upgrade the schema on the first CSA node that you upgrade. Then, you do not need to install CSA database components and upgrade the database schema when you upgrade CSA on the other CSA nodes.

Note: All CSA nodes must connect to the same database schema. However, you only need to install CSA database components and upgrade the database schema once.

- When running the upgrade installer, you must continue to use an external (existing) instance of Operations Orchestration. You cannot install or upgrade to use an embedded Operations Orchestration instance.
- When running the upgrade installer, you cannot install the additional sample content. You can deploy the content after the upgrade has completed. Refer to the *Cloud Service Automation Content Installation Guide* for information on how to manually deploy this content.
- After running the upgrade installer, any references to the `$CSA_HOME/jboss-as/standalone/configuration/standalone.xml` file in the *Cloud Service Automation Upgrade Guide* should be applied to the `$CSA_HOME/jboss-as/standalone/configuration/standalone-full-ha.xml` file instead.

For example, in CSA version 4.20, if you customized the host or ports in the `standalone-full-ha.xml` file, when you follow the instructions in the *Recustomize Host and Ports* section of the *Cloud Service Automation Upgrade Guide*, instead of updating the `standalone.xml` file, you should update the `standalone-full-ha.xml` file. If you do not remember the customizations you made to the file, refer to the backed up copy, `$CSA_HOME/_CSA_4_60_0_installation/Backup/standalone/configuration/standalone-full-ha.xml`.

- After upgrade to CSA 4.60, if **Enable HP SSO** is selected during upgrade, and if the `initString` value

in `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/hpsssoConfiguration.xml` file is detected to be the default value created during a previous installation of CSA, the `initString` value is regenerated as a security measure.

If the external Operations Orchestration had not already been configured for SSO, the upgrade process will attempt to update the external Operations Orchestration's SSO configuration with the new `initString` value generated during installation.

Any other products that you had configured for SSO with CSA will need to be updated to share a common `initString` with CSA. After upgrade to CSA 4.60, you should review and update, as needed, the SSO configuration in Operations Orchestration and other integrated products. For more information on configuring SSO between CSA and other products, see the *Cloud Service Automation Configuration Guide*.

The *Cloud Service Automation Upgrade Guide* and *Cloud Service Automation Configuration Guide* can be downloaded from the HPE Software Support Web site at <http://h20230.www2.hp.com/selfsolve/manuals/> (this site requires a Passport ID).

3. Follow the instructions in "[Configure CSA](#)" on the next page to configure CSA after running the upgrade installer. Do not copy back files from an earlier version of CSA unless you are instructed to do so. Many components of CSA, such as the JRE, JBoss, and Identity Management component, have been updated and therefore, the configuration files have also been updated. Some files may have retained the information you configured in the previous version. However, you should verify all information in the upgraded files.

Configure CSA

Complete the following tasks to configure CSA on each CSA node:

- "Edit Properties" below (required)
- "Enable JNDI" on the next page (required)
- "Request a Software License" on the next page (required)
- "Configure Marketplace Portal Redirection" on the next page (required)
- "Configure JBoss" on page 20 (required)
- "Configure a Secure Connection" on page 21 (required)
- "Configure the Identity Management Component" on page 21 (required)
- "Reconfigure the CSA Service" on page 22 (required)
- "Configure Global Search" on page 23 (required if using global search)
- "Configure Single Sign-On" on page 27 (required if using SSO)
- "Share Filesystem Resources" on page 28 (optional)

Edit Properties

Update property values to route requests to the Cloud Service Management Console through the load balancer and set the mode in which CSA is running.

1. Edit the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/classes/csa.properties`:
 - a. Set the following properties:

```
csa.provider.hostname=[LOAD_BALANCER_HOSTNAME]
csa.provider.port=[LOAD_BALANCER_CSA_HTTPS_PORT]
csa.provider.rest.protocol=https
deploymentMode=clustered
```

For example:

```
csa.provider.hostname=load_balancer.xyz.com
csa.provider.port=8443
csa.provider.rest.protocol=https
deploymentMode=clustered
```

Note: If you set the `csa.provider.hostname` attribute to the IP address of the system on which the load balancer is installed, the `Subject Alt Name` attribute of the load balancer's certificate that has been imported into CSA's keystore must also be set to the IP address of the system on which the load balancer is installed. If the load balancer's certificate does not contain the `Subject Alt Name` attribute or it is not set to the IP address of the system on which the load balancer is installed, you must regenerate and re-import the load balancer's certificate with the `Subject Alt Name` attribute set to the IP address of the system on which the load balancer is installed.

