

**precisely**

# Spectrum Technology Platform

## Installation Guide

Version 2019.1.0

Unix and Linux



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# 1 - Upgrading your installation

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# Path structure and log name changes

As of release 2019.1, we have flattened the folder structure at the platform level. We have also changed the path to and names of some log files.

## Path structure

We have removed the `server/app` and `server/app/repository` folders. Ensure that you make the necessary changes to configure the Spectrum Technology Platform server. The new folder hierarchy is shown here:

```

..|index                ** index location
  |-- logs              ** log files for technical support
..|repository           ** repository location
  |-- logs              ** log files for technical support
..|server               ** primary server folder
  |-- archive           ** archive files: resource bundles, reports
                        |-- audit                ** archive files: audit log data
                        |-- bundles              ** storage: resource bundles
                        |-- dataflows           ** archive: imported dataflows
                        |-- reports            ** default location for reports on disk/by
name
  |-- bin               ** startup scripts, wrapper
  |-- conf              ** configuration files
  |-- deploy            ** car and war files; consoles
  |-- doc               ** read me file(s)
  |-- drivers           ** jdbc drivers
  |-- exports           ** exported: Enterprise Designer, others
  |-- import            ** imported: license keys, flows, reports,
SPDs
  |-- error             ** import item error storage
    |-- dataflows      ** dataflow import errors
    |-- license-keys   ** backup of imported license keys
  |-- lib               ** platform jar files
  |-- logs              ** log files
  |-- modules           ** product modules
  |-- ref-data          ** reference data file archive
  |-- tmp               ** temporary folder
  |-- types             ** types jar files

```

## Log file location

Spectrum Technology Platform now directs all log files to `SpectrumDirectory/server/logs`.

### *wrapper.log file name change*

The wrapper.log file is now the spectrum-server.log file.

## Moving transactional data - upgrades only

As of release 2019.1, we are moving transactional audit log and flow history data from Neo4j to Elasticsearch to improve the maintenance of and access to this data.

**Note:** New installations are not affected by this change.

If you are performing an upgrade from a previous version of Spectrum, the upgrade process will export **all** of this data into two \*.zip files:

- Archive\_Upgrade\_18.2\_history.zip
- Archive\_Upgrade\_18.2\_audit.zip

The more data you have, the larger the \*.zip files.

**Important:** To avoid building large export files, we suggest that you purge or archive the data before you begin the upgrade process.

If you have a **standard installation** (server and database installed together on a machine), the upgrade process exports files into a directory (*SpectrumDirectory/server/import*). From this directory, Spectrum imports the files automatically on the first startup of Spectrum. Standard installations require no manual steps to accomplish this task.

If you have a **separate installation**, where the database was installed separately from the server, following the upgrade process, you must manually move the files from the database machine (*SpectrumDirectory/server/import*) to the server machine (*SpectrumDirectory/server/import*). Once you move the files to the server machine, Spectrum imports those files automatically on the first startup of the server.

Depending on how much data you are moving, you can expect the first startup to be considerably slower than usual while this data is imported back into the system and into the Elasticsearch repository. Once Spectrum imports all the data successfully, it deletes the \*.zip files from the server machine automatically.

# Migrating your search indexes

If you are upgrading to release 2019.1 from release 2018.2, your Elasticsearch search indexes will migrate to release 2019.1 during the upgrade process.

**Important:** Your server must be up and running to migrate your search indexes.

If you are upgrading to release 2019.1 from version 12.2.1 or earlier, you have to perform a separate, manual process as part of the upgrade to migrate your Elasticsearch indexes to release 2019.1. This process will maintain your compatibility with the latest version of Elasticsearch. We provide scripts to do this:

- export
- delete-all-indexes
- import

**Note:** You do not need to perform these steps if you are from upgrading from release 2018.2 to 2019.1. Indexes from 2018.2 will convey to 2019.1 as part of the upgrade.

Using the command parameters outlined below, perform these steps.

**Table 1: Index command parameters**

| Command parameter         | Description   | Default value                     |
|---------------------------|---|-----------------------------------|
| <code>-b value</code>     | Optional - Number of records in one batch   | import = 1_000<br>export = 25_000 |
| <code>-e path</code>      | Full path to where the Spectrum indexes will be exported to or imported from                |                                   |
| <code>-f value</code>     | Optional - Number of records in each file   | 100_000                           |
| <code>-h value</code>     | Optional - Number of concurrent threads   | 4                                 |
| <code>-o operation</code> | Operation: exp, imp, or del   |                                   |
| <code>-p filename</code>  | Optional – Override properties file containing default override index connection properties |                                   |
| <code>-r value</code>     | Optional – Batch size for profiling index report  | 500                               |

| Command parameter     | Description  | Default value |
|-----------------------|--|---------------|
| <code>-s path</code>  | Full path to the Spectrum installation location: Directory that includes the <code>/server</code> , <code>/index</code> , and <code>/repository</code> directories |               |
| <code>-t value</code> | Optional – Timeout for export connection, in minutes   | 5             |

You can perform the import/export from a script (\*.bat or \*.sh) or by using the `upgrade-index.jar` file.

- If you use the script method to import/export, the `-o` parameter is implied and does not have to be specified.
- If you are not importing/exporting from the script, specify: `javaLocation -jar upgrade-index.jar`

1. Export your indexes before upgrading to 2019.1.

```
export.sh -e backuplocation -s spectruminstalllocation
```

2. Delete your indexes.

```
delete-all-indexes.sh -e backuplocation -s spectruminstalllocation
```

3. Upgrade to release 2019.1 of Spectrum Technology Platform.

4. Import your indexes to 2019.1 after the upgrade.

```
import.sh -e backuplocation -s spectruminstalllocation
```

## If you have changed default Elasticsearch certificate connection properties

Most Spectrum users will run with the default set of connection properties. However, if you did change any connection properties, you will have to pass into Spectrum the properties file with your unique settings using the `-p` command, described in the previous section.

**Note:** This section applies only to sites that have changed the default configuration for Elasticsearch.

Review the valid properties, below. You can ignore/omit properties that do not apply.

### Index properties for 2019.1

```
spectrum.index.connect.timeout=
spectrum.index.encryption.keystore=
spectrum.index.encryption.keystoreAlias=
spectrum.index.encryption.keystorePassword=
```

```
spectrum.index.encryption.keystoreType=  
spectrum.index.encryption.selfSignedCerts=  
spectrum.index.encryption.trustAllHosts=  
spectrum.index.encryption.truststore=  
spectrum.index.encryption.truststorePassword=  
spectrum.index.encryption.truststoreType=
```

### **Index properties for versions before 2019.1**

```
spectrum.index.upgrade.certType=  
spectrum.index.upgrade.keystore.password=  
spectrum.index.upgrade.keystore.path=  
spectrum.index.upgrade.truststore.password=  
spectrum.index.upgrade.truststore.path=
```

# 2 - Planning Your Installation

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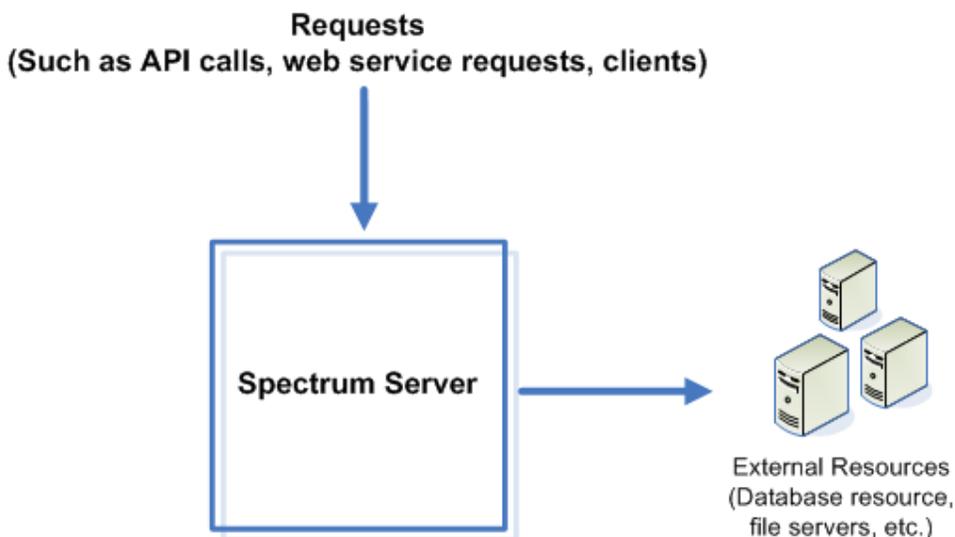


# Installation Scenarios

Spectrum Technology Platform supports a variety of installation scenarios that scale to fit the needs of your organization.

## Standard

The standard scenario is the simplest installation scenario. You install Spectrum Technology Platform on a single server. All activity is handled by this one server, including designing dataflows, storage of configuration information, running jobs, and handling service requests.

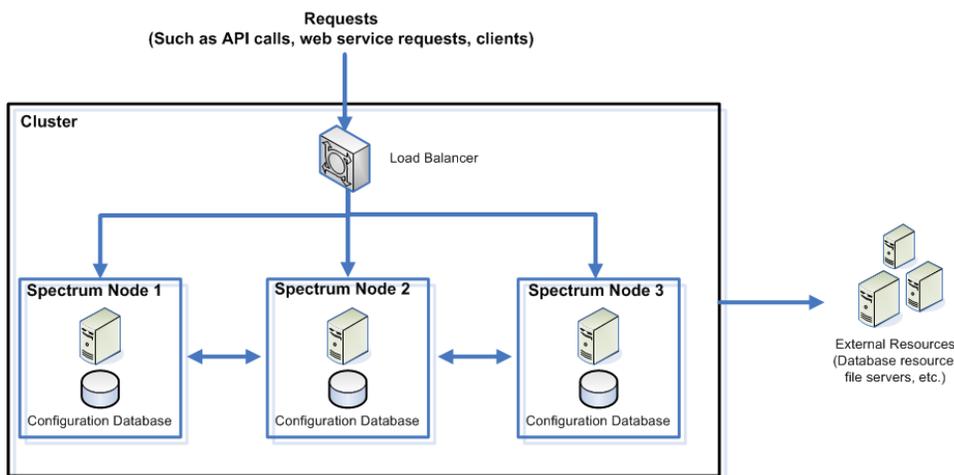


## Cluster

In a clustered environment, processing is shared among two or more instances of the server. All communication with Spectrum Technology Platform goes through a load balancer. Instead of using the URL and port of the Spectrum Technology Platform server, you use the URL and port of the load balancer. Consider using this approach if you require failover redundancy and high-volume, high-performance processing.

**Important:** As part of your cluster setup and machine preparation, ensure that all system times are synchronized across all nodes in the cluster.

This diagram illustrates the cluster architecture:



This approach has the following advantages:

- Processing is automatically distributed among the nodes in the cluster for optimal performance.
- Configuration settings are automatically synchronized across nodes.
- Uptime can be improved since if a node goes down the other nodes remain available to handle processing requests.
- Adding a new node is easy.

### *Cluster with Separated Configuration Database*

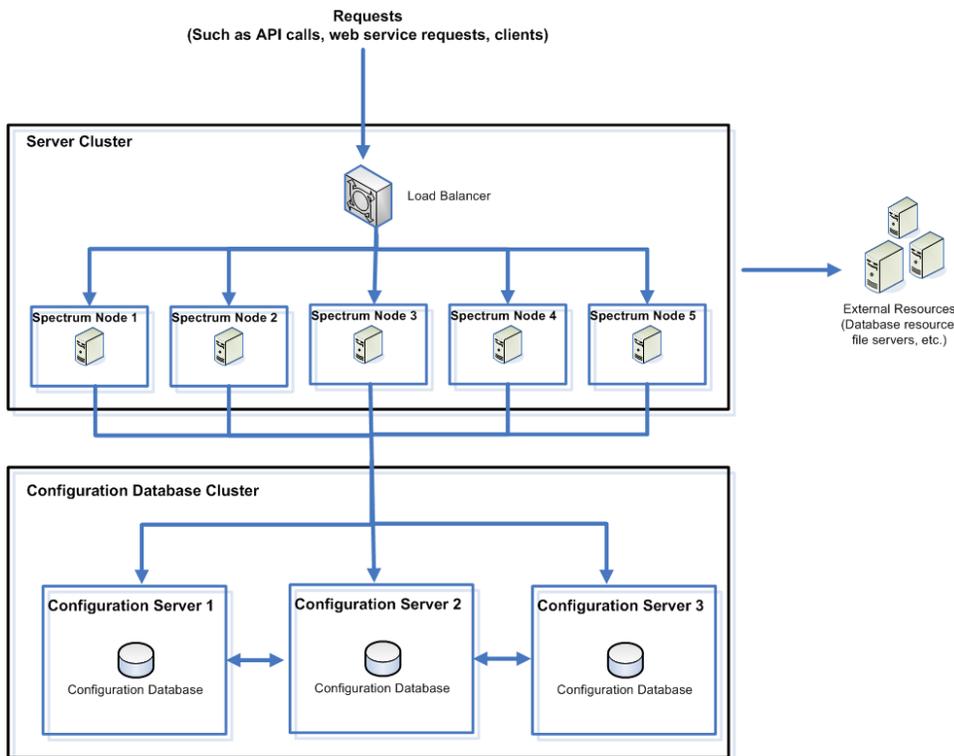
When you install the Spectrum Technology Platform server you are installing two things: server software and a configuration database. The server handles the execution of jobs and service requests, reporting, and logging. The configuration database stores data such as users and roles, data connections, dataflows, and the audit log.

For clusters consisting of only a few nodes, installing the server and configuration database together on the same server provides acceptable performance. However, a cluster that consists of a large number of nodes may have its performance negatively affected by having a copy of the configuration database on each node. This is because an increasing number of nodes results in increased data replication between nodes during synchronization. Performance may also suffer if users are accessing the configuration database frequently through activities such as editing dataflows or job schedules. These activities require processing power, resulting in less CPU capacity available for running jobs and responding to service requests.

If you have an implementation with four or more nodes, you should consider installing the configuration database to separate servers. This is the most scalable installation scenario because you can add nodes without necessarily adding another instance of the configuration database. For example, say you have five nodes and three configuration database servers. You could add another five nodes, bringing the total number of nodes to 10, while still using just the three configuration databases to support all 10 nodes.

Installing the configuration database to a separate server has the following advantages:

- More CPU is available to the server for running jobs, process flows, and service requests because reading and writing to the configuration database is handled by a separate server.
- Reduced network traffic due to reduced configuration data replicated between nodes. For example, you could have five Spectrum Technology Platform servers for handling execution while having only three repositories. With just three repositories instead of five, data only needs to replicate between three servers rather than five.
- Most scalable installation scenario.



## Before You Begin

### Before Installing on Unix or Linux

#### *Running as Root User*

You cannot run Spectrum Technology Platform as a root user. This type of installation is no longer supported.

You will see a prompt to designate the owner as part of the installation process.

```
=====
Change Directory and File Ownership
-----
Do you wish to change file ownership at this time?
  → 1 - Yes
  → 2 - No
ENTER THE NUMBER OF THE DESIRED CHOICE OR PRESS ENTER TO
ACCEPT THE DEFAULT:
```

- **For new installations**, do not install with the root user as the owner of the Spectrum Technology Platform installation.
- **For upgrade installations**, if root is the owner of the **Spectrum** directory, you will have to change the owner at installation time. If you do not change the installation ownership, the server will not start.

#### Related reference

[Install the JDK and Set the JAVA\\_Home Environment Variable](#) on page 15

Regardless of the operating system, you must have the Java 8 JDK (64-bit) installed to run Spectrum Technology Platform.

### *Buffer size conflict warnings while installing on Linux*

You may see buffer size conflict warnings while installing on Linux.

The following warnings may show on all distributed versions of Linux software while installing the Spectrum Technology Platform.

```
2019-12-06 01:37:36,317 WARN [NioChannelOptions] The configured tcp send
buffer size conflicts
with the value actually being used by the socket and can lead to
sub-optimal performance.
Configured 131072 bytes, actual 124928 bytes. On Linux look for kernel
parameters 'net.ipv4.tcp_wmem'
and 'net.core.wmem_max'.This warning will only be shown once.
```

```
2019-12-06 01:37:36,320 WARN [NioChannelOptions] The configured tcp
receive buffer size conflicts
with the value actually being used by the socket and can lead to
sub-optimal performance.
Configured 131072 bytes, actual 124928 bytes. On Linux look for kernel
parameters 'net.ipv4.tcp_rmem'
and 'net.core.rmem_max'.This warning will only be shown once.
```

These are warnings, only, and do not indicate errors. The software will still install normally after you see these warnings. To avoid seeing these warnings, you can set the following parameter values in `/etc/sysctl.conf`, or, for some versions of Linux, `/etc/sysctl.d/`:

```
net.core.rmem_max = 16777216
net.core.wmem_max = 16777216
net.ipv4.tcp_rmem = 4096 131072 16777216
net.ipv4.tcp_wmem = 4096 131072 16777216
```

These are example, non-required values, and these values may already be set higher on your system. Set the values `net.ipv4.tcp_rmem` and `net.ipv4.tcp_wmem` to clear these warnings.

## Install the JDK and Set the JAVA\_Home Environment Variable

Regardless of the operating system, you must have the Java 8 JDK (64-bit) installed to run Spectrum Technology Platform.

The following table lists Java distributions that have been tested with the Spectrum Technology Platform.

| Operating System             | Vendor-supplied | Azul | Oracle |
|------------------------------|-----------------|------|--------|
| AIX                          | Yes             |      |        |
| CentOS                       |                 | Yes  | Yes    |
| HP-UX                        | Yes             |      |        |
| Oracle Linux                 |                 | Yes  | Yes    |
| Red Hat Enterprise Linux     |                 | Yes  | Yes    |
| Solaris                      |                 | Yes  | Yes    |
| SUSE Enterprise Linux Server |                 | Yes  | Yes    |
| Ubuntu                       |                 | Yes  | Yes    |
| Windows Server               |                 | Yes  | Yes    |

Set the `JAVA_HOME` environment variable.

[Set JAVA\\_Home Environment Variable on Unix and Linux](#) on page 16

**Note:** To change the Java installation on a system that is currently running the Spectrum Technology Platform, you must stop Spectrum before performing changes to the Java installation. Restart Spectrum only after you complete the changes.

## Set JAVA\_Home Environment Variable on Unix and Linux

Before you begin the installation process, you must define the location for your installation of 64-bit Java. To define this location, specify the following: `export`

```
JAVA_HOME=/JavaLocation/jdkversion
```

...where *JavaLocation* is your site's Java installation location.

**Note:** If you do wish to set the JAVA\_HOME variable on your system, specify the absolute path to the Java installation location: *JavaLocation/jre/lib/security*.

# System Requirements

## Server

### Operating Systems

| Supported Operating System | Notes |
|----------------------------|-------|
| AIX 7.1                    |       |
| AIX 7.2                    |       |
| CentOS 6.x                 |       |

| Supported Operating System               | Notes   |
|--|---|
| <b>CentOS 7.x</b>                        | Requires the following:<br>libstdc++.so.5<br>installed as follows:<br>yum install compat-libstdc++-33<br>MrSID raster images require libpng12.so on this operating system.                |
| <b>HP-UX 11.31 (Itanium)</b>             |   |
| <b>Oracle Linux 6.x</b>                  |   |
| <b>Oracle Linux 7.x</b>                  |   |
| <b>Red Hat Enterprise Linux 6.x</b>      |   |
| <b>Red Hat Enterprise Linux 7.x</b>      |   |
| <b>Solaris 11 (SPARC only)</b>           |   |
| <b>SUSE Enterprise Linux Server 11.x</b> | Requires the following:<br>glibc-2.9 or glibc-2.11<br>installed as follows:<br>zypper install libstdc++33-32bit zlib-32bit  |
| <b>SUSE Enterprise Linux Server 12.x</b> | Requires the following:<br>glibc-2.9 or glibc-2.11<br>installed as follows:<br>zypper install libstdc++33-32bit zlib-32bit  |
| <b>Ubuntu 16.04 LTS</b>                  | Requires these runtime libraries installed as follows:<br>apt-get install libstdc++5:i386 zlib1g:i386<br>MrSID raster images require libpng12.deb and libjpeg62 on this operating system. |
| <b>Ubuntu 18.04 LTS</b>                  | Requires these runtime libraries installed as follows:<br>apt-get install libstdc++5:i386 zlib1g:i386<br>MrSID raster images require libpng12.deb and libjpeg62 on this operating system. |

| Supported Operating System    | Notes |
|-------------------------------|-------|
| <b>Windows Server 2012</b>    |       |
| <b>Windows Server 2012 R2</b> |       |
| <b>Windows Server 2016</b>    |       |
| <b>Windows Server 2019</b>    |       |

### *Unsupported Operating Systems by Module*

All modules support the Windows operating systems listed in the previous section.

The following table shows the UNIX/Linux operating systems that are not supported for specific modules.

| Module                             | Not Supported  |
|------------------------------------|--|
| Analytics Scoring Module           | AIX 7.1, 7.2<br>HP-UX 11.31 (Itanium)<br>Solaris 11 (SPARC only)                 |
| Data Hub Module                    | Data Hub is not supported on HP.   |
| Enterprise Geocoding Module (U.S.) | SUSE Enterprise Linux Server 12.x<br>Ubuntu 14.04 LTS                            |
| Enterprise Tax Module              | Solaris 11 (SPARC only)<br>SUSE Enterprise Linux Server 12.x<br>Ubuntu 14.04 LTS |
| GeoConfidence Module               | HP-UX 11.31 (Itanium)  |
| GeoEnrichment Module               | SUSE Enterprise Linux Server 12.x<br>Ubuntu 14.04 LTS                            |

| Module  | Not Supported   |
|---|---|
| Global Geocoding Module                               | SUSE Enterprise Linux Server 12.x (not supported for U.S. geocoder)<br>Ubuntu 14.04 LTS |
| Machine Learning Module                               | AIX 7.1, 7.2<br>HP-UX 11.31 (Itanium)<br>Solaris 11 (SPARC only)                        |
| Microsoft Dynamics CRM Module                         | Ubuntu 14.04 LTS, 16.04 LTS   |
| SAP Module  | Ubuntu 14.04 LTS, 16.04 LTS   |
| SugarCRM Module                                       | Ubuntu 14.04 LTS, 16.04 LTS   |
| Universal Addressing Module                           | Ubuntu 14.04 LTS  |
| Universal Addressing Module - Validate Address Global | Ubuntu 16.04 LTS<br>HP-UX 11.31 (Itanium)   |

## Disk Space

### New Installation

- The disk where you are installing Spectrum Technology Platform must have 4 GB of free space to install all modules, less if installing fewer modules.
- The disk where the temp folder is located must have at least 10 GB of free space for the installation to extract the files it needs. You may need more depending on the options you are installing. If necessary, modify your TEMP environment variable (Windows) or IATEMPDIR environment variable (Unix and Linux) to point to a location with enough space.

### Upgrade

- **Upgrade memory requirement** - You must have a minimum of 8GB of RAM to run the upgrade to release 2019.1.
- The disk where you are installing Spectrum Technology Platform must have free disk space equal to three times the size of your current installation. To determine the size of your current installation, look at the size of the folder where you installed Spectrum Technology Platform.
- If you are adding modules as part of your upgrade, you will need 3 GB to install all modules, less if installing fewer modules.
- The disk where the temp folder is located must have 10 GB of free space plus four times the size of your current installation. For example, if your current installation is 5 GB, you would need 30 GB of temp space:  $(4 \times 5 \text{ GB}) + 10 \text{ GB} = 30 \text{ GB}$ . If necessary, modify your TEMP environment variable (Windows) or IATEMPDIR environment variable (Unix and Linux) to point to a location with enough space.

---

**Note:** If you are installing a module that uses a reference database, such as a postal database, geocoding database, or data normalization tables, you will need space for this data. The total disk space varies, depending on which modules and databases you are installing.

## Memory

- **Upgrade memory requirement** - You must have a minimum of 8GB of RAM to run the upgrade to release 2019.1.
- Basic memory requirement: 16 GB
- The Data Normalization Module and Universal Name Module require additional memory if you use these name databases:
  - Arabic Plus Pack: 5.5 GB
  - Asian Plus Pack - Chinese: 32 MB
  - Asian Plus Pack - Japanese: 1.6 GB
  - Asian Plus Pack - Korean: 8 MB
  - Core Names: 1.1 GB
- The memory allocation for the Machine Learning Module should be three to four times the size of the input file used in jobs where models are created. We recommend that the minimum memory setting should be at least 1 GB. After installation of this release, configure minimum and maximum

memory settings for the Machine Learning Module on the **Configuration Settings** tab of the Machine Learning Model Management application.

### Additional Requirements

- For all Unix and Linux systems, a minimum value for file descriptors is required. Review the current *Installation Guide* for recommended settings. This can be set by running the `ulimit` command:

```
ulimit -n limitsetting
```

**Note:** Do not set `ulimit` to `unlimited`. Doing so may cause issues with system resources and security alerts that will cause the installation to fail.

- Set the file size limit to 2 GB. To set the file size limit, use the `ulimit` command: `ulimit -f 4194304`
- For CentOS and Ubuntu, you must increase the maximum number of memory map areas. To do this, open the `/etc/sysctl.conf` file and set `vm.max_map_count` to 262144. Then, reboot the system, and run `sysctl vm.max_map_count` to verify that the setting has been updated.
- For IBM AIX only, you must download and install the AdoptOpenJDK, both the 32-bit version and the 64-bit version, before installing Spectrum Technology Platform. If you do not have this JDK, download and install it from [AdoptOpenJDK](#)
- For IBM AIX only, with IBM JDK/JRE, you must apply the properties in `spectrum.https.encryption.excludeCipherSuites`. See [Configure HTTP or HTTPS](#) in the *Spectrum Administration Guide* for details.

### System Requirements for Enterprise Geocoding and Global Geocoding modules

- The Enterprise Geocoding Module and Global Geocoding Module system requirements:
  - minimum: 16 GB RAM, 4 CPU, 100 GB storage
  - recommended 32 GB RAM, 8 CPU, 200 GB storage, sufficient for all datasets.

The amount of RAM will depend on how many users are on the system and how many datasets are loaded.

### Requirements for the Big Data Integration Module

For the stages using Hadoop, which are **Read from Hive File**, **Read from Hadoop Sequence**, **Write to Hadoop Sequence**, and **Write to Hive File**, and for the activities **Run Hadoop MapReduce Job** and **Run Hadoop Pig**:

- Hadoop version 2.6 and above

For the activities using Spark, which are **Submit Spark Job** and **Spark Sorter**:

- Spark 2.0.1 and above.

## File locations

This topic shows where files are located in the folder hierarchy of the Spectrum Technology Platform server application directory.

The default location for the Spectrum Technology Platform

*SpectrumDirectory/repository/data/databases* is */Program Files/Pitney Bowes/Spectrum*, but you can specify a different location when you install the server.

```

..|index                ** index location
  |-- logs              ** log files for technical support
..|repository           ** repository location
  |-- logs              ** log files for technical support
..|server               ** primary server folder
  |-- archive           ** archive files: resource bundles, reports
                        |-- audit          ** archive files: audit log data
                        |-- bundles        ** storage: resource bundles
                        |-- dataflows      ** archive: imported dataflows
                        |-- reports        ** default location for reports on disk/by
name
  |-- bin               ** startup scripts, wrapper
  |-- conf              ** configuration files
  |-- deploy            ** car and war files; consoles
  |-- doc               ** read me file(s)
  |-- drivers           ** jdbc drivers
  |-- exports           ** exported: Enterprise Designer, others
  |-- import            ** imported: license keys, flows, reports,
SPDs
  |-- error             ** import item error storage
  |-- dataflows         ** dataflow import errors
  |-- license-keys      ** backup of imported license keys
|-- lib                 ** platform jar files
|-- logs                ** log files
|-- modules             ** product modules
|-- ref-data            ** reference data file archive
|-- tmp                 ** temporary folder
|-- types               ** types jar files

```

## Minimum Limits on File Descriptors, Processes, and Memory

In order for the Spectrum Technology Platform server to run, you must increase the allowed limits on file descriptors, processes, and other entities from their default limits. You must have root access to make these changes.

**Note:** The settings listed here are the minimum limits required by Spectrum Technology Platform. You may set higher limits if it is appropriate for your environment. We document the *default* settings here; however, your default file names for limits may vary.

### AIX (All Supported Versions)

In the file `/etc/security/limits`, change this setting for the default user, or for a specific user if `nofiles` is specified for specific users.

```
nofiles = 131072
```

### CentOS 5

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile      65536
*          hard    nofile      131072
*          soft    nproc       4096
*          hard    nproc       65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

### CentOS 6

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile      65536
*          hard    nofile      131072
*          soft    nproc       4096
*          hard    nproc       65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/90-nproc.conf`, comment out the `nproc` setting for non-root users.

## CentOS 7

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile    65536
*          hard    nofile    131072
*          soft    nproc     4096
*          hard    nproc     65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/20-nproc.conf`, comment out the `nproc` setting for non-root users.

## HP-UX (All Supported Versions)

Set the maximum number of file descriptors by running these commands:

```
kctune maxfiles_lim=131072
```

```
kctune maxfiles=65536
```

In order for the `maxfiles` setting to take effect you must reboot the server.

### Oracle Linux 6

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile    65536
*          hard    nofile    131072
*          soft    nproc    4096
*          hard    nproc    65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/90-nproc.conf`, comment out the `nproc` setting for non-root users.

### Oracle Linux 7

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile    65536
*          hard    nofile    131072
*          soft    nproc    4096
*          hard    nproc    65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/20-nproc.conf`, comment out the `nproc` setting for non-root users.

### Red Hat Enterprise Linux 5

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile      65536
*          hard    nofile     131072
*          soft    nproc       4096
*          hard    nproc       65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

### Red Hat Enterprise Linux 6

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile      65536
*          hard    nofile     131072
*          soft    nproc       4096
*          hard    nproc       65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/90-nproc.conf`, comment out the `nproc` setting for non-root users.

### Red Hat Enterprise Linux 7

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile      65536
*          hard    nofile      131072
*          soft    nproc       4096
*          hard    nproc       65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

- In the file `/etc/security/limits.d/20-nproc.conf`, comment out the `nproc` setting for non-root users.

### Solaris (All Supported Versions)

Set the maximum number of file descriptors for the user running Spectrum Technology Platform. Here is an example of how to set this limit at the project level:

```
projmod -s -K
"process.max-file-descriptor=(basic,131072,deny) , (privileged,262144,deny) "
default
```

You can also set the limit at the group or user level, if appropriate for your environment.

### SUSE Enterprise Linux Server (All Supported Versions)

Set these settings in `/etc/security/limits.conf`:

```
*          soft    nofile    65536
*          hard    nofile    131072
*          soft    nproc    4096
*          hard    nproc    65536
*          soft    as       unlimited
*          hard    as       unlimited
```

Set this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

### Ubuntu (All Supported Versions)

- Specify these settings in `/etc/security/limits.conf`:

```
*          soft    nofile    65536
*          hard    nofile    131072
*          soft    nproc    4096
*          hard    nproc    65536
```

- Specify this setting in `/etc/sysctl.conf` or `/etc/sysctl.d/99-sysctl.conf`, depending on which file you use on your system:

```
vm.max_map_count = 262144
```

After specifying these settings, apply them by running one of these commands:

- If you use `sysctl.conf`, run this command:

```
sysctl -p.
```

- If you use `sysctl.d`, run this command:

```
systemctl restart systemd-sysctl
```

## Network Ports

The Spectrum Technology Platform server uses several network ports for communication. Network port conflicts can result in module components failing to start. One indication that a component has failed to start is if it does not appear in Management Console. To troubleshoot the problem, look in the Spectrum Technology Platform log. This log shows which port is causing the problem. Open the following file to view the Spectrum Technology Platform server log:

```
SpectrumDirectory/server/logs/spectrum-server.log
```

### *Server port settings defined in the `spectrum-container.properties` file*

You can modify network ports by modifying properties settings in the following file:

```
SpectrumDirectory/server/conf/spectrum-container.properties
```

Restart the server after you make changes to the property settings.

