Altair Access Web 2019.3.1

Administrator's Guide

Altair | PBS Works™

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Altair® PBS Works® v.2019.3.1
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PBS Application Services™ ©2008-2017 is now part of Altair Access
PBS Analytics™ ©2008-2017 is now part of Altair Control
PBS Desktop™ ©2008-2012 is now part of Altair Access, specifically Altair Access desktop, which also has Altair Access web and Altair Access mobile
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Contents

What's New

1

Latest features available with Altair Access™ Web.

Simplified Deployment of Access Web on Windows

AMS and PAS are now automatically configured eliminating manual authentication configuration steps. The authentication services will run on Windows (not Docker) and users can login using their Windows credentials.

Shared File System

Access Web supports the use of a shared file system between the PBS Server and the PBS execution nodes. A simple change to the application definition is required to use the shared file system so that job files are not staged in and out. For more information see *Shared File System Support* in the *Access Web Administrator's Guide* and the recipe *How to Support a Shared File System* in *Diving Into Application Definitions*.

Soft Link Support

The Access Web file management UI now displays soft links (symbolic links) of files and folders as shortcuts. You can use these shortcuts to perform file management operations like job submission, viewing the file etc. The soft links cannot be created via the UI.

Handling Large File Uploads

In the previous release of Access Web, you could not upload large files (exceeding 4GB). Now, there is no upload restriction based on file size. The files are now uploaded in chunks and the restriction for uploading the large files in previous versions was a browser restriction. This is a beta feature and by default the conventional file upload is enabled. You can enable the modern file upload to handle large file uploads. Refer to *Configure to Handle Large File Uploads* section in *Access Web Administrators Guide*.

Remote Sessions Enhancements

The Remote Sessions enhancement will help in scaling on remote session proxy (Guacd) and increase the number of parallel remote session support. For scaling, the Remote Sessions Agent will install proxy component (Guacd) on the PBS MoM along with agent (TurboVNC and VirtualGL). The Guacamole service will connect to Guacd installed at the graphics node for VNC based sessions.

Refer to the section *Configure for Single and Distributed Remote Session Proxy Settings* in the *Access Web Administrators Guide*.

Job Submission Form Enhancements

A multi string type argument can be added in the application definition to provide an option to add text information in the Job Submission form. The information added is displayed in multiple lines in the Job Submission form.

Results Visualization Service Enhancements

RVS uses the modern communication layer for efficient extraction of result files for running jobs.

File Upload Option in Running Directory

An upload button in the running directory tab now allows files to be uploaded to the Running Directory.

File Browser Enhancement

When a file is accessed through the file browser, its location is retained and Access remembers its location when the file is subsequently accessed in the Job Submission Form.

Changes in Application Definition Validation

When Access Web starts, it performs a validation of the existing application definitions. If application definitions fail to meet key criteria, error messages are displayed in the PAS log file indicating why the application definition was invalid.

If an application is not displayed in the Access Web user interface after adding a new application definition or making changes to an existing one and restarting Access Web, then most likely there were validation problems with the application definition or the site configuration file.

View the PAS log for any error messages and edit the application definition or site configuration file to take any required corrective action. An invalid application definition will not prevent the PAS Server from starting up.

The site-config.xml file must be updated manually if you add an application definition. Access Web does not create a backup of the site-config.xml file. If you delete the site-conifg.xml file, then you must create it manually. Before making changes to the site configuration file, it is recommended to back it up.

Overview

2

Use Access Web to submit jobs to a Workload Manager.

This chapter covers the following:

Altair's new Access Web provides a simple, powerful, and consistent interface for submitting and monitoring jobs on remote clusters, clouds, or other resources. Engineers and researchers can now focus on core activities and spend less time learning how to run applications or moving data around. The Access Web remote visualization and collaboration capabilities bring access to an expensive, highend 3D visualization datacenter hardware right to the user. Access Web provides an ability to visualize the results by extracting plot and animation data. You can view plots for running jobs as well as for jobs which have been successfully completed. You can download and analyze animations using the Altair HyperView Player. Results Visualization Service allows you to compare two or more plots in the result viewer, save the plot you generated with the data as .rvs file and directly view your saved plots with the selected data.

Access Web Features:

- **Novice to Expert:** simple and powerful
- **Same UX:** desktop and web
- **Secure:** protected access to HPC resources
- **End-to-end:** submit, monitor progress, steer, fix, and rerun jobs
- **Collaborate:** shared 3D analysis
- **3D Remote Visualization**
- **Save time:** Simplify job submission and management thanks to a powerful GUI with smart, simplified interfaces
- **Be more productive:** Spend more time focused on work and not IT tasks - for example, monitor jobs graphically without having to download huge job files
- **Increase ROI:** Consolidate access to applications and optimize license availability

- **Reduce errors and improve consistency:** Embed your company's best-practice "know how" directly into Application Definitions used for job submission

2.1 Document Conventions

Common typographical conventions for Access Web technical publications.

PA_HOME
: The Access Web home directory which contains configuration, data, and logging files. Default location is `/var/spool/pbsworks/2019.3.1/access/home`, however this can be overridden during the installation of Access Web.

PA_EXEC
: The Access Web execution directory which contains binaries and scripts. Default location is `/opt/altair/pbsworks/2019.3.1/access/exec`, however this can be overridden during the installation of Access Web.

PBS_HOME
: The PBS Professional home directory which contains configuration and logging files. Default location is `/var/spool/pbs`, however this can be overridden during the installation of PBS Professional.

PBS_EXEC
: The PBS Professional execution directory which contains binaries and scripts. Default location is `/opt/pbs`, however this can be overridden during the installation of PBS Professional.

2.2 Access Web Components

Components and their associated responsibility.

Access Web consists of a collection of components and their associated services, accessed and invoked via a common interface.

Access Web Service

Access Web is a job submission and monitoring portal which enables users to run, monitor and manage workloads on distributed resources remotely. Access Web uses the High-Performance Computing (HPC) workload management capability of Altair's PBS Application Services (PAS) and PBS Professional for efficient resource utilization, access to the cloud for job submission, and subsequent accounting.

Results Visualization Service

Results Visualization Service (RVS) provides features to access, process and visualize CAE results from anywhere, without installing any post-processing desktop applications through the user friendly web interface of Access Web. CAE analysts can monitor simulations in real-time by tracking and visualizing relevant parameters from solver log files. Meaningful plots and animations can also be created remotely without downloading huge raw results files from compute clusters or remote networks locations. A variety of FEA and MBD solvers are supported - see Supported Result File Types.

RVS is automatically installed with Access Web. To extract plot and animation data Altair HyperWorks Desktop must be installed.

PBS Application Services

PBS Application Services (PAS) is a middleware component that communicates with the PBS Professional complex and the operating system, and provides services for the front end client applications such as graphical user interfaces. This middleware component is used as the preferred method of communication between the integration of client applications and the PBS Professional complex.

PAS can be installed with Access Web or it can be installed separately on the PBS Server.

Remote Sessions

Remote Sessions provides a platform for collaboration and remote visualization of graphics-intensive applications and data. It enables high performance remote display of applications over the networks using a web browser. Users can share sessions fostering teamwork and collaboration.

Depending upon the deployment option selected, Remote Sessions components must be distributed across several machines. Installation of the Remote Sessions components is done through a separate installer from Access Web. The Remote Sessions installer must be run on the following machines:

- PAS
  - GlxSpheres application definition is installed.
- PBS Server
  - Custom resource "ngpus" is added.
  - Interactive queue "iworkq" is added.

- PBS MoM
  - TurboVNC is installed.
  - VirtualGL is installed.
  - Remote Sessions Interactive Proxy (guacd) is installed.

2.3 System Requirements

Supported platforms and browsers for all components of Access Web.

Supported Platforms

Access Web is supported on the following Linux 64-bit (x86_64) platforms:

- Red Hat Enterprise Linux 7.1 to 7.6
- Cent OS 7.1 to 7.6
- SLES 12 SP1 to 12 SP3

Access Web is supported on Windows Server 2016 platform:

- Access Web Components can now be installed in Windows Server 2016 using a Docker container. PAS and Remote Sessions components can be installed using the Windows installer.

Supported Browsers

Access Web is supported on the following browsers:

Windows

- Firefox latest ESR (Only Extended Support Release is supported. Please refer to https://www.mozilla.org/en-US/firefox/organizations/)
- Google Chrome latest
- Microsoft Internet Explorer 11
- Microsoft Edge (limited testing)

Linux

- Not supported at this time.

OSX

- Firefox latest ESR (Only Extended Support Release is supported. Please refer to https://www.mozilla.org/en-US/firefox/organizations/)
- Google Chrome latest
- Safari Latest

2.4 Hardware Requirements

Minimum and recommended hardware requirements necessary to install and run Access Web.

Hardware Requirements for Access Web

The minimum hardware configuration required for Access Web is:

Hardware	Minimum Requirement	Recommended
CPU	2 CPU cores with a minimum speed of 2.5 GHz	4 CPU cores with a minimum speed of 2.5 GHz
Memory (Physical)	8 GB	16 GB
Disk Space	10 GB	500 GB

Note: For high user load installations please consult your Altair support team.

Hardware Requirements for Remote Sessions

Hardware configuration required for Remote Sessions are:

The Remote Sessions component installed on the PBS MoM to run interactive applications uses GNOME 3 as a Desktop Manager. GNOME 3 requires 3D acceleration, therefore a graphics card is required.

Other Desktop Managers such as KDE and MATE do not require 3D acceleration, therefore a graphics card is optional, however you will have to reconfigure your interactive application definitions to use these Desktop Managers rather than GNOME.

If your site chooses to install a graphics card, it must meet these hardware requirements:

- Only Nvidia and ATI (AMD) graphics cards are supported.
- The drivers provided by the manufacturer of the graphics card must be installed.
- Full 3D acceleration must be enabled for the graphic card drivers.
- Pixel Buffer support must be enabled for the graphic card drivers.
- Direct rendering must be enabled for the graphics card drivers.

GPU Cores and Memory
: Specific to the interactive applications being run.

CPU Cores and Physical Memory
: Specific to the interactive applications being run.

See Also

Verify that Interactive Applications are Configured for the Desktop Manager

2.5 Supported Product Configurations

Supported product configurations for using Access Web.

When installing Access Web, all components including PAS and Remote Sessions must be the same version.

> **Note:** HyperWorks Desktop is required to visualize CAE results. Access Web is tested on Hyperworks 2017.2.

Linux Support

The currently supported Access Web product configurations for Linux are:

Access Web	PBS Professional	Hyperworks
2019.3.1	19.2.3 19.2.2 19.1.1 18.2.4 18.2.3 18.2.2 18.1.1	14.0 2017.2

Windows Support

The currently supported Access Web product configurations for Windows Server 2016 are:

Access Web	PBS Professional	Hyperworks
2019.3.1	19.1.1 18.2.3	14.0 2017.2

2.6 Ports and Service Memory Usage

Overview of ports and memory used by Access Web services.

2.6.1 Ports Used by Access Web

A list of ports used by Access Web services and components.

The Access Web installer has auto-port detection logic in place and ports are chosen for each service within a specified range.

If the required port is not available during the installation, then Access Web will increment the port number and try again. This will continue until a free port is found, or until 100 consecutive ports are refused at which point the installer will ask for a port.

Below is a table of all ports and the port range used by Access Web and its services.

Ports used by Access Web

Port	Port Range	Service Using the Port	Description
4443	4443 - 4542	Gateway	Orchestrator for all access services.
4543	4543 - 4642	Access Web Server	Service which provides GUI and live job updates.
4643	4643 - 4742	Postgres Database	Service for data storage.
4743	4743 - 4842	Message Broker (ActiveMQ)	Service to provide async (event base) internal communication.
5343	5343 - 5442	Job Profiles Service	On-demand service to provide Access Desktop central repository for application definitions.
5543	5543 - 5642	AMS Service	Service to provide Authentication and Authorization.
5643	5643 - 5742	Mobile Notification Service	On-demand service to provide push notification support for Access Mobile.

Ports used by Results Visualization Service (RVS)

Port	Port Range	Service Using the Port	Description
5043	5043 - 5142	Result Manager Service	Service to provide integration between Access and RVS.

Port	Port Range	Service Using the Port	Description
5143	5143 - 5242	Result Core Service	Service to support all RVS capabilities.

Ports used by PBS Application Services (PAS)

Port	Port Range	Service Using the Port	Description
4222	4222 (no port range)	PAS Message Broker Service	Service to provide async modern communication for faster running job operations.
5243	5243 - 5342	PAS	Service for Files and HPC operations.

Ports used by Remote Sessions

Port	Port Range	Service Using the Port	Description
4843	4843 - 4942	Remote Session Service Webserver	Service to provide Remote Session capabilities.
4943	4943 - 5042	Remote Session Service Job Update	Service to receive faster job updates for remote sessions.
5443	5443 - 5542	Remote Session Service Proxy	Service to transmit data through websockets (gaucd).

Ports used by Remote Sessions on the PBS MoM

Port	Port Range	Service Using the Port	Description
5901	5901 to 59XX	Turbo VNC Server	Service to provide VNC sessions.

Open Ports

It is recommended to configure a firewall on the Access Web server and block all Access Web ports from the outside world except:

- 4222
- 4443
- 4943

See Also
Change Port Numbers

2.6.2 Memory Usage by Service

Overview of default Java heap space memory usage by each service.

The table below provides the amount of memory used by Access Web services and the file where this memory value can be configured post-installation.

The amount of memory can be adjusted by editing the associated configuration file and increasing the default value to a larger value. For example, when OutofMemory errors are noted in the Access Web log files.

Table 1: Memory Usage by Service

Service	Configuration Path and File	Value
Gateway	`PA_HOME/config/api_gateway/nginx.conf`	*512 MB*
Access Web Server	`PA_EXEC/pa/scripts/setenv.sh`	*512 MB*
Message Broker (ActiveMQ)	`PA_EXEC/shared/thirdparty/apache/activemq/bin/env`	*64 MB -512 MB*
Remote Session Services Webserver	`PA_EXEC/displaymanager/scripts/setenv.sh`	*512 MB*
Result Manager Services	`PA_EXEC/resultmanager/scripts/setenv.sh`	*512 MB*
Result Core Services	`PA_EXEC/resultservice/scripts/setenv.sh`	*512 MB*
Job Profiles Services	`PA_EXEC/jobprofiles/scripts/setenv.sh`	*512 MB*
AMS Services	`PA_EXEC/ams/scripts/setenv.sh`	*512 MB*
Mobile Notification Service	`PA_EXEC/mobile_notification_service/scripts/setenv.sh`	*512 MB*
Executor	`PA_EXEC/executor/scripts/setenv.sh`	*512 MB*

See Also
Change Memory used by the Services

2.7 Roles in Access Web

Roles defined in Access Web.

Service User

During the installation of Access Web Server, you are asked to provide a username that will be the Service User. The Service User must be an existing user on the machine where Access Web is installed. This user will own Access Web services and the files in PA_HOME and PA_EXEC. The default user is "pbsworks" for installing Access Web.

> **Note:** A Service User does not need to be established when installing PAS on the PBS Server or installing any of the Remote Sessions components

The Service User is automatically given portal administrator privileges and has unrestricted access to all features of Access Web. Users who have login access to the machine where Access Web is installed, can login to Access Web. The Service User has the ability to assign the role of portal administrator to users who have login access to the machine. The portal administrator is the only user who can add, edit, and delete service clusters and granting other user's access to applications (like Optistruct, Radios).

2.8 PBS Works Licensing

Licensing model for Access Web.

Licenses must be installed and available via a LMX version 14.0.1 or newer license server. Licenses consumed by Access Web:

- PBSWorksUsers

  This is the number of simultaneously logged in users; each user who logs in checks out one PBSWorksUsers license.

  PBSWorksUsers stack, not level, across products. So if 10 users are logged into Access, and 10 users are logged into Control, 20 PBSWorksUsers are checked out, even if they are the same users.

2.9 Basic Architecture Overview

Basic architecture of Access Web.

The basic architecture including the services and third party dependencies of Access Web is described as follows:

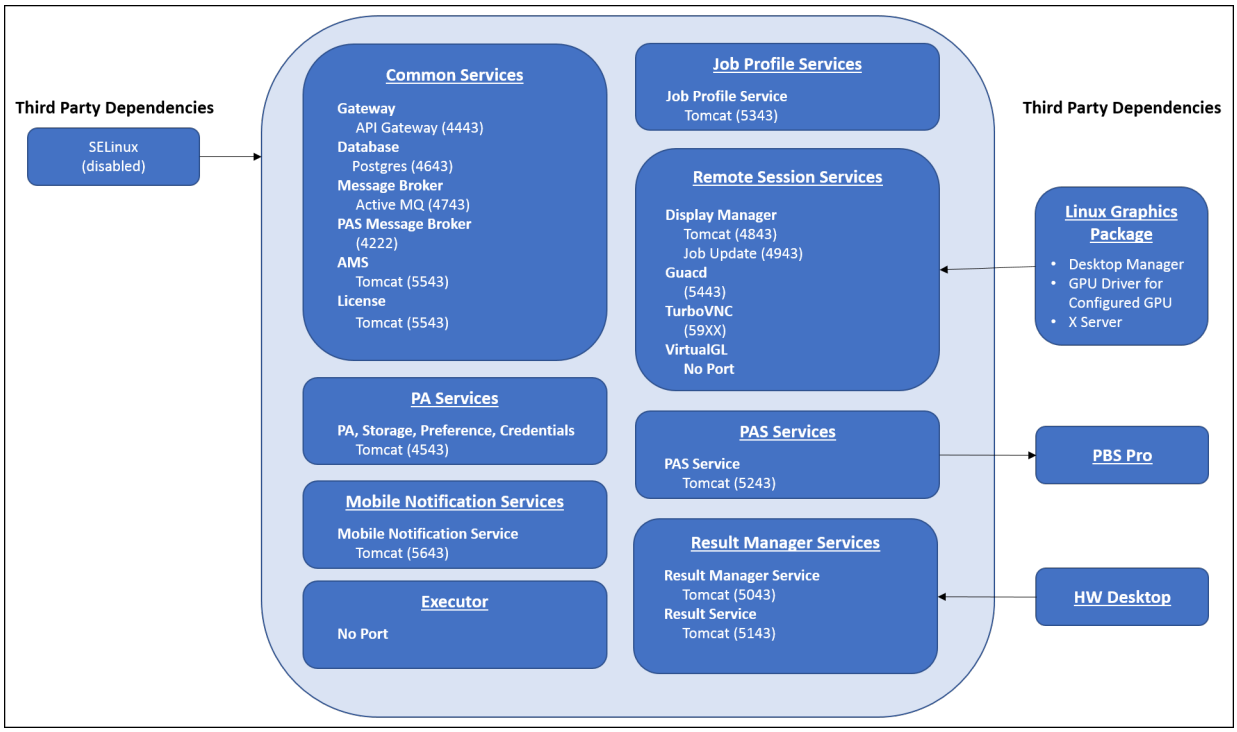


Figure 1: Basic Architecture Overview

2.10 Deployment Options on Linux

Overview of deployment options for Linux platforms.

Access Web consists of a collection of components and their associated services, accessed and invoked via a common interface.

Information requested during installation of Access Web:

- License server
- Staging directory
- Service user
- Installation location for the home (PA_HOME) and execution directories (PA_EXEC)
- HyperWorks location when Results Visualization Service features will be used at your site

Information requested during installation of Remote Sessions:

- Installation location for the home and execution directories
- Number of GPUs

2.10.1 Deployment Option 1

Install Access Web and PAS on a single machine and then install the Remote Sessions components on the HPC cluster.

Figure 2:Deployment Option 1

Deployment Option 1

Server - A

Access Web / PAS Server

Access Web/PAS Installation
- Access Web services installed
- PAS services installed
- ShellScript application definition installed

Remote Sessions Installation
- GlxSpheres application definition installed

Server - B

PBS Server

Remote Sessions Installation
- iworkq queue added
- Custom resources "ngpus" added

Server - C

PBS MoM

Remote Sessions Installation
- TurboVNC installed
- VirtualGL installed
- Interactive Proxy (guacd) installed
- Set resource_available.ngpus

Installation Steps

- Install Access Web and PAS on Server-A to:
  - Install Access Web and PAS services
  - Install ShellScript application definition
  - Register PAS automatically in Access Web
- Install Remote Sessions component on the PBS Server to:
  - Configure the PBS Server for Remote Sessions
  - Add iworkq queue
  - Add custom resource ‘ngpus’
- Install Remote Sessions Agent on the PBS MoM to:
  - Install TurboVNC and VirtualGL
  - Install the Interactive Proxy (guacd)
  - Set the number of GPUs available on the node
- Install Remote Sessions Interactive Proxy on Server-A to:
  - Configure PAS for Remote Sessions
  - Install the GlxSpheres application definition

2.10.2 Deployment Option 2

Install Access Web, install PAS on the PBS Server and then install the Remote Sessions components on the HPC cluster.

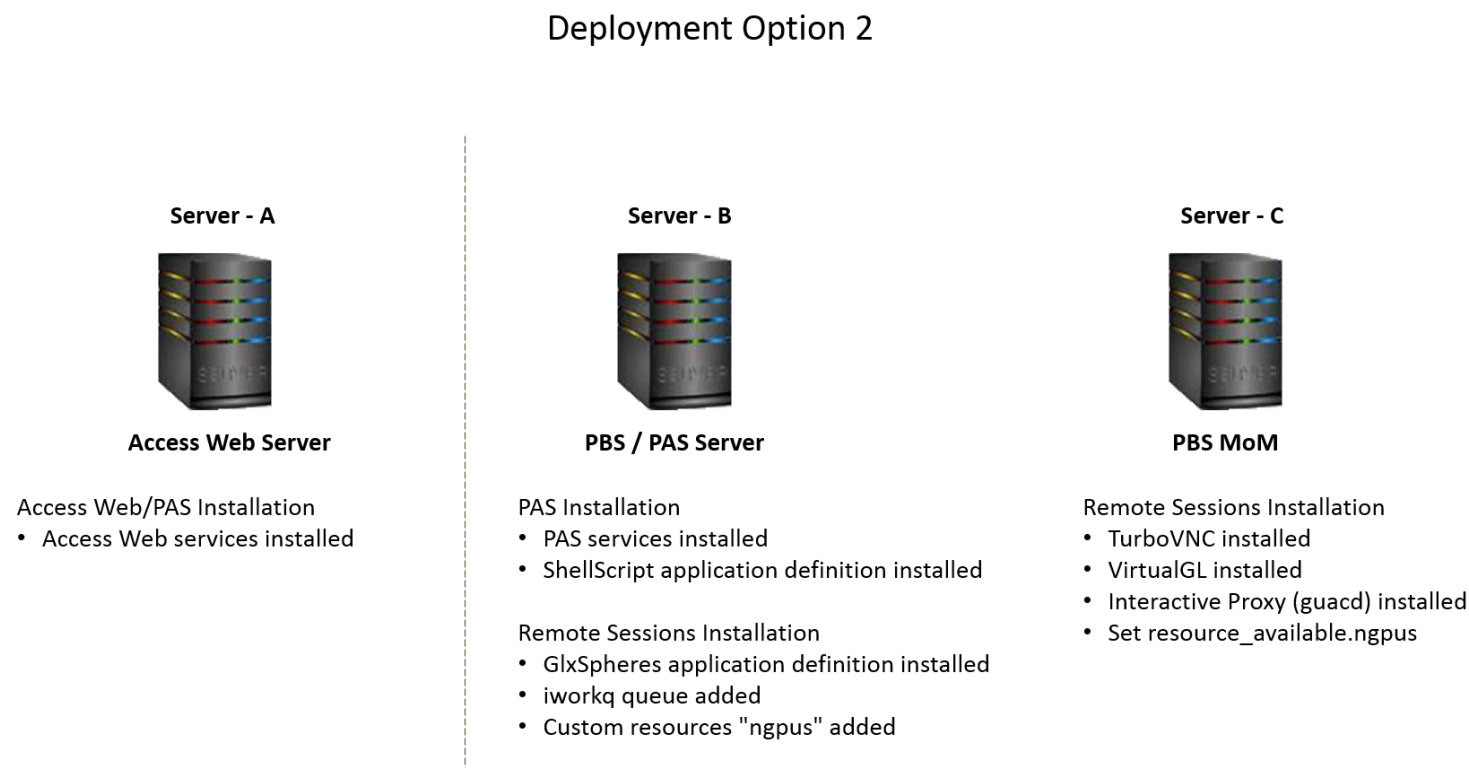


Figure 3: Deployment Option 2

Installation Steps

- Install Access Web on Server-A
  - Install Access Web services
- Install PAS on the PBS Server (Server-B) to:
  - Install PAS services
  - Install the ShellScript application definition
- Install Remote Sessions component on the PBS Server to:
  - Configure the PBS Server for Remote Sessions
  - Install the GlxSpheres application definition
  - Add iworkq queue
  - Add custom resource ‘ngpus’
- Install Remote Sessions Agent on the PBS MoM to:
  - Install TurboVNC and VirtualGL
  - Install the Interactive Proxy (guacd)

- Set the number of GPUs available on the node

Upgrade Access Web on Linux 3

Instructions for upgrading from a previous version of Access Web.

This chapter covers the following:

The upgrade of Access Web is not supported by the installer. You have to manually perform the steps to upgrade.

Only Access Web 2019.1, 2019.2 and 2019.3 versions are supported for upgrading.

The Access Web 2019.3.1 supports only PAS 2019.3.1. So, if you are upgrading Access Web, then you have to upgrade PAS.

Skip this chapter if your site is installing Access Web for the first time.

> **Note:** It is mandatory to perform Modern Communication Setup on Linux to complete the upgrade.

3.1 Prerequisites for Installation

Prerequisites and planning for installing Access Web, PBS Application Services, Remote Sessions Components, and for enabling visualization of CAE Results.

3.1.1 Prerequisites for Installing Access Web

Mandatory requirements for installing Access Web.

The following are the general prerequisites for installation:

- Installation must be done as root or as a user with sudo permissions.
- Installation must be done on a machine running on a supported platform.
- You will be prompted for a license server during the installation of Access Web, therefore a LMX license server version 14.0.1 or newer must be installed prior to installing Access Web.

  Note: A license server is not required for installing PAS on the PBS Server or the Remote Sessions components.

- You will be asked to provide a username that will be the Service User during the installation of Access Web. Review the requirements for this user account before installing Access Web.

  Note: The Service User is not required for installing PAS on the PBS Server or the Remote Sessions components.

- PBSWorksUsers licenses must be purchased.

Time Synchronization

Administrator must make sure that there is a time synchronization enabled between machines on which Altair Access and PBS Server installed. In lack of proper time synchronization functionalities like getting job updates, files update times etc. of Access will not work correctly. This is required if there no synchronization with any of the Network Time Protocol (NTP) server that is available.

PBS Professional

Ensure that a supported version of PBS Professional is installed.

PBS Application Services (PAS)

When deploying Access Web such that PAS is installed on the PBS Server (Deployment Option 2), the version of PAS installed on the PBS Server must match the version of Access Web that is begin installed.

Set *flatuid* to TRUE on the PBS Server (Deployment Option 1)

PAS Staging Directory

During the installation of PAS, you will be prompted to enter a value for the staging directory. The staging directory is where the necessary job files are transferred after job submission via a client, for example Access Web, for transfer to PBS Professional for execution.

The default location of the staging directory is: `/stage`

However, you have the option to choose a custom staging directory during installation.

Following are considerations for selecting and creating the staging directory:

- The stage area can grow quite large, depending on the size of the average job. Give careful consideration to the disk usage and disk capacity.
- The pathname for the staging directory should not contain spaces.
- PAS implements an automatic staging directory cleanup such that any data in the staging directory that is not generated by PAS is at risk of being purged without notice. It is recommended to select a staging directory where only PAS data files will be stored. Use of a directory that contains important data is not recommended. The automatic staging directory cleanup does not delete any files in the user's home directory. When the staging directory is set to `$USER_HOME` (for example: `$USER_HOME/stage`), the files in that directory are not automatically cleaned up and the responsibility for maintaining the staging directory falls on the individual user.

Service User

You will be asked to provide a username that will be the Service User during the installation of Access Web. Review the requirements for this user account before installing Access Web. The default user is "pbsworks" for installing Access Web.

Altair HyperWorks Desktop

RVS comes inbuilt with Altair Access. To use RVS for viewing result files, you need HyperWorks Desktop 2017.2 software. The software enables the HWHyperViewTrans and HWHyperMath features in computing the result file data. You can install Access Web and HyperWorks Desktop 2017.2 software in the same or separate locations. The HyperWorks Desktop path can be made accessible from Access Web by creating a mounting point for the HyperWorks installed directory on Access Web installed machine.

To install HyperWorks Desktop, follow the instructions in the *Altair HyperWorks 2017 Installation Guide*.

Note: The installation should be in a location where all users have read and write permission. It should not be in `/root` or any user's home directory.

Note: In Linux, install libXScrnSaver rpm package using the following command: `yum install libXScrnSaver`.

Result Visualization of results requires good network connectivity to all the connected file servers such as PAS server and job execution hosts. A minimum speed of 100mbps is required while a speed of 1gbps is recommended.

Tip: For a better performance of RVS, mount the stage directory and scratch directory on the Access Web installed machine if Access Web and PAS are installed separately.

See Also
PBS Works Licensing
Roles in Access Web

3.1.2 Prerequisites for Installing Remote Sessions

Mandatory requirements for Remote Sessions components.

The following are the general prerequisites for installation:

- Installation must be done as root or as a user with sudo permissions.
- Installation must be done on a machine running on a supported platform.

Access Web

Access Web must be installed prior to installing the Remote Sessions components.

Host Name and Port

It is recommended to configure hostname resolution, so that the PBS MoMs can connect to the Access Web server using its hostname rather than IP address and the configured Remote Session Service Job Update port.

The Remote Session Proxy should be able to connect to the interactive execution node through hostname and the Turbo VNC Port.

Refer to *Ports Used by Access Web* topic for more information on ports.

Prerequisites for Installing on the PBS MoM

- Run the Remote Sessions precheck diagnosis script on the graphical PBS MoM to check the status of GPU nodes.
- By default, the Remote Sessions component assumes that Gnome is being used as the Remote Sessions Desktop Manager. If Gnome is not installed on the PBS MoM as part of the Linux distribution, then install it.
- Graphics cards, if necessary, are installed and configured properly. Review the hardware requirements for Remote Sessions.
- For running interactive sessions, X Server and application on local display must be configured and working. Users that will be running interactive applications must have permission to access the 3D X Server. See http://www.virtualgl.org/vgldoc/2_2_1/#hd005001
- X Server must be configured to export True Color(24bit or 32bit) visuals.
- Use Virtual Private Networking or secured channels for communication between clients and interactive server if encryption is required.
- The PBS Professional execution host must be able to access and run the interactive applications available through Access Web.
- For the Access Web Remote Sessions installer to set the custom resource at each execution host. Follow the below steps:

- The root user of all execution hosts must be granted operator access. Prior to starting the Remote Sessions installer, issue the following command to grant this access:

  ```
  qmgr: s s operators+=root@*
  ```
- If root operator permission is set, number of ngpus available will be set by the remote session installer while installing agent.
- After installing the Remote Sessions components, you can remove the root user of the PBS MOMs from the operators list on the PBS server using the command:

  ```
  qmgr: s s operators-=root@*
  ```
- If this access is not granted, then you will manually have to set the custom resource by issuing a `qmgr` set command for each execution host after installation of Remote Sessions. For example:

  ```
  set node <node> resources_available.ngpus = 4
  ```

Warning: Restricting it to a specific subdomain still allows anyone running Linux on the subdomain access to the PBS Server.

Prerequisite Resource Libraries for Remote Sessions Interactive Proxy

The following libraries must be installed on the machine hosting the Access Web Server (these libraries do not need to be installed on the PBS Server or the PBS MoM) before attempting to install the Remote Sessions Interactive Proxy. Use the appropriate system tool (e.g. RPM, YUM, YAST etc.) to install them.

- libc.so.6()(64bit)
- libc.so.6(GLIBC_2.2.5)(64bit)
- libc.so.6(GLIBC_2.3)(64bit)
- libcrypt.so.1()(64bit)
- libdl.so.2()(64bit)
- libdl.so.2(GLIBC_2.2.5)(64bit)
- libGL.so.1()(64bit)
- libGLU.so.1()(64bit)
- libICE.so.6()(64bit)
- libm.so.6()(64bit)
- libm.so.6(GLIBC_2.2.5)(64bit)
- libpam.so.0()(64bit)
- libpthread.so.0()(64bit)
- libpthread.so.0(GLIBC_2.2.5)(64bit)
- libpthread.so.0(GLIBC_2.3.2)(64bit)
- libSM.so.6()(64bit)
- libX11.so.6()(64bit)
- libXaw.so.7()(64bit)
- libXcursor.so.1()(64bit)
- libXext.so.6()(64bit)
- libXmu.so.6()(64bit)
- libXt.so.6()(64bit)
- libXv.so.1()(64bit)
- libz.so.1()(64bit)

3.2 Prepare for an Upgrade

Instructions to prepare for upgrading Access Web.

Before you begin

- Review System Requirement and Prerequisites of Access Web

> **Note:** Do not uninstall previous version of Access Web or PAS.

Skip this chapter if your site is installing Access Web for the first time.

Create a back of the Access Web installation registry file and application configuration file. The backup of the configuration file can be used to downgrade back to the currently installed version of Access Web.

1. Login to the machine where previous version of Access Web is installed as root or as a user with sudo permissions.
2. Stop Access Web:
   ```
   service pbsworks-pa stop
   ```
3. Create a backup of `/var/.com.zerog.registry.xml`
4. Remove `/var/.com.zerog.registry.xml`
5. Create a backup of `/etc/pbsworks-pa.conf` as `/etc/pbsworks-pa.conf.<CurrentlyInstalledVersion>`

3.3 Uninstall Remote Sessions

Unconfigure PBS Professional and PBS Application Services and uninstall remote session components to disable the remote session capabilities of Access Web.

The uninstalling must be run multiple times across several machines and must be performed in the following sequence:

1. Unconfigure PBS Professional and PAS in PBS Professional headnode and in the machine where PBS Application Services is installed. This will
   - delete the interactive queue
   - unconfigure GPUs as a custom resource
   - remove the application definitions Glxsphere which is installed automatically when the Remote Sessions component was installed on the PAS Server
2. Uninstall Remote Sessions Components on all PBS MoMs.
3. Uninstall the interactive proxy.

3.3.1 Unconfigure PBS Professional and PBS Application Services

Unconfigure PBS Professional and PAS before uninstalling Remote Sessions Components.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands on Linux.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

Run the installer to unconfigure PBS Professional and PAS on the PBS Professional headnode and in the machine where PAS is installed.

This will:

- delete the interactive queue
- unconfigure GPUs as a custom resource
- remove the application definitions Glxphere which is installed automatically when the Remote Sessions component was installed on the PAS Server

1. Login to the machine where the PBS Professional Server and PAS is installed as root or as a user with sudo permissions.
2. Navigate to the folder where you have the Remote Sessions Agent installer.
3. Enter the command:

   ```
   ./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
    console
   ```
4. The installer will display the following message, enter `1` and press `ENTER`.

   ```
   Manage Instances
   ----------------
   ->1- Install a new instance
   ```

```
  2- Modify an existing instance
```

5. Read the introduction and press `ENTER`.
6. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
7. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four Options are displayed.
8. Enter `3` to unconfigure the PBS Professional and PAS servers and press `ENTER`.
9. PBS Professional and PAS is restarted during the installation process, choose whether you want to proceed:
   - Choose `No` to exit and run the installer at a more suitable time.
   - Choose `Yes` to run the installer.

3.3.2 Uninstall Remote Sessions Component from the PBS MoMs

Uninstall previous version of remote session component from PBS MoMs.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands on Linux.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

If it is a distributed deployment, then login to each of the PBS MoM and uninstall the Remote Sessions Component.

> **Note:** This will uninstall the Remote Sessions component and Interactive Proxy only if you installed Access Web on the same machine as the PBS Professional Server.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to the `/opt/altair/pbsworks/2019.3.1/remotesessionagent/_AltairRemoteSessionAgent_Installer_<Version>_installation` directory.
3. Execute the uninstall script by entering the following command:
   ```
   ./Change\ AltairRemoteSessionAgent_Installer_<Version>\ Installation -i console
   ```
   The command must contain spaces with escape characters.
4. Follow the instructions provided by the uninstaller.

3.3.3 Uninstall the Interactive Proxy from the Access Web Server

Uninstall the previous version of remote session component to remove interactive proxy from Access Web server.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands on Linux.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

If it is a distributed deployment, then login to the machine hosting Access Web and uninstall Remote Sessions Component to remove the proxy.

> **Note:** This will uninstall the Remote Sessions component and Interactive Proxy only if you installed Access Web on the same machine as the PBS Professional Server.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to the `/opt/altair/pbsworks/2019.3.1/remotesessionagent/_AltairRemoteSessionAgent_Installer_<Version>_installation` directory.
3. Execute the uninstall script by entering the following command:

   ```
   ./Change\ AltairRemoteSessionAgent_Installer_<Version>\ Installation -i console
   ```

   The command must contain spaces with escape characters.
4. Follow the instructions provided by the uninstaller.

3.4 Install Access Web

Install Access Web component, so that you can submit non-interactive jobs to the Workload Manager.

Before you begin:

- Review System Requirements of Access Web.
- Review Prerequisites of Access Web.
- Uninstall previous versions of Access Web.

  > **Note:** If you are upgrading from previous version, then do not uninstall previous version of Access Web or PBS Application Services (PAS).

- Install Altair HyperWorks Desktop on the HPC cluster to extract plot and animation data.

Ensure you having the following information before you start your installation:

- License server details
- HyperWorks location

A binary or executable needs to be downloaded or obtained using your usual Altair support channels.

Installation must be done as root or as a user with sudo permissions.

The Access Web 2019.3.1 installer provides an option for installing Access Web, PAS, or both.

If you are installing both Access Web and PAS on the same machine, then you will only need to run through this installation process once.

If you are installing them on a separate machine then you will have to run this installation process once to install Access Web and a second time to install PAS.

1. Login to the machine where Access Web is to be installed.
2. Enter the command:
   ```
   ./AltairAccessWeb_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i console
   ```
3. Read the introduction and press `ENTER`.
4. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
5. Accept the license agreement by entering `Y` and pressing `ENTER`.
6. Choose one of the following options:
   - Enter `1` and press `ENTER` to install Access Web Services.
   - Enter `2` and press `ENTER` to install PBS Application Services.
   - Enter `3` and press `ENTER` to install Access Web Services and PBS Application Services. This is the default option.

   > **Note:** The following steps will change based on your choice.

   If you enter 2 or 3, the following message is displayed. This message can be ignored. Press Enter and continue with the installation:

   ```
   ===============================================================================
   ```

```
PBS hooks directory absent
--------------------------

PBS Professional installation appears to be incomplete.
PBS Professional installation appears to be incomplete. Cannot locate
/server_priv/hooks
Please select "OK" to continue  OR "Cancel" to exit installation

  ->1- OK
    2- Cancel

ENTER THE NUMBER OF THE DESIRED CHOICE, OR PRESS <ENTER> TO ACCEPT THE
   DEFAULT:
```

7. Enter the license server details and press `ENTER`.

   The license server details should have the port and hostname in the format `port@hostname`. You can provide multiple license server details separated by a colon in Linux and semi-colon in Windows.

   It is not mandatory to provide the license server at installation time. You will however be required to configure the license server information prior to logging into Access Web.

8. If you are installing PAS, enter a staging directory and press `ENTER`.

   The staging directory is where user's job files will be staged prior to execution. This directory must exist prior to the installation of PAS.

   The stage area can grow quite large depending on the size of the average job. It's not recommended the use `/tmp` or user's `/home` as the staging directory, as they will get periodically purge.

9. Enter the service user and press `ENTER`.

   The default service user is 'pbsworks' and the Access Web service is registered under this user.

10. Enter the location where the Access Web binaries are to be installed.

    You may choose to install in the default location.

11. Enter the location where the Access Web configuration and logs files are to be installed.

    You may choose to install in the default location.

12. If Access Web is being installed, enter the HyperWorks location for visualizing results.

    For example, `/opt/hw2017.2/altair/`. The Access Web 2019.3.1 supports HyperWorks 2017.2.0.16.

    > **Note:** You can also configure this path after the installation by editing `PA_HOME/config/resultservice/config/site_config.xml` configuration file.

13. Review the installation summary and press `ENTER`.
    The installation starts. It may take a few minutes for the installation to complete.

    > **Note:** If you are upgrading from previous version, then do not start Access Web.

14. Start Access Web manually by entering the following command:

```
service pbsworks-pa start
```

> **Note:** Access Web starts a watcher process which will monitor the status of Access Services. The watcher process automatically brings up any services that goes down abruptly.

> **Note:** It is mandatory to perform Modern Communication Setup on Linux to complete the installation.

15. Login to the machine hosting the PBS Server.
16. As a PBS Operator or Manager enter the following command:

```
qmgr -c 'set server job_history_enable=True'
```

Perform Modern Communication Setup on Linux to enable the use of the modern infrastructure for faster running jobs on Linux.

If you want to run interactive jobs, you must now install the Interactive Application component of Access Web.

3.5 Install Remote Sessions Components

Install components necessary to enable the remote session capabilities of Access Web.

- Review the system requirements and prerequisites for installation.
- Run Remote Sessions precheck diagnosis script in PBS MoM to check the status of GPU nodes.

A separate installer is required to install the Remote Sessions components. Download or obtain the installer binary using your usual Altair support channels.

The installer will need to be run multiple times across several machines and must be performed in the following sequence:

1. Install the Remote Sessions component on the PBS Professional headnode and in the machine where PBS Application Services is installed. This installation will:
   - add a custom resource to PBS Professional called "ngpus"
   - creates an interactive queue called "iworkq"
   - add a new application definition "GlxSpheres" to PAS
   - restart PBS Professional and Access Web
2. Install the Remote Sessions component on all PBS MoMs on which you want to run interactive jobs.

After installing the Remote Sessions component, view the value of the `jobsub.monitor.host` variable in the file `PA_HOME/config/displaymanager/dmrest.properties` to confirm the configured hostname. If there is no access through hostname, then a slight delay may occur while opening a remote session for the first time.

3.5.1 Install the Remote Sessions Component on the PBS Professional Server and on PAS

Install binaries and configure PBS Professional and PAS to support interactive applications.

Before you begin:

- Review the system requirements and prerequisites for installation.

Install the remote session component on the PBS Professional headnode and in the machine where PAS is installed.

Installation must be done as root or as a user with sudo permissions.

This installation will:

- add a custom resource to PBS Professional called "ngpus"
- add an interactive queue called "iworkq"
- restart Access Web
- restart PBS Professional

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

1. Login to the machine where the PBS Professional Server and PAS is installed.
2. Enter the command:
   ```
   ./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
   console
   ```
3. Read the introduction and press `ENTER`.
4. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
5. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four options are displayed.
6. Enter `1` to configure the PBS Professional and PAS servers and press `ENTER`.
7. PBS Professional and PAS is restarted during the installation process, choose whether you want to proceed:
   - Choose `No` to exit and run the installer at a more suitable time.
   - Choose `Yes` to run the installer.
8. Enter the number of GPUs that are available in the cluster and press `ENTER`.
   If you have a cluster with 10 execution hosts and only two of those execution hosts have associated GPUs, then add up the number of GPUs for both execution hosts and enter this number.
9. Review the installation summary and press `ENTER`.
   The installation starts. It may take a few minutes for the installation to complete.
10. Press `ENTER` to complete the installation process.

Verify that iworkq is created, a GPU resource is configured, and GlxSpheres is installed.

3.5.2 Install the Remote Sessions Component on the PBS MoMs

Install binaries and configure the PBS Mom to support interactive applications.

Before you begin:

- Review the system requirements and prerequisites for installation.
- Run Remote Sessions precheck diagnosis script in PBS MoM to check the status of GPU nodes.

Install necessary components on the PBS MoM to support interactive applications, including TurboVNC and Virtual GL. The installer also configures a new resource called "ngpus".

