HP Server Automation

for the HP-UX operating system

Software Version: 9.11 or later

HP-UX OS Provisioning Whitepaper

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Contents

HP-UX Provisioning 3
Overview 3
Prerequisites 3
Ignite Setup on the SA Core 3
APXs 4
Customer Configuration Subfolders 4
Permissions 5
OS Installation 5
Installing an Operating System on HP-UX Servers 5
Creating a Custom Configuration 6
Boot Target 10
Provision the Target Servers 10
Deleting Custom Configurations 16
Additional Information 17
Glossary 17
Useful Links 18
Troubleshooting 18

HP-UX Provisioning

Overview

HP-UX Provisioning installs HP-UX on bare metal systems using custom configurations.

The HP-UX Provisioning process requires the following tasks:

- Setting up an Ignite environment on SA cores/satellites
- Creating custom configurations using the Custom Configuration Editor APX on the SA core
- Booting the target to the Network boot prompt
- Provisioning targets using the HP-UX Provisioning APX on the SA Core

The following sections discuss these tasks.

Prerequisites

You must insure that the following prerequisites are met before you can provision HP-UX servers.

Ignite Setup on the SA Core

To provision HP-UX servers, you must set up Ignite Configurations. This includes:

- updating the configuration file
- updating the Index file
- copying the golden image archives on each SA core

For detailed information on Ignite-LUX software on a server running Linux, see

http://www.hp.com/go/ignite-ux-docs

The following tasks are required to set up the 11.31 golden archive-based configuration on the SA Core:

- Copy over the sample golden image to the following location:

  `/var/opt/ignite/archives/B.11.31/`

- Copy over the corresponding `.cfg` file to following location:

  `/var/opt/ignite/data/Rel_B.11.31/B.11.31_archive_IA.cfg`

- Add an entry in /var/opt/ignite/INDEX for the configuration as follows:

  ```
  cfg "HP-UX B.11.31 Opsware Archive" {
  ```

```
description "This selection supplies the sample golden archive
created by the IUX team"
"/opt/ignite/data/Rel_B.11.31/config"
"/opt/ignite/data/Rel_B.11.31/hw_patches_cfg"
"/var/opt/ignite/data/Rel_B.11.31/B.11.31_archive_IA.cfg"
"/var/opt/ignite/data/config.local"
 }
```

APXs

- SA installs the HP-UX Provisioning APX (Automation Platform Extensions) and Custom Configuration Editor APX which perform parts of the provisioning process. These APXs appear in the SA Client APX Library.
- You can access APXs either through the SA Client or through an SA supported browser. HP recommends running the Custom Configuration Editor APX with Internet Explorer.
- Adobe Flash Player Version 10.0 or above must be installed on all machines on which you plan to run HP-UX Provisioning APXs.

Customer Configuration Subfolders

SA Administrators for HP-UX Provisioning or any user who has privileges to the following folder must create a sample configuration for every customer for whom users want to create configurations:

Library ➤ By Folder➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX Provisioning

The sample configuration is the same as the configuration that is created when you use the Custom Configuration Editor APX. It is called the sample configuration because it is the first configuration created for each new customer. When the first configuration is created, a subfolder is created for that new customer. If the SA Administrator wants to assign restricted access to a user/group based on configurations belonging to a specific customer, they must grant permission to that customer subfolder.

The SA Administrator can see subfolders created with the customer name only after creating the sample configuration.

When you create the sample configuration, make sure that you select the new customer so that the subfolder with the customer name is created immediately within the configuration folder. The SA Administrator can assign read/write access to the user/group to access configurations. For example, say that `PROV_USR` needs access to HP-UX Provisioning and should have access only to configurations belonging to `CustA` and `CustB` customers:

1. Open the Custom Configuration Editor APX using Internet Explorer.
2. Log on as SA Administrator or as any user who has access to **Library ➤ By Folder ➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX Provisioning**
3. Create a sample configuration for `CustA` and `CustB` using the Custom Configuration Editor APX.
4. Log on to the SA client as SA Administrator for HP-UX Provisioning. Create subfolders named CustA and CustB at the following location:

   Library ➤ By Folder ➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX Provisioning/CustA

   Library ➤ By Folder ➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX Provisioning/CustB

Permissions

This section discusses the minimum permissions required to use the HP-UX Provisioning feature. Your SA Administrators for HP-UX Provisioning can optionally provide additional permissions that enable more features.

User/Group Permissions

SA Administrators for HP-UX Provisioning must grant the following permissions to the user/group:

- Facilities – You must have read/write access to any facility where the Integrity servers are provisioned with the configurations created by the Custom Configuration Editor APX.
- Customers – You must have read/write access to any Not Assigned customer to run the provisioning job successfully.
- You must also have read/write access to any customer on whose behalf the HP-UX configurations are created.
- Features – You must have Managed Server and Groups permission so that you can actually see the server in SA after you provision it.

Folder Permissions

SA Administrators for HP-UX Provisioning must also grant folder permissions to list APXs, software policies, and configurations.

- APXs – You must have List Contents Of Folder and Execute Objects Within Folder permissions to the following folder to access HP-UX Provisioning and Custom Configuration Editor APXs:

  Library ➤ By Folder ➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX
- Software Policies – You must have List contents of Folder, Read Objects Within Folder, and Execute Objects Within Folder permissions to the folders where HP-UX software policies used to define the configurations are placed.
- Configurations – You must have Read Objects Within Folder and Write Objects Within Folder permissions to the following folder because it contains the HP-UX configurations:

  Library ➤ By Folder ➤ Opsware ➤ Tools ➤ OS Provisioning ➤ HP-UX Provisioning/<*customer_name*>

OS Installation

Installing an Operating System on HP-UX Servers

HP-UX Provisioning installs HP-UX on bare metal systems using custom configurations. The HP-UX Provisioning process requires the following tasks:

- Setting up an Ignite environment on SA cores/satellites
- Creating custom configurations using the Custom Configuration Editor APX on the SA core
- Booting the target to the Network boot prompt
- Provisioning targets using the HP-UX Provisioning APX on the SA Core

The following sections discuss these tasks.

You must have set up Ignite before continuing. For more information, see Ignite Setup on the SA Core on page 3.

Creating a Custom Configuration

You can specify customized configurations to be applied to an Integrity server. You can specify Ignite attributes that are applied on the server during HP-UX installation on top of the standard golden image configurations. You can also select additional software policies to be remediated as part of the HP-UX installation.

You can build customer-specific configurations by specifying the platform, base configuration, Ignite attributes, and related software policies. You can customize the installation to meet your specific needs.

To provision the server in a customized way, you must first create a custom configuration.