- b. Add and set the following property:

```
csa.provider.ip=[LOAD_BALANCER_IP_ADDR]
```

2. Edit the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/classes/swagger.properties` and set the following property:

```
documentation.services.basePath=https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_CSA_HTTPS_PORT]/csa/rest
```

For example:

```
documentation.services.basePath=https://load_balancer.xyz.com:8443/csa/rest
```

Enable JNDI

Enable the Java Naming and Directory Interface (JNDI).

1. Open the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/applicationContext.xml` file in a text editor.
2. Locate the comment `START HA Mode Configuration` and uncomment following content:

```
<jee:jndi-lookup id="channelGroup" jndi-name="java:jboss/clustering/group/server" expected-type="org.wildfly.clustering.group.Group"/>
```
3. If you modified the channel group, update the value of the `jndi-name` attribute to the new group name.
4. Save and exit the file.

Request a Software License

CSA version 4.60 requires a software license. CSA licensing is based on the number of operating system instances (OSIs) being used in current, active subscriptions.

After initial installation of CSA version 4.60, when you log in to the Cloud Service Management Console, a temporary 90-day trial license is activated. Once the trial license expires, you are limited to 25 OSIs. If you created more than 25 OSIs during the trial period, you cannot create any additional OSIs. You can add more licenses at any time to increase your OSI capacity.

When you request a software license, typically you supply the IP address of the system on which CSA is installed. However, in a clustered environment, use the IP address of the load balancer (`[LOAD_BALANCER_IP_ADDR]`) when requesting a software license. The license should be installed on only one node in the clustered environment.

For more information on managing software licenses, refer to the *Cloud Service Automation Configuration Guide*. For information on how to view, add, or delete a license, refer to the Cloud Service Management Console Help.

Configure Marketplace Portal Redirection

One of the URLs that can be used to launch the Marketplace Portal (for example, `https://load_balancer.xyz.com:8443/mpp`) redirects the request from the JBoss server (the CSA controller) to the Node.js server (the Marketplace Portal). By default, the request is redirected to the same system on which CSA is installed. However, in a clustered environment, the request must be redirected to the load balancer.

To update the redirection, do the following:

1. Open the `$CSA_HOME/jboss-as/standalone/deployments/mpp.war/index.html` in a text editor.
2. Locate the following line:

```
<meta http-equiv="refresh" content="0;URL= https://[CSA_NODE_HOSTNAME]:[CSA_NODE_
HTTPS_PORT]"/>
```

3. Replace `[CSA_NODE_HOSTNAME]` with `[LOAD_BALANCER_HOSTNAME]` and `[CSA_NODE_
HTTPS_PORT]` with `[LOAD_BALANCER_MPP_HTTPS_PORT]`. For example:

```
<meta http-equiv="refresh" content="0;URL= https://[LOAD_BALANCER_HOSTNAME]:[LOAD_
BALANCER_MPP_HTTPS_PORT]"/>
```

or

```
<meta http-equiv="refresh" content="0;URL= https://load_balancer.xyz.com:8089"/>
```

4. Save and exit the file.

Configure JBoss

Configure JBoss for use in a CSA clustered environment:

1. Open the `$CSA_HOME/jboss-as/standalone/configuration/standalone-full-ha.xml` file in a text editor.

2. Locate the server property and configure a unique node name for the node. Locate

```
<server xmlns="urn:jboss:domain:2.2" name="CHANGE ME!!">
```

and set the name to `[CSA_NODE_NAME]`.

For example:

```
<server xmlns="urn:jboss:domain:2.2" name="csa_node1">
```

3. Update the messaging subsystem password. Change

```
<cluster-password>${jboss.messaging.cluster.password:CHANGE ME!!}</cluster-password>
to
```

```
<cluster-password>password</cluster-password>
```

4. Locate the transactions subsystem and configure the node identifier for the `<core-environment>` property (set the node identifier to the unique node name you configured in step 2). Locate

```
<subsystem xmlns="urn:jboss:domain:transactions:2.0">
  <core-environment>
```

and add set the node identifier to `[CSA_NODE_NAME]`. For example:

```
<subsystem xmlns="urn:jboss:domain:transactions:2.0">
  <core-environment node-identifier="csa_node1">
```

5. Add the node's IP address to the public interface. Locate

```
<interface name="public">
```

and add the IP address `[CSA_NODE1_IP_ADDR]`. For example:

```
<interface name="public">
  <inet-address value="${jboss.bind.address:<CSA_Node_ip_Address>}" />
</interface>
```

Configure a Secure Connection

Configure a secure connection (using a protocol such as TLS) on the CSA node for communication from the load balancer node and between each CSA node in the cluster.