**Note:** In a clustered environment you must modify the `spectrum-container.properties` file on *each node* in the cluster.

| Port | Description  |
|------|--|
| 5001 | <p>This port is used by the Spectrum Technology Platform configuration database.</p> <p>To use a different port in a non-clustered environment, configure settings in the <code>SpectrumDirectory/repository/neo4j.template</code> file.</p> <p>To use a different port in a clustered environment, configure the <b>spectrum.repository.server.seeds</b> property to specify the seed nodes for the configuration database.</p>   |
| 5701 | <p>This port is used by Hazelcast for managing distributed processing between Spectrum Technology Platform servers in a cluster.</p> <p>To use a different port in a non-clustered environment, modify this property:</p> <pre>spectrum.cluster.port</pre> <p>To use a different port in a clustered environment:</p> <ul style="list-style-type: none"> <li>Specify the port you want to use instead of 5701 in <code>spectrum.cluster.port</code>.</li> <li>Include the Hazelcast port number after each IP address specified in <code>spectrum.cluster.seeds</code>. For example, if <code>spectrum.cluster.port</code> is set to 5702 and the IP address of a seed node is 1.2.3.4.5, you would specify <code>1.2.3.4.5:5702</code> in <code>spectrum.cluster.seeds</code>.</li> </ul> |

| Port  | Description  |
|-------|--|
| 6362  | This port is used if you enable backups of the Spectrum Technology Platform configuration database. To use a different port, modify this property:<br><code>spectrum.repository.backup.port</code>                           |
| 7474  | This port is used by the Spectrum Technology Platform configuration database. To use a different port, configure settings in the <code>SpectrumDirectory/repository/neo4j.template</code> file.                              |
| 7687  | This port is used by the Spectrum Technology Platform configuration database. To use a different port, configure the <b>spectrum.repository.port</b> property.   |
| 8080  | The port used for communication between the server and Enterprise Designer and Management Console. This port is also used by web services. To use a different port, modify this property:<br><code>spectrum.http.port</code> |
| 9200  | This port is used by the index server. To use a different port, modify this property:<br><code>spectrum.index.http.port</code>   |
| 9300  | This port is used by the search index engine used by the Advanced Matching Module, configured using <code>spectrum.index.tcp.port</code> .   |
| 10119 | This port is used for API calls made to services. To use a different port, modify this property:<br><code>spectrum.socketgateway.port</code>   |
| 32751 | This port is used for ODBC connections model stores which are created in Metadata Insights. To use a different port, modify this property: <code>spectrum.metadata.odbc.port</code>  |

#### Data Hub port settings defined in the `neo4j.properties` file

You can modify Data Hub ports by modifying the properties in this file and restarting the server:

- `SpectrumDirectory/server/modules/hub/db/neo4j.properties`

| Port      | Description   |
|-----------|---|
| 6044-6299 | These ports are used by the Data Hub module. This is specified by the following property:<br><code>ha.host.data.port</code> |

| Port      | Description   |
|-----------|---|
| 6372-6627 | These ports are used by the Data Hub module. This is specified by the following property:<br><code>dbms.backup.address</code>         |
| 7001      | This port is used by the Data Hub module. This is specified by the following property:<br><code>ha.host.coordination.base_port</code> |

### Machine Learning Module

Ports documented in this section are required for the Machine Learning module.

| Port  | Description   |
|-------|---|
| 15431 | Port 15431 is required for the Machine Learning module. |

## Enterprise Designer

Enterprise Designer can connect to a Spectrum Technology Platform server on any currently supported platform.

System requirements:

- Operating system: Microsoft Windows 10
- 86 MB of disk space to install Enterprise Designer without any modules. Each module you install requires additional disk space.
- Microsoft .NET Framework 4.6 (available from the Spectrum Technology Platform Welcome Page, <http://SpectrumServerName:8080>)
- A monitor with at least 1024 x 768 resolution
- Maximum DPI setting: 150%
- Adobe Reader 7 or later (for viewing and saving reports)

## Web Browsers

We recommend that you disable browser pop-up window blocking when using Spectrum Web-based applications.

- Microsoft Internet Explorer 11
- Google Chrome 77.0 or later
- Mozilla Firefox 69.0 or later
- To use the Data Hub Relationship Analysis Client, use Microsoft Internet Explorer 11. See [Get Microsoft Silverlight \(www.microsoft.com/getsilverlight\)](#).

There is no longer support for Microsoft Silverlight on Chrome, Firefox, or any browser using the Mac operating system. For more information, see [Silverlight End of Support](#).

**Note:** Metadata Insights now provides functionality previously found in Relationship Analysis Client for creating and editing Data Hub models.

## Command Line Tools

### *Job Executor and Process Flow Executor*

The Job Executor and Process Flow Executor command line tools require Java 8.

## User Interface Languages

Spectrum Technology Platform user interfaces such as Management Console, Enterprise Designer, and web applications are localized for these languages:

- English
- French
- German
- Japanese
- Spanish

## Client SDK

The Client SDK provides API access to Spectrum Technology Platform services. To use the Client SDK your computer must meet the following requirements:

- 1.25 GB disk space
- JDK 8 is required to install the Client SDK. Be sure that JDK 8 is in the PATH environment variable.

### Supported Compilers

The Spectrum Technology Platform Client SDK is supported with the following compiler and runtime minimum versions.

#### Java

Client SDK Package Directory: `clientSDK/platforms/java`

Client SDK requires *Java version 8*. This is not installed with the Client SDK.

**Note:** Oracle Java and Azul are supported.

#### Windows 64-bit

- JDK: version 8
- C Compiler: MSVC 2005, MSVC 2008
- C++ Compiler: MSVC 2005, MSVC 2008

#### HP-UX RISC

- JDK: version 8
- C Compiler: cc: HP92453-01 A.11.01.21 HP C (Bundled) Compiler
- C++ Compiler: aCC: HP aC++ B3910B A.03.30 HP aC++ B3910B A.03.27

The clientSDK 64-bit lib is linked to these libraries:

- libpthread.1
- libnsl.1
- librt.2
- libdl.1
- libc.2
- libxti.2
- libdl.1

### *HP-UX Itanium*

- JDK: version 8
- C Compiler: cc: HP aC++/ANSI C B3910B A.06.05
- C++ Compiler: aCC: HP aC++/ANSI C B3910B A.06.05

The clientSDK 64-bit lib is linked to the following libraries:

- libpthread.so.1
- libnsl.so.1
- librt.so.1
- libxti.so.1
- libdl.so.1

### *Red Hat (64-bit)*

- Operating System: Red Hat Linux version 2.6.9-34.0.2.ELsmp
- C Compiler: gcc version 3.4.5
- C++ Compiler: g++ version 3.4.5

The clientSDK lib is linked to the following libraries:

- libstdc++.so.6
- libm.so.6
- libgcc\_s.so.1
- libpthread.so.0
- libc.so.6
- ld-linux-x86-64.so.2

### *SuSE*

- Operating System: SuSE SLES 11 and 12 (powered by UnitedLinux 1.0) (i586)\nKernel 2.4.21-295-smp (0).
- C Compiler: gcc version 3.2.2
- C++ Compiler: g++ version 3.2.2

### *Solaris*

- Operating System: Solaris 5.11
- C Compiler: cc: Forte Developer 7 C 5.4 2002/03/09
- C++ Compiler: CC: Forte Developer 7 C++ 5.4 Patch 111715-16 2005/04/28

The clientSDK 64-bit lib is linked to the following libraries:

- libpthread.so.1
- libsocket.so.1

- libnsl.so.1
- librt.so.1
- libc.so.1
- libmp.so.2
- libmd5.so.1
- libscf.so.1
- libaio.so.1
- libdoor.so.1
- libuutil.so.1
- libm.so.2
- libc\_psr.so.1
- libmd5\_psr.so.1

## AIX

- Operating System: AIX version 7.x
- C Compiler: xlc 6.0 Visual Age C 6.0
- C++ Compiler: xlc 6.0 Visual Age C++ 6.0

The clientSDK 64-bit lib are linked to the following libraries:

- libC.a
- libc\_r.a
- libpthread.a
- librtl.a

## Spatial Module Support

### Databases

The Spatial Module, which includes routing, supports the following spatial databases for use with the spatial services, data, and resources:

- Oracle 11GR2 and Oracle 12CR2
- SQL Server 2016 and SQL Server 2017
- PostgreSQL 11.5 (with PostGIS 2.5) and PostgreSQL 12.0 (with PostGIS 3.0)

**Note:** Spectrum Spatial requires the PostGIS extension for PostGreSQL data source provider even if spatial capability will be not needed or used.

- GeoPackage (Windows and CentOS)

## Data Formats

The Spatial Module supports the following data formats for use with the spatial services:

- Generic JDBC (with XY)
- TAB (native, native extended, raster, grid, seamless, DBF)
- ESRI shapefile

## JDK

Users with Azul JDK on Linux require Lucida fonts for Spatial map rendering. To obtain this font family, download and install the Zulu Commercial Compatibility Kit (ZCCK). Download and install instructions can be found at

<https://www.azul.com/products/zulu-and-zulu-enterprise/cck-downloads>.

## Raster Formats

In order to use rasters and grids as a map layer, there must be an associated .TAB file containing georeference information about the image, including the bounds, coordinate system, and registration points.

The Spatial Module supports the following raster and grid formats (64-bit only):

### Raster Formats

| Format   | File Extension |
|--|----------------|
| ADRG   | .gen           |
| ASRP   | .gen           |
| BMP  | .bmp, .wbmp    |
| CADRG  | .gen           |
| CIB  | various        |
| ECW (SDK v5)   | .ecw           |
| GeoTiff  | .geotif        |
| GIF  | .gif           |
| JPEG   | .jpg/.jpeg     |
| MrSID (SDK v9)   | .sid           |
| <b>Note:</b> Supports MG4 (MrSID Generation 4). See OS specific notes below. |                |
| NITF   | .ntf           |
| PNG  | .png           |
| TIFF   | .tif           |

**Note:** TIFF files used by the Feature Service and Mapping Service cannot exceed 2GB.

**Note:** Solaris or AIX machines, whether installed with 32- or 64- bit JVM, do not support ECW and MrSID raster formats.

**Note:** The following Linux operating systems require library files installed to read MrSID raster files.

| OS              | MrSID Prerequisites  |
|-----------------|--|
| CentOS 7.x      | libpng12.so is required for reading MrSID raster files.  |
| Ubuntu 16.x LTS | libpng12.deb and libjpeg62 are required for reading MrSID raster files. Otherwise, you will see an "E file" message when installing runtime libraries using the command:<br><br>apt-get install libstdc++5:i386 zlib1g:i386.   |
| Ubuntu 18.x LTS | To install the lib files, as System Administrator:<br><br>1. Download libpng12.deb and place it in the /tmp folder using the command:<br><br>wget -q -O /tmp/libpng12.deb<br>http://mirrors.kernel.org/ubuntu/pool/main/libp/libpng/libpng12-0_1.2.54-1ubuntu1.16.04.1_amd64.deb<br><br>2. Install the debian package (located in the /tmp folder) by running the command:<br><br>dpkg -i /tmp/libpng12.deb<br><br>3. Install libjpeg62 by running the command:<br><br>apt-get install libjpeg62 |

### Grid Formats

| Format  | File Extension         |
|---|------------------------|
| Defense Digital Terrain Elevation Data (DTED)   | .dt0, .dt1, .dt2, .dt3 |
| MapInfo Grid  | .mig                   |
| MRR (Multi-Resolution Raster)<br><br><b>Note:</b> This support is provided on the following Linux environments:<br><br><ul style="list-style-type: none"> <li>• Oracle Linux 6.5 and 7.1</li> <li>• CentOS 6.4 and 7.1</li> <li>• Ubuntu 16.04 and 18.04</li> </ul> | .mrr                   |
| Vertical Mapper Classified Grid   | .grc                   |

Vertical Mapper Continuous Grid | .grd

### Utilities

The Spatial Module utilities (Tile Generator, WMTS Tile Generator, and the Geometry Validator) require, at a minimum, Java 8.

### .NET Samples

The .NET samples require at a minimum Visual Studio 2013 and Microsoft .NET Framework 4.5.

### MapInfo Professional Compatibility

The Map Uploader provided by the Spatial Module is compatible with MapInfo Professional 16.x or higher. For more information about the interoperability of the two products, see the section titled *MapInfo Pro* under *Getting Started* and *Tools* in the *Spectrum Spatial Guide*.

### Internet Explorer

To use Internet Explorer 11, uncheck **Display intranet sites in Compatibility View** in the Compatibility View settings.

### WebDAV

When communicating to the server over HTTPS to map a drive to the repository, a WebDAV client is required to use the TLS v1.2 protocol.

### Deprecating

#### Centrus Support

To work with Centrus, you must install a 32-bit JDK.

Centrus users have an additional step after installing or upgrading the Spectrum Technology Platform and the Spatial Module. To work with Centrus, you must update the Spectrum properties file `jdk.properties` to work with your 32-bit JDK installation.

1. Add a second property to the file, named `jdk.java.exe.32` that points to the 32-bit JDK (Java) installation. Your file will have two entries, one set to the 64-bit JDK and a second set to the 32-bit JDK. As an example:

```
jdk.java.exe.64=C:/Java/Zulu/zulu-8-202/64/bin/java
```

```
jdk.java.exe.32=C:/Java/Zulu/zulu-8-202/32/bin/java
```

Paths must include forward slashes (/) not backslashes.

2. Restart the Spectrum Technology Platform server.
  - To start the server on Unix or Linux, run the `SpectrumDirectory/server/bin/server.start` script.

## Configuring a Linux Machine for MRR

To use MRR (Multi Resolution Raster) files on Spectrum Spatial in a Linux environment, GCC and LIBC must be upgraded to the proper versions.

To configure a Linux machine for MRR:

1. Install the UUID package, which installs LIBC v.2.17.

For example, to install UUID on Cent OS:

- `wget http://ftp.riken.jp/Linux/centos/6/os/x86_64/Packages/libuuid-2.17.2-12.18.el6.x86_64.rpm`
- `sudo yum -y install libuuid-2.17.2-12.18.el6.x86_64.rpm`
- `sudo yum -y install libuuid-devel`

2. Install `devtoolset-3`, which installs GCC v.4.9. For instructions, see <https://www.softwarecollections.org/en/scls/rhscl/devtoolset-3/>.

3. Verify that GCC v.4.9 and LIBC v.2.17 (or higher) are installed.

4. Ensure that all the dependencies were resolved in the above steps. If any dependency is unresolved, install it and then repeat Step 2.

For example, the following are some of the required dependencies for an OEL 6.5 machine:

- `wget https://www.softwarecollections.org/en/scls/mizdebsk/maven30-rhel-6/epel-6-x86_64/download/mizdebsk-maven30-rhel-6-epel-6-x86_64.noarch.rpm`
- `sudo yum -y install mizdebsk-maven30-rhel-6-epel-6-x86_64-1-2.noarch.rpm`
- `wget https://www.softwarecollections.org/en/scls/rhscl/maven30/epel-6-x86_64/download/rhscl-maven30-epel-6-x86_64.noarch.rpm`
- `sudo yum -y install rhscl-maven30-epel-6-x86_64-1-2.noarch.rpm`
- `sudo yum -y install maven30`
- `wget https://www.softwarecollections.org/en/scls/mbooth/eclipse-luna/fedora-20-x86_64/download/mbooth-eclipse-luna-fedora-20-x86_64.noarch.rpm`
- `sudo yum -y install mbooth-eclipse-luna-fedora-20-x86_64-1-2.noarch.rpm`
- `sudo yum -y install --skip-broken eclipse-luna`

# 3 - Standard Installation

## In this section

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# Installing a New Server

## Prerequisites:

- Before installing Spectrum Technology Platform, be sure to read the release notes. The release notes contains important compatibility information as well as release-specific installation notes.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.

## To install a new server:

1. If you are installing Spectrum Technology Platform on Red Hat Enterprise Linux 6 or 7, Oracle Linux 6 or 7, or CentOS 6 or 7, you must install the 32-bit glibc runtimes before installing Spectrum Technology Platform. There are two ways to install the 32-bit glibc runtimes:

- Using your local yum repository run this command:

```
yum install -y libstdc++.i686 libstdc++-devel.i686  
libstdc++-devel.x86_64 zlib.i686 zlib.x86_64
```

- Perform an rpm install from media. Install the following:

```
libstdc++.i686  
libstdc++-devel.i686  
libstdc++-devel.x86_64  
zlib.i686  
zlib.x86_64
```

2. Download Spectrum Technology Platform using the download instructions contained in your welcome email or the release announcement email.
3. Extract the downloaded file to a temporary location on the server where you want to install Spectrum Technology Platform.
4. Change the directory to the location of `install.sh`.
5. Be sure you have permission to run the files by typing the following command:  

```
chmod a+x install.sh
```
6. Run `install.sh`.
7. The installer guides you through the installation process. Note the following:
  - If you are setting up an environment where the configuration database is installed on a separate server choose **Server only**. Otherwise choose **Standard installation**.
  - When prompted, select the modules that you want to install.
    - Make sure that Spectrum Technology Platform is selected.

- If you are installing the SAP Module you must install **Advanced Matching Module**. The Enterprise Tax Module is optional. The **Universal Addressing Module** is only required if you will be using the SAP module service SAPValidateAddressWithCandidates.
- If you are installing the Screener module, you must also install these modules: Business Steward Module, Data Integration Module, Data Hub Module, Universal Addressing Module, Universal Name Module, Data Normalization Module, and Advanced Matching Module
- When prompted, enter the HTTP port that you want to use then press **Enter**. The default is 8080. For a complete listing of ports used by Spectrum Technology Platform see **Network Ports** on page 29.

8. Start the server.

**Note:** If you are installing a cluster, you do not need to start the server.

- a) Change the working directory to the `bin` directory of where Spectrum Technology Platform is installed.

For example:

```
cd /usr/g1/tst/server/bin
```

- b) Source the setup file.

For example:

```
. ./setup
```

- c) Start the Spectrum Technology Platform server.

- To start Spectrum Technology Platform in the background, type the following command:

```
./server.start
```

- To start Spectrum Technology Platform in the foreground, type the following command:

```
./server.start console
```

9. To ensure that Spectrum Technology Platform has started, open the log file `<Spectrum Installation Location>/server/logs/spectrum-server.log` and look for this message:

```
INFO [Server] Pitney Bowes Spectrum(TM) Technology Platform (Version
version build) Started
```

**Important:** Do not attempt to stop the server until after it has fully started for the first time. Stopping the server before it performs an initial startup can cause your installation to become unusable.

10. Apply all the updates for the platform and any modules you have installed. For a listing of updates, see the **Update Summary** on the Pitney Bowes support website.

**Note:** Further module-level configurations might be required in some cases, such as Spectrum Screener™. See these details in the Installation section of the respective module guides.

### Related concepts

[Moving transactional data - upgrades only](#) on page 6

As of release 2019.1, we are moving transactional audit log and flow history data from Neo4j to Elasticsearch to improve the maintenance of and access to this data.

### Related tasks

[Migrating your search indexes](#) on page 7

If you are upgrading to release 2019.1 from release 2018.2, your Elasticsearch search indexes will migrate to release 2019.1 during the upgrade process.

### Related reference

[If you have changed default Elasticsearch certificate connection properties](#) on page 8

Most Spectrum users will run with the default set of connection properties. However, if you did change any connection properties, you will have to pass into Spectrum the properties file with your unique settings using the `-p` command, described in the previous section.

## Upgrading a Server

- Before upgrading, be sure to read the release notes for the new version. The release notes contain a list of known issues, important compatibility information, supported upgrade paths, and module-specific data backup recommendations.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.
- **Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.

- **Note:** If you have customized settings in the `wrapper.conf` file located in `<SpectrumDirectory>/server/bin/wrapper`, we recommend that you copy this file to a separate location before you upgrade the Spectrum Technology Platform server. After you complete the upgrade, compare the contents of `wrapper.conf` installed during the upgrade with the contents of the saved copy of the file. You can then manually copy customizations that you want to retain after the upgrade into the updated version of the file. This is particularly important for changes to the initial and maximum Java heap sizes.

This procedure is for upgrading a single Spectrum Technology Platform server. Follow this procedure when upgrading a standard installation or when upgrading a node in a cluster. If you are upgrading a cluster, be sure to follow the cluster upgrade process. For more information, see [Upgrading a Cluster](#) on page 68.

If you upgrade the main server and start it before upgrading and starting the nodes, you will need to recreate your connections in Management console after upgrading.

1. Download the updated version of Spectrum Technology Platform using the download instructions contained in the release announcement email.
2. Unzip the downloaded installer to a temporary folder on the server you want to upgrade.
3. Back up the server. For instructions on creating a backup, see the *Administration Guide*.
4. Back up module-specific data for any of these modules if you have them installed.

**Note:** For the Screener module, see the section [Upgrading Screener](#) in the Screener guide.

| Module   | Items to Back Up  |
|--|---|
| Advanced Matching Module, Data Normalization Module, and Universal Name Module | Back up the contents of these subfolders located in <i>SpectrumDirectory/server/modules</i> : <ul style="list-style-type: none"> <li>• cdqdb</li> <li>• lucene</li> <li>• matcher</li> <li>• parser</li> <li>• searchindex</li> <li>• tables</li> </ul>   |
| Data Hub Module  | Open the Relationship Analysis Client and click <b>Manage</b> . Select the model you want to back up then click <b>Backup</b> .<br><br>In addition to backing up your models, back up these two property files: <ul style="list-style-type: none"> <li>• <i>SpectrumDirectory/server/modules/hub/hub.properties</i></li> <li>• <i>SpectrumDirectory/server/modules/hub/db/neo4j.properties</i></li> </ul> |
| Spatial Module   | Back up your named resources, data, and configuration files.  |

5. (Optional) You can reduce the time it takes to upgrade your system by purging old records from the execution history. Consider purging the execution history if it contains over 100,000 entries. You can view your execution history in Enterprise Designer under **View > Execution History**.

If you are upgrading from 10.0 SP1, delete old history records manually using Management Console.

If you are upgrading from version 12.0 SP1, 12.0 SP2, 12.0 SP2.1 and 18.2, use the JMX console to delete old history records. This process is faster than manually deleting records in Management Console, and is available on versions 12.0 SP1, 12.0 SP2, 12.0 SP2.1 and 18.2. For more information, see [Purging Execution History](#) on page 46.

6. Source the `<SpectrumDirectory>/server/bin/setup` script.
7. Run the `<SpectrumDirectory>/server/bin/server.stop` script to stop the Spectrum Technology Platform server.
8. Wait for the server to finish the shutdown process before proceeding.
 

**Important:** If you have the Data Hub Module installed, make sure that all models are stopped. Models that do not shut down properly will not open successfully after upgrading.
9. If you have the Global Sentry Module installed, shut down the Global Sentry database server by executing the `<SpectrumDirectory>/server/GlobalSentryDatabase/bin/globalsentrydb.stop` script.
10. Run the Spectrum Technology Platform installer to upgrade your system.
11. Apply all the updates for the platform and any modules you have installed. For a listing of updates, see the [Update Summary](#) on the Pitney Bowes support website.

**Note:** Any job or subflow stored in the system during a server upgrade is marked as exposed to provide the same behavior for those jobs and subflows as before the upgrade. Any job or subflow that is exported prior to the upgrade will not be exposed. Therefore, when importing these jobs or subflows back into the system, you must manually expose the imported job or subflow.

Some modules have post-upgrade steps you need to perform.

#### Data Hub Module

Open this file in a text editor:

`server/modules/hub/db/neo4j.properties` and set this property to true: `dbms.allow_upgrade=true`. This property protects against unintentional and irreversible store upgrades. Setting this property to "true" indicates that you understand the ramifications of proceeding with an upgrade and have taken the necessary precautions before proceeding.

Restart the Spectrum Technology Platform server. The server will upgrade each model. Examine the file `server/logs/spectrum-server.log` for errors or warning messages. Once all models have been upgraded, edit the `neo4j.properties` file again and comment out the `dbms.allow_upgrade` property.

---

#### Spatial Module

During an upgrade, the pool size is reset to 4 if set to a lower value. A pool size setting of 4 or more is unaffected. To change the **Remote Component Pool Size** value after upgrading, open the Management Console and select **Resources > Spatial**. Change the pool size value and click **Save**. For details, see *Modifying the Pool Size* in the *Spectrum Spatial Guide*.

---

Spectrum Screener™

See the [Upgrading Screener](#) section of the Screener guide for details.

---

## Purging Execution History

If you have many flows, or services that are used frequently, the execution history in Management Console can become quite large. This procedure describes how to remove old records from the execution history. You may want to purge old records to reduce the size of the configuration database. Purging records before upgrading to a new version can help reduce the time it takes to upgrade Spectrum Technology Platform.

There are two purge methods:

- Purge records:  
`com.pb.spectrum.platform.configuration:manager=ArchiveTransactionManager`
- Purge records and provide archive status:  
`com.pb.spectrum.platform.transaction:manager=archiveTransactionManager`

The steps below demonstrate the "purge records" (non-archive status) request.

**Note:** To purge execution history for all nodes on a cluster, perform the purge on each node individually.

1. Open a web browser and go to `http://server:port/jmx-console`

Where:

- *server* is the IP address or host name of your Spectrum Technology Platform server.
- *port* is the HTTP port used by Spectrum Technology Platform. The default is 8080.

2. Under **Domain: `com.pb.spectrum.platform.configuration`**, click **`com.pb.spectrum.platform.configuration:manager=ArchiveConfigurationManager`**.
3. Optional: If you want to save an archive of the history that you are going to purge, specify the path where you want to save the archive in the **ArchiveDirectory** field, then click **set**. Then, set **ArchiveEnabled** to **true** and click **set**.
4. In the **ArchiveRetain** field, specify how many days of records you want to keep in the history then click **set**.  
For example, if you enter 45 then history records that are 45 days old or newer will be retained, and records 46 days old and older will be purged. To determine how many days of records you can retain, look at the job and process flow history in Enterprise Designer and identify the point in time where the number of records exceeds 100,000.
5. Optional: If you want to schedule a purge to occur on a regular schedule, enter the schedule in the **CronExpression** field using a Cron expression.

A cron expression consists of six space-separated values, with an optional seventh value:

Seconds  
 Minutes  
 Hours  
 Day of the month  
 Month  
 Day of the week  
 Year (Optional)

For example, this expression would purge the execution history at midnight every Sunday:

```
0 0 0 ? * SUN
```

For more information about cron expressions, see [quartz-scheduler.org/documentation](http://quartz-scheduler.org/documentation).

After specifying a cron expression, click the **set** button next to the **CronExpression** field, set **PurgeEnabled** to **true**, and click the **set** button next to the **PurgeEnabled** field.

**Note:** You do not need to schedule purges if you want to purge the history only one time for the purposes of speeding up the upgrade process.

- Optional: If you want to set a maximum number of records to remain in the history after the purge, specify the maximum number of records in the **MaxHistoryRecordCount** field.

This is useful if you have a large number of history records each day, and even after purging old records based on the value in the **ArchiveRetain** field, the size of the execution history is still larger than you want. After purging the old records based on the value in the **ArchiveRetain** field, additional records will be purged until the number of records that remains is equal to the number in the **MaxHistoryRecordCount** field. If you do not want to specify a maximum number of history records, specify `-1`.

**Note:** The limit you specify in **MaxHistoryRecordCount** sets the limits for process flows and jobs separately. For example, if you specify 5000, the maximum number of process flow history records will be 5,000, and the maximum number of job history records will be 5,000, for a total maximum number of 10,000 records.

- In the **PurgeOperation** field, leave the value set to `ALL`.
- Select **All MBeans** to return to the main JMX Console screen.
- Under **Domain: com.pb.spectrum.platform.configuration**, select **com.pb.spectrum.platform.transaction:manager=ArchiveTransactionManager**.
- To run the purge, click **Invoke**.

This purges the execution history so that you now have a smaller configuration database.

# Installing a License Key

The license key provides access to software pursuant to the terms of your license. It is an encrypted XML file with a file name ending in `.key`.

**Note:** When you upgrade an existing Spectrum Technology Platform installation, you may continue to use your existing license key. You do not need to get a new one.

To install a license key:

1. Locate the email containing your license key that you received from Precisely.

**Important:** You must install the license key within 45 days of receiving it. If you do not you will need to contact Precisely for another license key.

2. Copy the `.key` file to this directory:

`SpectrumPlatformLocation/server/import`

The license key is applied to your system. There is no need to restart your server.

If there was a problem installing the license key, check the log file in:

`SpectrumDirectory/server/logs`

Depending on whether the key was processed successfully or there was an error processing the key, the processed key goes into one of these folders:

- `SpectrumDirectory/server/archive/license-keys`
- `SpectrumDirectory/import/error/license-keys`

# Installing the Server with a Silent Installer

The silent install process for the server allows you to pre-configure the server installation process so that it runs without user intervention. Instead of responding to prompts for information such as the installation location and which modules to install, you specify these responses in a properties file which the installer uses instead of user prompts.

1. In the Spectrum Technology Platform installer, go to the folder `SilentInstaller`.
2. Open the file `installer.properties` in a text editor.
3. Edit `installer.properties` as necessary to specify the installation settings you want to use. See the comments in `installer.properties` for additional information.

4. To run the installer in silent mode, place `installer.properties` in the same directory as `install.sh`. When the installer runs it will detect `installer.properties` and automatically run in silent mode.

Alternatively, you can place `installer.properties` in different directory and give the absolute path to the property in the command prompt using the `-f` argument, as follows:

```
install.sh -f PathOfPropertyFile/installer.properties
```

## Adding Modules

Spectrum Technology Platform is designed so that modules can be added as you grow your system over time. For example, you may have one Spectrum Technology Platform module, then license another module a few months later. The second product may be built on a newer version of Spectrum Technology Platform. This will require you to upgrade your version of Spectrum Technology Platform. In another case, the second product is compatible with the installed version. In both cases, the install program recognizes if it needs to upgrade Spectrum Technology Platform and will do so without prompting. If an upgrade is not required, the installer will skip the Spectrum Technology Platform install steps and install the new module.

The process for adding a module is similar to that of a new installation. In both cases you start the installation process by running the Spectrum Technology Platform installer. Note that Spectrum Technology Platform modules do not have their own installer. Instead, you use the Spectrum Technology Platform installer to add modules.

1. If the Spectrum Technology Platform server is running, stop it by typing the following command in the Spectrum Technology Platform bin directory:

```
./server.stop
```

2. Change the directory to the location of `install.sh` in the Spectrum Technology Platform installer.
3. Run `install.sh`.
4. Load any necessary databases for the new product. See the instructions in [Spectrum Databases](#) on page 99.
5. Start the server:
  - a) Go to the Spectrum Technology Platform bin directory.
  - b) Source the setup file. For example,

```
. ./setup
```

- c) Type the following command:

```
./server.start
```

6. Install the license key for the module. For more information, see [Installing a License Key](#) on page 48.

## Removing the Server

Before uninstalling any product, back up any files you may need in the future. Uninstalling Spectrum Technology Platform will remove all jobs and settings.

1. Stop the Spectrum Technology Platform server.  
To do this, run the `SpectrumDirectory/server/bin/server.stop` script to stop the server.
2. Source the setup file.  
For example, `./setup`.
3. Uninstall the Spectrum Technology Platform modules by running the following uninstall script for each installed module.

```
SpectrumDirectory/Uninstall/Uninstall_IUCodeversion-identifier/Uninstall_IUCode
```

Where *IUCode* is the installation unit code for the module you want to uninstall, and *version-identifier* is a component version identifier. Within each module directory, the script that must be run is `./Uninstall_IUCode`.

**Table 2: Spectrum Component IU Codes**

| Module Name  | IU Code |
|--|---------|
| Analytics Scoring Module   | AAM     |
| Advanced Matching Module<br>Data Normalization Module<br>Universal Name Module | CDQ     |
| Big Data Integration Module  | BDI     |
| Business Steward Module  | BSM     |
| Data Federation Module   | SDF     |
| Data Hub Module  | GRF     |

| Module Name                          | IU Code |
|--------------------------------------|---------|
| Enterprise Data Integration Module   | EDI     |
| Enterprise Geocoding Module (Global) | GLOBAL  |
| Enterprise Geocoding Module (U.S.)   | KGL     |
| Enterprise Geocoding Module (World)  | IXW     |
| Enterprise System Connector          | ESC     |
| Enterprise Tax Module                | GSL     |
| GeoConfidence Module                 | GCO     |
| Global Address Validation Module     | GAV     |
| Global Sentry Module                 | OIS     |
| Information Extraction Module        | IEM     |
| Machine Learning                     | MLM     |
| Microsoft Dynamics CRM Module        | MSD     |
| Precisely Spectrum <sup>1</sup>      | LES     |
| SAP CRM 7.0 Module                   | 70S     |
| SAP ECC 6.0 Module                   | E6C     |
| Spatial and Routing Module           | LIM     |
| Universal Addressing Module          | UNC     |
| Visual Insights Module               | SBI     |

- Uninstall Spectrum Technology Platform by running the uninstall script:

<sup>1</sup> The LES code refers to the Spectrum platform itself, without any modules.

*SpectrumDirectory*/Uninstall/Uninstall\_LES/Uninstall\_LES

The script that must be run is `./Uninstall_LES`.

**Note:** Perform this step only after completing step 3 on page 50 for all installed modules.

Typically, the uninstaller program and the uninstall log remain after you complete this procedure. The repository folder may also remain if background processes were running during the installation. You can manually remove the *SpectrumDirectory* and any remaining files and folders that you do not want to keep.

# 4 - Cluster

## In this section

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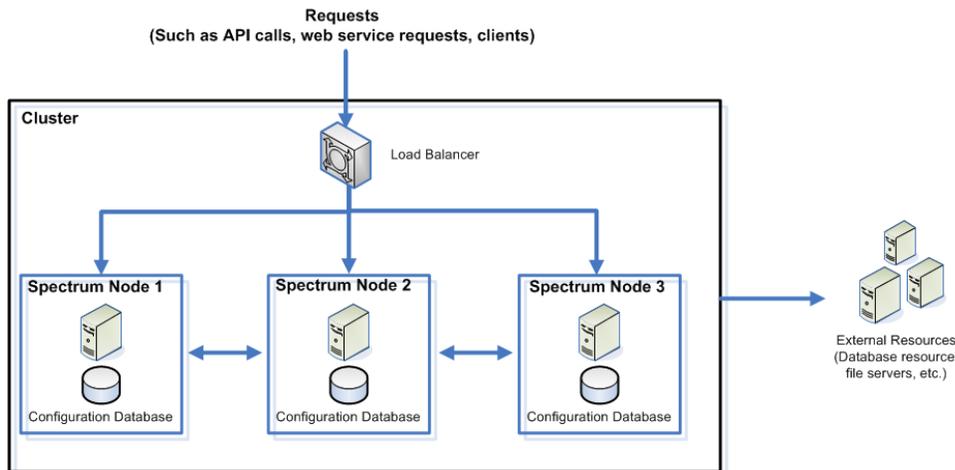


# Clustered Architecture

In a clustered environment, processing is shared among two or more instances of the server. All communication with Spectrum Technology Platform goes through a load balancer. Instead of using the URL and port of the Spectrum Technology Platform server, you use the URL and port of the load balancer. Consider using this approach if you require failover redundancy and high-volume, high-performance processing.