HP-UX Custom Configuration Editor APX

To access the HP-UX Custom Configuration Editor APX:

1 In the SAS Web Client: Open Internet Explorer and specify the URL:

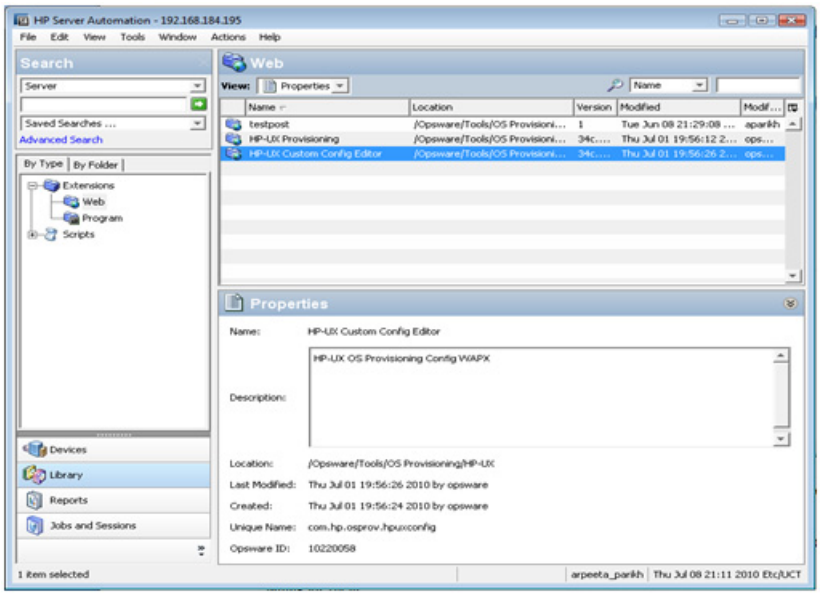
https://<your core>/webapp/<APX Unique Name>

The unique name for the APX is displayed in the SAS Web Client.

2 In the SA Client: Click the **Library** tab and select **Extensions ➤ Web ➤ HPUX Custom Config Editor**. The unique name for the APX is displayed when you select the APX.

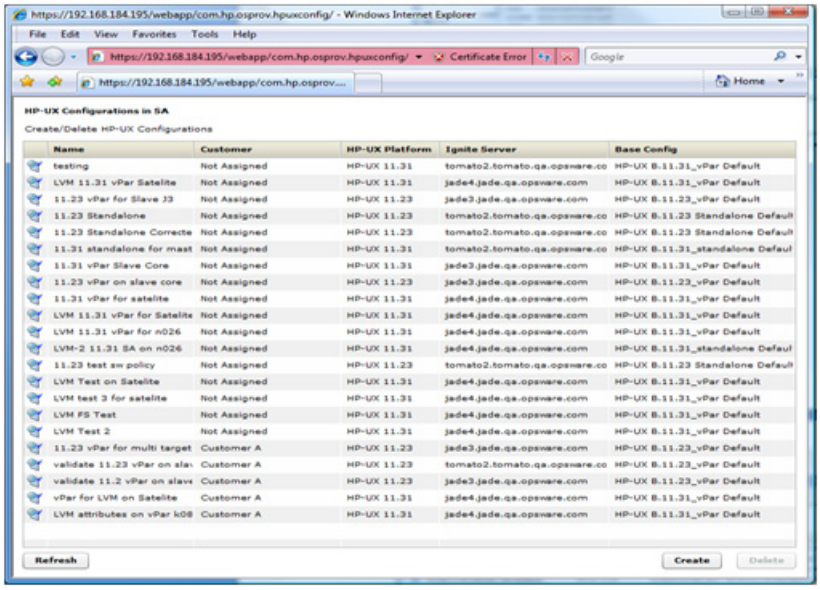
In this instance, the Custom Configuration Editor APX name is `com.hp.osprov.hpuxconfig`.

Figure 1 HP-UX Custom Configuration Editor APX



All existing custom configurations are listed with Name, Customer, HP-UX Platform, Ignite Server, and Base Config details. The Refresh, Create, and Delete buttons also appear.

Figure 2 HP-UX Custom Configuration Editor APX – List Existing Configurations



When you select any existing configuration from the list, you will see additional details such as Custom Configurations and Software policies.

The Configuration listings are based on permissions assigned to you. You are able to list configurations belonging to the customers for which you have been granted permission. The configuration can be customer dependent or customer independent.

A customer independent configuration is accessible to all users. A customer dependant configuration is accessible to only those users who have appropriate permissions assigned. You can make the configuration dependant or independent by selecting the customer when you create the configuration.

The HP-UX Custom Configuration Editor APX enables you to:

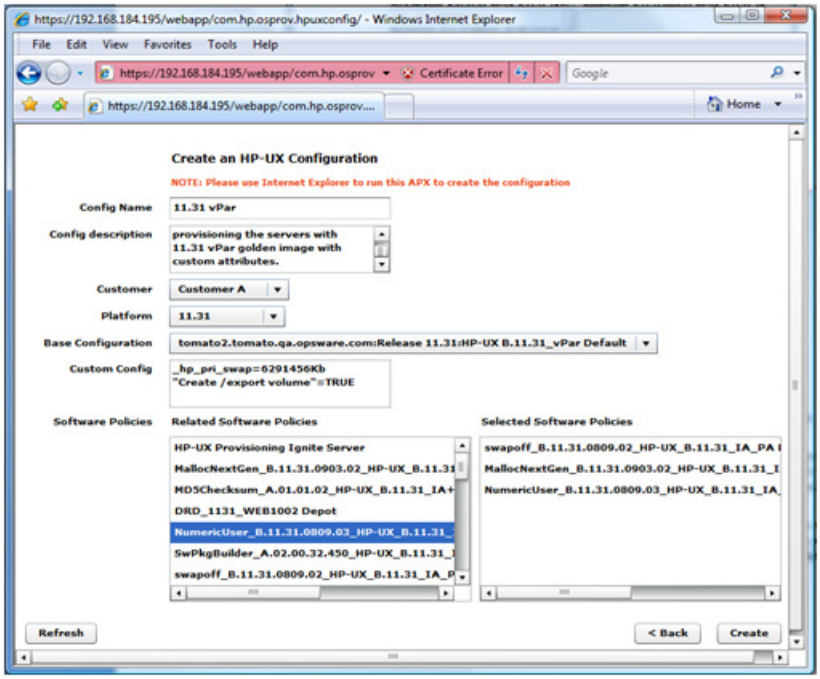
- Create Custom Configurations
- Delete Custom Configurations

Creating a Custom Configuration

To create a custom configuration:

1. Open the HP-UX Custom Configuration Editor APX using Internet Explorer.
2. Click the Create button and specify the required details to create a new custom configuration.

Figure 3 HP-UX Custom Configuration Editor – Create Custom Config



3 You must specify the following required details to define the HP-UX custom configuration:

- Config Name: This is a mandatory field. It must be unique for each customer. The APX validates the following specifications:
  - Must not exceed 255 characters in length.
  - Must not begin or end with an empty space.
  - Must not begin with punctuation, including `@#$%^&*()+_-,./:;~{}[]|\'"?=`
  - Should not use newline, tab, flash or backslash.
- Config Description: This is an optional field that can contain explanatory text describing the purpose and use of the configuration.
- Customer: By default, this is set to Not Assigned, which makes the configuration customer independent. You can only list those customers for which you have permission. You will not be able to list the configurations if appropriate permissions have not been granted to you for that customer.
- Platform: This is a mandatory field. You must select either 11.31 or 11.23 from the drop-down menu. Base configuration or Related Software Policies are dependent on platform selection. If the platform was not selected and you try to select either Base configuration or Related Software Policies, a warning message appears.
- Base Configuration: Content is displayed based on the HP-UX platform selected.
- Custom Config: This is an optional field that can be used to specify Ignite attributes. Any valid Ignite attributes specified in this field overwrite the configuration values specified in the golden image, which allows you to provision the servers in a customized manner.