1. To configure a secure connection between CSA and the load balancer node:
 - a. If you have not already done so, copy the certificate from the load balancer node (`load_balancer.crt`) to the `$CSA_HOME/jboss-as/standalone/configuration` directory.
 - b. Import the certificate into the JVM on the CSA node using the following command:

```
$CSA_JRE_HOME/bin/keytool -importcert -file $CSA_HOME/jboss-as/standalone/configuration/load_balancer.crt -alias load_balancer_csa -keystore $CSA_JRE_HOME/lib/security/cacerts
```

where `$CSA_JRE_HOME` is the directory in which the JRE that is used by CSA is installed.
2. Copy and import the certificate of each CSA node to every other CSA node in the cluster:
 - a. Copy the certificate of each CSA node to every other CSA node in the cluster. The certificate file on each CSA node is `$CSA_HOME/jboss-as/standalone/configuration/jboss.crt`.
For example, copy the certificates from `csa_node2` and `csa_node3` to `csa_node1` to the directory `/tmp/CSA-Certificates`. Rename the certificate files with unique names, such as `jboss-csa_node2.crt` and `jboss-csa_node3.crt`.
 - b. Import each certificate into the JVM of that CSA node.
For example, on `csa_node1`, run the following commands:

```
$CSA_JRE_HOME/bin/keytool -importcert -file /tmp/CSA-Certificates/jboss-csa_node2.crt -alias csa_node2 -keystore $CSA_JRE_HOME/lib/security/cacerts
```

```
$CSA_JRE_HOME/bin/keytool -importcert -file /tmp/CSA-Certificates/jboss-csa_node3.crt -alias csa_node3 -keystore $CSA_JRE_HOME/lib/security/cacerts
```

Configure the Identity Management Component

Complete the tasks in this section to configure the Identity Management component on the CSA node.

1. Edit the following content in the `$CSA_HOME/jboss-as/standalone/deployments/idm-service.war/WEB-INF/spring/applicationContext.properties` file. Update the values of `idm.csa.hostname` and `idm.csa.audit.hostname` to `[LOAD_BALANCER_HOSTNAME]` and `idm.csa.port` and `idm.csa.audit.port` to `[LOAD_BALANCER_HTTPS_PORT]`:

```
idm.csa.hostname = [LOAD_BALANCER_HOSTNAME]
idm.csa.port = [LOAD_BALANCER_CSA_HTTPS_PORT]
.
.
.
# Properties for CSA Auditing Server
.
.
.
idm.csa.audit.hostname = [LOAD_BALANCER_HOSTNAME]" />
idm.csa.audit.port = [LOAD_BALANCER_HTTPS_PORT]" />
```

For example:

```
idm.csa.hostname = load_balancer.xyz.com
idm.csa.port = 8443
.
.
.
# Properties for CSA Auditing Server
.
.
.
idm.csa.audit.hostname = load_balancer.xyz.com"/>
idm.csa.audit.port = 8443"/>
```

2. Edit the following content in the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/applicationContext-security.xml` file. Update the values of hostname to `[LOAD_BALANCER_HOSTNAME]` and port to `[LOAD_BALANCER_CSA_HTTPS_PORT]`:

```
<beans:bean id="idmConfig" class="com.hp.ccue.identity rp.IdentityServiceConfig">
  <beans:property name="protocol" value="https"/>
  <beans:property name="hostname" value="[LOAD_BALANCER_HOSTNAME]"/>
  <beans:property name="port" value="[LOAD_BALANCER_CSA_HTTPS_PORT]"/>
  <beans:property name="servicePath" value="idm-service"/> <!-- or hpcloud-idm-
service if you don't change the name of the WAR -->
  <beans:property name="integrationAcctUserName" value="idmTransportUser"/>
  <beans:property name="integrationAcctPassword"
value="\${securityIdmTransportUserPassword}"/>
</beans:bean>
```

For example:

```
<beans:bean id="idmConfig" class="com.hp.ccue.identity rp.IdentityServiceConfig">
  <beans:property name="protocol" value="https"/>
  <beans:property name="hostname" value="load_balancer.xyz.com"/>
  <beans:property name="port" value="8443"/>
  <beans:property name="servicePath" value="idm-service"/> <!-- or hpcloud-idm-
service if you don't change the name of the WAR -->
  <beans:property name="integrationAcctUserName" value="idmTransportUser"/>
  <beans:property name="integrationAcctPassword"
value="\${securityIdmTransportUserPassword}"/>
</beans:bean>
```

Reconfigure the CSA Service

Reconfigure the CSA service to start, restart, and stop CSA using the `standalone-full-ha.xml` configuration file.

Caution: You must stop the CSA service before reconfiguring it.

Note: If you upgrade from CSA 4.2 to CSA 4.6, copy the CSA 4.6 file under `$CSA_HOME/scripts` to the `/etc/init.d` directory, so that you can start Elasticsearch.