Install the Guacomole proxy server by default to support interactive applications.

> **Note:** This installation process must be repeated for all execution hosts where you want to run interactive jobs.

Installation must be done as root or as a user with sudo permissions.

1. Login to the machine where the PBS Professional MoM is installed.

2. Enter the command:

```
./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
 console
```

3. If you are installing the PBS MoM interactive component on a machine hosting both the PBS Professional Server and the MoM you will see the below message, enter `1` and press `ENTER`.

```
Manage Instances
----------------
->1- Install a new instance
  2- Modify an existing instance
```

4. Read the introduction and press `ENTER`.
5. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
6. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four options are displayed.
7. Enter `2` and press `ENTER`.
8. Enter the location where the binaries are to be installed and press `ENTER`.

   You may choose to install in the default location.
9. Enter the location where the configuration and logs files are to be installed and press `ENTER`.

   You may choose to install in the default location.
10. Enter the number of GPUs available on the execution host and press `ENTER`.
11. Review the installation summary and press `ENTER`.
    The installation starts. It may take a few minutes for the installation to complete.
12. Press `ENTER` to complete the installation process.
    The TurboVNC and Virtual GL is installed to support interactive applications by configuring X Server.
13. Restart the X Server.

> **Warning:** Restarting the X Server might affect any running graphical applications. Please make sure that are no critical graphical applications running.

Verify that "ngpus" resource has been added to the execution host by executing the command:

```
pbsnodes -av
```

The new resource should be listed and it should be assigned the value entered for the available GPUs entered during installation.

```
resources_available.ngpus = <NGPUS>
```

Verify that the Guacamole proxy daemon is installed and running by issuing the following command:

```
service guacd status
```

3.6 Upgrade 2019.1 and 2019.2 Access Web

Instructions to upgrade Access Web 2019.1 and 2019.2 to 2019.3.1 on Linux.

3.6.1 Apply Upgrade Patch Script

Instructions to apply the patch upgrading script.

Download or obtain the upgrade_2019 folder for upgrading using your usual Altair support channels.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Replace `upgrade.sh` file at `PA_EXEC/pa/scripts/` with `upgrade_2019/pa/scripts/upgrade.sh`.
3. Replace `upgrade.sh` file at `PA_EXEC/shared/scripts/` with `upgrade_2019/shared/scripts/upgrade.sh`.
4. Verify if the permission of copied upgrade scripts is same as that of the parent folder.

3.6.2 Run Upgrade Script

Instructions to run the upgrading script.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_EXEC/init/`.
3. Execute the `pa-upgrade.sh` script as follows:

   ```
   pa-upgrade.sh <PreviousVersion_PA_HOME> <PreviousVersion_PA_EXEC>
   ```

   where <PreviousVersion_PA_HOME> is the Access Web 2019.1 or 2019.2 home folder and <PreviousVersion_PA_EXEC> is the Access Web 2019.1 or 2019.2 execution folder.

   After upgrading, Access Web 2019.3.1 will be up and the following message will be displayed:

   ```
   "Access Web upgraded successfully"
   ```
4. Enter the URL `https://<hostname>:4443/pbsworks` in the address bar of a supported browser.

   where `<hostname>` is the hostname of the machine where Access Web is installed.

   The Access Web login screen is displayed.
5. Enter your username and password.
6. Click **Log In.**

Perform Modern Communication Setup on Linux to enable the use of the modern infrastructure for faster running jobs on Linux.

3.7 Upgrade 2019.3 Access Web

Instructions to upgrade Access Web 2019.3 to 2019.3.1 on Linux.

Before you begin:

- Review System Requirement and Prerequisites of Access Web

  Note: Do not uninstall previous version of Access Web or PAS.

- Download or obtain the `pa-upgrade_2019_3_2019_3_1.sh` upgrade script using your Altair support channels.

Note: Skip this chapter if your site is installing Access Web for the first time.

1. Login to the machine where Access Web 2019.3 is installed as root or as a user with sudo permissions.
2. Stop Access Web:
   ```
   service pbsworks-pa stop
   ```
3. Copy the `pa-upgrade_2019_3_2019_3_1.sh` script to the Access Server.
4. Execute the upgrade script as follows:
   ```
   ./pa-upgrade_2019_3_2019_3_1.sh <PA_HOME_2019.3> <PA_EXEC_2019.3>
   ```
5. Start Access Web:
   ```
   service pbsworks-pa start
   ```

Perform Modern Communication Setup on Linux to enable the use of the modern infrastructure for faster running jobs on Linux.

3.8 Modern Communication Setup on Linux

Enable the use of the modern infrastructure for faster running job operations on Linux.

Before you begin:

- The location of modern communication can be local to compute nodes and does not require a shared location
- A user having password-less SSH must be present on Server and Mom(s)

The following steps will distribute modern communication module to all the Execution Nodes.

1. Navigate to the directory `PA_EXEC/joboperation/scripts`
2. Execute the script modern communication modules (`distribute_modern_comm_modules.py`):

   ```
   python distribute_modern_comm_modules.py
   ```

   The script will guide you in distributing modern communication module.
3. Enter the location to distribute.

   > **Note:** Location of modules must be accessible by all users.

4. Enter the user name who has password-less access across the nodes.

   > **Note:** User must present on all the PBS Server and PBS Mom machine(s) and they should be able to communicate without password.

   The following message is displayed:

   ```
   Do you want to override if modules already exist (Y/N). [Default: N]?
   ```
5. Enter `Y` to override.

   The script will display the inputs provided.
6. Enter `Y` to continue with the inputs provided.

   The following information is displayed:

   ```
   Transferring Client Modules to n2.lab.com...
   Successfully transferred to 'n2.lab.com'
   Transferring Client Modules to n1.lab.com...
   Successfully transferred to 'n1.lab.com'
   Updated PAS Configuration file successfully
   ```
7. Restart the Access Web by entering the command:

   ```
   service pbsworks-pa restart
   ```

Upgrade Access Web on Windows

4

Instructions for upgrading from a previous version of Access Web.

This chapter covers the following:

The upgrade of Access Web is not supported by the installer. You have to manually perform the steps to upgrade.

Only Access Web 2019.2 and 2019.3 versions are supported for upgrading.

The Access Web 2019.3.1 supports only PAS 2019.3.1. So if you are upgrading Access Web, then you have to upgrade PAS.

Skip this chapter if your site is installing Access Web for the first time.

4.1 Prepare for an Upgrade on Windows

Instructions to prepare for upgrading Access Web on Windows.

Download or obtain the following files using your usual Altair support channels:

- Access Web Docker 2019.3.1 Tar File (`AltairAccessWeb_Docker_Container_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.tar`)
- PAS 2019.3.1 Installer (`AltairAccessWeb_PAS_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.exe`)
- If you site is going to run interactive applications, then download the Remote Sessions Agent Installer (`AltairAccessWeb_RemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.exe`)
- Docker Environment List (`env.list`)
- Remote Sessions Application Definition Zip File (`windows_remotesession_appdef.zip`)
- Windows Backup Script (`prepare_backup.sh`)
- Windows 2019.3.1 Upgrade Container Zip File (`container_upgrade.zip`)
- Windows 2019.3 Backup Script (`prepare_backup_2019_3_2019_3_1.sh`)
- Windows 2019.3 Upgrade Script (`pa-upgrade_2019_3_2019_3_1.sh`)

Note: It is mandatory to perform Modern Communication Setup on Windows after you Install Access and Docker Setup.

Note: The following are some of the Docker commands that will be useful:

- To check the Docker container ID use the following command:
  `docker ps -q`
- Use the following command to copy a file from the container to the local machine:
  `docker cp CONTAINER_ID:<source path> <local destination path>`
- Use the following command to copy the file from the local machine to the container:
  `docker cp <local source path> CONTAINER_ID:<destination path>`

4.2 Prepare for PAS Upgrade on Windows

Instructions to upgrade PAS on Windows.

1. Stop PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Stop**.
2. Remove the registry file `.com.zerog.registry.xml` located at

   `C:\Program Files\Zero G Registry\`

   > **Note:** If you do not want to remove the registry file, then uninstall PAS. Before uninstalling PAS take a backup of the home directory from the location `PAS_INSTALL/home/`.

   > **Note:** If you remove the registry file, then you have to install PAS 2019.3.1 in a different location.

4.3 Verify if the PBS Server is Enabled for Faster Response

Verify if IPV6 is disable and IPV4 is set as the preferred protocol to make sure PBS commands are responding quickly and Docker containers are able to ping the host machine.

Verification involves the following steps:

- Verify if IPV6 is disabled for all adapters.
- Registry is set to IPV4 over IPV6.

Verify if IPv6 is disabled for all adapters

1. Go to **Control Panel** > **Network and Internet** > **Network and Sharing Center**
2. Select **Change adapter settings**.

   > **Note:** The following steps must be performed for all the adapters in the **Change adapter settings**.

3. Right-click on an adapter and select **Properties**.
4. Verify that the **Internet Protocol Version 6 (TCP/IPv6)** check-box is unchecked.
5. Select **Internet Protocol Version 4 (TCP/IPv6)** and click **Properties**.
6. Click **Advanced** in the **Internet Protocol Version 4 (TCP/IPv6) Properties** dialog box.
7. Verify that **Automatic metric** is disabled in the **Advanced TCP/IP Settings** dialog box.
8. Verify that a positive integer value greater than 0 is set in the **Interface metric**.

   If you are using Ethernet, then enter the value as 1 and for the rest enter some higher number based on your preference. The lower the number the higher will be the preference.

Verify that the registry is set to IPv4 over IPv6

9. Press **Windows + R** key to open the **Run Dialog box.**
10. Enter **regedit**.
11. Navigate to `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\tcpip6\Parameters\`.
12. Verify that **DisabledComponents** is present and its Data value is set to 20 (Hexadecimal).

4.4 Verify User Access Control (UAC) in Windows

Verify if User Access Control is disabled for Access Web Windows setup to make sure the user is not blocked while executing any executables.

1. Open **Control Panel**
2. Navigate to **User Accounts and Family Safety\User Accounts**
3. Click **Change User Account Control Settings**.
4. Change it to **Never Notify**.
5. Click **Ok**.
6. Press **Windows + R** key to open the **Run Dialog box.**
7. Enter **regedit**.
8. Navigate to `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System\`.
9. Verify that the value of **EnableLUA DWORD** is set to 0.

> **Note:** Create the **EnableLUA DWORD** key if it is not available and set its value to 0. You have to restart the machine after these changes.

4.5 Upgrade 2019.1 and 2019.2 Access Web

Instructions to upgrade Access Web 2019.1 and 2019.2 to 2019.3.1 on Windows.

4.5.1 Backup Access Web Configuration Files

Instructions to take a backup of Access Web configuration files.

Download or obtain the following files using your usual Altair support channels:

- Windows Backup Script (`prepare_backup.sh`)

The script will create a zip file with the name *upgrade_$TIMESTAMP.zip* which contains the Access Web Home folder and Database dump.

1. Login to the Windows machine where Access Web is installed.
2. Check the Docker container ID using the following command:
   ```
   docker ps -q
   ```
3. Copy the Windows Backup Script (`prepare_backup.sh`) script to the Docker container using the following command:
   ```
   docker cp prepare_backup.sh CONTAINER_ID:/tmp
   ```
4. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
5. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```
6. Make the script executable:
   ```
   chmod +x prepare_backup.sh
   ```
7. Execute the script to create a zip file of the configurations using the following command:
   ```
   ./prepare_backup.sh /tmp/
   ```
   An example of the upgrade zip file is *upgrade_1569014147849.zip*.
8. Copy the upgrade zip file (*upgrade_1569014147849.zip*) to host Windows machine:
   ```
   docker cp CONTAINER_ID:/tmp//upgrade_1569014147849.zip
   ```
9. Backup the Docker container using the following command:
   ```
   docker save -o windows_docker_2019_2.tar windows_docker
   ```
10. Stop the Docker container:
    ```
    docker stop CONTAINER_ID
    ```
11. Remove the Docker container:
    ```
    docker rm -f CONTAINER_ID
    ```

4.5.2 Install PAS On Windows

Steps for installing PAS on a Windows platform.

Download or obtain the PAS Windows Installer using your usual Altair support channels.

These instructions will install PAS in `C:\Program Files\altair\pas\2019.3.1\`. This directory will be denoted as `PAS_INSTALL`. You may install PAS in a non-default location. However, please note this while following the below instructions.

1. Locate the PAS installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
2. Enter the installation location.

   By default, the installation location is `C:\Program Files\altair\pas\2019.3.1\`.
3. Enter the staging directory.

   By default, the staging directory is `C:\stage`.
4. Review the Pre-installation Summary and click **Install**.

   On completion, the installer will provide the details of the installation directory, host and port. By default, PAS will be running on port 5243 and `https` protocol.
5. Navigate to `PAS_INSTALL\PAS\exec\scripts\`.
6. Execute the script `update_service_user.py` by providing the service user name:

   ```
   python update_service_user.py pbsadmin
   ```
7. Start PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Start**.

> **Note:** It is mandatory to perform Modern Communication Setup on Windows before you Install Access and Docker Setup.

See Also
PBS Application Services Service Commands

4.5.3 Post Configuration of PAS Upgrade

Instructions for updating the application definition, site configuration file (site-config.xml) and AMS from the previous version of PAS.

You need to have the following files before beginning the post-installation configuration:

- Application definitions, Profiles, and site-config.xml from the previous installation of PAS.
- The `upgrade_$TIMESTAMP.zip` that is created using the `prepare_backup.sh` from the Access Web Docker container.
- PAS 2019.3.1 should be installed.

By default PAS is installed at `C:\Program Files\altair\pas\2019.3.1\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

1. Stop PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Stop**.
2. Copy the application definitions to: `PAS_INSTALL\PAS\home\data\pas\targets\localhost\repository\applications\`
3. Copy the profiles to: `PAS_INSTALL\PAS\home\data\pas\targets\localhost\`
4. Copy the site-config.xml file to: `PAS_INSTALL\PAS\home\data\pas\targets\localhost\repository\`
5. Copy the upgrade zip (`upgrade_$TIMESTAMP.zip`) acquired by running `prepare_backup.sh` to `C:\temp` directory.
6. Unzip the upgrade zip in the `C:\temp` directory.
7. Copy the AMS policies files from the unzipped upgrade file from to

   `upgrade_$TIMESTAMP\home\data\ams\policies\access\*PAS_HOME\data\ams\policies\access\`
8. Copy the AMS roles and groups files from the unzipped upgrade file from

   `upgrade_$TIMESTAMP\home\data\ams\local-datastore\*` to `PAS_HOME\data\ams\local-datastore`

4.5.4 Modern Communication Setup on Windows

Enable the use of the modern infrastructure for faster running job operations on Windows.

By default PAS is installed at `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

The `momclientmodules` folder will be available in the PAS installation directory at `PAS_INSTALL\PAS\exec\joboperation\binaries`.

1. Copy the directory `PAS_INSTALL\PAS\exec\joboperation\binaries\momclientmodules` from the machine where PAS is installed to `C:\` of the execution node.
2. Give Full control permissions to Everyone for the `momclientmodules` directory:
   a) Right click on `momclientmodules` and select **Properties**.
   b) Click **Security** tab.
   c) Click **Advanced**.
   d) Click **Add** and click on **Select a Principal**.
   e) Type in **Everyone** and click **Check Names**
   f) Click **OK**

g) Select **Full Control** on **Permissions** section.

h) Click **OK**.

3. Repeat Step 1 and 2 for each PBS MoM.
4. Login to the machine where PAS is installed.
5. Edit the file `PAS_INSTALL\PAS\home\config\pas\conf\server.conf` and update the distributed location:

```
MODERN_COMMUNICATION_SHARED_LIBS=C:\momclientmodules
```

6. Restart PAS services:

a) Click **Start** and choose **Run**.

b) Type `services.msc` to open the Services Management Console.

c) Right-click the **AltairPASService** and click **Retart**.

See Also
PBS Application Services Service Commands

4.5.5 Access Web and Docker Setup

Load the Access Web Docker image into Docker and update the Docker environment list.

The `env.list` file must be updated with:

ALTAIR_LICENSE_PATH
Specify Altair license server details in the format port@ip address or port@hostname.

HOSTNAME
IP Address/Hostname of the Windows Machine where Remote Sessions Agent is Installed.

HW_DESKTOP_LOCATION
Specify the HyperWorks installation path.

HOST_ENTRIES
Specify the IP addresses of PBS Server and PBS MOM.

TIME_ZONE
Time zone of the machine where PBS Server is running.

Download or obtain the Access Web Docker 2019.3.1 Tar file and Docker environment list (`env.list`) using your usual Altair support channels.

1. Load the Access Web Docker image into Docker using the following command:

```
docker load -i TARFILE
```

Where *TARFILE* is the name of the Access Web tar file.

2. Update the license path, hostname, HyperWorks installation location, host entries, and time zone in the Docker environment list (`env.list`).
For example, the modified `env.list` will be as follows:

```
ALTAIR_LICENSE_PATH=6200@10.130.3.175
HOSTNAME=10.75.20.123
HW_DESKTOP_LOCATION=10.75.32.34:/apps/hwdesktop
HOST_ENTRIES="10.75.22.95 blrpc686, 192.168.33.23 23centos7"
```

```
TIME_ZONE=/usr/share/zoneinfo/Asia/Kolkata
```

3. Start the Access Web Docker container using the following command:

```
docker run -itd --env-file .\env.list --entrypoint /tmp/scripts/access_setup.sh ^
--name windows_access --privileged -p 4443:4443 -p 4222:4222 -p 4943:4943 ^
-p 4743:4743 windows_docker:latest bash
```

4. Login to the Access Web Docker container using the following command:

```
docker exec -it windows_access bash
```

5. Stop Access Web using the following command:

```
service pbsworks-pa stop
```

6. Navigate to `PA_HOME/config/resultservice/config`.
7. Edit `site_config.xml`.
8. Locate the following line: `<AIFImpersonation enabled="true">`
9. Change `@enabled="true"` to `@enabled="false"`.
10. Start Access Web using the following command:

```
service pbsworks-pa start
```

11. Login to the Access Web portal and add the PAS server.
    - The Service User should have logged in to Access Web after starting or restarting Access Web and before registering the PAS service.
    - PAS installed in Windows will be running on port 5243 and `https` protocol. Please register the Windows PAS server in Access Web.
    - If PBS MOM is also active in same machine as PAS, then make sure you do not start remote session from the same user through which you started the docker and PAS service.

See Also
Access Web Service Commands

4.5.6 Post Configuration of Access Web Upgrade

Instructions for updating the previous version of Access Web configuration files.

Before beginning the post-installation configuration of Access Web after upgrading, ensure you have the following:

- The Access Web 2019.3.1 should be installed in the Docker container.
- The `upgrade_$TIMESTAMP.zip` that is created using the `prepare_backup.sh` from the previous version of Access Web Docker container.
- Windows 2019.3.1 Upgrade Container Zip File (`container_upgrade.zip`).

1. Login to the Access Web Docker container using the following command:

```
docker exec -it windows_access bash
```

2. Check the Docker container ID using the following command:

```
docker ps -q
```

3. Copy `upgrade_$TIMESTAMP.zip` and Windows 2019.3.1 Upgrade Container Zip File (`container_upgrade.zip`) to the Docker container using the following command:

```
docker cp upgrade_$TIMESTAMP.zip CONTAINER_ID:/tmp
```

```
docker cp container_upgrade.zip CONTAINER_ID:/tmp
```

4. Login to the Access Web Docker container using the following command:

```
docker exec -it windows_access bash
```

5. Stop Access Web using the following command:

```
service pbsworks-pa stop
```

6. Source the config file using the following command:

```
source /etc/pbsworks-pa.conf
```

7. Clean the Access Web instance using the following command:

```
$PA_EXEC/init/pbsworks-pa @clean
```

8. Unzip the container zip file to Access Web Exec folder using the following command:

```
cd $PA_EXEC
unzip /tmp/container_upgrade.zip
```

9. Provide the full permission to the script in the Access Web execution location:

```
chmod 777 $PA_EXEC/ams/scripts/upgrade.sh ^
$PA_EXEC/shared/scripts/upgrade.sh ^
$PA_EXEC/displaymanager/scripts/upgrade.sh
```

10. Unzip the `upgrade_$TIMESTAMP.zip` file using the following command:

```
cd /tmp
unzip upgrade_$TIMESTAMP.zip
```

11. Run the upgrade script using the following command:

```
$PA_EXEC/init/pa-upgrade.sh /tmp/upgrade_$TIMESTAMP/home ^
/tmp/upgrade_$TIMESTAMP/execs
```

12. Start Access Web using the following command:

```
service pbsworks-pa start
```

Perform Install Remote Sessions Agent on Windows.

4.6 Upgrade 2019.3 Access Web

Instructions to upgrade Access Web 2019.3 to 2019.3.1 on Windows.

4.6.1 Backup Access Web Configuration Files

Instructions to take a backup of Access Web 2019.3 configuration files.

Download or obtain the following files using your usual Altair support channels:

- Windows Backup Script (`prepare_backup_2019_3_2019_3_1.sh`)

The script will create a tar file with the name *upgrade_$TIMESTAMP.tar* which contains the Access Web Home folder and Database dump.

1. Login to the Windows machine where Access Web is installed.
2. Check the Docker container ID using the following command:
   ```
   docker ps -q
   ```
3. Copy the Windows Backup Script (`prepare_backup_2019_3_2019_3_1.sh`) script to the Docker container using the following command:
   ```
   docker cp prepare_backup_2019_3_2019_3_1.sh CONTAINER_ID:/tmp
   ```
4. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
5. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```
6. Make the script executable:
   ```
   chmod +x prepare_backup_2019_3_2019_3_1.sh
   ```
7. Execute the script to create a zip file of the configurations using the following command:
   ```
   ./prepare_backup_2019_3_2019_3_1.sh /tmp/
   ```
   An example of the upgrade tar file is *upgrade_1569014147849.tar*.
8. Copy the upgrade tar file (*upgrade_1569014147849.tar*) to host Windows machine:
   ```
   docker cp CONTAINER_ID:/tmp//upgrade_1569014147849.tar
   ```
9. Backup the Docker container using the following command:
   ```
   docker save -o windows_docker_2019_3.tar windows_docker
   ```
10. Stop the Docker container:
    ```
    docker stop CONTAINER_ID
    ```
11. Remove the Docker container:
    ```
    docker rm -f CONTAINER_ID
    ```

4.6.2 Install PAS On Windows

Steps for installing PAS on a Windows platform.

Download or obtain the PAS Windows Installer using your usual Altair support channels.

These instructions will install PAS in `C:\Program Files\altair\pas\2019.3.1\`. This directory will be denoted as `PAS_INSTALL`. You may install PAS in a non-default location. However, please note this while following the below instructions.

1. Locate the PAS installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
2. Enter the installation location.

   By default, the installation location is `C:\Program Files\altair\pas\2019.3.1\`.
3. Enter the staging directory.

   By default, the staging directory is `C:\stage`.
4. Review the Pre-installation Summary and click **Install**.

   On completion, the installer will provide the details of the installation directory, host and port. By default, PAS will be running on port 5243 and `https` protocol.
5. Navigate to `PAS_INSTALL\PAS\exec\scripts\`.
6. Execute the script `update_service_user.py` by providing the service user name:

   ```
   python update_service_user.py pbsadmin
   ```
7. Start PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Start**.

> **Note:** It is mandatory to perform Modern Communication Setup on Windows before you Install Access and Docker Setup.

4.6.3 Post Configuration of PAS Upgrade

Instructions for updating the application definition, site configuration file (site-config.xml) and AMS from the previous version of PAS.

You need to have the following files before beginning the post-installation configuration:

- The backup of 2019.3 PAS home directory.
- The backup of 2019.3 AMS file (`AA_jass.config`)
- PAS 2019.3.1 should be installed.

By default PAS is installed at `C:\Program Files\altair\pas\2019.3.1\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

1. Stop PAS services:

a) Click **Start** and choose **Run**.
b) Type `services.msc` to open the Services Management Console.
c) Right-click the **AltairPASService** and click **Stop**.

2. Remove the home directory from 2019.3.1 `PAS_INSTALL`.
3. Copy the backup of 2019.3 PAS home directory at 2019.3.1 `PAS_INSTALL`.
4. Copy the AMS backup (`AA_jaas.config`) of 2019.3 to `PAS_INSTALL\home\config\ams\`.

4.6.4 Modern Communication Setup on Windows

Enable the use of the modern infrastructure for faster running job operations on Windows.

By default PAS is installed at `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

The `momclientmodules` folder will be available in the PAS installation directory at `PAS_INSTALL\PAS\exec\joboperation\binaries`.

1. Copy the directory `PAS_INSTALL\PAS\exec\joboperation\binaries\momclientmodules` from the machine where PAS is installed to `C:\` of the execution node.
2. Give Full control permissions to Everyone for the `momclientmodules` directory:
   a) Right click on `momclientmodules` and select **Properties**.
   b) Click **Security** tab.
   c) Click **Advanced**.
   d) Click **Add** and click on **Select a Principal**.
   e) Type in **Everyone** and click **Check Names**
   f) Click **OK**
   g) Select **Full Control** on **Permissions** section.
   h) Click **OK**.
3. Repeat Step 1 and 2 for each PBS MoM.
4. Login to the machine where PAS is installed.
5. Edit the file `PAS_INSTALL\PAS\home\config\pas\conf\server.conf` and update the distributed location:
   ```
   MODERN_COMMUNICATION_SHARED_LIBS=C:\momclientmodules
   ```
6. Restart PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Retart**.

See Also
PBS Application Services Service Commands

4.6.5 Access Web and Docker Setup

Load the Access Web Docker image into Docker and update the Docker environment list.

The `env.list` file must be updated with:

ALTAIR_LICENSE_PATH
: Specify Altair license server details in the format port@ip address or port@hostname.

HOSTNAME
: IP Address/Hostname of the Windows Machine where Remote Sessions Agent is Installed.

HW_DESKTOP_LOCATION
: Specify the HyperWorks installation path.

HOST_ENTRIES
: Specify the IP addresses of PBS Server and PBS MOM.

TIME_ZONE
: Time zone of the machine where PBS Server is running.

Download or obtain the Access Web Docker 2019.3.1 Tar file and Docker environment list (`env.list`) using your usual Altair support channels.

1. Load the Access Web Docker image into Docker using the following command:
   ```
   docker load -i TARFILE
   ```
   Where *TARFILE* is the name of the Access Web tar file.
2. Update the license path, hostname, HyperWorks installation location, host entries, and time zone in the Docker environment list (`env.list`).
   For example, the modified `env.list` will be as follows:
   ```
   ALTAIR_LICENSE_PATH=6200@10.130.3.175
   HOSTNAME=10.75.20.123
   HW_DESKTOP_LOCATION=10.75.32.34:/apps/hwdesktop
   HOST_ENTRIES="10.75.22.95 blrpc686, 192.168.33.23 23centos7"
   TIME_ZONE=/usr/share/zoneinfo/Asia/Kolkata
   ```
3. Start the Access Web Docker container using the following command:
   ```
   docker run -itd --env-file .\env.list --entrypoint /tmp/scripts/access_setup.sh ^
   --name windows_access --privileged -p 4443:4443 -p 4222:4222 -p 4943:4943 ^
   windows_docker:latest bash
   ```
4. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
5. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```
6. Navigate to `PA_HOME/config/resultservice/config`.
7. Edit `site_config.xml`.
8. Locate the following line: `<AIFImpersonation enabled="true">`
9. Change `@enabled="true"` to `@enabled="false"`.
10. Start Access Web using the following command:
    ```
    service pbsworks-pa start
    ```
11. Login to the Access Web portal and add the PAS server.

- The Service User should have logged in to Access Web after starting or restarting Access Web and before registering the PAS service.
- PAS installed in Windows will be running on port 5243 and `https` protocol. Please register the Windows PAS server in Access Web.
- If PBS MOM is also active in same machine as PAS, then make sure you do not start remote session from the same user through which you started the docker and PAS service.

4.6.6 Post Configuration of Access Web Upgrade

Instructions for updating 2019.3 Access Web configuration files.

Before beginning the post-installation configuration of Access Web after upgrading, ensure you have the following:

- The Access Web 2019.3.1 should be installed in the Docker container.
- The `upgrade_$TIMESTAMP.tar` that is created using the `prepare_backup_2019_3_2019_3_1.sh` from the previous version of Access Web Docker container.
- Download or obtain the `pa-upgrade_2019_3_2019_3_1.sh` upgrade script using your Altair support channels.

1. Login to the Windows machine where Access Web is installed.
2. Check the Docker container ID using the following command:
   ```
   docker ps -q
   ```
3. Copy `upgrade_$TIMESTAMP.tar` and Windows 2019.3.1 upgrade script (`pa-upgrade_2019_3_2019_3_1.sh`) to the Docker container using the following command:
   ```
   docker cp upgrade_$TIMESTAMP.tar CONTAINER_ID:/tmp
   ```
   ```
   docker cp pa-upgrade_2019_3_2019_3_1.sh CONTAINER_ID:/tmp
   ```
4. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
5. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```
6. Source the config file using the following command:
   ```
   source /etc/pbsworks-pa.conf
   ```
7. Clean the Access Web instance using the following command:
   ```
   $PA_EXEC/init/pbsworks-pa @clean
   ```
8. Unzip the `upgrade_$TIMESTAMP.tar` file using the following command:
   ```
   cd /tmp
   tar -xpvf upgrade_$TIMESTAMP.tar
   ```
9. Run the upgrade script using the following command:
   ```
   pa-upgrade_2019_3_2019_3_1.sh /tmp/upgrade_$TIMESTAMP/home ^
   /tmp/upgrade_$TIMESTAMP/execs
   ```
10. Start Access Web using the following command:
    ```
    service pbsworks-pa start
    ```

Perform Install Remote Sessions Agent on Windows.

4.7 Install Remote Sessions Agent on Windows

Install the Remote Session component on Windows.

Download or obtain the Remote Sessions Windows Installer using your usual Altair support channels.

Install the Remote Sessions Windows installer on all PBS MoMs.

1. Locate the Remote Sessions installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
2. Enter the installation location.

   By default, the installation location for binaries and configuration is `C:\altair\pbsworks\2019.3.1\remotesessionagent`.
3. Review the Pre-installation Summary and click **Install**.
4. Once the installation is complete check that the Remote Sessions service is running:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Locate the **DMAgent Service**.

      The status should be "Started".
   d) If the service is not running then, right-click the **DMAgent Service** and click **Start**.

See Also
Remote Sessions Service Commands

Install Access Web and the Remote Sessions Component

5

Instructions for installing Access Web, PBS Application Services, and Remote Sessions components, so that interactive and non-interactive jobs can be submitted.

This chapter covers the following:

5.1 Prerequisites for Installation

Prerequisites and planning for installing Access Web, PBS Application Services, Remote Sessions Components, and for enabling visualization of CAE Results.

5.1.1 Prerequisites for Installing Access Web

Mandatory requirements for installing Access Web.

The following are the general prerequisites for installation:

- Installation must be done as root or as a user with sudo permissions.
- Installation must be done on a machine running on a supported platform.
- You will be prompted for a license server during the installation of Access Web, therefore a LMX license server version 14.0.1 or newer must be installed prior to installing Access Web.

  Note: A license server is not required for installing PAS on the PBS Server or the Remote Sessions components.

- You will be asked to provide a username that will be the Service User during the installation of Access Web. Review the requirements for this user account before installing Access Web.

  Note: The Service User is not required for installing PAS on the PBS Server or the Remote Sessions components.

- PBSWorksUsers licenses must be purchased.

Time Synchronization

Administrator must make sure that there is a time synchronization enabled between machines on which Altair Access and PBS Server installed. In lack of proper time synchronization functionalities like getting job updates, files update times etc. of Access will not work correctly. This is required if there no synchronization with any of the Network Time Protocol (NTP) server that is available.

PBS Professional

Ensure that a supported version of PBS Professional is installed.

PBS Application Services (PAS)

When deploying Access Web such that PAS is installed on the PBS Server (Deployment Option 2), the version of PAS installed on the PBS Server must match the version of Access Web that is begin installed.

Set *flatuid* to TRUE on the PBS Server (Deployment Option 1)

PAS Staging Directory

During the installation of PAS, you will be prompted to enter a value for the staging directory. The staging directory is where the necessary job files are transferred after job submission via a client, for example Access Web, for transfer to PBS Professional for execution.

The default location of the staging directory is: `/stage`

However, you have the option to choose a custom staging directory during installation.

Following are considerations for selecting and creating the staging directory:

- The stage area can grow quite large, depending on the size of the average job. Give careful consideration to the disk usage and disk capacity.
- The pathname for the staging directory should not contain spaces.
- PAS implements an automatic staging directory cleanup such that any data in the staging directory that is not generated by PAS is at risk of being purged without notice. It is recommended to select a staging directory where only PAS data files will be stored. Use of a directory that contains important data is not recommended. The automatic staging directory cleanup does not delete any files in the user's home directory. When the staging directory is set to `$USER_HOME` (for example: `$USER_HOME/stage`), the files in that directory are not automatically cleaned up and the responsibility for maintaining the staging directory falls on the individual user.

Service User

You will be asked to provide a username that will be the Service User during the installation of Access Web. Review the requirements for this user account before installing Access Web. The default user is "pbsworks" for installing Access Web.

Altair HyperWorks Desktop

RVS comes inbuilt with Altair Access. To use RVS for viewing result files, you need HyperWorks Desktop 2017.2 software. The software enables the HWHyperViewTrans and HWHyperMath features in computing the result file data. You can install Access Web and HyperWorks Desktop 2017.2 software in the same or separate locations. The HyperWorks Desktop path can be made accessible from Access Web by creating a mounting point for the HyperWorks installed directory on Access Web installed machine.

To install HyperWorks Desktop, follow the instructions in the *Altair HyperWorks 2017 Installation Guide*.

Note: The installation should be in a location where all users have read and write permission. It should not be in `/root` or any user's home directory.

Note: In Linux, install libXScrnSaver rpm package using the following command: `yum install libXScrnSaver`.

Result Visualization of results requires good network connectivity to all the connected file servers such as PAS server and job execution hosts. A minimum speed of 100mbps is required while a speed of 1gbps is recommended.

Tip: For a better performance of RVS, mount the stage directory and scratch directory on the Access Web installed machine if Access Web and PAS are installed separately.

See Also
PBS Works Licensing
Roles in Access Web

5.1.2 Prerequisites for Installing Remote Sessions

Mandatory requirements for Remote Sessions components.

The following are the general prerequisites for installation:

- Installation must be done as root or as a user with sudo permissions.
- Installation must be done on a machine running on a supported platform.

Access Web

Access Web must be installed prior to installing the Remote Sessions components.

Host Name and Port

It is recommended to configure hostname resolution, so that the PBS MoMs can connect to the Access Web server using its hostname rather than IP address and the configured Remote Session Service Job Update port.

The Remote Session Proxy should be able to connect to the interactive execution node through hostname and the Turbo VNC Port.

Refer to *Ports Used by Access Web* topic for more information on ports.

Prerequisites for Installing on the PBS MoM

- Run the Remote Sessions precheck diagnosis script on the graphical PBS MoM to check the status of GPU nodes.
- By default, the Remote Sessions component assumes that Gnome is being used as the Remote Sessions Desktop Manager. If Gnome is not installed on the PBS MoM as part of the Linux distribution, then install it.
- Graphics cards, if necessary, are installed and configured properly. Review the hardware requirements for Remote Sessions.
- For running interactive sessions, X Server and application on local display must be configured and working. Users that will be running interactive applications must have permission to access the 3D X Server. See http://www.virtualgl.org/vgldoc/2_2_1/#hd005001
- X Server must be configured to export True Color(24bit or 32bit) visuals.
- Use Virtual Private Networking or secured channels for communication between clients and interactive server if encryption is required.
- The PBS Professional execution host must be able to access and run the interactive applications available through Access Web.
- For the Access Web Remote Sessions installer to set the custom resource at each execution host. Follow the below steps:

- The root user of all execution hosts must be granted operator access. Prior to starting the Remote Sessions installer, issue the following command to grant this access:

  ```
  qmgr: s s operators+=root@*
  ```
- If root operator permission is set, number of ngpus available will be set by the remote session installer while installing agent.
- After installing the Remote Sessions components, you can remove the root user of the PBS MOMs from the operators list on the PBS server using the command:

  ```
  qmgr: s s operators-=root@*
  ```
- If this access is not granted, then you will manually have to set the custom resource by issuing a `qmgr` set command for each execution host after installation of Remote Sessions. For example:

  ```
  set node <node> resources_available.ngpus = 4
  ```

Warning: Restricting it to a specific subdomain still allows anyone running Linux on the subdomain access to the PBS Server.

Prerequisite Resource Libraries for Remote Sessions Interactive Proxy

The following libraries must be installed on the machine hosting the Access Web Server (these libraries do not need to be installed on the PBS Server or the PBS MoM) before attempting to install the Remote Sessions Interactive Proxy. Use the appropriate system tool (e.g. RPM, YUM, YAST etc.) to install them.

- libc.so.6()(64bit)
- libc.so.6(GLIBC_2.2.5)(64bit)
- libc.so.6(GLIBC_2.3)(64bit)
- libcrypt.so.1()(64bit)
- libdl.so.2()(64bit)
- libdl.so.2(GLIBC_2.2.5)(64bit)
- libGL.so.1()(64bit)
- libGLU.so.1()(64bit)
- libICE.so.6()(64bit)
- libm.so.6()(64bit)
- libm.so.6(GLIBC_2.2.5)(64bit)
- libpam.so.0()(64bit)
- libpthread.so.0()(64bit)
- libpthread.so.0(GLIBC_2.2.5)(64bit)
- libpthread.so.0(GLIBC_2.3.2)(64bit)
- libSM.so.6()(64bit)
- libX11.so.6()(64bit)
- libXaw.so.7()(64bit)
- libXcursor.so.1()(64bit)
- libXext.so.6()(64bit)
- libXmu.so.6()(64bit)
- libXt.so.6()(64bit)
- libXv.so.1()(64bit)
- libz.so.1()(64bit)

5.2 Install Access Web

Install Access Web component, so that you can submit non-interactive jobs to the Workload Manager.

Before you begin:

- Review System Requirements of Access Web.
- Review Prerequisites of Access Web.
- Uninstall previous versions of Access Web.

> **Note:** If you are upgrading from previous version, then do not uninstall previous version of Access Web or PBS Application Services (PAS).

- Install Altair HyperWorks Desktop on the HPC cluster to extract plot and animation data.

Ensure you having the following information before you start your installation:

- License server details
- HyperWorks location

A binary or executable needs to be downloaded or obtained using your usual Altair support channels.

Installation must be done as root or as a user with sudo permissions.

The Access Web 2019.3.1 installer provides an option for installing Access Web, PAS, or both.

If you are installing both Access Web and PAS on the same machine, then you will only need to run through this installation process once.

If you are installing them on a separate machine then you will have to run this installation process once to install Access Web and a second time to install PAS.

1. Login to the machine where Access Web is to be installed.
2. Enter the command:
   ```
   ./AltairAccessWeb_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i console
   ```
3. Read the introduction and press `ENTER`.
4. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
5. Accept the license agreement by entering `Y` and pressing `ENTER`.
6. Choose one of the following options:
   - Enter `1` and press `ENTER` to install Access Web Services.
   - Enter `2` and press `ENTER` to install PBS Application Services.
   - Enter `3` and press `ENTER` to install Access Web Services and PBS Application Services. This is the default option.

   > **Note:** The following steps will change based on your choice.

   If you enter 2 or 3, the following message is displayed. This message can be ignored. Press Enter and continue with the installation:

   ```
   ===============================================================================
   ```

```
PBS hooks directory absent
--------------------------

PBS Professional installation appears to be incomplete.
PBS Professional installation appears to be incomplete. Cannot locate
/server_priv/hooks
Please select "OK" to continue  OR "Cancel" to exit installation

  ->1- OK
    2- Cancel

ENTER THE NUMBER OF THE DESIRED CHOICE, OR PRESS <ENTER> TO ACCEPT THE
   DEFAULT:
```

7. Enter the license server details and press `ENTER`.

   The license server details should have the port and hostname in the format `port@hostname`. You can provide multiple license server details separated by a colon in Linux and semi-colon in Windows.

   It is not mandatory to provide the license server at installation time. You will however be required to configure the license server information prior to logging into Access Web.

8. If you are installing PAS, enter a staging directory and press `ENTER`.

   The staging directory is where user's job files will be staged prior to execution. This directory must exist prior to the installation of PAS.

   The stage area can grow quite large depending on the size of the average job. It's not recommended the use `/tmp` or user's `/home` as the staging directory, as they will get periodically purge.

9. Enter the service user and press `ENTER`.

   The default service user is 'pbsworks' and the Access Web service is registered under this user.

10. Enter the location where the Access Web binaries are to be installed.

    You may choose to install in the default location.

11. Enter the location where the Access Web configuration and logs files are to be installed.

    You may choose to install in the default location.

12. If Access Web is being installed, enter the HyperWorks location for visualizing results.

    For example, `/opt/hw2017.2/altair/`. The Access Web 2019.3.1 supports HyperWorks 2017.2.0.16.

    > **Note:** You can also configure this path after the installation by editing `PA_HOME/config/resultservice/config/site_config.xml` configuration file.

13. Review the installation summary and press `ENTER`.
    The installation starts. It may take a few minutes for the installation to complete.

    > **Note:** If you are upgrading from previous version, then do not start Access Web.

14. Start Access Web manually by entering the following command:

```
service pbsworks-pa start
```

> **Note:** Access Web starts a watcher process which will monitor the status of Access Services. The watcher process automatically brings up any services that goes down abruptly.

> **Note:** It is mandatory to perform Modern Communication Setup on Linux to complete the installation.

15. Login to the machine hosting the PBS Server.
16. As a PBS Operator or Manager enter the following command:

```
qmgr -c 'set server job_history_enable=True'
```

Perform Modern Communication Setup on Linux to enable the use of the modern infrastructure for faster running jobs on Linux.

If you want to run interactive jobs, you must now install the Interactive Application component of Access Web.

5.3 Modern Communication Setup on Linux

Enable the use of the modern infrastructure for faster running job operations on Linux.

Before you begin:

- The location of modern communication can be local to compute nodes and does not require a shared location
- A user having password-less SSH must be present on Server and Mom(s)

The following steps will distribute modern communication module to all the Execution Nodes.

1. Navigate to the directory `PA_EXEC/joboperation/scripts`
2. Execute the script modern communication modules (`distribute_modern_comm_modules.py`):

   ```
   python distribute_modern_comm_modules.py
   ```

   The script will guide you in distributing modern communication module.
3. Enter the location to distribute.

   > **Note:** Location of modules must be accessible by all users.

4. Enter the user name who has password-less access across the nodes.

   > **Note:** User must present on all the PBS Server and PBS Mom machine(s) and they should be able to communicate without password.

   The following message is displayed:

   ```
   Do you want to override if modules already exist (Y/N). [Default: N]?
   ```
5. Enter `Y` to override.

   The script will display the inputs provided.
6. Enter `Y` to continue with the inputs provided.

   The following information is displayed:

   ```
   Transferring Client Modules to n2.lab.com...
   Successfully transferred to 'n2.lab.com'
   Transferring Client Modules to n1.lab.com...
   Successfully transferred to 'n1.lab.com'
   Updated PAS Configuration file successfully
   ```
7. Restart the Access Web by entering the command:

   ```
   service pbsworks-pa restart
   ```

5.4 Install Remote Sessions Components

Install components necessary to enable the remote session capabilities of Access Web.

- Review the system requirements and prerequisites for installation.
- Run Remote Sessions precheck diagnosis script in PBS MoM to check the status of GPU nodes.

A separate installer is required to install the Remote Sessions components. Download or obtain the installer binary using your usual Altair support channels.

The installer will need to be run multiple times across several machines and must be performed in the following sequence:

1. Install the Remote Sessions component on the PBS Professional headnode and in the machine where PBS Application Services is installed. This installation will:
   - add a custom resource to PBS Professional called "ngpus"
   - creates an interactive queue called "iworkq"
   - add a new application definition "GlxSpheres" to PAS
   - restart PBS Professional and Access Web
2. Install the Remote Sessions component on all PBS MoMs on which you want to run interactive jobs.

