HP-UX Provisioning for HP Server Automation

Software Version 7.84 or later, released August 2010

Overview

The HP-UX Provisioning feature in HP Server Automation (SA) enables you to install HP-UX on bare metal servers using golden image archives. You can model your HP-UX installation with customized configurations to provision multiple servers using HP's native unattended provisioning technology, Ignite-UX. HP-UX Provisioning in SA does not require separate dedicated Ignite-UX setup, instead SA core running with RedHat Linux can be used with Ignite-UX setup. HP-UX Provisioning feature is also supported on multi-master mesh and satellite environment.

Using HP-UX Provisioning feature in SA, you can:

- Perform network-based unattended installations using Ignite golden images
- Define Ignite attributes values different than specified in golden image for customized provisioning
- Bundle additional SA software policies to remediate as part of HP-UX installation
- Segment custom configurations in multi-customer environment on multi-mesh environment with permissions escalations.

Supported HP-UX Platforms and Systems

Supported	Not Supported
Bare metal HP-UX provisioning on Integrity servers only	HP 9000 (PA-RISC)
All Integrity standalone, blade, nPar/vPar/ HPVM	Support for provisioning other operating systems such as Windows and Linux
Provisioning HP-UX 11.23 and 11.31 only	Provisioning HP-UX 11.11 or earlier
Provisioning using golden images	Alternate methods to provision HP-UX servers such as software depot-based install
Network boot support only	
Multi-customer environment	
HP-UX configuration selection based on customer permissions granted	
Configuration customization:	

- Configurations isolated by customer
- Ability to upload Ignite image files as part of operating system profiles

Bundling additional SA software policies to remediate

SA core platforms - RHEL (AS4-x64), Solaris, SUSE

Prerequisites

This document does not cover SA core setup because it is assumed that SA 7.8 setup already exists. For more details, see the SA 7.8 User Guide for instructions on setting up a new SA core.

DHCP Setup

To provision servers with unattended installations, DHCP should be enabled. HPSA ships the DHCP server plus a highly customized configuration file to handle DHCP for OS provisioning purposes. To provision HP-UX instead of Linux on Integrity servers, HP-UX provisioning feature must be enabled on each core/satellite.

To enable HP-UX Provisioning feature, make the following changes on the core:

1   Modify the /etc/opt/opsware/dhcpd/dhcpd.conf file by commenting the following line:

```
#filename "elilo.efi";
```

2   Uncomment the following line to enable network boot on HP-UX Provisioning:

```
filename "/opt/ignite/boot/nbp.efi";
```

3   Restart the dhcp service:

```
/etc/opt/opsware/startup/dhcpd restart
```

Ignite Setup on Core

To provision the servers, you must set up Ignite Configurations such as updating the configuration file, updating the Index file, and 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 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

•   While upgrading the patch on the SA core, the HP-UX Provisioning APX (Automation Platform Extensions) and Custom Config Editor APX are installed to perform actions for the provisioning process. These APXs appear in the SA Client's APX Library.

•   APXs are accessible either through the SA client or through Internet explorer. HP recommends running the Custom Config Editor APX on 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 Config 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 for HP-UX Provisioning 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 for HP-UX Provisioning 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 for HP-UX 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. To set this up, follow these steps:

1   Open the Custom Config 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 Config Editor APX.

4   Log on to the SA client as SA Administrator for HP-UX Provisioning. Subfolders named CustA and CustB are created 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. SA Administrators for HP-UX Provisioning can 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 Config 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 HPUX configurations are being 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 Config 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>

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 Config 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.

Setting Up an Ignite Environment

Setting up an Ignite environment on SA cores/satellites requires the following tasks:

- Setting up corresponding Ignite configurations and Index files.
- Obtaining the HP-UX golden image archives.
- Copying the archives (install media) to a network file share.

For more information, see Ignite Setup on 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 Config Editor APX

To access the HPUX Custom Config Editor APX on the SA web client, follow these steps:

1 Open Internet Explorer and type https://<your core>/webapp/<APX Unique Name>. The unique name for the APX is displayed on the SA NGUI.

2 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.
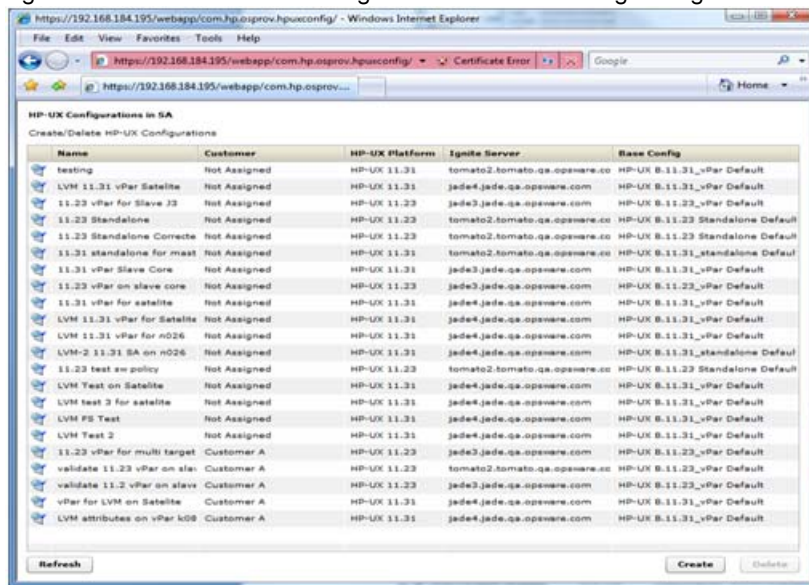
In this instance, the Custom Config Editor APX name is com.hp.osprov.hpuxconfig.