1. Open a command prompt.
2. Stop the CSA service. Run the following command:
service csa stop
3. Edit the `$CSA_HOME/scripts/csa_env.conf` file:
 - a. Locate the Toggle below two lines to run CSA in HA mode comment.
 - b. Below this comment, comment out the `export CSA_DEPLOY_MODE=standalone.sh # Standalone Mode` line:

```
#export CSA_DEPLOY_MODE=standalone.sh # Standalone Mode
```
 - c. Uncomment the following line:

```
export CSA_DEPLOY_MODE="standalone.sh -c standalone-full-ha.xml # HA Mode
```
4. Start the CSA service. Run the following command:
service csa start

Configure Global Search

Global search allows you to find a certain service offering, service instance, or subscription by a meaningful keyword from the Marketplace Portal. For service offerings, global search finds the keyword in the name, description, option sets, options, and properties. For service instances and subscriptions, global search finds the keyword in the name, description, and instance properties (name and value).

Global search must be enabled before being available on the Marketplace Portal. See the *Cloud Service Automation Configuration Guide* for more information about enabling global search.

To configure global search, do the following:

1. Edit the `$CSA_HOME/elasticsearch-1.5.2/config/elasticsearch.yml` file:
 - a. Uncomment the `cluster.name` property and set it to a unique name that is shared by all the nodes in the cluster. That is, if you have more than one clustered environment on the same network, each clustered environment should have a unique cluster name. All the nodes in the single clustered environment will share the same cluster name.
For example, `cluster.name: "csa_cluster"`
 - b. Set the `node.name` property to a unique name. Each node in the cluster must have a unique node name.
For example, `node.name: "node1"`
 - c. Uncomment the `node.master` property and set it to **true** to make this node a master node. All nodes in the cluster should be a master node.
For example, `node.master: true`
 - d. Optionally, uncomment and set the `node.data` property. Refer to the comments in the file for information of how to combine this and the `node.master` property settings to suit the requirements of the node.
 - e. Comment out the `node.local: true` property. When disabled, global search can find and communicate with other nodes on the network. If this property is left enabled, global search will not discover other nodes and will isolate itself from the network.
 - f. Verify that the following properties are set to these values (and if they are not set to these values, set them to these values):

```
transport.tcp.port: 9300
http.port: 9201
http.enabled: true
discovery.zen.ping.timeout: 5s
```

- g. Set the `discovery.zen.ping.unicast.hosts` property to the IP addresses of the master nodes that perform discovery when new master or data nodes are started. Since all nodes in the cluster are master nodes, set this property to all IP addresses of the nodes in the cluster.

For example, `discovery.zen.ping.unicast.hosts`:
["111.222.333.444", "111.222.333.445", "111.222.333.446"]

- h. Locate the `Transport layer SSL` section and do the following:
 - i. Verify that the following properties are set to these values (and if they are not set to these values, set them to these values):

```
searchguard.ssl.transport.node.keystore_type: JKS
searchguard.ssl.transport.node.keystore_password: changeit
searchguard.ssl.transport.node.truststore_type: JKS
searchguard.ssl.transport.node.truststore_password: changeit
```

- ii. Set the `searchguard.ssl.transport.node.keystore_filepath` property to the location of CSA's keystore. For example,

```
searchguard.ssl.transport.node.keystore_filepath: /usr/local/hpe/csa/jboss-
as/standalone/configuration/.keystore
```

- iii. Set the `searchguard.ssl.transport.node.truststore_filepath` property to the location of CSA's truststore. For example,

```
searchguard.ssl.transport.node.truststore_filepath:
/usr/local/hpe/csa/openjre/lib/security/cacerts
```

- i. Locate the `REST layer SSL` section and do the following:
 - i. Verify that the following properties are set to these values (and if they are not set to these values, set them to these values):

```
searchguard.ssl.transport.http.keystore_type: JKS
searchguard.ssl.transport.http.keystore_password: changeit
searchguard.ssl.transport.http.truststore_type: JKS
searchguard.ssl.transport.http.truststore_password: changeit
```

- ii. Set the `searchguard.ssl.transport.http.keystore_filepath` property to the location of CSA's keystore. For example,

```
searchguard.ssl.transport.http.keystore_filepath: /usr/local/hpe/csa/jboss-
as/standalone/configuration/.keystore
```

- iii. Set the `searchguard.ssl.transport.http.truststore_filepath` property to the location of CSA's truststore. For example,

```
searchguard.ssl.transport.http.truststore_filepath:
/usr/local/hpe/csa/openjre/lib/security/cacerts
```

- j. Save and exit the file.

2. In the `csa.properties` file, set the value of the `csa.provider.msvc.hostname` property with the local node FQDN.

3. In the `csa-search-service/app.json` file, set the values of the following properties:

`ccue-basic-server.host` with the local node FQDN

`msvc-basic-search.searchidmURL` should point to the load balancer FQDN and load balancer port 8443.