  The following are examples of Ignite attributes:

```
_hp_pri_swap=6291456Kb
"Create /export volume"=TRUE
_hp_root_disk="0/1/1/1.2.0"
```

```
_hp_disk_layout="Logical Volume manager (LVM) with VxFS"
```

For detailed information on Ignite custom attributes, see

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01942568/c01942568.pdf

If the attributes and values specified are valid, they are applied on the servers on top of the standard image configurations. However, if the attributes specified are invalid or have incorrect syntax, provisioning will not start.

In some cases, attributes and values are incompatible. For example, say that you want to provision the server with the following Ignite attributes:

```
_hp_pri_swap=6291456Kb
"Create /export volume"=TRUE
```

The Ignite attributes syntax is correct and also has valid values but your target does not have enough disk space to implement it. As a result, a warning message is displayed on the targets before provisioning starts.

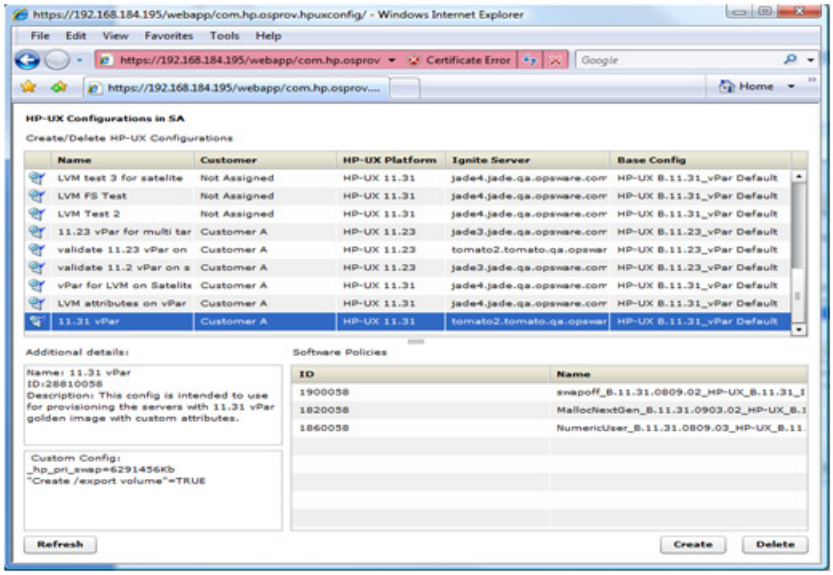
4 Related Software Policies: This is an optional field consisting of a drop-down menu whose contents are displayed based on the platform selected. You can select multiple Related Software policies by holding the CTRL key and dragging the policies to the selected software policies list to apply them on the server after provisioning is completed and the agent is installed.

You can change the sequence of a selected software policy by dragging it up or down. Polices specified in Selected Software Policies are applied on top of the standard policies in the golden Ignite image.

After the details for all mandatory fields, Config Name, Platform and Base Config are specified, the Create button is enabled.

5 Click the Create button. A confirmation message appears and the newly created configuration is listed.

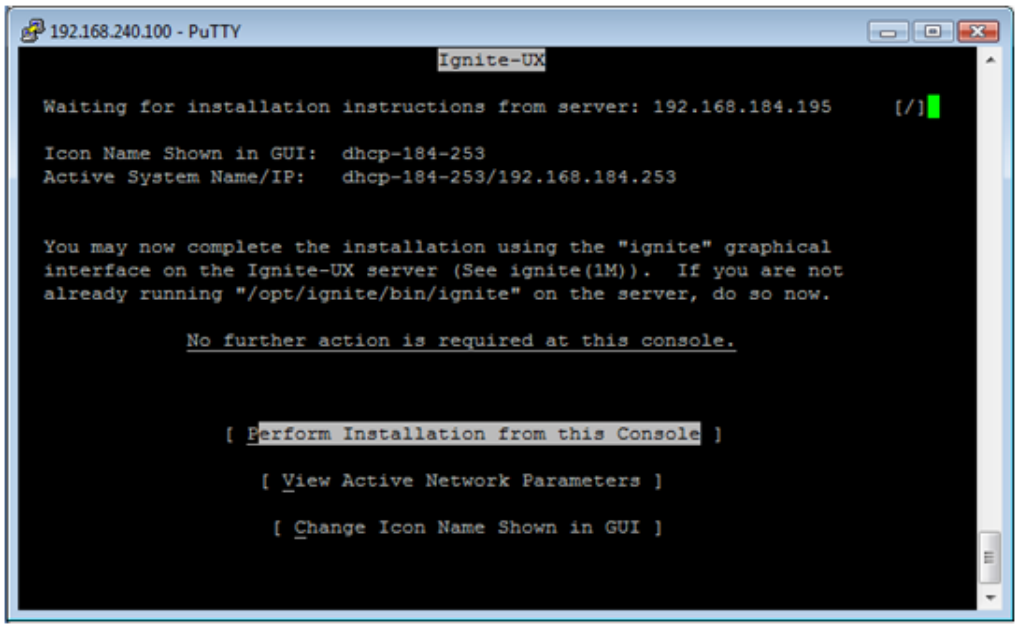
Figure 4 Newly Created Custom Config Profile



Boot Target

The network booted integrity client requires selecting the desired LAN and target OS to install. It waits for server side install instructions to start HP-UX Provisioning. The following figure shows a target client waiting to be installed.

Figure 5 Server Waiting to be Installed



For more information, see:

http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01868281/c01868281.pdf

Provision the Target Servers

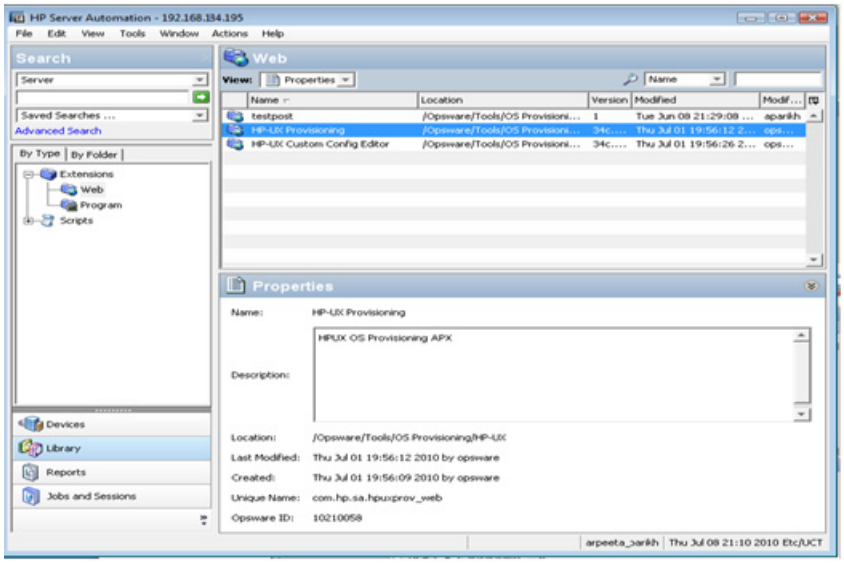
Once the custom configuration is created, it is listed on the HP-UX Provisioning APX on the SA Client. The target server waiting at the network boot prompt is listed under the unprovisioned servers list on the HP-UX Provisioning APX. The following section describes how to provision the targets.