Figure 1   HP-UX Custom Config Editor APX
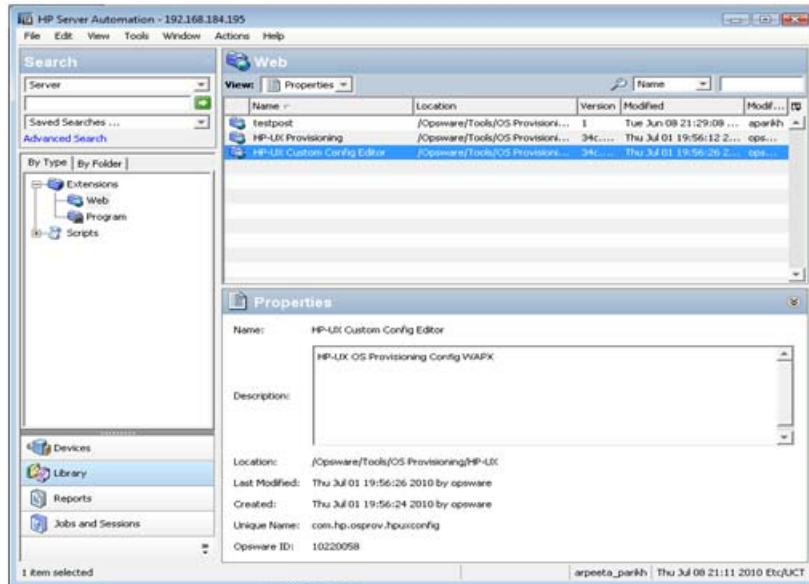
All existing custom configurations are listed with Name, Customer, HP-UX Platform, Ignite Server, and Base Config details. The Refresh, Create, and Delete buttons also appear.

Figure 2   HP-UX Custom Config Editor APX – List Existing Configs

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 Config Editor APX enables you to:

•   Create Custom Configurations
•   Delete Custom Configurations

Creating a Custom Configuration

To create a custom configuration, follow these steps:

1   Open the HP-UX Custom Config 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 Config 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://docs.hp.com/en/5992-1999/5992-1999.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.

- 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.

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

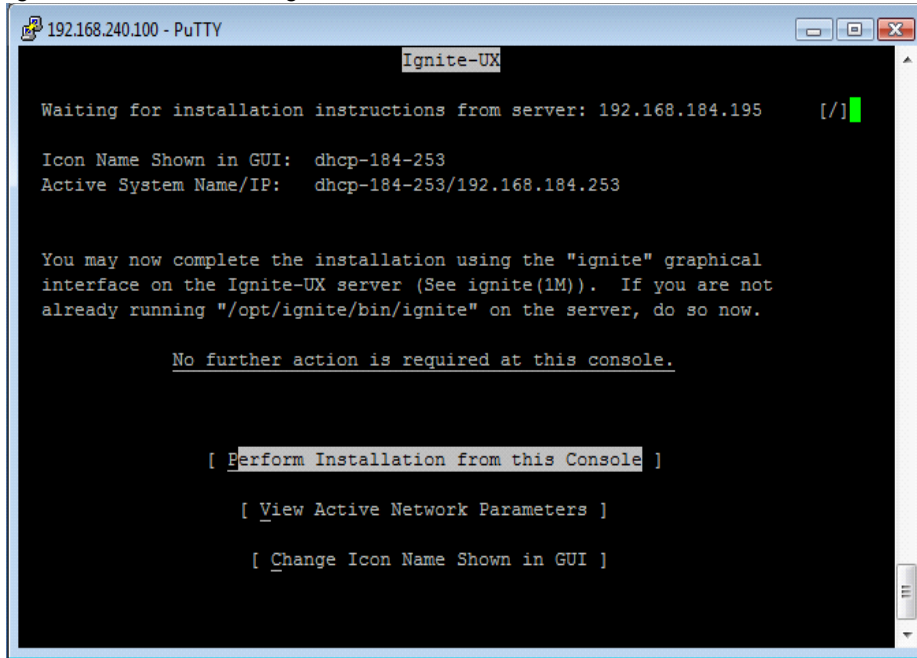Figure 4   Newly Created Custom Config Profile
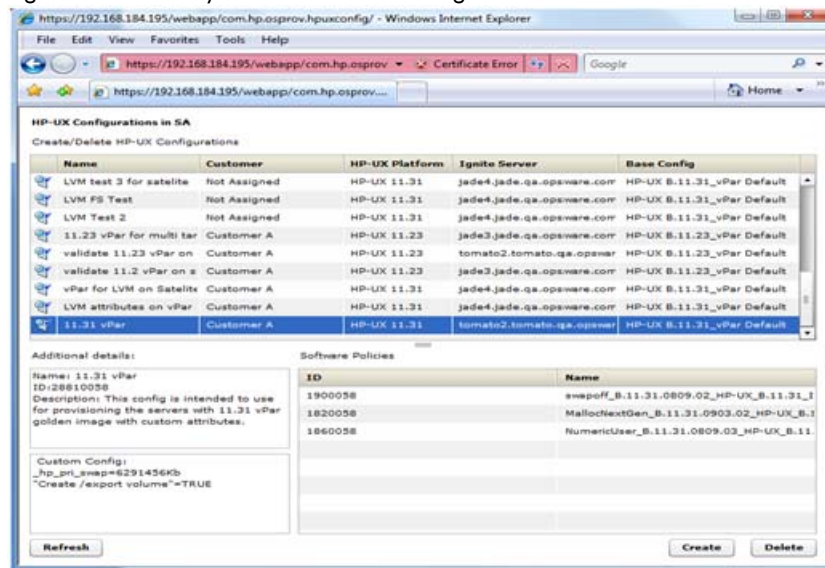
Boot Target