After installing the Remote Sessions component, view the value of the `jobsub.monitor.host` variable in the file `PA_HOME/config/displaymanager/dmrest.properties` to confirm the configured hostname. If there is no access through hostname, then a slight delay may occur while opening a remote session for the first time.

5.4.1 Install the Remote Sessions Component on the PBS Professional Server and on PAS

Install binaries and configure PBS Professional and PAS to support interactive applications.

Before you begin:

- Review the system requirements and prerequisites for installation.

Install the remote session component on the PBS Professional headnode and in the machine where PAS is installed.

Installation must be done as root or as a user with sudo permissions.

This installation will:

- add a custom resource to PBS Professional called "ngpus"
- add an interactive queue called "iworkq"
- restart Access Web
- restart PBS Professional

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

1. Login to the machine where the PBS Professional Server and PAS is installed.
2. Enter the command:
   ```
   ./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
   console
   ```
3. Read the introduction and press `ENTER`.
4. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
5. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four options are displayed.
6. Enter `1` to configure the PBS Professional and PAS servers and press `ENTER`.
7. PBS Professional and PAS is restarted during the installation process, choose whether you want to proceed:
   - Choose `No` to exit and run the installer at a more suitable time.
   - Choose `Yes` to run the installer.
8. Enter the number of GPUs that are available in the cluster and press `ENTER`.
   If you have a cluster with 10 execution hosts and only two of those execution hosts have associated GPUs, then add up the number of GPUs for both execution hosts and enter this number.
9. Review the installation summary and press `ENTER`.
   The installation starts. It may take a few minutes for the installation to complete.
10. Press `ENTER` to complete the installation process.

Verify that iworkq is created, a GPU resource is configured, and GlxSpheres is installed.

Verifying the Existence of the Interactive Queue

Verify that a PBS Professional interactive queue has been created.

After running the interactive installer on the PBS Professional Server, a queue called "iworkq" should exist. All interactive jobs are submitted to this queue. The attribute *max_queued_res.ngpus* denotes the number of GPUs available in the cluster and should reflect the number entered during installation. Other attributes used internally by Access Web are *resouce_max.ngpus* and *resouce_min.ngpus*. These two attributes are always to set the value of "1".

Enter the command:

```
qmgr -c "p q iworkq"
```

Output similar to the following is displayed:

```
#
# Create queues and set their attributes.
#
#
# Create and define queue iworkq
#
create queue iworkq
set queue iworkq queue_type = Execution
```

```
set queue iworkq Priority = 150
set queue iworkq max_queued_res.ngpus = [o:PBS_ALL=7]
set queue iworkq resources_max.ngpus = 1
set queue iworkq resources_min.ngpus = 1
set queue iworkq resources_default.arch = linux
set queue iworkq resources_default.place = free
set queue iworkq default_chunk.mem = 512mb
set queue iworkq default_chunk.ncpus = 2
set queue iworkq enabled = True
set queue iworkq started = True
```

Verifying the Existence of the Interactive Custom Resource

Verify that a new resources called ngpus has been added to PBS Professional.

After running the interactive installer on the PBS Professional headnode, a new custom resource called ngpus is added to PBS Professional. This resource is necessary to run interactive jobs. You can verify the existence of this custom resource by viewing the contents of the PBS Professional resource definition file and the scheduler's configuration file.

1. Navigate to the location `PBS_HOME/server_priv`
2. Enter the command:

   ```
   grep -A3 "DM STATIC" resourcedef
   ```

   The resource ngpus should be defined in this file.

   ```
   # ************ BEGINNING OF DM STATIC RESOURCES SECTION.DO NOT EDIT BY HAND ******
   ngpus type=long flag=nh
   # ************ END OF DM STATIC RESOURCES SECTION.DO NOT EDIT BY HAND ************
   ```
3. Navigate to the location `PBS_HOME/sched_priv`
4. Enter the command:

   ```
   grep ngpus sched_config
   ```

   The resource ngpus should be displayed in the list of resources defined in this file.

   ```
   resources: "ncpus, mem, arch, host, vnode, netwins, aoe, ngpus"
   ```

Verifying the Installation of the Interactive Application Definition

Verify that a new application definition called GlxSpheres is installed.

1. Login to the machine hosting the PAS Server as root or a user with sudo permissions.
2. Navigate to the directory `PA_HOME/data/pas/targets/localhost/repository/applications`.
3. Verify that a new application definition has been placed in this location called GlxSpheres.

5.4.2 Install the Remote Sessions Component on the PBS MoMs

Install binaries and configure the PBS Mom to support interactive applications.

Before you begin:

- Review the system requirements and prerequisites for installation.
- Run Remote Sessions precheck diagnosis script in PBS MoM to check the status of GPU nodes.

Install necessary components on the PBS MoM to support interactive applications, including TurboVNC and Virtual GL. The installer also configures a new resource called "ngpus".

Install the Guacomole proxy server by default to support interactive applications.

> **Note:** This installation process must be repeated for all execution hosts where you want to run interactive jobs.

Installation must be done as root or as a user with sudo permissions.

1. Login to the machine where the PBS Professional MoM is installed.
2. Enter the command:
   ```
   ./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
    console
   ```
3. If you are installing the PBS MoM interactive component on a machine hosting both the PBS Professional Server and the MoM you will see the below message, enter `1` and press `ENTER`.
   ```
   Manage Instances
   ----------------
   ->1- Install a new instance
     2- Modify an existing instance
   ```
4. Read the introduction and press `ENTER`.
5. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
6. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four options are displayed.
7. Enter `2` and press `ENTER`.
8. Enter the location where the binaries are to be installed and press `ENTER`.
   You may choose to install in the default location.
9. Enter the location where the configuration and logs files are to be installed and press `ENTER`.
   You may choose to install in the default location.
10. Enter the number of GPUs available on the execution host and press `ENTER`.
11. Review the installation summary and press `ENTER`.
    The installation starts. It may take a few minutes for the installation to complete.
12. Press `ENTER` to complete the installation process.
    The TurboVNC and Virtual GL is installed to support interactive applications by configuring X Server.
13. Restart the X Server.

> **Warning:** Restarting the X Server might affect any running graphical applications. Please make sure that are no critical graphical applications running.

Verify that "ngpus" resource has been added to the execution host by executing the command:

```
pbsnodes -av
```

The new resource should be listed and it should be assigned the value entered for the available GPUs entered during installation.

```
resources_available.ngpus = <NGPUS>
```

Verify that the Guacamole proxy daemon is installed and running by issuing the following command:

```
service guacd status
```

Install Access Web on Windows

6

Load Access Web Docker image in Windows Docker, install PAS in Windows, install Remote Sessions agent, application definitions, update docker environment list, start docker container and start PAS service.

This chapter covers the following:

Before you begin:

- Ensure that the PBS Professional cluster for Windows is installed and running.
- Docker is installed and running on the machine where you are going to install Access Web. Refer to Install Docker Desktop for Windows for more information.
- For the application to run smoothly, your windows Docker requires 8 CPU cores and 16 GB Memory.

Download or obtain the following files using your usual Altair support channels:

- Access Web Docker 2019.3.1 Tar File (`AltairAccessWeb_Docker_Container_2019.3_494_20190923_195602.tar`)
- PAS 2019.3.1 Installer (`AltairAccessWeb_PAS_2019.3_494_20190923_195602`)
- If you site is going to run interactive applications, then download the Remote Sessions Agent Installer (`AltairAccessWeb_RemoteSessionAgent_2019.3_494_20190923_195602`)
- Docker Environment List (`env.list`)
- Application Definitions repository
- Remote Sessions Application Definition Zip File (`windows_remotesession_appdef.zip`)

The following will be the infrastructure after you install Access Web and PAS on Windows:

- PAS running along with PBS Pro cluster on Windows machine.
- Access Web will be running in Docker.

Note: It is mandatory to perform Modern Communication Setup on Windows after you Install Access and Docker Setup.

Note: The following are some of the Docker commands that will be useful:

- To check the Docker container ID use the following command:
  `docker ps -q`
- Use the following command to copy a file from the container to the local machine:
  `docker cp CONTAINER_ID:<source path> <local destination path>`
- Use the following command to copy the file from the local machine to the container:
  `docker cp <local source path> CONTAINER_ID:<destination path>`

6.1 Configure Network for Faster PBS Response

Disable IPV6 and set IPV4 as the preferred protocol to make sure PBS commands are responding quickly and Docker containers are able to ping the host machine.

Before you begin:

- Refer to Configuring IPV6 in Windows for Advanced Users for more information.

Skip this topic if IPV4 is set as the preferred protocol.

To disable IPV6 and set IPV4 as the preferred protocol, the following steps must be performed:

- Disable IPV6 for all adapters.
- Edit Registry to prefer IPV4 over IPV6.

Disable IPv6 for all adapters

1. Go to **Control Panel** > **Network and Internet** > **Network and Sharing Center**
2. Select **Change adapter settings**.

   > **Note:** The following steps must be performed for all the adapters in the **Change adapter settings**.

3. Right-click on an adapter and select **Properties**.
4. Disable **Internet Protocol Version 6 (TCP/IPv6)** by removing the check-box.
5. Select **Internet Protocol Version 4 (TCP/IPv6)** and click **Properties**.
6. Click **Advanced** in the **Internet Protocol Version 4 (TCP/IPv6) Properties** dialog box.
7. Disable **Automatic metric** in the **Advanced TCP/IP Settings** dialog box.
8. Enter a positive integer value greater than 0 in the **Interface metric**.

   If you are using Ethernet, then enter the value as 1 and for the rest enter some higher number based on your preference. The lower the number the higher will be the preference.

Edit Registry to Prefer IPv4 over IPv6

9. Press **Windows + R** key to open the **Run Dialog box.**
10. Enter **regedit**.
11. Navigate to `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\tcpip6\Parameters\`.
12. Right-click **New** > **DWORD (32 bit) Value**
13. Enter the name as **DisabledComponents** and set its Data value to 20 (Hexadecimal).
14. Restart the machine.

6.2 Disable User Access Control (UAC) in Windows

Disable User Access Control for Access Web Windows setup to make sure the user is not blocked while executing any executables.

Skip this topic if you the User Access Control is disabled.

1. Open **Control Panel**
2. Navigate to **User Accounts and Family Safety\User Accounts**
3. Click **Change User Account Control Settings**.
4. Change it to **Never Notify**.
5. Click **Ok**.
6. Press **Windows + R** key to open the **Run Dialog box.**
7. Enter **regedit**.
8. Navigate to `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System\`.
9. Set the value of **EnableLUA DWORD** to 0.

   > **Note:** Create the **EnableLUA DWORD** key if it is not available.

10. Restart the machine.

6.3 Install PAS On Windows

Steps for installing PAS on a Windows platform.

Download or obtain the PAS Windows Installer using your usual Altair support channels.

These instructions will install PAS in `C:\Program Files\altair\pas\2019.3.1\`. This directory will be denoted as `PAS_INSTALL`. You may install PAS in a non-default location. However, please note this while following the below instructions.

1. Locate the PAS installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
2. Enter the installation location.

   By default, the installation location is `C:\Program Files\altair\pas\2019.3.1\`.
3. Enter the staging directory.

   By default, the staging directory is `C:\stage`.
4. Review the Pre-installation Summary and click **Install**.

   On completion, the installer will provide the details of the installation directory, host and port. By default, PAS will be running on port 5243 and `https` protocol.
5. Navigate to `PAS_INSTALL\PAS\exec\scripts\`.
6. Execute the script `update_service_user.py` by providing the service user name:

   ```
   python update_service_user.py pbsadmin
   ```
7. Start PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Start**.

> **Note:** It is mandatory to perform Modern Communication Setup on Windows before you Install Access and Docker Setup.

See Also
PBS Application Services Service Commands

6.4 Modern Communication Setup on Windows

Enable the use of the modern infrastructure for faster running job operations on Windows.

By default PAS is installed at `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

The `momclientmodules` folder will be available in the PAS installation directory at `PAS_INSTALL\PAS\exec\joboperation\binaries`.

1. Copy the directory `PAS_INSTALL\PAS\exec\joboperation\binaries\momclientmodules` from the machine where PAS is installed to `C:\` of the execution node.
2. Give Full control permissions to Everyone for the `momclientmodules` directory:
   a) Right click on `momclientmodules` and select **Properties**.
   b) Click **Security** tab.
   c) Click **Advanced**.
   d) Click **Add** and click on **Select a Principal**.
   e) Type in **Everyone** and click **Check Names**
   f) Click **OK**
   g) Select **Full Control** on **Permissions** section.
   h) Click **OK**.
3. Repeat Step 1 and 2 for each PBS MoM.
4. Login to the machine where PAS is installed.
5. Edit the file `PAS_INSTALL\PAS\home\config\pas\conf\server.conf` and update the distributed location:
   ```
   MODERN_COMMUNICATION_SHARED_LIBS=C:\momclientmodules
   ```
6. Restart PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Retart**.

See Also
PBS Application Services Service Commands

6.5 Access Web and Docker Setup

Load the Access Web Docker image into Docker and update the Docker environment list.

The `env.list` file must be updated with:

ALTAIR_LICENSE_PATH
: Specify Altair license server details in the format port@ip address or port@hostname.

HOSTNAME
: IP Address/Hostname of the Windows Machine where Remote Sessions Agent is Installed.

HW_DESKTOP_LOCATION
: Specify the HyperWorks installation path.

HOST_ENTRIES
: Specify the IP addresses of PBS Server and PBS MOM.

TIME_ZONE
: Time zone of the machine where PBS Server is running.

Download or obtain the Access Web Docker 2019.3.1 Tar file and Docker environment list (`env.list`) using your usual Altair support channels.

1. Load the Access Web Docker image into Docker using the following command:
   ```
   docker load -i TARFILE
   ```
   Where *TARFILE* is the name of the Access Web tar file.
2. Update the license path, hostname, HyperWorks installation location, host entries, and time zone in the Docker environment list (`env.list`).
   For example, the modified `env.list` will be as follows:
   ```
   ALTAIR_LICENSE_PATH=6200@10.130.3.175
   HOSTNAME=10.75.20.123
   HW_DESKTOP_LOCATION=10.75.32.34:/apps/hwdesktop
   HOST_ENTRIES="10.75.22.95 blrpc686, 192.168.33.23 23centos7"
   TIME_ZONE=/usr/share/zoneinfo/Asia/Kolkata
   ```
3. Start the Access Web Docker container using the following command:
   ```
   docker run -itd --env-file .\env.list --entrypoint /tmp/scripts/access_setup.sh ^
   --name windows_access --privileged -p 4443:4443 -p 4222:4222 -p 4943:4943 ^
   -p 4743:4743 windows_docker:latest bash
   ```
4. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
5. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```
6. Navigate to `PA_HOME/config/resultservice/config`.
7. Edit `site_config.xml`.
8. Locate the following line: `<AIFImpersonation enabled="true">`
9. Change `@enabled="true"` to `@enabled="false"`.
10. Start Access Web using the following command:
    ```
    service pbsworks-pa start
    ```

11. Login to the Access Web portal and add the PAS server.

- The Service User should have logged in to Access Web after starting or restarting Access Web and before registering the PAS service.
- PAS installed in Windows will be running on port 5243 and `https` protocol. Please register the Windows PAS server in Access Web.
- If PBS MOM is also active in same machine as PAS, then make sure you do not start remote session from the same user through which you started the docker and PAS service.

See Also

Access Web Service Commands

6.6 Install Remote Sessions Agent on Windows

Install the Remote Session component on Windows.

Download or obtain the Remote Sessions Windows Installer using your usual Altair support channels.

Install the Remote Sessions Windows installer on all PBS MoMs.

1. Locate the Remote Sessions installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
2. Enter the installation location.

   By default, the installation location for binaries and configuration is `C:\altair\pbsworks\2019.3.1\remotesessionagent`.
3. Review the Pre-installation Summary and click **Install**.
4. Once the installation is complete check that the Remote Sessions service is running:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Locate the **DMAgent Service**.

      The status should be "Started".
   d) If the service is not running then, right-click the **DMAgent Service** and click **Start**.

See Also
Remote Sessions Service Commands

Post-Installation Configuration 7

Mandatory configuration steps that must be completed before Access Web can be started.

This chapter covers the following:

Before you start the Access Web service, you must copy over default application definitions provided by Altair and a corresponding PAS site configuration file.

7.1 Copy Application Definitions and Site Configuration File

Copy default application definitions and a PAS site configuration file.

Default application definitions and a site configuration file are provided to get you up and running quickly. Obtain them through your usual Altair support channels.

1. Login to the machine where PAS is installed as root or as a user with sudo permissions.
2. Copy any default application definitions required for your site to the location: `PA_HOME/data/pas/targets/localhost/repository/applications`
3. Copy the default `site-config.xml` file to `PA_HOME/data/pas/targets/localhost/repository`
4. Edit the `site-config.xml` file.
5. For each application, update the value of the XML element `<Executable>` to the location of the application's executable.

```
<Application id="Abaqus">
   <ApplicationVersions>
       <ApplicationVersion>
          <Option>13.0</Option>
          <Executable>/opt/scripts/abaqus</Executable>
       </ApplicationVersion>
   </ApplicationVersions>
</Application>
```

6. Remove `time_stamp.txt` from `PA_HOME/data/pas/`

7.2 Configure the License Server

Configure the license server after Access Web installation in console mode.

During the installation Access Web, you are prompted to provide a license server in the format `port@hostname`. If this information is not provided at that time, then the license server must be configured post-installation.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Open the file `app.properties` located at `PA_HOME/config/license/`
3. Change the value of *`pbsworks.license.server`* to the port and hostname of the license server in the format `port@hostname`.

   ```
   Licensed application name
   pbsworks.license.application=PBSAccess

   #server location for license server
   pbsworks.license.server=6200@cntrlicsrv03
   ```
4. Restart Access Web for these changes to take effect by entering the following command:

   ```
   service pbsworks-pa restart
   ```

7.3 Log into Access Web

Log into Access Web so that you can submit and monitor jobs.

Review the supported browsers before logging into Access Web.

Before you can submit a job, a service cluster must be added. Only the portal administrator can add service clusters.

The Service User is automatically designated as the portal administrator. The Service User has the ability to add other user's and assign them the role of portal administrator. The portal administrator is the only user who can add, edit, and delete service clusters.

A localhost cluster is added by default, if Access Web is installed with PBS Application Services (PAS).

1. Enter the URL `https://<hostname>:4443/pbsworks` in the address bar of a supported browser. where `<hostname>` is the IP address or hostname of the machine where Access Web is installed. The Access Web login screen is displayed.
2. Enter your username and password.
3. Click **Log In.**

If Access Web is not installed with PAS, then you must add a service cluster.

7.4 Add a Service Cluster

Establish a connection to an HPC cluster so that you may begin submitting jobs.

Before you can configure a cluster, you must know the hostname of the PAS Server installed on the PBS Professional headnode.

The Service User provided during installation of Access Web is automatically designated as the portal administrator. The portal administrator is the only user who can add, edit, and delete service clusters. The portal administrator can add other users and assign them the role of portal administrator.

A service cluster must be added before jobs can be submitted to the Workload Manager.

Note: A localhost cluster is added by default, if Access Web is installed with PBS Application Services (PAS).

1. Choose one of the following options:
   - If no service clusters have been configured, click the **Configure one or more services** link.
   - Click and then click **Add**.

   The Add Service Cluster screen is displayed.

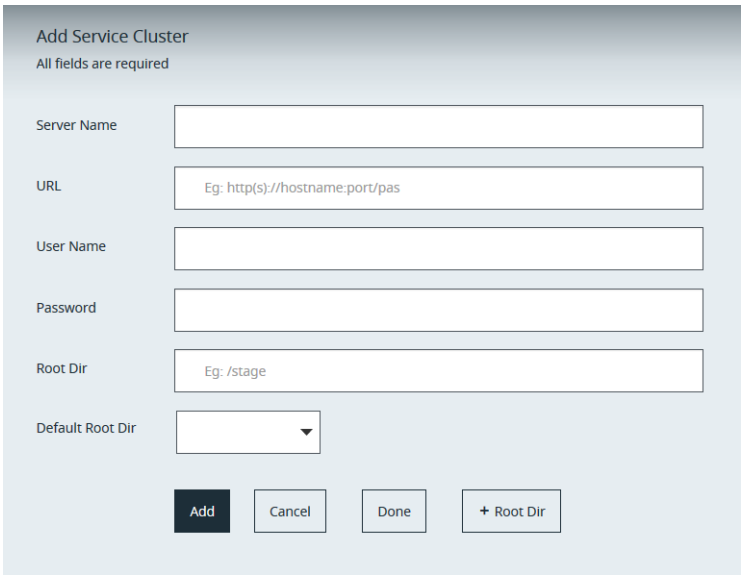


Figure 4: Add Service Cluster

2. For **Server Name**, enter a short name describing the cluster.
3. For **URL**, enter the URL for connecting to the Workload Manager.

   The URL is in the format `https://<hostname>:5243/pas` where `<hostname>` is the hostname of the machine where the PAS Server is installed (typically the PBS Professional headnode).

> **Note:** It is recommended to add a cluster using the hostname of the PAS Server rather than the IP address. This prevents connectivity issues from arising when an IP address is changed (DHCP, etc.).

4. For **User Name** and **Password**, enter your login credentials.
   The user name and password must be available in PAS.
5. For **Root Dir**, enter the pathname where user job input and result files are stored.
   Ex: `/home`, `/users`, `/stage`
6. Click + Root Dir if you want to add another **Root Dir** and enter the pathname.

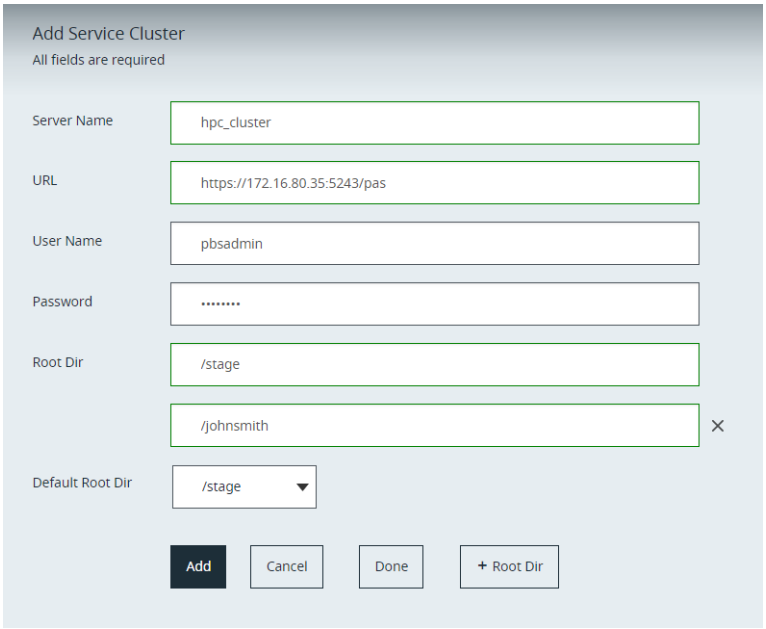


Figure 5: Multiple Root Directory Entry

7. Select the default root directory to be displayed from the **Default Root Dir** drop-down menu.

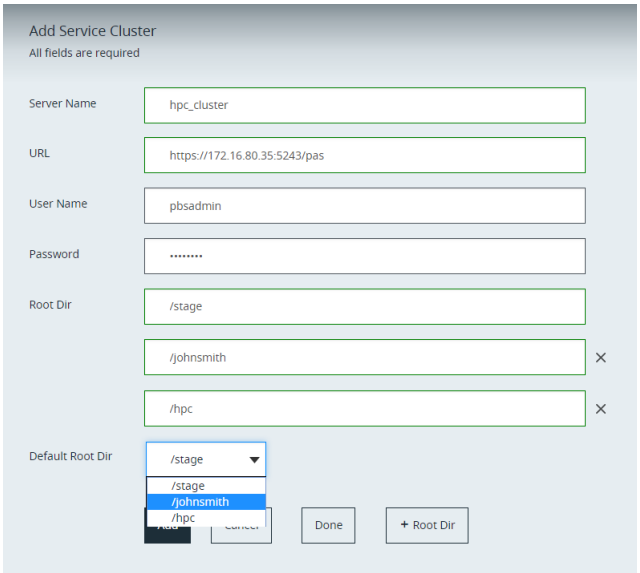


Figure 6: Default Root Directory

8. Click **Add**.
   If the service cluster is added successfully, then a notification is displayed.

   Note: A notification is displayed to all users logged into Access Web when a service cluster gets added, edited, deleted, if it goes down or if it is unreachable.

9. Repeat steps 2 through 8 to add additional service clusters.
10. Click **Done**.
    A list of service clusters that have been added is displayed.

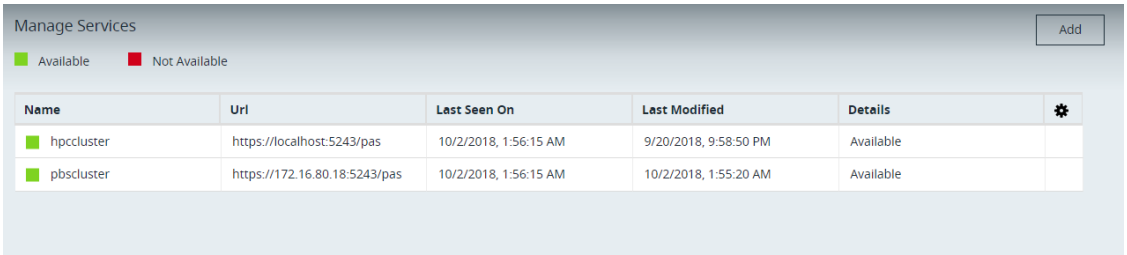


Figure 7: Service Clusters List

The green color next to the service cluster indicates that it is available to use. The red color indicates that the service cluster is not available.

The **Details** column provides the reason when a service cluster is not available. Mouse hover the **Details** column of a service cluster to view the error message.

Figure 8: Service Cluster Details

7.5 Onboard an Application Definition

Port an application definition from a legacy version of PBS Works so that it can be used by Access Web.

Access Web allows onboarding the legacy application definitions in a very easy way and it can be done at any time.

> **Note:** The `site-config.xml` file must be updated manually after you onboard the legacy application definitions or you can copy over a site configuration file from a previous installation of Access or Compute Manager.

Recommended techniques for onboarding legacy application definitions:

Test Legacy Application Definitions
: Submit jobs to an HPC cluster and verify that Access Web can render and submit the job properly.

Upgrade Application Definitions to Use Access Web Features
: Access Web allows you to enhance your application definition by making some modification for using the following features of Access Web:

  Submit a Job using a Right-Click Context Menu
  : Access Web includes a feature that allows a job to be submitted to an HPC cluster by right-clicking a job input file and choosing a solver. This eliminates the need to submit a job using a job submission form. Below are changes that must be made to the application definition to enable this feature:

    PRIMARY_FILE and QUEUE Arguments in Application Definition
    : Application definitions must have a PRIMARY_FILE argument defined in the application definition input file that represents the primary input file for the solver. If a legacy application definition calls the primary input file something other than PRIMARY_FILE, then a mapping file must be updated to port the application definition. Additionally, if the legacy application definition contains an application argument that represents the queue to which the job is submitted, the name of the application argument must be QUEUE. If it is not, the mapping file must be updated.

    Update a Solver's Application Definition to Link it to a Specific File Extension
    : Update a solver's application definition to link it to a specific file extension. Access Web links a job input file to a specific application or solver via the file's extension. For example, the solver Optistruct is a structural analysis solver and can process input files with a .fem extension. The association between the file extension and the solver is done through the application definition and must be set up so that Access Web can determine which solvers are available for a file extension.

  Extracting Include Files from a Master File
  : Another feature available with Access is the ability to extract the names of include files from a master file and automatically populate a job submission form argument of type FILE_MULTI with the list of include files. A special script called the Master File Analyzer script is required to read the master file and identify the include files.

This feature must be enabled in the application definition to dynamically identify the include files. The default application definitions with Master File Analyzer capabilities are provided to get you up and running quickly. Obtain them through your usual Altair support channels.

Refer to the tutorial *Extracting Include Files from a Master File* in *Diving Into Application Definitions* to convert or write application definitions that support the Master File Analyzer script.

7.5.1 Integrate Right Click Context Menu of Access Web

Enrich your legacy application definition so that a job can be submitted by right-clicking a job input file and selecting a solver.

1. Edit the solver's application input file `app-inp-application.xml`
2. Link the file extension to the solver by adding the following XML:

   ```
   <ApplicationExtension>file_extension</ApplicationExtension>
   ```

   The below example links a file with the extension of .fem to the Optistruct solver.

   ```
   <ApplicationId>Optistruct</ApplicationId>
   <ApplicationName>Optistruct</ApplicationName>
   <ApplicationExtension>.fem</ApplicationExtension>
   ```
3. Save the application input file.
4. Update the site configuration file `site-config.xml` with the appropriate application information such as versions and policies:

   ```
   <Applications>
       <Application id="Optistruct">
           <ApplicationVersions>
               <ApplicationVersion>
                   <Option>11.0</Option>
                   <Executable>/opt/hyperworks/11.0/altair/scripts/optistruct</
   Executable>
               <ApplicationVersion>

               <ApplicationVersion>
                   <Option>12.0</Option>
                   <Executable>/opt/hyperworks/12.0/altair/scripts/optistruct</
   Executable>
               <ApplicationVersion>
           </ApplicationVersions>
   </Application>
   </Applications>
   ```
5. Edit the file `PA_HOME/config/pa/appmapping/applicationmapping.json`
6. Add the following JSON between the bracket []

   ```
   {
       "serverName": "server-1","version": "13.1","applications":
       [
           {
           "applicationName": "RADIOSS-SMP",
           "primaryFile": "MASTER_FILE",
           "queue": "Queues"
           }
       ]
   }
   ```

7. Change the value of serverName to the name of the server provided when adding the service cluster to Access Web.

```
"serverName": "server-1",
```

8. Change the value of version to the legacy version of PBS Works that you are porting from.

```
"version": "13.1",
```

9. Change the value of *applicationName* to the name of the application that you want to port.

   Denoted by the XML element <ApplicationName> in the legacy application definition. The legacy XML looks like this:

```
<ApplicationName>Optistruct</ApplicationName>
```

   The JSON should look like this:

```
"applicationName": "Optistruct"
```

10. Change the value of *primaryFile* to the name of the application argument that represents the application input file for the solver.

    Denoted by the XML element <Name> in the legacy application definition. The legacy XML looks like this:

```
<ArgumentChoice>
    <ArgumentFileName>
        <Name>MASTER_FILE</Name>
        <Description>Select your Optistruct Master file.</Description>
        <DisplayName>Master File</DisplayName>
        <InputRequired>true</InputRequired>
    </ArgumentFileName>
</ArgumentChoice>
```

    The JSON should look like this:

```
"primaryFile": "MASTER_FILE"
```

11. Change the value of *queue* to the name of the application argument that represents the queue to which the job is submitted.

    Denoted by the XML element <Name> in the legacy application definition. The legacy XML looks like this:

```
<ArgumentChoice>
    <ArgumentStringEnumerated>
        <Name>BATCH_QUEUE</Name>
        <Description>Select the batch queue you would like to submit to.</
Description>
        <DisplayName>Batch Queue</DisplayName>
        <InputRequired>false</InputRequired>
        <Option>workq</Option>
        <Option>testq</Option>
        <DefaultValue>workq</DefaultValue>
    </ArgumentStringEnumerated>
</ArgumentChoice>
```

    The JSON should look like this:

```
"queue": "BATCH_QUEUE"
```

12. Add additional applications by repeating previous step 9-11 making sure that when you add the next application to the JSON mapping file you separate the applications using a comma.

```
"applications":
[
    {
        "applicationName": "ShellScript",
```

```
        "primaryFile": "JOB_SCRIPT"
    },
    {
        "applicationName": "Optistruct",
        "primaryFile": "MASTER"
    }
]
```

13. Save the file.
14. Copy your legacy application definitions to the PAS repository.
15. Restart PAS by issuing the command:

    ```
    service pbsworks-pa restart
    ```

    The following notification is displayed to any users that are logged into Access Web:

    ```
    There is a change in configuration data.  Application will reload.
    ```

    Once Access Web reloads, the new application definition is available.
16. Right-click on a job input file that has the file extension that was just added to the application definition.
17. Verify that the correct solver and job profiles are being displayed in the context menu.

7.5.2 Master File Analyzer

The Master File Analyzer identifies the list of include files from the input or master file that is required to submit a job.

This feature must be enabled in the application definition to dynamically identify the include files. The default application definitions with Master File Analyzer capabilities are provided to get you up and running quickly. Obtain them through your usual Altair support channels.

You can refer to *Diving Into Application Definitions* guide and the samples provided to convert or write application definitions to support Master File Analyzer.

7.6 Enable PBS Job History

Enable the PBS Professional job history status.

PAS does not automatically set the PBS Professional *job_history_enable* attribute to `true`.

Therefore, to enable job history use the PBS Professional command:

```
qmgr -c 'set server job_history_enable=True'
```

7.7 Verify the Installation of PBS Application Services

Verify PAS installation and server status.

1. Open any of the supported browsers.
2. Enter URL (`https://<HOSTNAME>:<PORT>/pas`)

   Where *HOSTNAME* is the hostname of the machine where PAS is installed and *PORT* is the port that PAS listens on.

   > **Note:** The default port is 5243.

   The browser will display the PAS information.

   Messages similar to the following are displayed:

7.8 Configure Results Visualization Service

This sections provides relevant information for the administrator in configuring the Results Visualization Service (RVS).

7.8.1 Configure HyperWorks Location

Configure the Altair HyperWorks Desktop location to enable the results visualization capabilities.

Follow these steps when the HyperWorks location was not specified while installing Access Web 2019.3.1.

1. Edit the file at `PA_HOME/config/resultservice/config/site_config.xml`.
2. Change the value of the *`location`* to the location of HyperWorks.

```
<Products>
   <Product id="ALTAIR_HYPERWORKS" defaultVersion="2017.2">
        <Version id="2017.2" location="HW_EXEC/altair/" />
   </Product>
</Products>
```

3. Restart Access Web using the following command:

```
service pbsworks-pa restart
```

7.8.2 Configure HyperWorks Licenses

Install the Hyperworks Desktop features, HWHyperMath and HWHyperViewTrans in a LMX server.

These feature licenses must be available via a LMX version 14.0 or newer license server to enable the visualization of the supported result files. To configure, point RVS to the HyperWorksinstalled license server. Refer Point RVS to the HyperWorks License Server.

The HyperWorks Desktop installation should not be in `/root` or any user's home directory and in a location where all users have read and write permission.

Install `"libXScrnSaver-1.2.2-6.1.el7.x86_64"` package for HMathserv to run after installing the HyperWorks Desktop software.

> **Tip:** Install HyperWorks Desktop by following the Linux installation instructions in the `HyperWorks 2017 Installation Guide`.

Point RVS to the HyperWorks License Server

Update the Altair license path to point to the HyperWorks license server.

Point RVS to the HyperWorks license server to keep the HyperWorks and Access Web licenses separate.

1. Open the file at `PA_EXEC/resultservice/scripts/setenv.sh`.

2. Update the Altair license path to point to the HyperWorks license server in this format `port@hostname`.

```
export ALTAIR_LICENSE_PATH=port@hostname
```

This will enable the RVS capabilities of Access Web.

Licensing System of HyperWorks Units

RVS uses the Altair patented licensing system of HyperWorks Units (HWU).

Animation requests checkout 6 HWUs and plot requests checkout 10 HWUs. Units are leveled for the same user but stacked for different users. Licenses are checked out only during the results extraction. As soon as the results are extracted, units are immediately returned to the licensing pool. The client side rendering of plot and animation results are covered by Altair Access licensing and does not require any extra units.

7.8.3 Configure Data Directory

Configure the RVS data directory for storing the RVS data such as result files, temporary files and cache data.

1. Open the file at `PA_HOME/config/resultservice/config/site_config.xml`
2. Configure the folders to store your RVS data in the following line:

```
<HWE_RM_DATA_LOC><folder_name</HWE_RM_DATA_LOC
```

> **Note:** By default, the RVS data is stored in the temp folder.

3. Restart Access Web using the command, `service pbsworks-pa restart`.

7.8.4 Kill HyperWorks HyperMath Process Ids

After upgrade or installation, kill any HyperWorks HyperMath Process ids of your previous version of Access Web.

Follow the given steps:

1. To check if there any of the HMath processes that are running, use the command:

```
ps -ef | grep hmathserv
```

   The list of HMath process ids is displayed.

2. To kill a process id, specify the `process id` in the following command:

```
kill -9 <process id>
```

7.8.5 Allow Pop-up Windows

In the supported web browsers, allow the pop-up windows to view the auto-refresh loading messages for a running job.

Follow the steps given to enable pop-up windows in Google Chrome.

1. Open the supported browser, Google Chrome.
2. Click ⋮ located in the top-right corner of the web page.
3. Choose **Settings**. Click **Advanced** and choose **Site Settings**.
4. Click **Pop-ups and redirects** and change the permissions as follows: Slide the option to **Allowed**. This will allow pop-up windows for all the sites you access.
5. Click **Add** under **Allow** section.
6. On the **Add a site** window, add the Site address. This will allow pop-up windows for the sites you add.

Downgrade Access Web

8

Instructions for downgrading Access Web 2019.3.1 to a previous version.

Perform these steps to downgrade Access Web and PAS (single and different machine setup) 2019.3.1 to 2019.3, 2019.2 or 2019.1.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Stop Access Web 2019.3.1 using the following command:
   ```
   service pbsworks-pa stop
   ```
3. Create a backup of `/etc/pbsworks-pa.conf` as `/etc/pbsworks-pa.conf.2019.3.1`
4. Rename `/etc/pbsworks-pa.conf.CurrentlyInstalledVersion` to `/etc/pbsworks-pa.conf`
5. Copy `PreviousVersion_PA_EXEC/init/pbsworks-pa` script to `/etc/init.d/`
   You are successfully downgraded to previous version of Access Web.
6. Start Access Web using the following command:
   ```
   /etc/init.d/pbsworks-pa start
   ```
7. Enter the URL `https://<hostname>:4443/pbsworks` in the address bar of a supported browser.
   where `<hostname>` is the IP address or hostname of the machine where Access Web is installed.
   The Access Web login screen is displayed.
8. Enter your username and password.
9. Click **Log In.**

Downgrade Access Web on Windows

9

Instructions for downgrading Access Web 2019.3.1 to a previous version on Windows.

This chapter covers the following:

9.1 Downgrade PAS On Windows

Instructions for downgrading PAS 2019.3.1 to a previous version.

By default PAS is installed in `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. You may install PAS in a non-default location. However, please note this while following the below instructions.

1. Stop PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Stop**.
2. Uninstall PAS 2019.3.1.
   a) Navigate to **Start** > **Control Panel** > **Programs and Features**.
   b) Scroll down until you find the **AltairAccessWeb_PAS** application.
   c) Right-click the **AltairAccessWeb_PAS** application, and then click **Uninstall/Change**.
3. Navigate to the previous version of installation:
   ```
   PAS_INSTALL\exec\scripts\
   ```
4. Register previous version of PAS service using the command:
   ```
   AltairAccessWeb_PAS_Service.bat install AltairPASService
   ```
5. Start PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Start**.

9.2 Modern Communication Setup on Windows

Enable the use of the modern infrastructure for faster running job operations on Windows.

By default PAS is installed at `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

The `momclientmodules` folder will be available in the PAS installation directory at `PAS_INSTALL\PAS\exec\joboperation\binaries`.

1. Copy the directory `PAS_INSTALL\PAS\exec\joboperation\binaries\momclientmodules` from the machine where PAS is installed to `C:\` of the execution node.
2. Give Full control permissions to Everyone for the `momclientmodules` directory:
   a) Right click on `momclientmodules` and select **Properties**.
   b) Click **Security** tab.
   c) Click **Advanced**.
   d) Click **Add** and click on **Select a Principal**.
   e) Type in **Everyone** and click **Check Names**
   f) Click **OK**
   g) Select **Full Control** on **Permissions** section.
   h) Click **OK**.
3. Repeat Step 1 and 2 for each PBS MoM.
4. Login to the machine where PAS is installed.
5. Edit the file `PAS_INSTALL\PAS\home\config\pas\conf\server.conf` and update the distributed location:
   ```
   MODERN_COMMUNICATION_SHARED_LIBS=C:\momclientmodules
   ```
6. Restart PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Retart**.

See Also
PBS Application Services Service Commands

9.3 Downgrade Access Web in Docker

Instructions for downgrading Access Web 2019.3.1 to a previous version in Docker.

You need to have the following files before beginning the downgrade:

- Windows Access Web 2019.2 Docker Tar (`windows_docker_2019_2.tar`) or 2019.3 Docker Tar (`windows_docker_2019_3.tar`)backup that was taken at the time of upgrade
- The `env.list` file of 2019.2

1. Login to the machine as an administrator where Access Web 2019.3.1 is installed.
2. Open Windows command line terminal and enter the command:
   ```
   docker exec -it windows_access bash
   ```
3. Check the Docker container ID using the following command:
   ```
   docker ps -q
   ```
4. Stop the Docker container:
   ```
   docker stop CONTAINER_ID
   ```
5. Remove the Docker container:
   ```
   docker rm -f CONTAINER_ID
   ```
6. Load the previous version of Access Web Docker Tar (`windows_docker_2019_2.tar` or `windows_docker_2019_3.tar`) backup that was taken at the time of upgrade:
   ```
   docker load -i windows_docker_<Version>.tar
   ```
7. Verify the license path, hostname, HyperWorks installation location, host entries, time zone, and service user in the 2019.2 or 2019.3 Docker environment list (env.list).

   Note: The 2019.3 Docker environment list (env.list) will not contain service user.

8. Start the Access Web Docker container:
   a) If you are starting Access Web 2019.2 Docker, then use the following command:
      ```
      docker run -itd --env-file .\env.list --entrypoint /tmp/scripts/
      access_setup.sh ^
      --name windows_access --privileged -p 4443:4443 -p 4222:4222 -p 4943:4943 ^
      windows_docker:latest bash
      ```
   b) If you are starting Access Web 2019.3 Docker, then use the following command:
      ```
      docker run -itd --env-file .\env.list --entrypoint /tmp/scripts/
      access_setup.sh ^
      --name windows_access --privileged -p 4443:4443 -p 4222:4222 -p 4943:4943 ^
      -p 4743:4743 windows_docker:latest bash
      ```
9. Login to the Access Web 2019.2 Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
10. Start Access Web using the following command:
    ```
    service pbsworks-pa start
    ```
11. Login to the Access Web portal and verify that the PAS server is registered.
    - The Service User should have logged in to Access Web after starting or restarting Access Web and before registering the PAS service.
    - PAS installed in Windows will be running on port 5243 and `https` protocol.

- If PBS MOM is also active in same machine as PAS, then make sure you do not start remote session from the same user through which you started the docker and PAS service.

9.4 Downgrade Remote Sessions Agent

Instructions for downgrading Remote Sessions 2019.3.1 to a previous version.

You need to have the following file before beginning the downgrade:

- Remote Sessions Agent 2019.3 or 2019.2 installer.

You have to perform the following steps in all the PBS MoM's.

1. Login in to PBS MoM machine where Remote Sessions Agent is installed.
2. Stop Remote Sessions Agent service.
3. Uninstall Remote Sessions Agent.
   a) Navigate to **Start** > **Control Panel** > **Programs and Features**.
   b) Scroll down until you find the **AltairAccessWeb_RemoteSessionAgent_2019.3.1** application.
   c) Right-click the **AltairAccessWeb_RemoteSessionAgent_2019.3.1** application, and then click **Uninstall/Change**.
4. Locate the previous version of Remote Sessions installer executable in Windows Explorer, right click and choose the **Run as administrator** option from the context menu.
5. Enter the installation location.