HP-UX Provisioning APX

To access HP-UX Provisioning APX:

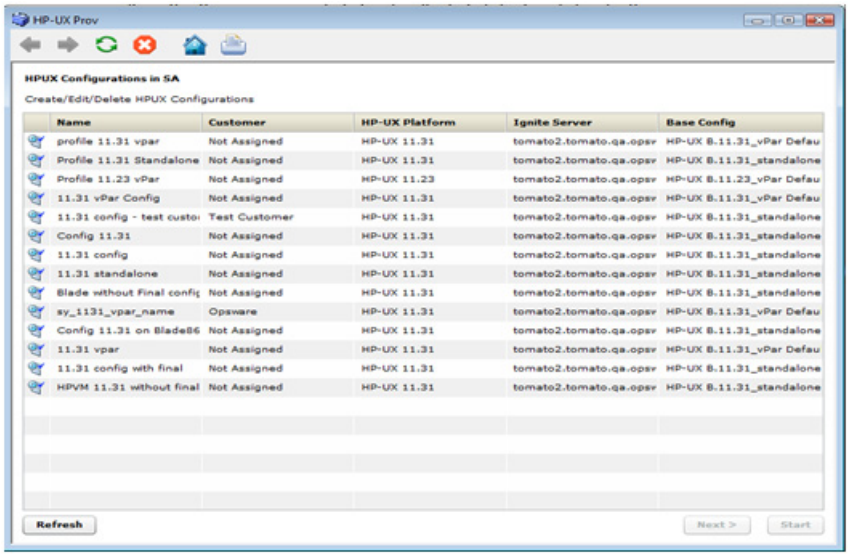
1. Log on to the SA Client.
2. Click the **Library** tab and select **Extensions ➤ Web ➤ HP-UX Provisioning**.

Figure 6 HP-UX Provisioning APX



The HP-UX Provisioning APX popup window showing the HP-UX configuration opens.

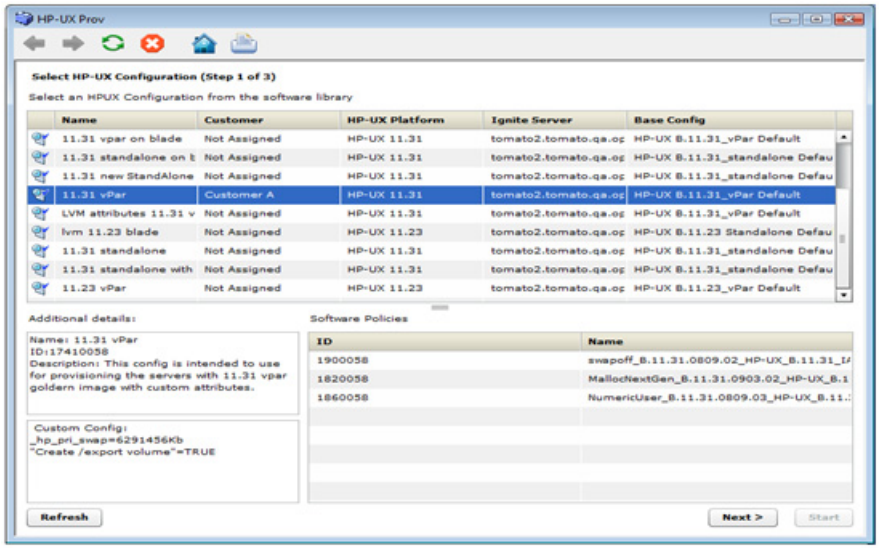
Figure 7 HP-UX Provisioning APX – Listing of HP-UX Configurations



All the configurations created using the Custom Configuration Editor APX are listed on the HP-UX Provisioning APX based on permissions granted. Configurations are listed with Name, Customer, HP-UX Platform, Ignite Server, and Base configurations details. The Refresh, Next, and Start buttons are also displayed. Select the HP-UX configuration you want installed on the servers and click **Next**.

When you select a configuration, additional details, including Custom Configurations and Software policies of the chosen configuration, are displayed. When you select a configuration, the Next button is enabled.

Figure 8 HP-UX Provisioning APX – Select HP-UX Configuration

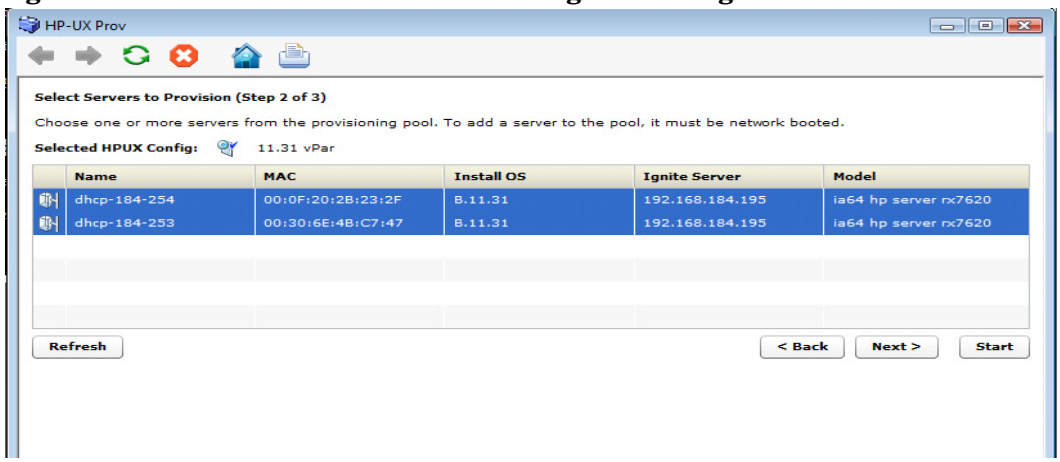


3 Click **Next** to select the unprovisioned servers.

All unprovisioned servers waiting at the network boot prompt matching the selected configuration platform are displayed and show MAC address, install OS, Ignite Server and Model details. Servers in the Unprovisioned Servers list register their presence, but do not have an operating system installed.

4 Select the server to provision. Hold down the CRTL key to select multiple servers to provision at the same time using the same configuration.