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 details, go to: http://docs.hp.com/en/5991-1247B_ed2/ch05s17.html#aes-npar-229b.

Provision the Targets

Once the custom configuration is created, it is listed on the HP-UX Provisioning APX on the SA client. Also, the target 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

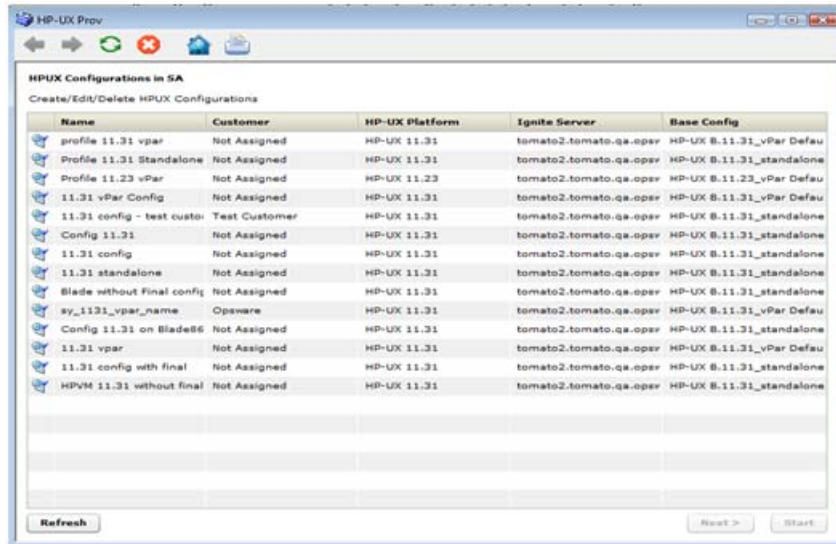To access HP-UX Provisioning APX, follow these steps:

1   Log on to the SA NGUI.

2   Click the Library tab and select Extensions > Web > HP-UX Provisioning.

Figure 6   HP-UX Provisioning APX
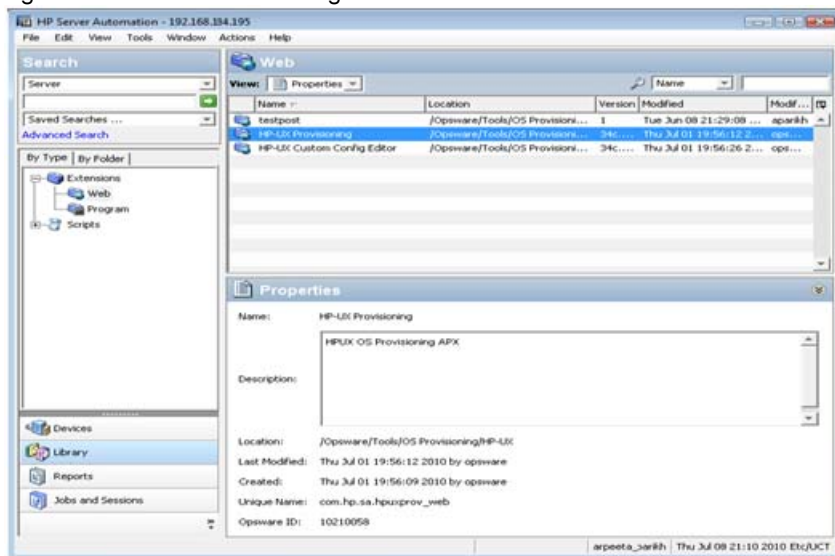
The HP-UX Provisioning APX popup window showing the HP-UX configuration opens.