**Important:** As part of your cluster setup and machine preparation, ensure that all system times are synchronized across all nodes in the cluster.

This diagram illustrates the cluster architecture:



## Load Balancer

As requests come into the cluster, the load balancer identifies the best available Spectrum Technology Platform node to handle the request. The request is then passed to a Spectrum Technology Platform node.

From the user's perspective, the distributed architecture is handled automatically behind the scenes. The user sends a request to the load balancer URL and port for Spectrum Technology Platform (typically port 80 for a distributed environment) as if it were a single Spectrum Technology Platform server.

## Nodes

A node is a Spectrum Technology Platform server installation. Each node has a copy of the configuration database. Each copy is continuously synchronized. This enables each node to share the same settings, such as license information, dataflows, and database resources.

To configure the cluster, simply point Management Console or Enterprise Designer to the load balancer URL and port for Spectrum Technology Platform (typically port 80 for a distributed environment).

### *External Resources*

The definitions for external resources such as database resources (postal databases and geocoding databases for example), JDBC connections, and file servers, reside in the configuration database. The resources themselves (databases, files, web services) can reside anywhere you choose. Database resources can be installed either on each node in the cluster or on a shared network location.

Because the database resources themselves reside outside the cluster, multiple clusters can share the same database resources. You must create the resource definitions in each cluster using Management Console. For example if you want multiple clusters to share the same geocoding database, you can install the geocoding database on a server accessible from each cluster, then in Management Console point each cluster to the geocoding database.

### *Installing a Cluster*

See [Installing a Cluster](#) on page 59 for more information.

## Clustered Architecture for the Data Hub Module

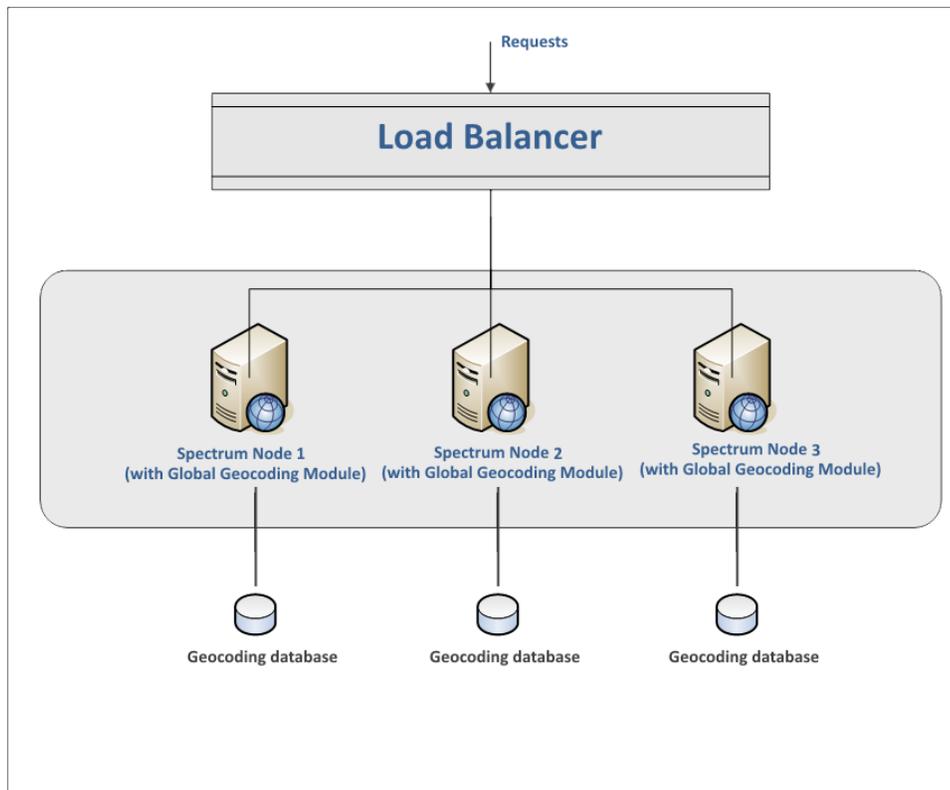
In a clustered environment, Data Hub Module graph databases are replicated to each Spectrum Technology Platform server in the cluster. The server that receives the first request to open a model is the master. All other servers maintain a replicated mirror of that master. If different servers receive requests to open different models, the masters for the models are on different servers. All writes to the database are synchronized with the master. Any server can process read requests.

We recommend that clusters have a minimum of three servers in order to achieve a level of fault tolerance. Also, an odd number of servers provides better individual server resiliency than an even-numbered cluster. We make these recommendations because once the model is running, the system will continue running as long as more than half the servers are in communication. For example, in a cluster of six servers, four must stay in communication; for a cluster of three servers, two must stay in communication, and for a cluster of two servers, all servers must be in communication. Both a three-server cluster and a four-server cluster can tolerate a maximum of one lost server.

All servers in the cluster must be available in order to open or create a model. If any server is unavailable, the server will wait for all servers to join the cluster. If this number of servers do not join within the timeout period, the operation fails.

## Clustered Architecture for the Global Geocoding Module

In a clustered environment, processing is shared among two or more instances of the server. The diagram below illustrates the deployment architecture of such a configuration. Load balancing can be used to support high availability and scaling. The deployment architecture includes a load balancer, Spectrum Technology Platform nodes with Global Geocoding Modules and Geocoding databases.



**Note:** Each Geocoding database MUST be installed in the same location on all of the nodes for the cluster to work properly. For example, if the Geocoding database for "Spectrum Node 1" is installed on `C:\data\`, then the other Spectrum nodes' Geocoding database must also reside on `C:\data\`.

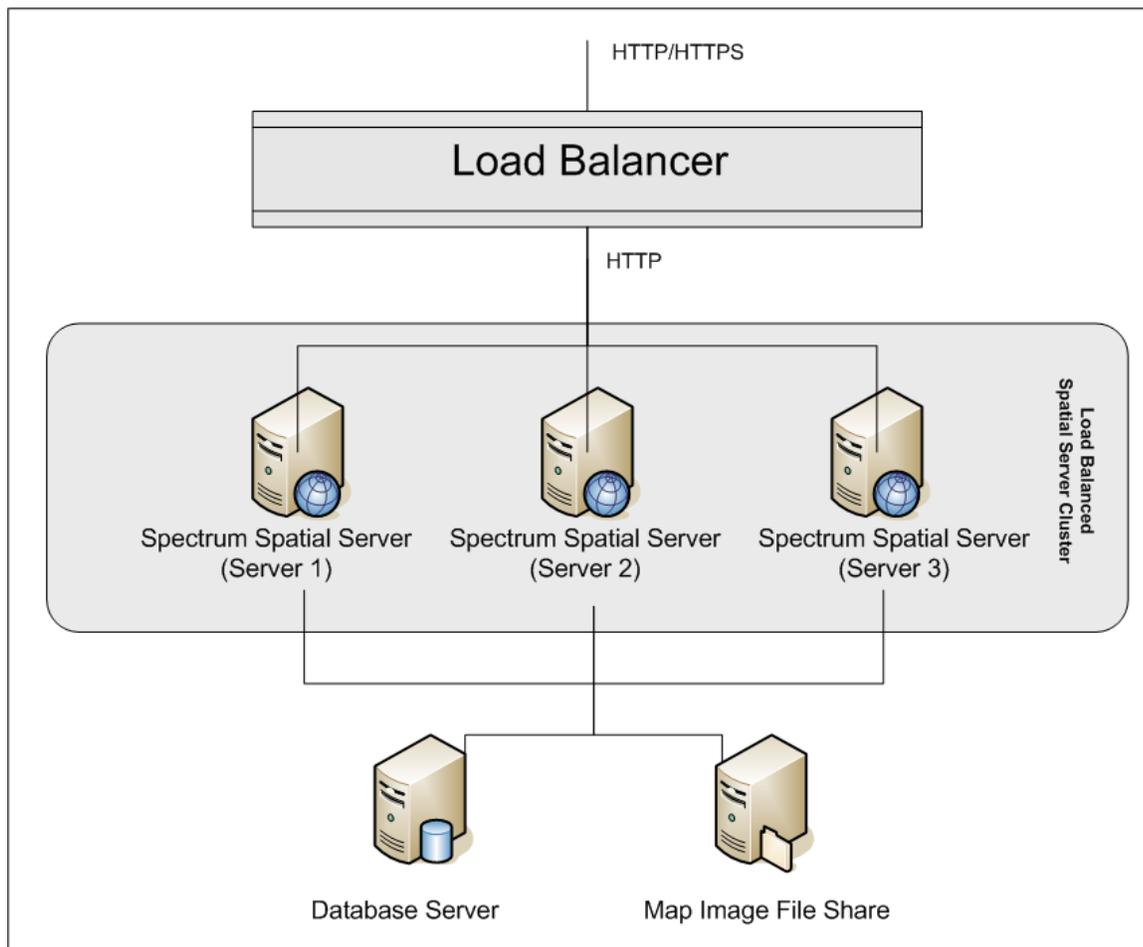
## Clustered Architecture for the Spatial Module

In a clustered environment, processing is shared among two or more instances of the server. The diagram below illustrates the deployment architecture of such a configuration. Load balancing can be used to support high availability and scaling. The deployment architecture includes a load balancer,

a Spectrum Spatial cluster, a database, and a file share. With this approach it is possible to scale both horizontally and vertically. You can cluster the Spatial Module with or without platform clustering.

**Note:** Setting up both a Spectrum Technology Platform cluster and a Spatial Module cluster is recommended and has several benefits:

- Security (ACL) synchronization happens automatically for named resources .
- Dataflows, users, and roles created on one node will automatically synchronize to all nodes.
- All Spatial Module demo pages and utilities (such as Spectrum Spatial Manager) can and should point to the load balancer.



### Load Balancer

The load balancer spreads requests between the Spectrum Spatial instances. Any load balancer that supports load balancing HTTP/HTTPS requests can be used.

### *Spectrum Spatial Cluster*

The cluster is a collection of Spectrum instances with the Spatial Module sharing administration, named resources, geographical metadata content and configuration settings. Additional nodes can be added to the cluster for resilience or to deliver support for greater loads. Each node can be scaled vertically through additional hardware resources and/or additional instances should this be required for hardware with massive resources. Spectrum can be configured to use restricted numbers of CPUs.

### *Database*

Spectrum stores named resources (maps, layers, tables and styles), geographic metadata and configuration in a repository. In the default single server installation an embedded database is used to store these resources on the local server. To create a resilient scalable solution this embedded database should be replaced with a resilient independent database. Oracle, PostGreSQL/PostGIS and Microsoft SQL Server are the supported repository databases.

In the load balanced configuration, Spectrum nodes cache these resources in a local cache and search index in each node in the cluster. When a Spectrum node receives a request it uses the local cache and index to find resources. Named resources can be added through any node in the cluster. Each node keeps its cache current by checking for differences between its local cache and the central database. This check occurs every 2 seconds by default. Time frequency can be configured. This architecture ensures the server delivers high performance transactions and the load on the repository database is kept to a minimum. If a new Spectrum node is added to the cluster the cache and index are created automatically. Such a scenario can occur to remedy a node failure or grow the capability of the deployment.

### *File Share*

The file share provides a folder to hold map images generated by Spectrum. When maps are rendered using the web services the server supports the map images being returned through URLs or returned as a base 64 encoded image. When a URL is returned the map image is stored as a file and served on request of the URL. To ensure any Spectrum node can return the map image a file share is used to store the images.

## Requirements

- A cluster should consist of at least three nodes.
- All servers that host a node must have their system clocks synchronized in order for the cluster to function. Verify that all systems point to the same time service to synchronize their clocks.

- All nodes in a cluster must be the same version of Spectrum Technology Platform so be sure that the version you install is the same as the existing nodes.
- All nodes in a cluster must have the same modules installed.

## Installing a Cluster

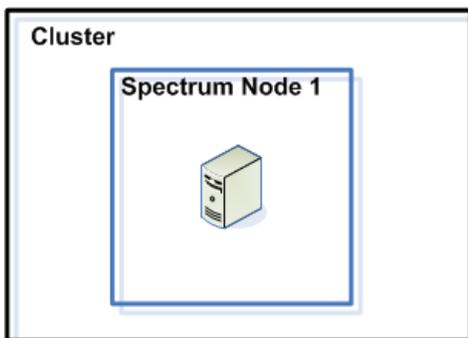
Installing a cluster involves setting up one Spectrum Technology Platform server at a time.

Each time you add a server you need to point it to an existing server which will act as a seed node. A *seed node* is a server that has a copy of the Spectrum configuration data that it can copy to a new node so that the new node's configuration is synchronized with the other nodes in the cluster.

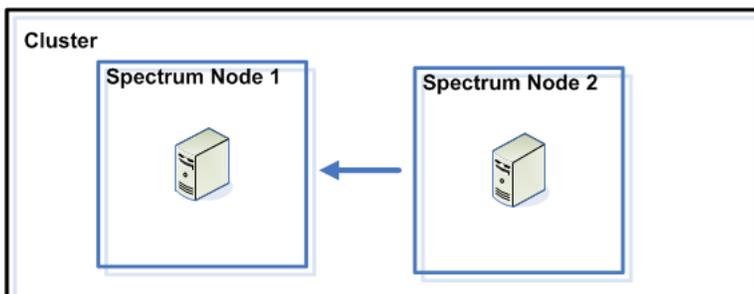
**Note:** All similar nodes should contain all seed addresses. In a combined installation, where the product server and repository are located on the same physical or virtual machine, the seeds would be identical. However, in a separated installation, where the product server and repository server are on separate physical or virtual machines, the server nodes would contain only server seeds and the repository would contain only repository seeds.

The following diagrams illustrate this process.

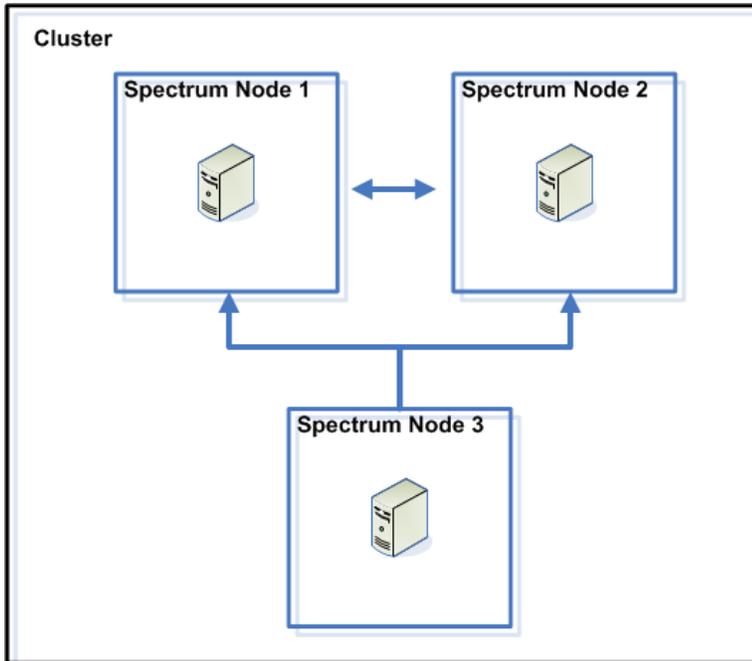
After installing the first node you will, in effect, have a cluster with only one node:



When you install the second node it must point to the first node as a seed node. This will enable the second node to receive a copy of the first node's configuration database, resulting in a cluster with two nodes with synchronized configuration information.



As you add additional nodes, the new nodes can point to any of the existing nodes as a seed node. You must also configure the first node to point to at least one other node in the cluster so that if it is ever brought down it can rejoin the cluster.



Before you begin, install an appropriate load balancer. Follow the procedures described in the load balancer's documentation when installing.

**Note:** The load balancer must be configured to allow encoded forward slashes. If the load balancer does not allow encoded forward slashes you may get HTTP 404 errors while using the cluster. For example, if you are using an Apache load balancer, you can configure it to allow encoded forward slashes by opening the `httpd.conf` file and specifying this property: `AllowEncodedSlashes On`. For other types of load balancers, refer to the load balancer's documentation.

Once you have your load balancer installed, follow these steps to install nodes in the cluster.

1. Install Spectrum Technology Platform on a server where you want to host a node. For instructions, see [Installing a New Server](#) on page 41.

**Important:** Do not start the server when the installation completes. You must complete the following steps before starting the server.

2. Configure the properties files.
  - a) Edit the properties in file `server/conf/spectrum-container.properties`, as described in [Cluster Properties](#) on page 63.
  - b) Save and close the `spectrum-container.properties` file.
  - c) Some modules have module-specific settings that you must configure to enable the module to work in a cluster.

| Module                   | Cluster Configuration Settings  |
|--------------------------|---|
| Advanced Matching Module | <p data-bbox="737 323 1425 415">These settings configure clustering for full-text search indexes. If you do not use full-text search indexes you do not need to configure these settings.</p> <p data-bbox="737 428 1040 457">Open this file in a text editor:</p> <pre data-bbox="737 474 1425 504">..\server\modules\searchindex\es-container.properties</pre> <p data-bbox="737 516 1027 546">Configure these properties:</p> <p data-bbox="737 558 1484 798"><b>es.index.default_number_of_replicas</b> Enter the number of additional copies you want created for each search index. This number should be the number of nodes in your cluster minus 1. For example, if your cluster has five nodes, you would enter "4" in this property.</p> <p data-bbox="737 810 1484 995"><b>es.index.default_number_of_shards</b> Enter the number of shards you want your index to have in the distributed environment. The more nodes that are in your cluster, the higher this number should be.</p> <p data-bbox="1166 1003 1484 1121">Save and close <code>es-container.properties</code> when you are done editing these properties.</p> <p data-bbox="821 1146 1419 1295"><b>Note:</b> Search indexes created prior Spectrum Technology Platform 10.0 do not support clustering. To enable clustering for indexes created prior to the 10.0 release, you must recreate the search index using the 10.0 API after modifying the <code>es-container.properties</code> file.</p> |

| Module          | Cluster Configuration Settings   |
|-----------------|--|
| Data Hub Module | <p>Open this file in a text editor:</p> <pre>..\server\modules\hub\hub.properties</pre> <p>Configure these properties:</p> <p><b>hub.models.path.base</b> Specifies the folder where models are stored. By default, each model is placed in a subdirectory under the <code>..\server\modules\hub\db</code> folder. If you want to store models in a different location, uncomment this property and specify the folder where you want to store models.</p> <p><b>hub.neo4j.database.type</b> Change the value of this property to <code>ha</code>. The default value embedded is for non-clustered installations.</p> <p><b>hub.servers.per.cluster</b> Uncomment this line. Set the value of this property to the number of Spectrum Technology Platform servers in the cluster.</p> <p>Save and close <code>hub.properties</code> when you are done editing these properties.</p> <p>The <code>..\server\modules\hub\db\neo4j.properties</code> controls how the graph databases are configured, using Neo4j Enterprise. This file is used as a template for each model. If needed, each model can be configured separately by placing a copy of the <code>neo4j.properties</code> file into the store directory for that model.</p> |

3. Start the server. To start the server, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command:

```
./server.start.
```
4. Repeat this procedure to install additional nodes in the cluster.
5. After installing all the nodes, go back to the first node and add the other nodes as seed nodes.
  - a) On the first node you installed, open the properties file `server/conf/spectrum-container.properties`.
  - b) In the property `spectrum.cluster.seeds`, add the host name or IP address of the other nodes in the cluster, separating each with a comma: `ipaddress1, ipaddress2, ..., ipaddressn`
  - c) Save and close the `spectrum-container.properties` file. You do not need to restart the server.

## Cluster Properties

The `spectrum-container.properties` file contains the properties that configure a cluster. This table describes how to set the cluster properties for a cluster where the server and configuration database are installed together on each node, and for nodes in the server cluster in a separated configuration database installation. If you are setting up a configuration database cluster, see [Cluster Properties for a Configuration Database Cluster](#) on page 86.

| Property                               | Description   |
|--|---|
| <code>spectrum.cluster.enabled</code>  | Indicates whether a clustered configuration is used. Set this to true.  |
| <code>spectrum.cluster.name</code>     | <p>If this is the first node in the cluster, set this to the name you want to give to the cluster.</p> <p>If this is not the first node in the cluster, set this to the name of the cluster that you want this node to join. If you are unsure of the cluster name, check the <code>spectrum.cluster.name</code> property on another node in the cluster.</p> |
| <code>spectrum.cluster.seeds</code>    | List the IP address and host name for all seeds of the cluster. For example, if your configuration includes three nodes, list <i>Node1IPorHostName, Node2IPorHostName, Node3IPorHostName</i> .  |
| <code>spectrum.cluster.nodeID</code>   | <p>Set this to an integer value to use as the ID for this node. The ID must be an integer and must be unique among all nodes in the cluster.</p> <p><b>Tip:</b> We recommend that the first node you install have a node ID of 1, the second one 2, and so on.</p>  |
| <code>spectrum.runtime.hostname</code> | Un-comment this property and set this property to the load balancer host name.  |
| <code>spectrum.runtime.port</code>     | Un-comment this property and set this property to the port on which you have configured the load balancer to listen.  |

| Property                                   | Description   |
|--|---|
| <code>spectrum.repository.addresses</code> | <p><b>Note:</b> This property can be commented out, unless a distributed installation is used. For distributed installations, this property must point to all repository nodes.</p> <p>In distributed clustered configurations, with separate clusters of servers and repositories, on different machines, specify the IP addresses of each node in the configuration database cluster. Separate each IP address with a comma. For example, in a three-node database cluster, you would specify:</p> <pre>spectrum.repository.addresses=dbNode1-IPaddress,dbNode2-IPaddress,dbNode3-IPaddress</pre> |

## Installing a Cluster for the Spatial Module

To set up a cluster for the Spatial Module, you must first configure a common repository (depending on the type of database you have) then configure your system to prepare it for clustering.

**Note:** Setting up both a Spectrum Technology Platform cluster and a Spatial Module cluster is recommended and has several benefits:

- Security (ACL) synchronization happens automatically for named resources .
- Dataflows, users, and roles created on one node will automatically synchronize to all nodes.
- All Spatial Module demo pages and utilities (such as Spectrum Spatial Manager) can and should point to the load balancer.

### Related tasks

[Installing a Cluster on the Platform](#) on page 59

Installing a cluster involves setting up one Spectrum Technology Platform server at a time.

## Setting Up a Common Repository Database

You must configure the Spatial Module to use a common repository database for the cluster. This ensures that named resources, geographic metadata and configuration settings are managed across the cluster.

The repository is installed with a set of named resources, geographic metadata and configuration files. To migrate these resources to the common database repository the resources need to be

exported from the default internal repository database and reimported into the new shared repository database.

For bulk export and import of repository content, use the `limrepo import` and `limrepo export` commands in the Administration Utility. These commands give you the option of preserving permissions (see the Administration section of the *Spectrum Spatial Guide* for instructions.)

These steps describe how to set up your repository on a common database, either PostgreSQL, Oracle, or Microsoft SQL Server:

1. Export all repository resources to a local folder using the `limrepo export` command in the Administration Utility (see the Administration section of the *Spectrum Spatial Guide* for instructions).

The contents of the installed repository must be exported. This step only needs to be performed once, as the contents of the repository should be the same at this point for all instances of Spectrum Technology Platform.

2. Stop the Spectrum Technology Platform server on all nodes (for instructions, see [Stopping a Cluster](#) on page 78.)
3. On all nodes of the Spectrum Technology Platform modify the configuration to specify the common database.
  - a) Copy the contents of `repository.<databaseType>.xml` to `repository.xml` located under the `server/modules/spatial/jackrabbit` folder where `<databaseType>` is the appropriate type for your database (postgres, oracle, or mssql).
  - b) In `repository.xml`:
    - Modify the DataSource section with the server host name, port, database, user, and password.
    - Modify the Cluster section to assign a distinct cluster ID, like Node1. Ensure unique IDs are assigned to every subsequent node in the cluster (for example, Node2, Node3).
    - Save the changes to `repository.xml`.
  - c) Remove these folders from the `/server/modules/spatial/jackrabbit` folder: `repository`, `version`, `workspaces`.
4. If your database has previously contained any repository content, you must remove these tables to create a clean repository:
  - `default_binval`
  - `default_bundle`
  - `default_names`
  - `default_refs`
  - `rep_fsenry`
  - `rep_global_revision`
  - `rep_journal`
  - `rep_local_revisions`
  - `security_binval`

- security\_bundle
- security\_names
- security\_refs
- version\_binval
- version\_bundle
- version\_names
- version\_refs

If using Oracle, then also delete `version_seq_names_id`, `security_seq_names_id`, and `default_seq_names_id`.

5. On the seed node only, import the backed up repository content.
  - a) Start the Spectrum Technology Platform server (for instructions, see [Starting a Cluster](#) on page 77).
  - b) Import the contents using the `limrepo import` command, pointing to the seed node.
6. Start the remaining nodes in the cluster (for instructions, see [Starting a Cluster](#) on page 77).

## Configuring Your System

Once the Spectrum Technology Platform is installed and you have configured a common repository, you need to configure your instance before you can replicate it to another virtual machine. If you are not using a virtual machine environment, you will need to perform these steps on each of your Spectrum Technology Platform installations.

### Configure the Map File Share

To configure the map file share (a shared image folder) to Spectrum Technology Platform, you first need a shared map image directory.

**Note:** To create a Unix/Linux map file share, see [Creating a Map Image File Share on Unix/Linux](#) on page 67.

**Note:** To create a Windows map file share, see [#unique\\_52](#).

Once a map image directory has been created, configure the map file share:

1. Modify the Mapping Service configuration by pointing to a shared image folder and load balance server. In the ImageCache change the Directory parameter to a common image directory, and change the `AccessBaseURL` parameter to the load balancer machine image URL.

If you are using a virtual machine environment, remember this IP address, as you must set the load balancer VM to this IP address.

For Unix/Linux installations:

```
<ImageCache>
<Directory><spatial server
root>/server/modules/spatial/images</Directory>
<AccessBaseURL>http://<loadbalance_IP_address>/rest/Spatial/
MappingService/internal/imageCache</AccessBaseURL>
  <FileExpire>30</FileExpire>
  <ScanInterval>30</ScanInterval>
</ImageCache>
```

For Windows installations:

```
<ImageCache>
<Directory>\\server\Share\images</Directory>
<AccessBaseURL>http://<loadbalance_IP_address>/rest/Spatial/MappingService/
internal/imageCache
</AccessBaseURL>
  <FileExpire>30</FileExpire>
  <ScanInterval>30</ScanInterval>
</ImageCache>
```

- For Unix/Linux installations, you must set up a symbolic link to enable map images to go to the shared file system.

Create an `images` subfolder in the mounted share folder, for example, `/mnt/<linux mount>/images`

```
cd /<spatial server root>/server/modules/spatial
rm -Rf images
ln -s /mnt/<linux mount>/images ./images
```

## Creating a Map Image File Share on Unix/Linux

The file share provides a folder to hold map images generated by Spectrum Spatial. Create a shared folder accessible to all Spectrum nodes. The file share is not required if maps are returned from the web services as Base64-encoded images.

To create a map image file share on Unix/Linux:

- Mount a shared folder on each operating system hosting Spectrum. The commands below mount a drive on a Microsoft Windows Server or network drive supporting CIFS.

```
mkdir /mnt/<linux mount>
mount -t cifs //<windows host>/<windows share> /mnt/<linux mount>-o
username=shareuser,password=sharepassword,domain=pbj
```

2. Set the image share to load at startup in `/etc/fstab`.

```
//<windows ip address for share>/share /path_to/mount cifs
username=server_user,password=secret,_netdev 0 0
```

## Modifying OGC Service Configurations for Clustering

To ensure clustering works when you have both a Spectrum Technology Platform cluster and a Spatial Module cluster, changes are required to the Open Geospatial Consortium (OGC) services configuration files using Spectrum Spatial Manager: From the WFS, WMS, and WMTS settings pages, change the online resource (service) URL to the IP address and port of the load balancer. See the *Spectrum Spatial Manager Guide* in the Utilities section of the *Spectrum Spatial Guide* for more information.

## Configuring Ports for Multiple Spectrum Instances

If you have multiple Spectrum Technology Platform instances on a single machine, you must change the port numbers for each instance. Change all ports in `<Spectrum root>/server/conf/spectrum-container.properties` to new port values that are not in use. The HTTP port reflects the port number entered in the installer.

## Shared Spectrum Local Data

If you are using TAB file data on the file system, this data needs to be in a shared location accessible by all instances of Spectrum in the load balanced environment. It is also important to note that all named resources in the repository accessing data on the file system should point to this shared location.

Each VM or machine hosting Spectrum needs to have access to the mounted shared drive.

**Note:** Using named resources that point to database tables do not require a shared drive, as the named resources in the repository do not access the data using a file path; rather they use a named connection to the data in the database.

# Upgrading a Cluster

- Before upgrading, be sure to read the release notes for the new version. The release notes contain a list of known issues, important compatibility information, supported upgrade paths, and module-specific data backup recommendations.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.

- **Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.
  - **Note:** If you have customized settings in the `wrapper.conf` file located in `<SpectrumDirectory>/server/bin/wrapper`, we recommend that you copy this file to a separate location before you upgrade the Spectrum Technology Platform server. After you complete the upgrade, compare the contents of `wrapper.conf` installed during the upgrade with the contents of the saved copy of the file. You can then manually copy customizations that you want to retain after the upgrade into the updated version of the file. This is particularly important for changes to the initial and maximum Java heap sizes.

This procedure is for upgrading a cluster where the Spectrum Technology Platform server and configuration database are installed on each node of the cluster. To upgrade a cluster, you upgrade one node at a time. The first node you upgrade is handled slightly differently than the other nodes because you must point the node to itself as a seed node since no other nodes will be running in the cluster when it starts up.

Note that these scenarios have special procedures for upgrading a cluster:

| For this scenario...   | Use this information...  |
|--|--|
| ...separate clusters for server nodes and configuration database nodes | <a href="#">Upgrading a Cluster with a Separated Database</a> on page 87.  |
| ...upgrading a cluster for the Spatial Module only                     | <a href="#">Upgrading a Cluster with the Spatial Module</a> on page 74   |
| ...upgrading both Spectrum and Spatial Module clusters                 | <a href="#">Upgrading a Cluster with the Spatial Module</a> on page 74   |
| ...upgrading a cluster running the Data Hub Module                     | Before shutting down all nodes, see "Upgrading a Cluster with the Data Hub Module" in the <i>Spectrum Installation Guide</i> . |

If the above scenarios do not apply to you, follow this procedure to upgrade your cluster:

1. Back up the server. For instructions on creating a backup, see the *Administration Guide*.
2. Stop all the nodes in the cluster. For more information, see [Stopping a Cluster](#) on page 78.
3. On the last node that you stopped:
  - a. Upgrade the node. For more information, see [Upgrading a Server](#) on page 43.
  - b. Open the file `spectrum-container.properties` in a text editor and configure the cluster properties. For more information, see [Cluster Properties](#) on page 63.
4. Upgrade each of the other nodes, one at a time. **Follow this procedure only when upgrading nodes other than the first node.**

**Note:** Be sure to back up your server before proceeding. This step is only applicable when upgrading from Spectrum Technology Platform versions 11.1 or older.

- a. Add or ensure that you have set `spectrum.cluster.nodeID` – Set this to "1" on the first node, and this value will increase for subsequent nodes.
  - b. Delete this folder, if present:  
`SpectrumDirectory\server\repository\store\databases.`
  - c. Upgrade the node. For more information, see [Upgrading a Server](#) on page 43.
  - d. Open the file `spectrum-container.properties` in a text editor and configure the cluster properties. For more information, see [Cluster Properties](#) on page 63. Save and close the file when you are done.
5. Start all nodes consecutively, after upgrading. Make sure that you start node 2 within only a few seconds after starting node 1, and repeat this for each remaining node.

You may find it necessary to stop nodes manually, as in the case of applying software updates. When you stop all nodes of the cluster manually, or if all nodes are down, you must start as a new cluster/session.

## Upgrading a Cluster with the Data Hub Module

- Before upgrading, be sure to read the release notes for the new version. The release notes contain a list of known issues, important compatibility information, supported upgrade paths, and module-specific data backup recommendations.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.
- **Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.
- **Note:** If you have customized settings in the `wrapper.conf` file located in `<SpectrumDirectory>/server/bin/wrapper`, we recommend that you copy this file to a separate location before you upgrade the Spectrum Technology Platform server. After you complete the upgrade, compare the contents of `wrapper.conf` installed during the upgrade with the contents of the saved copy of the file. You can then manually copy customizations that you want to retain after the upgrade into the updated version of the file. This is particularly important for changes to the initial and maximum Java heap sizes.