   By default, the installation location for binaries and configuration is `C:\altair\pbsworks\<Version>\remotesessionagent`.
6. Review the Pre-installation Summary and click **Install**.
7. Once the installation is complete check that the Remote Sessions service is running:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Locate the **DMAgent Service**.

      The status should be "Started".
   d) If the service is not running then, right-click the **DMAgent Service** and click **Start**.

Uninstall Access Web and Remote Sessions Component

10

Instructions for uninstalling previous version of Access Web and Remote Sessions component.

This chapter covers the following:

10.1 Uninstall Access Web

Remove a previous version of Access Web.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** Uninstalling Access Web will not remove `PA_HOME`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to the installation directory.
   The default installation directory is `/opt/altair/pbsworks/2019.3.1/access/Altair_Access_installation/`
3. Execute the uninstall script by entering the following command:
   ```
   ./Change_Altair_Access_Installation -i console
   ```
   The command must contain spaces with escape characters.
4. Follow the instructions provided by the uninstaller.

10.2 Uninstall Remote Sessions

Unconfigure PBS Professional and PBS Application Services and uninstall remote session components to disable the remote session capabilities of Access Web.

The uninstalling must be run multiple times across several machines and must be performed in the following sequence:

1. Unconfigure PBS Professional and PAS in PBS Professional headnode and in the machine where PBS Application Services is installed. This will
   - delete the interactive queue
   - unconfigure GPUs as a custom resource
   - remove the application definitions Glxsphere which is installed automatically when the Remote Sessions component was installed on the PAS Server
2. Uninstall Remote Sessions Components on all PBS MoMs.
3. Uninstall the interactive proxy.

10.2.1 Unconfigure PBS Professional and PBS Application Services

Unconfigure PBS Professional and PAS before uninstalling Remote Sessions Components.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands on Linux.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

Run the installer to unconfigure PBS Professional and PAS on the PBS Professional headnode and in the machine where PAS is installed.

This will:

- delete the interactive queue
- unconfigure GPUs as a custom resource
- remove the application definitions Glxphere which is installed automatically when the Remote Sessions component was installed on the PAS Server

1. Login to the machine where the PBS Professional Server and PAS is installed as root or as a user with sudo permissions.
2. Navigate to the folder where you have the Remote Sessions Agent installer.
3. Enter the command:

   ```
   ./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
    console
   ```
4. The installer will display the following message, enter `1` and press `ENTER`.

   ```
   Manage Instances
   ----------------
   ->1- Install a new instance
   ```

```
  2- Modify an existing instance
```

5. Read the introduction and press `ENTER`.
6. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
7. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four Options are displayed.
8. Enter `3` to unconfigure the PBS Professional and PAS servers and press `ENTER`.
9. PBS Professional and PAS is restarted during the installation process, choose whether you want to proceed:
   - Choose `No` to exit and run the installer at a more suitable time.
   - Choose `Yes` to run the installer.

10.2.2 Uninstall Remote Sessions Component from the PBS MoMs

Uninstall previous version of remote session component from PBS MoMs.

You must stop Access Web before uninstalling. For more information about stopping Access Web, see Access Web Service Commands on Linux.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

If it is a distributed deployment, then login to each of the PBS MoM and uninstall the Remote Sessions Component.

> **Note:** This will uninstall the Remote Sessions component and Interactive Proxy only if you installed Access Web on the same machine as the PBS Professional Server.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to the `/opt/altair/pbsworks/2019.3.1/remotesessionagent/_AltairRemoteSessionAgent_Installer_<Version>_installation` directory.
3. Execute the uninstall script by entering the following command:
   ```
   ./Change\ AltairRemoteSessionAgent_Installer_<Version>\ Installation -i console
   ```
   The command must contain spaces with escape characters.
4. Follow the instructions provided by the uninstaller.

Uninstall Access Web and its Components on Windows

11

Instructions for uninstalling Access Web, PAS and Remote Sessions component.

This chapter covers the following:

11.1 Uninstall Access Web on Windows

Instructions for uninstalling Access Web on Windows.

1. Login to the Windows machine as an administrator where Access Web is installed.
2. Open Windows command line terminal and enter the command:
3. Check the Docker container ID using the following command:
   ```
   docker ps -q
   ```
4. Stop the Docker container:
   ```
   docker stop CONTAINER_ID
   ```
5. Remove the Docker container:
   ```
   docker rm -f CONTAINER_ID
   ```
6. Remove the 2019.3 Docker image.

11.2 Uninstall PAS on Windows

Instructions for uninstalling PAS on Windows.

1. Stop PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Stop**.
2. Navigate to **Start** > **Control Panel** > **Programs and Features**.
3. Scroll down until you find the **AltairAccessWeb_PAS** application.
4. Right-click the **AltairAccessWeb_PAS** application, and then click **Uninstall/Change**.

11.3 Uninstall Agents on Windows

Instructions for uninstalling Remote Sessions Agent on Windows.

You have to perform the following steps in all the PBS MoM's.

1. Login in to PBS MoM machine where Remote Sessions Agent is installed.
2. Stop Remote Sessions Agent service.
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **DMAgent Service** and click **Stop**.
3. Remove `momclientmodules` folder from the configured directory
4. Navigate to **Start** > **Control Panel** > **Programs and Features**.
5. Scroll down until you find the **AltairAccessWeb_RemoteSessionAgent_2019.3** application.
6. Right-click the **AltairAccessWeb_RemoteSessionAgent_2019.3** application, and then click **Uninstall/Change**.

Access Web Service Commands on Linux

12

Commands for starting, stopping, restarting and checking the status of Access Web on Linux.

This chapter covers the following:

The commands should be executed by the root or as a user with sudo permissions as defined in `/etc/pbsworks-pa.conf`.

12.1 Start Access Web

Start all Access Web services.

Starting Access Web must be done as root or as a user with sudo permissions.

1. Login to the machine where Access Web is installed.
2. Enter the following command to start Access Web:

   ```
   service pbsworks-pa start
   ```

12.2 Stop Access Web

Stop all Access Web services.

Stopping Access Web must be done as root or as a user with sudo permissions.

1. Login to the machine where Access Web is installed.
2. Enter the following command to stop Access Web:

```
service pbsworks-pa stop
```

12.3 Restart Access Web

Restart all Access Web services.

Restarting Access Web must be done as root or as a user with sudo permissions.

1. Login to the machine where Access Web is installed.
2. Enter the following command to restart Access Web:

   ```
   service pbsworks-pa restart
   ```

12.4 Determine the Status of all Access Web Services

Determine whether a Access Web service is up or down.

1. Login to the machine where Access Web is installed.
2. Enter the following command to display the status of each Access Web service:

   ```
   service pbsworks-pa status
   ```

   Messages similar to the following are displayed:

   ```
   PBSWORKS_EXEC =>/opt/altair/pbsworks/2019.3.1/access/exec
   PBSWORKS_HOME =>/var/spool/pbsworks/2019.3.1/access/home
   PAS_REPO: => /var/spool/pbsworks/2019.3.1/access/home//data/pas/

   api_gateway_service is Running (13328)  [OK]
   database_service is Running (Database)  [OK]
   message_broker_service is Running (Messaging service)   [OK]
   ams_service is Running (13811)  [OK]
   pa_service is Running (13887)   [OK]
   executor_service is Running (13964)     [OK]
   displaymanager_service is Running (14042)       [OK]
   resultmanager_service is Running (14121)        [OK]
   pas_message_broker_service is Running (Nats Service!)   [OK]
   resultservice_service is Running (14405)        [OK]
   pas_service is Running (14654)  [OK]
   ```

Access Web Service Commands on Windows

13

Commands for starting, stopping, restarting and checking the status of Access Web on Windows.

This chapter covers the following:

13.1 Access Web Service Commands

Access Web service commands on Windows.

13.1.1 Start Access Web on Windows

Start Access Web services.

1. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
2. Start Access Web using the following command:
   ```
   service pbsworks-pa start
   ```

13.1.2 Stop Access Web on Windows

Stop Access Web services.

1. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
2. Stop Access Web using the following command:
   ```
   service pbsworks-pa stop
   ```

13.1.3 Restart Access Web on Windows

Restart Access Web services.

1. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
2. Restart Access Web using the following command:
   ```
   service pbsworks-pa restart
   ```

13.1.4 Status of Access Web on Windows

Status of Access Web services.

1. Login to the Access Web Docker container using the following command:
   ```
   docker exec -it windows_access bash
   ```
2. Check the status of Access Web using the following command:
   ```
   service pbsworks-pa status
   ```

13.2 PBS Application Services Service Commands

PAS service commands on Windows.

13.2.1 Start PAS Service

Start PAS services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **AltairPASService**.
4. Click **Start**.
   Once the service is started, the status of the service will be displayed as **Started**.

13.2.2 Stop PAS Service

Stop PAS services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **AltairPASService**.
4. Click **Stop**.
   Once the service is stopped, the status of the service will be displayed as **Stopped**.

13.2.3 Restart PAS Service

Restart PAS services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **AltairPASService**.
4. Click **Restart**.
   Once the service is restarted, the status of the service will be displayed as **Restarted**.

13.3 Remote Sessions Service Commands

Remote Sessions service commands on Windows.

13.3.1 Start Remote Sessions Service

Start Remote Sessions services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **DMAgent Service**.
4. Click **Start**.
   Once the service is started, the status of the service will be displayed as **Started**.

13.3.2 Stop Remote Sessions Service

Stop Remote Sessions services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **DMAgent Service**.
4. Click **Stop**.
   Once the service is stopped, the status of the service will be displayed as **Stopped**.

13.3.3 Restart Remote Sessions Service

Restart Remote Sessions services.

1. Click **Start** and choose **Run**.
2. Type `services.msc` to open the Services Management Console.
3. Right-click **DMAgent Service**.
4. Click **Restart**.
   Once the service is restarted, the status of the service will be displayed as **Restarted**.

Manage Service Clusters

14

Add, edit, and delete service clusters.

This chapter covers the following:

Only the portal administrator can add, edit, and remove service clusters. The Manage Services page will not be displayed for regular users.

14.1 Add a Service Cluster

Establish a connection to an HPC cluster so that you may begin submitting jobs.

Before you can configure a cluster, you must know the hostname of the PAS Server installed on the PBS Professional headnode.

The Service User provided during installation of Access Web is automatically designated as the portal administrator. The portal administrator is the only user who can add, edit, and delete service clusters. The portal administrator can add other users and assign them the role of portal administrator.

A service cluster must be added before jobs can be submitted to the Workload Manager.

Note: A localhost cluster is added by default, if Access Web is installed with PBS Application Services (PAS).

1. Choose one of the following options:
   - If no service clusters have been configured, click the **Configure one or more services** link.
   - Click and then click **Add**.

   The Add Service Cluster screen is displayed.

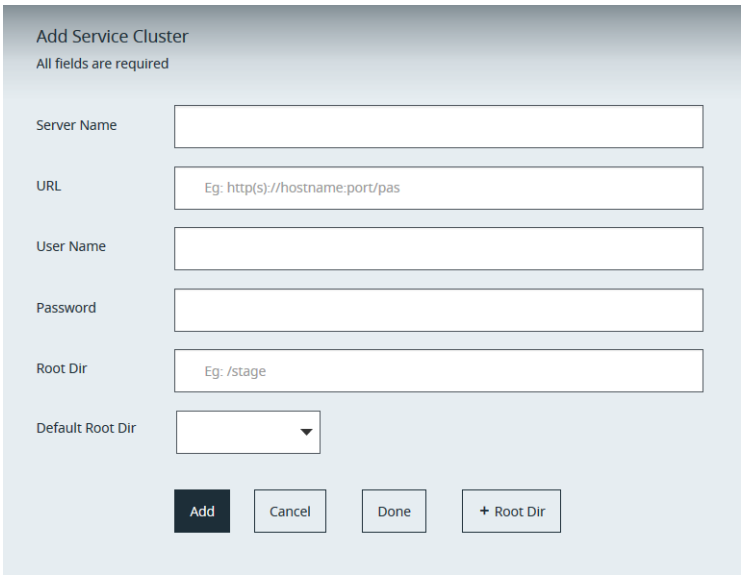


Figure 9: Add Service Cluster

2. For **Server Name**, enter a short name describing the cluster.
3. For **URL**, enter the URL for connecting to the Workload Manager.

   The URL is in the format `https://<hostname>:5243/pas` where `<hostname>` is the hostname of the machine where the PAS Server is installed (typically the PBS Professional headnode).

> **Note:** It is recommended to add a cluster using the hostname of the PAS Server rather than the IP address. This prevents connectivity issues from arising when an IP address is changed (DHCP, etc.).

4. For **User Name** and **Password**, enter your login credentials.
   The user name and password must be available in PAS.
5. For **Root Dir**, enter the pathname where user job input and result files are stored.
   Ex: `/home`, `/users`, `/stage`
6. Click + Root Dir if you want to add another **Root Dir** and enter the pathname.

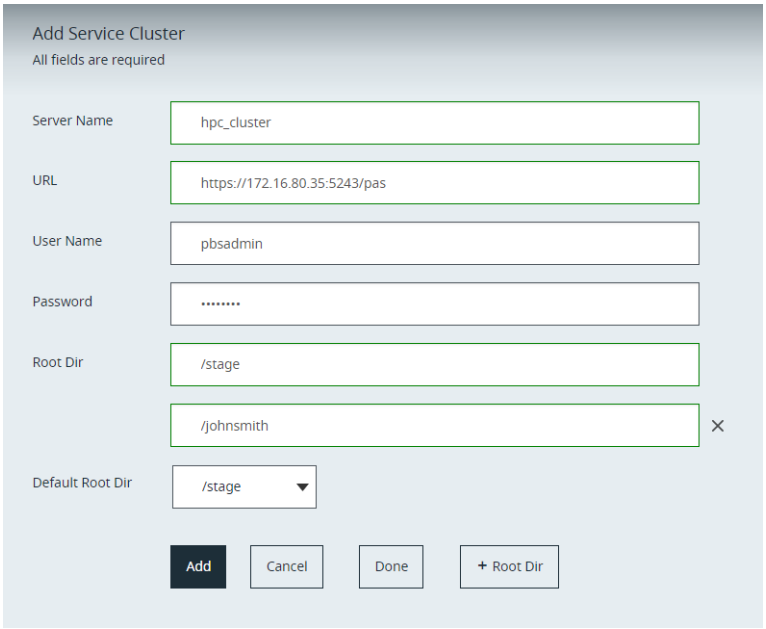


Figure 10: Multiple Root Directory Entry

7. Select the default root directory to be displayed from the **Default Root Dir** drop-down menu.

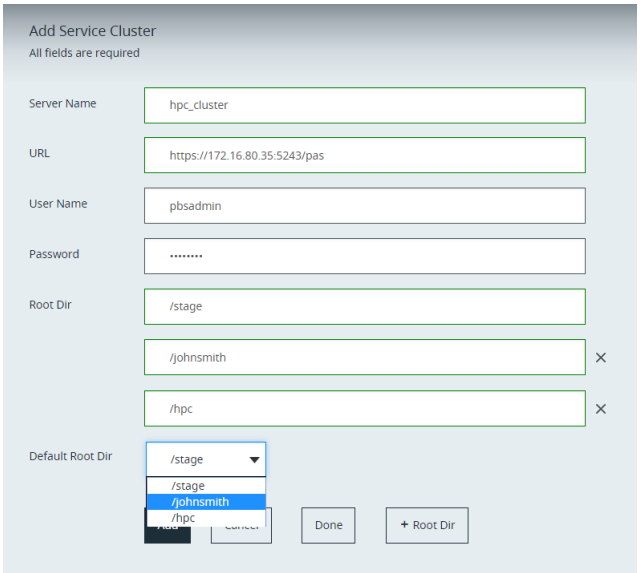


Figure 11: Default Root Directory

8. Click **Add**.
   If the service cluster is added successfully, then a notification is displayed.

   Note: A notification is displayed to all users logged into Access Web when a service cluster gets added, edited, deleted, if it goes down or if it is unreachable.

9. Repeat steps 2 through 8 to add additional service clusters.
10. Click **Done**.
    A list of service clusters that have been added is displayed.

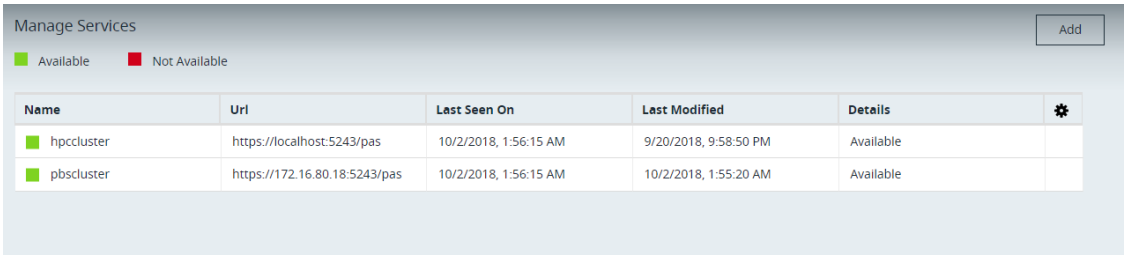


Figure 12: Service Clusters List

The green color next to the service cluster indicates that it is available to use. The red color indicates that the service cluster is not available.

The **Details** column provides the reason when a service cluster is not available. Mouse hover the **Details** column of a service cluster to view the error message.

Figure 13: Service Cluster Details

14.2 Edit a Service Cluster

Update a service cluster password or root directory so that you can continue to submit your jobs.

Note: Only the portal administrator can edit a service cluster.

1. Click .
   A list of service clusters that have been previously added is displayed.

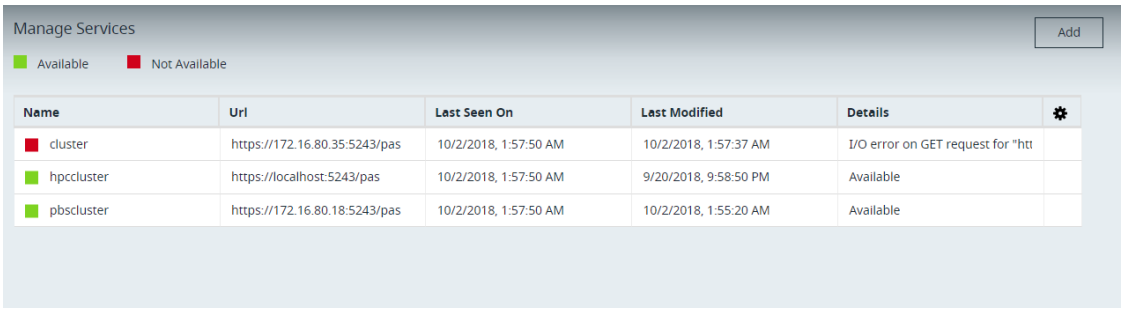


Figure 14: Manage Services

2. Right-click the cluster that you want to edit.
3. Click **Edit** from the context menu.

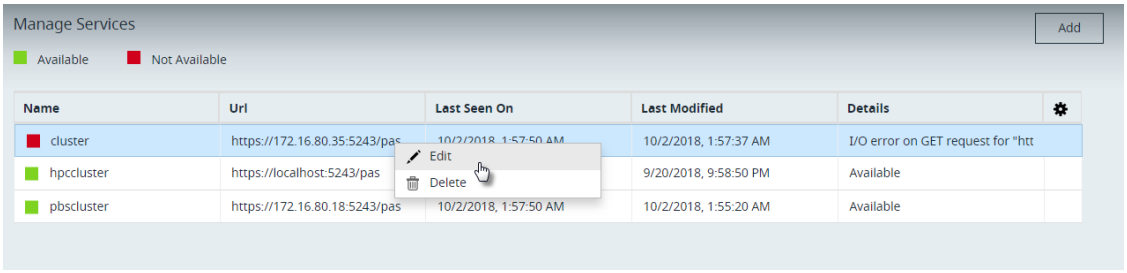


Figure 15: Cluster Edit Option

The Edit Service Cluster screen is displayed.

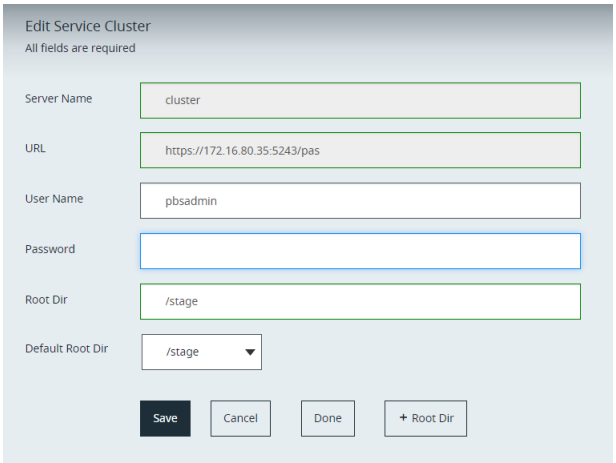


Figure 16: Edit Service Cluster

4. Update the service cluster information.
5. Click **Save**.

> **Note:** A notification is displayed to all users logged into Access Web when a service cluster gets added, edited, deleted, if it goes down or if it is unreachable.

6. Click **Done**.

14.3 Delete a Service Cluster

Remove a service cluster when you no longer want to submit and manage jobs on that cluster.

Note: Only the portal administrator can delete a service cluster.

1. Click .
   A list of service clusters that have been previously added is displayed.

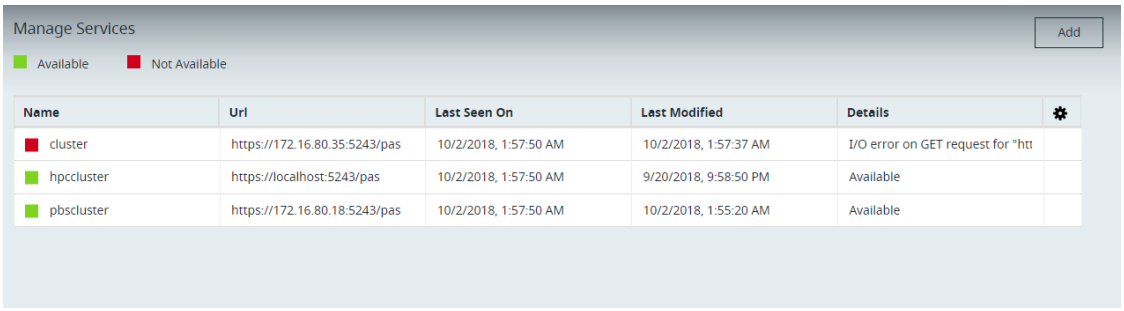


Figure 17: Manage Services

2. Right-click the cluster that you want to remove.
3. Click **Delete** from the context menu.

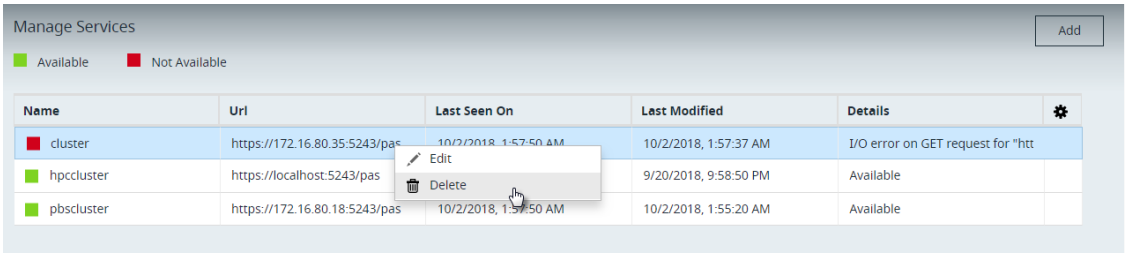


Figure 18: Server Cluster Delete

4. Click **Yes**.
   The files and jobs from this cluster will no longer be accessible.

   Note: A notification is displayed to all users logged into Access Web when a service cluster gets added, edited, deleted, if it goes down or if it is unreachable.

5. Click **Done**.

Advanced Configurations

15

Advanced configurations for Access Web and its services.

This chapter covers the following:

15.1 Configure the Access Web Component

Configurations required for Access Web component.

15.1.1 Change Port Numbers

Change the default port numbers used by Access Web.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

The Access Web installer has auto-port detection logic in place and ports will be picked up by each service within the specified range. Refer to ports used by Access Web for more information.

To allocate specific port to each of the service, then follow the steps mentioned in below topics:

Change the Gateway Port Number

Change the port that the Gateway service listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The gateway port number has to be updated in the files:

- `nginx.conf`
- `rm_servers.xml`
- `dmrest.properties`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/api_gateway/nginx.conf`
3. Update the value of *`listen`* of *`server`*:

```
server {
        listen       4443;
        server_name  localhost;
        add_header X-Frame-Options "SAMEORIGIN";
```

4. Edit the file `PA_HOME/config/resultmanager/rm_servers.xml`
5. Update the value in `<PAServerURL>`.

```
<PAServerURL>https://localhost:4443</PAServerURL>
```

6. Edit the file `PA_HOME/config/displaymanager/dmrest.properties`
7. Update value of *`pbsaccess.api_gateway.service.host`*.

```
pbsaccess.api_gateway.service.host=https://localhost:4443/
```

8. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Web Server Port Number

Change the port that the Access Web server listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The web server port number has to be updated in the following files:

- `server.xml`
- `nginx.conf`
- `dmrest.properties`
- `dmrest.properties.template`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/pa/tomcat/conf/server.xml`
3. Search for the Connector port and update with the new port number.

```
<Connector port="4543" protocol="HTTP/1.1" address="127.0.0.1"
               scheme="https" compression="on" compressionMinSize="2048"
               noCompressionUserAgents="gozilla, traviata"
               compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
               useSendfile="false" secure="true" SSLEnabled="true"
               clientAuth="false" sslEnabledProtocols="TLSv1,TLSv1.1,TLSv1.2"
               keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
               ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/api_gateway/nginx.conf`
5. Update the port number of *`server localhost`*.

```
env STORAGE_SERVICE_PORT=4543;

upstream pbsaccess {
    server localhost:4543;
}
```

6. Edit the file `PA_HOME/config/displaymanager/dmrest.properties`.
7. Update the port number of *`pbsaccess.storage.service.host`*.

```
pbsaccess.storage.service.host=https://localhost:4543/storage
```

8. Edit the file `PA_HOME/config/displaymanager/dmrest.properties.template`.
9. Update the port number of *`pbsaccess.storage.service.host`*.

```
pbsaccess.storage.service.host=https://localhost:4543/storage
```

10. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Postgres Port Number

Change the port that Postgres listen on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

Changing the Postgres port requires the removal and recreation of the Postgres database. The script that performs this work also removes all log files located at `PA_HOME/logs`. Additionally, this script allows the Service User who owns the Postgres database and the files in PA_HOME and PA_EXEC to be changed. If you do not want to change the Service User, then provide the username of the current Service User when executing the script. The current Service User can be determined by viewing the contents of `/etc/pbsworks-pa.conf`.

The Postgres database port number has to be updated in the files `configure.sh` and `app.properties`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/database/scripts/configure.sh`.
3. Update the port number of *`PG_PORT`*.
   ```
   PG_PORT=4643;
   ```
4. Edit the file Navigate to `PA_HOME/config/shared/app.properties`.
5. Update the port number of *`spring.datasource.url`*.
   ```
   spring.datasource.url=jdbc:postgresql://localhost:4643/pbsworks
   ```
6. Navigate to `PA_EXEC/init/`
7. Run the command:
   ```
   ./reconfigure-pa.sh
   ```

Change the Message Broker Port Number

Change the port that the message broker (ActiveMQ) listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Message Broker port number has to be updated in the files:

- `message-app.properties`
- `env`
- `activemq.xml`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/shared/message-app.properties`.
3. Update the port number of *`pbsworks.messaging.broker.url`*.
   ```
   pbsworks.messaging.broker.url=tcp://localhost:4743
   ```
4. Edit the file `PA_EXEC/shared/thirdparty/apache/activemq/bin/env`.
5. Update the port number of *`ACTIVEMQ_QUEUEMANAGERURL`*.
   ```
   ACTIVEMQ_QUEUEMANAGERURL="--amqurl tcp://localhost:4743"
   ```
6. Edit the file `PA_EXEC/shared/thirdparty/apache/activemq/conf/activemq.xml`.
7. Update the port number of *`uri`*.
   ```
   <transportConnector name="openwire"
   uri="tcp://127.0.0.1:4743?
   maximumConnections=1000&wireFormat.maxFrameSize=104857600>
   ```

8. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Remote Sessions Proxy Port Number

Change the port that the Remote Sessions Proxy (GUACD) listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Interactive Proxy port number has to be updated in the following files:

- `guacd.conf`
- `guacamole.properties`
- `guacamole.properties.template`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `/etc/guacamole/guacd.conf`.
3. Update the port number of *`bind_port`*.
   ```
   bind_port = 5443
   ```
4. Edit the file `PA_HOME/config/displaymanager/guacamole.properties`.
5. Update the port number of *`guacd-port`*.
   ```
   guacd-port:     5443
   ```
6. Edit the file `PA_HOME/config/displaymanager/guacamole.properties.template`.
7. Update the port number of *`guacd-port`*.
   ```
   guacd-port:     5443
   ```
8. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```
9. Restart the Interactive Proxy by entering the command:
   ```
   /etc/init.d/guacd start
   ```

Change the Remote Sessions Web Server Port Number

Change the port that the Remote Sessions Web Server listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Interactive Application web server port number has to be updated in the following files:

- `server.xml`
- `nginx.conf`
- `guacamole.properties`
- `guacamole.properties.template`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/displaymanager/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="4843" protocol="HTTP/1.1" address="127.0.0.1"
                scheme="https" compression="on" compressionMinSize="2048"
                noCompressionUserAgents="gozilla, traviata"
                compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
                useSendfile="false" secure="true" SSLEnabled="true"
 clientAuth="false"
                sslEnabledProtocols="TLSv1,TLSv1.1,TLSv1.2"
                keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
                ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
5. Update the port number of *`server localhost`*.

```
upstream displaymanager {
    server localhost:4843;
}
```

6. Edit the file `PA_HOME/config/displaymanager/guacamole.properties`.
7. Update the port number in *`dm-host`*.

```
dm-host: https://localhost:4843/displaymanager
```

8. Edit the file `PA_HOME/config/displaymanager/guacamole.properties.template`.
9. Update the port number in *`dm-host`*.

```
dm-host: https://localhost:4843/displaymanager
```

10. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Remote Sessions Job Update Port Number

Change the port that the Remote Sessions Job Update listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Remote Session Job Update port number has to be updated in the files `dmrest.properties` and `dmrest.properties.template`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/displaymanager/dmrest.properties`.
3. Update the port number of *`jobsub.monitor.port`*.

```
jobsub.monitor.port=4943
```

4. Edit the file `PA_HOME/config/displaymanager/dmrest.properties.template`
5. Update the port number of *`jobsub.monitor.port`*.

```
jobsub.monitor.port=4943
```

6. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Result Manager Services Port Number

Change the port that the Result Manager Services listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Result Manager Services port number has to be updated in the files `server.xml` and `nginx.conf`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/resultmanager/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="5043" maxThreads="200" address="127.0.0.1" scheme="https"
      compression="on" compressionMinSize="2048" noCompressionUserAgents="gozilla,
 traviata"
      compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
      useSendfile="false" secure="true" SSLEnabled="true" clientAuth="false"
 sslProtocols="TLSv1, TLSv1.1, TLSv1.2"
      keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
      ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file Navigate to `PA_HOME/config/api_gateway/nginx.conf`.
5. Update the port number of *`server localhost`*.

```
upstream resultmanager {
    server localhost:5043;
}
```

6. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Result Core Services Port Number

Change the port that the Result Core Services listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The Result Core Services port number has to be updated in the files `server.xml`, `rm.servers.xml` and `resultmanager.conf`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/resultservice/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="5143" maxThreads="200" address="127.0.0.1" scheme="https"
      compression="on" compressionMinSize="2048" noCompressionUserAgents="gozilla,
 traviata"
      compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
      useSendfile="false" secure="true" SSLEnabled="true" clientAuth="false"
 sslProtocols="TLSv1, TLSv1.1, TLSv1.2"
```

```
      keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
      ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/resultmanager/rm.servers.xml`.
5. Update the port number in *`RVSServerURL`*.

```
<RVSServerURL>https://localhost:5143</RVSServerURL>
```

6. Edit the file `PA_HOME/config/api_gateway/default.d/resultmanager.conf`
7. Update the port number in *`proxy_pass`*:

```
proxy_pass https://localhost:5143/resultservice;
```

8. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the PBS Application Services Port Number

Change the port that the PAS listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The PAS port number has to be updated in the files `server.xml` and `nginx.conf`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/pas/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="5243" protocol="HTTP/1.1" maxThreads="200"
                scheme="https" compression="on" compressionMinSize="2048"
                noCompressionUserAgents="gozilla, traviata"
                relaxedPathChars="[]|{}^&#x5c;&#x60;&quot;&lt;&gt;"
                relaxedQueryChars="[]|{}^&#x5c;&#x60;&quot;&lt;&gt;"
                compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
                useSendfile="false" secure="true" SSLEnabled="true"
 clientAuth="false"
                sslEnabledProtocols="TLSv1,TLSv1.1,TLSv1.2"
                keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
                ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
5. Update the port number of *`env PAS_SERVICE_PORT`*.

```
env PAS_SERVICE_PORT=5243;
```

6. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the PAS Messaging Port Number

Change the port that the PAS messaging service listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The PAS messaging service port number has to be updated in the files `nats-server.conf`, `server.conf` and `application.properties`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/shared/nats-server.conf`.
3. Update the port number of `port`.
   ```
   port: 4222
   ```
4. Edit the file `PA_HOME/config/pas/conf/server.conf`.
5. Update the port number of `MQ_PORT`.
   ```
   #message broker port
   MQ_PORT=4222
   ```
6. Edit the file `PA_HOME/config/joboperation/application.properties`.
7. Update the port number of `mq.port`.
   ```
   mq.port=4222
   ```
8. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Job Profile Services Port Number

Change the port that the Job Profile Services listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The job profile services port number has to be updated in the files `server.xml` and `nginx.conf`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/jobprofiles/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.
   ```
   <Connector port="5343" maxThreads="200" scheme="https"
         compression="on" compressionMinSize="2048" noCompressionUserAgents="gozilla,
    traviata"
         compressableMimeType="text/html,text/xml,text/javascript,text/
   css,application/javascript,text/plain,application/json"
         useSendfile="false" secure="true" SSLEnabled="true" clientAuth="false"
    sslProtocols="TLSv1, TLSv1.1, TLSv1.2"
         keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
    keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
         ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
   ```
4. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
5. Update the port number of *`server localhost`*.

```
upstream jobprofiles {
        server localhost:5343;
}
```

6. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the AMS Port Number

Change the port that the Access Management Services listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The AMS port number has to be updated in the files:

- `server.xml`
- `app.properties`
- `nginx.conf`
- `ServiceRegistry.json`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/ams/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="5543" protocol="HTTP/1.1" address="127.0.0.1"
               scheme="https" compression="on" compressionMinSize="2048"
               noCompressionUserAgents="gozilla, traviata"
               compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
               useSendfile="false" secure="true" SSLEnabled="true"
               clientAuth="false" sslEnabledProtocols="TLSv1,TLSv1.1,TLSv1.2"
               keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
               ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/shared/app.properties`.
5. Update the port number of *`pbsworks.ams.url`*.

```
pbsworks.ams.url = https://localhost:5543/AAService
```

6. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
7. Update the port number of *`server localhost`*.

```
upstream amsservice {
                server localhost:5543;
        }
```

8. Edit the file `PA_HOME/config/shared/token_handler_config/token_injector/ServiceRegistry.json`.
9. Update the port number in *`service`*.

```
{"service":[{"name":"ams","host":"localhost","port":"5543",
 "service_name":"AAService","scheme":"https"}]}
```

10. Start Access Web by entering the command:

```
service pbsworks-pa start
```

Change the Mobile Notification Service Port Number

Change the port that the mobile notification service listens on.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

For information on default port and port range, refer to Ports Used by Access Web.

The mobile notification service port number has to be updated in the files `server.xml` and `nginx.conf`.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/mobile_notification_service/tomcat/conf/server.xml`.
3. Search for the Connector port and update the new port number.

```
<Connector port="5643" protocol="HTTP/1.1" address="127.0.0.1"
                scheme="https" compression="on" compressionMinSize="2048"
                noCompressionUserAgents="gozilla, traviata"
                compressableMimeType="text/html,text/xml,text/javascript,text/
css,application/javascript,text/plain,application/json"
                useSendfile="false" secure="true" SSLEnabled="true"
 clientAuth="false"
                sslEnabledProtocols="TLSv1,TLSv1.1,TLSv1.2"
                keystoreFile="${PBSWORKS_HOME}/config/shared/access.keystore"
 keystorePass="k86BCuq3mLrCqUGZVj3n9DupJ2ePqv" keyAlias="pbsworks"
                ciphers="TLS_RSA_WITH_AES_128_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"/>
```

4. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
5. Update the port number of `server localhost`.

```
upstream mobile_notification_service {
                server localhost:5643;
        }
```

6. Start Access Web by entering the command:

```
service pbsworks-pa start
```

15.1.2 Change Memory used by the Services

Change the default memory value used by the services in Access Web.

You must stop Access Web before changing the port number. For more information about stopping Access Web, see Access Web Service Commands.

To change the default memory value used by the service, follow the steps mentioned in below topics:

Change the Gateway Service Memory Value

Change the memory value of gateway service.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
>
> `jvm_options "-Xmx512m";`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/api_gateway/nginx.conf`.
3. Update the value of *`jvm_options`*:

   ```
   jvm_options     "-Xmx512m";
   ```
4. Start Access Web by entering the command:

   ```
   service pbsworks-pa start
   ```

Change the Access Web Server Service Memory Value

Change the memory value of Access Web server service.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
>
> `JAVA_OPTS="-Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/pa/scripts/setenv.sh`.
3. Update the value of *`JAVA_OPTS`*:

   ```
   JAVA_OPTS="-Xmx512M"
   ```
4. Start Access Web by entering the command:

   ```
   service pbsworks-pa start
   ```

Change the Message Broker (ActiveMQ) Service Memory Value

Change the memory value of message broker (ActiveMQ) service.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
>
> `ACTIVEMQ_OPTS_MEMORY="-Xms64M -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/shared/thirdparty/apache/activemq/bin/env`.
3. Update the value of *`ACTIVEMQ_OPTS_MEMORY`*:

   ```
   ACTIVEMQ_OPTS_MEMORY="-Xms64M -Xmx512M"
   ```

4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Remote Session Webserver Service Memory Value

Change the memory value of remote session webserver service.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/displaymanager/scripts/setenv.sh`.
3. Update the value of *`JAVA_OPTS`*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Result Manager Services Memory Value

Change the memory value of result manager services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/resultmanager/scripts/setenv.sh`.
3. Update the value of *`JAVA_OPTS`*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Result Core Services Memory Value

Change the memory value of result core services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/resultservice/scripts/setenv.sh`.
3. Update the value of *JAVA_OPTS*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Job Profile Services Memory Value

Change the memory value of job profile services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/jobprofiles/scripts/setenv.sh`.
3. Update the value of *JAVA_OPTS*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the AMS Services Memory Value

Change the memory value of AMS services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/ams/scripts/setenv.sh`
3. Update the value of *JAVA_OPTS*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```

4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Mobile Notification Services Memory Value

Change the memory value of mobile notification services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/mobile_notification_service/scripts/setenv.sh`.
3. Update the value of *`JAVA_OPTS`*:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

Change the Executor Services Memory Value

Change the memory value of executor services.

You must stop Access Web before changing the Java heap size. For more information about stopping Access Web, see Access Web Service Commands.

> **Note:** You can add the following line in the configuration file if the memory value is not found:
> `JAVA_OPTS="$JAVA_OPTS -Xmx512M"`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_EXEC/executor/scripts/setenv.sh`.
3. Add the following line:
   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx512M"
   ```
4. Start Access Web by entering the command:
   ```
   service pbsworks-pa start
   ```

15.1.3 Set the Double-Click Delay Time

Change the delay time required between two consecutive clicks for a double-click.

The default delay time between two consecutive clicks is set to 500ms (500 millisecond)

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.

2. Navigate to `PA_HOME/config/pa/`
3. Edit the file `configuration.json`.
4. Change the value of the *`doubleClickDelay`*.

15.1.4 Change the Database Password

Change the database password to encrypted text.

If the Postgres database password is changed (via passwd, yppasswd, etc.), then Access Web will need to be updated with the new password.

The Postgres database password is stored in the `app.properties` file. The location of the file for a typical installation of Access Web is: `PA_HOME/config/shared/`

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_EXEC/shared/thirdparty/postgresql/bin/`
3. Execute the following command:

   ```
   ./psql -p <DB_PORT> -d pbsworks -U <DB_USER>)
   ```

   `DB_PORT` is database port, and *`DB_USER`* is database username.

   For example,

   ```
   ./psql -p 4643 -d pbsworks -U pbsworks
   ```
4. Enter the existing password. The default password is `postgres`.
5. Enter `\password` in Postgres prompt.
6. Enter the new password.
7. Navigate to `PA_EXEC/init/`
8. Execute the following command:

   ```
   ./pa-encrypt.sh
   ```
9. Enter the new password given in step 6.

   This command will output the password in its encrypted format.
10. Navigate to `PA_HOME/config/shared/`
11. Edit the `app.properties` file and update the value of *`spring.datasource.password`* to the encrypted format of the new password.
12. Restart Access Web by entering the command:

    ```
    service pbsworks-pa restart
    ```

15.1.5 Configure Default File Viewer

Configure default file viewer to open the file based on the file extension.

By default, the file extension .out, .Log, .stat, .rad, .fem will open in the default text viewer by double-clicking the files. If you double-click or open a file with unknown file extension, then an application list dialog box is displayed to choose the desired application to view the file.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.

2. Navigate to `PA_HOME/config/pa/`
3. Open the `nativeviewer.json` file.
4. Add the file extensions under *`ApplicationFileExtension`* value.

```
"ApplicationFileExtension": {
    "type": "array",
    "items": {
        "type": "string"
              },
    "value": [".sh",
            ".fem",
            ".py",
            ".env",
            ".txt",
            ".Log",
            ".stat",
            ".rad",
            ".out"
            ],
    "Displayable": false
}
```

The file extensions mentioned in *`ApplicationFileExtension`* value will open with the default file viewer.

15.1.6 Configure Default Columns in Job List View

Configure the job properties columns that are displayed in the job list view.

By default, the job properties columns displayed in the job list view after clicking on the Jobs tab are Job ID, Job Name, Job State, Creation Time and User Name. You can add or remove the *`defaultGridColumns`* property value in the `jobpropertiesmap.json` file.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/pa/`
3. Open the `jobpropertiesmap.json` file.
4. Update the *`defaultGridColumns`* value.

```
"defaultGridColumns": ["jobId", "jobName", "jobState", "creationTime", "userName"]
```

The updated job properties value will be displayed in the job list view in Jobs tab.

15.1.7 Change the File Opening behavior of a Remote Session Application

Change the file opening behavior of a remote session application from cross mounted file system to non-shared file system.

The default application definition provided with Access Web is configured such that the selected file is not copied to the execution node. The remote session will open the file in execution node with the assumption that the file name and file path is available in execution node. This option is the cross mounted file system where the file system is available on the execution node and head node.

In the case of non-shared file system, there is no shared file system between the execution node and head node. The Access Web will copy the file to execution node job directory and remote application will open with the copied file from job directory.

If your site does not have a cross-mounted file system that is accessible to both the PBS MoMs and the PBS Server, then you have two options for job submission:

- Update the Application Definition Input file and change the default value of `Run from job directory` to *true*.
- Uncheck the **Run from job directory** field from Job Submission Form while submitting.

> **Note:** The **Run from job directory** field is displayed only if you select **All Fields** option in Job Submission form. The behavior will be changed for that session only.

When submitting an interactive job via Access Web, the Run from job directory field must be unchecked. You will need to do this every time you submit a job.

15.1.8 Configure Notifications for a Job State Change

Configure email notifications for a job state change.