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

All the configurations created using the Custom Config 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
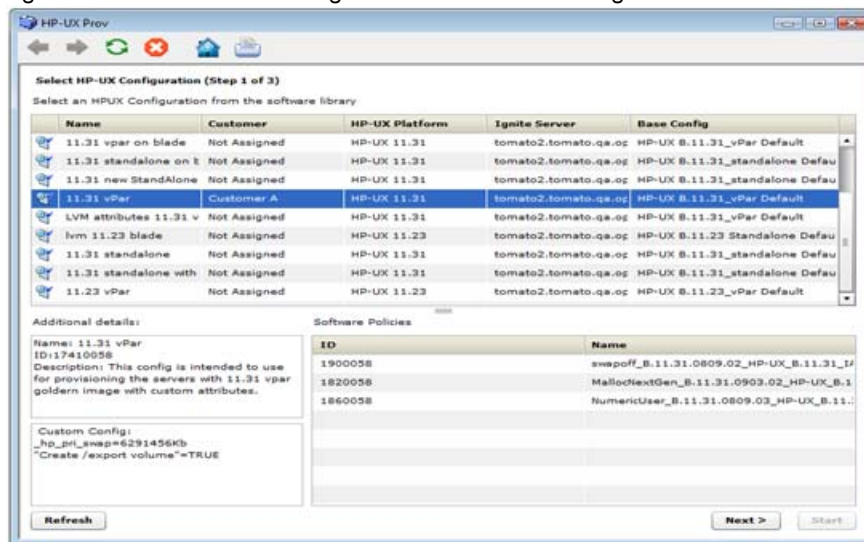
3   Click **Next** to select the unprovisioned servers.

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.
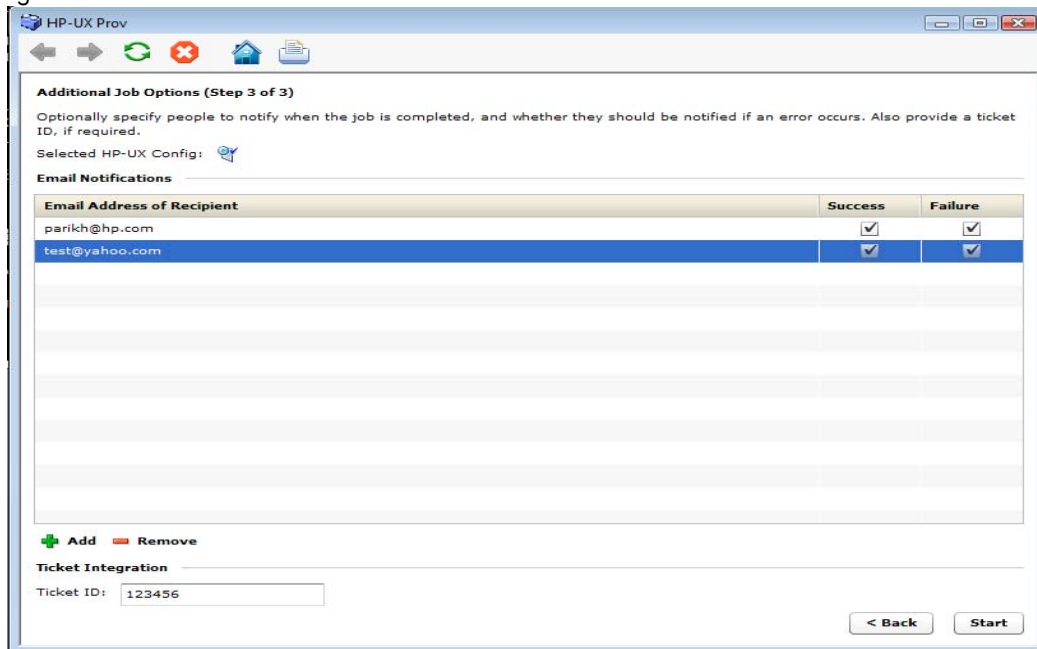
Figure 9   Select Client to Provision Using the Config Selected Before
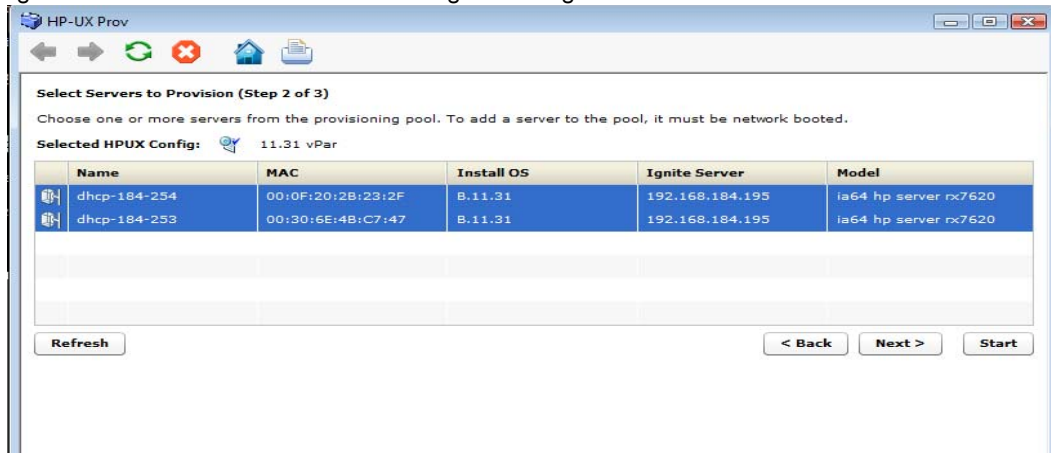
Once all servers are selected, provisioning starts immediately after you click the Start button.

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.