In a cluster that runs the Data Hub Module, each node hosts the Spectrum Technology Platform server as well as Data Hub Module models. When upgrading, you need to upgrade your models in addition to upgrading the Spectrum Technology Platform server.

The upgrade process consists of these steps:

1. Back up your models and properties files.
2. On the master server, upgrade Spectrum Technology Platform then upgrade your models.

3. On each non-master server, upgrade Spectrum Technology Platform then copy the upgraded models from the master server to the non-master server.

To upgrade a cluster that runs the Data Hub Module, follow this procedure:

1. Back up the server. For instructions on creating a backup, see the *Administration Guide*.

**Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.

2. Open the Relationship Analysis Client and click **Manage**. Select the model you want to back up then click **Backup**.

In addition to backing up your models, back up these two property files:

- *SpectrumDirectory/server/modules/hub/hub.properties*
- *SpectrumDirectory/server/modules/hub/db/neo4j.properties*

3. Identify which node is the serving as the master server for the Data Hub Module.

- a) Open a web browser and go to:

`http://LoadBalancer:8080/jmx-console/HttpAdaptor/list`

- b) Scroll down to the **neo4j.org domain**.

You will see a set of objects for each model. The **Role** attribute in the **HighAvailability** object indicates whether a server is the master for a model.

- c) If you have more than one model and each model has a different master, you need to make one server the master of all the models. To do this, restart the cluster then open the Relationship Analysis Client using the hostname or IP address of one of the nodes rather than the load balancer. In the Relationship Analysis Client, open each model by running a query on each model. This will make the server you are connected to the master for each model.

4. Stop each non-master node in the cluster; stop the master server last. Stop nodes one at a time rather than all at once.

**Important:** Make sure that Spectrum Technology Platform stops without errors. If a server does not stop properly, Data Hub Module models on the server will not open successfully after upgrading. To ensure that Spectrum Technology Platform stopped cleanly, examine the *SpectrumDirectory/server/logs/spectrum-server.log* file for errors during shutdown.

5. Upgrade the master server.

- a) If you are upgrading from Spectrum Technology Platform 11.0 or later, each model directory must contain a *version.data* file. Review all the *model.ModelName* subdirectories located under *SpectrumDirectory/server/modules/hub/db* to confirm that they contain a *version.data* file. If any model directory is missing this file, copy the corresponding *version.data* file from one of the non-master nodes.
- b) **Important:** Do not start the server after the master server has been upgraded. You must complete the remaining steps.

Run the Spectrum Technology Platform installer to upgrade the master server to the new version of Spectrum Technology Platform.

- c) Open the file `SpectrumDirectory/server/modules/hub/db/neo4j.properties` in an editor and set the following property to true.

```
dbms.allow_upgrade=true
```

- d) Start the Spectrum Technology Platform server.
- e) Open each model in the Relationship Analysis Client and run a query. Any query is sufficient.
- f) Stop the Spectrum Technology Platform server.
- g) Indexed properties are now restricted to a maximum length of 4036 bytes. If your model has an indexed property that exceeds this limitation, proceed to step 6 on page 72.

If your model does not have an indexed property that exceeds this limitation, continue with substep 5.h on page 72.

- h) Open the `SpectrumDirectory/server/modules/hub/hub.properties` file in an editor and set the following property to ha:

```
hub.neo4j.database.type=ha
```

- i) Compare any properties files that you backed up to the installed files and make any necessary changes. Do not overwrite new files with old files because new files may contain properties that old files do not.
- j) Skip step 6 on page 72 and continue to step 7 on page 73.

6. Indexed properties are now restricted to a maximum length of 4036 bytes. If a model has an indexed property that exceeds this limitation, you will not be able to open that model until you complete the following steps:

- a) Copy the `SpectrumDirectory/server/modules/hub/db/neo4j.properties` file to the `SpectrumDirectory/server/modules/hub/db/model.ModelName` folder for each model that exceeds the property constraint of 4036 characters.
- b) Open the `neo4j.properties` files that you copied in Step a. In a text editor, uncomment and set `dbms.index.default_schema_provider` to `lucene+native-1.0`. Make sure the `neo4j store upgrade` is uncommented and that the following property is set to `true`:

```
dbms.allow_upgrade=true
```

- c) Start the Spectrum Technology Platform server.
- d) Remove the `SpectrumDirectory/server/modules/hub/db/model.ModelName\neo4j.properties` file in each model folder that had the constraint.

After you remove the files, `native-btree-1.0` indexing will be used by default. We recommend that you fix all models that failed upgrade due to the 4036 indexed property constraint and re-index those models from `Lucerne+native-1.0` indexes to the latest `native-btree-1.0` indexes. See the `hub model reindex` command in the Administration Utility section of the Administration Guide.

- e) Stop the Spectrum Technology Platform server.
- f) Open the `SpectrumDirectory/server/modules/hub/hub.properties` file in an editor and set the following property to ha:

```
hub.neo4j.database.type=ha
```

- g) Compare any properties files that you backed up to the installed files and make any necessary changes. Do not overwrite new files with old files because new files may contain properties that old files do not.

## 7. Upgrade the non-master servers.

- a) Delete the models in the `SpectrumDirectory/server/modules/hub/db` directory.

**Warning:** Do not delete the models from the master server.

- b) **Important:** Do not start the server after the master server has been upgraded. You must complete the remaining steps.

On one of the non-master servers, run the Spectrum Technology Platform installer to upgrade it to the new version of Spectrum Technology Platform.

- c) Open the `SpectrumDirectory/server/modules/hub/hub.properties` file in an editor and confirm that the following property is set to embedded:

```
hub.neo4j.database.type=embedded
```

- d) Compare any properties files that you backed up to the installed files and make any necessary changes. Do not overwrite new files with old files because new files may contain properties that old files do not.
- e) Copy all `SpectrumDirectory/server/modules/hub/db/model.ModelName` directories from the master server to the non-master server.
- f) Repeat these steps for each non-master server in the cluster.

## 8. Start the cluster.

- a) Start the master server, followed by non-master servers.
- b) Ensure that each server in the cluster is functioning. Check `SpectrumDirectory/server/logs/spectrum-server.log` for any errors.
- c) While directly connected to the master server (bypassing the load balancer), open each model, one at a time, and inspect the `spectrum-server.log` file for errors.

# Upgrading a Cluster with the Spatial Module

When a common repository database is used for clustering, these additional steps are required before and after the Spectrum Technology Platform upgrade process. This upgrade process must be followed even if you have a single node with a common repository database.

Before the upgrade, you must move to a local database setup; after the upgrade, you then change back to the cluster setup by pointing `repository.xml` to the external database.

**Note:** To preserve access control settings, use the Administration Utility instead of WebDAV. See the Administration section of the *Spectrum Spatial Guide* for instructions on using the Administration Utility. The `limrepo` commands in the Administration Utility were available beginning in version 11.0; if you are upgrading from a version prior to 11.0, you must use WebDAV.

1. Before upgrading Spectrum Technology Platform, back up the repository by following these steps.
  - a) Select a node from the cluster. This will be the seed node (see [Installing a Cluster](#) on page 59).
  - b) Back up the repository content using the Administration Utility's `limrepo export` command with ACL, pointing to the seed node.
  - c) Back up the `Spectrum\server\modules\spatial\jackrabbit` folder to a location outside the installation folder.
2. Switch the common repository database to a local database (temporarily, just for upgrade purposes). Apply these steps to all nodes in the cluster.
  - a) Stop the Spectrum Technology Platform server on all nodes (for instructions, see [Stopping a Cluster](#) on page 78).
  - b) Delete the repository, version, workspaces folders and the `lock.properties` file (if available) from the jackrabbit folder (`Spectrum\server\modules\spatial\jackrabbit`).
  - c) Create a backup copy of `repository.xml` and name it `repository-Copy.xml` for example.
  - d) Copy the contents of `repository.standalone.xml` to `repository.xml`.
  - e) Start the Spectrum Technology Platform server on all nodes (for instructions, see [Starting a Cluster](#) on page 77).
  - f) Import the repository content (backed up in Step 1b) into the repository using the `limrepo import` command with ACL for all nodes.
  - g) Stop the Spectrum Technology Platform server.
3. Follow normal procedures in [Upgrading a Cluster](#) on page 68 to upgrade Spectrum Technology Platform to the new version on all nodes.

4. For the seed node only, after the Spectrum Technology Platform upgrade is complete, back up the upgraded content by following these steps.
  - a) Start the upgraded Spectrum Technology Platform server on the seed node and download the Administration Utility.
  - b) Back up the content from the repository using the `limrepo export` command with ACL by pointing to the seed node.
  - c) Stop the Spectrum Technology Platform server on all nodes (for instructions, see [Stopping a Cluster](#) on page 78).
  - d) On all nodes, back up the upgraded `Spectrum\server\modules\spatial\jackrabbit` folder to a location outside the installation folder.
5. On all nodes of the Spectrum Technology Platform modify the configuration to specify the common database.
  - a) Restore the backup `repository-Copy.xml` file to `repository.xml`.
  - b) Remove these folders from the `/server/modules/spatial/jackrabbit` folder: `repository`, `version`, `workspaces`.
6. If your database has previously contained any repository content, you must remove these tables to create a clean repository:
  - `default_binval`
  - `default_bundle`
  - `default_names`
  - `default_refs`
  - `rep_fsenry`
  - `rep_global_revision`
  - `rep_journal`
  - `rep_local_revisions`
  - `security_binval`
  - `security_bundle`
  - `security_names`
  - `security_refs`
  - `version_binval`
  - `version_bundle`
  - `version_names`
  - `version_refs`

If using Oracle, then also delete `version_seq_names_id`, `security_seq_names_id`, and `default_seq_names_id`.
7. On the seed node only, import the backed up repository content.
  - a) Start the Spectrum Technology Platform server (for instructions, see [Starting a Cluster](#) on page 77).
  - b) Import the contents using the `limrepo import` command, pointing to the seed node.
8. Start the remaining nodes in the cluster (for instructions, see [Starting a Cluster](#) on page 77).

## Removing a Node from a Cluster

To remove a node from a cluster, stop the Spectrum Technology Platform server.

1. Stop the Spectrum Technology Platform server using the `../server/bin/server.stop` script.
2. Stop the node you want to remove:  
change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command: `./server.stop`.  
On Windows, right-click the Spectrum Technology Platform icon in the system tray and select **Stop Spectrum™**.
3. Open the file `server/conf/spectrum-container.properties` in a text editor and set `spectrum.cluster.enabled` to `false`.
4. On each of the other nodes in the cluster, open the `spectrum-container.properties` file and remove the node from the `spectrum.cluster.seeds` property.

**For Spatial Module users:** If you want to keep the node standalone and able to run outside the cluster, copy back the original `repository.xml` file and remove the following folders from the `/server/modules/spatial/jackrabbit` directory for each instance of Spectrum Technology Platform: `repository`, `version`, `workspaces`. Restart the server and import the repository content.

## Adding Nodes to a Cluster

This procedure describes how to add one or more nodes to an existing cluster.

1. Stop all the Spectrum Technology Platform nodes in the cluster. For more information, see [Stopping a Cluster](#) on page 78. If your cluster has a separated configuration database cluster, you only need to stop the server cluster, not the configuration database cluster.

**Warning:** To prevent data loss you must stop the cluster by following the procedure described in [Stopping a Cluster](#) on page 78.

2. On any node in the cluster, install the module or modules you want to add.
3. Open this file in a text editor:

```
server/conf/spectrum-container.properties
```

4. In the `spectrum.cluster.seeds` property, remove all host names and IP addresses except for the one for this server. Save the host names and IP addresses so that you can re-add them later.
5. Save the file.
6. Start the server.

**Note:** Wait for the server to fully start before proceeding.

7. In the file `spectrum-container.properties`, add the host names and IP addresses that you had removed.
8. Save the file. You do not need to restart the server.
9. Install the modules on each of the other nodes in the cluster. Start each node after installing the modules on it, and wait for it to fully start before installing the modules on the next node. You do not need to modify the `spectrum.cluster.seeds` property when installing modules on subsequent nodes.

## Starting a Cluster

These instructions assume that the server is stopped.

If all the nodes in a cluster are stopped, you must follow this procedure to start the cluster safely and avoid data loss.

On the last node that was stopped last, start the server. Do this for each node in the cluster.

**Warning:** The first node that you start must be the last node that was stopped to preserve the most recent data. Starting another node first may result in loss of data such as job history and configuration settings. If you do not know which node was stopped last, look in each node's log for the time stamp of the shutdown message. You can find the log in:

`SpectrumDirectory\server\logs\spectrum-server.log`.

- a) Start the server.
- b) Start all nodes consecutively, after upgrading. Make sure that you start node 2 within only a few seconds after starting node 1, and repeat this for each remaining node.

You can tell when the Spectrum Technology Platform server has completely started by looking in the log file: `SpectrumDirectory\server\logs\spectrum-server.log`. This message is displayed when the server is completely started:

```
Pitney Bowes Spectrum(TM) Technology Platform (Version Version Number)
Started.
```

The log will show the IP address for one of the nodes bound to the Spectrum Technology Platform service.

# Stopping a Cluster

To stop an entire cluster:

1. Identify which nodes are seed nodes. To do this, open the file `SpectrumDirectory/server/conf/spectrum-container.properties` and look at the nodes listed in the `spectrum.cluster.seeds` property.
2. Stop each Spectrum Technology Platform server in the cluster, making sure that the last node you stop is a seed node.
3. Change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command: `./server.stop`.

**Warning:** To prevent loss of data when starting the cluster, the first node you start must be the last node that was stopped, and that node must be a seed node.

4. Make a note of the last node you stopped. You will need this information when starting up the cluster.

# Using Enterprise Designer with a Cluster

1. Launch Enterprise Designer.
2. In the **Server name** field, enter the server name of the load balancer.
3. In the **Port** field, enter the port that you have configured the load balancer to listen on.

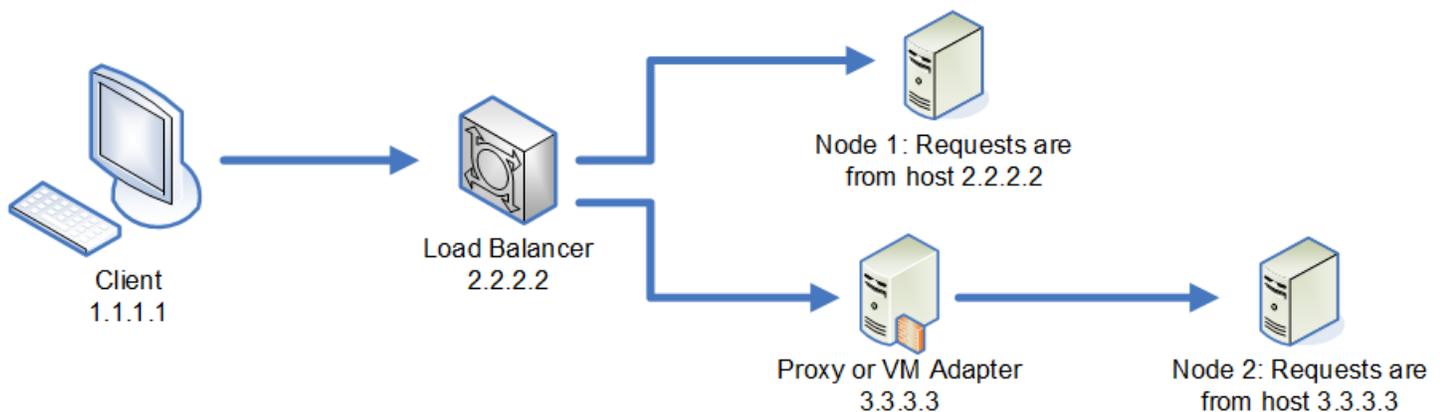
**Note:** Input files, output files and database resources must be on a shared drive, or file server, or some commonly-accessible location. Otherwise, all files must be loaded on each server that hosts a Spectrum Technology Platform server and must be located in the same path.

Once you have logged in you can use Enterprise Designer as normal. The actions you take will apply to all Spectrum Technology Platform instances in the cluster where you are logged in.

# Disabling Host Checks in Token Authentication

In token authentication, the Spectrum Technology Platform server examines the token presented by the client before responding to the request. The server checks the token to see if it has expired, if it is encrypted correctly, and if it is from the correct host. For session tokens, the server also checks the session ID. If any of these checks fail, the token is rejected and the server does not respond to the request.

In a clustered environment, it is possible that requests may be redirected in a way that makes the request appear to be coming from a different host than is specified in the token, resulting in "invalid token" errors. For example, say you have a cluster with two nodes as shown here:



Let's say that the client makes a request and the request is routed to Node 1. A token is created and tied to host 2.2.2.2 (the load balancer) since the node views the request as coming from the load balancer. If the next request from the client is routed to Node 2, the token will still be tied to host 2.2.2.2 but the request will appear to be coming from the proxy server, 3.3.3.3. In this case the node will reject the token because it appears that it is not associated with the host making the request.

In this situation you must configure the Spectrum Technology Platform server to ignore the host information included in the token. This should only be done if you have an environment where there are different network devices between the load balancer and the nodes. If all nodes are behind the same network device, there is no need to disable the host check.

**Note:** If you follow this procedure, client tokens become "open" tokens, since the host check is disabled. Session tokens will continue to be associated with a specific session ID, but not with a specific host.

1. Open the following properties file on the Spectrum Technology Platform server:

```
SpectrumDirectory/server/conf/spectrum-container.properties
```

2. Set the following property to false.

```
spectrum.security.authentication.token.remoteClientCheck.enabled=false
```

3. Save and close the properties file.
4. Repeat this process on all the nodes in the cluster.

# 5 - Cluster with Separated Configuration Database

## In this section

---

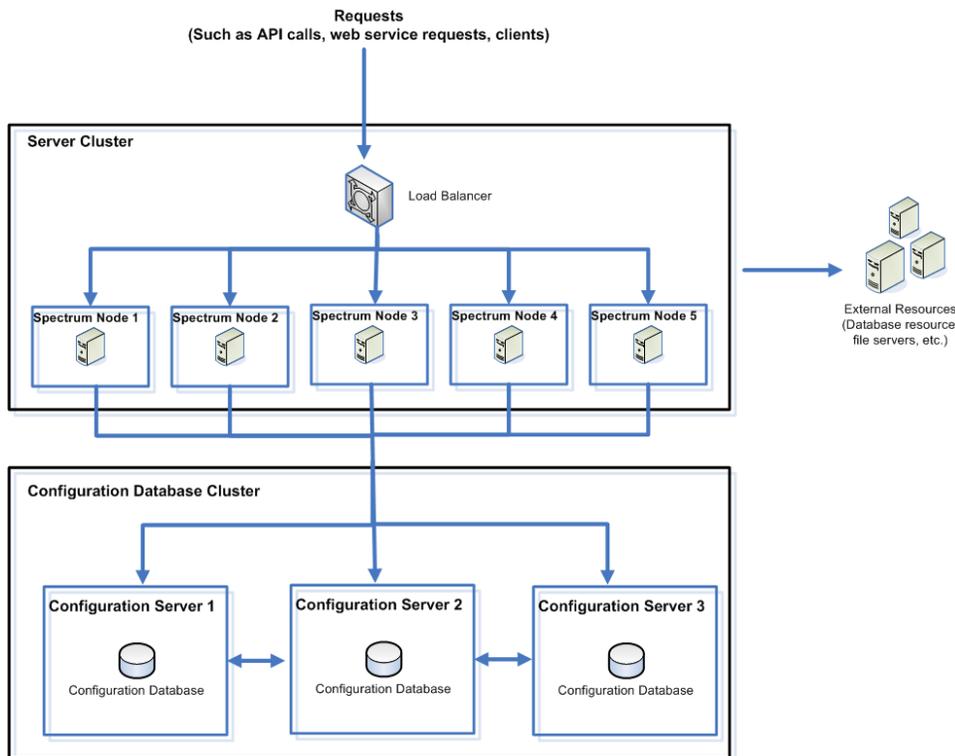
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# Installing a Cluster with a Separated Configuration Database

This procedure creates two clusters: one for the server nodes and one for configuration database nodes. The nodes in the server cluster point to the servers in the configuration database cluster for their configuration data. The nodes in the configuration database cluster replicate their data between each other.

The following diagram illustrates this installation scenario:



To install a separate database repository, you first install the configuration database on servers in a cluster, then install the server on nodes in a separate cluster. At least one configuration database must be running before you can install the server.

**Note:** In the case of a separated database configuration cluster setup, as shown here, you can apply load balancing only to the Spectrum server cluster. You cannot apply load balancing to the separated database cluster.

1. Place the Spectrum Technology Platform installer on the server where you want to install the configuration database.

2. Run `installdb.sh`.
3. Follow the prompts to install the configuration database.
4. Edit the file `Database/repository/spectrum-container.properties` as described in [Cluster Properties for a Configuration Database Cluster](#) on page 86.
5. Save and close `spectrum-container.properties`.
6. Start the configuration database. To start the configuration database, change the working directory to the Spectrum Technology Platform repository's `bin` directory, `SpectrumDirectory/Database/repository/bin`, source the setup file, then type the following command: `./server.start`.
7. Install the configuration database on additional servers as needed to complete the configuration database cluster.
8. Install the server cluster.
  - a) Install Spectrum Technology Platform on a server where you want to host a node. For instructions, see [Installing a New Server](#) on page 41.

**Important:** When installing each server select the **Server only** option in the installer and provide the host and port of one or more of the configuration database servers. You can find the port in the file

`SpectrumDirectory\Database\repository\spectrum-container.properties`. The port is specified in the `spectrum.repository.server.connector.bolt.port` property.

- b) If the Spectrum Technology Platform server is running, stop it. To stop the server, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command: `./server.stop`.
- c) Edit the properties in file `server/conf/spectrum-container.properties`, as described in [Cluster Properties](#) on page 63.
- d) Save and close the `spectrum-container.properties` file.
- e) Some modules have module-specific settings that you must configure to enable the module to work in a cluster.

| Module                   | Cluster Configuration Settings  |
|--------------------------|---|
| Advanced Matching Module | <p data-bbox="738 325 1429 415">These settings configure clustering for full-text search indexes. If you do not use full-text search indexes you do not need to configure these settings.</p> <p data-bbox="738 430 1039 457">Open this file in a text editor:</p> <pre data-bbox="738 478 1429 506">..\server\modules\searchindex\es-container.properties</pre> <p data-bbox="738 520 1023 548">Configure these properties:</p> <p data-bbox="738 562 1485 800"><b>es.index.default_number_of_replicas</b> Enter the number of additional copies you want created for each search index. This number should be the number of nodes in your cluster minus 1. For example, if your cluster has five nodes, you would enter "4" in this property.</p> <p data-bbox="738 821 1485 995"><b>es.index.default_number_of_shards</b> Enter the number of shards you want your index to have in the distributed environment. The more nodes that are in your cluster, the higher this number should be.</p> <p data-bbox="1161 1010 1485 1121">Save and close<br/><code>es-container.properties</code><br/>when you are done editing these properties.</p> <p data-bbox="820 1150 1421 1295"><b>Note:</b> Search indexes created prior Spectrum Technology Platform 10.0 do not support clustering. To enable clustering for indexes created prior to the 10.0 release, you must recreate the search index using the 10.0 API after modifying the <code>es-container.properties</code> file.</p> |

| Module          | Cluster Configuration Settings   |
|-----------------|--|
| Data Hub Module | <p>Open this file in a text editor:</p> <pre>..\server\modules\hub\hub.properties</pre> <p>Configure these properties:</p> <p><b>hub.models.path.base</b> Specifies the folder where models are stored. By default, each model is placed in a subdirectory under the <code>..\server\modules\hub\db</code> folder. If you want to store models in a different location, uncomment this property and specify the folder where you want to store models.</p> <p><b>hub.neo4j.database.type</b> Change the value of this property to <code>ha</code>. The default value embedded is for non-clustered installations.</p> <p><b>hub.servers.per.cluster</b> Uncomment this line. Set the value of this property to the number of Spectrum Technology Platform servers in the cluster.</p> <p>Save and close <code>hub.properties</code> when you are done editing these properties.</p> <p>The <code>..\server\modules\hub\db\neo4j.properties</code> controls how the graph databases are configured, using Neo4j Enterprise. This file is used as a template for each model. If needed, each model can be configured separately by placing a copy of the <code>neo4j.properties</code> file into the store directory for that model.</p> |

- f) Start the server. To start the server, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command:
 

```
./server.start.
```
  - g) Repeat this procedure to install additional nodes in the server cluster.
9. After installing all the nodes in the server cluster, go back to the first node you installed in the server cluster and add the other nodes as seed nodes.
- a) On the first node you installed, open the properties file `server/conf/spectrum-container.properties`.
  - b) In the property `spectrum.cluster.seeds`, add the host name or IP address of the other nodes in the cluster, separating each with a comma.
  - c) Save and close the `spectrum-container.properties` file. You do not need to restart the server.

## Cluster Properties for a Configuration Database Cluster

A configuration database cluster is a cluster where each node contains the configuration database only, and not the server. If you are setting up a cluster where the server and configuration database are installed together on each node, or are setting up a server-only cluster, see [Cluster Properties](#) on page 63.

The settings for a configuration database cluster are located in this properties file:

```
Database\repository\spectrum-container.properties
```

This table describes each property:

| Property                              | Description   |
|---------------------------------------|---|
| <code>spectrum.cluster.enabled</code> | Indicates whether a clustered configuration is used. Set this to true.  |
| <code>spectrum.cluster.name</code>    | <p>If this is the first node in the cluster, set this to any name you want to give to the configuration database cluster. Be sure that the name is unique if you have multiple clusters.</p> <p>If you are adding a node to an existing cluster, set this to the name of the configuration database cluster that you want this node to join.</p>  |
| <code>spectrum.cluster.seeds</code>   | <p>If you are setting up the first node in the cluster, or if this is the first node you are starting after having stopped the cluster, specify only the host name or IP address of this server. This effectively points this node to itself as a seed node, which is necessary in order for it to be able to start as the first node in the cluster.</p> <p>If this is not the first node in the cluster, specify the host name or IP address of each of the other nodes in the cluster, including nodes that you have not yet installed. Separate each seed node with a comma. When starting up, this property should be set to all nodes in the cluster when <b>cluster.enabled</b> = true.</p> <p><b>Tip:</b> We recommend that you specify multiple seed nodes so that if one seed node is down others can be used to allow nodes to join the cluster. We also recommend that you specify the same seed nodes in the same order on all nodes in the cluster.</p> |

| Property                             | Description   |
|--------------------------------------|---|
| <code>spectrum.cluster.nodeID</code> | Set this to an integer value to use as the ID for this node. The ID must be an integer and must be unique among all nodes in the database cluster. For example, you could set the node ID for the first node to 1, the second node's node ID to 2, and the third node's node ID to 3. |

## Upgrading a Cluster with a Separated Database

- Before upgrading, be sure to read the release notes for the new version. The release notes contain a list of known issues, important compatibility information, supported upgrade paths, and module-specific data backup recommendations.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.
- **Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.
  - **Note:** If you have customized settings in the `wrapper.conf` file located in `<SpectrumDirectory>/server/bin/wrapper`, we recommend that you copy this file to a separate location before you upgrade the Spectrum Technology Platform server. After you complete the upgrade, compare the contents of `wrapper.conf` installed during the upgrade with the contents of the saved copy of the file. You can then manually copy customizations that you want to retain after the upgrade into the updated version of the file. This is particularly important for changes to the initial and maximum Java heap sizes.

This procedure describes how to upgrade Spectrum Technology Platform when you have separated the configuration database from the server. To upgrade an environment that has a separated configuration database, you first upgrade the configuration database cluster, then the server cluster.

1. Back up the server. For instructions on creating a backup, see the *Administration Guide*.

**Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.

2. Back up module-specific data for any of these modules if you have them installed.

**Note:** For the Screener module, see the section [Upgrading Screener](#) in the Screener guide.

| Module   | Items to Back Up   |
|--|--|
| Advanced Matching Module, Data Normalization Module, and Universal Name Module | <p>Back up the contents of these subfolders located in <i>SpectrumDirectory/server/modules</i>:</p> <ul style="list-style-type: none"> <li>• cdqdb</li> <li>• lucene</li> <li>• matcher</li> <li>• parser</li> <li>• searchindex</li> <li>• tables</li> </ul>  |
| Data Hub Module  | <p>Open the Relationship Analysis Client and click <b>Manage</b>. Select the model you want to back up then click <b>Backup</b>.</p> <p>In addition to backing up your models, back up these two property files:</p> <ul style="list-style-type: none"> <li>• <i>SpectrumDirectory/server/modules/hub/hub.properties</i></li> <li>• <i>SpectrumDirectory/server/modules/hub/db/neo4j.properties</i></li> </ul> |
| Spatial Module   | <p>Back up your named resources, data, and configuration files.</p>  |

3. Stop all the nodes in the server cluster then stop all the nodes in the configuration database cluster. Make a note of the last node that you stop in the configuration database cluster. You must start this node first after upgrading. For instructions on stopping a cluster, see [Stopping a Cluster](#) on page 78.
4. On the *last* node that you stopped in the configuration database cluster, run `installdb.sh`.
5. The installer upgrades the configuration database.

**Warning:** The first node that you upgrade must be the last node that was stopped. This is because on some operating systems the configuration database will start automatically at the end of the upgrade process. If the first node that starts is not the last node that was stopped, data such as job history and configuration settings may be lost. If you do not know which node was stopped last, look in each node's log for the time stamp of the shutdown message. You can find the log in: *SpectrumDirectory\Database\logs\spectrum-server.log*.

6. Stop the configuration repository.  
Run the `DBonlyDirectory/server/bin/server.stop` script to stop the Spectrum Technology Platform repository.

**Important:** Do not attempt to stop the server until after it has fully started for the first time. Stopping the server before it performs an initial startup can cause your installation to become unusable.

7. Configure the database cluster.

- a) Edit the file `Database/repository/spectrum-container.properties` as described in [Cluster Properties for a Configuration Database Cluster](#) on page 86.
  - b) Save and close the `spectrum-container.properties` file.
  - c) Start the *last* node that was stopped in the configuration database cluster. To start the configuration database, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command:  

```
./server.start .
```
  - d)
  - e) After the upgraded configuration database is fully started, repeat the previous steps to upgrade each of the remaining servers in the configuration database cluster and start each of them.
8. Upgrade each node in the server cluster. For more information, see [Upgrading a Cluster](#) on page 68.

**Important:** When installing each server select the **Server only** option in the installer and provide the host and port of one or more of the configuration database servers. You can find the port in the file `SpectrumDirectory\Database\repository\spectrum-container.properties`. The port is specified in the `spectrum.repository.server.connector.bolt.port` property.

**Note:** Any job or subflow stored in the system during a server upgrade is marked as exposed to provide the same behavior for those jobs and subflows as before the upgrade. Any job or subflow that is exported prior to the upgrade will not be exposed. Therefore, when importing these jobs or subflows back into the system, you must manually expose the imported job or subflow.

Some modules have post-upgrade steps you need to perform.

#### Data Hub Module

Open this file in a text editor:

`server/modules/hub/db/neo4j.properties` and set this property to true: `dbms.allow_upgrade=true`. This property protects against unintentional and irreversible store upgrades. Setting this property to "true" indicates that you understand the ramifications of proceeding with an upgrade and have taken the necessary precautions before proceeding.

Restart the Spectrum Technology Platform server. The server will upgrade each model. Examine the file `server/logs/spectrum-server.log` for errors or warning messages. Once all models have been upgraded, edit the `neo4j.properties` file again and comment out the `dbms.allow_upgrade` property.

**Spatial Module**

During an upgrade, the pool size is reset to 4 if set to a lower value. A pool size setting of 4 or more is unaffected. To change the **Remote Component Pool Size** value after upgrading, open the Management Console and select **Resources > Spatial**. Change the pool size value and click **Save**. For details, see *Modifying the Pool Size* in the *Spectrum Spatial Guide*.

**Spectrum Screener™**

See the **Upgrading Screener** section of the Screener guide for details.

**Related concepts**

**Moving transactional data - upgrades only** on page 6

As of release 2019.1, we are moving transactional audit log and flow history data from Neo4j to Elasticsearch to improve the maintenance of and access to this data.

**Related tasks**

**Migrating your search indexes** on page 7

If you are upgrading to release 2019.1 from release 2018.2, your Elasticsearch search indexes will migrate to release 2019.1 during the upgrade process.

**Related reference**

**If you have changed default Elasticsearch certificate connection properties** on page 8

Most Spectrum users will run with the default set of connection properties. However, if you did change any connection properties, you will have to pass into Spectrum the properties file with your unique settings using the `-p` command, described in the previous section.

## Upgrading a Cluster with a Separated Database and Data Hub Module

- Before upgrading, be sure to read the release notes for the new version. The release notes contain a list of known issues, important compatibility information, supported upgrade paths, and module-specific data backup recommendations.
- Apply all the latest updates available for your operating system, especially those that resolve issues with Java.
- **Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.

**Note:** If you have customized settings in the `wrapper.conf` file located in

- `<SpectrumDirectory>/server/bin/wrapper`, we recommend that you copy this file to a separate location before you upgrade the Spectrum Technology Platform server. After you complete the upgrade, compare the contents of `wrapper.conf` installed during the

upgrade with the contents of the saved copy of the file. You can then manually copy customizations that you want to retain after the upgrade into the updated version of the file. This is particularly important for changes to the initial and maximum Java heap sizes.