Users of Access Web can configure email notifications when a job's state changes, including who will receive the email notification, and when the email will be sent. Currently, Access Web supports sending email notifications for the following job state changes:

- job is aborted
- job begins execution
- job finishes execution

However, the email will not be sent unless the application associated with the job has been configured accordingly. This is done through the application definition.

Each Access Web user must set their email preferences through the Access Web application.

1. Click .
2. Select **Preferences**.
   Access Web Preferences is displayed.

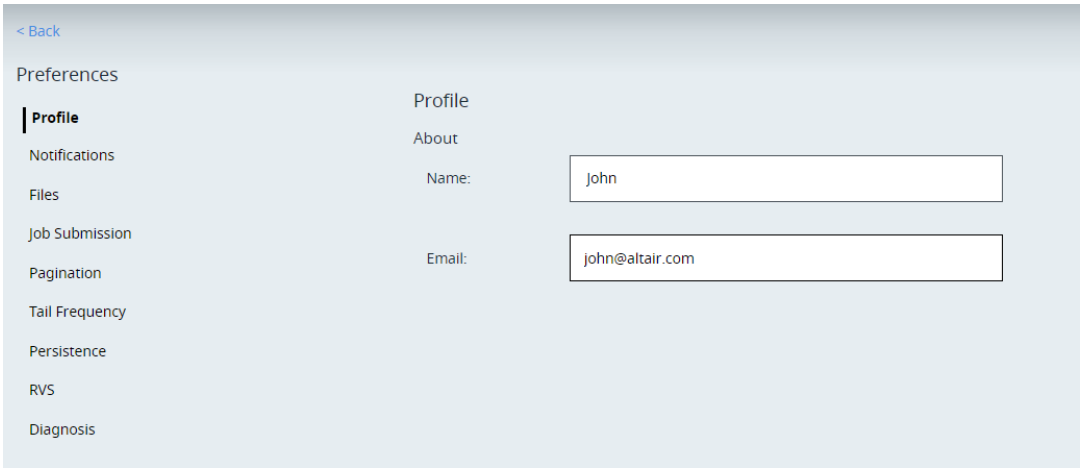


Figure 19: Preferences

3. Double-click the **Email** field to enter additional email ID and press `Enter`.
   You can enter multiple email IDs separated by semi-colon (;).
4. Click **Job Submission** in the left menu.
   The Job Submission panel is displayed.

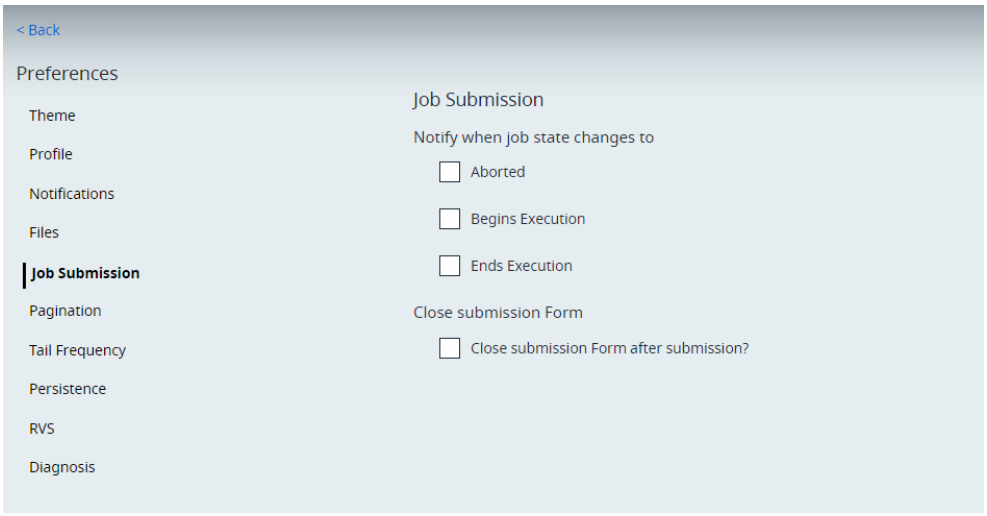


Figure 20: Job Submission

> **Note:** Click < Back to go back to the previous page.

5. Check any or all of the options in the **Notify when job state changes to** list to indicate when the email will be sent.
6. The application definition must be modified to support the email notification. This is accomplished by modifying the application definition submittime script, `presubmit.py`, with the following lines of code:

```
import re
```

```
''' Mail Options '''

if userInputs['MAIL_USERS'].replace(';',',')]:
    job.attr_mail_list = userInputs['MAIL_USERS']

if userInputs['MAIL_POINTS']:
    mail_points = userInputs['MAIL_POINTS']

    if re.match(r"[abe]", mail_points):
        job.attr_mail_options = mail_points
```

This code captures the mail preferences entered through Access Web, and sets the job's mail options, so that PBS Professional knows to send an email when a particular job state is reached.

15.1.9 Disable to View all Jobs

Restrict users to only be able to view their own jobs.

By default, users can view all jobs.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/pa/`
3. Edit the `configuration.json` file.
4. Change the value of *`restrictOthersJobs`* to `true`.

15.1.10 Add a Generic Action for a PAS server

Perform a generic action on a job.

Generic actions are simple python scripts that run on a PAS server irrespective of the job or application.

A JSON file is used to define generic actions. You have to specify the PAS server name and the generic actions that has to be performed on that server. For a typical installation of Access Web, the generic action JSON file is `genericactions.json` and it is located at `PA_HOME/config/pa/`

> **Note:** Refer to https://jsonlint.com/ to validate the JSON file and refer to https://jsonformatter.org/ to format the code.

Define a Generic Action

Define a generic action JSON file.

Here is an example of a generic action for a cluster denoted by "hpccluster":

```
{
 "hpccluster": [{
   "Name": "qstat",
   "DisplayName": "Qstat of Job",
   "Description": "Qstat of Job",
   "ScriptLocation": "/stage/GenericActions/qstat.py",
```

```
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  }
```

The following JSON elements provide a way of identifying and describing the generic action:

Name
: An internal name of the generic action.

DisplayName
: Name of the generic action that will be displayed to the user.

Description
: Description of the generic action.

ScriptLocation
: Location of the execution script.

Arguments
: Defines arguments (input fields) that a user will enter prior to executing the generic action. The following elements define an argument:

  type
  : Defines the type of the argument

  DisplayName
  : Name of the argument that will be displayed

  required
  : Indicates a required field

Define a Generic Action Execution Script

Define a generic action execution script file.

A job can be selected from the Job Monitoring page of Access Web, and an action can be executed. This generic action allows a command and command options to be entered. Access Web will then run the command.

Example of Generic Action for a Single Cluster

Below is an example of a generic action for the server "hpccluster", stored in a JSON file called `genericactions.json`.

```
{
 "hpccluster": [{
   "Name": "qstat",
   "DisplayName": "Qstat of Job",
   "Description": "Qstat of Job",
   "ScriptLocation": "/stage/GenericActions/qstat.py",
   "Arguments": {
    "jobid": {
```

```
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Tracejob",
   "DisplayName": "Tracejob of Job",
   "Description": "Tracejob of Job",
   "ScriptLocation": "/stage/GenericActions/tracejob.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Distributed Tracejob",
   "DisplayName": "Distributed Tracejob of Job",
   "Description": "Distributed Tracejob of Job",
   "ScriptLocation": "/stage/GenericActions/dtj.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Node Status",
   "DisplayName": "Node status of cluster",
   "Description": "Node status of cluster",
   "ScriptLocation": "/stage/GenericActions/nodestatus.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": [ ]
   }
  }
 ]
}
```

Example of Generic Action for a Multiple Cluster

Below is an example of a generic action for the server "hpccluster-1" and "hpccluster-2", stored in a JSON file called `genericactions.json`.

```
{
 "hpccluster-1": [{
   "Name": "qstat",
   "DisplayName": "Qstat of Job",
   "Description": "Qstat of Job",
   "ScriptLocation": "/stage/GenericActions/qstat.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
```

```
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Tracejob",
   "DisplayName": "Tracejob of Job",
   "Description": "Tracejob of Job",
   "ScriptLocation": "/stage/GenericActions/tracejob.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Distributed Tracejob",
   "DisplayName": "Distributed Tracejob of Job",
   "Description": "Distributed Tracejob of Job",
   "ScriptLocation": "/stage/GenericActions/dtj.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Node Status",
   "DisplayName": "Node status of cluster",
   "Description": "Node status of cluster",
   "ScriptLocation": "/stage/GenericActions/nodestatus.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": [ ]
   }
  }
 ]
},
{
 "hpccluster-2": [{
   "Name": "Queue Hold",
   "DisplayName": "Queue hold a job",
   "Description": "Queue hold a job",
   "ScriptLocation": "/stage/GenericActions/qhold.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Queue Release",
   "DisplayName": "Queue release a job",
   "Description": "Queue release a job",
```

```
   "ScriptLocation": "/stage/GenericActions/qrls.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Suspend a job ",
   "DisplayName": "Suspend a job",
   "Description": "Suspend a job",
   "ScriptLocation": "/stage/GenericActions/qsig.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  },
  {
   "Name": "Delete jobs ",
   "DisplayName": "Delete job(s)",
   "Description": "Delete job(s)",
   "ScriptLocation": "/stage/GenericActions/qdel.py",
   "Arguments": {
    "jobid": {
     "type": "string",
     "DisplayName": "Job ID"
    },
    "required": ["jobid"]
   }
  }
 ]
}
```

Execution Script

The generic action script is a python script that is responsible for executing the generic action, using the information entered by the user (defined by the generic action JSON file). You can directly edit this script, taking full advantage of Python to add further inspection and complexity to the execution of the generic action. In this example, the python script will create a subprocess to execute the command entered by the user.

```
import subprocess, sys, os

def execcmd(cmd):
            try:
                        p = subprocess.Popen(cmd, shell=True, stdout=subprocess.PIPE,
stderr=subprocess.STDOUT)
                        data = ""
                        for line in p.stdout.readlines():
                                    data = data + line
            except:
                        errTtype = sys.exc_type
                        try:
                                    errName = errTtype.__name__
                        except AttributeError:
                                    errName = errType
                        data = "Error: " + str(errName) + " --- " + str(sys.exc_value)
```

```
            return data
cmd = "/opt/pbs/bin/qstat -fx " + sys.argv[2]
print (cmd)
print execcmd(cmd)
sys.stdout.flush()
```

15.1.11 Map a File Extensions to an Icon

Map icons to a file extension in the Access Web application.

Access Web displays customized file types and icons when viewing remote files.

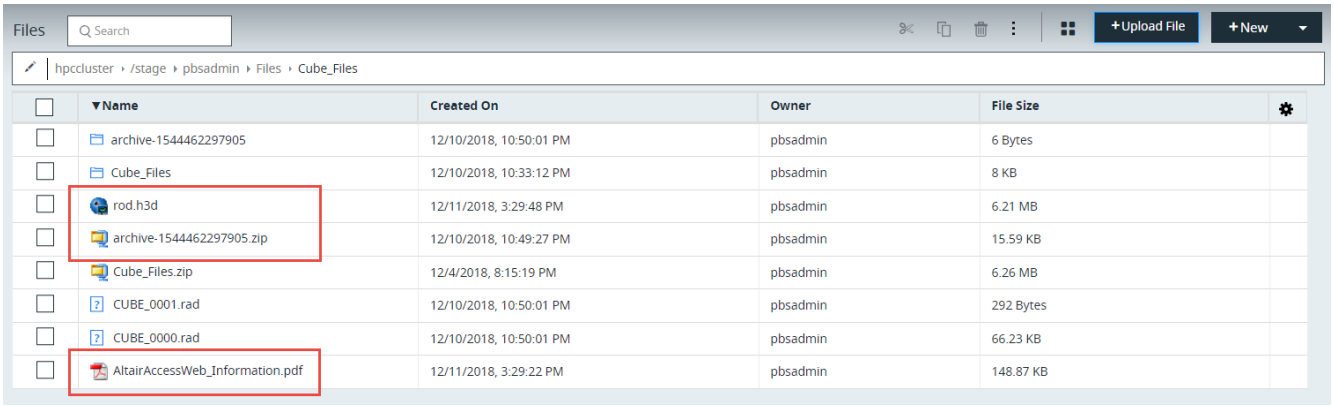


Figure 21: File Icon Mapping

The file icons are mapped to a file extension in the JSON file, `fileextensions.json` and the location of this file is at `PA_HOME/config/pa/`

The file icon image file must be placed at the location `PA_HOME/config/pa/fileicons/`

Below is an example of a file extension and icon that has been mapped in `fileextensions.json` located at `PA_HOME/config/pa/`:

```
{
    "fileextension":
    [
        {
            "name": "pdf",
            "displayText": "Acrobat",
            "icon": "icon_pdf.png"
        },
        {
            "name": "zip",
            "displayText": "Archive",
            "icon": "icon_zip.png"
        }
        {
            "name": "h3d",
            "displayText": "H3D",
            "icon": "hvpctrl-32.gif"
        }
    [
}
```

The XML attributes of the file extension mapping file is as follows:

name
The file extension.

displayText
Access Web will display this as the files type.

icon
Icon image file located at `PA_HOME/config/pa/fileicons/`

15.1.12 Set Maximum Page Size for Files

Set the maximum file size (in bytes) for displaying a file in a single page.

The default is 5000 bytes.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/pa/`
3. Open the `configuration.json` file and change the value of the *`filechunksize`*.
   ```
   "filechunksize": 5000
   ```

15.1.13 Install and Configure SSL Certificate

Install and configure SSL certificate on the server to secure communication.

If you do not have a valid domain certificate for your site, you need to create a Certificate Signing Request (CSR) and order your certificate.

1. You should have received a `your_domain_name.pem` file from Certificate Authority which contains both your primary certificate and the intermediate certificate. If you have that `.pem` file, you can skip to Step 4.
2. Download the intermediate (`Intermediate.crt`) and your primary certificate (`your_domain_name.crt`) files.
3. Copy these files, along with the `.key` file you generated when creating the CSR, to the directory on the server where the certificate and key files are kept.
4. Concatenate the primary certificate file (`your_domain_name.crt`) and the intermediate certificate file (`Intermediate.crt`) into a single `.pem` file by running the following command:
   ```
   cat your_domain_name.crt Intermediate.crt >> bundle.crt
   ```
5. Navigate to `PA_HOME/config/api_gateway/`
6. Open the `nginx.conf` file and update the following line:
   ```
   server
   {
       ssl     on;
       ssl_certificate     /etc/ssl/your_domain_name.pem; (or bundle.crt)
       ssl_certificate_key     /etc/ssl/your_domain_name.key;
   }
   ```
   - *`ssl_certificate`* should be your primary certificate combined with the intermediate certificate (`your_domain_name.crt`).

- *ssl_certificate_key* should be the `.key` file generated when you created the CSR.

7. Restart Access Web by entering the following command:

```
service pbsworks-pa restart
```

15.1.14 Enable Mobile Notification Service

Enable mobile notification service in Access Web so that the job status notification is displayed in Access Mobile.

You must stop Access Web before enabling mobile notification service. For more information about stopping Access Web, see Access Web Service Commands.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/shared/`
3. Open the `deployment.ini` file.
4. Add the following line under *pa_deploy_options* section:

```
option=("mobile_notification_service")
```

5. Start Access Web using the following command:

```
service pbsworks-pa start
```

15.1.15 Customize Login Page

Customize Access Web login page with custom branding information.

Customize the Access Web login page with your company's logo, as well as a custom message that is displayed below the login prompt.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Add the branding logo at `PA_HOME/config/pa/branding/`
3. Edit `PA_HOME/config/pa/configuration.json`
4. Update the path of the branding logo in *appLogo*.
   For example:

```
"appLogo": "/config/pa/branding/company-logo.png"
```

5. Update the description of the branding information in *appDescription*
   For example:

```
"appDescription": "ALTAIR PBSWORKS HPC PORTAL"
```

6. Refresh your Access Web browser to reflect the login screen with branding logo and description. For example, Access Web with branding logo and description will be displayed as follows:

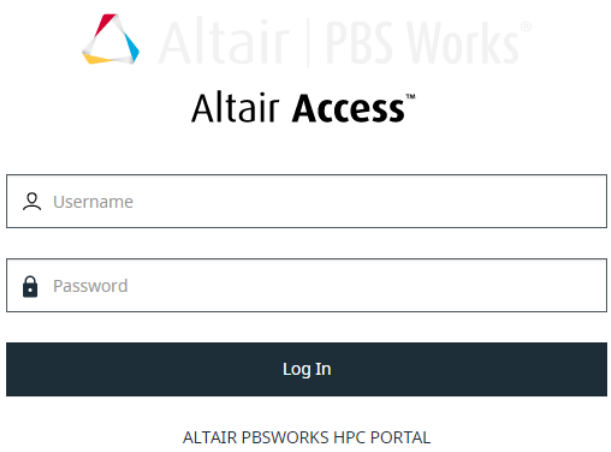


Figure 22: Access Web Login Page with Branding Logo and Description

15.1.16 Switch to Use the Locally Installed Webhelp

Configure Access Web to point to the locally installed webhelp when there is no internet connectivity and the internet version of the webhelp is not reachable.

Download or obtain the Access Web help using your Altair support channels.

Access Web will now fetch and display the latest version of the User Guide (WebHelp) from Altair Connect. As a fall back, the application can also be configured to use a local copy of the help.

Perform these steps to configure and view the local copy of the help.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Copy the Access Web help zip file to `PA_HOME/data/pa/`
3. Unzip the Access Web help zip file.
4. Edit the `PA_HOME/config/pa/configuration.json` file.
5. Update the *`helpurl`* path to the local webhelp folder path.

   Note: By default, the `helpurl` path mentioned is the Altair Connect path.

6. Change the Altair Connect default path to the local webhelp folder path as follows:
   ```
   "helpurl": "/data/pa/webhelp/index.htm"
   ```
7. Refresh the Access Web browser.

15.1.17 Shared File System Support

Support for sites that have deployed a shared file system on their HPC cluster.

Organizations may deploy a shared file system on their HPC cluster such that the file system is shared between the PBS Server and the PBS execution nodes, eliminating the need to stage in and stage out job files. Applications that run on the HPC cluster and need access to the shared file system will require a change to their corresponding application definition to set the following environment variables in the submittime script (`presubmit.py`) and a change to the runtime script (`start.py`):

ACCESS_INPUT_FILES
: Environment variable used by Access to establish the job's input files.

ACCESS_OUTPUT_FILES
: Environment variable used by Access to establish the job output directory.

ACCESS_RUNNING_FILES
: Environment variable used by Access to establish the job running directory.

For example, a site may have `/shared` mounted on a share file system that is shared between the PBS Server and the PBS execution nodes. The user tsmith moves job files to the directory `/stage/tsmith/opti_test1` and submits an Optistruct job. For Access to support the use of the shared file system by the job, the application definition associated with the Optistruct solver must be updated to set these three environment variables in the `presubmit.py` script.

For more information about the specific changes that need to be made to the application definition see the recipe *How to Support a Shared File System*in *Diving Into Application Definitions*.

This feature is completely backward compatible. If your site is not using a shared file system, then your current application definitions do not require any changes.

15.1.18 Change the Maximum File Upload Size

Change the default file upload size based on site's requirements.

Before you begin

- You must stop Access Web before changing the maximum file upload size. For more information about stopping Access Web, see Access Web Service Commands.

The default maximum file upload size is 4Gb. The user will not be able to upload a file size bigger than the value set in the maximum file size.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/api_gateway/`
3. Open the `nginx.conf` file.
4. Update the *`client_max_body_size`* value in MB.

```
#set max file upload size to 4GB
    client_max_body_size 4096m;
```

5. Start Access Web using the following command:

```
service pbsworks-pa start
```

15.1.19 Configure to Handle Large File Uploads

Configure to handle large file uploads by enabling the modern file upload parameter.

Before you begin:

- You must stop Access Web before changing the maximum file upload size. For more information about stopping Access Web, see Access Web Service Commands.

By default, the conventional file upload feature is enabled which will restrict the file upload to 4GB.

By enabling the modern file upload parameter there will be no upload restriction based on file size and the files will be uploaded in chunks.

You need to have administrative privileges to makes the changes.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/pa/`
3. Open the `configuration.json` file.
4. Change the *`enableModernFileUpload`* value to *true* to enable modern file upload.
   ```
   "enableModernFileUpload": false
   ```
   > **Note:** By default, the *`enableModernFileUpload`* value is set to *false*.
5. Start Access Web using the following command:
   ```
   service pbsworks-pa start
   ```

15.2 Configure PBS Application Services

Information about configuration files, verification of your PAS installation, post-installation configuration and tasks.

15.2.1 PAS Configuration Files

Configuration files that are installed with PAS.

Application Definitions

Application definitions are a feature of PAS and are used to submit jobs using the power and flexibility of PAS. Application definitions are stored in the PAS application directory. The default location of this directory is:

`PA_HOME/data/pas/targets/localhost/repository/applications/`

Site Configuration File

A default site configuration file, `site-config.xml`, is installed in the PAS configuration directory. The location of this file for a typical installation of PAS is: `PA_HOME/data/pas/targets/localhost/repository/`

This file is a central repository for site specific information that can be used across all application definitions. The default site configuration file installed with PAS is basically a template. Initially, you may use the default site configuration file as is, but as you become accustomed to working with application definitions, you may choose to modify the site configuration file per your site's needs. A tutorial and several recipes are available within *Diving Into Application Definitions* showing several ways that the site configuration file can be used with an application definition. For an overview of the site configuration file see Sitewide Settings on page 57.

Server Configuration File

A server configuration file, `server.conf`, is also installed in the PAS configuration directory. This file contains all configurable parameters available with PAS. The location of this file for a typical installation of PAS is: `PA_HOME/config/pas/conf`

15.2.2 Configure System Zip Utility

Configure PAS to use the system compression utility.

By default, PAS uses zip 3.0 utility to compress the file.

Configure System Zip Utility to Compress by Updating Python Script

Enable the system zip utility to compress the files by updating the Python Script.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the `PA_EXEC/pas/scripts/FileCompress.py` file.
3. Before `zipcmd = [zip_full_path_normalized] + ['-rq'] + [compressionSpeed]` line, add the following: `zip_full_path_normalized = '/usr/bin/zip'`

   The `/usr/bin/zip` is the path where the system zip utility is located.

   > **Note:** If you do not specify the system zip utility path, then PAS zip utility will be used to compress the files.

Configure System Zip Utility to Compress without Updating Python Script

Enable the system zip utility to compress the files without updating the python script.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_EXEC/pas/bin/Linux-x86_64`.
3. Rename the existing zip utility to `zip_backup`.
4. Create a soft link to link to the system installed zip utility:

   ```
   ln -s /usr/bin/zip zip
   ```

   The `/usr/bin/zip` mentioned, is the path where the system zip utility is located.

   > **Note:** Restore the permission of the changed zip utility.

15.2.3 Configure System Unzip Utility

Configure PAS to use the system uncompression utility.

By default, PAS uses unzip 6.0 utility to uncompress the file.

Configure System Unzip Utility to Uncompress by Updating Python Script

Enable the system unzip utility to uncompress the files by updating the Python Script.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the `PA_EXEC/pas/scripts/FileUncompress.py` file.

3. Before `files_list_cmd = [unzip_full_path_normalized] + ['-lqq'] + [archive]` line, add the following: `unzip_full_path_normalized = '/usr/bin/unzip'`

   The `/usr/bin/unzip` is the path where the system unzip utility is located.

   > **Note:** If you do not specify the system unzip utility path, then PAS unzip utility will be used to uncompress the files.

Configure System Unzip Utility to Uncompress without Updating Python Script

Enable the system unzip utility to uncompress the files without updating the python script.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_EXEC/pas/bin/Linux-x86_64`
3. Rename the existing unzip utility to `unzip_backup`.
4. Create a soft link to link to the system installed unzip utility:

   ```
   ln -s /usr/bin/unzip unzip
   ```

   The `/usr/bin/unzip` mentioned, is the path where the system unzip utility is located.

   > **Note:** Restore the permission of the changed unzip utility.

15.2.4 Configurable Parameters

Parameters that can be modified to configure the behavior of PAS.

PAS stores its configuration data in a file called `PA_HOME/config/pas/conf/server.conf`.

All parameters are stored in *`key=value`* pairs. Spaces and tabs are preserved (as spaces) and providing quotes around values is optional. As spaces are preserved, do not use *`key = value`* (notice the space surrounding the =) unless spaces are intentional. Empty lines beginning with a comment symbol (i.e., #) are ignored.

Standard Configuration Parameters

A description of the standard parameters for configuration of the PAS Server.

LOGGING_CONFIG_FILE_RELATIVE

The PAS logging configuration file (Log4J) which is used to configure logging levels. Since the PAS uses Log4J as its logging and tracing API, you can access additional information on Log4J via the Apache Log4J website at http://logging.apache.org/log4j
Default value is `server-log.xml`.

ADMIN_USER

The PAS administration account (for example, pbsadmin) that has complete control over the PAS Server. This account is required for any remote PAS administration tasks.

On Linux, the administration account can be a non-privileged user account that has been granted manager status for PBS Professional, and can be changed after installation.

Default value is pbsadmin.

LOGIN_MODULE_NAME

The PAS authentication module. PAS uses the Java Authentication and Authorization Service (JAAS) as its authentication abstraction layer.
Default value is UnixLogin.

STAGE_ROOT

The PAS file staging location.

Default value is `/stage`.

This directory must exist prior to the installation of PAS. The staging directory is where the necessary files are transferred after job submission (via a client for example, PBS Portals or Access Web), but prior to the portal submitting the job to PAS for transfer to PBS Professional for execution. When PBS Professional selects the job for execution, the files are stagedin to the execution host from the staging directory. Upon job completion, any files the job wants to retain are staged-out by PBS Professional to the staging directory, and the client retrieves them from there when it is ready to do so. Customer written portals may choose to do the same, but are not required to do so.

The value of STAGE_ROOT can be set to point to the user's home directory by using the variable `$USER_HOME` (for example: `$USER_HOME/stage`) after installation.

FILE_TRANSFER_PROTOCOL

The PAS file transfer mechanism. Default value is http.

FILE_EXPIRATION_TIME

The PAS stage area file expiration time. That is, the age in days after which data is removed from the staging directory (as defined by the STAGE_ROOT parameter) and its subdirectories with the exception of the profiles directory. Files in the profiles directory are never removed by PAS.
The default value is 14.

ZIP_COMPRESSION_SPEED

Compression speed value for the zip compression utility. The value of -0 is the fastest with no compression (Store), the value of -9 is the slowest with maximum compression. Default value is -1.

MAX_LIST_FILES_COUNT

The number of files to be returned by the FileList API. Allows sites to impose limits on how many files are returned to improve the response time of Access Web remote file operations.

Default value is 1000.

BUFFER_SIZE

Maximum buffer size for file operations in bytes. Default value is 65536.

JSCH_REQUEST_TIMEOUT
: The JSCH request timeout value. The default value is 30000.

MAX_EXECUTION_TIME
: Maximum process execution time in minutes. The default value is 5 minutes.

MODERN_COMMUNICATION_ENABLED
: A modern communication infrastructure for faster running job operations. Enabling this will use modern communication layer for faster running job operations. Default value is True.
For more information about modern communication, refer to Modern Communication Setup.

MODERN_COMMUNICATION_SHARED_LIBS
: Location of python modules needed for modern communication for Job operations. This directory should be present on all MOMs.
For more information about modern communication, refer to Modern Communication Setup.

MQ_PROTOCOL
: Message broker protocol used for modern communication. The default message broker protocol used is PAS.

MQ_HOSTNAME
: Message broker server hostname used for modern communication.

MQ_PORT
: Message borker port number used for modern communication. The default port number is 4222.
For more information about modern communication port, refer to Change the PAS Messaging Port Number.

Advanced Configuration Parameters

Optional parameters available for advanced configurations of the PAS Server.

PYTHON_PATH

: The PAS Python binary. PAS requires that each PBS execution host provide a standard Python binary. The full path to your systems Python binary can be changed here.

  Default path is `$PBS_EXEC/bin/pbs_python`.

  The PBS Professional daemon pbs_mom will look for a binary called pbs_python in `PBS_EXEC/bin`. If using custom actions or any other operations that involve the pbs_mom accessing this pbs_python (aka python binary) there may be problems if the python libraries are not located in the standard locations relative to `PBS_EXEC/bin/pbs_python`. If Python is installed elsewhere a link to (Linux)the actual python binary must exist as `PBS_EXEC/bin/pbs_python`.

PBS_DATA_REFRESH_TIME
: Time interval in minutes to fetch PBS related data like qmgr, queues etc.
Default value is 15.

SSH_LOGGER_ENABLE
: SSH Log enabling. Default value is False.

STAGE_ROOT_TEMP_DIR
: Temporary folder for zip/download API.

  Default stage root temporary directory path is `/tmp`. The default path can be changed to `$STAGE_ROOT/tmp`.

JSON_SCHEMA_VALIDATION
: JSON Schema Validation. Default value is False.

15.2.5 Configure PBS Resources

Configure PBS resources in PAS.

You can install PAS on a separate machine from the PBS Professional Server as a failover server. The PBS Professional *`flatuid`* attribute must be set to True. This attribute specifies whether, for each user, the username at the submission host must be the same as the one at the Server host. The username at the Server host must always be the same as the username at the execution host. When *`flatuid`* is set to `True`, the Server assumes that UserA@host1 is the same as UserA@host2. Therefore, if *`flatuid`* is `True`, UserA@host2 can operate on UserA@host1's job. Follow these steps to set *`flatuid`* to `True`. These steps must be performed either by root or a PBS manager.

1. Login to the PBS Server.
2. At the command line, enter the command:

   ```
   qmgr -c "print server"
   ```
3. If the attribute *`flatuid`* is equal to `False` or is not set (you do not see it in the output from the print server command), then set the value to `True` by issuing the command:

   ```
   qmgr -c "set server flatuid=true"
   ```

15.2.6 Configure JVM Performance

Configure the Java Virtual Machine (JVM) heap size of PAS.

Currently, the default JVM heap size is 1024 MB. If OutOfMemory errors or warnings are reported in the PAS log file, this value should be increased. It can be increased in multiples of 256 MB.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the script `PA_EXEC/pas/scripts/setenv.sh`.
3. Modify the JVM argument *`-Xmx1024m`*:

   ```
   JAVA_OPTS="$JAVA_OPTS -Xmx1024m -XX:PermSize=128m -XX:MaxPermSize=128m"
   ```
4. Restart Access Web by entering the following command:

   ```
   service pbsworks-pa restart
   ```

15.3 Configure the Remote Session Component

Configurations when you install remote session component.

15.3.1 Verify that Interactive Applications are Configured for the Desktop Manager

Verify that all interactive application definitions are configured for the Desktop Manager that is installed on the graphic PBS MoM.

By default, the GlxSpheres application definition, that is installed when the PAS server is configured for Remote Sessions, is configured to use the GNOME Desktop Manager. If you install a different Desktop Manager, then you will have to edit all of the interactive application definitions to reconfigure them to use a different Desktop Manager.

1. Login to the PAS Server as root or a user with sudo permissions.
2. Navigate to *PA_HOME*`/data/pas/targets/localhost/repository/applications`.

For each interactive application definition:

3. Navigate to the `runtime` directory .
4. Edit the file `xstartup.turbovnc`.
5. If the Desktop Manager that is installed on the PBS MoM is GNOME:
   a) Verify that the *DESKTOP* variable is set to GNOME:
   ```
   #DESKTOP=${DESKTOP:-NONE}
   #DESKTOP=${DESKTOP:-MATE}
   #DESKTOP=${DESKTOP:-KDE}
   DESKTOP=${DESKTOP:-GNOME}
   ```
6. If the Desktop Manager that is installed on the PBS MoM is MATE:
   a) Verify that the *DESKTOP* variable is set to MATE:
   ```
   #DESKTOP=${DESKTOP:-NONE}
   DESKTOP=${DESKTOP:-MATE}
   #DESKTOP=${DESKTOP:-KDE}
   #DESKTOP=${DESKTOP:-GNOME}
   ```
7. If the Desktop Manager that is installed on the PBS MoM is KDE:
   a) Verify that the *DESKTOP* variable is set to KDE:
   ```
   #DESKTOP=${DESKTOP:-NONE}
   #DESKTOP=${DESKTOP:-MATE}
   DESKTOP=${DESKTOP:-KDE}
   #DESKTOP=${DESKTOP:-GNOME}
   ```
8. If the Desktop Manager that is installed on the PBS MoM is something other than GNOME, MATE, or KDE:
   a) Add a line to represent the Desktop Manager:
   ```
   #DESKTOP=${DESKTOP:-NONE}
   #DESKTOP=${DESKTOP:-MATE}
   #DESKTOP=${DESKTOP:-KDE}
   #DESKTOP=${DESKTOP:-GNOME}
   DESKTOP=${DESKTOP:-DESKTOP_MGR}
   ```

Where *DESKTOP_MGR* is an acronym for the installed Desktop Manager.

b) Add a line to start a Desktop Manager session:

```
  MATE)  exec ${VGLRUN} -display ${DISPLAY_VGL} +wm /bin/mate-session  ;;
  KDE)   exec ${VGLRUN} -display ${DISPLAY_VGL} +wm /bin/startkde ;;
  DESKTOP_MGR)  exec ${VGLRUN} -display ${DISPLAY_VGL} +wm /
bin/DESKTOP_MGR_BIN  ;;
```

Where *DESKTOP_MGR* is an acronym for the installed Desktop Manager and*DESKTOP_MGR_BIN* is the executable for the Desktop Manager.

9. Restart PAS/Access or remote timestamp.txt.:

```
service pbsworks-pa restart
```

The Desktop Manager should now display. If the Desktop Manager does not display, then there may be graphic card compatibility issues.

15.3.2 Change the Maximum Wait Time for a Session to Start

Change the configured wait time for an interactive application session to start.

The default maximum wait time configured is 25 seconds for an interactive application session to start. The following message is displayed if the session does not start within the configured time:

```
Opening session is taking longer than expected, you can choose to wait for some more
time or kill session.
```

Configure the maximum wait time by updating the `maxWait` value in `configuration.json` file.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/pa/configuration.json`
3. Update the value of *`maxWait`* in milliseconds.

```
"maxWait": 25000
```

4. Refresh the Access Web browser.

15.3.3 Change the Session Timeout for Interactive Applications

Change the remote session timeout when it is getting closed or killed because of inactivity over the client connection.

The default remote session timeout is 30 minutes. The session is killed if the user does not access the remote session within this time.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/displaymanager/dmrest.properties`
3. Update the value of *`jobaction.expiry_time`* in seconds.

```
#session expiry time(seconds)
    jobaction.expiry_time=1800
```

4. Restart Access Web using the following command:

```
service pbsworks-pa restart
```

15.3.4 Update the Remote Session Service when there is a Job Submission Host Change

Update the remote session service when the hostname or IP address of the job submission host changes.

Interactive jobs connect to the remote session service to provide job status updates. When the hostname or IP address of the machine where Access Web is installed changes, the remote session service must be updated with the new value.

Note: This hostname or IP address must be accessible from all execution hosts.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/config/displaymanager/`
3. Edit the file `dmrest.properties`
4. Update the value of *`jobsub.monitor.host`* to the new hostname or IP address.

```
#Enables handling asynchronous job updates.
    jobsub.monitor.host=dm-05
    jobsub.monitor.port=4909
```

5. Restart Access Web using the following command:

```
service pbsworks-pa restart
```

15.3.5 Configure GPU Limits when the Number of GPUs Change

Reconfigure the remote session component when GPUs are added or removed from a cluster.

The installer configures all the node and cluster limits for GPUs. Follow the below procedure in situations where these limits might change (e.g. a node going down or being removed, adding new graphical nodes post-installation, etc.)

Modify the Cluster GPU Limit

Modify the available number of GPUs in a cluster when graphical nodes or devices are added or removed.

A queue (iworkq) is created when the remote session installer is run on the PBS Server. This queue exclusively handles interactive job requests. An attribute is set on the queue which limits the number of GPUs that can be allocated to jobs queued in or running from this queue. Modify the value of this attribute to accommodate any changes in the limit due to the addition or removal of graphical nodes or devices.

1. Login to the machine hosting the PBS Server as root or a user with sudo permissions.
2. Enter the command:

   ```
   qmgr -c "p q iworkq"
   ```

   Output similar to the below is displayed.

   ```
   #
   # Create queues and set their attributes.
   #
   #
   # Create and define queue iworkq
   #
   create queue iworkq
   set queue iworkq queue_type = Execution
   set queue iworkq Priority = 150
   set queue iworkq max_queued_res.ngpus = [o:PBS_ALL=5*]
   set queue iworkq resources_max.ngpus = 1
   set queue iworkq resources_min.ngpus = 1
   set queue iworkq enabled = True
   set queue iworkq started = True
   ```

   The value of *max_queued_res.ngpus* is the available GPU limit for the cluster. This is the cumulative number of all the GPUs available in the cluster managed by the PBS server.
3. Change the value of *max_queued_res.ngpus* using the command:

   ```
   qmgr -c "set queue iworkq max_queued_res.ngpus= [o:PBS_ALL=<GPUS>]"
   ```

   where <*GPUS*> is the new number of GPUs available in the cluster.

Modify the Node GPU Limit

Modify the available number of GPUs for any execution hosts when graphical nodes or devices are added or removed.

When the remote session installer is run on the PBS MoM, an attribute is set on each graphical node which defines the number of available GPUs for the node. Modify the value of this attribute to accommodate any changes in the limit due to the addition or removal of GPUs.

Note: This must be done for any execution hosts that have had graphical nodes or devices added or removed.

1. Login to the machine hosting the PBS Server as root or a user with sudo permissions.
2. Enter the command:

   ```
   pbsnodes -a
   ```

   Output similar to the below is displayed.

   ```
   interactive-05
        Mom = interactive-05.cad.company.com
        Port = 15002
        pbs_version = PBSPro_13.1.3.170747
        ntype = PBS
        state = free
        pcpus = 32
        resources_available.arch = linux
        resources_available.host = interactive-05
        resources_available.mem = 131727204kb
   ```

```
     resources_available.ncpus = 32
     resources_available.ngpus = 3
     resources_available.vnode = interactive-05
     resources_assigned.accelerator_memory = 0kb
     resources_assigned.mem = 0kb
     resources_assigned.naccelerators = 0
     resources_assigned.ncpus = 0
     resources_assigned.netwins = 0
     resources_assigned.ngpus = 0
     resources_assigned.vmem = 0kb
     resv_enable = True
     sharing = default_shared
```

The value of *resources_available.ngpus* is the available GPU limit for the node, this is the cumulative number of all the graphical devices available for a particular node.

3. Change the value of *resources_available.ngpus* using the command:

```
qmgr -c "set node <VNODENAME> resources_available.ngpus=<NGPUS>"
```

where <*VNODENAME*> is the name of the node and <*NGPUS*> is the new number of GPUs available on this execution host.

15.3.6 Configure to use Single Remote Session proxy

Install remote session proxy on a server and modify the Guacd setting.

Install the Remote Session Proxy on a Server

Install the remote session proxy on a central server where all the graphic nodes are reachable.

Before you begin:

- Review the system requirements and prerequisites for installation.

By default, remote session proxy is installed at the PBS MoM. If you do not want to use the default remote session proxy, then install the remote session proxy on a central server where all the graphic nodes are reachable. and update the `PA_HOME/config/displaymanager/guacamole.properties` file.

Installation must be done as root or as a user with sudo permissions.

1. Login to the machine where Access Web is installed.
2. Enter the command:

```
./AltairRemoteSessionAgent_<Version>_<Build ID>_<YYYYMMDD>_<Timestamp>.bin -i
 console
```

3. If you are installing the Remote Session Proxy server on a machine hosting either the PBS Professional Server or the MoM you will see the below message, enter `1` and press `ENTER`.

```
Manage Instances
----------------
->1- Install a new instance
  2- Modify an existing instance
```

4. Read the introduction and press `ENTER`.

5. Page through the license agreement by pressing `ENTER` until you are asked to accept its terms and conditions.
6. Accept the license agreement by entering `Y` and pressing `ENTER`.
   Four options are displayed.
7. Enter `4` and press `ENTER`.
8. Enter the location where the binaries are to be installed and press `ENTER`.
   You may choose to install in the default location.
9. Enter the location where the configuration and logs files are to be installed and press `ENTER`.
   You may choose to install in the default location.
   The installation starts. It may take a few minutes for the installation to complete.
10. Press `ENTER` to complete the installation process.

Verify that the Guacamole proxy daemon is installed and running by issuing the following command:

```
service guacd status
```

Update the Guacamole properties in `PA_HOME/config/displaymanager/guacamole.properties` file.

See Also
Configure Guacd Settings to use Single Remote Session Proxy

Configure Guacd Settings to use Single Remote Session Proxy

Change the configuration of Guacd, to use the single remote session proxy for all the sessions.

By default, Guacd is installed while installing remote session agent on the graphic node (PBS MoM). For the VNC based session, the Guacamole service will connect to the Guacd installed on the graphics node.

Follow the steps to configure the settings to use the common Guacd for all the session including the VNC based sessions.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/displaymanager/guacamole.properties`.
3. Change the value of the *`guacd-distributed-environment`* to *false*.

   ```
   guacd-distributed-environment: true
   ```

   > **Note:** By default, the *`guacd-distributed-environment`* value is set to *true* indicating that the remote session proxy will use Guacd installed in graphic node (PBS MoM) where VNC server is running.

4. Update the remote session proxy by changing the value of the *`guacd-hostname`* and *`guacd-port`*.

   ```
   guacd-hostname: $ALTAIR_DM_MONITOR_HOST$
   guacd-port:     5443
   ```

5. Restart Access Web by entering the command:

   ```
   service pbsworks-pa restart
   ```

6. Restart the Interactive Proxy by entering the command:

   ```
   /etc/init.d/guacd start
   ```

15.3.7 Configure to use Distributed Remote Session Proxy

Uninstall remote session proxy from the server and update the Guacd settings.

Uninstall the Remote Session Proxy from the Server

Uninstall the previous version of remote session component to remove remote session proxy from the server.

> **CAUTION:** It is advisable that you run the installer when critical jobs are not running.

If it is a distributed deployment, then login to the machine hosting Access Web and uninstall Remote Sessions Component to remove the proxy.

> **Note:** This will uninstall the Remote Sessions component and Interactive Proxy only if you installed Access Web on the same machine as the PBS Professional Server.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to the `/opt/altair/pbsworks/2019.3.1/dmagent/_AltairRemoteSessionAgent_Installer_<Version>_installation` directory.
3. Execute the uninstall script by entering the following command:
   ```
   ./Change\ AltairRemoteSessionAgent_Installer_<Version>\ Installation -i console
   ```
   The command must contain spaces with escape characters.
4. Follow the instructions provided by the uninstaller.

See Also
Configure Guacd Settings to use Distributed Remote Session Proxy

Configure Guacd Settings to use Distributed Remote Session Proxy

Change the configuration of Guacd, to use the distributed remote session proxy for all the sessions.

By default, Guacd is installed while installing remote session agent on the graphic node (PBS MoM). For the VNC based session, the Guacamole service will connect to the Guacd installed on the graphics node.

Follow the steps to configure the settings to use the distributed Guacd for all the session including the VNC based sessions.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Edit the file `PA_HOME/config/displaymanager/guacamole.properties`.
3. Change the value of the *`guacd-distributed-environment`* to *true*.
   ```
   guacd-distributed-environment: true
   ```

> **Note:** By default, the *guacd-distributed-environment* value is set to *true* indicating that the interactive proxy will use Guacd installed in graphic node (PBS MoM) where VNC server is running.

4. Check that the *guacd-hostname* and *guacd-port* is as mentioned below:

```
guacd-hostname: $ALTAIR_DM_MONITOR_HOST$
guacd-port:     5443
```

5. Restart Access Web by entering the command:

```
service pbsworks-pa restart
```

6. Restart the Interactive Proxy by entering the command:

```
/etc/init.d/guacd start
```

15.4 Configure Results Visualization Service

This sections provides relevant information for the administrator in configuring the Results Visualization Service (RVS).