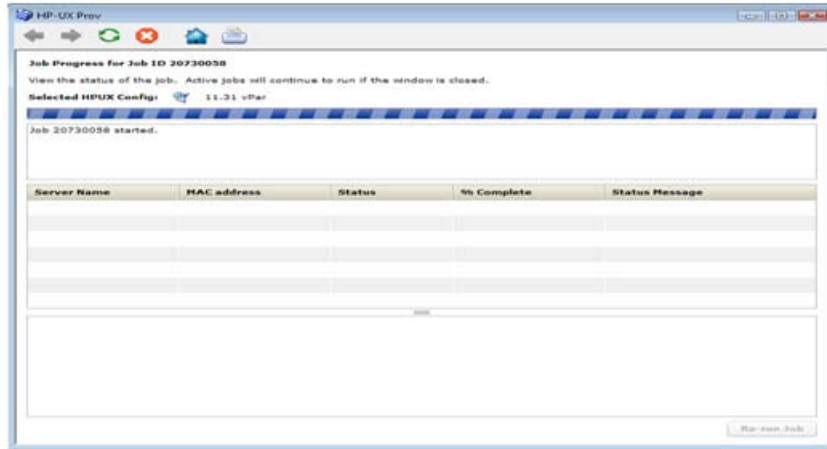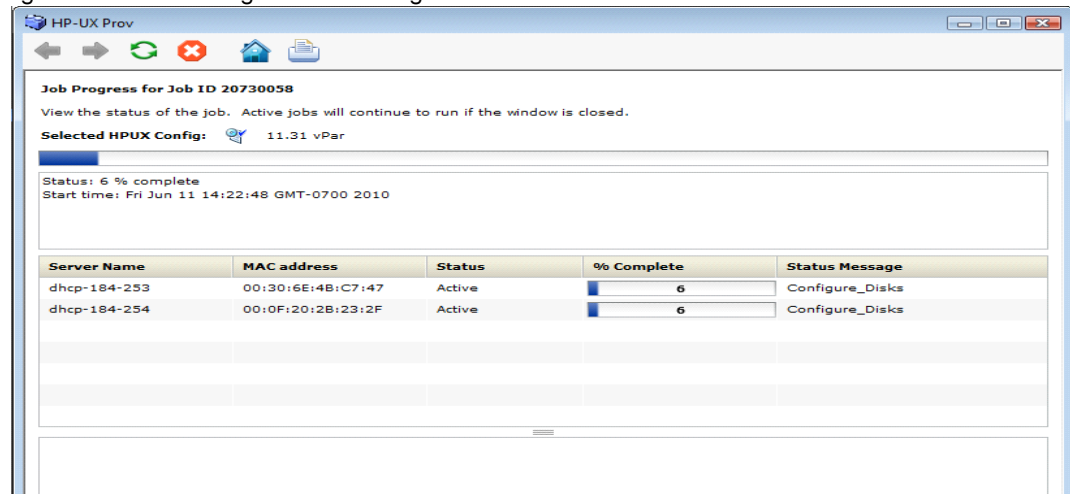Figure 11   Initializing the Provisioning Job

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
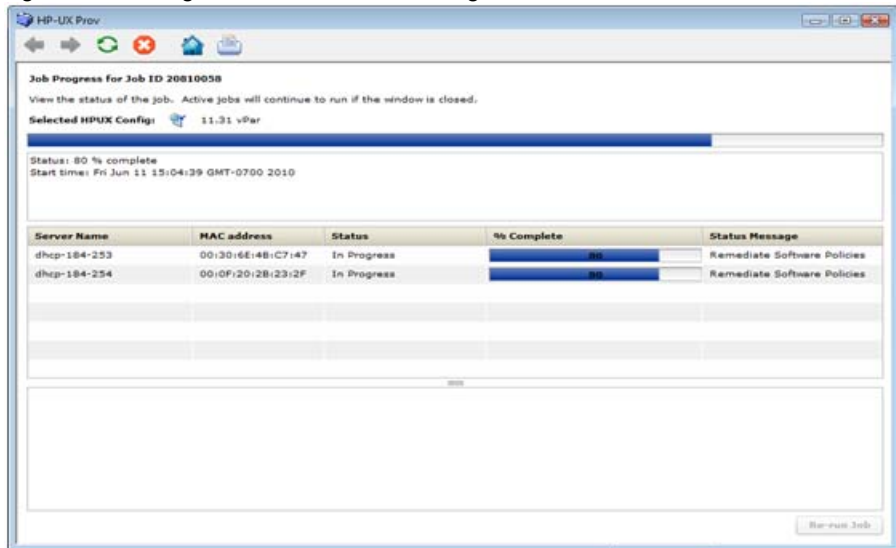*   Agent Install
*   Remediate software policy