4. If the cluster setup is using default CSA (self-signed) certificates, complete the following step. (This step is not required if the cluster runs valid certificates signed by a common CA).
 - In the `csa-search-service/app.json` file, find the following keys and change the values to **false**:
`msvc-basic-search.strictSSL`
`rejectUnauthorized`
5. Verify that the following High Availability configurations in the `csa-search-service/app.json` file, are maintained after the installation of CSA:
 - a. `msvc-basic-search.idmURL:[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_HTTPS_PORT]/idm-service` should point to the load balancer
For example:
`idmURL: https://http-loadbalancer.csapcoe.hp.com:8443/idm-service`
where port 8443 is the Load balancer port which was configured manually during installation.
 - b. `cert` should point to the load balancer certificate:
For example:
`"ca": "/usr/local/hpe/csa/jboss-as/standalone/configuration/apache_csa.crt"`.
The name of the crt file cannot remain as `jboss.crt` which is set as the default.
6. Create the security key on one node and copy it to the other nodes in the cluster. The security key is used to authenticate the communication between the nodes in the cluster when sharing the shards and replicas of the inventory index. The security key must be the same on all nodes in the cluster.
 - a. On a `CSA_Node` (for example, `csa_node1`), stop, then start the CSA:
Open a command prompt and type `service csa restart`.
 - b. After the service has restarted on `csa_node1`, copy the `$(CSA_HOME)/elasticsearch-1.5.2/searchguard_node_key.key` file from `csa_node1` to all other nodes in the cluster. Copy the file to the same directory (`$(CSA_HOME)/elasticsearch-1.5.2/`) and use the same file name on the other nodes.
 - c. On all nodes in the cluster except `csa_node1`, restart CSA:
On all nodes in the cluster except `csa_node1`, open a command prompt and type `service csa restart`.
7. Restart CSA:
Open a command prompt and type `service csa restart`.
8. If you changed the `cluster.name`, you must create new indexes. Do the following:

Note: CSA must be running.

- a. Open a command prompt and navigate to `$(CSA_HOME)/csa-search-service/bin/`.
- b. Run the following command:
`$(CSA_HOME)/node.js/bin/node create-index.js`
If displayed, ignore the following errors:
`ERROR: Error connecting to Elasticsearch server. Cannot create index catalog.`
`Error: DEPTH_ZERO_SELF_SIGNED_CERT`

```
ERROR: Error connecting to Elasticsearch server. Cannot create index inventory.  
Error: DEPTH_ZERO_SELF_SIGNED_CERT
```

It may take a few minutes for the first CSA artifact to be indexed.

Configure the TCP Communication Channel on JGroups

JBoss uses JGroups for communication between nodes in order to establish the cluster and manage membership of nodes in the cluster. By default, the JGroups subsystem on JBoss is configured to communicate through IP multicast messages using UDP. If the environment that you are using to set up the cluster does not support multicast messaging, the JGroups subsystem may alternatively be configured to use multiple TCP unicast messages.

To configure the TCP communication channel on JGroups, do the following:

1. Open the `$CSA_HOME/jboss-as/standalone/configuration/standalone-full-ha.xml` file in an editor.
2. Update the `jgroups` subsystem default stack from `udp` to `tcp`. Change

```
<subsystem xmlns="urn:jboss:domain:jgroups:1.1" default-stack="udp">
```

to

```
<subsystem xmlns="urn:jboss:domain:jgroups:1.1" default-stack="tcp">
```

3. Locate the `tcp` stack and do the following:

- a. Replace `<protocol socket-binding="jgroups-mping" type="MPING"/>` with:

```
<protocol type="TCPPING">  
  <property name="initial_hosts">[LIST_OF_INITIAL_HOSTS]</property>  
  <property name="num_initial_members">[NUMBER_OF_INITIAL_HOSTS]</property>  
  
  <property name="port_range">1</property>  
  <property name="timeout">2000</property>  
</protocol>
```

where:

- `[LIST_OF_INITIAL_HOSTS]` is a comma-separated list of nodes (IP address and port) that define the cluster. It is recommended that you list all known nodes in the CSA controller cluster. Other nodes that are not listed may join the cluster and you may remove a node from the list at any time. However, at least one initial host (a node in the list of initial hosts) must be running in order for other nodes (that are not included in this list) to join the cluster. The more initial hosts listed means that there is a greater chance an initial host is running so that an unlisted node may join the cluster (if no initial hosts are running, no unlisted nodes may join the cluster). Once the cluster is running, if you update the list of initial hosts, all nodes in the cluster must be restarted. The following are examples of a list of three initial hosts: `[CSA_NODE1_IP_ADDR][7600], [CSA_NODE2_IP_ADDR][7600], [CSA_NODE3_IP_ADDR][7600]` or `111.222.333.444 [7600], 111.222.333.445 [7600], 111.222.333.446 [7600]`
- `[NUMBER_OF_INITIAL_HOSTS]` is the number of initial hosts specified in the cluster.