15.4.1 Activate Solver Files Readers

You can activate the result data files such as Abaqus, CFX, Fluent, and STAR-CCM+ that are not supported by default.

Solver log file readers are already present in the standard installation of HyperWorks, but they are not activated by default. Enable them by activating a HyperWorks plotting preference file.

Activate the Abaqus Reader

Activate the Abaqus reader so that Abaqus data files can be read by HyperWorks.

1. Edit the file at `HW_EXEC/hw/prefinc/preferences_common_plot.mvw`
2. Locate the following line of code:

   ```
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
3. Add the following line of code directly before the code referenced in the previous step to activate the Abaqus reader:

   ```
   *RegisterExternalReader({external_readers_dir + "/hgabaqus.exe"}, "", "", ascii)
   ```

   The code looks like this when you are done.

   ```
   *RegisterExternalReader({external_readers_dir + "/hgabaqus.exe"}, "", "", ascii)
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```

Activate the CFX Reader

Activate the CFX reader so that CFX data files can be processed by HyperWorks.

1. Edit the file at `HW_EXEC/hw/prefinc/preferences_common_plot.mvw`
2. Locate the following line of code:

   ```
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
3. Add the following line of code directly before the code referenced in the previous step to activate the CFX reader:

   ```
   *RegisterExternalReader({external_readers_dir + "/hgCFX.exe"}, "", "", ascii)
   ```

   The code looks like this when you are done.

   ```
   *RegisterExternalReader({external_readers_dir + "/hgCFX.exe"}, "", "", ascii)
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```

Activate the Fluent Reader

Activate the Fluent reader so that Fluent data files can be processed by HyperWorks.

1. Edit the file at `HW_EXEC/hw/prefinc/preferences_common_plot.mvw`
2. Locate the following line of code:
   ```
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
3. Add the following line of code directly before the code referenced in the previous step to activate the Fluent reader:
   ```
   *RegisterExternalReader({external_readers_dir + "/hgfluent.exe"}, "", "", ascii)
   ```
   The code looks like this when you are done.
   ```
   *RegisterExternalReader({external_readers_dir + "/hgfluent.exe"}, "", "", ascii)
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```

Activate the STAR-CCM+ Reader

Activate the STAR-CCM reader so that STAR-CCM data files can be processed by HyperWorks.

1. Edit the file at `HW_EXEC/hw/prefinc/preferences_common_plot.mvw`
2. Locate the following line of code:
   ```
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
3. Add the following line of code directly before the code referenced in the previous step to activate the STAR-CCM reader:
   ```
   *RegisterExternalReader({external_readers_dir + "/hgStarCCM.exe"}, "", "", ascii)
   ```
   The code looks like this when you are done.
   ```
   *RegisterExternalReader({external_readers_dir + "/hgStarCCM.exe"}, "", "", ascii)
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
4. Copy the hgstarccm executable from the user download area to `HW_EXEC/io/abf_readers/bin/linux64`

15.4.2 Supported Result File Types

The supported result file types supported by Access Web for visualizing Plot and Animation.

Table 2: Supported Result File Types for Plotting

Results File Format	Plot Data	Animation Data	Default TOC Type
Radioss Bulk			
*.op2	Yes	Yes	Animation
*.h3d	Yes	Yes	Animation
*.res	Yes	NA	Plot

Results File Format	Plot Data	Animation Data	Default TOC Type
*.pch	Yes	NA	Plot
*.gz	Yes	Yes	Animation
Radioss Block			
*A00#	Yes	Yes	Animation
*.T##	Yes	NA	Plot
*.gz	Yes	Yes	Animation
Optistruct			
*.op2	Yes	Yes	Animation
*.h3d	Yes	Yes	Animation
*.res	Yes	NA	Plot
*.pch	Yes	NA	Plot
*.hgdata	Yes	NA	Plot
MotionSolve			
*.mrf	Yes	NA	Plot
*.plt	Yes	NA	Plot
*.h3d	Yes	Yes	Animation
*.maf	Yes	NA	Plot
Abaqus			
*.odb	Yes	Yes	Animation
*.dat	Yes	NA	Plot
*.out	Yes	NA	Plot
ADAMS			
*.req	Yes	NA	Plot
*.res	Yes	NA	Plot
*.nam	Yes	NA	Plot

Results File Format	Plot Data	Animation Data	Default TOC Type
*.rsp	Yes	NA	Plot
*.shl	Yes	NA	Plot
*.sta	Yes	NA	Plot
Ansys			
*.rst	Yes	Yes	Animation
*.rth	Yes	Yes	Animation
*.rth	Yes	Yes	Animation
CFX			
*.out	Yes	NA	Plot
Fluent			
*.out	Yes	NA	Plot
output.*	Yes	NA	Plot
*.trn	Yes	NA	Plot
.txt	Yes	NA	Plot
Ls-Dyna			
d3plot	Yes	Yes	Animation
*dynain	Yes	Yes	Animation
*.fz	Yes	Yes	Animation
Intfor	Yes	Yes	Animation
Ptf	Yes	Yes	Animation
ABSTAT	Yes	NA	Plot
BINOUT	Yes	Yes	Animation
BNDOUT	Yes	Yes	Animation
DBFSI	Yes	NA	Plot
DEFORC	Yes	NA	Plot

Results File Format	Plot Data	Animation Data	Default TOC Type
*.dyn	Yes	NA	Plot
ELOUT	Yes	NA	Plot
GLSTAT	Yes	NA	Plot
GECOUT	Yes	NA	Plot
JNTFORC	Yes	NA	Plot
MATSUM	Yes	NA	Plot
NCFORC	Yes	NA	Plot
NODFOR	Yes	NA	Plot
NODOUT	Yes	NA	Plot
RBDOUT	Yes	NA	Plot
RCFORC	Yes	NA	Plot
RWFOC	Yes	NA	Plot
SBTOUT	Yes	NA	Plot
SECFORC	Yes	NA	Plot
SLEOUT	Yes	NA	Plot
SPHOUT	Yes	NA	Plot
SWFORC	Yes	NA	Plot
NanoFluidX			
nFX	Yes	No	NA
UltraFluidX			
uFX	Yes	No	NA
HyperXtrude			
*.h3d	Yes	Yes	Animation
*.out	Yes	NA	Plot
FEMZIP			

Results File Format	Plot Data	Animation Data	Default TOC Type
*.fz	Yes	Yes	Animation
d3plot	Yes	Yes	Animation
HW ASCII			
*.hwascii	Yes	Yes	Animation
MADYMO			
*.fai	Yes	NA	Plot
*.kn3	Yes	Yes	Animation
Marc			
*.t16	Yes	Yes	Animation
Nastran			
*.op2	Yes	Yes	Animation
*.pch	Yes	NA	Plot
NIKE3D			
*n3plot	Yes	Yes	Animation
Pamcrash			
*.DSY	Yes	Yes	Animation
*.erfh5	Yes	Yes	Animation
*.THP	Yes	NA	Plot
*.fz	Yes	Yes	Animation
*.h3d	Yes	Yes	Animation
Permas			
*A##	Yes	Yes	Animation
Other Ascii formats			
*.xgr	Yes	NA	Plot
*.dat	Yes	NA	Plot

Results File Format	Plot Data	Animation Data	Default TOC Type
*.col	Yes	NA	Plot
*.csv	Yes	NA	Plot
*.rvp	Yes	NA	Plot

Note: The default TOC type (plot or animation) will be identified depending on the file type registration and the parameter `isDefault` in the `plugin_def.xml` file.

15.4.3 RVS Cache Data

Enable data caching for RVS. The fetched result file data is stored as a RVS cache data in the configured RVS server.

Set RVS Data Cleanup

To improve the performance of visualizing the result files you can configure the RVS data cleanup for the RVS cache data.

To configure the RVS data files refer to Configure Data Directory.

Scheduling data cleanup avoids overlaing the database and server's disk space. You can configure the RVS data cleanup criteria settings in `site_config.xml` file. The recurring cleanup can be configured in these formats: Daily, Weekly or Monthly.

Note: By default, the RVS data cleanup is set for Weekly Sun 1:00 AM.

If you wish to setup the cleanup criteria on a daily basis, you need to specify the time as `DAILY 21:45` which represents everyday at 9:45 PM.

If you wish to setup the cleanup criteria weekly, you need to specify the days and the time. Here are a few examples:

`WEEKLY SUN 14:30` represents every Sunday in a week at 2:30 PM.

`WEEKLY MON-FRI 1:00` represents the range of days in a week. Every Monday to Friday at 1 AM.

`WEEKLY MON,WED 3:00` represents the days Monday and Wednesday in a week at 3 AM.

If you wish to setup the cleanup criteria monthly, you would need to specify the days and time. Here are a few examples:

`MONTHLY 15 15:30` represents the every 15th day in a month at 3:30 PM.

`MONTHLY 10-20 1:30` represents every 10th day to 20th day in a month at 1:30 AM.

`MONTHLY 1, 11, 21 8:00` represents every 1st day, 11th day and 21st day in a month at 8 AM.

Schedule RVS Data Cleanup

You can configure the recurring RVS data cleanup criteria settings in *site_config.xml* file.

Follow the steps given here:

1. Open the file at `PA_HOME/config/resultservice/config/site_config.xml`
2. Set the value of cleanup time *<CleanupTime>* indicate when the cleanup should occur.
   The below example will set the cleanup daily at 1AM.
   ```
   <CleanupTime>DAILY 01:00</CleanupTime>
   ```
3. Enter the cleanup time in 24 hours format.
4. Choose one of the cleanup criteria to cleanup the untouched RVS data.
   - Specify the value of cleanup criteria `<noofDays>`. The RVS data that is not accessed for the specified number of days is considered for the cleanup.
     ```
     <Criterion id="LAST_ACCESSED_TIME_BASED" noOfDays="30"
     class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastAccessed
     TimeBasedCriterion"/>
     ```
   - Specify the value of cleanup criteria `<noofDays>`. The RVS data that is not modified for the specified number of days is considered for the cleanup.
     ```
     <Criterion id="LAST_MODIFIED_TIME_BASED" noOfDays="100"
     class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastModified
     TimeBasedCriterion"/>
     </CleanupCriteria>
     ```
5. Replace the criterion id with the framework element value to configure the RVS data cleanup.
   `<Criterion id="FRAMEWORK_CACHE_CLEANUP_CRITERIA">`
   The following snippet is set with Daily cleanup time and the chosen cleanup criteria is, the last modified time to clean the RVS data.
   ```
   <CleanupTime>DAILY 01:00</CleanupTime>
                          <CleanupCriteria>
                          <Criterion id="LAST_ACCESSED_TIME_BASED" noOfDays="30"

    class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastAccessed
                          TimeBasedCriterion"/>
                          <Criterion id="FRAMEWORK_CACHE_CLEANUP_CRITERIA"
    noOfDays="100"

    class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastModified
                          TimeBasedCriterion"/>
                          </CleanupCriteria>

    <FrameworkCacheCleanupCriteria>FRAMEWORK_CACHE_CLEANUP_CRITERIA</
   FrameworkCacheCleanupCriteria>
   ```
6. Save the file and restart Access Web using the command, `service pbsworks-pa restart`.

15.4.4 Configure RVS Parameters

Main parameters related to RVS in Access Web.

Parameters for Result Service

The default value of the result service parameters are stored and listed in the following file *site_config.xml*. This file is located at `PA_HOME/config/resultservice/config/site_config.xml`.

Parameter in site_config.xml

TOC Size

The maximum TOC size-limit in bytes.
Default value is 2097152 (In bytes).
Configure the maximum TOC size using the parameter `<SizeLimit toc="2097152">`.

AIF Impersonation

The result file computation and license check out are processed for the access user.
Default value is set to true.
If the value is changed to False, then the RVS result file computation and license check out are processed using the concern administrator's credentials.
Configure the RVS impersonation using `<AIFImpersonation enabled ="true">`

Cache enabled

Enable or disable data caching for theRVS data extraction requests. For the repeated RVS file request, the data is fetched from the cache. This will speed up the RVS performance.
Default value is set to true. For a repeated RVS request, . This will speed up the
If the value is changed to false, for every RVS query, the result file data is fetched from the database. Overall, this setting slows down the RVS performance.
Configure the RVS data caching using `<Cache enabled="true">`.

Session defaultTimeout

The maximum amount of time the server should wait for a response from another application before disconnecting.
Default value is 6000 milliseconds.
Configure the session default timeout using `<Session defaultTimeout="6000">`.

Operation defaultTimeout

Is the maximum amount of time the server should wait before closing an old connection and creating a new connection.
Default value is 6000 milliseconds.
Configure the operation default timeout using Operation defaultTimeout="6000"

Parameter in resultmanager.conf

The parameter is located at PA_HOME/config/api_gateway/default.d/resultmanager.conf

Browser Timeout

The amount of time for the browser should wait to respond to any RVS requests. If the server doesn't respond beyond this timeout value then a browser timeout message appears.

> **Note:** The timeout value doesn't interrupt any of the RVS background operations.

Default value is 600 seconds.
Configure the browser timeout for RVS requests in the line `<proxy_read_timeout 600sec>` and enter the timeout value in seconds.

Parameters for Hypermath

The default value of the parameters are stored and listed in the following file *plugin_def.xml*. This file is located at `PA_HOME/config/resultservice/plugins/hypermath_application/plugin_def.xml`

Parameters in plugin_def.xml

Socket timeout for HMath

It is the maximum amount of time that the HMath server should wait to setup a connection with RVS.
Default value is 6000 milliseconds.
Configure the socket timeout for HMath in the line `<Application id="HYPERMATH_APPLICATION">` and enter the `<socketTimeout="6000">` value.

Connection timeout for HMath

It is the maximum amount of time that the HMath server should wait to respond for the data query from RVS.
Default value is 6000 milliseconds.
Configure the connection timeout for HMath in the line `<Application id="HYPERMATH_APPLICATION">` and enter the `<connectionTimeout="6000">` value.

Request timeout for PBS datasource

It is the maximum amount of time that the RVS server will wait for a request from PAS.
Default value is 6000 milliseconds.
Configure the request timeout for PAS in the line `<DataSourceHandler id="PBS_DATA_SOURCE_HANDLER">` and enter the `<requestTimeout="6000">` value.

Connection timeout for PBS datasource

It is the maximum amount of time that the PAS server should wait to respond for the data query from RVS.
Default value is 6000 milliseconds.
Configure the connection timeout for PAS in the line `<DataSourceHandler id="PBS_DATA_SOURCE_HANDLER">` and enter the `<connectionTimeout="6000">` value.

Modern Communication Setup 16

Enable modern infrastructure to improve the performance of running job operations on Windows and Linux.

This chapter covers the following:

Improvements have been made in the performance of running job operations by implementing a modern infrastructure. For 2019.3.1, this technology is enabled by default. For example, the performance of the below types of running jobs operations will be faster, reliable, strong and significantly improve the performance:

- Executing a custom action
- Generating h3d file custom action
- Starting a remote session
- File listing in Running directory

16.1 Modern Communication Setup on Windows

Enable the use of the modern infrastructure for faster running job operations on Windows.

By default PAS is installed at `C:\Program Files\altair\pas\<version>\`. This directory will be denoted as `PAS_INSTALL`. If you have installed PAS in a non-default location, then please mention that location while following the below instructions.

The `momclientmodules` folder will be available in the PAS installation directory at `PAS_INSTALL\PAS\exec\joboperation\binaries`.

1. Copy the directory `PAS_INSTALL\PAS\exec\joboperation\binaries\momclientmodules` from the machine where PAS is installed to `C:\` of the execution node.
2. Give Full control permissions to Everyone for the `momclientmodules` directory:
   a) Right click on `momclientmodules` and select **Properties**.
   b) Click **Security** tab.
   c) Click **Advanced**.
   d) Click **Add** and click on **Select a Principal**.
   e) Type in **Everyone** and click **Check Names**
   f) Click **OK**
   g) Select **Full Control** on **Permissions** section.
   h) Click **OK**.
3. Repeat Step 1 and 2 for each PBS MoM.
4. Login to the machine where PAS is installed.
5. Edit the file `PAS_INSTALL\PAS\home\config\pas\conf\server.conf` and update the distributed location:
   ```
   MODERN_COMMUNICATION_SHARED_LIBS=C:\momclientmodules
   ```
6. Restart PAS services:
   a) Click **Start** and choose **Run**.
   b) Type `services.msc` to open the Services Management Console.
   c) Right-click the **AltairPASService** and click **Retart**.

See Also
PBS Application Services Service Commands

16.2 Modern Communication Setup on Linux

Enable the use of the modern infrastructure for faster running job operations on Linux.

Before you begin:

- The location of modern communication can be local to compute nodes and does not require a shared location
- A user having password-less SSH must be present on Server and Mom(s)

The following steps will distribute modern communication module to all the Execution Nodes.

1. Navigate to the directory `PA_EXEC/joboperation/scripts`
2. Execute the script modern communication modules (`distribute_modern_comm_modules.py`):

   ```
   python distribute_modern_comm_modules.py
   ```

   The script will guide you in distributing modern communication module.
3. Enter the location to distribute.

   > **Note:** Location of modules must be accessible by all users.

4. Enter the user name who has password-less access across the nodes.

   > **Note:** User must present on all the PBS Server and PBS Mom machine(s) and they should be able to communicate without password.

   The following message is displayed:

   ```
   Do you want to override if modules already exist (Y/N). [Default: N]?
   ```
5. Enter `Y` to override.

   The script will display the inputs provided.
6. Enter `Y` to continue with the inputs provided.

   The following information is displayed:

   ```
   Transferring Client Modules to n2.lab.com...
   Successfully transferred to 'n2.lab.com'
   Transferring Client Modules to n1.lab.com...
   Successfully transferred to 'n1.lab.com'
   Updated PAS Configuration file successfully
   ```
7. Restart the Access Web by entering the command:

   ```
   service pbsworks-pa restart
   ```

16.3 Enable Modern Communication

Enable modern communication for faster running job operations.

If you have not setup the modern communication on Linux earlier, then perform Modern Communication Setup on Linux before enabling Modern Communication.

Perform Modern Communication Setup on Linux before enabling Modern Communication.

By default, the modern communication is enabled when you install Access Web.

1. Login to Access Web application.
2. Delete all the registered server from Access Web.
3. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
4. Stop Access Web by entering the following command:

   ```
   service pbsworks-pa stop
   ```
5. Edit `PA_HOME/config/pas/conf/server.conf` file and update the value:

   ```
   MODERN_COMMUNICATION_ENABLED=true
   ```
6. Copy `PA_HOME/config/api_gateway/template_joboperation.conf` to `PA_HOME/config/api_gateway/template.conf`
7. Start Access Web by entering the following command:

   ```
   service pbsworks-pa start
   ```
8. Login to Access Web application and register the servers.

16.4 Disable Modern Communication

Disable modern communication for faster running job operations.

By default, the modern communication is enabled when you install Access Web. If Modern communication is disabled, then the performance of job operations will not be faster.

1. Login to Access Web application.
2. Delete all the registered server from Access Web.
3. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
4. Stop Access Web by entering the following command:
   `service pbsworks-pa stop`
5. Edit `PA_HOME/config/pas/conf/server.conf` file and update the value:
   `MODERN_COMMUNICATION_ENABLED=false`
6. Copy `PA_HOME/config/api_gateway/template_pyspawn.conf` to `PA_HOME/config/api_gateway/template.conf`
7. Start Access Web by entering the following command:
   `service pbsworks-pa start`
8. Login to Access Web application and register the servers.

Application Definitions

17

PAS requires a predefined set of instructions, called application definitions, to describe your application parameters to users, store their responses, and prepare those responses for job execution via PBS Professional.

This chapter covers the following:

An application definition provides a flexible set of instructions that can be manipulated to allow for precise control over all aspects of application-specific parameters and job execution. These application definitions are stored in a central repository and will make PBS Professional aware of each of them upon server startup. The location of the application directory for a typical installation of PAS is:

`PA_HOME/data/pas/targets/localhost/repository/applications`.

17.1 Application Definition Components

Overview of application definition components.

An application definition is comprised of a set of Python scripts and two XML files which could include references to site wide configuration settings. A separate application definition with application-specific details is required for each application that will be integrated into PAS. Application definitions are compliant with the Open Grid Forum High Performance Computing Basic Profile (HPCBP), Business Process Execution Language (BPEL), and Job Submission Description Language (JSDL) standards.

Application definitions are stored in the PAS application directory. The default location of this directory is: `PA_HOME/data/pas/targets/localhost/repository/applications/`.

Diving Into Application Definitions explains what an application definition is and how to use an application definition. If you are installing PAS for the first time and are not familiar with application definitions, then *Diving Into Application Definitions* is a good place to start. A set of tutorials is provided starting with how to create the simplest of application definitions and progressing to more advanced topics. Recipes are also available demonstrating advanced techniques. For more comprehensive information about application definitions and their associated files see *Diving Into Application Definitions*.

17.1.1 Application Input File

The application input file is where administrators can define the allowed arguments for a given application. This file is also used by graphical, web-based and even command-line tools to display these arguments to users for job submission.

The mandatory naming convention for the application input file is `app-inp-applicationname.xml` where `applicationname` is whatever name you choose to give your application.

17.1.2 Application Converter File (HPCBP Converter)

The application converter file is where administrators take the values received by the user via the input file and communicates this information to PAS and PBS Professional. This file allows the PAS administrator to configure the job submission environment.

The mandatory naming convention for the application converter file is `app-conv-applicationname.xml` where `applicationname` is whatever name you decide to give to your application.

17.1.3 Application Runtime Scripts

The application runtime scripts are what get executed on the execution hosts. The runtime script, `start.py`, is what will be executed as the “job script”. This script file is responsible for executing

the application associated with your application definition, using the information entered by the user (defined by the application input file) and converted (via the application converter file). Additional scripts can also be included that support and enhance the runtime script. Administrators can directly edit these runtime script(s), taking full advantage of Python to add further inspection and complexity to job submission and finally execution of the application itself. This adds tremendous flexibility as nearly infinite possibilities for job control exist at this phase of job description.

For information about how to use runtime scripts see the tutorials *Enhancing your Application with Runtime Scripts*, *Executing Actions on a Running Job* and the *Recipes* section in *Diving Into Application Definitions*.

17.1.4 Site Configuration File

A default site configuration file, `site-config.xml`, is installed in the PAS configuration directory.

The site configuration file, `site-config.xml`, is meant to make application definitions more portable by consolidating data that may change from cluster to cluster in a central location. It is where administrators can define things like policies, version, and path information for all the available applications, billing account information, etc. The data in this file is used by the application input and converter files.

The location of this file for a typical installation of PAS is:

`PA_HOME/data/pas/targets/localhost/repository/`

For information on how to reference the site configuration file in an application definition see the tutorial *Maintaining Multiple Versions of an Application*, recipes *How to Configure & Use Sitewide Billing Accounts*, *How to Configure & Use Sitewide Policies*, and *How to Configure & Use Application Policies* section in *Diving Into Application Definitions*.

The `site-config.xml` file must be updated manually if you add an application definition. Access Web does not create a backup the `site-config.xml` file. If you delete the `site-conifg.xml` file, then you must create it manually. Before making changes to the site configuration file, it is recommended to back it up.

17.2 Sample Application Definition ShellScript

PAS provides a sample application definition, ShellScript, which is located in the application definition directory.

ShellScript is an example of how an administrator could create an application definition enabling users to use custom job scripts akin to the more common PBS Professional job script. ShellScript allows these job scripts to be written in any language by using its runtime script, `start.py`, to parse the first line (shebang line) to determine the correct interpreter to execute your job script against. ShellScript's versatility allows the following:

- extra arguments to be passed to the job script
- specification of advanced multi-node placement options
- the inclusion of additional files

This application definition in conjunction with the *Diving Into Application Definitions* documentation will assist administrators to create and deploy application definitions.

17.3 Map Icons to an Application

Map an icon to an application so that the icon gets displayed in the context menu and in the application list.

The application input file is where administrators can map an icon for a given application. The icon mapped in this file is displayed in the context menu and in the application list.

Two images are used to map an icon to an application. The first image must be a size 16x16 pixels and is used when displaying the application in a context menu such as submitting a job by right-clicking on a job input file. The second image must be a size of 64x64 pixels and is the icon that is displayed next to the name of the application when displaying available applications.

Figure 23:Context Menu Icons

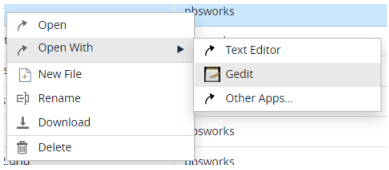
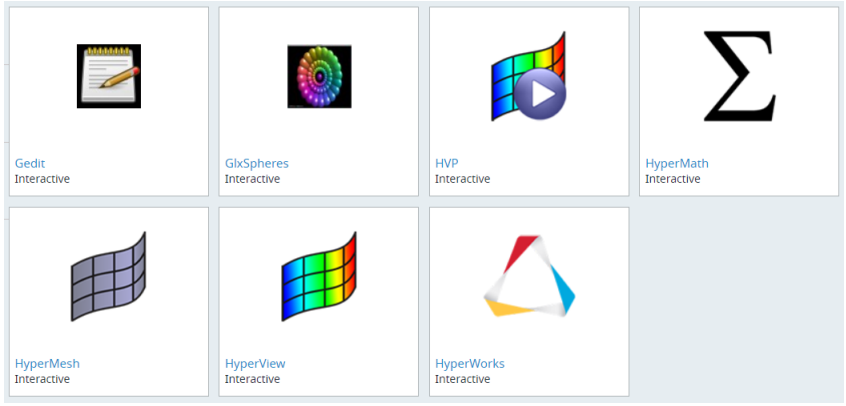


Figure 24:List Menu Icons



Note: Only Administrators can map an icon to the application.

1. Login to the machine where Access Web is installed as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/data/pas /targets/localhost/repository/applications/`*`APPNAME`*.
   where *APPNAME* is the application folder. For example, let's assume that we are adding icon to the ShellScript application definition.
3. Create an `avatar` directory.
4. Navigate to the `avatar` directory.
5. Place the application icon.
   Place one image of size 16x16 for the context menu and the other image of size 64x64 for the list menu.
6. Navigate to `PA_HOME/data/pas /targets/localhost/repository/applications/ShellScript`.

7. Edit the application input file and add the `<ApplicationIconSmall>` xml element to display the icon in context menu and `<ApplicationIconMedium>` xml element to display the icon in the application list.

```
<ApplicationId>ShellScript</ApplicationId>
<ApplicationName>ShellScript</ApplicationName>
<ApplicationExtension>.fem</ApplicationExtension>
<ApplicationIconSmall>ShellScriptIconSmall.jpg</ApplicationIconSmall>
<ApplicationIconMedium>ShellScriptIconMedium.jpg</ApplicationIconMedium>
```

8. Repeat steps 2 through 7 for all applications.
9. Restart Access Web by entering the following command:

```
service pbsworks-pa restart
```

An example of the icons mapped to the application definition displayed in UI:

17.4 Define a Category for an Application Definition

Define a category in the application definition input file so that the application listed can be filtered based on the category.

The XML element `<TAGS>` defines the category under which an application is listed within the Access Web UI.

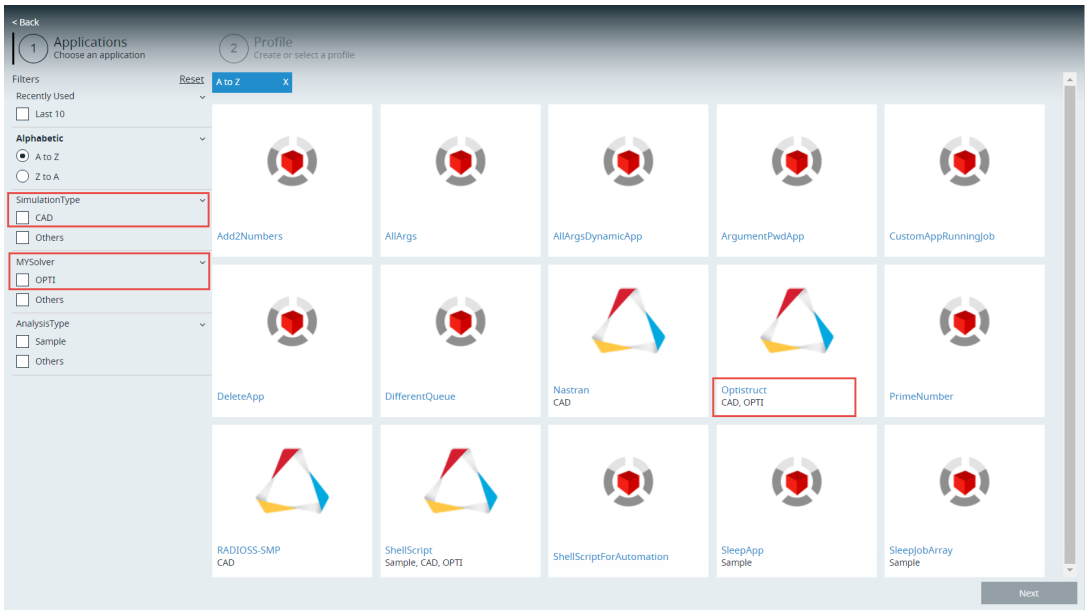


Figure 25: Application Definition Category

Applications can be filtered in the UI by selecting a category.

For example, add a category to the Optistruct application using the XML element `<TAGS>`:

```
<TAGS>
    <TAG>SimulationType:CAD</TAG>
    <TAG>MYSolver:OPTI</TAG>
</TAGS>
```

This tag indicates that the Optistruct application will be listed under the SimulationType and MySolver categories. The CAD and OPTI will be the subcategory of SimulationType and MySolver respectively. The category tags can be defined in other application definition input files so that the categories can be used to filter the application list.

17.5 Administration of Application Definitions

PAS has a central location for storing application definitions -

`PA_HOME/data/pas/targets/localhost/repository/applications`.

All application definition components are stored in this directory.

17.5.1 Add a New Application Definition

Adding an application definition to the applications directory, followed by a restart of Access Web, will expose your application definition to the user.

A default application definition called ShellScript is available after installing Access.

Follow these steps to add an application definition:

1. Login to the machine hosting the PAS Server as root or as a user with sudo permissions.
2. Navigate to `PA_HOME/data/pas/targets/localhost/repository/applications`.
3. Create a directory called `appname`.
   where `appname` is the name of the application.
4. Place the application definition input file (`app-inp-appname.xml`) and the application definition converter file (`app-conv-appname.xml`) in the application directory.
5. Navigate to the `appname` directory.
6. Create a subdirectory called `runtime` and navigate to that subdirectory.
7. Place any runtime scripts into the runtime directory.
8. Navigate to `PA_HOME/data/pas/targets/localhost/repository/`.

   Note: It is recommended to back up the site configuration file before making any changes to it.
9. Update the application definition information in `site-config.xml`.
10. Restart Access Web by entering the following command:

```
service pbsworks-pa restart
```

17.5.2 Application Definition Validation

When Access Web starts, it performs a validation of the existing application definitions. If application definitions fail to meet key criteria, error messages are displayed in the PAS log file indicating why the application definition was invalid.

If an application is not displayed in the Access Web user interface after adding a new application definition or making changes to an existing one and restarting Access Web, then most likely there were validation problems with the application definition or the site configuration file.

View the PAS log for any error messages and edit the application definition or site configuration file to take any required corrective action. An invalid application definition will not prevent the PAS Server from starting up.

17.5.3 Maintenance of Existing Application Definition

Existing application definitions can be modified or removed. To make PAS aware of the modification or the removal of an application definition, restart Access Web.

Update an Application Definition

You can easily modify an existing application definition using your favorite XML editor.

1. Login to the machine hosting the PAS Server as root or as a user with sudo permissions.
2. Navigate to the applications directory located at:

   `PA_HOME/data/pas/targets/localhost/respository/applications`.
3. Edit and make any modifications necessary to the application definition files.
4. Restart Access Web by entering the following command:

   ```
   service pbsworks-pa restart
   ```

Remove an Application Definition

Removing an application definition from PAS is also very simple.

Simply remove the application definition directory from the applications folder. You have to restart Access Web to remove your application definition from PAS. Follow these steps to remove an application definition:

1. Login to the machine hosting the PAS Server as root or as a user with sudo permissions.
2. Navigate to the applications directory located at:

   `PA_HOME/data/pas/targets/localhost/respository/applications`.
3. Remove the application directory and all of its content including the `runtime` subdirectory and associated files.
4. Remove references to the application definition from the `site-config.xml` file located at:

   `PA_HOME/data/pas/targets/localhost/repository/`.
5. Restart Access Web by entering the following command:

   ```
   service pbsworks-pa restart
   ```

17.6 Sitewide Settings

PAS provides a central repository for site specific information such as executable paths, policies, and billing account information. This information is stored in a site configuration file, `site-config.xml`. By putting some site specific application information in the, `site-config.xml` application definitions can be made more portable and reusable among different PBS Professional complexes. For example, putting binaries locations and version availability information here, makes the rest of the application definition reusable on a different cluster just by modifying that cluster's `site-config.xml`. The location of this file is `PA_HOME/data/pas/targets/localhost/repository`.

17.6.1 Site Configuration File Content

This file can hold virtually any sort of information, since the information stored in the file can be referenced by any application definition XML file. Altair has included certain data in the site configuration file for the integration and support of other products from the PBS Professional family. The example below shows a sample of the site configuration file with the sections currently used by the PBS Professional product suite:

Applications
: This section holds application specific information.

Application versions
: For each application, you can insert site supported versions and for each version its binary pathname.

Job projects (billing accounts)
: This section is for integrating PAS with other products from Altair. Here you can list a set of strings to be used as “accounting” information to be attached to jobs.

Policies
: Site policies are values that can be used in a site’s application definition XML files and/or as values available in job runtime environment (policies are included as environment variables for the jobs).

Application policies
: This section is for setting policies that are specific to an application.

The `site-config.xml` file must be updated manually if you add an application definition. Access Web does not create a backup of `site-config.xml` file. If you delete the `site-conifg.xml` file, then you must create it manually. Before making changes to the site configuration file, it is recommended to back it up.

17.6.2 Site Configuration File Backup

Upon server start-up, PAS will validate the content of the site configuration file and the content of application definitions. Any validation errors are written to the PAS log file.

If an application is not displayed in the Access Web user interface after adding a new application definition or making changes to an existing one and restarting PAS, then most likely there were validation problems with the application definition or the site configuration file.

View the PAS log for any error messages and edit the application definition or site configuration file to take any required corrective action.

As of Access 2019.3.1, the site configuration file is no longer backed up during its validation process.

17.6.3 Initial Site Configuration File after Installation of PAS

After installation of PAS the site configuration file will contain references to ShellScript, an application definition that is provided out-of-the-box. Placeholders for billing accounts and policies are provided, but will need to be updated according to your site specifications.

```
<?xml version="1.0" encoding="UTF-8"?>
<SiteConfiguration xmlns="http://schemas.altair.com/pbs/2007/01/site-config"
    xmlns:site-config="http://schemas.altair.com/pbs/2007/01/site-config"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://schemas.altair.com/pbs/2007/01/site-config ../schemas/
site-config.xsd">
    <Applications>
      <Application id="ShellScript">
        <ApplicationVersions/>
      </Application>
    </Applications>
    <JobProjects id="BILLING_ACCOUNT"/>
    <Policies/>
</SiteConfiguration>
```

17.6.4 Sample of a Site Configuration File

Here is an example of a site configuration file with modifications for site supported application versions, application policies, billing accounts, and sitewide policies:

```
<?xml version="1.0" encoding="UTF-8"?>
<SiteConfiguration xmlns="http://schemas.altair.com/pbs/2007/01/site-config"
   xmlns:site-config="http://schemas.altair.com/pbs/2007/01/site-config"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://schemas.altair.com/pbs/2007/01/site-config ../schemas/
site-config.xsd">
  <Applications>
    <Application id="ShellScript">
      <ApplicationVersions/>
      <Policies>
        <Policy>
          <Option>MAX_CPUS</Option>
          <Value>4</Value>
        </Policy>
      </Policies>
    </Application>
    <Application id="Optistruct">
      <ApplicationVersions>
```

```
        <ApplicationVersion>
          <Option>8.0</Option>
          <Executable>/opt/hyperworks/11.0/altair/scripts/optistruct</Executable>
        </ApplicationVersion>
        <ApplicationVersion>
          <Option>9.0</Option>
          <Executable>/sw/optistruct9/optistruct</Executable>
        </ApplicationVersion>
      </ApplicationVersions>
    </Application>
  </Applications>
  <JobProjects id="BILLING_ACCOUNT">
     <Option>Company1</Option>
     <Option>Company2</Option>
  </JobProjects>
  <Policies>
    <Policy>
      <Option>MAX_CPUS</Option>
      <Value>4</Value>
    </Policy>
  </Policies>
</SiteConfiguration>
```

17.6.5 Use Site Configuration Information in an Application Definition

For information on how to reference the site configuration file in an application definition see the tutorial *Maintaining Multiple Versions of an Application*, recipes *How to Configure & Use Sitewide Billing Accounts*, *How to Configure & Use Sitewide Policies*, and *How to Configure & Use Application Policies* in *Diving Into Application Definitions*.

17.6.6 Site Configuration File Validation

Upon server startup, PAS validates the site configuration file. It is validated against its XML schema. An XML schema defines the legal building blocks of a particular XML document. An XML schema:

- defines elements that can appear in a document
- defines attributes that can appear in a document
- defines which elements are child elements
- defines the order of child elements
- defines the number of child elements
- defines whether an element is empty or can include text
- defines data types for elements and attributes
- defines default and fixed values for elements and attributes

The validation process also determines if the content of the site configuration file is well-formed (valid). The content is well-formed if the following criteria is met:

- It must have a root element.

- XML elements must have a closing tag.
- XML tags are case sensitive.
- XML elements must be properly nested.
- XML attribute values must be quoted.

17.7 Interactive Application Definitions

Interactive application definition mandatory and special arguments.

An interactive application runs a 3D and graphics-intensive application on a graphical node.

17.7.1 Mandatory Interactive Application Definitions Changes

XML tags that are required for an interactive application definition.

For an application to be identified as interactive, the corresponding application definition must contain the `<Interactive>` element and its value must be set to `true` in the application input file.

```
<Interactive>true</Interactive>
```

Additionally, a boolean argument is necessary to run an interactive application which controls how many GPUs are requested at job submission.

```
<ArgumentChoice>
    <ArgumentBooleanWithDescription>
        <Name>GPU</Name>
        <Description>Is GPU required ?</Description>
        <DisplayName>GPU(?)</DisplayName>
        <InputRequired>false</InputRequired>
        <Value>true</Value>
    </ArgumentBooleanWithDescription>
</ArgumentChoice>
```

The `<Value>` element controls the request for GPUs. For 2D applications set it to `false` and a request for GPUs will not be made for the application. For 3D applications, `<Value>` option has to be set to `true`.

17.7.2 Special Interactive Application Arguments

Arguments that can be added to an interactive application definition.

The following interactive application specific arguments can be added to an application definition to pass arguments and environment variables to the application, define a job working directory, create a backup of job input files, and change the viewing mode from Applet to HTML5.

Arguments

A special string argument having the name *`DM_APP_ARGS`* can be added to an application definition so that arguments can be passed to the application. Multiple arguments can be passed to the application by separating them by `'\n'`.

```
<ArgumentChoice>
    <ArgumentString>
        <Name>DM_APP_ARGS</Name>
        <Description>'\n' separated args</Description>
        <DisplayName>Arguments</DisplayName>
        <InputRequired>false</InputRequired>
    </ArgumentString>
</ArgumentChoice>
```

Environment

A special string argument having the name *DM_APP_ENVS* can be added to an application definition so that environment variables can be passed to the application. Multiple variables can be passed to the application by separating them by *'\n'*.

```
<ArgumentChoice>
    <ArgumentString>
        <Name>DM_APP_ENVS</Name>
        <Description>'\n' separated envs</Description>
        <DisplayName>Environments</DisplayName>
        <InputRequired>false</InputRequired>
    </ArgumentString>
</ArgumentChoice>
```

WorkDirectory

A special string argument having the name *DM_APP_WDIR* can be added to an application definition so a job working directory is created when the job is submitted.

```
<ArgumentChoice>
    <ArgumentString>
        <Name>DM_APP_WDIR</Name>
        <Description>Working dir</Description>
        <DisplayName>Workding Dir</DisplayName>
        <InputRequired>false</InputRequired>
    </ArgumentString>
</ArgumentChoice>
```

Note: The arguments mentioned above are disabled by default. Enable them by setting the `<InputRequired>` field to `true`.

Copy Back Files

A special boolean argument having the name *COPY_BACK_FILES* can be added to an application definition so that job input files are copied to the stageout directory.

```
<ArgumentChoice>
    <ArgumentBooleanWithDescription>
        <Name>COPY_BACK_FILES</Name>
        <Description>Should job file(s) be staged out</Description>
        <DisplayName>Copy back files</DisplayName>
        <InputRequired>true</InputRequired>
        <FeatureEnabled>false</FeatureEnabled>
        <RefreshOnUpdate>true</RefreshOnUpdate>
    </ArgumentBooleanWithDescription>
</ArgumentChoice>
```

Note: The *COPY_BACK_FILES* arguments is disabled by default. Enable this field by setting the `<FeatureEnabled>` option to `true`. When `<FeatureEnabled>` is set to `true`, the person who is submitting the job can choose whether to stageout job input files.

Client View Mode

A special enumerated list argument having the name *DM_CLIENT_VIEW_MODE* can be added to an application definition so that the person submitting the job can choose the type of mode to view the job results.

```
<ArgumentChoice>
    <ArgumentStringEnumerated>
        <Name>DM_CLIENT_VIEW_MODE</Name>
        <Description>Viewer mode</Description>
        <DisplayName>Viewer Mode</DisplayName>
        <InputRequired>false</InputRequired>
            <Option>Desktop</Option>
            <Option>HTML5</Option>
            <Option>Applet</Option>
        <Value>HTML5</Value>
    </ArgumentStringEnumerated>
</ArgumentChoice>
```

Note: By default, the HTML5 view mode is enabled.

Mandatory/Optional Application Converter File Changes

In the `app-conv-AppName` application definition file, the following section determines which jobs are displayed in Access Web.

```
<jsdl-hpcp:Environment name="DM_JOB">True</jsdl-hpcp:Environment>
```

If this is set to `False`, apart from the interactive application jobs, all the other jobs belonging to the user will be displayed. Ensure that this is set to `True`.

17.7.3 Add a New Interactive Application

Create a new interactive application definition by copying a default interactive application definition and making application specific changes.

Any time a new application is added to your HPC, a corresponding application definition needs to be written. Writing a specific interactive application definition is a bit more complex than writing simple application definitions. We recommend the following procedure of copying and modifying the GLXSpheres application definition which is available after installing the Remote Session components of Access Web.

1. Navigate to `PA_HOME/data/pas/targets/localhost/repository/applications/`
2. Copy the GlxSpheres application definition directory and rename it to the name of the new application.

   If the new application is HyperView, then execute the following command:

   ```
   cp -rp GlxSpheres HyperView
   ```
3. Rename the GlxSpheres application definition files to the name of the new application.

   ```
   mv app-actions-GlxSpheres.xml app-actions-HyperView.xml
   mv app-conv-GlxSpheres.xml app-conv-HyperView.xml
   mv app-inp-GlxSpheres.xml app-inp-HyperView.xml
   ```
4. Edit the application input file.
   a) Change the value of the `<ApplicationId>` element to the name of the new application.

      ```
      <ApplicationId>HyperView</ApplicationId>
      ```
   b) Change the value of the `<ApplicationName>` element to the new application name.