Figure 13   Progress Bar with Status Message
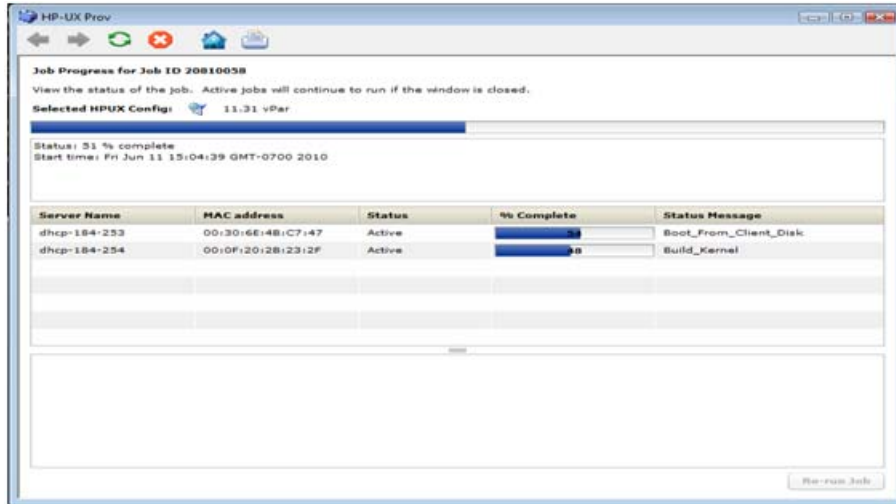
Once the provisioning job starts, two different progress bars are displayed. The consolidated progress bar displays the average percentage of progress on all servers being provisioned. It also displays the average percentage of jobs finished with the job start time.

The progress bar for each of the servers being provisioned shows % of provisioning complete with Server Name, MAC address, Status, and Status Message details. The % Complete and Status Message is 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
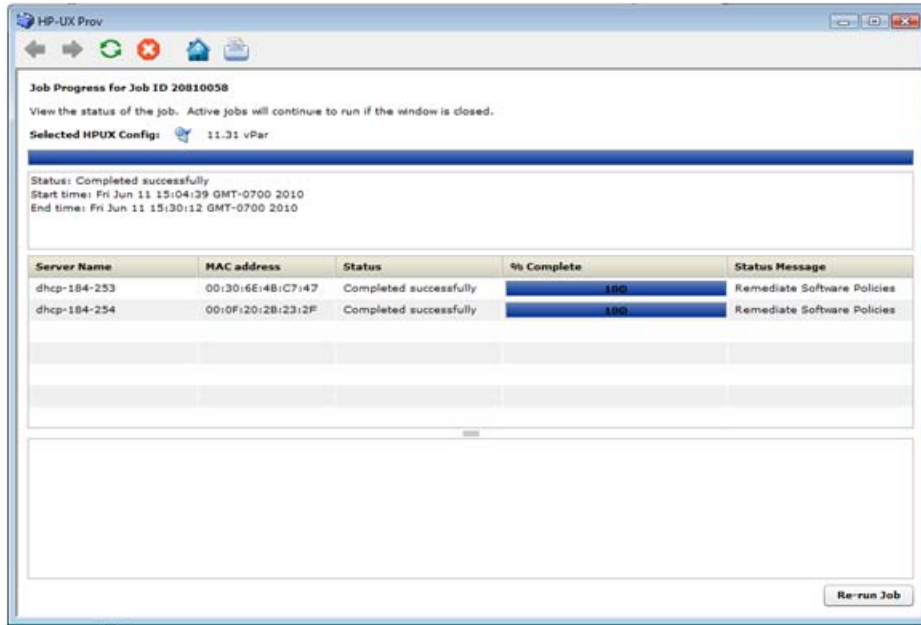
The provisioned servers are managed by SA. The servers are listed under Devices > All Managed Servers. Select the server, and then select Go to View > Properties. You can see the customer value, which is the same as the configuration customer value. You can see the servers listed as managed servers only 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 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
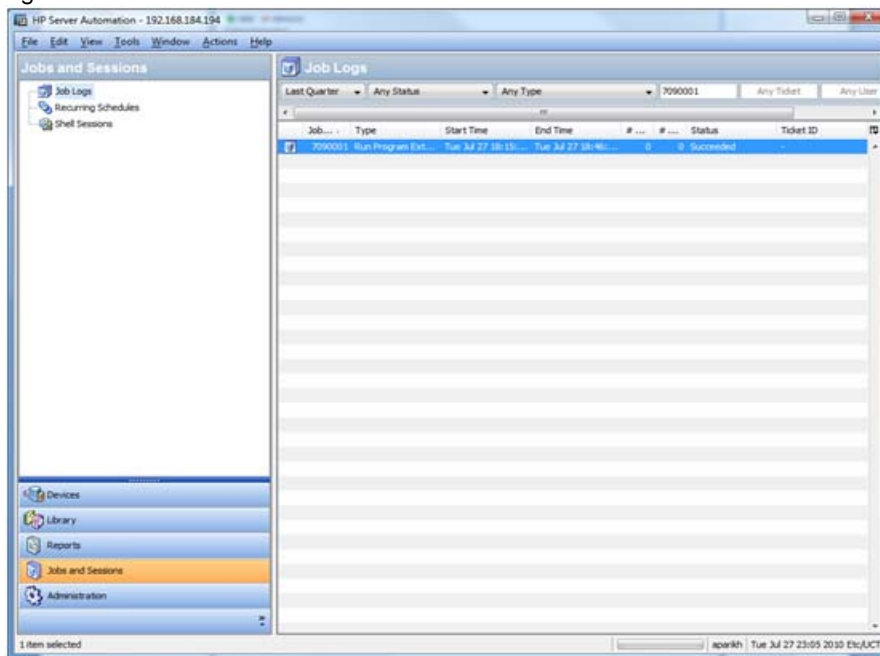
You can also find the specified Job Ticket ID in the notifications tab by double-clicking the job.