For example:

```
<protocol type="TCPPING">  
  <property name="initial_hosts">111.222.333.444[7600], 111.222.333.445[7600],
```

```
111.222.333.446[7600]</property>
  <property name="num_initial_members">3</property>
  <property name="port_range">1</property>
  <property name="timeout">2000</property>
</protocol>
```

A TCP-based channel may be less efficient than its UDP counterpart as the size of the cluster increases beyond four to six nodes.

- b. Under `<protocol type="pbcst.NAKACK2"/> ---<Stack_name="tcp">` add:

```
<property name="use_mcast_xmit">>false</property>
<property name="use_mcast_xmit_req">>false</property>
</protocol>
```

4. Add the node's IP address to the public interface. Locate:

```
<interface name="public">
```

and add the IP address [CSA_NODE1_IP_ADDR]. For example:

```
<interface name="public">
  <inet-address value="{jboss.bind.address:<CSA_Node_ip_Address>}" />
</interface>
```

5. Reconfigure the CSA service. In the `$CSA_HOME\scripts\csa_env.conf` file:

- a. Locate the Toggle below two lines to run CSA in HA mode comment.
- b. Comment out `export CSA_DEPLOY_MODE=standalone.sh # Standalone Mode`.
- c. Add `export CSA_DEPLOY_MODE="standalone.sh -c standalone-full-ha.xml" # HA Mode`.

Note: You do not need to specify the `-u [MULTICAST_ADDRESS]` option.

Configure Single Sign-On

If you have integrated Single Sign-On (SSO) between CSA and another application (such as Operations Orchestration), you must configure SSO on the CSA node.

1. Open the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/hpssoConfiguration.xml` file in a text editor.
2. Locate the following content:

```
<onFailure>
  .
  .
  .
  <action name="redirectToAP">
    <targetUrl>https://[CSA_NODE_HOSTNAME]:[CSA_NODE_PORT]/csa/login</targetUrl>
  </action>
```

3. Replace [CSA_NODE_HOSTNAME] and [CSA_NODE_PORT] with the load balancer hostname (LOAD_BALANCER_HOSTNAME) and the virtual host port for the CSA nodes (LOAD_BALANCER_CSA_HTTPS_PORT). For example:

```
<onFailure>
  .
  .
```

```
<action name="redirectToAP">
  <targetUrl>https://load_balancer.xyz.com:8443/csa/login</targetUrl>
</action>
```

4. Locate the `initString` value in the `crypto` element. The `initString` setting for CSA must be the same value for all nodes in the cluster and any applications (such as Operations Orchestration) that are integrated with Single Sign-On. The `initString` value represents a secret key and should be treated as such in your environment.
5. Copy the `initString` value to the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/hpssoConfiguration.xml` file on all other nodes in the cluster.
6. Copy the `initString` value to the `$CSA_HOME/jboss-as/standalone/deployments/idm-service.war/WEB-INF/hpssoConfig.xml` file on this and all other nodes in the cluster.
7. Configure this `initString` value in any applications that are integrated with CSA using Single Sign-On.

Share Filesystem Resources

Configure CSA to share filesystem resources to free up disk space (this task is optional). Static filesystem resources, such as images or JSP files, can be stored on one system and shared by all nodes in the cluster. The following example shows how to share the `images` directory that is installed with each instance of CSA.

CSA provides images that are stored in an `images` directory (for example, `$CSA_HOME/jboss-as/standalone/deployments/csa.war/images`). From the Cloud Service Management Console, you may also upload images which are saved to the same `images` directory. You can store these images on a shared filesystem on a network and the images on this single shared filesystem can be used by all nodes in the cluster.

To configure CSA to use a shared filesystem to store images, do the following:

1. Move the contents of the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/images` directory to the shared location (for example, move the files to `//<SharedFilesystem>/CSAImages`).
2. On the CSA node, log in as root.
3. If it exists, delete the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/images` directory.
4. Create a credentials file to store the shared filesystem user login information. For example, create `/etc/.win-mnt-cred` and add the following lines:

```
username=<SharedFilesystemUser>
password=<SharedFilesystemPassword>
```

5. Change the permissions of the credentials file. Type the following:

```
chmod 600 /etc/.win-mnt-cred
```

6. Edit `/etc/fstab` by adding the following line:

```
//<SharedFilesystem>/CSAImages $CSA_HOME/jboss-as/
standalone/deployments/csa.war/images cifs credentials=
/etc/.win-mnt-cred,iocharset=utf8,file_mode=0777,dir_mode=0777,
uid=csauser,gid=csagrps 0 0
```

7. Mount the shared filesystem:

```
mount -a
```

Chapter 4: Configure the Marketplace Portal Node

This chapter describes how to install, upgrade, and configure a remote Marketplace Portal instance on the Marketplace Portal node (for example, MPP_Node1, MPP_Node2, or MPP_Node3) in a cluster configured for high availability. The Marketplace Portal should be installed as a remote instance on a Marketplace Portal node in its own clustered environment.