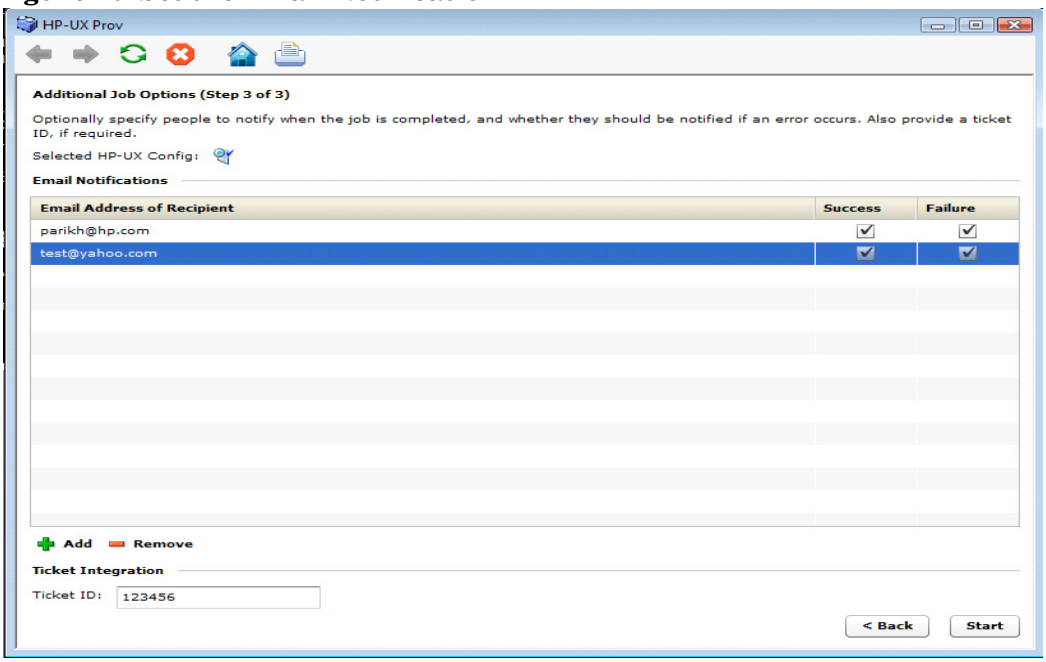
Figure 9 Select Client to Provision Using the Config Selected Before



Once all servers are selected, provisioning starts immediately after you click the Start button.

5 To set email notification, click the **Next** button. The following screen appears.

Figure 10 Set the Email Notification



On Email Notification, by default, your email address (the user running the job) is displayed. To add additional email addresses, click **+Add**. Select the check boxes to receive notifications when job failure or success occurs. To remove an email address, select the address and click **Remove**.

You can also specify the Job Ticket ID in the Ticket Integration section. This Ticket ID is associated with the Job.

6 When you click Start, the job is initiated for program APX and the Job ID is assigned to it.

Figure 11 Initializing the Provisioning Job

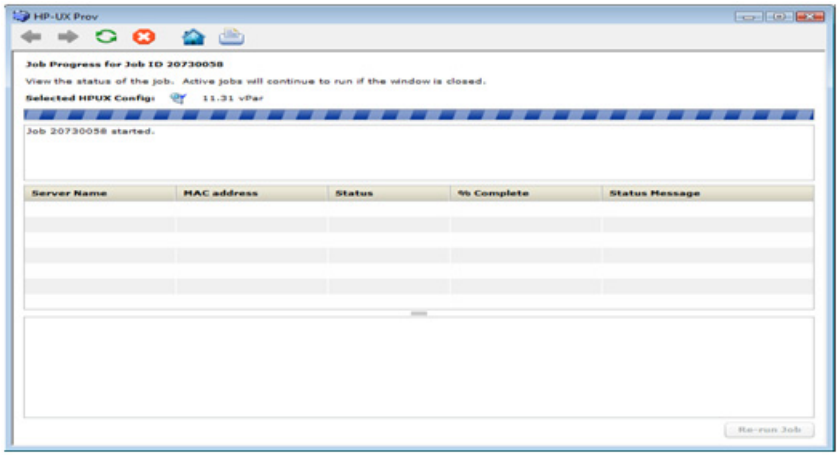
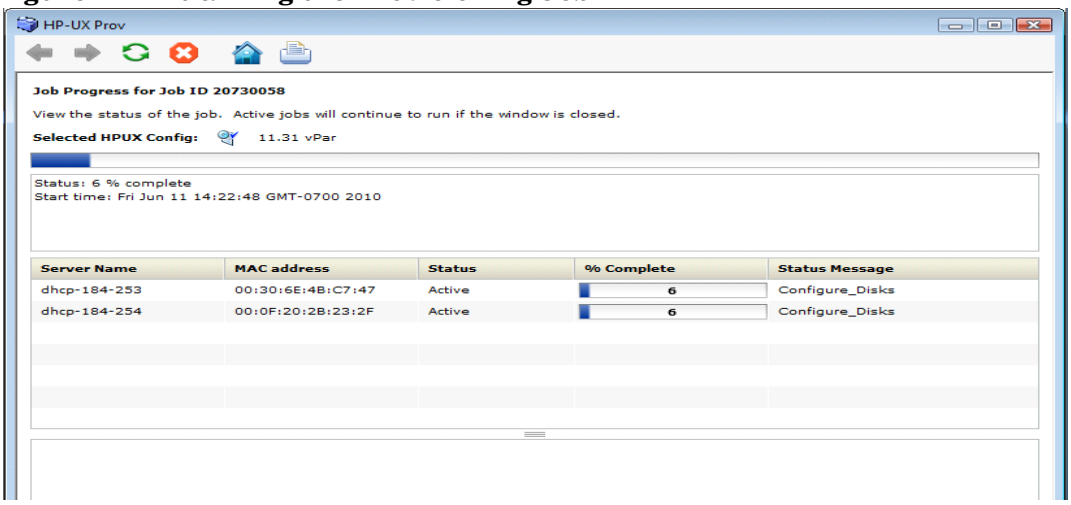


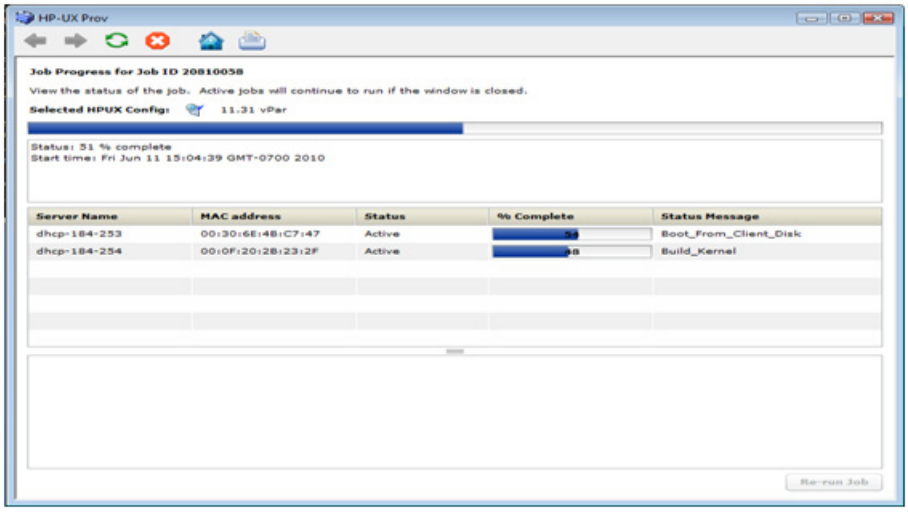
Figure 12 Initializing the Provisioning Job



If the provisioning job was initiated successfully on the servers, you will see the following screen. This screen has a progress bar that is refreshed with updated progress status messages. The following status messages are updated during the provisioning job:

- Waiting_to_install
- Prepare_Config_File
- Configure_Disks
- Download_mini-system
- Loading_software
- Build_Kernel
- Boot_From_Client_Disk
- Run_Postconfigure_Scripts
- Agent Install
- Remediate software policy

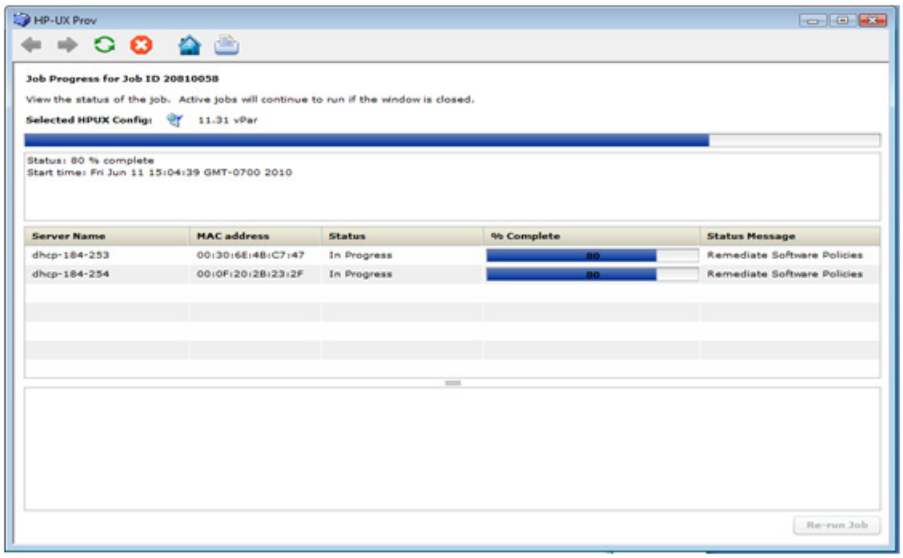
Figure 13 Progress Bar with Status Message



Once the provisioning job starts, two different progress bars are displayed. The consolidated progress bar displays the average percentage of progress on all servers being provisioned. It also displays the average percentage of jobs finished with the job start time.

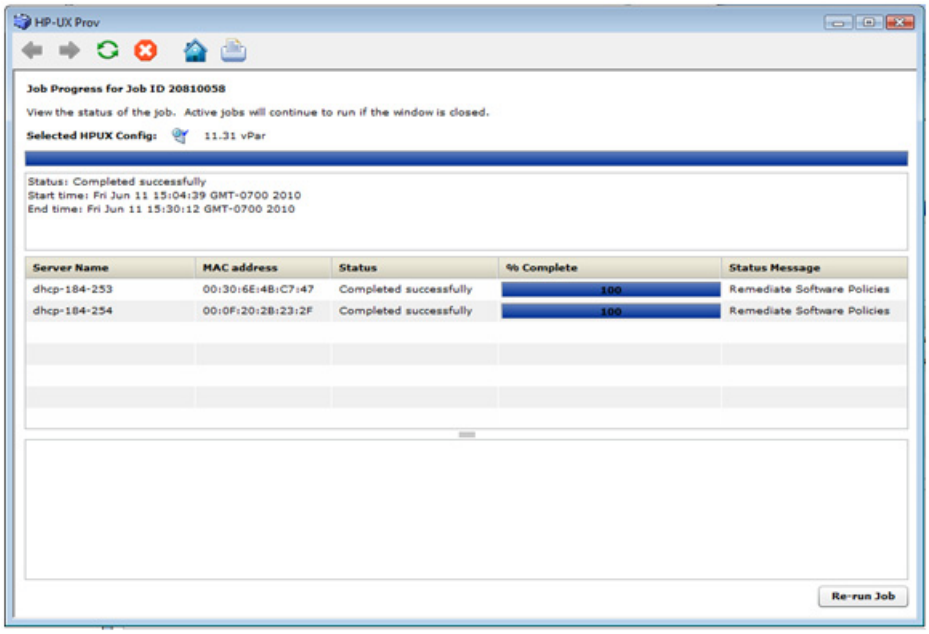
The progress bar for each of the servers being provisioned shows the percentage of provisioning complete with Server Name, MAC address, Status, and Status Message details. The `% Complete` and `Status Message` are updated along with the progress of the provisioning job.

Figure 14 Progress Bar with Status Message Remediate Software Policies



Once the server is provisioned, the agent is installed by default. Also, the software policies chosen in the configuration are remediated on the servers. When the HP-UX Provisioning job completes, an email is sent to you if you set up email notification.

Figure 15 Progress Bar with Job Completed Message



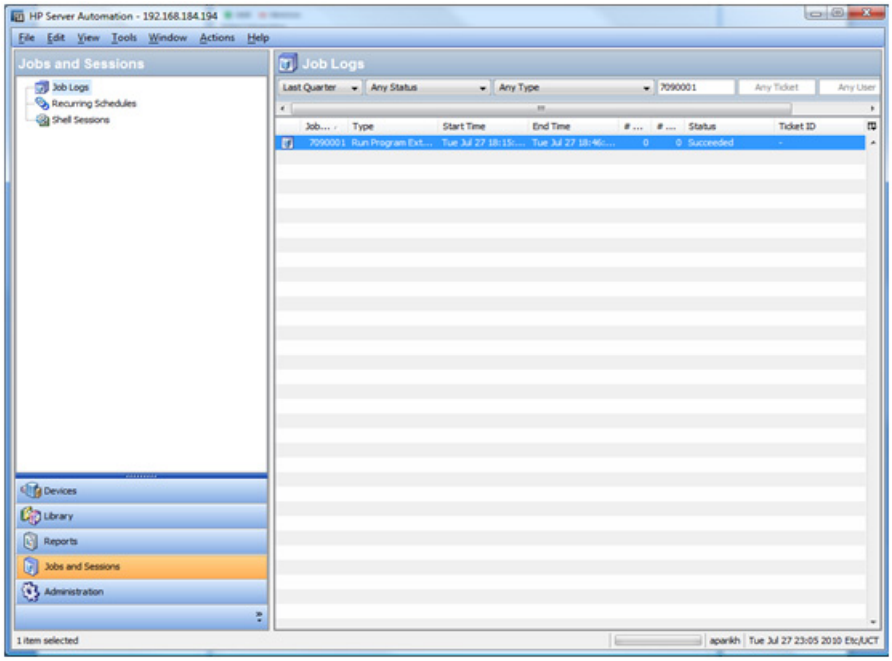
The provisioned servers are managed by SA. The servers are listed under **Devices ➤ All Managed Servers**. Select the server, and then select Go to **View ➤ Properties**. You can see the customer value, which is the same as the configuration customer value. You can see the servers listed as managed servers only if you have permission granted for the customer.

You can also verify the configuration name associated with the server. Go to **View ➤ Custom Attributes**. This can be useful to find out which configuration was used to provision the server.

Jobs and Sessions on SA Core

HP-UX Provisioning APX assigns the job ID. You can use the job ID to verify the job status at the following location: **SA ➤ Jobs and Sessions ➤ Job Logs**.