Deleting Custom Configurations

To delete a custom configuration, follow these steps:

1   Open the HP-UX Custom Config 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
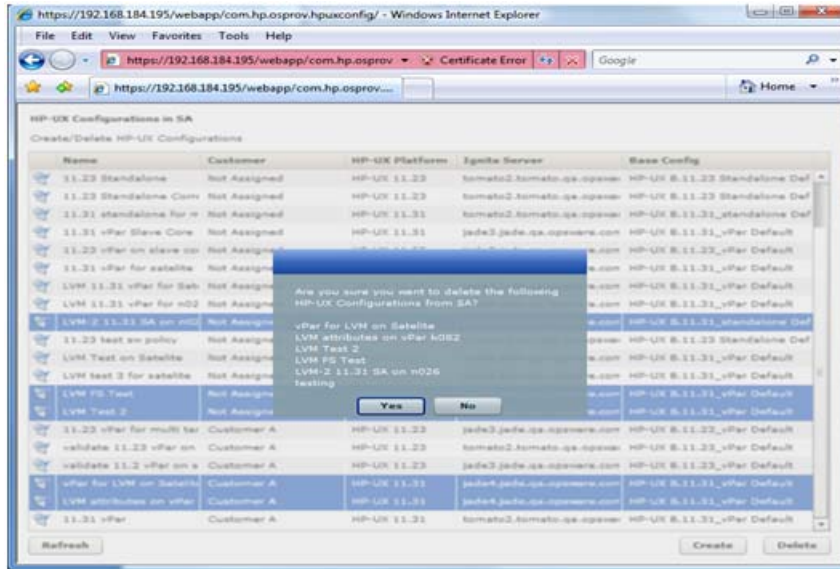
3   Click **Yes** on the confirmation window. The selected configurations are deleted and are no longer listed.

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

Glossary

Ignite-UX

> An HP-UX administration toolset that allows simultaneous installation of HP-UX on multiple clients, create custom installation configurations (golden images) for multiple installations on clients, create recovery media, and recover 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 the server with new customized values that overwrite the standard attributes values defined in the golden image.

Network boot

> When a system boots the HP-UX install kernel over the network from an Ignite-UX server.

Target

> The HP integrity server to be provisioned.

Custom Config 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 SA.

Useful Links

- 11iv3 installation information: http://docs.hp.com/en/5992-4165/ch02s01.html
- Ignite-LUX: Management and Integration of Ignite-UX Software on a Server Running nux white paper at http://www.hp.com/go/ignite-ux-docs
- Ignite-UX custom configuration files: http://docs.hp.com/en/5992-1999/5992-1999.pdf
- Ignite-UX: http://www.docs.hp.com/en/osHP-UX11iv3.html#Ignite-UX
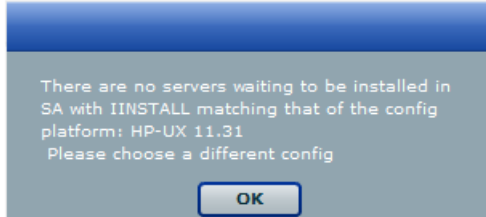
Troubleshooting

Following are some 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

Scenario: Servers Waiting to be Installed are Managed Servers

If there are servers waiting at the network boot, but they are already managed servers in 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 at the network boot prompt but cannot get listed here for reprovisioning because they are listed as managed servers in SA. To continue reprovisioning on these servers, you must manually delete them from the SA managed servers.

For detailed information on deactivating and deleting a server from the SA managed servers list, see https://external1.collaboration.hp.com/external/dca_pubs/Shared%20Documents/ SA%207.50%20Manuals/SA_7.50_Users_Guide_Server.pdf.

Figure 20   HP-UX Provisioning APX Listing 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 created.

Figure 21   No Configs Available or Permissions Granted
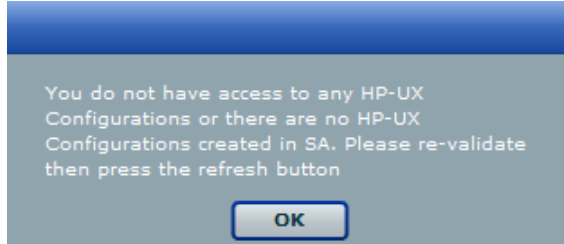
Contact your SA Administrator to obtain permission, or create configurations using the Custom Config Editor APX.

## Scenario: Incorrect Target Listing

In certain error scenarios, you might notice 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. Following are some of the reasons for this and how to address them.

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

  This could be due to the target being reset while it was waiting to be network installed. If this is done, the Ignite-UX does not detect this change and continues to think that the client is still waiting. This can be addressed either by retrying the install, or by deleting the directories for this 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 this directory. Delete both of them.