      ```
      <ApplicationName>HyperView</ApplicationName>
      ```

c) Locate the application argument `<ArgumentChoice>` called VERSION.

```
<ArgumentChoice>
    <ArgumentStringEnumerated>
        <Name>VERSION</Name>
        <Description>Version of the interactive application you
                        selected to start </Description>
        <DisplayName>Version</DisplayName>
        <xi:include href="site-config.xml" pointer="xpath1
          (//Application[@id='GlxSpheres']/ApplicationVersions//Option)" />
    <ArgumentStringEnumerated>
</ArgumentChoice>
```

d) Change the attribute `@pointer` of the `<xi:include>` element to point to the path of the new application:

```
<xi:include href="site-config.xml" pointer="xpath1
          (//Application[@id='HyperView']/ApplicationVersions//Option)" />
```

5. Edit the application action file.

a) Change the value of the `<ApplicationId>` element to the name of the new application.

```
<ApplicationId>HyperView</ApplicationId>
```

b) Change the value of the `<ApplicationName>` element to the new application name.

```
<ApplicationName>HyperView</ApplicationName>
```

6. Edit the application converter file.

a) Change the value of the `<ApplicationId>` element to the name of the new application.

```
<ApplicationId>HyperView</ApplicationId>
```

b) Change the value of the `<ApplicationName>` element to the new application name.

```
<ApplicationName>HyperView</ApplicationName>
```

c) Set the site specific required environment for the application.

You can set the ALTAIR_LICENSE_PATH, NCPUS, ngpus, MEMORY etc according to the requirements for the application.

```
<jsdl-hpcp:Environment name="ALTAIR_LICENSE_PATH">6200@licsrv</
jsdlhpcp:Environment>
```

7. Navigate to the directory `PA_HOME/data/pas/targets/localhost/repository/`

8. Edit the `site-config.xml` file.

a) Add a new `<Application>` element that points to the new application executable.

```
<Application id="HyperView">
    <ApplicationVersions>
        <ApplicationVersion>
            <Option>13.2</Option>
            <Executable>/altair/hw/13.2/altair/scripts/hv</Executable>
        </ApplicationVersion>
    </ApplicationVersions>
</Application>
```

Tip: You can also define multiple executable versions for the application.

```
<Application id="HyperView">
    <ApplicationVersions>
        <ApplicationVersion>
            <Option>13.1</Option>
            <Executable>/altair/hw/13.1/altair/scripts/hv</Executable>
        </ApplicationVersion>
```

```
        <ApplicationVersion>
            <Option>13.2</Option>
            <Executable>/altair/hw/13.2/altair/scripts/hv</Executable>
        </ApplicationVersion>
    </ApplicationVersions>
</Application>
```

9. Restart the Access Web for these changes to take effect by entering the following command:

```
service pbsworks-pa restart
```

The new application will be available in Access Web after restart.

Establish Access Controls

18

Create roles and add users to these roles to grant and restrict access to the various features of Access Web.

This chapter covers the following:

Access Web roles and privileges are defined by clicking > **Access Management** located in the upper right-hand of the web page once you have logged into Access Web. This option is only displayed for the portal administrator.

Note: The first person to login to Access Web after installation is considered the portal administrator. The portal administrator is the only user who can add or delete service clusters and controls the user management.

18.1 Managing Roles

Add a role, change a role's privileges or delete a role.

18.1.1 Default Roles and Resources

Overview of the default Access Web roles.

Access Web Roles

By default, the only role available in Access Web is Manager. This role cannot be deleted and their assigned privileges cannot be changed, however additional users can be added to these roles to provide manager access.

Manager
: A Manager has the highest level of access privilege. Managers can add, edit, or remove clusters, can view and act upon jobs and files, and can grant and restrict access to the various features of Access Web. By default, the Service User entered during the installation of Access Web is assigned to the Manager role and cannot be removed from this role.

Privileges

By default, the following privilege levels are available:

Portal Admin
: This privilege allows full access to manage clusters and access management.

Application User
: This privilege restricts application access for jobs, sessions and to the resources.

Resources

By default, the following resource levels are available:

Applications
: This privilege allows access to the applications and its respective profiles available in Access Web. It limits the users to access applications for job submission, create job profiles, use the application for remote session and perform custom action.

18.1.2 Add a New Role

Create a custom role for your site.

Review the default roles and privileges before adding a new role.

1. Click > **Access Management**.
2. Click **Roles** from the menu located on the left-hand side of the web page.
3. Click **Add Roles**.

A role is created with a default role name and application user privileges.

4. Click located to the right of the name of the role.
   a) For Role Name, enter a name that describes the role.
   b) Click **Ok**.
5. Choose **Portal Admin** privilege if you want to provide full permission.
   By default, only **Application User** privilege is provided to the new Role.
6. Click + at the top next to the **Assigned Resources**.
   The **Available Resources** menu is displayed.
7. Choose the resources to give to this role by clicking the check-box located to the right of the resources.
   Resources are not mutually exclusive, so you may assign more than one.
8. Click **Ok** in the **Available Resources** menu.
9. Click **Save**.
   The new role is displayed in the Roles list.

18.1.3 Change the Resources of a Role

Add or remove access resources for a role.

Review the default roles and privileges before adding a new role.

1. Click > **Access Management**.
2. Click **Roles** from the menu located on the left-hand side of the web page.
3. Click the name of the role.
   The **Assigned Resources** menu is displayed.
4. Click + at the top next to the **Assigned Resources**.
   The **Available Resources** menu is displayed.
5. Enable the checkbox next to the Resource to assign the resource to the role.
6. Click **Ok** in the **Available Resources** menu.
7. Click **Save**.

18.1.4 Change the Name of a Role

Rename a role.

1. Click > **Access Management**.
2. Click **Roles** from the menu located on the left-hand side of the web page.
3. Click the name of the role.
4. Click located to the right of the name of the role.

a) For Role Name, enter a name that describes the role.
b) Click **Ok**.

5. Click **Save**.

18.1.5 Delete a Role

Delete a role that is no longer needed.

1. Click > **Access Management**.
2. Click **Roles** from the menu located on the left-hand side of the web page.
3. Select a role by enabling the checkbox next to the role's name.

> **Tip:** Select multiple roles so that they can be deleted in a single click.

4. Click .
5. Click **Ok**.

18.2 Managing Users

Add a user, assign or remove a role from a user, or delete a user.

> **Note:** User is auto populated on first time login to the access.

18.2.1 Add a User

Add a user so that the user can access the features of Access Web.

1. Click > **Access Management**.
2. Click **Users** from the menu located on the left-hand side of the web page.
3. Click **Add User**.
   a) For First Name, enter the first name of the user.
   b) For Last Name, enter the last name of the user.
   c) For User Name, enter the user's NIS/SSH username.
   d) Click **Save**.

18.2.2 Assign a Role to a User

Assign a role to the user to establish user resources.

1. Click > **Access Management**.
2. Click **Users** from the menu located on the left-hand side of the web page.
3. Select a user by enabling the checkbox next to the user's name.

   > **Tip:** Select multiple users when you want to assign the same roles to multiple users.

4. Click **Assign Roles**.
   The **Available Roles** menu is displayed.
5. Enable the checkbox next to the Role Name to assign the role to the user.

   > **Tip:** More than one role can be assigned to the user.

6. Click **OK**.

18.2.3 Remove a Role from a User

Remove a role from a user to limit access to certain features.

1. Click > **Access Management**.
2. Click **Users** from the menu located on the left-hand side of the web page.
3. Click the name of the user.
   The roles assigned to the user is displayed.
4. Click to delete the role.
5. **Save**.

18.2.4 Change the User Name

Change the first or last name of a user.

1. Click > **Access Management**.
2. Click **Users** from the menu located on the left-hand side of the web page.
3. Click the name of the user.
   The roles assigned to the user is displayed.
4. Change the first or last name of the user.
5. Click **Save**.

18.2.5 Delete a User

Delete a user when the user no longer needs access to Access Web.

1. Click > **Access Management**.
2. Click **Users** from the menu located on the left-hand side of the web page.
3. Select a user by enabling the checkbox next to the user's name.

   Tip: Select multiple users so that they can be deleted in a single click.

4. Click .
5. Click **Ok**.

Troubleshoot Access Web

19

Troubleshoot Access Web, PAS, Results Visualization Service, and Remote Sessions.

This chapter covers the following:

The following section provides the troubleshooting information and steps for Access Web and its services.

19.1 Use the Diagnosis Script to Troubleshoot Issues

Use the diagnosis script to gather log files and system data to help troubleshoot issues with Access Web.

The diagnosis script must be run as root or as a user with sudo permissions using the `sudo` command.

The diagnosis script will create a zip file that can be shared with Altair support team for troubleshooting issues.

> **Note:** If PAS is installed on a separate machine, run the diagnosis script on the PAS server as well.

1. Login to the machine where you have installed Access Web.
2. Navigate to `PA_EXEC/init/`
3. Run the following command:

   ```
   ./pa-diagnosis.py
   ```

   A zip file is created in `/tmp` called `pbsworks-pa-diagnosis_`*`DATETIMESTAMP`*`.zip` where *DATETIMESTAMP* is the file creation timestamp in the format YYYYMMDD-HHMMSS.

19.2 Troubleshoot PBS Application Services

Troubleshooting information and steps for PAS.

19.2.1 PAS Status Page

Use the PAS status page to get information about PAS such as JVM data, memory and disk usage data, and PBS information.

A status page is available through the following URL to monitor the status of PAS:
`https://HOSTNAME:5243/pas/pasStatus`

Where *HOSTNAME* is the hostname of the machine where the PAS Server is installed.

PAS Status at time: 6:23:29 PM

JVM Platform OS Name (system property os.name)	Linux - OK
JVM Platform OS Version (system property os.version)	3.10.0-693.el7.x86_64 - OK
JVM Platform Architecture (system property os.arch)	amd64 - OK
JVM Data Model (system property sun.arch.data.model)	64 - OK
Java Version	1.8.0_92 - OK
Python	OK
Dependent shared objects	OK
Available heap memory in MB	186 MB - OK
Memory used by AIF server in MB	101 MB - OK
PAS_EXEC directory disk space.	OK
PAS_HOME directory disk space.	OK
PBS status	PBS server is Running - OK
PBS Version	18.2 - OK
PBS execution speed	OK

Figure 26: PAS Status Page

Green indicates that the system is functioning properly. Red indicates an issue that should be investigated.

For the PBS execution speed, PAS retrieves the PBS version by executing `get_PBS_version.py` located in `PA_EXEC/pas/scripts`. If the response takes more than 5 seconds, the execution speed is considered slow and will be displayed in red.

19.2.2 PAS Log File Contains OutofMemory Errors

Condition

There are `OutOfMemoryErrors` in the PAS Server log.

Cause

Usually, this error is thrown when the Java Virtual Machine cannot allocate an object because it is out of memory.

Remedy

Adjust the Java Virtual Machine (JVM) heap size of PAS.

Out of memory errors can indicate a underlying problem, therefore it is recommended to report these errors to the Altair support team.

See Also

Configure JVM Performance

19.2.3 PBS Professional Features are Not Working after Upgrade

Condition

I have upgraded PBS Professional to the newest version and now the new features are not working.

Cause

Whenever PAS starts, it saves PBS configuration information in memory. After PBS Professional is upgraded, the new configuration information is not available to PAS.

Remedy

After installing a new version of PBS Professional, you must restart PAS.

1. Login to the PAS Server.
2. Restart PAS.

19.2.4 Troubleshoot PAS Job Submission Issues

Information about troubleshooting PAS job submission issues.

Change the Logging Level to Troubleshoot Job Submission Issues

Change the PAS logging level to get fine-grained information that is more useful to debug a job submission issue.

> **Note:** To gather debugging information for other functional areas of PAS, see Logging Behavior.

To troubleshoot errors during job submission and job monitoring, relevant information must be collected:

- user input provided for the job submission
- submission environment
- status (success or failure) of all the dependencies
- steps which happen during the job submission
- job submission attributes generated by the PAS Server for the workload manager (PBS)

Follow these steps to gather relevant data:

1. Check the PAS server log *PA_HOME*`/logs/pas/pas-server.log` for errors.
2. Check the Tomcat log file `PA_HOME/logs/pas/catalina.out` for network or security errors.
3. Check the system logs.

> **Note:** For advanced debugging, contact the Altair support team.

If you cannot determine the cause of the issue after checking the PAS Server log files, the Tomcat log files and the system logs, change the PAS logging level to get fine-grained information that is more useful to debug a job submission issue.

4. Navigate to `PA_HOME/config/pas/conf/`.
5. Add the following lines to the `server-log.xml` file to get detailed logging information about user inputs and to see how long it takes to execute a submission request:

```
<category name="com.altair.gw.aif.rest.RESTJobsPortImpl">
    <priority value="debug" />
</category>
```

6. Add the following lines to the `server-log.xml` file to get detailed logging information about the process of creating PBS job attributes from user inputs as well as information about the application definition:

```
<category name=" com.altair.gw.aif.rest.util.PASNextGenJobUtils">
    <priority value="debug" />
</category>
```

   PAS supports multiple adapters to communicate with the workload manager.

7. If the SSH adapter is enabled for the communication with the PBS cluster, add the following XML to the `server-log.xml` file to troubleshoot job submission:

```
<category name=" com.altair.gw.aif.ssh.implementation. SSHImplementation”>
    <priority value="debug" />
</category>
```

8. Edit the PAS job script `PA_EXEC/pas/scripts/job.py`.

9. Enable debug logging by setting *DEBUG* to `true`.

   ```
   DEBUG=TRUE
   ```

   This provides information about the job process arguments and the job environment at the moment of job execution. This information is available in the job output file.
10. Restart Access Web by entering the following command:

    ```
    service pbsworks-pa restart
    ```
11. Resubmit the job.
12. Check the log files described in steps 1 through 3.
13. Check the job output file for information about the job process arguments and the job environment.

If this troubleshooting steps do not provide enough information to debug the issue, then submit a job script directly to PBS.

Troubleshoot Job Submission Issues by Submitting a Job Directly to PBS

Debug job submission issues by submitting the job script directly to PBS.

Submit a job directly to PBS to determine if the problem is a PBS issue or a PAS issue.

1. Edit the file *PA_HOME*`/config/pas/conf/server.conf`.
2. Enable debug mode for the PAS Server by setting *DEBUG* to `true`.

   ```
   DEBUG=TRUE
   ```
3. Restart Access Web by entering the command:

   ```
   service pbsworks-pa restart
   ```

   The PAS Server will save the job script to a file in *PA_HOME*`/data/pas/system/temp`
4. Use the job script file to submit a job directly to PBS Professional.
   If the job runs successfully with no errors, then the problem is originating from PAS.

Job Fails With "Bad UID for job execution" Error

Condition

Our site has installed PAS on a separate machine from the one hosting the PBS Professional Server. When a user submits a job, the job fails with a `"Bad UID for job execution"` exception.

Cause

This error is displayed when jobs are submitted by root. If the failed job was not submitted by root, then the PBS Professional *flatuid* may be set to False.

Remedy

The PBS Professional *flatuid* attribute must be set to True. This attribute specifies whether, for each user, the username at the submission host must be the same as the one at the Server host. The username at the Server host must always be the same as the username at the execution host. When

flatuid is set to True, the Server assumes that UserA@host1 is the same as UserA@host2. Therefore, if *flatuid* is True, UserA@host2 can operate on UserA@host1's job.

1. Login to the PBS Server as root or a user with sudo permissions.
2. At the command line, enter the command:
   ```
   qmgr
   ```
3. Enter the command:
   ```
   print server
   ```
4. If the attribute *flatuid* is equal to False or is not set (you do not see it in the output from the print server command), then set the value to True by issuing the command:
   ```
   set server flatuid = True
   ```

19.2.5 Troubleshoot Issues During the Installation of PAS

Error messages, explanation, and a resolution for the error that may occur during the installation of PAS.

Stage Directory is Blank

Condition

During the installation of PAS, I get a Staging Directory is blank warning message.

Cause

Staging Directory path is not provided during installation.

Remedy

The staging directory is where the necessary files are transferred after job submission, but prior to the portal submitting the job to PAS for transfer to PBS Professional for execution. This staging directory must exist for the installation to complete successfully. Please enter a pathname to an existing directory which will be designated as the PAS staging directory.

PAS Service was unable to start

Condition

During the installation of PAS, I get a PAS Service was unable to start error message.

Cause

This may be due to port required by PAS is unavailable or busy.

Remedy

An error occurred while starting PAS. Review the PAS log file for errors and contact system support.

PAS Log File Contains OutofMemory Errors

Condition

There are `OutOfMemoryErrors` in the PAS Server log.

Cause

Usually, this error is thrown when the Java Virtual Machine cannot allocate an object because it is out of memory.

Remedy

Adjust the Java Virtual Machine (JVM) heap size of PAS.

Out of memory errors can indicate a underlying problem, therefore it is recommended to report these errors to the Altair support team.

See Also

Configure JVM Performance

Job Fails With "Bad UID for job execution" Error

Condition

Our site has installed PAS on a separate machine from the one hosting the PBS Professional Server. When a user submits a job, the job fails with a `"Bad UID for job execution"` exception.

Cause

This error is displayed when jobs are submitted by root. If the failed job was not submitted by root, then the PBS Professional *`flatuid`* may be set to False.

Remedy

The PBS Professional *`flatuid`* attribute must be set to True. This attribute specifies whether, for each user, the username at the submission host must be the same as the one at the Server host. The username at the Server host must always be the same as the username at the execution host. When *`flatuid`* is set to True, the Server assumes that UserA@host1 is the same as UserA@host2. Therefore, if *`flatuid`* is True, UserA@host2 can operate on UserA@host1's job.

1. Login to the PBS Server as root or a user with sudo permissions.
2. At the command line, enter the command:
   ```
   qmgr
   ```
3. Enter the command:
   ```
   print server
   ```
4. If the attribute *`flatuid`* is equal to False or is not set (you do not see it in the output from the print server command), then set the value to True by issuing the command:
   ```
   set server flatuid = True
   ```

Job Fails With `Unknown Resource` Error ??????

Condition

Our site has installed PAS on a separate machine from the one hosting the PBS Professional Server. When a user submits a job, the job fails with a `Unknown resource Resource_List.xxxxxx` exception.

Cause

The resource needed for running the job is not configured in PBS Professional.

Remedy

Resources required by PAS have not been defined to PBS Professional. Add the required PAS resources to the PBS Professional resource definition file.

1. Login to the PBS Server as root or a user with sudo permissions.
2. Edit the PBS resource definition file *PBS_HOME*`/server_priv/resourcedef`.
3. Add these resource definitions to the `resourcedef` file:

```
# *** BEGINNING OF AIF STATIC RESOURCES SECTION.DO NOT EDIT BY HAND ***
pas_billing_accounts type=string_array
pas_policies type=string_array
pas_applications type=string_array
pas_applications_enabled type=string_array flag=h
pas_platform type=string_array flag=h
pas_candidate_hosts type=string_array
pas_operating_system type=string_array flag=h
pas_cpu_arch type=string_array flag=h
aif_billing_accounts type=string_array
aif_policies type=string_array
aif_applications type=string_array
aif_applications_enabled type=string_array flag=h
aif_platform type=string_array flag=h
aif_candidate_hosts type=string_array
aif_operating_system type=string_array flag=h
aif_cpu_arch type=string_array flag=h
# *********END OF AIF STATIC RESOURCES SECTION *************
# *** BEGINNING OF DM STATIC RESOURCES SECTION.DO NOT EDIT BY HAND ***
ngpus type=long flag=nh
# *********** END OF DM STAT
```

4. Save the file.
5. Restart the PBS Professional server.
6. At the command line, enter the command:

```
qmgr
```

7. Enter the command:

```
print server
```

8. If the attribute *flatuid* is equal to False or is not set (you do not see it in the output from the print server command), then set the value to True by issuing the command:

```
set server flatuid = True
```

PBS Professional Features are Not Working after Upgrade

Condition

I have upgraded PBS Professional to the newest version and now the new features are not working.

Cause

Whenever PAS starts, it saves PBS configuration information in memory. After PBS Professional is upgraded, the new configuration information is not available to PAS.

Remedy

After installing a new version of PBS Professional, you must restart PAS.

1. Login to the PAS Server.
2. Restart PAS.

19.3 Troubleshoot Remote Sessions Components

Troubleshoot problems related to Remote Sessions and interactive applications.

19.3.1 Remote Sessions Precheck Diagnosis Script

A script that captures Remote Sessions information to help troubleshoot issues in PBS MoM.

Name

`remotesession-precheck.py`

Description

Capture information about GPU Nodes and X Server in PBS MoM before installing Remote Sessions. This information will be useful to troubleshooting issues.

Running the Script

This command must be executed as root.

This diagnosis script must be run on all the PBS MoM.

Python 2.4 or later is required to run the script.

Script Location

Download or obtain the Remote Sessions precheck diagnosis script zip file using your usual Altair support channels.

The Remote Sessions precheck diagnosis script zip file script will have to be copied to all the PBS MoM to troubleshoot those machines.

Unzip the diagnosis script file and run the `remotesession-precheck.py` script.

Output on the Machine Hosting the PBS MoM

After running the diagnosis script on the machine hosting the PBS MoM, messages similar to the below are displayed. Information that is of interest in this output:

Script Location
: Provides the path of the script location.

```
Script Location: /tmp/remotesession-utilityscript-master/remotesession_precheck
```

Log Location
: Location of the log file is provided for troubleshooting. A separate directory is created each time when the script is run and the logs are stored in that directory.

```
Log Location: /tmp/remotesession-utilityscript-master/remotesession_precheck/
scratch/scratch_20190628140246
```

GPU Harware
: Print the configurered GPU hardware if available.

```
GPU Hardware:
        - output: 01:00.0 VGA compatible controller: NVIDIA Corporation GK106GL
 [Quadro K4000] (rev a1)
05:00.0 VGA compatible controller: NVIDIA Corporation GF106GL [Quadro 2000] (rev
 a1)
```

X Server Status

Provides the status of X Server.

```
X Server status: Running
```

Libraries Installed

Lists the libraries installed for VirtualGL and TurboVNC to run. If any of the libraries are missing, then that has to be installed.

```
- Dependency Library Check:
  - VirtualGL:
       - output:         linux-vdso.so.1 (0x00007ffec4fa5000)
        libGL.so.1 => /usr/lib64/libGL.so.1 (0x00007f110dd3d000)
        libX11.so.6 => /usr/lib64/libX11.so.6 (0x00007f110d9fe000)
        libGLU.so.1 => /usr/lib64/libGLU.so.1 (0x00007f110d790000)
        libm.so.6 => /lib64/libm.so.6 (0x00007f110d493000)
        libc.so.6 => /lib64/libc.so.6 (0x00007f110d0ef000)
        libdl.so.2 => /lib64/libdl.so.2 (0x00007f110ceeb000)
        libGLX.so.0 => /usr/lib64/libGLX.so.0 (0x00007f110ccbb000)
        libGLdispatch.so.0 => /usr/lib64/libGLdispatch.so.0 (0x00007f110c9ec000)
        libxcb.so.1 => /usr/lib64/libxcb.so.1 (0x00007f110c7cc000)
        libstdc++.so.6 => /usr/lib64/libstdc++.so.6 (0x00007f110c443000)
        libgcc_s.so.1 => /lib64/libgcc_s.so.1 (0x00007f110c22b000)
        /lib64/ld-linux-x86-64.so.2 (0x0000555797423000)
        libXext.so.6 => /usr/lib64/libXext.so.6 (0x00007f110c019000)
        libXau.so.6 => /usr/lib64/libXau.so.6 (0x00007f110be15000)

  - TurboVNC:
       - output:         linux-vdso.so.1 (0x00007ffe90db5000)
        libm.so.6 => /lib64/libm.so.6 (0x00007fdee0ab9000)
        libpthread.so.0 => /lib64/libpthread.so.0 (0x00007fdee089b000)
        libpam.so.0 => /lib64/libpam.so.0 (0x00007fdee068c000)
        libc.so.6 => /lib64/libc.so.6 (0x00007fdee02e9000)
        /lib64/ld-linux-x86-64.so.2 (0x0000556334b3c000)
        libaudit.so.1 => /usr/lib64/libaudit.so.1 (0x00007fdee00c5000)
        libdl.so.2 => /lib64/libdl.so.2 (0x00007fdedfec1000)
```

Hardware Accelerator

Status about OpenGL installation and rendering information are provided.

```
- Hardware Accelerator:
        OpenGL vendor string: NVIDIA Corporation
OpenGL renderer string: Quadro K4000/PCIe/SSE2
OpenGL core profile version string: 4.3.0 NVIDIA 390.67
OpenGL core profile shading language version string: 4.30 NVIDIA via Cg compiler
OpenGL core profile extensions:
OpenGL version string: 4.6.0 NVIDIA 390.67
OpenGL shading language version string: 4.60 NVIDIA
OpenGL extensions:

       direct rendering: Yes

       359 GLXFBConfigs:
    visual  x   bf lv rg d st  colorbuffer  ax dp st accumbuffer  ms  cav  drw
  id dep cl sp  sz l  ci b ro  r  g  b  a F bf th cl  r  g  b  a ns b eat  typ
--------------------------------------------------------------------------------
0x135 24 tc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
```

```
0x136 24 dc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x137 24 tc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x138 24 dc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x139 24 tc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13a 24 dc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13b 24 tc  0  32  0 r  .  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
```

Desktop Manager Environment

Status about Desktop Manager environment is provided.

```
- Desktop Manager Environment installed:
       - output: /usr/share/xsessions/gnome-classic.desktop:Exec=env
 GNOME_SHELL_SESSION_MODE=classic gnome-session --session gnome-classic
/usr/share/xsessions/gnome.desktop:Exec=gnome
/usr/share/xsessions/icewm-session.desktop:Exec=icewm-session
/usr/share/xsessions/icewm.desktop:Exec=icewm-session
/usr/share/xsessions/sle-classic.desktop:Exec=env GNOME_SHELL_SESSION_MODE=classic
 SLE_CLASSIC_MODE=1 gnome-session --session gnome-classic
```

VNC Session

Starts VNC session, provides the information about the VNC session status, and the log file path. An interactive cause and suggestions is also displayed of the VNC session.

```
- Starting VNC session:
        - started VNC server. Please connect through vnc client:
Warning: BLRENTQA5:1 is taken because of /tmp/.X1-lock
Remove this file if there is no X server BLRENTQA5:1

Warning: BLRENTQA5:2 is taken because of /tmp/.X2-lock
Remove this file if there is no X server BLRENTQA5:2

Desktop 'TurboVNC: BLRENTQA5:3 (root)' started on display BLRENTQA5:3

Starting applications specified in
/tmp/remotesession-utilityscript-master/remotesession_precheck/xstartup.turbovnc
Log file is /tmp/remotesession-utilityscript-master/remotesession_precheck/
scratch/scratch_20190628140246/Xvnc.log


        - VNC Display: 3
Are you able to access the VNC connection? Y/N: y
Are you able to See the desktop manager? Y/N: y
Are you able to see the Glxshpere app? Y/N: y
Stopping VNC session.
Congratulation! System look good for remote session.
```

Cause and Resolution

The script also checks if you are able to access VNC Connection, See Desktop Manager, and GlxSphere application.

Are you able to access the VNC connection? Y/N:

If you enter N, then the following suggestion is provided:

```
Are you able to access the VNC connection? Y/N: n
please check the network connection between the machince and the firewall
 settings of the machine and run the script again after that.
```

Are you able to See the desktop manager? Y/N:

If you enter N, then the following suggestion is provided:

```
please check the Xvnc log for Desktop manager issue in:/tmp/
remotesession-utilityscript-master/remotesession_precheck/scratch/
scratch_20190628140433Xvnc.log.
If you want to change the Desktop manager. Please update it
on:/tmp/remotesession-utilityscript-master/remotesession_precheck/
xstartup.turbovnc
and run the script again.
```

Are you able to see the Glxshpere app? Y/N:

If you enter N, then the following suggestion is provided:

```
please check if, GPU driver is installed, X server is 3D Accelerated and
run the script again after that.
```

Complete Output of the Precheck Diagnosis Script

The complete display of the Precheck diagnosis script:

```
- Script Location: /tmp/remotesession-utilityscript-master/remotesession_precheck
- Log Location: /tmp/remotesession-utilityscript-master/remotesession_precheck/scratch/
scratch_20190628140246
- GPU Harware:
        - output: 01:00.0 VGA compatible controller: NVIDIA Corporation GK106GL [Quadro
 K4000] (rev a1)
05:00.0 VGA compatible controller: NVIDIA Corporation GF106GL [Quadro 2000] (rev a1)

- X Server status: Running
- Dependency Library Check:
  - VirtualGL:
       - output:        linux-vdso.so.1 (0x00007ffec4fa5000)
         libGL.so.1 => /usr/lib64/libGL.so.1 (0x00007f110dd3d000)
         libX11.so.6 => /usr/lib64/libX11.so.6 (0x00007f110d9fe000)
         libGLU.so.1 => /usr/lib64/libGLU.so.1 (0x00007f110d790000)
         libm.so.6 => /lib64/libm.so.6 (0x00007f110d493000)
         libc.so.6 => /lib64/libc.so.6 (0x00007f110d0ef000)
         libdl.so.2 => /lib64/libdl.so.2 (0x00007f110ceeb000)
         libGLX.so.0 => /usr/lib64/libGLX.so.0 (0x00007f110ccbb000)
         libGLdispatch.so.0 => /usr/lib64/libGLdispatch.so.0 (0x00007f110c9ec000)
         libxcb.so.1 => /usr/lib64/libxcb.so.1 (0x00007f110c7cc000)
         libstdc++.so.6 => /usr/lib64/libstdc++.so.6 (0x00007f110c443000)
         libgcc_s.so.1 => /lib64/libgcc_s.so.1 (0x00007f110c22b000)
         /lib64/ld-linux-x86-64.so.2 (0x0000555797423000)
         libXext.so.6 => /usr/lib64/libXext.so.6 (0x00007f110c019000)
         libXau.so.6 => /usr/lib64/libXau.so.6 (0x00007f110be15000)

  - TurboVNC:
       - output:        linux-vdso.so.1 (0x00007ffe90db5000)
         libm.so.6 => /lib64/libm.so.6 (0x00007fdee0ab9000)
         libpthread.so.0 => /lib64/libpthread.so.0 (0x00007fdee089b000)
         libpam.so.0 => /lib64/libpam.so.0 (0x00007fdee068c000)
         libc.so.6 => /lib64/libc.so.6 (0x00007fdee02e9000)
         /lib64/ld-linux-x86-64.so.2 (0x0000556334b3c000)
         libaudit.so.1 => /usr/lib64/libaudit.so.1 (0x00007fdee00c5000)
         libdl.so.2 => /lib64/libdl.so.2 (0x00007fdedfec1000)

- Harware Accelerator:
        OpenGL vendor string: NVIDIA Corporation
```

```
OpenGL renderer string: Quadro K4000/PCIe/SSE2
OpenGL core profile version string: 4.3.0 NVIDIA 390.67
OpenGL core profile shading language version string: 4.30 NVIDIA via Cg compiler
OpenGL core profile extensions:
OpenGL version string: 4.6.0 NVIDIA 390.67
OpenGL shading language version string: 4.60 NVIDIA
OpenGL extensions:

       direct rendering: Yes

       359 GLXFBConfigs:
    visual  x   bf lv rg d st  colorbuffer  ax dp st accumbuffer  ms  cav  drw
  id dep cl sp  sz l  ci b ro  r  g  b  a F bf th cl  r  g  b  a ns b eat  typ
-----------------------------------------------------------------------------
0x135 24 tc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x136 24 dc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x137 24 tc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x138 24 dc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x139 24 tc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13a 24 dc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13b 24 tc  0  32  0 r  .  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW

- Desktop Manager Environment installed:
       - output: /usr/share/xsessions/gnome-classic.desktop:Exec=env
 GNOME_SHELL_SESSION_MODE=classic gnome-session --session gnome-classic
/usr/share/xsessions/gnome.desktop:Exec=gnome
/usr/share/xsessions/icewm-session.desktop:Exec=icewm-session
/usr/share/xsessions/icewm.desktop:Exec=icewm-session
/usr/share/xsessions/sle-classic.desktop:Exec=env GNOME_SHELL_SESSION_MODE=classic
 SLE_CLASSIC_MODE=1 gnome-session --session gnome-classic

- Starting VNC session:
        - started VNC server. Please connect through vnc client:
Warning: BLRENTQA5:1 is taken because of /tmp/.X1-lock
Remove this file if there is no X server BLRENTQA5:1

Warning: BLRENTQA5:2 is taken because of /tmp/.X2-lock
Remove this file if there is no X server BLRENTQA5:2

Desktop 'TurboVNC: BLRENTQA5:3 (root)' started on display BLRENTQA5:3

Starting applications specified in
/tmp/remotesession-utilityscript-master/remotesession_precheck/xstartup.turbovnc
Log file is /tmp/remotesession-utilityscript-master/remotesession_precheck/scratch/
scratch_20190628140246/Xvnc.log


        - VNC Display: 3
Are you able to access the VNC connection? Y/N: y
Are you able to See the desktop manager? Y/N: y
Are you able to see the Glxshpere app? Y/N: y
Stopping VNC session.
Congratulation! System look good for remote session.
```

19.3.2 Remote Sessions Diagnosis Script

A script that captures Remote Sessions information to help troubleshoot issues.

Name

`remotesession-diagnosis.py`

Description

Capture information that is useful when troubleshooting issues with Remote Sessions.

The output of the command can be shared with the Altair support team to help troubleshoot issues with Remote Sessions and interactive applications.

Running the Script

This command must be executed as root or as a user with sudo privileges using the `sudo` command.

As different Remote Sessions components are distributed across multiple machines, the diagnosis script must be run on any machine where those components have been installed:

- the PBS MoM
- the PBS Server
- the PAS Server
- the machine hosting Access Web

Python 2.4 or later is required to run the script.

Script Location

The script is located on the PAS Server or the Access Web server. It is located at:

PA_EXEC`/displaymanager/scripts/remotesession-diagnosis.py`

The script will have to be copied to the PBS Server and the PBS MoM to troubleshoot those machines.

Output on the Machine Hosting Access Web and the Remote Sessions Interactive Proxy

After running the diagnosis script on the machine hosting Access Web and the Interactive Proxy, messages similar to the below are displayed. Information that is of interest in this output:

guacd
: Information about the Guacamole proxy daemon (guacd). Guacamole is an HTML5 web application that provides access to desktop environments using remote desktop protocols such as VNC or RDP. It is installed when the Interactive Proxy is installed on the Access Web server. The diagnosis script output displays whether Guacomole is installed and running, as well as the hostname and port that guacd is listening on.

pbsaccess
: Information about the state of Access Web as well as the hostname and port that guacd is running on.

Note: The below output is based on a distributed deployment where PAS is not installed on the Access Web server. If PAS is installed on the same machine as Access Web, additional information about whether the PAS Server is installed and running, as well as the interactive application definitions that are installed on the PAS Server is displayed.

```
- guacd
    - Guacd is installed - YES
    - Guacd is running - YES
    - Guacd configuration
        - bind_host = pbsworks-centos75.company.com
        - bind_port = 5443
- pbsaccess
    - PBSAccess is installed - YES
    - PBSAccess is running - YES
    - Gucad hostname matched - YES
    - Gucad port matched - YES
- PBSPro
    - PBSPro is installed - NO
    - PBSPro is running - SKIPPING
    - PBSPro iworkq configured: SKIPPING
    - PBSPro GPU Resource configured: SKIPPING
- PAS
    - PAS is installed - NO
    - PAS is running - SKIPPING
- execution_node
    - DBUS_SESSION_BUS_ADDRESS :
    - RemoteSession agent: TurboVNC is installed - NO
    - RemoteSession agent: VirtualGL is installed - NO
    - RemoteSession agent: GPU hardware is configured: SKIPPING
```

Output on the Machine Hosting PAS

After running the diagnosis script on the machine hosting PAS, messages similar to the below are displayed. Information that is of interest in this output:

PAS

Information about whether the PAS Server is installed and running, as well as the interactive application definitions that are installed on the PAS Server.

Note: The below output is based on a distributed deployment where PAS is installed stand-alone.

```
- guacd
    - Guacd is installed - NO
    - Guacd is running - SKIPPING
    - Guacd configuration - SKIPPING
- pbsaccess
    - PBSAccess is installed - NO
    - PBSAccess is running - SKIPPING
    - PBSAccess Remote Session guacd configration is same: SKIPPING
- PBSPro
    - PBSPro is installed - NO
    - PBSPro is running - SKIPPING
    - PBSPro iworkq configured: SKIPPING
    - PBSPro GPU Resource configured: SKIPPING
- PAS
    - PAS is installed - YES
```

```
        - PAS is running - YES
        - Interactive Appdef XML:
            - output: GlxSpheres
        - Interactive Appdef JSON:
            - output: GlxSpheres
- execution_node
        - DBUS_SESSION_BUS_ADDRESS :
        - RemoteSession agent: TurboVNC is installed - NO
        - RemoteSession agent: VirtualGL is installed - NO
        - RemoteSession agent: GPU hardware is configured: SKIPPING
```

Output on the Machine Hosting the PBS Server

After running the diagnosis script on the machine hosting the PBS Server, messages similar to the below are displayed. Information that is of interest in this output:

PBSPro
: Information about whether the PBS Server is installed and running, and whether the queue iworkq has been configured.

```
- guacd
      - Guacd is installed - NO
      - Guacd is running - SKIPPING
      - Guacd configuration - SKIPPING
- pbsaccess
      - PBSAccess is installed - NO
      - PBSAccess is running - SKIPPING
      - PBSAccess Remote Session guacd configration is same: SKIPPING
- PBSPro
      - PBSPro is installed - YES
      - PBSPro is running - YES
      - PBSPro iworkq configured: YES
- PAS
      - PAS is installed - NO
      - PAS is running - SKIPPING
- execution_node
      - DBUS_SESSION_BUS_ADDRESS :
      - RemoteSession agent: TurboVNC is installed - NO
      - RemoteSession agent: VirtualGL is installed - NO
      - RemoteSession agent: GPU hardware is configured: SKIPPING
```

Output on the Machine Hosting the PBS MoM

After running the diagnosis script on the machine hosting the PBS MoM, messages similar to the below are displayed. Information that is of interest in this output:

PBSPro
: Information about whether PBS Professional is installed.

execution_node
: The below information is displayed if the Remote Session agent is installed on the execution node.

- Information about whether TurboVNC and VirtualGL are installed.
- Information about which Desktop Manager is installed.
- Information about the GPU hardware configuration (even if a graphics card is not present on the system).

This information is displayed whether PBS Professional is installed or not.

```
     - guacd
          - Guacd is installed - NO
          - Guacd is running - SKIPPING
          - Guacd configuration - SKIPPING
     - pbsaccess
          - PBSAccess is installed - NO
          - PBSAccess is running - SKIPPING
          - PBSAccess Remote Session guacd configration is same: SKIPPING
     - PBSPro
          - PBSPro is installed - YES
          - PBSPro is running - NO
               - output: pbs_server is not running

pbs_sched is not running

pbs_comm is not running

          - PBSPro iworkq configured: SKIPPING
          - PBSPro GPU Resource configured: SKIPPING
     - PAS
          - PAS is installed - NO
          - PAS is running - SKIPPING

     - execution_node
          - DBUS_SESSION_BUS_ADDRESS :
          - RemoteSession agent: TurboVNC is installed - YES
          - RemoteSession agent: VirtualGL is installed - YES
          - RemoteSession agent: GPU hardware is configured: YES
               - output: OpenGL version string: 3.0 Mesa 17.2.3

          - RemoteSession agent: Direct Rendering: YES
               - output: 600 GLXFBConfigs:
    visual  x   bf lv rg d st  colorbuffer  ax dp st accumbuffer  ms  cav  drw
  id dep cl sp  sz l  ci b ro  r  g  b  a F bf th cl  r  g  b  a ns b eat  typ
------------------------------------------------------------------------------
0x05d 24 tc  0  32  0 r  .  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
0x05e 24 tc  0  32  0 r  .  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
0x05f 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
0x060 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
0x061 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
0x062 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
0x063 24 tc  0  32  0 r  .  .  8  8  8  8 .  0 16  0  0  0  0  0  0 0 None PXW

          - Desktop Manager Environment installed:
               - output: gnome-classic.desktop, gnome-custom-session.desktop,
 gnome.desktop,
mate.desktop
```

19.3.3 Use the Remote Sessions Diagnosis Script to Troubleshoot Issues

Use the Remote Sessions diagnosis script to gather information to help troubleshoot issues.

The diagnosis script must be run as root or as a user with sudo permissions using the `sudo` command.

The diagnosis script must be run on any machine where Remote Sessions components have been installed:

- the PBS MoM

- the PBS Server
- the PAS Server
- the machine hosting Access Web

The script will have to be copied from either the PAS Server or the Access Web server to the PBS Server and the PBS MoM using a command such as `scp`.

1. Login to the each of the above machines.
2. Choose one of the following options:
   - On the Access Web or PAS servers:
     ```
     python PA_EXEC/displaymanager/scripts/remotesession-diagnosis.py
     ```
   - On the PBS Server or the PBS MoM:
     ```
     python COPY_LOC/remotesession-diagnosis.py
     ```
     Where *COPY_LOC* is the location where the script was copied.

   The output of the command can be shared with the Altair support team to help troubleshoot issues with Remote Sessions and interactive applications.

19.3.4 Troubleshooting Remote Sessions

Use these steps to troubleshoot Remote Sessions when it is difficult to determine where the failure is occurring.

Remedy - Verify that the X Server is Running

1. Login to a PBS MoM where the Remote Sessions agent has been installed:
2. Verify that X Server is running as the display number 0.
   ```
   ps -ef | grep X
   or
   ps -ef | grep Xorg
   ```
   If X Server is running, messages similar to this should be displayed:
   ```
   root  195463  0.0  0.0 253056 39852 ?    Ssl  Feb08  10:30 /usr/bin/X :0
   ```
   The first parameter after `/usr/bin/X` is the display number prefixed by a colon.
3. If the X Server is not running, then start the X Server.
   If the X Server start-up is failing, view the file `/var/log/Xorg.0.log` for errors and check the graphic card installation guides to verify that the X Server is configured properly for the graphic card.

Remedy - Verify the Connection to the VNC Server

If the X Server is running, then verify that the connection to the VNC server:

1. Install a VNC client on a user's laptop or desktop such as TigerVNC or TightVNC.
2. Login to a PBS MoM where the Remote Sessions agent has been installed:
3. Run the following command to start a virtual network computer (VNC):
   ```
   /opt/TurboVNC/bin/vncserver -noauth
   ```
   Messages similar to the below are displayed.

```
Desktop 'TurboVNC: pc02.mycompany.com:1' started on display pc02.mycompany.com:1

Starting applications specified in /users/tsmith/.vnc/xstartup.turbovnc
Log file is /users/tsmith/.vnc/pc02.mycompany.com:1.log
```

4. Using the VNC client, connect to the X server using the hostname and display number provided in the messages displayed after starting the VNC server:

   ```
   Desktop 'TurboVNC: pc02.mycompany.com:1' started on display pc02.mycompany.com:1
   ```

   If the virtual desktop is not displayed, forward the `.vnc` directory to the Altair support team for further investigation.

   ```
   Starting applications specified in /users/tsmith/.vnc/xstartup.turbovnc
   ```

Remedy - Verify that VirtualGL is Configured and Functional

If the virtual desktop is displayed after connecting to the VNC server using the VNC client, run the following command in a terminal window in the remote desktop session:

```
/opt/VirtualGL/bin/vglrun -d :0.0 -sp /opt/VirtualGL/bin/glxspheres64
```

If GLXSpheres starts, then VirtualGL is properly configured. If GLXSpheres does not start, then a detailed investigation is required by the support team.

See Also

Display Session is Visible but Not the Interactive Application
A Single 3D Application is Not Working
Desktop Manager Is Not Displaying
Graphic Card Compatibility Issues
Interactive Application Job is in a Wait State

19.3.5 Troubleshoot a Connection Error

Condition

After submitting an interactive job, the following error message is displayed:

```
Connection closed abruptly. Please refresh your browser.
```

Cause

The Remote Sessions interactive proxy (guacd) installed on the Access Web server cannot connect to the VNC server installed on the graphical execution host. This may be caused when:

- the graphics node is not reachable.
- a hostname resolution problem exists between the Access Web server and the graphical execution host.
- the VNC port number is blocked through the firewall on the graphical node.