Figure 16 Job Status on SA Jobs and Sessions



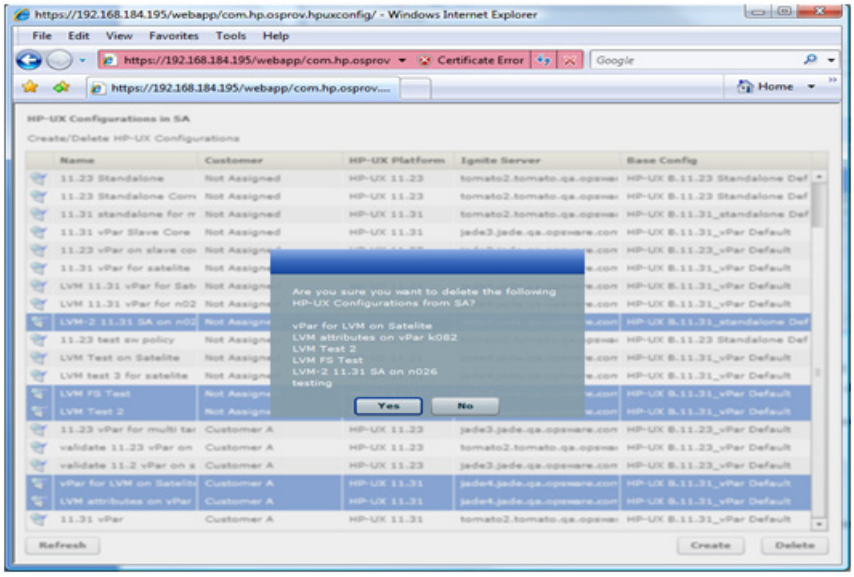
You can also find the specified Job Ticket ID in the notifications tab by double-clicking the job.

Deleting Custom Configurations

To delete a custom configuration:

1. Open the HP-UX Custom Configuration Editor APX using Internet Explorer.
2. Select the configuration or hold the CTRL key to select multiple configurations and click **Delete**.

Figure 17 Delete Custom Config Profile



3 Click **Yes** on the confirmation window. The selected configurations are deleted and are no longer listed.

You are allowed to delete only those configurations for which you were granted privileges to execute the delete configuration operation.

Additional Information

Glossary

Ignite-UX

An HP-UX administration toolset that allows:

- simultaneous installation of HP-UX on multiple clients
- creation of custom installation configurations (golden images) for multiple installations on clients
- creation of recovery media
- recovery of HP-UX clients both locally and remotely

Ignite-UX server

A server from which Ignite-UX is used to install HP-UX on client systems.

Golden Image

A combination of a golden archive and a configuration file describing a system's disk layout and file system. Used as a common configuration to install clients.

Ignite Attributes

Custom attributes that allow provisioning of a server with new customized values that overwrite the standard attributes values defined in the golden image.

Network boot

A system boot of the HP-UX install kernel over a network connection from an Ignite-UX server.

Target or Target Server

The HP Integrity server to be provisioned.

Custom Configuration Editor APX

The APX used to create and delete the custom configurations for HP-UX Provisioning.

HP-UX Provisioning APX

The APX used to start HP-UX Provisioning on target servers.

Sample Configuration

The first configuration created for the new customer by the SA Administrator for HP-UX Provisioning. It is same as the custom configuration but is the first configuration for a new customer. It creates a subfolder with the customer name under the HP-UX Configs folder in the SA Client Library.

Useful Links

- 11iv3 installation information:

  http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01916012/c01916012.pdf

- White paper: *Ignite-LUX: Management and Integration of Ignite-UX Software on a Server Running Linux* at:

  http://www.hp.com/go/ignite-ux-docs

- Ignite-UX custom configuration files:

  http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01942568/c01942568.pdf

- Ignite-UX:

  http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?lang=en&cc=us&taskId=101&prodClassId=10008&contentType=SupportManual&docIndexId=64255&prodTypeId=18964&prodSeriesId=4077173

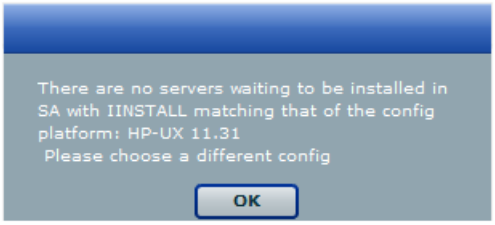
Troubleshooting

Following are some problem scenarios and suggested solutions.

Scenario: No Servers Waiting to be Installed

If there are no servers waiting at the network boot prompt with the HP-UX version that matches the selected configuration's HP-UX version, the following message is displayed:

Figure 18 No Servers Waiting to be Installed

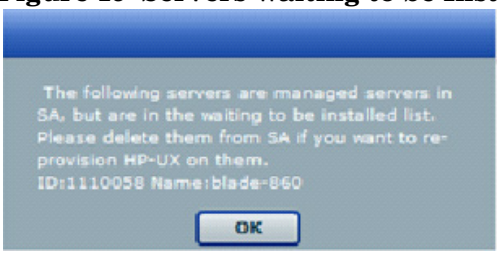


Ensure that you have the selected correct configuration.

Scenario: Servers Waiting to be Installed are Managed Servers

If there are servers waiting for network installation but they are already managed by SA, the following warning message is displayed.

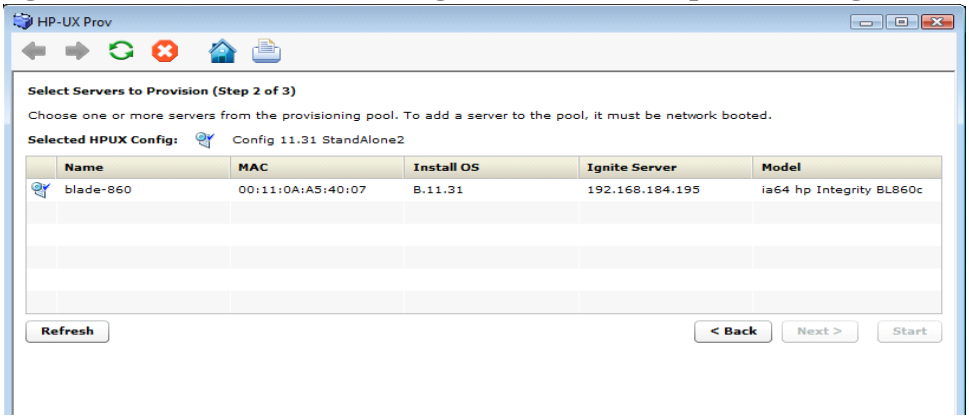
Figure 19 Servers Waiting to be Installed are Managed Servers



This warning message indicates that the listed servers are waiting for installation but are not candidates for reprovisioning because they are listed as Managed Servers in SA. To continue reprovisioning these servers, you must manually delete them from the SA managed server list.

For more information about deactivating and deleting a server from the SA managed servers list, see the *SA User Guide: Server Automation*.