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

  This could happen if you modified dhcp to provide a different hostname after having tried provisioning this client earlier. Ignite UX seems to reuse the directories it set up for a client in /var/opt/ignite/clients/ if it finds one based on the MAC address, so the APX ends up reusing the earlier information. To get around this, delete the two directories for this client under /var/opt/ignite/clients and retry the install process.

Scenario: Install Timed Out Error

An install timed out error occurs when the provisioning job does not get initiated on the server. This could be due to a network issue, the golden image not being available, or another reason.

Figure 22   Provisioning Did Not Get Initiated on Server
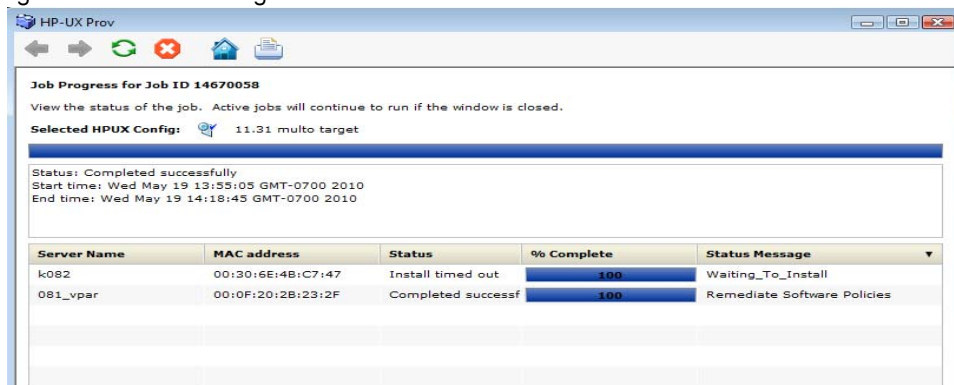
Make sure the network connection and Ignite images are accessibility and open a new APX to initiate provisioning.

Scenario: Loading Software Error

A loading software error can occur in situations like the following:

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

Figure 23   Golden Image Set Up Incorrectly
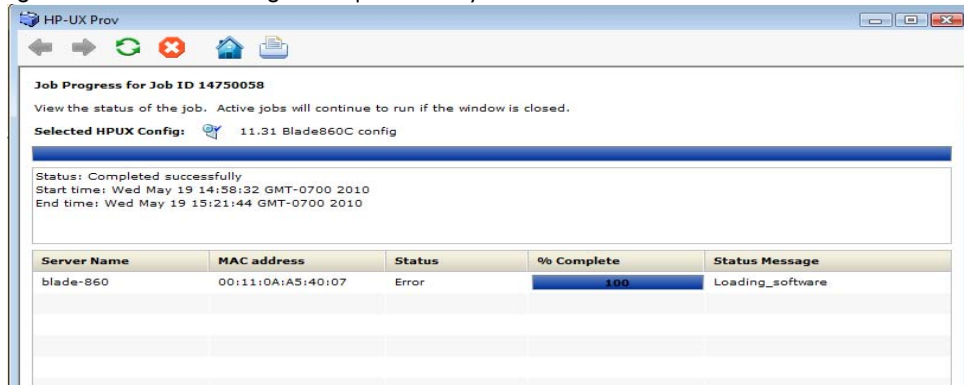
To resolve this, make sure that the Ignite specific configuration file, Index file, and archives are set up correctly and pointing to correct locations. Also make sure the network connection between the target and the Ignite server is accessible.

Scenario: Prepare Config File Error

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

Figure 24   Provisioning Failed Due to Invalid Ignite Attributes
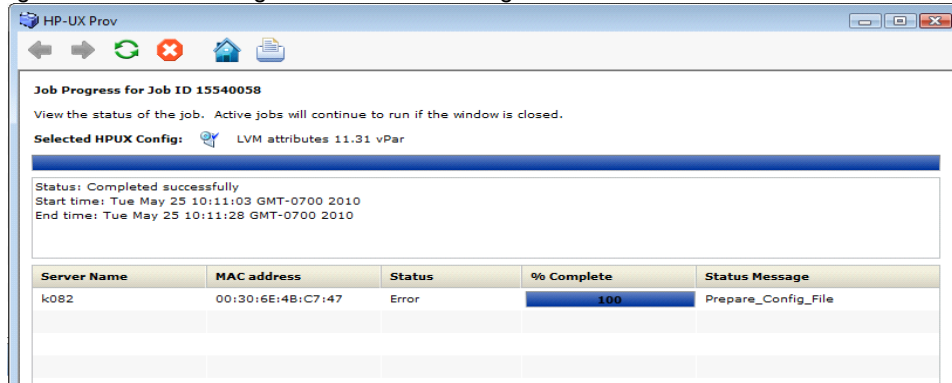
You might need to reboot the system and bring it back to the network boot prompt. On SA, create a new configuration with corrected custom attributes. Make sure the syntax specified is correct and compatible. Use the newly created profile.

Scenario: Agent Fails to Start

After successful job completion, if the Opsware agent fails to start on a newly provisioned target, there is a possibility that the golden image you used already has the agent installed. As part of the standard provisioning process, once HP-UX is installed on the server, the post-install script runs on the server that installs the agent. Because the agent is already installed through the golden image, it contradicts the usual process of provisioning and the agent does not get started on the target.