This procedure describes how to upgrade Spectrum Technology Platform when you have separated the configuration database from the server and you have the Data Hub Module installed. The upgrade process consists of these steps:

1. Stop the server cluster.
2. Stop the configuration database cluster.
3. Upgrade the last node that was stopped in the configuration database cluster.
4. Upgrade the other nodes in the configuration database cluster.
5. Upgrade the server acting as the Data Hub Module master in the server cluster.
6. Upgrade the non-master servers in the server cluster.

To upgrade a cluster with a separated configuration database and the Data Hub Module, follow this procedure:

1. Back up the server. For instructions on creating a backup, see the *Administration Guide*.

**Important:** We recommend that you create a backup before upgrading so that you can recover your flows, security settings, and other settings, if an error occurs during the upgrade process.

2. Open the Relationship Analysis Client and click **Manage**. Select the model you want to back up then click **Backup**.

In addition to backing up your models, back up these two property files:

- `SpectrumDirectory/server/modules/hub/hub.properties`
- `SpectrumDirectory/server/modules/hub/db/neo4j.properties`

3. Identify which node is the serving as the master server for the Data Hub Module.

- a) Open a web browser and go to:

`http://LoadBalancer:8080/jmx-console/HttpAdaptor/list`

- b) Scroll down to the **neo4j.org domain**.

You will see a set of objects for each model. The **Role** attribute in the **HighAvailability** object indicates whether a server is the master for a model.

- c) If you have more than one model and each model has a different master, you need to make one server the master of all the models. To do this, restart the cluster then open the Relationship Analysis Client using the hostname or IP address of one of the nodes rather than the load balancer. In the Relationship Analysis Client, open each model by running a query on each model. This will make the server you are connected to the master for each model.

4. Stop all the non-master nodes in the server cluster then stop the master server last. Stop nodes one at a time rather than all at once.

**Important:** Make sure that Spectrum Technology Platform stops without errors. If a server does not stop properly, Data Hub Module models on the server will not open successfully after upgrading. To ensure that Spectrum Technology Platform stopped cleanly, examine the `SpectrumDirectory/server/logs/spectrum-server.log` file for errors during shutdown.

5. Stop all the nodes in the configuration database cluster. Make a note of the last node that you stop in the configuration database cluster. You must start this node first after upgrading.
6. On the *last* node that you shut down in the configuration database cluster, execute `installldb.sh`. The installer upgrades the configuration database.

**Warning:** The first node that you upgrade must be the last node that was stopped. This is because on some operating systems the configuration database will start automatically at the end of the upgrade process. If the first node that starts is not the last node that was stopped, data such as job history and configuration settings may be lost. If you do not know which node was stopped last, look in each node's log for the time stamp of the shutdown message. You can find the log in: `Spectrum Location\server\logs\spectrum-server.log`.

7. Configure clustering for the database cluster.
  - a) Edit the file `server/conf/spectrum-container.properties` as described in **Cluster Properties for a Configuration Database Cluster** on page 86.
  - b) Save and close the `spectrum-container.properties` file.
  - c) Start the *last* node that was stopped in the configuration database. To start the configuration database, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type the following command: `./server.start`.

**Warning:** The first node that you start must be the last node that was stopped to preserve the most recent data. Starting another node first may result in loss of data such as job history and configuration settings. If you do not know which node was stopped last, look in each node's log for the time stamp of the shutdown message. You can find the log in: `SpectrumDirectory\server\logs\spectrum-server.log`.

- d) After the upgraded configuration database is fully started, repeat the previous steps to upgrade each of the remaining servers in the configuration database cluster and start each of them.
8. Upgrade the Data Hub Module master server in the server cluster.
  - a) If you are upgrading from Spectrum Technology Platform 11.0 or later, each model directory must contain a `version.data` file. Review all the `model.ModelName` subdirectories located under `SpectrumDirectory/server/modules/hub/db` to confirm that they contain a `version.data` file. If any model directory is missing this file, copy the corresponding `version.data` file from one of the non-master nodes.
  - b) **Important:** Do not start the server after the master server has been upgraded. You must complete the remaining steps.

Run the Spectrum Technology Platform installer to upgrade the master server to the new version of Spectrum Technology Platform.

- c) Open the file `SpectrumDirectory/server/modules/hub/db/neo4j.properties` in an editor and set the following property to true.

```
dbms.allow_upgrade=true
```

- d) Start the Spectrum Technology Platform server.  
 e) Open each model in the Relationship Analysis Client and run a query. Any query is sufficient.  
 f) Stop the Spectrum Technology Platform server.  
 g) Indexed properties are now restricted to a maximum length of 4036 bytes. If your model has an indexed property that exceeds this limitation, proceed to step [#unique\\_64/unique\\_64\\_Connect\\_42\\_d67e297](#).

If your model does not have an indexed property that exceeds this limitation, continue with substep [8.h](#) on page 93.

- h) Open the `SpectrumDirectory/server/modules/hub/hub.properties` file in an editor and set the following property to ha:

```
hub.neo4j.database.type=ha
```

- i) Compare any properties files that you backed up to the installed files and make any necessary changes. Do not overwrite new files with old files because new files may contain properties that old files do not.  
 j) Skip step [#unique\\_64/unique\\_64\\_Connect\\_42\\_d67e297](#) and continue to step [#unique\\_64/unique\\_64\\_Connect\\_42\\_d67e397](#).

9. Upgrade the Data Hub Module non-master servers in the server cluster.

**Important:** When installing each server select the **Server only** option in the installer and provide the host and port of one or more of the configuration database servers. You can find the port in the file `SpectrumDirectory\Database\repository\spectrum-container.properties`. The port is specified in the `spectrum.repository.server.connector.bolt.port` property.

- a) Delete the models in the `SpectrumDirectory/server/modules/hub/db` directory.

**Warning:** Do not delete the models from the master server.

- b) **Important:** Do not start the server after the master server has been upgraded. You must complete the remaining steps.

On one of the non-master servers, run the Spectrum Technology Platform installer to upgrade it to the new version of Spectrum Technology Platform.

- c) Open the `SpectrumDirectory/server/modules/hub/hub.properties` file in an editor and confirm that the following property is set to embedded:

```
hub.neo4j.database.type=embedded
```

- d) Compare any properties files that you backed up to the installed files and make any necessary changes. Do not overwrite new files with old files because new files may contain properties that old files do not.
  - e) Copy all *SpectrumDirectory/server/modules/hub/db/model.ModelName* directories from the master server to the non-master server.
  - f) Repeat these steps for each non-master server in the cluster.
10. Start the cluster.
- a) Start the master server, followed by non-master servers.
  - b) Ensure that each server in the cluster is functioning. Check *SpectrumDirectory/server/logs/spectrum-server.log* for any errors.
  - c) While directly connected to the master server (bypassing the load balancer), open each model, one at a time, and inspect the spectrum-server.log file for errors.

## Converting to a Separated Configuration Database

Converting an existing Spectrum Technology Platform installation to a separated configuration database enables you to take advantage of the improved scalability of a separated configuration database. When you convert to a separated configuration database, your existing installation is converted from one where the configuration database is part of the server to one where the configuration database is in a separate cluster.

At a high level, this is the conversion process:

- Stop your existing Spectrum Technology Platform server.
- Set up the new configuration database cluster:
  - Install the separate configuration database software on a new server.
  - Copy your existing configuration database to the new server.
  - Configure clustering and start the configuration database cluster.
- Install the server-only cluster and start it up.

**Note:** This procedure applies both to converting a single server to a separated configuration database, and converting a cluster to a separated configuration database.

To convert to a separated configuration database:

1. Back up module-specific data for any of these modules if you have them installed.

**Note:** For the Screener module, see the section [Upgrading Screener](#) in the Screener guide.

| Module   | Items to Back Up   |
|--|--|
| Advanced Matching Module, Data Normalization Module, and Universal Name Module | <p>Back up the contents of these subfolders located in <i>SpectrumDirectory/server/modules</i>:</p> <ul style="list-style-type: none"> <li>• cdqdb</li> <li>• lucene</li> <li>• matcher</li> <li>• parser</li> <li>• searchindex</li> <li>• tables</li> </ul>  |
| Data Hub Module  | <p>Open the Relationship Analysis Client and click <b>Manage</b>. Select the model you want to back up then click <b>Backup</b>.</p> <p>In addition to backing up your models, back up these two property files:</p> <ul style="list-style-type: none"> <li>• <i>SpectrumDirectory/server/modules/hub/hub.properties</i></li> <li>• <i>SpectrumDirectory/server/modules/hub/db/neo4j.properties</i></li> </ul> |
| Spatial Module   | <p>Back up your named resources, data, and configuration files.</p>  |

2. If the server you are converting is running Spectrum Technology Platform 11.0 SP1 or earlier, you must upgrade to the latest version of Spectrum Technology Platform before converting from a standard installation to a separated configuration database. For more information, see [Upgrading a Server](#) on page 43 (for upgrading a single server) or [Upgrading a Cluster](#) on page 68 (for upgrading a cluster).
3. Stop the server. If you have a clustered installation, stop the cluster.
4. Install the configuration database to a new server.
  - a) Place the Spectrum Technology Platform installer on the machine where you want to install the configuration database. This must be a different machine from the one where you have your existing Spectrum Technology Platform server installed.
  - b) Run `installdb.sh`.
  - c) Follow the prompts to install the configuration database.
  - d) Copy the `databases` folder from your existing server to the server where you installed the separate configuration database. Replace the existing folder.

**Important:**

- If you are upgrading from 11.1, copy this folder:  
`..SpectrumDirectory\Database\server\app\repository\store\databases` folder.
- If you are upgrading from any version higher than 11.1, copy this folder:  
`..SpectrumDirectory\Database\repository\data\databases` folder.

For more information about path changes, see [Path structure and log name changes](#).

- a) Configure the cluster properties for the database cluster by editing the file `Database\repository\spectrum-container.properties` as described in [Cluster Properties for a Configuration Database Cluster](#) on page 86.
  - b) Save and close the `spectrum-container.properties` file.
  - c) Start the configuration database. To start the configuration database, change the working directory to the Spectrum Technology Platform server's `bin` directory, source the setup file, then type this command: `./server.start`.
  - d) Install the configuration database on additional servers as needed to complete the configuration database cluster.
5. Install the server.
- a) (Optional) If you are upgrading to a new version and you want to use the same machine to host the upgraded server as hosted the existing server, uninstall the existing server of Spectrum Technology Platform.
  - b) Install the server cluster. For more information, see [Installing a Cluster](#) on page 59.

**Important:** When installing each server select the **Server only** option in the installer and provide the host and port of one or more of the configuration database servers. You can find the port in the file

`SpectrumDirectory\Database\repository\spectrum-container.properties`. The port is specified in the `spectrum.repository.server.connector.bolt.port` property.

## Converting from a Separated Configuration Database to a Standard Installation

If you have a cluster that consists of separate clusters for the server and for the configuration database, you can convert your installation to a standard installation where the server and configuration database are installed together on the same server.

1. Back up module-specific data for any of these modules if you have them installed.

**Note:** For the Screener module, see the section [Upgrading Screener](#) in the Screener guide.

| Module   | Items to Back Up   |
|--|--|
| Advanced Matching Module, Data Normalization Module, and Universal Name Module | <p>Back up the contents of these subfolders located in <i>SpectrumDirectory/server/modules</i>:</p> <ul style="list-style-type: none"> <li>• cdqdb</li> <li>• lucene</li> <li>• matcher</li> <li>• parser</li> <li>• searchindex</li> <li>• tables</li> </ul>  |
| Data Hub Module  | <p>Open the Relationship Analysis Client and click <b>Manage</b>. Select the model you want to back up then click <b>Backup</b>.</p> <p>In addition to backing up your models, back up these two property files:</p> <ul style="list-style-type: none"> <li>• <i>SpectrumDirectory/server/modules/hub/hub.properties</i></li> <li>• <i>SpectrumDirectory/server/modules/hub/db/neo4j.properties</i></li> </ul> |
| Spatial Module   | <p>Back up your named resources, data, and configuration files.</p>  |

2. Stop all the nodes in the server cluster, then stop all the nodes in the configuration database cluster.
3. The configuration database must be of the same version of Spectrum Technology Platform as the server you are converting to. If the configuration database is from an older version, upgrade the configuration database to the same version of Spectrum Technology Platform as the version you want to use for the standard server. The installer upgrades the configuration database.

**Warning:** The node that you upgrade must be the last node that was stopped. This is so that data such as job history and configuration settings are not lost. If you do not know which node was shut down last, look in each node's log for the time stamp of the shutdown message. You can find the log in: *SpectrumDirectory\server\logs\spectrum-server.log*.

4. Install a new server.  
For instructions, see [Installing a New Server](#) on page 41

**Note:** When prompted, be sure to select **Standard Installation**, not **Server only**.

5. Stop the server.
6. Copy the `databases` folder from the last configuration database server you stopped to the new server, replacing the existing folder.

**Important:**

- If you are upgrading from 11.1, copy this folder:  
`..SpectrumDirectory\Database\server\app\repository\store\databases` folder.
- If you are upgrading from any version higher than 11.1, copy this folder:  
`..SpectrumDirectory\Database\repository\data\databases` folder.

For more information about path changes, see [Path structure and log name changes](#).

7. Start the server.

## Adding Nodes to a Cluster

This procedure describes how to add one or more nodes to an existing cluster.

1. Stop all the Spectrum Technology Platform nodes in the cluster. For more information, see [Stopping a Cluster](#) on page 78. If your cluster has a separated configuration database cluster, you only need to stop the server cluster, not the configuration database cluster.

**Warning:** To prevent data loss you must stop the cluster by following the procedure described in [Stopping a Cluster](#) on page 78.

2. On any node in the cluster, install the module or modules you want to add.
3. Open this file in a text editor:

```
server/conf/spectrum-container.properties
```

4. In the `spectrum.cluster.seeds` property, remove all host names and IP addresses except for the one for this server. Save the host names and IP addresses so that you can re-add them later.
5. Save the file.
6. Start the server.

**Note:** Wait for the server to fully start before proceeding.

7. In the file `spectrum-container.properties`, add the host names and IP addresses that you had removed.
8. Save the file. You do not need to restart the server.
9. Install the modules on each of the other nodes in the cluster. Start each node after installing the modules on it, and wait for it to fully start before installing the modules on the next node. You do not need to modify the `spectrum.cluster.seeds` property when installing modules on subsequent nodes.

# 6 - Spectrum Databases

After you have installed the server you need to install the databases that support the modules you have installed. Databases provide the information that Spectrum Technology Platform modules use to process data, such as postal address data, name data, or geospatial data. For example, if you have installed the Enterprise Geocoding Module, you will need to install databases that contain geospatial data; if you have installed the Universal Addressing Module, you will need to install databases that contain postal data.

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# Installing a Spectrum Database

Spectrum databases contain reference data from trusted data providers that is used to enhance and validate your data. For example, to perform address validation, Spectrum Technology Platform uses official address data from postal authorities to compare your address to addresses of record. Other types of processing that use Spectrum databases include geocoding, routing, and tax jurisdiction assignment for a given address.

We update Spectrum databases periodically to provide you with the most up-to-date data from third-party data providers. Database updates occur independently from software updates, in some cases quarterly or even monthly. When a database update is available you will receive an email notification that includes a link to download the updated database. You should install it as soon as possible so that you are using the most accurate data available.

Spectrum Technology Platform provides CLI commands that help you install, maintain, and archive SPD files.

- Use the **productdata archive register** command to configure an alternate (non-default) location for the Spectrum Platform Data (SPD) archive.
- Use the **productdata extract register** command to specify an alternate (non-default) extract location for a set of product data on the server.

The default SPD file archival area is `../archive/ref-data`. Extracted SPD files are located in `../ref-data`.

- Use the **productdata install** command to install your data files.

We recommend using the `productdata extract register` and `productdata archive register` commands to ensure that the SPD data, which may be large, resides in an appropriate and manageable location of your choosing on the server. The default location inside the Spectrum folders can make upgrades and re-installations more difficult and require even greater temporary space.

## SPD Setup on a New Spectrum Server

If you are a new customer to the Spectrum Technology Platform or setting up a new Spectrum server, we recommend setting a location for your Spectrum Product Data (SPD) that is separate from the Spectrum Technology Platform installation folder.

The Spectrum Technology Platform has Command Line Interface (CLI) commands for setting the SPD file archive location and for setting the extract location. The archive location establishes the archive location for the data on the Spectrum server. The extract location establishes the extract location for the data on the Spectrum server. You only need to run these commands once to set the

extract and archive locations. Spectrum remembers these locations for future Spectrum Product Data (SPD) installations.

If you do not use these commands to set the location for your Spectrum Product Data (SPD), then Spectrum installs the data to default locations: the default SPD file archive area is `../archive/ref-data` and extracted SPD files are in `../ref-data` under the spectrum folder where the Spectrum Technology Platform is installed. Installing to the default location may affect:

- How long it takes to upgrade the Spectrum Technology Platform because everything under the spectrum folder, including data, is backed up to a ZIP archive file during the upgrade. If there is not enough space on the server, the upgrade will stop.
- How long it takes to uninstall and reinstall the Spectrum Technology Platform, which would include the extra step of reinstalling Spectrum Product Data (SPD). Uninstalling the Spectrum Technology Platform removes everything under the spectrum installation folder including any data files.
- The space requirements for the Spectrum server machine.
- The length of the folder paths to the data.

## Setting Product Data Extraction and Archive Locations

This procedure describes how to set the folder locations that a Spectrum server uses for its Spectrum Product Data (SPD).

We recommend different locations for the Spectrum install and the Spectrum archive and extract folders. You must be a Spectrum Technology Platform administrator (admin) to perform this task.

The Spectrum Technology Platform has Command Line Interface (CLI) commands for setting the SPD file archive location and for setting the extract location. You only need to run the product data extract, and product data archive commands once to set the extract and archive locations. Spectrum remembers these locations for future Spectrum Product Data (SPD) installations.

To set the data file archive location and extract locations:

1. Verify that the Spectrum Technology Platform server is running before you begin.
2. Open a command-line window.
3. Connect to the Spectrum server by typing this command:

```
connect --h servername:port --u username --p password --s SSLtrueFalse
```

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s false
```

4. Establish the extract location for the data on the server by typing:

```
productdata extract register --p product --d directory
```

For example,

```
productdata extract register --p platform --d
E:/SpatialFiles/SpectrumDataStorage
```

5. Establish the archive location for the data on the server by typing:

```
productdata archive register --p product --d directory
```

For example,

```
productdata archive register --p platform --d E:/SpatialFiles/Archive
```

You are now ready to install Spectrum Product Data (SPD). For details, see [Installing Spectrum Product Data](#) on page 102

## Installing Spectrum Product Data

This procedure describes how to install Spectrum Product Data (SPD) from Pitney Bowes. Spectrum data is downloaded using the link provided in a Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace \(SDM\)](#).

To add Spectrum Product Data (SPD) to a Spectrum server:

1. Add Spectrum data using product data Command Line Interface (CLI) commands as described in [Adding Data to Spectrum](#) on page 102.
2. Create a database resource using the Management Console as described in [Creating a Database Resource](#) on page 104.

Modules may have additional instructions that are specific to the module and data used by the module. See [Spectrum Databases](#) on page 99 to locate additional module-specific information or instructions.

### Adding Data to Spectrum

You must be a Spectrum Technology Platform administrator (admin) to perform this task. If you are a new customer to the Spectrum Technology Platform or setting up a new Spectrum server, we recommend setting a location for your Spectrum Product Data (SPD) that is separate from the Spectrum Technology Platform installation folder. For details, see [SPD Setup on a New Spectrum Server](#) on page 100 and [Setting Product Data Extraction and Archive Locations](#) on page 101.

The Spectrum Technology Platform has Command Line Interface (CLI) commands to install Spectrum data without having to download the data to the Spectrum server or having to connect your Spectrum server to the internet. The CLI commands copy data to the Spectrum server.

After installing the data, we suggest keeping your download files so that those files are available if you need to reinstall Spectrum data in the future. If you need to remove data from the Spectrum server, use the Spectrum command line (CLI) commands.

To install Spectrum Product Data (SPD):

1. Verify that the Spectrum Technology Platform server is running before you begin.
2. Download your Spectrum Product Database (SPD) format files from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace \(SDM\)](#). If the download is a zip file, extract it to a temporary location.
3. Open a command-line window.
4. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s SSLtrueFalse
```

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s false
```

5. Optionally list the locations of extracted Spectrum Product Data (SPD) files based on product name by typing:

```
productdata extract list
```

The command output shows the directory where files are located for each product.

6. Install the data to the Spectrum server by typing:

```
productdata install --f fileOrDirectory --w waitOrReturn
```

For example,

```
productdata install --f E:/SpatialFiles/Geocoding/KNT072019.spd --w
```

If installing a Spectrum product with multiple `.spd` files, then use the folder path to the files. The command installs the data files that are in the folder and subfolders. For example:

```
productdata install --f E:/SpatialFiles/Geocoding --w
```

7. Define a database resource for the data in the Management Console or by using the Administration Utility database commands. Instructions may vary by module and data, see [Spectrum Databases](#) on page 99 to locate additional module-specific information or instructions. For general instructions, see [Creating a Database Resource](#) on page 104.

For more information about these Product Data CLI commands, see *Product Data* under *Administration Utility* in the *Spectrum Technology Platform Administration Guide*.

## Creating a Database Resource

You must be a Spectrum Technology Platform administrator (admin) or Spatial administrator (spatial-admin) to perform this task. If you are a Spatial sub-administrator (spatial-sub-admin), then you must have permission to the folder that you are editing.

To create a database resource for Spectrum:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.

If you do not see the **Spectrum Databases** menu, then you do not need to define database resources.

3. Click the **Add** button **+** to create a new database resource.
4. Enter a name for the database resource in the **Name** field. The name can be anything you choose.
5. In the **Module** field, select the name of your module.

If you have modules that use Spectrum databases, they display in the **Module** field.

**Note:** Modules may have additional fields and settings beyond what the following steps describe. If this is the case, see [Spectrum Databases](#) on page 99 for more details about the module you have installed.

6. If applicable, in the **Type** field, select the type of data.

A list of available databases displays in the table, including description and vintage.

7. Select one or more entries from the list.

This list should include the data you installed using the `productdata install` command as described in [Adding Data to Spectrum](#) on page 102.

8. Click **Save** to create the database.

A list of the Spectrum databases and status displays. (It may take a moment to refresh the **Status** column.)

## Deleting Data from Spectrum

**Warning:** Do not manually delete any files in the Spectrum data archive or extract locations.

To delete data from a Spectrum server, to replace the data with a newer version or to clean the data from a machine, use the Spectrum command line (CLI) commands.

To remove data from a Spectrum server:

1. In the Management Console, delete the database resource that is using the data as described in [Deleting a Database Resource](#) on page 105.

- Using CLI commands, delete the data from the Spectrum server as described in [Deleting Data from Spectrum](#) on page 105.

Modules may have additional instructions that are specific to the module and data used by the module. Check the [Spectrum Databases](#) on page 99 section for the module you have installed.

## Deleting a Database Resource

**Warning:** Before deleting any resource, verify that jobs or services are not using the resource. Deleting a resource that is referenced by jobs or services causes those jobs or services to fail.

You must be a Spectrum Technology Platform administrator (admin) or Spatial administrator (spatial-admin) to perform this task. If you are a Spatial sub-administrator (spatial-sub-admin), then you must have permission to the folder that you are editing.

To delete a database from Spectrum:

- Open Management Console.
- Go to **Resources > Spectrum Databases**.
- Put a check mark next to the Spectrum database you want to delete.
- Click the **Delete** button .

Deleting a Spectrum database does not delete the actual data files. After deleting the resource, you must delete the data files from the Spectrum server if you want to free up space on your system. For instructions, see [Deleting Data from Spectrum](#) on page 105.

## Deleting Data from Spectrum

You must be a Spectrum Technology Platform administrator (admin) to perform this task.

Before deleting data, verify that it is not being used by a database resource in the Management Console. For details, see [Deleting a Database Resource](#) on page 105.

To delete data from a Spectrum server:

- Verify that the Spectrum Technology Platform server is running before you begin.
- Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s SSLtrueFalse
```

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s false
```

- Run the `productdata list` command to view the details for the currently installed data. The results provide current information without having to access the file system. We recommend using this command before using the `productdata delete` command to make an informed decision about the data to delete.

Open a command-line window and type the following:

```
productdata list
```

4. Run the `productdata delete` command to delete the data from a Spectrum server by typing:

```
productdata delete --p productName --c productComponent --q qualifier
--v dataVintage
```

For example,

```
productdata delete --p gam --c gav --q GAV-DEU --v 201907
```

For more information about these Product Data CLI commands, see *Product Data* under *Administration Utility* in the *Spectrum Technology Platform Administration Guide*.

## Modifying a Spectrum Database Resource

You must be a Spectrum Technology Platform administrator (admin) to perform this task.

A Spectrum database may include multiple data entries: a North American database might include Canada, United States (USA), and Mexico data; a population survey database might include yearly updates for a sales region. Managing a database may include adding data to it to increase its coverage, relevance, or accuracy, or removing data from it to change its coverage or reduce its size.

Every Spectrum database resource has a name, which is used in your dataflows as well as web service APIs. It is important when modifying a database that the database name remains untouched.

To modify a database by adding or removing data:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.
3. Put a check mark next to the Spectrum database you want to modify and then click Modify button .
4. Either add data or remove data from the database.
  - To add data, select a data entry. If the data you want to add is not in the list, then you must add it to the Spectrum server, as described in [Adding Data to Spectrum](#) on page 102.
  - To remove data, clear the check box beside the data entry.
5. Click **Save**.

Removing data from a Spectrum database does not delete the actual data files. If you wish to also delete the files from the Spectrum server to free up space on your system, see [Deleting Data from Spectrum](#) on page 105.

# Installing Advanced Matching Module Database

The Advanced Matching Module provides a load utility to install databases. The database files that you install depend on the databases you have licensed.

1. Stop the Spectrum Technology Platform server using the `ServerOnlyDirectory/server/bin/server.stop` script.
2. If you have Oracle environment variables set in your profile, these environment variables may interfere with DVD database loading processes. If you experience database loading problems and are using Oracle, check that the Oracle environment variables are not active when you perform the DVD database loads.
3. Make sure that Spectrum Technology Platform is stopped. To stop Spectrum Technology Platform, change the working directory to the `bin` directory of where Spectrum Technology Platform is installed, then type the following command:

```
./server.stop
```

4. Insert the database DVD or download the database from the Pitney Bowes eStore. You received a download link with your product release announcement.

**Note:** If you download the database from the technical support web site, it will be downloaded as a zip file. Unzip the database before proceeding with the installation.

5. If you are installing from DVD and your system does not auto-mount, issue the appropriate mount command to indicate that the DVD device is a file system.

If necessary, issue the `/etc/filesystem` command to update your system so that it recognizes this file system. Specify the correct device name for the DVD device on your system.

**Note:** Your system must allow DVDs created under the ISO 9660 format to be mounted as a file system.

6. Change the working directory to the `bin` directory of where Spectrum Technology Platform is installed.
7. Source the "setup" bourne shell script to setup the environment by typing the following command:  

```
./setup
```
8. Run the script to install the database:  

```
./installdb_cdq
```
9. Follow the prompts as the script verifies your environment and database location.
10. Open the file `SpectrumDirectory/server/bin/wrapper/wrapper.conf` in a text editor.

11. Increase the Java settings for initial heap size (`wrapper.java.initmemory`) and maximum heap size (`wrapper.java.maxmemory`) to reflect the total amount of memory required for the Arabic Plus Pack and Asian Plus Pack.
  - Arabic Plus Pack: 5.5 GB
  - Asian Plus Pack - Chinese: 32 MB
  - Asian Plus Pack - Japanese: 1.6 GB
  - Asian Plus Pack - Korean: 8 MB
  - Core Names: 1.1 GB
12. Save and close `wrapper.conf`.
13. Start the Spectrum Technology Platform by changing the working directory to the bin directory of where Spectrum Technology Platform is installed, then type the following command:
 

```
./server.start
```

## Installing Data Normalization Module Databases

The Data Normalization Module provides a load utility to install databases for the Advanced Transformer, Open Parser, and Table Lookup components. The database files that you install depend on the databases you have licensed. Use this list of database tables to determine which files you should download and install. For more information about tables contained in each database, refer to the reference documentation for each component.

| Stage                | Available Databases   |
|----------------------|---|
| Advanced Transformer | Data Normalization Module - Base Tables   |
| Open Parser          | <ul style="list-style-type: none"> <li>• Data Normalization Module - Base Tables</li> <li>• Core Names Database</li> <li>• Company Names Database</li> <li>• Arabic Plus Pack</li> <li>• Asian Plus Pack</li> </ul> |

| Stage        | Available Databases  |
|--------------|--|
| Table Lookup | <ul style="list-style-type: none"> <li>• Data Normalization Module - Base Tables</li> <li>• Core Names Database</li> <li>• Arabic Plus Pack</li> <li>• Asian Plus Pack</li> <li>• ZREPLACE (Used by the SAP Module for French address validation)</li> </ul> |

1. If you have Oracle environment variables set in your profile, these environment variables may interfere with DVD database loading processes. If you experience database loading problems and are using Oracle, check that the Oracle environment variables are not active when you perform the DVD database loads.
2. Make sure that Spectrum Technology Platform is stopped. To stop Spectrum Technology Platform, change the working directory to the `bin` directory of where Spectrum Technology Platform is installed, then type the following command:
 

```
./server.stop
```
3. Insert the database DVD or download the database from the Pitney Bowes eStore. You received a download link with your product release announcement.

**Note:** If you download the database from the technical support web site, it will be downloaded as a zip file. Unzip the database before proceeding with the installation.

4. If you are installing from DVD and your system does not auto-mount, issue the appropriate mount command to indicate that the DVD device is a file system.

If necessary, issue the `/etc/filesystem` command to update your system so that it recognizes this file system. Specify the correct device name for the DVD device on your system.

**Note:** Your system must allow DVDs created under the ISO 9660 format to be mounted as a file system.

5. Change the working directory to the `bin` directory of where Spectrum Technology Platform is installed.
6. Source the "setup" bourne shell script to setup the environment by typing the following command:
 

```
./setup
```
7. Run the script to install the database:
 

```
./installdb_dnm
```
8. Follow the prompts as the script verifies your environment and database location.

**Note:** You may install databases on a network share, but performance will be affected since you will be accessing them on a network rather than accessing them locally.

9. Open the file `SpectrumDirectory/server/bin/wrapper/wrapper.conf` in a text editor.
10. Increase the Java settings for initial heap size (`wrapper.java.initmemory`) and maximum heap size (`wrapper.java.maxmemory`) to reflect the total amount of memory required for the Arabic Plus Pack and Asian Plus Pack.
  - Arabic Plus Pack: 5.5 GB
  - Asian Plus Pack - Chinese: 32 MB
  - Asian Plus Pack - Japanese: 1.6 GB
  - Asian Plus Pack - Korean: 8 MB
  - Core Names: 1.1 GB
11. Save and close `wrapper.conf`.
12. Start the Spectrum Technology Platform by changing the working directory to the bin directory of where Spectrum Technology Platform is installed, then type the following command:
 

```
./server.start
```

## Installing Geocoding Databases (SPD format)

Review the following items.

- Spectrum Server is running and the Administration Utility (CLI Command tool) is available to you. If you haven't used the tool before, see [Getting Started with the Administration Utility](#).
- Java 8 is installed.
- For an AIX environment, OpenJDK is also needed.
- (Optional) If needed, run the following command to identify the directory where Spectrum will store the extracted files.

```
productdata extract list
```

- (Optional) If you need to know more about existing Spectrum Product Data (SPD) files, run the following command. The results will display PRODUCT, COMPONENT, QUALIFIER, VINTAGE, EXPIRATION, DESCRIPTION, and IDENTIFIER information.