To configure the Marketplace Portal, do the following:

- Install or upgrade the remote Marketplace Portal instance
- Configure the remote Marketplace Portal instance

Install the Remote Marketplace Portal Instance

Install a remote instance of the Marketplace Portal on each Marketplace Portal node, as described in the *Cloud Service Automation Installation Guide* with the following exceptions:

- You must install the same version of CSA on each node (including the CSA nodes).
- When selecting a location in which to install the Marketplace Portal, select the same location for all Marketplace Portal nodes.
- When configuring the CSA Host, use the fully-qualified domain name of the Load_Balancer node (for example, load_balancer.xyz.com or `[LOAD_BALANCER_HOSTNAME]`).
- When configuring the CSA Port, use the port of the load balancer installed on the Load_Balancer node (for example, 8443 or `[LOAD_BALANCER_CSA_HTTPS_PORT]`).

The *Cloud Service Automation Installation Guide* can be downloaded from the HPE Software Support Web site at <http://h20230.www2.hp.com/selfsolve/manuals/> (this site requires a Passport ID).

Upgrade the Remote Marketplace Portal Instance

Upgrade the remote Marketplace Portal instance on each Marketplace Portal node as described in the *Cloud Service Automation Upgrade Guide* with the following exception:

The *Cloud Service Automation Upgrade Guide* can be downloaded from the HPE Software Support Web site at <http://h20230.www2.hp.com/selfsolve/manuals/> (this site requires a Passport ID).

Configure the Remote Marketplace Portal Instance

To configure the remote Marketplace Portal instance on each Marketplace Portal node, do the following:

1. If you have not done so already, copy the certificate of the load balancer from the Load_Balancer node (for example, load_balancer.crt) to the `$CSA_HOME/portal/conf/` directory on the Marketplace Portal node.

2. Edit the following content in the `$CSA_HOME/portal/conf/mpp.json` file:

- For the provider, update the `url` attribute value to use `[LOAD_BALANCER_HOSTNAME]` and `[LOAD_BALANCER_CSA_HTTPS_PORT]` and `ca` to use the location of the certificate of the load balancer. For example:

```
"provider": {  
  "url": "https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_CSA_HTTPS_PORT]"  
  "ca": "$CSA_HOME/portal/conf/load_balancer.crt"  
  .  
  .  
  .  
},
```

or

```
"provider": {  
  "url": "https://load_balancer.xyz.com:8443"  
  "ca": "$CSA_HOME/portal/conf/load_balancer.crt"  
  .  
  .  
  .  
},
```

- For the `idmProvider`, update the values of the `url` attribute to use `[LOAD_BALANCER_HOSTNAME]` and `[LOAD_BALANCER_CSA_HTTPS_PORT]`, `returnUrl` to use `[LOAD_BALANCER_HOSTNAME]` and `[LOAD_BALANCER_MPP_HTTPS_PORT]`, and `ca` to use the location of the certificate of the load balancer. For example:

```
"idmProvider": {  
  "url": "https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_CSA_HTTPS_PORT]",  
  "returnUrl": "https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_MPP_HTTPS_PORT]",  
  
  "ca": "$CSA_HOME/portal/conf/load_balancer.crt"  
  .  
  .  
  .  
},
```

or

```
"idmProvider": {  
  "url": "https://load_balancer.xyz.com:8443",  
  "returnUrl": "https://load_balancer.xyz.com:8089",  
  "ca": "$CSA_HOME/portal/conf/load_balancer.crt"
```

```
    .  
    .  
    .  
  },
```

3. Restart the Marketplace Portal service:

Open a command prompt and type `service mpp restart`.

Chapter 5: Common Tasks

This chapter provides information on how to perform common tasks.

Tasks include:

- "Start CSA" below
- "Stop CSA" below
- "Start the Marketplace Portal" below
- "Stop the Marketplace Portal" on the next page
- "Launch the Cloud Service Management Console" on the next page
- "Launch the Marketplace Portal" on the next page

Start CSA

Caution: If you have not already done so, [reconfigure the CSA service](#) to start and stop CSA using the `standalone-full-ha.xml` configuration file (you should have completed these steps when you configured the CSA node).

To start CSA, on the server that hosts CSA, type the following:

```
service csa start
```

Stop CSA

Caution: If you have not already done so, [reconfigure the CSA service](#) to start and stop CSA using the `standalone-full-ha.xml` configuration file (you should have completed these steps when you configured the CSA node).