General Troubleshooting Steps

1. Login to the Access Web server.
2. Check for errors in the `/var/log/messages` file.

Remedy - Verify that the Graphics Node is Reachable

1. Login to the Access Web server.
2. Verify that the graphics node is reachable.

   ```
   ping GRAPHIC_NODE_IP
   ```

   Where *GRAPHIC_NODE_IP* is the IP address of the graphics node.
3. If the graphics node cannot be pinged, then contact your network administrator to configure network access between the Access Web server and the graphics node.

Remedy - Verify Hostname Resolution between Access Web and the Graphical Node

1. Login to the Access Web server.
2. Verify that there is hostname resolution from the Access Web server and the graphical execution host.

   ```
   ping GRAPHIC_NODE_HOSTNAME
   ```

   Where *GRAPHIC_NODE_HOSTNAME* is the hostname of the graphics node.
3. If the hostname is not resolving, then configure it by updating DNS, `/etc/hosts`, or whatever your site uses for hostname resolution.

Remedy - Verify that the VNC Port Number is Not Blocked through the Firewall

1. Login to the graphical PBS MoM.
2. View the information in the `dm.info` file.

   This file is located in the interactive application's job's execution directory on the graphic node.

   The below lines display the hostname and port on which the VNC server is listening.

   ```
   host=ptlhpc1cn002.childrens.sea.kids
   port=5904
   ```

   > **Note:** The port should be within the 59xx range.
3. Login to the Access Web server.
4. Attempt to connect to the VNC server through the VNC server hostname and port:

   ```
   telnet hostname port
   ```
5. If a connection cannot be established:
   a) Login to the graphical PBS Mom.
   b) Open the port through the firewall to allow access to the VNC server from the Access Web server.

19.3.6 Troubleshoot an Unable to Connect to Display Proxy Error

Condition

After submitting an interactive job, the following error message is displayed:

```
Unable to connect to Display Proxy.
```

Cause

The Access Web server is unable to connect to the Remote Sessions interactive proxy (guacd). This may be caused by:

- The Remote Session Interactive Proxy (guacd) is not running.
- The Remote Session Interactive Proxy has been configured to listen on the wrong port.
- The Remote Session Interactive Proxy has been configured to the listen on the wrong network interface.

Remedy - Verify that the Remote Session Interactive Proxy is Running

1. Login to the Access Web server as root or a user with sudo permissions.
2. Verify that the Remote Session Interactive Proxy is running:
   ```
   /etc/init.d/guacd status
   ```
3. If the Remote Session Interactive Proxy is not running then start it:
   ```
   /etc/init.d/guacd start
   ```

Remedy - Verify that the Interactive Proxy is Listening on the Correct Port and Network Interface

1. Login to the Access Web server as root or a user with sudo permissions.
2. Navigate to *PA_EXEC*`/displaymanager/scripts`.
3. Run the diagnosis script.
   ```
   python remotesession-diagnosis.py
   ```
   In the command output you should see messages similar to the below.
   ```
   - pbsaccess
             - PBSAccess is installed - YES
             - PBSAccess is running - YES
             - Gucad hostname matched - YES
             - Gucad port matched - YES
   ```
4. If the Remote Sessions Interactive Proxy (guacd) hostname or port do not match:
   a) Determine the hostname and port of the Remote Sessions Interactive Proxy by viewing the following output from the diagnosis script:
      ```
            - guacd
              - Guacd is installed - YES
              - Guacd is running - YES
              - Guacd configuration
                    - bind_host = access
                    - bind_port = 5443
      ```
   b) Change the Remote Sessions Proxy Port Number to the *bind_host* and *bind_port* values.

19.3.7 Display Session is Visible but Not the Interactive Application

Condition

After submitting a job to start a remote session, the display session is visible but not the interactive application.

Cause

- The user does not have access to the 3D X Server.
- There are graphic card compatibility issues with the interactive application.

General Troubleshooting Steps

1. Login to the PBS MoM.
2. Check the `<jobname>.STDERR` and `<jobname>.STDOUT` for error messages.

   These files are located in the interactive application's job execution directory on the graphic node where the job is running.

Remedy - User Does Not Have Access to the 3D X Server

Follow the steps to determine if the user has access to the X Server:

1. Login to the machine hosting the X Server as the user who is experiencing the issue.
2. Run the following command:

   ```
   /opt/VirtualGL/bin/glxinfo -display :0 -c
   ```

   The following message is displayed when the user does not have permission to access the 3D X Server:

   ```
   "unable to open display :0"
   ```
3. If the user does not have permission to access the 3D X Server, then grant the appropriate access to the 3D X Server using these instructions: http://www.virtualgl.org/vgldoc/2_2_1/#hd005001.
4. Submit a job to start a remote session to verify that the user now has access to the X Server. The interactive application should display. If the interactive application does not display then there may be graphic card compatibility issues with the interactive application.

See Also

Graphic Card Compatibility Issues

19.3.8 A Single 3D Application is Not Working

Condition

All 3D applications appear to be working properly, except for a single application.

Cause

- There may be application specific errors.

- The 3D application may not work in a VirtualGL environment.

Remedy - Check for Application Specific Errors When the Job is in a Running State

When the job is in a running state, check the log files to verify that there are not any application specific errors.

1. Login to the PBS MoM.
2. Check the `<jobname>.STDERR` and `<jobname>.STDOUT` files for errors.

   These files are located in the interactive application's job's execution directory on the graphic node.

Remedy - Check for Application Specific Errors When the Job has Failed

Resubmit the job but enable the feature that copies back all job files to the job's output directory.

1. Login to Access Web.
2. Create a new remote session.
3. When the job submission form appears, enable **All Fields** at the top of the job submission form. All job submission fields are displayed.
4. Enable the **Copy back** checkbox.
5. Fill in the required fields for the interactive application.
6. Submit the job.
7. Once the job fails, view the following files in the job's Output tab to help diagnose the problem.
   - `dmtrace.log`
   - `<jobname>.STDERR`
   - `<jobname>.STDOUT`
   - `<jobname>.e<jobid>`
   - `<jobname>.o<jobid>`
   - `Xvnc.log`

Remedy - 3D Application Does Not Work in a VirtualGL Environment

Check with the 3D application software vendor to verify that the application works in a VirtualGL environment.

19.3.9 Desktop Manager Is Not Displaying

Condition

I have opened a Remote Session and the application is displayed, but I cannot see the Desktop Manager.

> **Note:** GNOME 3 requires 3D acceleration, therefore a graphics card is required. However, other desktop managers such as KDE or MATE do not require 3D acceleration, therefore a graphics card is optional.

Cause

- The Desktop Manager is not installed.
- The interactive application is not configured for the installed Desktop Manager.
- A graphic card compatibility issue.

Remedy - General Troubleshooting Steps

1. Login to the PBS MoM.
2. Check the `Xvnc.log` and the `dmtrace.log` files for errors.

   These files are located in the interactive application's job's execution directory on the graphic node where the job is running.

Remedy - Verify that a Desktop Manager is Installed

Follow the below steps to determine if a Desktop Manager is installed on the PBS MoM:

1. Login to the PBS MoM where the interactive application is running as root or a user with sudo permissions.
2. Copy the remote session diagnosis script from either the PAS Server or the Access Web server.

   The script is located at *PA_EXEC*`/displaymanager/scripts/remotesession-diagnosis.py`
3. Run the diagnosis script.

   ```
   python remotesession-diagnosis.py
   ```

   At the bottom of the command output you should see messages similar to the below. This is the Desktop Manager that has been installed on the PBS MoM.

   ```
   - Desktop Manager Environment installed:
      - output: gnome-classic.desktop, gnome-custom-session.desktop,
                gnome.desktop,mate.desktop
   ```
4. If a Desktop Manager has not been installed, then install a Desktop Manager such as GNOME, MATE, or KDE.

   By default, the GlxSpheres application definition, that is installed when the PAS server is configured for Remote Sessions, is configured to use the GNOME Desktop Manager. If you install a different Desktop Manager, then you will have to edit all of the interactive application definitions to reconfigure them to use a different Desktop Manager.

See Also
Graphic Card Compatibility Issues

19.3.10 Graphic Card Compatibility Issues

Condition

Several conditions may be observed that may be caused by graphic card compatibility issues:

- After submitting a job to start a remote session, the display session is visible but the interactive application is not.
- The Desktop Manager is not visible after opening a Remote Session but the application is displayed.

Cause

- A supported graphic card is not installed.
- The wrong drivers have been installed for the graphics card.
- Full 3D acceleration is not enabled by the graphic card drivers.
- Pixel Buffer support is not enabled by the graphic card drivers.
- Direct rendering is not enabled for the graphics card.

Remedy

Use the drivers provided by the manufacturer of the graphics card. If the manufacturer of the 3D adapter provides proprietary drivers for Linux, it is recommended that these drivers be installed.

1. Login to the PBS MoM where the interactive application is running as root or a user with sudo permissions.
2. Copy the remote session diagnosis script from either the PAS Server or the Access Web server.
   The script is located at *PA_EXEC*`/displaymanager/scripts/remotesession-diagnosis.py`
3. Run the diagnosis script.

   ```
   python remotesession-diagnosis.py
   ```

   At the bottom of the command output you should see messages similar to the below.

   ```
        - execution_node
             - DBUS_SESSION_BUS_ADDRESS :
             - RemoteSession agent: TurboVNC is installed - YES
             - RemoteSession agent: VirtualGL is installed - YES
             - RemoteSession agent: GPU hardware is configured: YES
                  - output: OpenGL version string: 3.0 Mesa 17.2.3

             - RemoteSession agent: Direct Rendering: YES
                  - output: 600 GLXFBConfigs:
       visual  x   bf lv rg d st  colorbuffer  ax dp st accumbuffer  ms  cav  drw
     id dep cl sp  sz l  ci b ro  r  g  b  a F bf th cl  r  g  b  a ns b eat  typ
   ------------------------------------------------------------------------------
   0x05d 24 tc  0  32  0 r  .  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
   0x05e 24 tc  0  32  0 r  .  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
   0x05f 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
   0x060 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
   0x061 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0  0  0  0  0  0 0 None PXW
   0x062 24 tc  0  32  0 r  y  .  8  8  8  8 .  0  0  0 16 16 16 16  0 0 Slow PXW
   0x063 24 tc  0  32  0 r  .  .  8  8  8  8 .  0 16  0  0  0  0  0  0 0 None PXW

       - Desktop Manager Environment installed:
           - output: gnome-classic.desktop, gnome-custom-session.desktop,
        gnome.desktop, mate.desktop
   ```

4. Verify that the graphics card is either NVIDIA or ATI(AMD).

   ```
             - RemoteSession agent: GPU hardware is configured: YES
                  - output: OpenGL version string: NVIDIA Corporation
   ```

   It should not be Mesa or some other kind of graphics library software.

   ```
             - RemoteSession agent: GPU hardware is configured: YES
                  - output: OpenGL version string: 3.0 Mesa 17.2.3
   ```

   This indicates that software rendering is being used to render the graphics, rather than using the graphics hardware. In this case, make sure that a NVIDIA or ATI(AMD) graphic card is installed,

the appropriate drivers are installed and verify that the graphics card vendor supports direct hardware rendering in your environment.

5. Verify that direct rendering is being used:

```
          - RemoteSession agent: Direct Rendering: YES
```

Direct rendering means that all 3D rendering commands are handled by the client application, and the X server is not involved in the rendering. If indirect rendering is used, all rendering commands are sent to the server, and the server may use either software or hardware rendering. In terms of performance, direct hardware rendering is fastest. If indirect rendering is being used, it is an indication that the graphic card drivers are not installed or configured correctly.

6. Examine the output to ensure that at least one of the visuals is 24-bit or 32-bit TrueColor and has Pbuffer support (the latter is indicated by a "P" in the last column.)

```
359 GLXFBConfigs:
    visual  x   bf lv rg d st   colorbuffer   ax dp st accumbuffer   ms   cav  drw
  id dep  cl sp  sz l  ci b ro  r  g  b  a F bf th cl  r  g  b  a ns b eat  typ
---------------------------------------------------------------------------------
0x135 24  tc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x136 24  dc  0  24  0 r  y  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x137 24  tc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x138 24  dc  0  32  0 r  y  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x139 24  tc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13a 24  dc  0  24  0 r  .  .  8  8  8  0 .  4 24  8 16 16 16 16  0 0 None PXW
0x13b 24  tc  0  32  0 r  .  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x13c 24  dc  0  32  0 r  .  .  8  8  8  8 .  4 24  8 16 16 16 16  0 0 None PXW
0x13d 24  tc  0  24  0 r  y  .  8  8  8  0 .  4 24  0 16 16 16 16  0 0 None PXW
0x13e 24  dc  0  24  0 r  y  .  8  8  8  0 .  4 24  0 16 16 16 16  0 0 None PXW
0x13f 24  tc  0  32  0 r  y  .  8  8  8  8 .  4 24  0 16 16 16 16  0 0 None PXW
0x140 24  dc  0  32  0 r  y  .  8  8  8  8 .  4 24  0 16 16 16 16  0 0 None PXW
0x141 24  tc  0  24  0 r  .  .  8  8  8  0 .  4 24  0 16 16 16 16  0 0 None PXW
```

Figure 27: Pbuffer Support Check

If none of the visuals has Pbuffer support, then this is most likely because there is no 3D acceleration, which is most likely because the correct 3D drivers are not installed or are not configured correctly.

19.3.11 Interactive Application Job is in a Wait State

Condition

After submitting a job to start a remote session, the job has gone into a wait state.

Cause

There is an issue at the PBS Professional level, for example a file transfer issue.

Remedy

1. Login to the PBS Server as root or a user with sudo permissions.
2. Check the PBS Server logs for any errors related to the job.

19.3.12 Interactive Application Job is in a Queued State

Condition

After submitting a job to start a remote session, the job has gone into a queued state.

Cause

- GPU resources are currently not available to run the job.
- An insufficient amount of GPU resources are available to run the job.

Remedy

1. Login to the PBS Server as root or a user with sudo permissions.
2. Check the PBS Server logs for any errors related to the job.
3. Execute the command:

   ```
   qstat -xf <jobid>
   ```
4. View the *comment* parameter at the end of the `qstat` command's output.

   The following error indicates that there are not enough GPU resources available to run this job currently. The job remains in the queued state until GPU resources are free to run the job.

   ```
   Not Running: Insufficient amount of resource: ngpus
   ```

   The following error indicates that there is an insufficient amount of GPUs to run the job. For example, the job requests 2 GPUs and there is only a single GPU in the cluster or there are no execution nodes having a GPU resource.

   ```
   Can Never Run: Insufficient amount of resource: ngpus
   ```

19.3.13 Interactive Application Job Fails

Condition

After submitting a job to start a remote session, the job fails.

Cause

Interactive jobs may fail because:

- there is an application specific error.
- there is an issue with the associated application definition, such pointing to the wrong application path.
- the Remote Session component is not installed on the PBS MoM.

Remedy

Resubmit the job but enable the feature that copies back all job files to the job's output directory.

1. Login to Access Web.
2. Create a new remote session.
3. When the job submission form appears, enable **All Fields** at the top of the job submission form. All job submission fields are displayed.

4. Enable the **Copy back** checkbox.
5. Fill in the required fields for the interactive application.
6. Submit the job.
7. Once the job fails, view the following files in the job's Output tab to help diagnose the problem.
   - `dmtrace.log`
   - `<jobname>.STDERR`
   - `<jobname>.STDOUT`
   - `<jobname>.e<jobid>`
   - `<jobname>.o<jobid>`
   - `Xvnc.log`

19.4 Troubleshoot Results Visualization Service

Troubleshooting information and steps for RVS.

The following section provides the information about troubleshooting information and steps for RVS.

19.4.1 Troubleshoot Checklist

A quick checklist of pre-requisites for RVS.

1. The RVS server should be installed on a supported operating system and web browsers to visualize the result files. For more information refer System Requirements.

   > **Note:** Turn off pop-up blockers to view the running job file auto-refresh loading message for all the supported web browsers.

2. For Linux OS, ensure HyperMath is working fine before running RVS.
   a) Verify if the shared library is accessible by running HMathserv at: `/opt/2017.2/altair/scriptsh/hmath`.
   b) Install `"libXScrnSaver-1.2.2-6.1.el7.x86_64"` package to resolve the shared library error: `"error while loading shared libraries:libXss.so.1"`.
3. Ensure HyperWorks is installed in a location where all the Access Web users have read and write permissions.

   HyperWorks is recommended to install in the `Home` location, which enables read permission to all the Access Web users.
4. The Access Web user should have read access to results files. This indicates the user's read access to the PBS MOM's execution directory (the staging directory set during the installation) to view the running job result files.
5. To check if there any of the HMath processes that are running, use the command:

   ```
   ps -ef | grep hmathserv
   ```

   The list of HMath process ids is displayed.
6. To kill a process id, specify the `process id` in the following command:

   ```
   kill -9 <process id>
   ```

19.4.2 Common Issues

This section provides list of common issues occurs in RVS. The causes and the resolution steps are provided to resolve these common issues.

Unable to Use Results Visualization Service Features

Unable to view or perform any of the RVS options.

The causes could be:

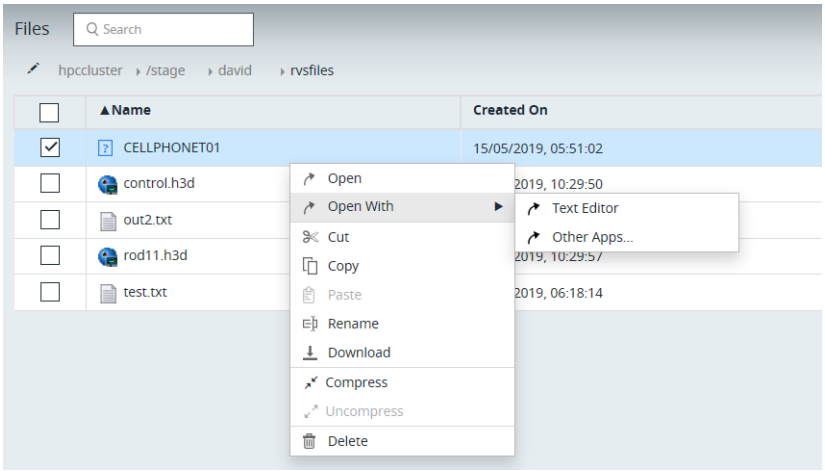
- RVS Options are Not Visible when a Result File is Right-Clicked
- RVS Services are Down Message is Displayed

RVS Options are Not Visible when a Result File is Right-Clicked

RVS options are not available when attempting to view or create a plot or animation.

Condition

I am attempting to create or view a plot or animation by right-clicking a results file and the RVS options are not visible on the sub-menu.



Cause

The results file type may be unsupported or the result file type reader may need to be activated.

Remedy

Check that the file is a supported results file type.

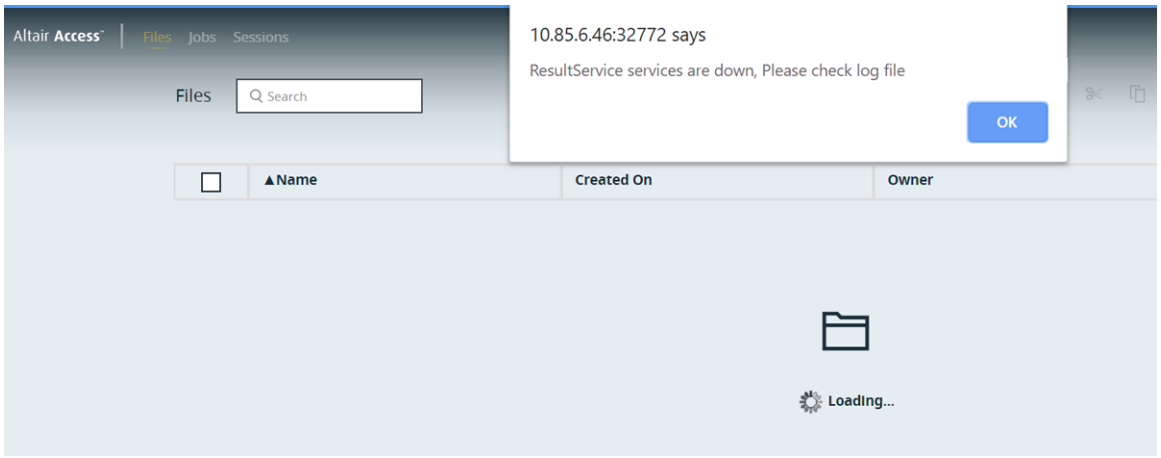
- If the results file type is supported:
  1. Check if the result file type is associated to one of the following solvers: Abaqus, CFX, Fluent, or STAR-CCM+.
  2. If the result file type is associated to one of the above solvers, activate the solver file reader.
- If the result file type is not supported, then post-processing by RVS is not supported.

RVS Services are Down Message is Displayed

Unable to view or perform any of the RVS options.

Condition

The message, `Result Service services are down, please check log files.` appears as soon as you login to Access Web.



Cause

The RVS service may not have been started.

Remedy

1. Check if the RVS service is running using the command: `ps -ef | grep resultservice`.
2. If RVS is not started, try restarting Access Web using the command:`service pbsworks-pa restart`.

Cause

The RVS service is down due to an error condition.

Remedy

Check for errors in the RVS log files. To check the log files:

1. Navigate to: `PA_HOME/logs/resultservice/resultservicelog/resultservice.log`
2. If found none in the RVS Core logs, then navigate to the following file location: `PA_HOME/logs/resultservice/catalina.out` and check for the error messages.
3. Based on the errors or error messages found in the above file paths, Altair Support Contact will further resolve the issue.

Cause

It could be a port conflict with other services.

Remedy

1. Check for the port conflicts in the following path: `PA_HOME/logs/resultservice/catalina.out`.
2. Verify if RVS service is working on the default port. Refer to the list of ports used by Access Web Services and Components, Ports Used by Access Web.

HyperMath License Error

Unable to post process the result files due to HWHyperMath license error.

Condition

HWHyperViewTrans licenses are not available in the license server.

Cause

I receive the following error while plotting a result file: `License for HyperMath is required for post processing of results and is not available in the License Server.`

Remedy

Follow the given steps:

1. Login to Access Web server.
2. Navigate to RVS license configuration file location at `PA_EXEC/resultservice/scripts/setenv.sh`.
3. Use the Altair Hyperworks license server hostname.
4. Ping the hostname of the license server to determine if it is pingable.
5. If the server responds to the ping, navigate to the license file location at: `/usr/local/altair/licensing14.0`.
6. Verify the validity dates of HWHyperMath and HWHyperViewTrans licenses.

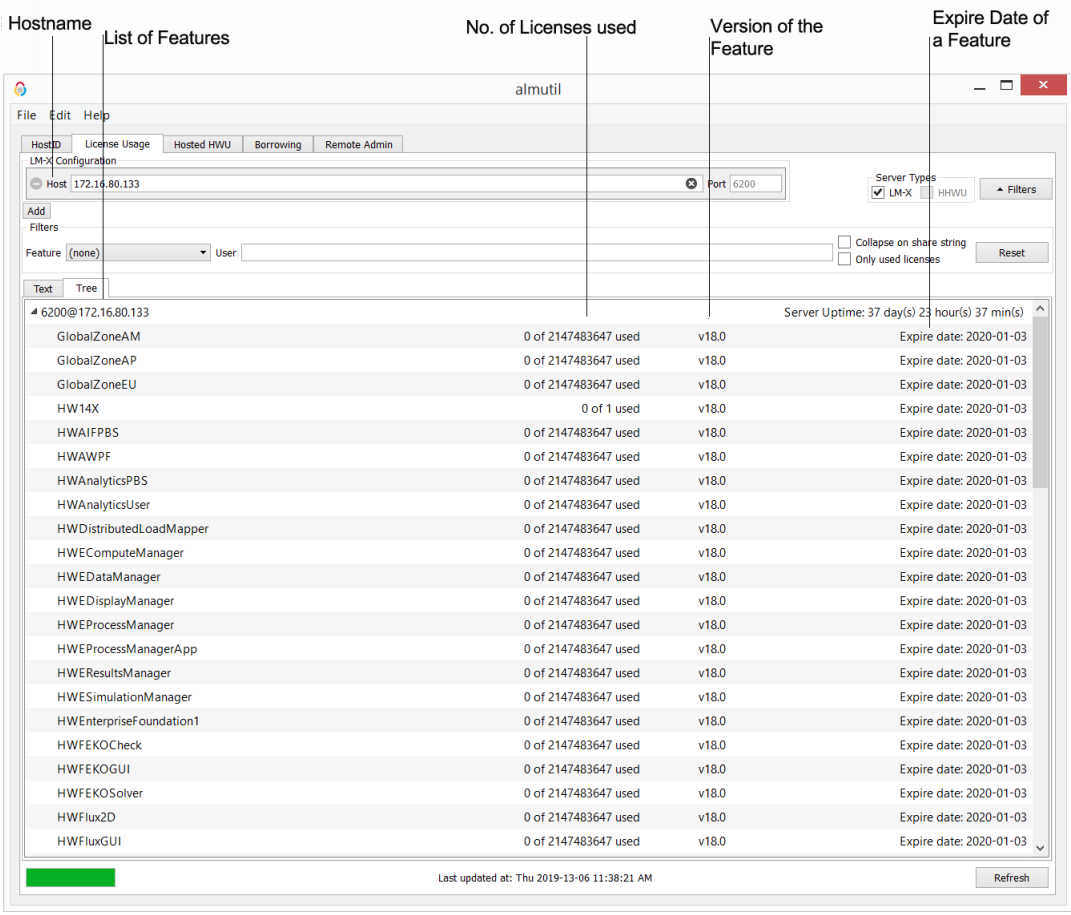
Cause

`License for HyperMath is required` indicates HWHyperMath feature is not available or insufficient licenses are available.

Remedy

Verify the details of licenses using Altair Utility:

1. Download The Altair License Utility Software from the following Altair Connect Weblink:https://connect.altair.com/CP/downloads.html.
2. On the Altair Connect page, click **Downloads** > **Software Downloads** > **PBS Works**.
3. On the **License Manager** tab, select the Altair License Manager software link for your operating system.
4. Download and install the software on your system. A shortcut, **Altair License Utility** is displayed.
5. Enter the LMX server hostname.
   The utility will provide the list of features with version, number of licenses used and unused, and expiry date of the feature.



Cause

If the error still persist even after the above checks, verify if there are any HWHyperMath process ids running. Kill the processs id and try again.

Remedy

Follow the given steps:

1. To check if there any of the HMath processes that are running, use the command:

   ```
   ps -ef | grep hmathserv
   ```

   The list of HMath process ids is displayed.
2. To kill a process id, specify the `process id` in the following command:

   ```
   kill -9 <process id>
   ```

HVTrans License Error

Unable to post process the result files due to HWHyperViewTrans license error.

Condition

HWHyperViewTrans licenses are not available in the license server.

Cause

I receive the following error while viewing an animation result file: `License for HWHyperViewTrans is required for post processing of results and is not available in the License Server.`

Remedy

Follow the given steps:

1. Login to Access Web server.
2. Navigate to RVS license configuration file location at `PA_EXEC/resultservice/scripts/setenv.sh`.
3. Use the Altair Hyperworks license server hostname.
4. Ping the hostname of the license server to determine if it is pingable.
5. If the server responds to the ping, navigate to the license file location at: `/usr/local/altair/licensing14.0`.
6. Verify the validity dates of HWHyperMath and HWHyperViewTrans licenses.

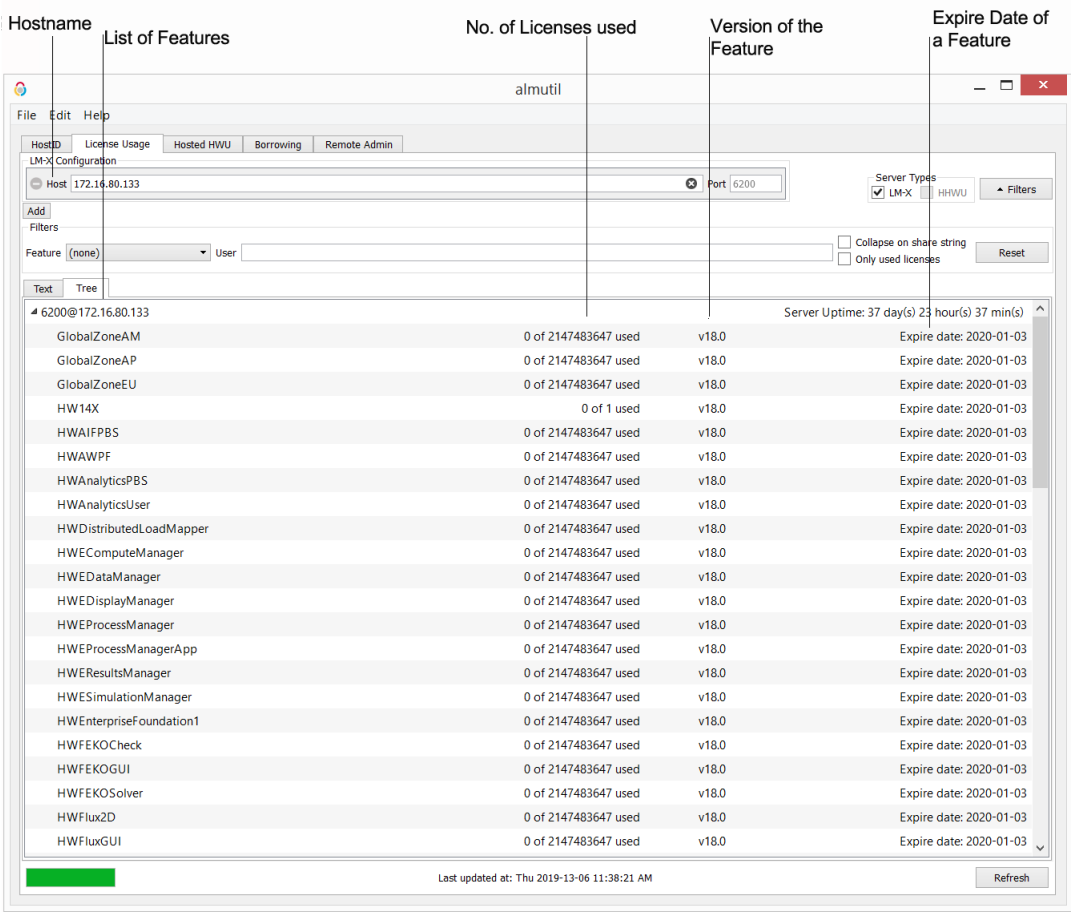
Cause

`License for HVTrans is required` indicates HyperViewTrans feature is not available or insufficient licenses are available.

Remedy

Verify the details of HyperViewTrans feature and its licenses using Altair Utility:

1. Download The Altair License Utility Software from the following Altair Connect Weblink:https://connect.altair.com/CP/downloads.html.
2. On the Altair Connect page, click **Downloads** > **Software Downloads** > **PBS Works**.
3. On the **License Manager** tab, select the Altair License Manager software link for your operating system.
4. Download and install the software on your system. A shortcut, **Altair License Utility** is displayed.
5. Enter the LMX server hostname.
   The utility will provide the list of features with version, number of licenses used and unused, and expiry date of the feature.



Cause

If the error still persist even after the above checks, verify if there are any HWHyperMath process ids running. Kill the running processses and try again.

Remedy

Follow the given steps:

1. To check if there any of the HMath processes that are running, use the command:

   ```
   ps -ef | grep hmathserv
   ```

   The list of HMath process ids is displayed.
2. To kill a process id, specify the `process id` in the following command:

   ```
   kill -9 <process id>
   ```

Result File Reader is Unrecognized

Unable to post process the result files when you try to plot or animation.

Condition

The supported file type reader is not configured in HyperWorks.

Cause

I am trying to open a result file using RVS and I receive the following error: `The result file reader is not configured in HyperWorks.`

Remedy

Follow the givens steps:

1. Verify if your result file reader is configured.
   For the Fluent file reader, the entry should be as following:
   ```
   *RegisterExternalReader({external_readers_dir + "/hgfluent.exe"}, "", "", ascii
   ```
2. If not configured, then you need to configure the solver file reader.

See Also

Activate Solver Files Readers

Supported Result File Types

Unable to Extract TOC of a Result File

Condition

RVS is unable to post process the plot or animation result files.

Cause

I receive the following error while plotting a result file: `Unable to extract TOC of a Result file.`

Remedy

1. Verify if the solver reader file type is activated.
2. To enable the solver reader file, navigate to `HW_EXEC/hw/prefinc/preferences_common_plot.mvw`.
3. Locate the following line of code:
   ```
   *RegisterExternalColumnReader({external_readers_dir + "/hgtextcolumn.exe"})
   ```
4. Add the following line of code directly before the code referenced in the previous step to activate the solver reader:
   ```
   *RegisterExternalReader({external_readers_dir + "/hg<solvername>.exe"}, "", "",
    ascii)
   ```

Cause

Insufficient permissions to read the result file.

Remedy

Ensure HyperWorks is installed in a location where all the Access Web users have read and write permissions.

- Hyperworks is recommended to install in the `Home` location, which enables read and write permission to all the Access Web users.

- Navigate to `ALTAIR_HOME` and verify if the permissions.
  The image displays Access Web users having executable persmissions for the HyperWorks Desktop application. 

  .

Cause

The reason could be HWHyperMath is not accessible.

Remedy

Verify if HyperMath is installed properly.

- Verify if HyperMath is accessible by running the HMathserv script at: `/opt/2017.2/altair/scriptsh/hmath`.

  > **Note:** hwx: cannot connect to x server. Please ignore this message since this is referring to HyperMesh Desktop.

Cause

The reason could be that the shared library package is not installed.

Remedy

1. Download, `"libXScrnSaver-1.2.2-6.1.el7.x86_64"` package to resolve the shared library error.
2. Install libXScrnSaver rpm package using the following command: `# yum install libXScrnSaver`.

19.5 Logging

Information about defining PAS logging behavior and Log Files.

19.5.1 Logging Behavior

Information about defining PAS logging behavior.

PAS logging behavior is defined in the file `PA_HOME/config/pas/server-log.xml`.

The default logging level is set to "info" providing informational messages that highlight the progress of the application at a coarse-grained level.

PAS allows logging to be configured for certain functional aspects of PAS, such as file operations or job submission. These functional areas are defined by the `<category>` element. The existing categories in the `server-log.xml` are useful as a basic configuration, are more course-grained, and provide the default PAS logging.

To configure the level of logging, edit the `server-log.xml` file and set the `<priority value>` attribute of a particular `<category>` to one of the following values:

- `off` - has the highest possible rank and is intended to turn off logging.
- `fatal` - very severe error events that will presumably lead the application to abort.
- `error` - error events that might still allow the application to continue running.
- `warn` - potentially harmful situations.
- `info` - informational messages highlighting the progress of the application at a coarse-grained level.
- `debug` - fine-grained informational events that are most useful to debug an application.
- `trace` - finer-grained informational events than the DEBUG.
- `all` - the lowest possible rank and is intended to turn on all logging.

```
<category name="category">
    <priority value="<logging_level>" />
</category>
```

Remote File operations, Job submission, and Job Status

Configure logging behavior for remote file operations, job submission, and job status.

The logging for this category is relevant for the communication with the EIFL server.

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` with the following XML:
   ```
   <category name=" com.altair.gw.aif.cli.implementation.BasicCommandsImpl">
       <priority value="debug" />
   </category>
   ```
3. Update `server-log.xml` to get detailed troubleshooting information for the job status:

```
<category name="com.altair.gw.aif.pbs.ifl.implementations.PbsEiflWs">
    <priority value="debug" />
</category>
```

The following are examples of the type of messages that will be logged if debugging is enabled for the job status operation:

Table 3: Logging Messages for Communication with the EIFL Server

Event	Message
Before a web service API call to the EIFL server	"Success getting eifl server port <port>"
After an EIFL web service API call to the EIFL server	"Success returning from eifl.waitExit(), port is <port>"
For a job status request, before the web service API call to the EIFL server	"qstatJobs(): Success getting eifl server port <port>"
After an EIFL web service API call to the EIFL server	"qstatJobs(): Success returning from eifl.waitExit(), port is <port>"
For the get detailed job status operation, if an error occurs, the error code will be logged as returned by PBS	"PbsEiflWs.java getErrorCode(): pbs error code is <pbsErrorCodeStr>"

File Operations (local and remote)

Configure logging behavior for file operations (local and remote).

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` to change the *`priority value`*:

```
<category name="com.altair.gw.aif.fileop.implementation.FileOperations">
    <priority value="debug" />
</category>

<category name="com.altair.gw.aif.fileop.implementation.FileOperationsHelper">
    <priority value="debug" />
</category>
```

Job Submission

Configure logging behavior for job submission.

1. Navigate to `PA_HOME/config/conf/`

2. Update `server-log.xml` to get detailed logging information about user inputs and to see how long it takes to execute a submission request by adding the following XML:

```
<category name=" com.altair.gw.aif.rest. RESTJobsPortImpl">
    <priority value="debug" />
</category>
```

3. Update `server-log.xml` to get information about the process of creating PBS job attributes from user inputs and the application definition by adding the following XML:

```
<category name=" com.altair.gw.aif.rest.util.PASNextGenJobUtils">
    <priority value="debug" />
</category>
```

PAS supports multiple adapters to communicate with the workload manager.

4. If the SSH adapter is enabled for the communication with the PBS cluster, add the following XML to the `serverlog.xml` file to troubleshoot job submission:

```
<category name=" com.altair.gw.aif.ssh.implementation. SSHImplementation”>
    <priority value="debug" />
</category>
```

The following are examples of the type of messages that will be logged if debugging is enabled for this class:

Table 4: Logging Messages for Job Submission

Event	Message
Before job submission, PAS will record the job name and the resources requested.	“PbsJobFactory.getPbsJob():job name = <job name>, resourceList to String: <job resources>
Once the job is submitted, PAS will record the job id.	“JobSubmit success. Job id: <jobId>”
For job status requests, PAS will log any empty responses.	"HpcpPbsAdapter.jobList(): qstat is empty"

Job Submission and Status

Configure logging behavior for job submission and status.

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` with the following XML:

```
<category name="com.altair.gw.aif.pbs.ifl.responses.JobsStatus_Response">
    <priority value="debug" />
</category>

<category name=" com.altair.gw.aif.pbs.ifl.responses.PBSObjectStatus">
    <priority value="debug" />
```

```
</category>
```

Enabling a debugging level for the "PbsJobsPortImpl" class also provides the ability to determine the IP address of a client request for PAS job submission services.

For each job submission API call, a log record is created having the API name, requesting user name, and remote host. For example,

```
Entered getJobs(). User: <username>, client host: '<clientHost>'
```

Application Definitions

Configure logging behavior for application definitions.

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` to get detailed logging information about application definitions by adding the following XML:

```
<category name="com.altair.gw.aif.converter">
    <priority value="debug" />
</category>
```

Dynamic Application Refresh Script

Configure logging behavior for the dynamic application refresh script.

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` to get detailed logging information about dynamic application refresh script by adding the following XML:

```
<category name="com.altair.gw.aif.applications.utils.DynamicApplicationBuilder">
    <priority value="debug" />
</category>
```

During the Job Status Retrieval

Configure logging behavior to troubleshoot errors during the job status retrieval.

1. Navigate to `PA_HOME/config/conf/`
2. Update `server-log.xml` to get user information and the total time of the PAS server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. RESTJobsPortImpl">
    <priority value="debug" />
</category>
```

3. To get job details information coming from the Workload Manager to PAS and details about response from PBS, add the following XML to the `server-log.xml` file:

```
<category name="com.altair.gw.aif.pbs.ifl.responses.JobsStatus_Response">
    <priority value="debug" />
</category>

<category name=" com.altair.gw.aif.pbs.ifl.responses.PBSObjectStatus">
    <priority value="debug" />
```

```
</category>
```

4. If the SSH adapter is enabled for the communication with the PBS cluster, add the following XML to the `server-log.xml` file to troubleshoot job submission:

```
<category name="com.altair.gw.aif.ssh.implementation. SSHImplementation”>
    <priority value="debug" />
</category>
```

This will log the job status attributes as returned to the PAS Server from the script executed through the SSH channel.

File Operations Execution (Local and Remote) and File Download

Configure logging behavior to troubleshoot errors during the file operations execution (local and remote) and file download.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest.RESTFilePortImpl">
    <priority value="debug" />
</category>
```

3. Update the `server-log.xml` file to get details about the local and remote file operation (parameters, current working directory, the operation result) at the PAS server level by adding the following XML:

```
<category name="com.altair.gw.aif.fileop.implementation. FileOperations">
    <priority value="debug" />
</category>
```

4. Update the `server-log.xml` file to get details about the local file operation by adding the following XML:

```
<category name="com.altair.gw.aif.fileop.implementation. FileOperationsHelper">
    <priority value="debug" />
</category>
```

5. Update the `server-log.xml` file to get details about the remote file operations by adding the following XML:

```
<category name=" com.altair.gw.aif.process.ProcessWrapper">
    <priority value="debug" />
</category>
```

With this category we’ll see more details related to user impersonation when we create the process as specific user.

6. If the SSH adapter is enabled for the communication with PBS cluster, it is possible to enable the logging of additional information related to the SSH tunnel. For the troubleshooting and debugging of remote file operations add the following XML to the `server-log.xml` file:

```
<category name="com.altair.gw.aif.fileop.implementation.cli. RemoteFileOpsTunnel-
Based">
    <priority value="debug" />
</category>
```

It will show the command and parameters passed to the SSH tunnel and what is the result of the communication with the remote host coming back to the PAS Server.

7. Update the `server-log.xml` file to see more information about the file download by adding the following XML:

```
<category name=" com.altair.gw.aif.fileop.implementation. FileDownloadModel">
    <priority value="debug" />
</category>
```

Application Definition Related Errors

Configure logging behavior to troubleshoot application definition related errors.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. ApplicationDefinitionService">
    <priority value="debug" />
</category>
```

3. If any errors indicate the failure of communication with the file system, add the following XML to the `server-log.xml` file to log more details about application definition reading and writing from the file system:

```
<category name=" com.altair.gw.aif.applications.utils. ApplicationsRepository">
    <priority value="debug" />
</category>
```

   Application definitions are cached for better performance. If any discrepancy between the application definition in the upstream products and the file system is observed, the cache debug logging should be enabled to make sure the PAS Server is providing the most current application definition.

4. Update the `server-log.xml` to get more information on cache debug logging by adding the following XML:

```
<category name=" com.altair.gw.aif.utils.generic. CacheManager">
    <priority value="debug" />
</category>
```

User Profile

Configure logging behavior to troubleshoot user profile errors.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS Server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. ProfileService">
    <priority value="debug" />
</category>
```

Server Registration

Configure logging behavior to troubleshoot server registration errors.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS Server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. ServerService">
    <priority value="debug" />
</category>
```

User Account

Configure logging behavior to troubleshoot user account related errors.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS Server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. UserService">
    <priority value="debug" />
</category>
```

Session Errors

Configure logging behavior to troubleshoot session related errors.

1. Navigate to `PA_HOME/config/conf/`
2. Update the `server-log.xml` to get more details on user information and the total time of the PAS Server operation by adding the following XML:

```
<category name="com.altair.gw.aif.rest. SessionService">
    <priority value="debug" />
</category>
```

19.5.2 Locate RVS Log Files

The file path details to locate RVS core logs, web server logs, and integration logs are listed.

Locating RVS log files locations:

a) RVS core logs: `PA_HOME/logs/resultservice/resultservicelog/resultservice.log`
b) RVS web server logs: `PA_HOME/logs/resultservice/catalina.out`
c) RVS integration logs: `PA_HOME/logs/resultmanager/resulmanager.log`

19.5.3 Log Files

Information about the log files.

PAS Log File

The PAS log file, `pas-server.log`, contains a record of server activities and is useful for identifying issues and problems. The location of the log file for a typical installation of PAS is: `PA_HOME/logs/pas/`

Other Log Files

The PAS installation log file is located in: `/opt/altair/pbsworks/pas/2019.3.1/_PAS Services_installation/Logs`

The log files for the Apache Tomcat web server are located in: `PBSWORKS_EXEC/pas/bin/pas-server/logs`