```
productdata list
```

Geocoding databases contain the data necessary to perform geocoding and reverse geocoding for locations. Each country has its own database, and some countries have optional databases that provide enhanced geocoding.

These databases are for use in the Global Geocoding or Enterprise Geocoding modules.

**Note:** Do not install geocoding datasets on a network drive. Doing so can cause performance problems.

1. Select and download your licensed SPD files (xxx.spd) from Pitney Bowes using the link provided in the Pitney Bowes communication or from the Pitney Bowes [Software and Data Marketplace](#).
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
3. Install the SPD files:
  - a) Place the SPD files in `SpectrumDirectory/server/import`. This is the default location for SPD files. The Spectrum™ Technology Platform server monitors this folder and looks for new files in two-second intervals.  
You can change the location of the data import directory by altering the **spectrum.import.dir** property in the `SpectrumDirectory/server/conf/spectrum-container.properties` file.
  - b) When the server detects new SPD files, the server automatically extracts the SPD files to `SpectrumDirectory/server/ref-data`.  
You can change the location of the data storage folder by altering the **spectrum.data.manager.storage.dir** property in the Data Manager settings section of the `SpectrumDirectory/server/conf/spectrum-container.properties` file.
4. At this point the data will become available and you can add it as a Spectrum™ database resource in the **Spectrum™ Databases** section of Management Console.
5. After you install the database files, use either the Database Resource tool in the Management Console or the Administration Utility database commands to define the database as a resource.
6. After the SPD files are extracted and are no longer needed, use the CLI commands to delete the SPD files. Do not manually delete the SPD files from the location where the server extracted the SPD files. Instead, use these CLI commands to delete the SPD files. For more information about the Product Data CLI commands, see Administration Utility in your Spectrum™ Technology Platform *Administration Guide*.
  - a) Run the `productdata list` command to view the details for the currently installed SPD files. The results provide current information without having to access the file system. We suggest that you run this command before you run the `productdata delete` command, to make an informed decision about the data to delete.
  - b) Run the `productdata delete` command to delete the SPD files from the Spectrum™ Technology Platform.

### Example

```
productdata delete --p productName --c productComponent --q qualifier --v dataVintage
```

```
spectrum> productdata delete --p gam --c gav --q GAV-DEU --v 201907
```

## AUS G-NAF

If you installed the Australia Geocoded National Address File (G-NAF), you must specify the `GNAF123` and `GNAF456` as separate paths but in the same database resource in Management Console.

`GNAF123` contains the point-level dictionary. This has the highest precision of geocoding (characterized by Reliability Level 1, 2, or 3.) `GNAF456` contains the remainder of address information in G-NAF that does not meet high precision geocoding criteria (characterized by Reliability Level 4, 5, or 6.) We recommend that you use both databases to validate the existence of addresses but only use `GNAF123` for parcel-level geocoding. If you do not require parcel-level geocodes you can use `GNAF456` for geocoding.

## U.S. Geocoding Databases

The U.S. geocoding databases contain the spatial data necessary to perform address standardization and geocoding. You must install at least one of these databases.

- **Centrus Enhanced Geocoding**—This database consists of TIGER data provided by the U.S. Geological Survey and address data provided by the U.S. Postal Service.
- **TomTom Geocoding**—This database provides more up-to-date data than the Centrus Enhanced Geocoding database. It requires an additional license. The data is provided by TomTom, a third-party provider of spatial data, and postal data from the U.S. Postal Service.
- **HERE Geocoding**—This database provides more up-to-date data than the Centrus Enhanced Geocoding database. It requires an additional license. HERE data is provided by HERE, a third-party provider of spatial data. For more information about these databases, contact your sales representative.
- **ZIP + 4 Centroid**—This database provides only address standardization and ZIP + 4 centroid matching. It does not provide street-level matching.

These databases use proprietary files called SPD files. For ZIP Code centroid matching, the file `us.Z9` contains all the centroid info for all states and normally has a `z9` extension.

Each geocoding database has an optional Statewide Intersections Index. The Statewide Intersection Index is designed to enable fast intersection identification on a statewide basis. For example, the Statewide Intersection Index will allow the database to search for "1st and Main St, CO" and return a list of possible matches in Colorado more quickly than searching the entire geocoding database for each instance of the intersection.

1. Download your licensed SPD files (`xxx.spd`) using the link provided in the Pitney Bowes communication or from the Pitney Bowes [Software and Data Marketplace \(SDM\)](#).
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
3. To install, see [Installing Geocoding Databases \(SPD format\)](#) on page 110.

## Points Databases (U.S. Only)

Points databases contain data for locating the center of a land parcel. These databases provides enhanced geocoding accuracy for internet mapping, property and casualty insurance, telecommunications, utilities, and others. To install, see [Installing Geocoding Databases \(SPD format\)](#) on page 110.

- **Master Location Data**—This database provides the best available address point location for every mailable and deliverable address in the United States.
- **Centrus Points**—This database contains the data necessary to locate the center of a parcel or building. It does not contain assessor's parcel number (APN) or elevation data.
- **Centrus Elevation**—This database contains the same data as Centrus Points, plus elevation data.
- **Centrus Enhanced Points**—This database contains the same data as Centrus Points, plus APN data.
- **Centrus Premium Points**—This database contains the same data as Centrus Points, plus both APN and elevation data.
- **TomTom Points Database**—The data in this database is provided by TomTom, a third-party provider of spatial data.
- **HERE Points**—This database is provided by HERE, a third-party data provider. It contains data used to locate addresses at the center of the actual building footprint or parcel.

## Early Warning System (U.S. Only)

The USPS provides free Early Warning System (EWS) data to prevent matching errors due to the age of the address information in the .gsd files. The USPS creates a new EWS data set each week that you can download from the USPS website (<https://postalpro.usps.com/cass/EWS>).

To install the Early Warning System (EWS) database, rename the database file from OUT to EWS.txt and place it in the same folder as the primary database.

# Installing Enterprise Tax Module Databases

Depending on the features you have licensed, you need to install one or more of these databases.

## Database Compatibility

The Enterprise Tax Module version 9.0 SP2 and later uses a different data format than previous releases. You must download and install the **GeoTAX/Enterprise Tax Premium database** for use in this version. The GeoTAX/Enterprise Tax Premium database is not compatible with any releases prior to version 9.0 SP2.

## Downloading Database Files

**Note: Prior to downloading the data files:** If you have previously installed database files, you should back up those files and delete any copies of the `.gdi`, `.gsd`, `gsi`, `.gsl`, `.gsu`, `.gsz`, `.gsx`, `.z9`, `.dir`, `.las` and `.los` files in the data install directory.

### *Downloading from the eStore*

Use the link in your welcome email to download the zip file. Extract the files and make note of the directory where you save the files.

### *Downloading from the Technical Support Web Site*

Download the database from the the Pitney Bowes eStore. You received a download link with your product release announcement or Welcome letter. The data file will be downloaded as a .zip file. Extract the files and make note of the directory where you save the files.

### *After Downloading the Database Files*

You will need to decrypt the `zip5.gs_` file before it can be installed. To perform this process, open a command prompt, navigate to the `/datasets/UNIX/<platform>` directory included on the data media, where `<platform>` is your operating system, and execute the following command:

```
centrus_decrypt.exe <New Data>/zip5.gs_ Clear28050
```

Where `<New Data>` is the location of the downloaded or copied updated data. Your file is now ready to be installed.

### *Downloading Florida Format Files*

You can obtain the Florida format files from the Florida Department of Revenue. The Florida Department of Revenue compiles the database based on county.

1. Download the files from the Florida website at:  
<https://pointmatch.state.fl.us/General/AddressFiles.aspx/>.
2. Unzip the downloaded files and transfer them to the server.  
**Note:** Be sure to FTP your files in binary format.
3. Combine the county files into a single file if you downloaded more than one county. If you downloaded the entire state list, you have approximately 67 files. You must combine all the files into one file.  
Your file is ready for loading.

## Downloading TS-158 Format Files

The Federation of Tax Administrators (FTA) maintains a website with links to all data sources that use the TS-158 format.

1. Download the files from the Florida website at:  
[https://pointmatch.state.fl.us/General/AddressFiles.aspx.](https://pointmatch.state.fl.us/General/AddressFiles.aspx/)
2. Unzip the downloaded files and transfer them to the Spectrum Technology Platform server.
3. State files are often broken up into individual county files. Combine all state and/or county files into a single file.  
Your file is ready for loading.

## Database Options

The following describes the database options presented in the UNIX/Linux Database Install script.

### GeoTAX master files

The GeoTAX/Enterprise Tax Premium Database is a required dataset and is the master file for the Enterprise Tax Module software. The master files identify all geographic components associated with a street address, such as the latitude/longitude, census tract, and block group.

### Point Data files

Point Data products include Master Location Data (MLD), Centrus Points, HERE Points, and TomTom Points. The point data provides point-level geocoding for the most accurate placement of addresses throughout the U.S. The Master Location Data database provides the best available address point location for every mailable and deliverable address in the United States.

### User auxiliary file

This is a user-defined file that the Enterprise Tax Module uses to override results from the master files in street-level matching. If you have data that is more current than that in the master files, you can enter the new data into the auxiliary file and use it for

your address matching. The Enterprise Tax Module returns matches made with a code that signifies the answer came from the auxiliary file. You can also return user-defined data from the auxiliary file with the match. The install program creates the file `G1GTAUX` in the specified destination.

### **GeoTAX auxiliary file**

This file contains new addresses that have not yet been added to the master files. It provides the most up-to-date address data possible. The install program creates the indexed sequential file `G1GTAX2` in the specified destination.

### **Landmark auxiliary file**

This is a user-defined file that allows you to specify customized address information in your input records. The recommended primary use of this file is to match to your company's non-address locations such as well heads, transmission towers or any other descriptive location. The latitude/longitude that is part of the input needed to build this file allows companies to automatically keep track of any jurisdictional changes that affect these unique locations. Matching to this file requires that the input record information match exactly to the Landmark file contents. This also applies to street records if you choose to enter them in the Landmark file. For more information, refer to the *Enterprise Tax Module Guide*.

### **State-supplied Florida format file**

This is a state-supplied file in Florida-native format which is provided by individual state governments. The Enterprise Tax Module first attempts to match to the state database. If the Enterprise Tax Module cannot find a state match, it attempts a match to the GeoTAX Auxiliary file, if loaded, then to the master files.

### **State-supplied TS-158 format file**

This is a state-supplied file in TS-158 (ANSI Transaction Set No. 158) format which is provided by individual state governments. The Enterprise Tax Module first attempts to match to the state database. If the Enterprise Tax Module cannot find a state match, it attempts a match to the GeoTAX Auxiliary file, if loaded, then to the master files.

### **Boundary file**

Boundary files provide additional data about locations of special tax districts:

- Special Purpose Tax Districts (spd.txb)
- Insurance Premium Tax Districts (ipd.txb)
- Payroll Tax Districts (pay.txb)
- User-defined Boundary file (usr.txb)

### **PB Software tax rate file**

The Pitney Bowes Sales and Use Tax Rate file allows you to use the Enterprise Tax Module to provide sales and use tax rates for each of the assigned tax jurisdictions as well as the total rate for the assigned locations. The install program creates the indexed sequential file `GTTAXRT`.

### **Payroll tax correspondence file**

Payroll tax cross-reference file allow you to use third-party software to determine the payroll tax rates. The cross-reference files combine the U.S. Government Federal Information Processing Standards (FIPS) codes with the proprietary geocodes used by tax software from third parties. The Payroll System Tax Code file is a customized file that you build to return the payroll tax codes used by your payroll system. The install program produces database files called `G1GTPTC` and `G1GTPTC.vix`.

### Sovos cross reference file

This sales tax cross-reference file enables you to use the Enterprise Tax Module to determine tax jurisdictions for a given address, then use Sovos software to determine the sales tax rates for those jurisdictions.

### PB Software Vertex® cross reference file

This is a Vertex® cross-reference file supplied by Precisely. The install program produces a database file `GTMSTR2` in the specified destination.

## Installing the Database Files

1. Open a command prompt.
2. If the database that you are installing is larger than 2 GB, type the following two commands:

```
export LARGE_FILE_LIMIT_2TB=1
export USE_LARGE_FILE_API=1
```

3. Change the working directory to the `bin` directory of where Spectrum Technology Platform is installed.
4. Type the following to source the setup script:
 

```
../setup
```
5. Run the database install script `installdb_gsl`. The GeoTAX Database Installation Menu displays.
6. Enter the number of the database you want to install.

**Note:** For Point Data, enter the number for the **GeoTAX master files**.

7. Follow the instructions provided in the script.

**Note:** You may install databases on a mapped drive, but performance will be affected since you will be accessing them on a network rather than accessing them locally.

**Note:** If you are installing a User-defined Boundary file, the filename is name- and case-sensitive and should be specified as `usr.txb`.

8. In Management Console, open the Enterprise Tax Module database resource tool and define a database resource that includes the database you just installed. Be sure to update Assign GeoTAX Info and Reverse GeoTAX Info Lookup to use the new database resource.

## Installing GeoEnrichment Module Databases

GeoEnrichment Module database resources are used by GeoEnrichmentLookup. Given a lookup key as input, the GeoEnrichmentLookup stage accesses a registered database and returns additional attribute data for the referenced address.

To install Spectrum Product Data (SPD) data from Pitney Bowes for use with GeoEnrichmentLookup, you must:

1. Download the SPD format files that you purchased from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace](#).
2. Use Command Line Interface (CLI) commands to install the Spectrum Product Data to a Spectrum database. This copies the data to the Spectrum database and makes the Spectrum Technology Platform aware of the data in the database. For details, see [Adding Data to Spectrum](#) on page 102.
3. In Management Console, create a new database resource for the Spectrum Product Data, or change an existing database resource to include the Spectrum Product Data. For details, see *Adding a GeoEnrichment Module Database Resource* in the *GeoEnrichment Guide*.

If you are installing Spectrum Product Data for the first time, because you are a new customer to the Spectrum Technology Platform or setting up a new Spectrum server, then we recommend you set the data extract and archive locations before installing Spectrum Product Data. For details, see [SPD Setup on a New Spectrum Server](#) on page 100. We recommend using the `productdata extract register` and `productdata archive register` commands to ensure that the Spectrum Product Data, which may be large, resides in an appropriate and manageable location of your choosing on the server. The default location inside the Spectrum folders can make upgrades and re-installations more difficult and require even greater temporary space.

# Installing Global Addressing Module Databases

## Global Addressing Module Databases

Global Addressing Module databases are distributed in the Spectrum™ Product Database (SPD) format from the Pitney Bowes [Software and Data Marketplace](#).

### Disk Space

The disk space requirements for extracted and non-extracted SPD bundles are:

- Extracted bundles (all SPD) - 100 GB
- Non-extracted bundles (all SPD) - 32 GB

### Memory

A typical Global Address Validation (GAV) country database can take 700 MB of memory when loaded but can take as much as 3000 MB. A typical Global Type Ahead (GTA) database also takes about 700 MB of memory when loaded but rarely exceeds that value.

To download and install a Global Addressing Module database resource in the Spectrum™ Product Database (SPD) format, see [Installing Global Addressing Module SPD Files](#) on page 119.

## Installing Global Addressing Module SPD Files

You must be a Spectrum Technology Platform administrator (admin) to perform this task. Before deleting data, verify that the data is not being used by a database resource in the Management Console.

To download and install a Global Addressing Module database resource in the Spectrum™ Product Database (SPD) format:

1. Select and download your licensed SPD format files (xxx.spd) from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace \(SDM\)](#). If the download is a zip file, extract it to a temporary location.
2. Verify that the Spectrum Technology Platform server is running before you continue.
3. Open a Spectrum™ command line window.
4. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s TrueOrFalse
```

If your Spectrum™ server requires a secure connection, set **--s True**. The default is **False**.

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s False
```

5. Install the data to the Spectrum™ server by typing:

```
productdata install --f fileOrDirectory --w TrueOrFalse
```

To wait for the installation to complete, set **--w True**. To allow the installation to proceed in the background, set **--w False**. The default is **False**.

For example,

```
productdata install --f E:/GAM/GAE092019.spd --w False
```

If installing a Spectrum™ product with multiple .spd files, then use the folder path to the files. The command installs the data files that are in the folder and subfolders.

For example,

```
productdata install --f E:/GAM/GAV --w False
```

6. After you install the SPD files, see either [Using Management Console to Create a Database Resource](#) on page 121 or [Using CLI Commands to Create a Database Resource](#) on page 123 to define the database as a resource.

For more information about the Product Data specific CLI commands, see *Product Data* under *Administration Utility* in the *Spectrum Technology Platform Administration Guide*.

## Deleting Global Addressing Module SPD Files

You must be a Spectrum Technology Platform administrator (admin) to perform this task. Before deleting data, verify that the data is not being used by a database resource in the Management Console.

Do not manually delete the SPD files from the location where the server extracted the SPD files. Instead, use these CLI commands to delete the SPD files. For more information about the Product Data CLI commands, see "Administration Utility" in your *Spectrum™ Technology Platform Administration Guide*.

1. Verify that the Spectrum Technology Platform server is running before you begin.
2. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s TrueOrFalse
```

If your Spectrum™ server requires a secure connection, set **--s True**. The default is **False**.

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s False
```

3. Run the `productdata list` command to view the details for the currently installed SPD files. The results provide current information without having to access the file system. We recommend using this command before using the `productdata delete` command to make an informed decision about the data to delete.

Open a Spectrum CLI window and type the following:

```
productdata list
```

4. Run the `productdata delete` command to delete the SPD files from the Spectrum™ Technology Platform:

```
productdata delete --p productName --c Component --q Qualifier --v Vintage
```

For example,

```
productdata delete --p GAM --c GAV --q GAV_DEU --v SEP2019
```

## Creating a Global Addressing Module Database Resource

After you install new Spectrum™ Product Database (SPD) format files, use either [Using Management Console to Create a Database Resource](#) on page 121 or [Using CLI Commands to Create a Database Resource](#) on page 123 to define the newly installed database as a Global Addressing Module database resource.

### *Using Management Console to Create a Database Resource*

To create a Global Addressing Module database resource in Management Console from a newly installed SPD file:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.

If you do not see the **Spectrum Databases** menu, then you do not need to define database resources.

3. You can use the buttons at the top left to manage your databases.

To create a new database, click Add **+**.

To create a new database by copying an existing database, click Copy .

4. Enter a name for the database resource in the **Name** field. The name can be anything you choose. If you are creating a new database resource by copying an existing database resource, rename as needed. You cannot modify the name of an existing database resource.
5. In the **Pool size** field, specify the maximum number of concurrent requests you want this database to handle.

The optimal pool size varies by module. You will generally see the best results by setting the pool size between one-half to twice the number of CPUs on the server, with the optimal pool size for most modules being the same as the number of CPUs. For example, if your server has four CPUs you may want to experiment with a pool size between 2 (one-half the number of CPUs) and 8 (twice the number of CPUs) with the optimal size possibly being 4 (the number of CPUs).

When modifying the pool size you must also consider the number of runtime instances specified in the dataflow for the stages accessing the database. Consider for example a dataflow that has a Global Address Validation stage that is configured to use one runtime instance. If you set the pool size for the Global Address Validation database to four, you will not see a performance improvement because there would be only one runtime instance and therefore there would only be one request at a time to the database. However, if you were to increase the number of runtime instances of the Global Address Validation stage to four, you might then see an improvement in performance since there would be four instances of the Global Address Validation stage accessing the database simultaneously, therefore using the full pool. For more information about setting runtime instances, see the *Spectrum™ Technology Administration Guide*.

**Tip:** You should conduct performance tests with various settings to identify the optimal pool size and runtime instance settings for your environment.

6. In the **Module** field, select Global Address Validation Coder.
7. In the **Type** field, select the type of data.
  - a) Select the **Global Addressing** database for international address processing.
  - b) Select the **US Addressing** database for United States (USA) address processing.
8. To select all Global Addressing databases and all countries within those databases, click **Include** at the top of the list of available databases. To select only specific individual databases and all countries within those individual databases, click Include next to the individual databases.

**Tip:** To see the countries included in an individual database, click the arrow to the left of a database. You can also click Include at this level to include only specific countries in an individual database.

**Note:** We recommend grouping countries into regional Database Resources. For example, group the APAC countries into one Database Resource and the EMEA countries into another Database Resource. Attempting to add all countries for the Global Addressing Validation stage and the Global Type Ahead stage into just one Database Resource may cause the Database Resource creation process to time out and fail to create the Database Resource.

- Click **Save** to add and save the database resource. The Spectrum™ Databases page displays the added database resource.

## Using CLI Commands to Create a Database Resource

To create and configure a Global Addressing Module database resource from a newly installed SPD file, use the `gamdb create` command.

For detailed descriptions of all Global Addressing Module CLI command options, type:

```
help gamdb
```

For a detailed descriptions of the available options for a specific Global Addressing Module CLI command, type "Help" and the command name.

For example,

```
help gamdb create
```

### **gamdb create**

The `gamdb create` command creates and configures Global Addressing Module databases.

#### Usage

```
gamdb create --n Name --d Dataset Name --v Dataset Vintage --c Country --t Type --g Group --p Poolsize --mn minimum_memory_size --mx maximum_memory_size
```

| Required | Argument                   | Description  |
|----------|----------------------------|--|
| Yes      | --n <i>Name</i>            | Specifies the name of the database resource to create.   |
| Yes      | --d <i>Dataset Name</i>    | Specifies the name of the SPD dataset.   |
| Yes      | --v <i>Dataset Vintage</i> | Specifies the vintage of the dataset.  |
| No       | --c <i>Country</i>         | Specifies the three-digit ISO code for each country to include in the databases specified by the "t" option (type of SPD) where Countries is a list of three-digit ISO codes separated by semicolons. For more information about ISO codes, see your <i>Spectrum™ Technology Platform Addressing Guide</i> . |
| Yes      | --t <i>Type</i>            | Specifies the type of dataset.<br><b>GAV</b> Global Address Validation dataset.<br><b>GTA</b> Global Type Ahead dataset.   |
| Yes      | --g <i>Group</i>           | Specifies the coder for Global Address Validation.<br><b>Global</b> Global Address Validation International coder.   |

| Required | Argument  | Description   |
|----------|---|---|
|          |   | <b>US</b> Global Address Validation US coder.   |
| No       | <code>--p Poolsize</code>   | Specifies the maximum number of concurrent requests you want this database to handle. The default is 4.                                   |
| No       | <code>--mn</code> or<br><code>--minMem</code><br><i>minimum_memory_size</i> | Defines the minimum amount of memory allocated for this database. This value must be less than or equal to the <code>--mx</code> setting. |
| No       | <code>--mx</code> or<br><code>--maxMem</code><br><i>maximum_memory_size</i> | Defines the maximum amount of memory allocated for this database. This value must be greater than zero, but cannot exceed 65536 MB.       |

**Example**

This example creates a Global Addressing Validation database for Germany named "GAV\_DEU" using the database resource "GAV\_EMEA" with a December 2018 vintage and the International coder. This example configures the GAV\_DEU database with a pool size of 5, and memory allocation between 12200 and 65536 MB.

```
gamdb create --n GAV_DEU --d GAV_EMEA --v DEC2018 --c DEU --t
GAV --g Global --p 5 --mn 12200 --mx 65536
```

**Example**

This example creates a Global Type Ahead database for Austria named "GTA\_AUT" using the database resource "GTA\_EMEA" with a December 2018 vintage. This example configures the GTA\_AUT database with a pool size of 6, , and memory allocation between 12200 and 65536 MB.

```
gamdb create --n GTA_AUT --d GTA_EMEA --v DEC2018 --c AUT --t
GTA --p 6 --mn 12200 --mx 65536
```

## Modifying a Global Addressing Module Database Resource

You can use either the Database Resource tool in the Management Console or the Global Addressing Module CLI commands to modify a Global Addressing Module database resource. For more information about modifying a Global Addressing Module database resource, see either [Using Management Console to Modify a Database Resource](#) on page 125 or [Using CLI Commands to Modify a Database Resource](#) on page 125.

## Using Management Console to Modify a Database Resource

To modify a Global Addressing Module database resource:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.
3. To modify an existing database, select the database and then click Edit .
4. Make your required changes. For more information on database resource fields, see [Using Management Console to Create a Database Resource](#) on page 121.
5. Click **Save** to save your changes to the selected database resource. The Spectrum™ Databases page displays the modified database resource.

## Using CLI Commands to Modify a Database Resource

To modify a Global Addressing Module database resource, use the `gamdb modify` command.

For detailed descriptions of all Global Addressing Module CLI command options, type:

```
help gamdb
```

For a detailed descriptions of the available options for a specific Global Addressing Module CLI command, type "Help" and the command name.

For example,

```
help gamdb modify
```

### **gamdb modify**

The `gamdb modify` command modifies and updates Global Addressing Module databases.

#### Usage

```
gamdb modify --n Name --d Dataset Name --v Dataset Vintage --c Country --t Type --g Group --p Poolsize
```

| Required | Argument                   | Description  |
|----------|----------------------------|--|
| Yes      | --n <i>Name</i>            | Specifies the name of the database resource to modify.   |
| Yes      | --d <i>Dataset Name</i>    | Specifies the name of the SPD dataset.   |
| Yes      | --v <i>Dataset Vintage</i> | Specifies the vintage of the dataset.  |
| No       | --c <i>Country</i>         | Specifies the three-digit ISO code for each country to include in the databases specified by the "t" option (type of SPD) where Countries is a list of three-digit ISO codes separated by semicolons. For more |

| Required | Argument                         | Description   |
|----------|----------------------------------|---|
|          |                                  | information about ISO codes, see your <i>Spectrum™ Technology Platform Addressing Guide</i> .   |
| Yes      | <code>--t <i>Type</i></code>     | Specifies the type of dataset.<br><b>GAV</b> Global Address Validation database.<br><b>GTA</b> Global Type Ahead database.  |
| Yes      | <code>--g <i>Group</i></code>    | Specifies the coder for Global Address Validation.<br><b>Global</b> Global Address Validation International coder.<br><b>US</b> Global Address Validation US coder. |
| No       | <code>--p <i>Poolsize</i></code> | Specifies the maximum number of concurrent requests you want this database to handle. The default is 4.   |

**Example**

This example modifies the poolsize of the Global Addressing Validation database for Germany named "GAV\_DEU". This example specifies the Global Address Validation International coder.

```
gamdb modify --n GAV_DEU --d GAV_EMEA --v DEC2018 --c DEU --t
GAV --g Global --p 6
```

**Example**

This example modifies the poolsize of the Global Type Ahead database for Austria named "GTA\_AUT".

```
gamdb modify --n GTA_AUT --d GTA_EMEA --v DEC2018 --c AUT --t
GTA --p 3
```

## Deleting a Global Addressing Module Database Resource

You can use either the Database Resource tool in the Management Console or the Global Addressing Module CLI commands to delete a Global Addressing Module database resource. For more information about modifying a Global Addressing Module database resource, see either [Using Management Console to Delete a Database Resource](#) on page 126 or [Using CLI Commands to Delete a Database Resource](#) on page 127.

### Using Management Console to Delete a Database Resource

To delete a Global Addressing Module database resource:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.
3. To delete a database, select the database and then click Delete .
4. You will be asked to confirm that you want to delete the selected database resource. To confirm and delete the database resource, click Yes.
5. The database resource is deleted and no longer displays on the Spectrum™ Databases page.

## Using CLI Commands to Delete a Database Resource

To delete a Global Addressing Module database resource, use the `gamdb delete` command.

For detailed descriptions of all Global Addressing Module CLI command options, type:

```
help gamdb
```

For a detailed descriptions of the available options for a specific Global Addressing Module CLI command, type "Help" and the command name.

For example,

```
help gamdb delete
```

### **gamdb delete**

The `gamdb delete` command deletes a Global Addressing Module database.

#### Usage

```
gamdb delete --n Name --g Group
```

| Required      | Argument                                       | Description  |               |  |           |                                     |
|---------------|--|--|---------------|--|-----------|-------------------------------------|
| Yes           | <code>--n <i>Name</i></code>                   | Specifies the name of the database.  |               |  |           |                                     |
| Yes           | <code>--g <i>Group</i></code>                  | Specifies the coder for Global Address Validation. <table border="0" data-bbox="552 1449 1380 1543"> <tr> <td><b>Global</b></td> <td>Global Address Validation International coder.</td> </tr> <tr> <td><b>US</b></td> <td>Global Address Validation US coder.</td> </tr> </table> | <b>Global</b> | Global Address Validation International coder. | <b>US</b> | Global Address Validation US coder. |
| <b>Global</b> | Global Address Validation International coder. |  |               |  |           |                                     |
| <b>US</b>     | Global Address Validation US coder.            |  |               |  |           |                                     |

#### Example

This example deletes a Global Address Validation database for Germany named "GAV\_DEU". This example specifies the Global Address Validation International coder.

```
gamdb delete --n GAV_DEU --g Global
```

**Example**

This example deletes a Global Type Ahead database for Austria named "GTA\_AUT".

```
gamdb delete --n GTA_AUT
```

## Installing Global Sentry Module Database

These databases are required to run Global Sentry in real-time mode:

- ofac.db
- pep.db
- sanctions.db

These files are required to run Global Sentry in batch mode:

- globalsentrydb.addresses-ofac.csv
- globalsentrydb.fullNames-ofac.csv
- globalsentrydb.ids-ofac.csv
- globalsentrydb.names-ofac.csv
- globalsentrydb.addresses-pep.csv
- globalsentrydb.fullNames-pep.csv
- globalsentrydb.ids-pep.csv
- globalsentrydb.names-pep.csv
- globalsentrydb.addresses-sanctions.csv
- globalsentrydb.fullNames-sanctions.csv
- globalsentrydb.ids-sanctions.csv
- globalsentrydb.names-sanctions.csv

In addition, you must install the **Data Normalization Module** and **Advanced Matching Module** databases to use Global Sentry. For instructions, see [Installing Data Normalization Module Databases](#) on page 108 and [Installing Advanced Matching Module Database](#) on page 107.

If you have Oracle environment variables set in your profile, these environment variables may interfere with DVD database loading processes. If you experience database loading problems and are using Oracle, check that the Oracle environment variables are not active when you perform the DVD database loads.

Ensure the Global Sentry Database Server is in up and running. In case it is not, use the option in the utility to start it before you begin data loading.

**Note:** You need to perform data loading after every upgrade of Spectrum Technology Platform.

1. Stop the Spectrum Technology Platform server.

2. Make sure that Spectrum Technology Platform is stopped. To stop Spectrum Technology Platform, change the working directory to the bin directory of where Spectrum Technology Platform is installed, then type the following command:

```
./server.stop
```

3. Insert the database DVD or download the database from the Pitney Bowes eStore. You received a download link with your product release announcement.

**Note:** If you download the database from the technical support web site, it will be downloaded as a zip file. Unzip the database before proceeding with the installation.

4. If you are installing from DVD and your system does not auto-mount, issue the appropriate mount command to indicate that the DVD device is a file system. If necessary, issue the `/etc/filesystem` command to update your system so that it recognizes this file system. Specify the correct device name for the DVD device on your system.

**Note:** Your system must allow DVDs created under the ISO 9660 format to be mounted as a file system.

5. In the `server/bin` directory, source the "setup" bourne shell script to setup the environment by typing the following command:

```
./setup
```

6. Execute the script for installing the database by typing the following command:

```
./installdb_ois
```

**Note:** It is mandatory to maintain all the CSV and DB files in a correct folder structure. The `ofac`, `pep`, and `sanctions` folder should have their respective DB and four CSV files, and all these should be in one root folder (which you can name according to your convention and convenience). An example of the folder hierarchy is depicted below with `GlobalSentryDatabaseFiles` as the root folder:

```
GlobalSentryDatabaseFiles:
ofac pep sanctions

GlobalSentryDatabaseFiles/ofac:
globalsentrydb.addresses-ofac.csv  globalsentrydb.fullNames-ofac.csv  globalsentrydb.ids-ofac.csv  globalsentrydb.names-ofac.csv  ofac.db

GlobalSentryDatabaseFiles/pep:
globalsentrydb.addresses-pep.csv  globalsentrydb.fullNames-pep.csv  globalsentrydb.ids-pep.csv  globalsentrydb.names-pep.csv  pep.db

GlobalSentryDatabaseFiles/sanctions:
globalsentrydb.addresses-sanctions.csv  globalsentrydb.fullNames-sanctions.csv  globalsentrydb.ids-sanctions.csv  globalsentrydb.names-sanctions.csv  sanctions.db
```

7. Follow the prompts as the script verifies your environment and database location.

**Note:** You may install databases on a network drive, but performance will be affected since you will be accessing them on a network rather than accessing them locally.

8. After installing the Global Sentry Module database, you must configure a JDBC connection in the Spectrum Technology Platform Management Console.
9. Start Spectrum Technology Platform. To start Spectrum Technology Platform, change the working directory to the bin directory of where Spectrum Technology Platform is installed, then type the following command:

```
./server.start
```

10. Log in to the **Management Console** and configure the driver and connection properties using these steps:

- a) In a web browser go to this URL:

```
http://server.port/managementconsole
```

Where *server* is the server name or IP address of your Spectrum Technology Platform server and *port* is the HTTP port used by Spectrum Technology Platform. By default, the HTTP port is 8080 and the HTTPS port is 8443.

- b) Enter your user name and password to access the **Home** page of the **Management Console**.

- c) On the Main Menu, click **Systems > Drivers** to open the **Drivers** page

- d) Click **Add**

- e) Type these JDBC properties in the applicable text boxes:

- JDBC driver configuration name: HSQLDB
- JDBC driver class name: org.hsqldb.jdbcDriver
- Connection string template: jdbc:hsqldb:hsqldb://\${host}:\${port}/\${instance}

- f) Add this driver file:

```
SpectrumDirectory/GlobalSentryDatabase/lib/hsqldb.jar
```

- g) To define connection properties, go to **Resources > Data Sources**.

- h) Click **Add**, and define these connection properties:

- Connection name: Global Sentry
- Database driver: select the HSQLDB JDBC driver that you created in the previous steps.

- i) Enter these values in the **Connection Properties** dialog box:

- host: localhost or <your server name>
- port: 9001
- instance: globalsentrydb

- j) Click **Test** to verify the connection works.

- k) Click **OK**, then click **Save**

## Installing Routing Databases

Spatial Module routing database resources are used by Find Nearest, Get Travel Boundary, Get Travel Cost Matrix, Get Travel Directions, Get Route Data, and Persistent Update.

To install routing Spectrum Product Data (SPD) data from Pitney Bowes, you must:

1. Download the routing SPD format files that you purchased from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace](#).
2. Use Command Line Interface (CLI) commands to install the routing Spectrum Product Data to a Spectrum database. This copies the data to the Spectrum database and makes the Spectrum Technology Platform aware of the data in the database. For details, see [Adding Routing Data to Spectrum](#) on page 131.
3. In Management Console, create a new database resource for the routing Spectrum Product Data, or change an existing database resource to include the routing Spectrum Product Data. A database resource is how you add the data to projects. For details, see [Creating a Routing Database Resource](#) on page 133.

If you are installing Spectrum Product Data for the first time, because you are a new customer to the Spectrum Technology Platform or setting up a new Spectrum server, then we recommend you set the data extract and archive locations before installing Spectrum Product Data. For details, see [SPD Setup on a New Spectrum Server](#) on page 100. We recommend using the `productdata extract register` and `productdata archive register` commands to ensure that the Spectrum Product Data, which may be large, resides in an appropriate and manageable location of your choosing on the server. The default location inside the Spectrum folders can make upgrades and re-installations more difficult and require even greater temporary space.

## Adding Routing Data to Spectrum

You must be a Spectrum Technology Platform administrator (admin) to perform this task.

To install routing Spectrum Product Data (SPD):

1. Verify that the Spectrum Technology Platform server is running before you begin.
2. Download your Spectrum Product Database (SPD) format files from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace \(SDM\)](#). If the download is a zip file, extract it to a temporary location.
3. Open a command-line window.
4. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s SSLtrueFalse
```

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s false
```

5. Install the routing data to the Spectrum server by typing:

```
productdata install --f fileOrDirectory --w waitOrReturn
```

For example:

```
productdata install --f C:/Downloads/C1A122018/CA_Driving.spd --w
```

To import and extract multiple Spectrum Product Data (.spd) files, when installing both pedestrian and driving data for example, provide the path to the folder:

```
productdata install --f C:/Downloads/C1A122018 --w
```

6. Run the following command to view information about the Spectrum data:

```
productdata list
```

This command lists all the information related to Spectrum Product Data (SPD), which are:

- a. PRODUCT
- b. COMPONENT
- c. QUALIFIER
- d. VINTAGE
- e. EXPIRATION
- f. DESCRIPTION
- g. IDENTIFIER

7. Run one of the following commands to generate a template for adding Spectrum data to Spectrum.

- Run the following command to create a template file (.json file) in the current directory:

```
ermdb template
```

- Alternatively, include the file name with the command to export the template to a specific location:

```
ermdb template path of the directory
```

For example:

```
ermdb template C:/Downloads/Templates/ermdbresource.json
```

The current file folder or the path you specified now has a template file (.json) that contains information like:

```
[{"product": "Spatial",
  "module": "routing",
  "name": "enter database name",
  "properties": {"isSPD": "true",
  "DatasetPaths": "${spectrum.spd.Spatial/routing/add IDENTIFIER from
productdata list};"},
  "maxActive": 4}
```

- Configure the JSON template (.json) file by adding the database display name for the `name` tag and adding the IDENTIFIER information from running `productdata list` (in **step 2**) to the `DatasetPaths` tag.

For example:

```
[{"product": "Spatial",
  "module": "routing",
  "name": "Austria",
  "properties": {"isSPD": "true",

  "DatasetPaths": "${spectrum.spd.Spatial/routing/Alt_Pedestrian_Mar_2019};"},
  "maxActive": 4}]
```

- Save your changes to the template file.
- Run the `import` command to add the SPD to the Management Console.