Figure 20 List of Deleted Managed Servers for Reprovisioning

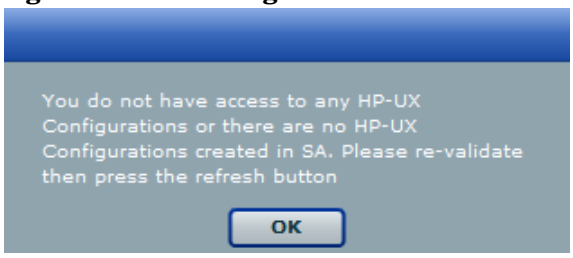


Once a server is deleted, it is not listed under the SA managed server list. Click **Refresh** in the HP-UX Provisioning APX window and the server should be listed under the unprovisioned server pool. Select the server and continue provisioning it.

Scenario: Configurations Unavailable or Permissions Not Granted

This message appears when you do not have enough permission granted to list the configurations or there are no configurations found.

Figure 21 No Configurations Available or Permissions Granted



Contact your SA Administrator to obtain permission or create required configurations using the Custom Configuration Editor APX.

Scenario: Incorrect Target Listing

In certain error scenarios, you may see stale data in the APX client's menu such as clients that are not currently waiting to be network installed or clients with an incorrect hostname.

- A client that is not currently waiting to be network installed is displayed in the APX clients list.

  If the target server is reset while waiting to be network installed, the Ignite-UX cannot detect the change and does not update the client's status.

  Retry the installation or delete the directories for the target under `/var/opt/ignite/clients/`. There are two directories for each client, one of the form `<mac address>` (for example, `0x00306EF37245`) and the other a symbolic link to the directory. Delete both directories.

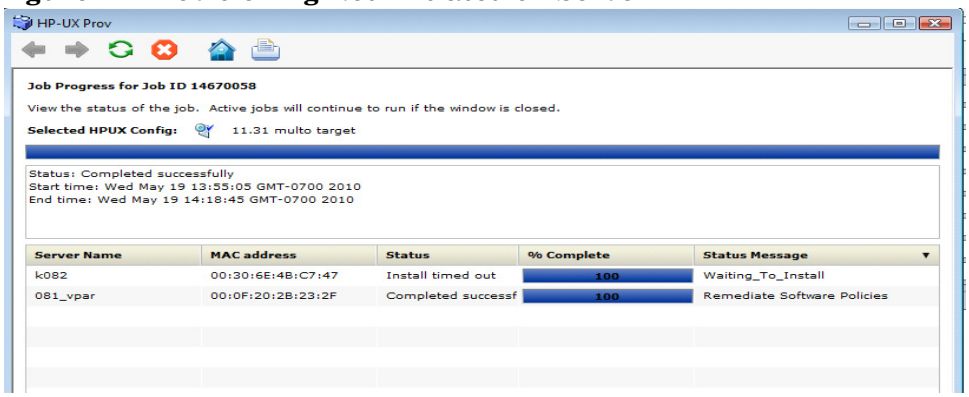
- A client is listed in the APX with an incorrect hostname.

  This can happen when you modify DHCP to provide a different hostname after having previously provisioned the client. Ignite UX reuses the directories in `/var/opt/ignite/clients/` it set up for a client (when it finds a client based on the MAC address), so the APX reuses that information. You can delete the two directories for the client under `/var/opt/ignite/clients` and retry the installation.

Scenario: Installation Timed Out Error

An installation timed out error occurs when the provisioning job is not initiated on the target server. This could be due to a network issue, the golden image not being available, or for other reasons.

Figure 22 Provisioning Not Initiated on Server



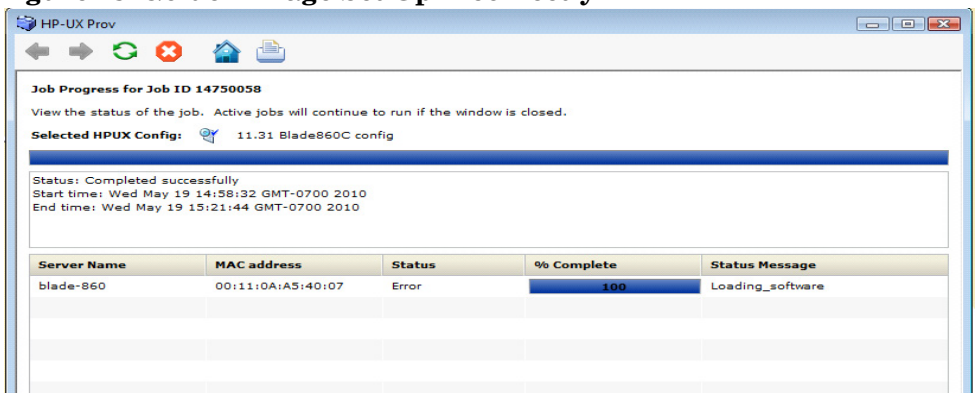
Ensure that the network connection and Ignite images are accessibility and run the APX again to initiate provisioning.

Scenario: Loading Software Error

A loading software error can occur due to:

- Network issues
- Corresponding archive missing or not accessible
- Incorrect setup of golden images

Figure 23 Golden Image Set Up Incorrectly

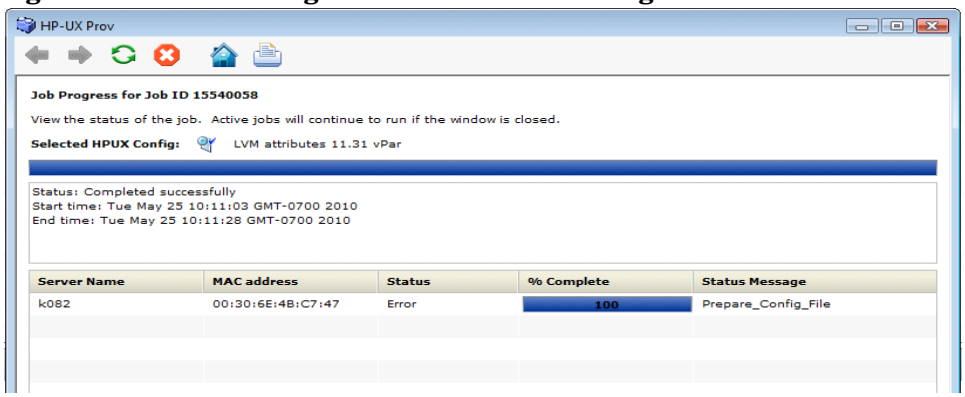


To resolve this, ensure that the Ignite-specific configuration file, Index file, and archives are correctly set up and pointing to correct locations. Also ensure that the network connection between the target and the Ignite server is accessible.

Scenario: Prepare Config File Error

The provisioning job fails to initiate on the server when any syntax errors are found in the custom attributes specified in the configuration or when the custom attributes are not compatible.

Figure 24 Provisioning Failed Due to Invalid Ignite Attributes



You may need to reboot the system and bring it back to the network boot prompt, then create a new configuration with corrected custom attributes. Ensure that the specified syntax is correct and compatible.

Scenario: Agent Fails to Start

If, after successful job completion, the SA Agent fails to start on a newly provisioned target, the golden image you used may already have an Agent installed.

For example, as part of the standard provisioning process, after HP-UX is installed on the server, a post-install script that installs an Agent runs on the server. Because the Agent was previously installed with the golden image, the Agent may not start.