To stop CSA, on the server that hosts Cloud Service Automation, type the following:

```
service csa stop
```

Start the Marketplace Portal

To start Marketplace Portal, on the system that hosts CSA, open a command prompt and type `service mpp start`.

Stop the Marketplace Portal

To stop Marketplace Portal, on the server that hosts Marketplace Portal, type `service mpp stop`.

Launch the Cloud Service Management Console

Launch the Cloud Service Management Console through the load balancer by opening one of the following URLs in a supported Web browser:

- `http://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_HTTP_PORT]/csa`
For example, `http://load_balancer.xyz.com:8080/csa`
- `https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_CSA_HTTPS_PORT]/csa`
For example, `https://load_balancer.xyz.com:8443/csa`

Launch the Marketplace Portal

To launch the default Marketplace Portal, open the following URL in a supported Web browser:

- `https://[LOAD_BALANCER_HOSTNAME]:8443/mpp`
For example, `https://load_balancer.xyz.com:8443/mpp`

The organization associated with the default Marketplace Portal is defined in the `$CSA_HOME/portal/conf/mpp.json` file. By default, this is the sample organization that is installed with CSA (CSA_CONSUMER). To modify the organization associated with the default Marketplace Portal, modify the `defaultOrganizationName` property value by setting it to the `<organization_identifier>` of the desired organization, where `<organization_identifier>` is the unique name that CSA assigns to the organization, based on the organization display name (the organization identifier can be found in the General Information section of the **Organizations** tile of the Cloud Service Management Console).

To launch an organization's Marketplace Portal, open one of the following URLs in a supported Web browser:

- `http://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_HTTP_PORT]/org/<organization_identifier>`
For example, `http://load_balancer.xyz.com:8080/org/ORGANIZATION_A`
- `https://[LOAD_BALANCER_HOSTNAME]:[LOAD_BALANCER_MPP_HTTPS_PORT]/org/<organization_identifier>`
For example, `https://load_balancer.xyz.com:8089/org/ORGANIZATION_A`

where `<organization_identifier>` is the unique name that CSA assigns to the organization, based on the organization display name (the organization identifier can be found in the General Information section of the **Organizations** tile of the Cloud Service Management Console)

Caution: Do not launch more than one organization-specific Marketplace Portal from the same browser session. For example, if you launch ORGANIZATION_A's Marketplace Portal in a browser, do not open a tab or another window from that browser and launch ORGANIZATION_B's Marketplace Portal. Otherwise, the user who has logged in to the Marketplace

Portal launched for ORGANIZATION_A will start to see data for ORGANIZATION_B.

Instead, start a new browser session to launch another organization's Marketplace Portal.

Chapter 6: Troubleshoot the CSA Clustered Environment

This section describes some of the common problems you may encounter while configuring your CSA clustered environment for high availability. Workarounds are provided, when available. Additional information may be found in the *Cloud Service Automation Release Notes*.

Problem

Accessing the Cloud Service Management Console or Marketplace Portal may generate an error when running in a clustered environment with a load balancer. The following error may appear in the log file:

```
flex.messaging.security.SecurityException: Secure endpoint '/messagebroker/amfsecure' must be contacted via a secure protocol
```

Cause

The client side traffic is configured as TLS and the load balancer redirects HTTPS traffic to HTTP.

Workaround

Make the following changes on all CSA nodes:

In the `$CSA_HOME/jboss-as/standalone/deployments/csa.war/WEB-INF/flex/services-config.xml` file, update the endpoint class value for the `csa-secure-amf` channel to **flex.messaging.endpoints.AMFEndpoint**.

For example, change the following from:

```
<channel-definition id="csa-secure-amf" class="mx.messaging.channels.SecureAMFChannel">
  <endpoint url="https://{server.name}:{server.port}/{context.root}/messagebroker/amfsecure"
  class="flex.messaging.endpoints.SecureAMFEndpoint" />
  <properties>
    <add-no-cache-headers>>false</add-no-cache-headers>
  </properties>
</channel-definition>
```

to

```
<channel-definition id="csa-secure-amf" class="mx.messaging.channels.SecureAMFChannel">
  <endpoint url="https://{server.name}:{server.port}/{context.root}/messagebroker/amfsecure"
  class="flex.messaging.endpoints.AMFEndpoint" />
  <properties>
    <add-no-cache-headers>>false</add-no-cache-headers>
  </properties>
</channel-definition>
```

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Feedback on Configuring a CSA Cluster for High Availability Using a Load Balancer (Cloud Service Automation 4.60)

Just add your feedback to the email and click send.

If no email client is available, copy the information above to a new message in a web mail client, and send your feedback to clouddocs@hpe.com.

We appreciate your feedback!