```
ermdb import --f path_to_JSON_template
```

For example, if the template is stored in a JSON file named `ermdbresource.json`, then the command will look like:

```
ermdb import --f C:/Downloads/File/ermdbresource.json
```

You are now ready to create a database resource for the routing data as described in **Creating a Routing Database Resource** on page 133.

For more information about these Product Data CLI commands, see *Product Data and Spatial Module and Routing Databases* in the *Spectrum Technology Platform Administration Guide*.

## Creating a Routing Database Resource

You must be a Spectrum Technology Platform administrator (admin) or Spatial administrator (spatial-admin) to perform this task. If you are a Spatial sub-administrator (spatial-sub-admin), then you must have permission to the folder that you are adding to or editing.

To create a routing database resource for Spectrum:

- In Management Console, go to **Resources > Spectrum Databases**.
- Click the **Add** button  to create a new database resource, or change an existing database resource by clicking the **Edit** button .

**Note:** You can create a new database resource by copying an existing one by clicking the **Copy** button .

3. If you are creating a new database, enter a name for the database resource in the **Name** field. The name can be anything you choose. If you create a new database by copying an existing one, then rename it. You cannot modify the name of an existing database resource, because any services or jobs that reference the database resource by its original name would fail.
4. Change the **Pool Size** value if needed, by specifying the maximum number of concurrent requests you want this database to handle.

**Note:** This setting represents the number of threads on the components that are listening for service requests from the Spectrum Technology Platform for executing a Spatial routing stage (that is, the maximum number of managed connections). Every web service request enters Spectrum from the platform and passes to the components. To accommodate greater request loads, increase the default value (which is 4). We recommend a pool size that matches the number of CPUs. The maximum setting should not go above twice the number of the CPU core; for example, on a 4 CPU machine, the combined number of threads for all services should not exceed 8. Run performance tests with various settings to find the optimal performance.

5. Specify the **Min memory (MB)** and **Max memory (MB)** heap memory values.
6. In the **Module** field, select **Spatial**.
7. In the **Type** field, select **Enterprise Routing**.
8. From **Network Type**, select the type of network that is applicable for the database. You can choose between **Driving** and **Pedestrian**.  
A list of available databases appears in the table below. Each database is listed with its description and vintage.
9. Select the databases from the list.  
To find out more about installing Spectrum data, see [Installing a Spectrum Database](#) on page 100.
10. Select **Override advanced settings** if applicable. This feature lets you override settings such as additional command-line arguments when starting process, properties, and environment variables for remote process.
11. Click **Save** to add the database.  
A list of the Spectrum databases and their status displays. (It may take a moment to refresh the **Status** column.)

The database resource now displays in the list of available database resources for Route, Travel Boundary, Cost Matrix, Find Nearest, Get Travel Boundary, Get Travel Cost Matrix, Get Travel Directions, and Get Route Data.

# Installing Universal Addressing Module Databases

## Universal Addressing Module Databases

**Note:** This section is valid only for users of *UAM- US* , *UAM- Canada*, *UAM- International*, *Loqate*, and *Validate Address Global*.

Universal Addressing Module databases are distributed in the Spectrum™ Product Database (SPD) format from the Pitney Bowes [Software and Data Marketplace](#). After upgrading to Spectrum Technology Platform version **2019.1** from any previous version, you must delete and reconfigure all the previously configured databases using SPDs. You cannot install older databases or vintages.

### Disk Space

The disk space requirements for extracted and non-extracted SPD bundles are:

- Extracted bundles (all SPD) - 50 GB
- Non-extracted bundles (all SPD) - 20 GB

To download and install a Universal Addressing Module database resource in the Spectrum™ Product Database (SPD) format, see [Installing Universal Addressing Module SPD Files](#) on page 135.

## Installing Universal Addressing Module SPD Files

You must be a Spectrum Technology Platform administrator (admin) to perform this task. Before deleting data, verify that the data is not being used by a database resource in the Management Console.

To download and install a Universal Addressing Module database resource in the Spectrum™ Product Database (SPD) format:

1. Select and download your licensed SPD format files (xxx.spd) from Pitney Bowes using the link provided in the Pitney Bowes communication or from the [Pitney Bowes Software and Data Marketplace \(SDM\)](#). If the download is a zip file, extract it to a temporary location.
2. Verify that the Spectrum Technology Platform server is running before you continue.
3. Open a Spectrum™ command line window.

4. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s TrueOrFalse
```

If your Spectrum™ server requires a secure connection, set **--s True**. The default is **False**.

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s False
```

5. Install the data to the Spectrum™ server by typing:

```
productdata install --f fileOrDirectory --w TrueOrFalse
```

To wait for the installation to complete, set **--w True**. To allow the installation to proceed in the background, set **--w False**. The default is **False**.

For example,

```
productdata install --f E:/UAM/USS112019_201820.spd --w False
```

If installing a Spectrum™ product with multiple `.spd` files, then use the folder path to the files. The command installs the data files that are in the folder and subfolders.

For example,

```
productdata install --f E:/UAM/ValidateAddress --w False
```

6. After you install the SPD files, see either [Using Management Console to Create a Database Resource](#) on page 137 or [Using CLI Commands to Create a Database Resource](#) on page 139 to define the database as a resource.

For more information about the Product Data specific CLI commands, see *Product Data* under *Administration Utility* in the *Spectrum Technology Platform Administration Guide*.

## Deleting Universal Addressing Module SPD Files

You must be a Spectrum Technology Platform administrator (admin) to perform this task. Before deleting data, verify that the data is not being used by a database resource in the Management Console.

Do not manually delete the SPD files from the location where the server extracted the SPD files. Instead, use these CLI commands to delete the SPD files. For more information about the Product Data specific CLI commands, see *Product Data* under *Administration Utility* in the *Spectrum Technology Platform Administration Guide*.

1. Verify that the Spectrum Technology Platform server is running before you begin.

2. Connect to the Spectrum Technology Platform server by typing this command:

```
connect --h servername:port --u username --p password --s TrueOrFalse
```

If your Spectrum™ server requires a secure connection, set **--s True**. The default is **False**.

For example,

```
connect --h myserver:8080 --u admin --p myPassword1 --s False
```

3. Run the `productdata list` command to view the details for the currently installed SPD files. The results provide current information without having to access the file system. We recommend using this command before using the `productdata delete` command to make an informed decision about the data to delete.

Open a Spectrum CLI window and type the following:

```
productdata list
```

4. Run the `productdata delete` command to delete the SPD files from the Spectrum™ Technology Platform:

```
productdata delete --p productName --c Component --q Qualifier --v Vintage
```

For example,

```
productdata delete --p "Universal Addressing Module" --c C6P --q UAM-CAN --v SEP2019
```

## Creating a Universal Addressing Module Database Resource

After you install new Spectrum™ Product Database (SPD) format files, use either [Using Management Console to Create a Database Resource](#) on page 137 or [Using CLI Commands to Create a Database Resource](#) on page 139 to define the newly installed database as a Universal Addressing Module database resource.

### *Using Management Console to Create a Database Resource*

To create a Universal Addressing Module database resource in Management Console from a newly installed SPD file:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.

If you do not see the **Spectrum Databases** menu, then you do not need to define database resources.

3. You can use the buttons at the top left to manage your databases.

To create a new database, click Add **+**.

To create a new database by copying an existing database, click Copy .

4. Enter a name for the database resource in the **Name** field. The name can be anything you choose. If you are creating a new database resource by copying an existing database resource, rename as needed. You cannot modify the name of an existing database resource.
5. In the **Pool size** field, specify the maximum number of concurrent requests you want this database to handle.

The optimal pool size varies by module. You will generally see the best results by setting the pool size between one-half to twice the number of CPUs on the server, with the optimal pool size for most modules being the same as the number of CPUs. For example, if your server has four CPUs you may want to experiment with a pool size between 2 (one-half the number of CPUs) and 8 (twice the number of CPUs) with the optimal size possibly being 4 (the number of CPUs).

When modifying the pool size you must also consider the number of runtime instances specified in the dataflow for the stages accessing the database. Consider for example a dataflow that has a Universal Addressing Module stage that is configured to use one runtime instance. If you set the pool size for the Universal Addressing Module database to four, you will not see a performance improvement because there would be only one runtime instance and therefore there would only be one request at a time to the database. However, if you were to increase the number of runtime instances of the Universal Addressing Module stage to four, you might then see an improvement in performance since there would be four instances of the Universal Addressing Module stage accessing the database simultaneously, therefore using the full pool. For more information about setting runtime instances, see the *Spectrum™ Technology Administration Guide*.

**Tip:** You should conduct performance tests with various settings to identify the optimal pool size and runtime instance settings for your environment.

6. In the **Min memory (MB)** field, specify the minimum amount of memory allocated for this database resource.
7. In the **Max memory (MB)** field, specify the maximum amount of memory allocated for this database resource.
8. In the **Module** field, select Universal Addressing Module.
9. In the **Type** field, select the type of data.
  - a) Select the **Canada Address Coders** database for Canada address processing.
  - b) Select the **International Address Coders** database for International address processing.
  - c) Select the **US Address Coders** database for United States (USA) address processing.
10. For Canada Address Coders, in the **\*Canada:** field, select the base database vintage.
11. For International Address Coders, in the **\*International:** field, select the base database vintage.

12. For US Address Coders, in the **\*US:** field, select the base database vintage.
13. For US Address Coders, specify the database vintage for the following optional databases you use for processing.
  - Delivery Point Validation (DPV)
  - LACSLink
  - SuiteLink
  - Residential Delivery Indicator (RDI)
  - Early Warning System (EWS)
14. To override advanced settings such as additional command line arguments when starting processing, properties, and environmental variables for remote processing, select **Override advanced settings**.
15. Click **Save** to add and save the database resource. The Spectrum™ Databases page displays the added database resource.

## Using CLI Commands to Create a Database Resource

To create and configure a Universal Addressing Module database resource from a newly installed SPD file, use the `uamdb create` command.

For detailed descriptions of all Universal Addressing Module CLI command options, type:

```
help uamdb
```

For a detailed descriptions of the available options for a specific Universal Addressing Module CLI command, type "Help" and the command name.

For example,

```
help uamdb create
```

### ***uamdb create***

The `uamdb create` command creates a new Universal Addressing Module database.

#### ***Usage***

```
uamdb create --t Type --n Name --c CacheSize --i Country --pl PreloadingType
--dt DatabaseType --b BasePath --d DPVPath --l LACSPath --s SuiteLinkPath --r
RDIPath --e EWSPath --p Poolsize --mm minimumMemorySize --mx maximumMemorySize
```

**Note:** To see a list of parameters, type `help uamdb create`.

| Required       | Argument   | Description  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
|----------------|--|--|-------------|---------------------------------|----------------|--|--------------|--|---------------|-----------------|---------------|----------------------------------|-------------|---------------------|
| Yes            | <code>--t Type</code>  | Specifies the type of database, where <i>Type</i> is one of the following: <table border="0"> <tr> <td><b>USA</b></td> <td>United States database</td> </tr> <tr> <td><b>CAN</b></td> <td>Canadian Database</td> </tr> <tr> <td><b>INTL</b></td> <td>International Database</td> </tr> <tr> <td><b>Loqate</b></td> <td>Loqate Database</td> </tr> <tr> <td><b>Global</b></td> <td>Validate Address Global Database</td> </tr> <tr> <td><b>Amas</b></td> <td>Australian Database</td> </tr> </table>  | <b>USA</b>  | United States database          | <b>CAN</b>     | Canadian Database  | <b>INTL</b>  | International Database   | <b>Loqate</b> | Loqate Database | <b>Global</b> | Validate Address Global Database | <b>Amas</b> | Australian Database |
| <b>USA</b>     | United States database   |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>CAN</b>     | Canadian Database  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>INTL</b>    | International Database   |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Loqate</b>  | Loqate Database  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Global</b>  | Validate Address Global Database   |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Amas</b>    | Australian Database  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| Yes            | <code>--n Name</code>  | Specifies the name of the database.  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| No             | <code>--c CacheSize</code>   | Specifies the cache size of a Validate Address Global database, where <i>CacheSize</i> is one of the following: <table border="0"> <tr> <td><b>None</b></td> <td>No cache</td> </tr> <tr> <td><b>Small</b></td> <td>Small cache</td> </tr> <tr> <td><b>Large</b></td> <td>Large cache (default)</td> </tr> </table>  | <b>None</b> | No cache                        | <b>Small</b>   | Small cache  | <b>Large</b> | Large cache (default)  |               |                 |               |                                  |             |                     |
| <b>None</b>    | No cache   |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Small</b>   | Small cache  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Large</b>   | Large cache (default)  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| No             | <code>--i Country</code>   | Specifies the three-digit ISO code(s) for each country in a Validate Address Global database that you want to use, where <i>Country</i> is either "All" (default) or a list of codes separated by comma.   |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| No             | <code>--pl PreloadingType</code>   | Specifies the amount of a Validate Address Global database that is preloaded, where <i>PreloadingType</i> is one of the following: <table border="0"> <tr> <td><b>None</b></td> <td>No data is preloaded (default).</td> </tr> <tr> <td><b>Partial</b></td> <td>Loads the metadata and indexing structures into memory. The reference data itself will remain on the hard drive. Offers some performance enhancements and is an alternative when not enough memory is available to fully load the desired databases.</td> </tr> <tr> <td><b>Full</b></td> <td>Moves the entire reference database into memory. This may need a significant amount of memory for countries with large databases such as the USA or the United Kingdom, but it will significantly increase the processing speed.</td> </tr> </table> | <b>None</b> | No data is preloaded (default). | <b>Partial</b> | Loads the metadata and indexing structures into memory. The reference data itself will remain on the hard drive. Offers some performance enhancements and is an alternative when not enough memory is available to fully load the desired databases. | <b>Full</b>  | Moves the entire reference database into memory. This may need a significant amount of memory for countries with large databases such as the USA or the United Kingdom, but it will significantly increase the processing speed. |               |                 |               |                                  |             |                     |
| <b>None</b>    | No data is preloaded (default).  |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Partial</b> | Loads the metadata and indexing structures into memory. The reference data itself will remain on the hard drive. Offers some performance enhancements and is an alternative when not enough memory is available to fully load the desired databases. |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| <b>Full</b>    | Moves the entire reference database into memory. This may need a significant amount of memory for countries with large databases such as the USA or the United Kingdom, but it will significantly increase the processing speed.                     |  |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |
| No             | <code>--dt DatabaseType</code>   | Specifies the processing mode for a Validate Address Global database, where <i>DatabaseType</i> is one of the following: <p>Used in batch processing or interactive environments. It is optimized for speed and will terminate attempts to correct an address when ambiguous data is encountered that cannot be corrected automatically (default).</p>   |             |                                 |                |  |              |  |               |                 |               |                                  |             |                     |

| Required | Argument  | Description  |
|----------|---|--|
|          |   | Used in batch processing environments for Australian mail to standardize and validate mail against the Postal Address File.  |
|          |   | Used to enter truncated data in address fields and have Validate Address Global generate suggestions.  |
| Yes      | --b <i>BasePath</i>                               | Specifies the base subscription database path.<br><br><b>Note:</b> For <b>USA, CAN, INTL, Loqate</b> , and <b>Validate Address Global</b> specify the database vintage in place of database path.<br><b>Example:</b> NOV2017 |
| No       | --d <i>DPVPath</i>                                | Specifies the DPV database vintage.  |
| No       | --l <i>LACSPath</i>                               | Specifies the LACS database vintage.   |
| No       | --s <i>SuiteLinkPath</i>                          | Specifies the SuiteLink database vintage.  |
| No       | --r <i>RDIPath</i>                                | Specifies the RDI database vintage.  |
| No       | --e <i>EWSPath</i>                                | Specifies the EWS database vintage.  |
| No       | --p <i>Poolsize</i>                               | Specifies the maximum number of concurrent requests you want this database to handle. The default is 4.  |
| No       | --mn or<br>--minMem<br><i>minimum_memory_size</i> | Defines the minimum amount of memory allocated for this database. This value must be less than or equal to the --mx setting.   |
| No       | --mx or<br>--maxMem<br><i>maximum_memory_size</i> | Defines the maximum amount of memory allocated for this database. This value must be greater than zero, but cannot exceed 65536 MB.  |

**Note:** The *database vintage* can be obtained using the *uamdb listdatasets* command. For more information see [uamdb listdatasets](#).

#### Example

To create a database for *UAM US, CAN, INTL, Loqate*, or *Validate Address Global* provide input in this format:

```
uamdb create --t USA --n UAM_US --b FEB2018 --d AUG2018 --r
SEP2018 --mn 1200 --mx 65536
```

## Modifying a Universal Addressing Module Database Resource

You can use either the Database Resource tool in the Management Console or the Universal Addressing Module CLI commands to modify a Universal Addressing Module database resource. For more information about modifying a Universal Addressing Module database resource, see either [Using Management Console to Modify a Database Resource](#) on page 142 or [Using CLI Commands to Modify a Database Resource](#) on page 142.

### Using Management Console to Modify a Database Resource

To modify a Universal Addressing Module database resource:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.
3. To modify an existing database, select the database and then click Edit .
4. Make your required changes. For more information on database resource fields, see [Using Management Console to Create a Database Resource](#) on page 137.
5. Click **Save** to save your changes to the selected database resource. The Spectrum™ Databases page displays the modified database resource.

### Using CLI Commands to Modify a Database Resource

To modify a Universal Addressing Module database resource, use the `uamdb modify` command.

For detailed descriptions of all Universal Addressing Module CLI command options, type:

```
help uamdb
```

For a detailed descriptions of the available options for a specific Universal Addressing Module CLI command, type "Help" and the command name.

For example,

```
help uamdb modify
```

#### ***uamdb modify***

The `uamdb modify` command updates an existing Universal Addressing Module database.

#### *Usage*

```
uamdb modify --t Type --n Name --b BasePath --d DPVPath --l LACSPath --s SuiteLinkPath --r RDIPath --e EWSPath --p Poolsize
```

| Required | Argument                              | Description  |
|----------|---------------------------------------|--|
| Yes      | <code>--t <i>Type</i></code>          | Specifies the type of database, where <i>Type</i> is one of the following:<br><b>USA</b> United States database<br><b>CAN</b> Canadian Database<br><b>INTL</b> International Database<br><b>Global</b> Validate Address Global Database              |
| Yes      | <code>--n <i>Name</i></code>          | Specifies the name of the database.  |
| Yes      | <code>--b <i>BasePath</i></code>      | Specifies the base subscription database path.<br><br><b>Note:</b> For <b>USA</b> , <b>CAN</b> , <b>INTL</b> , <b>Loqate</b> , and <b>Validate Address Global</b> specify the database vintage in place of database path.<br><b>Example:</b> NOV2017 |
| No       | <code>--d <i>DPVPath</i></code>       | Specifies the DPV database vintage.  |
| No       | <code>--l <i>LACSPath</i></code>      | Specifies the LACS database vintage.   |
| No       | <code>--s <i>SuiteLinkPath</i></code> | Specifies the SuiteLink database vintage.  |
| No       | <code>--r <i>RDIPath</i></code>       | Specifies the RDI database vintage.  |
| No       | <code>--e <i>EWSPath</i></code>       | Specifies the EWS database vintage.  |
| No       | <code>--p <i>Poolsize</i></code>      | Specifies the maximum number of concurrent requests you want this database to handle. The default is 4.  |

**Note:** The *database vintage* can be obtained using the `uamdb listdatasets` command. For more information see [uamdb listdatasets](#).

#### Example

To create a database for *UAM US*, *CAN*, *INTL*, *Loqate*, or *Validate Address Global* provide input in this format:

```
uamdb modify --n UAM_US --t USA --b SEP2018 --d AUG2018 --r
OCT2018
```

## Deleting a Universal Addressing Module Database Resource

You can use either the Database Resource tool in the Management Console or the Universal Addressing Module CLI commands to delete a Universal Addressing Module database resource. For more information about deleting a Universal Addressing Module database resource, see either

[Using Management Console to Delete a Database Resource](#) on page 144 or [Using CLI Commands to Delete a Database Resource](#) on page 144.

## Using Management Console to Delete a Database Resource

To delete a Universal Addressing Module database resource:

1. Open Management Console.
2. Go to **Resources > Spectrum Databases**.
3. To delete a database, select the database and then click Delete .
4. You will be asked to confirm that you want to delete the selected database resource. To confirm and delete the database resource, click Yes.
5. The database resource is deleted and no longer displays on the Spectrum™ Databases page.

## Using CLI Commands to Delete a Database Resource

To delete a Universal Addressing Module database resource, use the `uamdb delete` command.

For detailed descriptions of all Universal Addressing Module CLI command options, type:

```
help uamdb
```

For a detailed descriptions of the available options for a specific Universal Addressing Module CLI command, type "Help" and the command name.

For example,

```
help uamdb delete
```

### ***uamdb delete***

The `uamdb delete` command deletes a Universal Addressing Module database.

### Usage

```
uamdb delete --t Type --n Name
```

| Required      | Argument                         | Description   |            |                        |            |                   |             |                        |               |                 |               |                                  |
|---------------|----------------------------------|---|------------|------------------------|------------|-------------------|-------------|------------------------|---------------|-----------------|---------------|----------------------------------|
| Yes           | --t <i>Type</i>                  | Specifies the type of database, where <i>Type</i> is one of the following: <table border="0" data-bbox="552 1638 1299 1875"> <tr> <td><b>USA</b></td> <td>United States database</td> </tr> <tr> <td><b>CAN</b></td> <td>Canadian Database</td> </tr> <tr> <td><b>INTL</b></td> <td>International Database</td> </tr> <tr> <td><b>Loqate</b></td> <td>Loqate Database</td> </tr> <tr> <td><b>Global</b></td> <td>Validate Address Global Database</td> </tr> </table> | <b>USA</b> | United States database | <b>CAN</b> | Canadian Database | <b>INTL</b> | International Database | <b>Loqate</b> | Loqate Database | <b>Global</b> | Validate Address Global Database |
| <b>USA</b>    | United States database           |   |            |                        |            |                   |             |                        |               |                 |               |                                  |
| <b>CAN</b>    | Canadian Database                |   |            |                        |            |                   |             |                        |               |                 |               |                                  |
| <b>INTL</b>   | International Database           |   |            |                        |            |                   |             |                        |               |                 |               |                                  |
| <b>Loqate</b> | Loqate Database                  |   |            |                        |            |                   |             |                        |               |                 |               |                                  |
| <b>Global</b> | Validate Address Global Database |   |            |                        |            |                   |             |                        |               |                 |               |                                  |

| Required | Argument              | Description                         |
|----------|-----------------------|-------------------------------------|
|          |                       | <b>Amas</b> Australian Database     |
| Yes      | <code>--n Name</code> | Specifies the name of the database. |

**Example**

This example deletes a Canadian database named "UAM\_CAN".

```
uamdb delete --t CAN --n UAM_CAN
```

## Installing Validate Address Global Databases

This procedure describes how to install the databases used by the Validate Address Global stage. For instructions on installing databases used by other Universal Addressing Module stages, see the *Spectrum Technology Platform Administration Guide*.

1. Download your licensed SPD files (xxx.spd) using the link provided in the Pitney Bowes communication or from the Pitney Bowes [Software and Data Marketplace \(SDM\)](#).
2. The SPD files are:
  - VAGlobal-EMEA.spd—Contains the data for Europe, Middle East, and Africa.
  - VAGlobal-APAC.spd—Contains the data for Asia-Pacific.
  - VAGlobal-Americas.spd—Contains the data for the Americas.

**Note:** You may install databases on a network share, but performance will be affected since you will be accessing the databases on a network rather than accessing the databases locally.

3. Stop Spectrum Technology Platform. To do this, change the working directory to the `bin` directory of where Spectrum Technology Platform is installed, then type the following command:

```
./server.stop
```

4. Install the unlock code:

- a) Open the following file in a text editor:

```
<SpectrumDirectory>/server/modules/addressglobal/conf/unlockcodes.txt
```

- b) Enter your unlock codes, one per line.
- c) Save and close the file.

5. Start the Spectrum Technology Platform by changing the working directory to the `bin` directory of where Spectrum Technology Platform is installed, then type the following command:

```
./server.start
```

## Installing Validate Address Loqate Databases

This procedure describes how to install the databases used by the Validate Address Loqate stage. For instructions on installing databases used by other Universal Addressing Module stages, see the *Spectrum Technology Platform Administration Guide*.

1. Download your licensed SPD files (xxx.spd) using the link provided in the Pitney Bowes communication or from the Pitney Bowes [Software and Data Marketplace \(SDM\)](#).
2. The database SPD files are:
  - LQ0 — Contains a separate lib file for the Windows installation of data in the .spd file format. Irrespective of which Windows and non-Windows platform you are using, there will be a different lq0 file (lib file) for these platforms:
    - Win-LQ0\_win
    - Linux- LQ0\_Linux
    - AIX7.1-LQ0\_AIX7.1
    - AIX7.2- LQ0\_AIX7.2
    - Solaris-LQ0\_Solaris
    - HPUX-LQ0\_hpux

**Note:** Regardless of which set of data you use, the files in LQ0 must be installed.

- LQ1-APAC\_AFR\_ME—Contains the data for Asia-Pacific, Africa, and Middle East.
- LQ2-Americas—Contains the data for Americas regions.
- LQ3-Europe—Contains the data for Europe region.

You may install databases on a network share, but performance will be affected since you will be accessing them on a network rather than accessing them locally.

3. The database is downloaded as a .spd file. Install the SPD file:
  - a. Place the SPD files at <SpectrumLocation>/server/import. This is the default location for the SPD files. The *Spectrum Technology Platform* server monitors this folder and looks for new files in two-second intervals. You can change the location of the data import directory by altering the *spectrum.import.dir* property in this file:
 

```
<SpectrumLocation>/server/conf/spectrum-container.properties.
```
  - b. When the server detects new SPD files, the server automatically extracts the SPD files to <SpectrumLocation>/server/ref data. You can change the location of the data storage folder by altering the *spectrum.data.manager.storage.dir* property in the Data Manager settings section of the
 

```
<SpectrumLocation>/server/conf/spectrum-container.properties
```

 file.

- c. By default, the SPD files will be archived in `<SpectrumLocation>/server/archive/ref data`.
4. At this point the data will become available and you can add it as a Spectrum™ database resource in the **Spectrum™ Databases** section of **Management Console**.

## Installing Universal Name Module Databases

The Universal Name Module provides a load utility to install databases. The database files that you load depend on the databases you have licensed.

1. Stop the Spectrum Technology Platform server.
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.

## Using the Database Silent Installer

The silent install process allows you to preconfigure the database installation process so that it runs without user intervention.

Instead of responding to prompts from the installation process for information such as the installation location, you specify these responses in a properties file that the installer uses instead of user prompts.

## Using the Loqate Database Silent Installer

1. In the Spectrum Technology Platform server installer (not the database installer), browse to the `SilentInstaller` folder.
2. Using a text editor, open the `uam_loqate.installer.properties` file.
3. Edit the properties file as necessary to specify the installation settings you want to use. See the comments in the properties file for additional information.
4. To run the installer in silent mode, place the properties file in any directory except the location where you are going to install the Loqate data and give the absolute path to the property in the command prompt, as follows:

```
./install.sh %PathOfPropertyFile%\uam_loqate.installer.properties
```

## Using the Universal Addressing Module Database Silent Installer

These instructions are for all Universal Addressing Module databases with the exception of Loqate. Please see [Using the Loqate Database Silent Installer](#) on page 147 for Loqate-specific instructions.

1. In the installed Spectrum Technology Platform Server, browse to the `bin` folder.  
When the Spectrum Technology Platform is installed, the properties file is created in the `<Spectrum Location>/server/bin` folder.
2. Using a text editor, open the `silentinstalldb_unc.properties` file.
3. Edit the properties file as necessary to specify the installation settings you want to use. See the comments in the properties file for additional information.

**Note:** The silent installer for Universal Addressing Module supports U.S. Postal, Canadian Postal, and International Postal databases.

| Region                         | Database   |
|--------------------------------|--|
| Validate Address U.S.          | <ul style="list-style-type: none"> <li>• U.S. Postal database</li> <li>• Delivery Point Validation database</li> <li>• LACS<sup>Link</sup> database</li> <li>• Early Warning System database</li> <li>• Residential Delivery Indicator database</li> </ul> |
| Validate Address Canada        | Canadian Postal Database   |
| Validate Address International | International Postal Database  |

4. Run the installer in silent mode. When the installer executes it will detect the properties file and automatically run in silent mode.

# 7 - Client Tools

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# Installing the Client Tools

The Spectrum Technology Platform client tools are applications that you use to administer your server and design and run dataflows and process flows. You must install your Spectrum Technology Platform server before installing the client tools.

Before installing, be sure to read the release notes. The release notes contains a list of known issues, important compatibility information, and release-specific installation notes.

This procedure describes how to install the client tools:

- **Enterprise Designer** allows you to create, modify, and run dataflows.
- **Flow Designer** is the next-generation Web UI dataflow design tool. This release provides a technical *preview* version of Flow Designer.

**Note:** Enterprise Designer will be retired once Flow Designer contains the full feature set in a future release.

- **Job Executor** is a command line tool that allows you to run a job from a command line or script. The job must have been previously created and saved on Spectrum Technology Platform using Enterprise Designer or Flow Designer.
- **Process Flow Executor** is a command line tool that allows the execution of a process flow from a command line or script. The process flow must have been previously created and saved on Spectrum Technology Platform using Enterprise Designer or Flow Designer.
- **Administration Utility** provides command line access to several administrative functions. You can use it in a script, allowing you to automate certain administrative tasks. You can also use it interactively.

To install the client tools:

1. Open a web browser and go to the Spectrum Technology Platform Welcome Page at:

```
http://<servername>:<port>
```

For example, if you installed Spectrum Technology Platform on a computer named **myspectrumplatform** and it is using the default HTTP port 8080, you would go to:

```
http://myspectrumplatform:8080
```

2. Click **Platform Client Tools**.
3. Download the client tool you want to install.

# Installing Enterprise Designer with a Silent Installer

The silent install process installs Enterprise Designer without user intervention. Instead of prompting the user for information such as the installation location, the installer uses preconfigured selections that you specify.

To use the silent installer you must first create an installer properties file by running the client installer and responding to the prompts. The resulting properties file can then be used to silently install Enterprise Designer on other computers.

1. Open a web browser and go to the Spectrum Technology Platform Welcome Page at:

```
http://<servername>:<port>
```

For example, if you installed Spectrum Technology Platform on a computer named **myspectrumplatform** and it is using the default HTTP port 8080, you would go to:

```
http://myspectrumplatform:8080
```

2. Click **Platform Client Tools**.
3. Click **Download Installer**.
4. Choose to save the file to a location on your computer.

**Note:** Save the installer on a Windows computer that does not already have Enterprise Designer installed. You will need to run the installer in order to specify the options you want to use in the silent install process.

5. Open a Windows command prompt.
6. In the command prompt, change directories to the directory where you saved the installer.
7. Execute the following command:

```
Setup.exe -r installer.properties
```

8. Respond to the installer prompts by selecting the options that you want to use when the installer runs silently.

For example, if you want the silent installer to install Enterprise Designer to `C:\Spectrum\EnterpriseDesigner`, specify `C:\Spectrum\EnterpriseDesigner` when prompted for an installation folder.

When the installer finishes running, a properties file named `installer.properties` is created in the same folder as the `Setup.exe` file.

9. Open the file `installer.properties` in a text editor.

10. Add the following on line 8 of the file:

```
INSTALLER_UI=silent
```

**Note:** This is case sensitive to be sure to enter it exactly as shown above.

11. Save and close the properties file.

You have now configured a properties file that will enable you to install Enterprise Designer silently.

12. To install Enterprise Designer silently, place `installer.properties` and `Setup.exe` in the same folder on the computer where you want to install Enterprise Designer and run `Setup.exe`. When the installer executes it will detect `installer.properties` and automatically run in silent mode.

Alternatively, you can place `installer.properties` in different directory and give the absolute path to the property in the command prompt using the `-f` argument, as follows:

```
Setup.exe -f PathOfPropertyFile\installer.properties
```

## Upgrading Enterprise Designer

### *Upgrading from 12.0 or 11.0 SP1*

If you are upgrading to Spectrum Technology Platform 12.0 SP1 from 12.0 or 11.0 SP1, you do not need to upgrade Enterprise Designer. However, you should delete this file before logging in to 12.0 SP1:

```
C:\Users\UserName\AppData\Roaming\Pitney Bowes\Enterprise Designer\Settings.xml
```

### *Upgrading from a version prior to 11.0*

If you are upgrading to Spectrum Technology Platform 12.0 SP1 from a version prior to 11.0 SP1, you must upgrade Enterprise Designer due to security changes.

**Important:** Once you upgrade your server to 12.0 SP1, you will not be able to log in to Enterprise Designer until you upgrade it.

To upgrade Enterprise Designer:

1. Uninstall the existing client tools by going to **Start > All Programs > Pitney Bowes > Client Tools > Setup**.

2. Make sure that you have .NET 4.6 installed on the client machine. This is a newer version of .NET than was required in previous releases. Note that Windows 10 comes with this version of .NET installed by default.
3. Download the client tools installer from the Spectrum Technology Platform welcome page, <http://SpectrumServer:Port>. The default port is 8080.
4. Run the installer.

## Removing Enterprise Designer

1. Back up any files you may need in the future.
2. Use the Windows Add/Remove Programs control panel to uninstall Enterprise Designer.

# 8 - Client API

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# Installing the Client API

The Client API is used to integrate Spectrum Technology Platform functionality into your applications. If you will be creating your own program to call Spectrum Technology Platform, you need to install the Spectrum Technology Platform Client API on the system where you will be developing your application. The Client API allows access to Spectrum Technology Platform through several programming languages, including Java, C++, and web services.

To run the Client API install and uninstall procedures, you must have the Spectrum Technology Platform-supported version of Java installed on your machine. Add the `/jre/bin` location to `$PATH`. If you are installing the Client API on the same machine as Spectrum Technology Platform, you can use the version of Java included with Spectrum Technology Platform by sourcing the `server/bin` setup script in your Spectrum Technology Platform install location.

1. Open the folder where you have downloaded the Spectrum Technology Platform Client API installer.
2. Type the following:  

```
./sdkinst.bin
```
3. The installer guides you through the installation process.

# Removing the Client API

1. Navigate to the folder where you installed the Client API. If you installed the Client API to the default location, navigate to the following path: `/PBSpectrum_ClientSDK/Uninstall_SDK`.
2. Type the following and press **Enter**:  

```
# ./Uninstall_SDK
```
3. The uninstall script guides you through the uninstall process.

**Note:** If the Client API and the Spectrum Technology Platform server were installed on the same machine and you used the Java installation from Spectrum Technology Platform to install the Client API, you cannot remove the server before uninstalling the Client API. If you remove the Spectrum Technology Platform server before removing the Client API, you will need to install Java on your machine to complete the uninstallation of the Client API.

# 9 - SAP, SugarCRM, and Microsoft Dynamics

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# Configuring SAP

## Integrating with SAP

To integrate Spectrum Technology Platform with SAP, you need to install supporting databases and dataflows on the Spectrum Technology Platform server, and then configure your SAP system to communicate with Spectrum Technology Platform. Once you do this, users of SAP will have access to address validation and geocoding functionality from within SAP.

1. On the Spectrum Technology Platform server, install the databases required to perform address validation, geocoding, and tax jurisdiction assignment and define database resources for each database.

You must give the database resources the following names.

| Database                                      | Required Name for Database Resource |
|---|-------------------------------------|
| Enterprise Geocoding Module - Canada Database | IGEO_CAN                            |
| Enterprise Geocoding Module - U.S. Database   | EGM_US                              |
| Enterprise Tax Module Database                | ETM                                 |
| Universal Addressing Module - Canada Database | Canada                              |
| Universal Addressing Module - Loqate Database | Loqate                              |
| Universal Addressing Module - U.S. Database   | UAM_US                              |

2. When you install the SAP Module, several dataflow files are automatically installed. Other dataflow files must be manually copied into Spectrum Technology Platform.
  - a) If you are adding the Enterprise Tax Module or Universal Addressing Module to an existing installation, open Spectrum Technology Platform Enterprise Designer, select **View > Server Explorer**, and delete this dataflow: SAPValidateAddressWithCandidates.
  - b) Go to: `SpectrumDirectory\server\modules\dataflows\sap`.
  - c) Review the following table then copy the applicable dataflow files to:

*SpectrumDirectory\server\import*

If you are installing this set of modules Copy these dataflow files to the import folder

|   |   |
|---|---|
| Universal Addressing Module   | ValidateAddresswithCandidates_UAM.df  |
| Enterprise Geocoding Module   | ValidateAddressWithCandidates_EGM.df  |
| Enterprise Geocoding Module<br>Universal Addressing Module                          | ValidateAddressWithCandidates_UAM_EGM.df  |
| Enterprise Tax Module<br>Universal Addressing Module                                | ValidateAssignGeoTAXInfo.df<br>SAPBatchAssignGeoTAXInfo.df<br><br>SAPValidateAddressAndAssignGeoTAXInfo.df<br>ValidateAddressWithCandidates_UAM_ETM .df |
| Enterprise Geocoding Module<br>Enterprise Tax Module<br>Universal Addressing Module |   |
| Universal Addressing Module without<br>Loqate                                       | SAPValidateAddressWithCandidate_UAM.df  |
| Universal Addressing Module without<br>Loqate<br>Enterprise Tax Module              | ValidateAssignGeoTAXInfo.df<br>SAPBatchAssignGeoTAXInfo.df<br><br>SAPValidateAddressAndAssignGeoTAXInfo.df<br>ValidateAddressWithCandidates.UAM_ETM.df  |
| Universal Addressing Module with<br>Loqate  | ValidateAddressWithCandidates_UAM_Loqate.df   |
| Universal Addressing Module with<br>Loqate<br>Enterprise Geocoding Module           | ValidateAddressWithCandidates_UAM_Loqate_EGM.df   |

If you are installing this set of modules Copy these dataflow files to the import folder

|   |  |
|---|--|
| Universal Addressing Module with Loqate Enterprise Tax Module                             | ValidateAddressWithCandidates_UAM_Loqate_ETM.df  |
| Universal Addressing Module with Loqate Enterprise Geocoding Module Enterprise Tax Module | ValidateAddressWithCandidates_UAM_Loqate_EGM_ETM.df  |
| Universal Addressing Module, Loqate only  | ValidateAddressWithCandidates_Loqate.df  |
| Universal Addressing Module, Loqate only Enterprise Geocoding Module                      | ValidateAddressWithCandidates_Loqate_EGM.df  |
| Enterprise Geocoding Module   | GeocodeUSAddressWithCandidates.df<br>ValidateAddressWithCandidates_EGM.df                          |
| Enterprise Tax Module   | ValidateAssignGeoTAXInfo.df<br>ValidateAddressWithCandidates_ETM.df<br>SAPBatchAssignGeoTAXInfo.df |

**Note:** If errors occur in Management Console or Enterprise Designer, delete the contents of <WindowsTemporaryDirectory>\glAssemblies, where <WindowsTemporaryDirectory> is one of these: %TMP%, %TEMP%, %USERPROFILE%, or the *Windows directory*. Typically, C:\Documents and Settings\

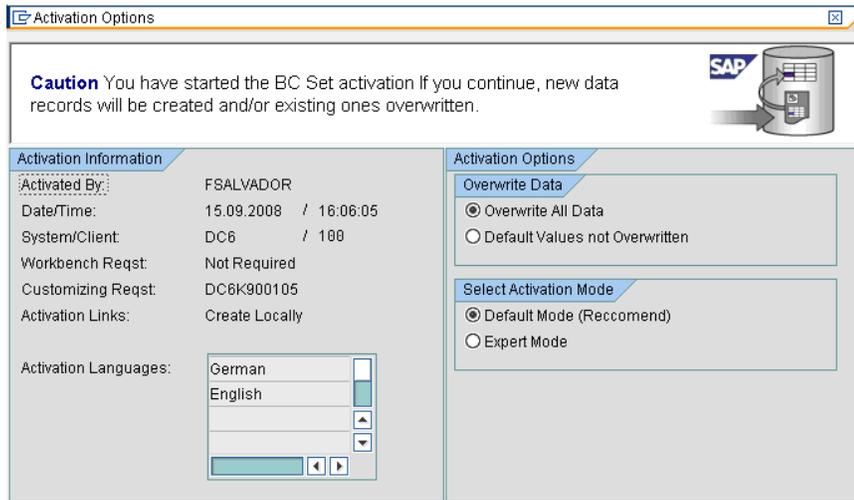
### 3. Import .SAR files.

A .SAR file is a file that contains a third-party add-on package for SAP, such as the Spectrum Technology Platform SAP Module. The .SAR file is located on the Spectrum Technology Platform installer in the `SAP Objects` folder. For information about importing .SAR files into SAP applications, see your SAP Basis administrator.

4. Activate the business configuration (BC) sets. The activation options and sequence differs for ECC and CRM installations.

a) **Activate BC sets for ECC and S/4 HANA installations**

1. Log on to the client where the settings for the Spectrum Technology Platform SAP Module is to be configured.
2. Enter the transaction code `SCPR20`. This activates BC sets and places the default entries on the Spectrum Technology Platform customizing tables.
3. In the **BC Set** field, enter keyword `*hsggrp1*` and find all the BC Sets in this namespace.
4. Activate it with the options **Overwrite All Data** and **Default Mode**.



5. Select and activate the BC sets with the activation options set to **Overwrite All Data** and **Expert Mode**

**Note:** Activate these BC sets in the order listed.

```

/HSGRP1/BCSET_BC_BAS_DES
/HSGRP1/BCSET_BC_BAS_GTX
/HSGRP1/BCSET_BC_BAS_PV
/HSGRP1/BCSET_BUPA_CUSTOM
/HSGRP1/BCSET_DQC_CUSTOM
/HSGRP1/BCSET_VENDOR
/HSGRP1/DD_TCODE
/HSGRP1/FUZZY_SEARCH_INPUT_PARAM
/HSGRP1/MERGE_SETTINGS
/HSGRP1/ONP_PO
/HSGRP1/SPOD_CON_TABLE
/HSGRP1/SPOD_IN_TABLE
/HSGRP1/SPOD_OPT_TABLE
/HSGRP1/SPOD_OUT_TABLE

```

/HSGRP1/SPOD\_PO

b) **Activate BC sets for CRM installations where ICWC isn't required (IC Web Client)**

1. Log on to the client where the settings for the Spectrum Technology Platform SAP Module is to be configured.
2. Enter the transaction code `SCPR20`. This activates BC sets and places the default entries on the Spectrum Technology Platform customizing tables.
3. In the **BC Set** field, enter keyword `*hsggrp1*` and find all the BC Sets in this namespace.
4. Activate it with the options **Overwrite All Data** and **Default Mode**.

5. Select and activate the BC sets with the activation options set to **Overwrite All Data** and **Expert Mode**

**Note:** Activate these BC sets in the order listed.

/HSGRP1/BCSET\_BC\_BAS\_DES  
 /HSGRP1/BCSET\_BC\_BAS\_GTX  
 /HSGRP1/BCSET\_BC\_BAS\_PV  
 /HSGRP1/BCSET\_BUPA\_CUSTOM  
 /HSGRP1/BCSET\_DQC\_CUSTOM  
 /HSGRP1/BCSET\_VENDOR  
 /HSGRP1/DD\_TCODE  
 /HSGRP1/FUZZY\_SEARCH\_INPUT\_PARAM  
 /HSGRP1/HYBRID\_CONFIG  
 /HSGRP1/MERGE\_SETTINGS  
 /HSGRP1/ONP\_PO  
 /HSGRP1/SPOD\_CON\_TABLE  
 /HSGRP1/SPOD\_CON\_ENTRY  
 /HSGRP1/SPOD\_IN\_TABLE

/HSGRP1/SPOD\_OPT\_TABLE  
 /HSGRP1/SPOD\_OUT\_TABLE  
 /HSGRP1/SPOD\_PO  
 /HSGRP1/SPOD\_SSE\_ENTRY

5. Set up the RFC destination for Spectrum OnPremise.
  - a) Enter transaction code `SM59`.
  - b) Click **Create**.
  - c) In the **RFC Destination** field, enter a name of your choice.
  - d) In the **Connection Type** field, enter `G` (HTTP connection to external server).
  - e) In the **Description 1** field, enter a meaningful description.
  - f) Press the Enter key.
  - g) Click the **Technical Settings** tab.
  - h) In the **Target Host** field, enter the computer name or IP Address of the Spectrum Technology Platform server.
  - i) In the **Service No** field enter `8080`.
  - j) Click the **Special Options** tab.
  - k) Select **No Timeout**.
  - l) Select **HTTP 1.1**.
  - m) After you save, click **Connection Test**.

**Note:** If there is a pop-up window, check the **Accept All Further Cookies** box and select YES.

- n) When the test is successful, go to the **Response Body** tab to view the Spectrum Technology Platform page.

**Note:** To setup RFC Destination for Spectrum OnDemand, see [Integration of SAP with Spectrum on Demand](#).

6. Set up the Spectrum Technology Platform Logging Object
  - a) Enter transaction code `SLG0`.
  - b) Click **New Entries**.
  - c) In the **Object** column, enter `/HSGRP1/DQC`.
  - d) In the **Object text** column, enter `DQC Logging`.
  - e) Save the change.
7. Configure the BuildGlobalAddress web service in the SAP Visual Admin:
  - a) Go to `<drive>:/usr./sap/<system id>/DVEBMGS01/j2ee/admin` and click *go.bat* and enter `J2EE_ADMIN` as password.
  - b) Go to **Cluster > Server > Services > JCo RFC Provider** and select the **Bundles** tab.
  - c) Enter all the information needed by the application and click **Set** to save the changes.
  - d) Go to **Cluster > Server > Services > Web Services Security**.

- e) Create a proxy in **Web Services Client** > **sap.com** > **Dynamic WSPproxies** with the name `PBBIWebServiceConnectorBGA`.
  - f) For the URL, enter:
 

```
http://spectrumservername:port/soap/BuildGlobalAddress?wsdl
```

 For example,
 

```
http://MySpectrumServer:8080/soap/BuildGlobalAddress?wsdl
```
  - g) Restart the application server.
8. If you will be using French address validation, you must install the Data Normalization Module table `cdq-TableLookup-SAP.tba` on the Spectrum Technology Platform server. For more information, see the *Spectrum Technology Platform Installation Guide*.
  9. To configure DPV and RDI options, open T-code `/hsgrp1/options`, and specify **Y** (to enable) or **N** (to disable), as needed.
    - **PVPO**: For PO Box address validation
    - **PVST**: For street address validation
    - **PVQU**: For batch address validation

## Installing Support Files for Read from SAP

The Read from SAP stage reads data from an SAP database as input to a Spectrum Technology Platform dataflow. In order for the Read from SAP stage to access data in your SAP system you must make the following changes on your SAP system:

- Install the SAP Java Connector
- Install the SAP Transport Requests that support Read from SAP

**Note:** You will not be able to use the Read from SAP stage until you perform these steps.

1. Install the SAP Java Connector (SAP JCo).
  - a) Go to the SAP Marketplace and log in with your SAP Marketplace credentials.
  - b) Go to **SAP JCo Connector** > **Tools & Services**.
  - c) Download SAP JCo to your system.
  - d) Unzip the SAP JCo zip file to a temporary location.
  - e) Stop the Spectrum Technology Platform server.
  - f) Copy the `.jar` file to this directory on the Spectrum Technology Platform server:
 

```
SpectrumDirectory/server/lib
```
  - g) Copy the `.so` file to this directory on the Spectrum Technology Platform server:

`SpectrumDirectory/server/bin/wrapper`

h) Start the Spectrum Technology Platform server.

2. Install the SAP Transport Requests that support Read from SAP.

**Note:** These steps should be performed by your SAP Basis administrator.

- a) In the Spectrum Technology Platform installer, go to the folder `AP Data Integration Objects\Enterprise System Connectors`.
- b) Deploy the SAP Transport Requests contained in this folder. See your SAP documentation for instructions on deploying SAP Transport Requests.

## Integrating with SAP Interaction Center WebClient

Before continuing verify these:

- The Interaction Center WebClient user has the `CRM_UI_PROFILE` parameter ID with `IC_AGENT` as the Parameter Value
- The duplicate option is activated in SPRO under ICWC (**SPRO > CRM > ICWC > Define Account Identification Profiles**)

To integrate Spectrum Technology Platform with SAP Interaction Center WebClient, you need to install supporting databases and dataflows on the Spectrum Technology Platform server, then configure your SAP system to communicate with Spectrum Technology Platform. Once you do this, users of SAP Interaction Center WebClient will have access to address validation and geocoding functionality from within SAP Interaction Center WebClient.

**Note:** The SAP Interaction Center WebClient is supported only for new installations of Data Quality Connector.

1. On the Spectrum Technology Platform server, install the databases required to perform address validation, geocoding, and tax jurisdiction assignment and define database resources for each database.

You must give the database resources the following names.

| Database                                      | Required Name for Database Resource |
|---|-------------------------------------|
| Enterprise Geocoding Module - Canada Database | IGEO_CAN                            |
| Enterprise Geocoding Module - U.S. Database   | EGM_US                              |
| Enterprise Tax Module Database                | ETM                                 |

| Database                                      | Required Name for Database Resource |
|---|-------------------------------------|
| Universal Addressing Module - Canada Database | Canada                              |
| Universal Addressing Module - Loqate Database | Loqate                              |
| Universal Addressing Module - U.S. Database   | UAM_US                              |

2. When you install the SAP Module, several dataflow files are automatically installed. Other dataflow files must be manually copied into Spectrum Technology Platform.

- a) If you are adding the Enterprise Tax Module or Universal Addressing Module to an existing installation, open Spectrum Technology Platform Enterprise Designer, select **View > Server Explorer**, and delete this dataflow: SAPValidateAddressWithCandidates.
- b) Go to: `SpectrumDirectory\server\modules\dataflows\sap`.
- c) Review the following table then copy the applicable dataflow files to:

`SpectrumDirectory\server\import`

If you are installing this set of modules Copy these dataflow files to the import folder

|   |   |
|---|---|
| Universal Addressing Module   | ValidateAddresswithCandidates_UAM.df  |
| Enterprise Geocoding Module   | ValidateAddressWithCandidates_EGM.df  |
| Enterprise Geocoding Module<br>Universal Addressing Module                          | ValidateAddressWithCandidates_UAM_EGM.df  |
| Enterprise Tax Module<br>Universal Addressing Module                                | ValidateAssignGeoTAXInfo.df<br>SAPBatchAssignGeoTAXInfo.df<br><br>SAPValidateAddressAndAssignGeoTAXInfo.df<br>ValidateAddressWithCandidates_UAM_ETM .df |
| Enterprise Geocoding Module<br>Enterprise Tax Module<br>Universal Addressing Module |   |

If you are installing this set of modules Copy these dataflow files to the import folder

---

|  |  |
|--|--|
| Universal Addressing Module without Loqate | SAPValidateAddressWithCandidate_UAM.df |
|--|--|

---

|  |  |
|--|--|
| Universal Addressing Module without Loqate | ValidateAssignGeoTAXInfo.df              |
| Enterprise Tax Module                      | SAPBatchAssignGeoTAXInfo.df              |
|  | SAPValidateAddressAndAssignGeoTAXInfo.df |
|  | ValidateAddressWithCandidates.UAM_ETM.df |

---

|   |   |
|---|---|
| Universal Addressing Module with Loqate | ValidateAddressWithCandidates_UAM_Loqate.df |
|---|---|

---

|   |   |
|---|---|
| Universal Addressing Module with Loqate | ValidateAddressWithCandidates_UAM_Loqate_EGM.df |
| Enterprise Geocoding Module             |   |

---

|   |   |
|---|---|
| Universal Addressing Module with Loqate | ValidateAddressWithCandidates_UAM_Loqate_ETM.df |
| Enterprise Tax Module                   |   |

---

|   |   |
|---|---|
| Universal Addressing Module with Loqate | ValidateAddressWithCandidates_UAM_Loqate_EGM_ETM.df |
| Enterprise Geocoding Module             |   |
| Enterprise Tax Module                   |   |

---

|  |   |
|--|---|
| Universal Addressing Module, Loqate only | ValidateAddressWithCandidates_Loqate.df |
|--|---|

---

|  |   |
|--|---|
| Universal Addressing Module, Loqate only | ValidateAddressWithCandidates_Loqate_EGM.df |
| Enterprise Geocoding Module              |   |

---

|                             |                                      |
|-----------------------------|--------------------------------------|
| Enterprise Geocoding Module | GeocodeUSAddressWithCandidates.df    |
|                             | ValidateAddressWithCandidates_EGM.df |

---

If you are installing this set of modules Copy these dataflow files to the import folder

---

|                       |  |
|-----------------------|--|
| Enterprise Tax Module | ValidateAssignGeoTAXInfo.df<br>ValidateAddressWithCandidates_ETM.df<br>SAPBatchAssignGeoTAXInfo.df |
|-----------------------|--|

---

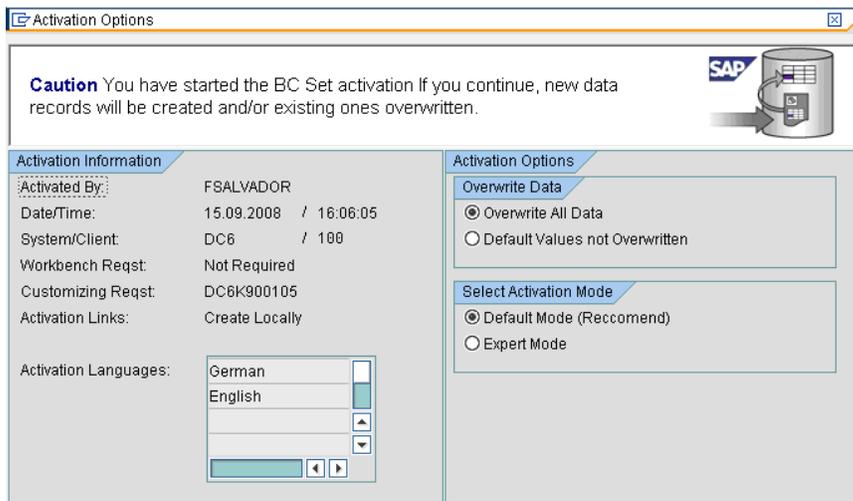
**Note:** If errors occur in Management Console or Enterprise Designer, delete the contents of `<WindowsTemporaryDirectory>\glAssemblies`, where `<WindowsTemporaryDirectory>` is one of these: `%TMP%`, `%TEMP%`, `%USERPROFILE%`, or the *Windows directory*. Typically, `C:\Documents and Settings\<USERNAME>\Local Settings\Temp\glAssemblies`. After deleting the contents of this folder, log in again.

### 3. Import .SAR files.

A .SAR file is a file that contains a third-party add-on package for SAP, such as the Spectrum Technology Platform SAP Module. The .SAR file is located on the Spectrum Technology Platform installer in the `SAP Objects` folder. For information about importing .SAR files into SAP applications, see your SAP Basis administrator.

### 4. **Activate BC sets for CRM installation where ICWC is required (IC Web Client) - You have already assigned CRM\_UI\_Profile parameter to the user with appropriate roles and authorization.**

- a. Log on to the client where the settings for the Spectrum Technology Platform SAP Module is to be configured.
- b. Enter the transaction code `SCPR20`. This activates BC sets and places the default entries on the Spectrum Technology Platform customizing tables.
- c. In the **BC Set** field, enter keyword `*hsgrp1*` and find all the BC Sets in this namespace.
- d. Activate it with the options **Overwrite All Data** and **Default Mode**.



- e. Select and activate the BC sets with the activation options set to **Overwrite All Data** and **Expert Mode**

**Note:** Activate these BC sets in the order listed.

```

/HSGRP1/BCSET_BC_BAS_DES
/HSGRP1/BCSET_BC_BAS_GTX
/HSGRP1/BCSET_BC_BAS_PV
/HSGRP1/FUZZY_SEARCH_INPUT_PARAM
/HSGRP1/ICWC_SCRN_CFG
/HSGRP1/ICWC_SETTINGS
/HSGRP1/MERGE_SETTINGS
/HSGRP1/ONP_PO_CRM
/HSGRP1/SPOD_CONFIG
/HSGRP1/SPOD_IN_TABLE
/HSGRP1/SPOD_OPT_TABLE
/HSGRP1/SPOD_OUT_TABLE
/HSGRP1/SPOD_PO_CRM
/HSGRP1/SPOD_SSE_ENTRY

```

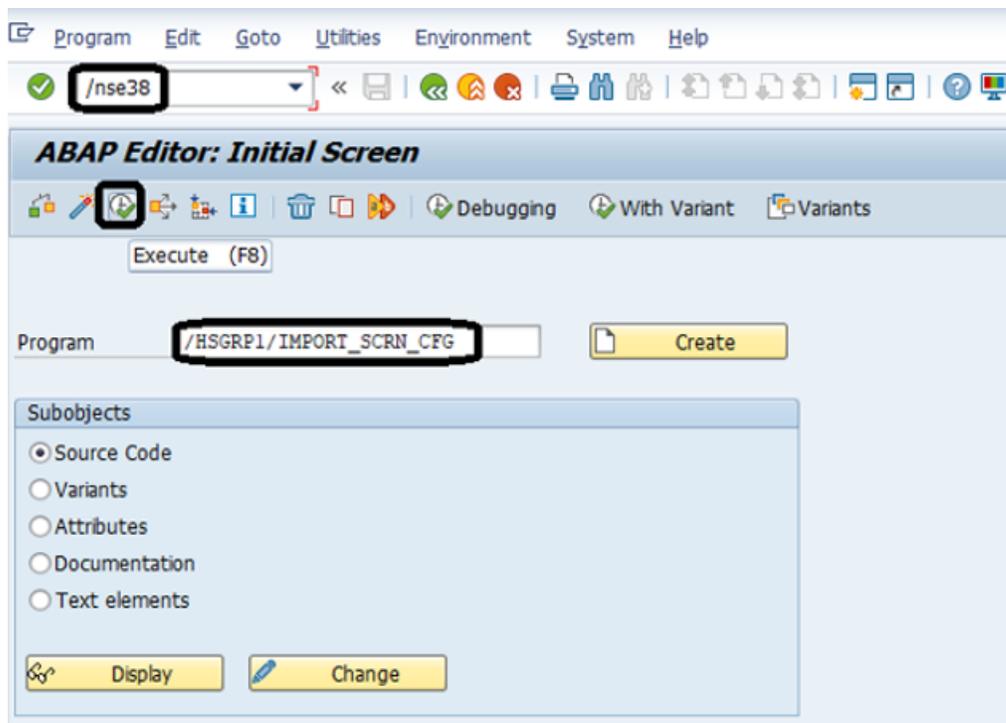
**Note:** Ignore any activation error or warnings with BC Set: /HSGRP1/ICWC\_SCRN\_CFG

5. Set up the RFC destination for Spectrum OnPremise
  - a) Enter transaction code SM59.
  - b) Click **Create**.
  - c) In the **RFC Destination** field, enter a name of your choice.
  - d) In the **Connection Type** field, enter G (HTTP connection to external server).
  - e) In the **Description 1** field, enter a meaningful description.

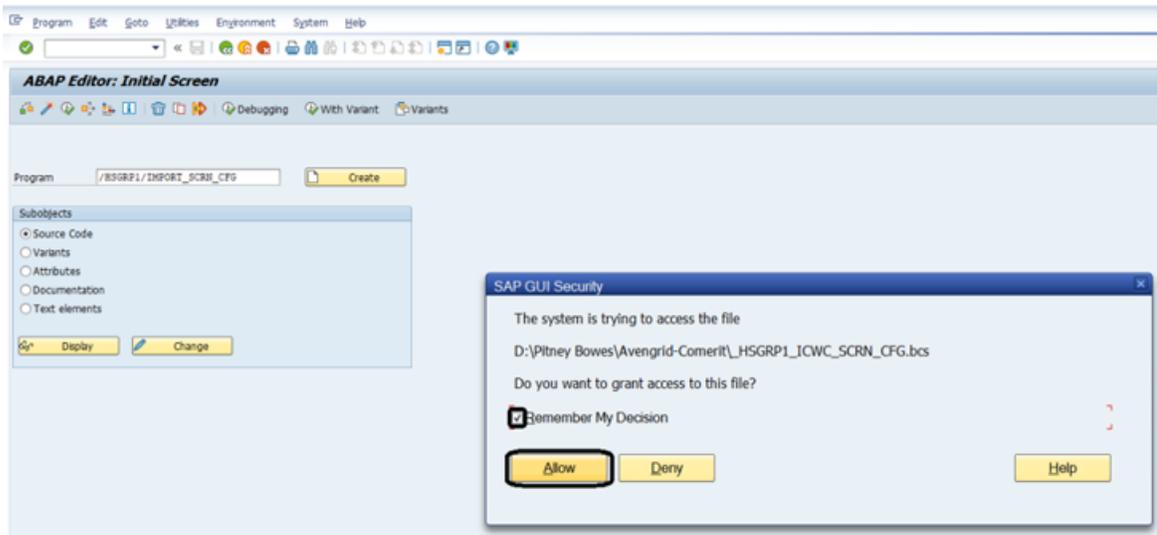
- f) Press the Enter key.
- g) Click the **Technical Settings** tab.
- h) In the **Target Host** field, enter the computer name or IP Address of the Spectrum Technology Platform server.
- i) In the **Service No** field enter 8080.
- j) Click the **Special Options** tab.
- k) Select **No Timeout**.

**Note:** These steps are not valid for *Spectrum OnDemand* as it is not supported for ICWC.

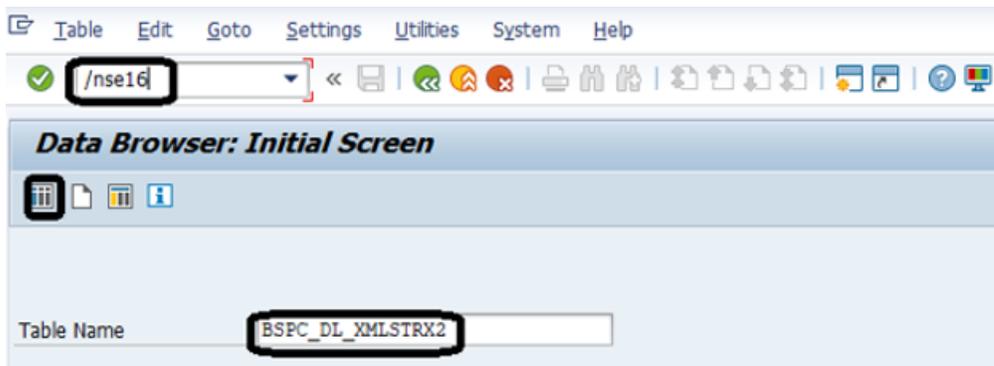
6. Use these steps to import the upload the ICWC configuration file (`CQ7_All_Screen_Configurations.cfg`). The file resides on the Spectrum Technology Platform installer at this location: `SAP Objects\SAP CRM 7.0\data\inst_cs7`.
  - a. On the initial screen, go to Tcode 'SE38' and enter `'/HSGRP1/IMPORT_SCRN_CFG'`
  - b. Click `Execute`.



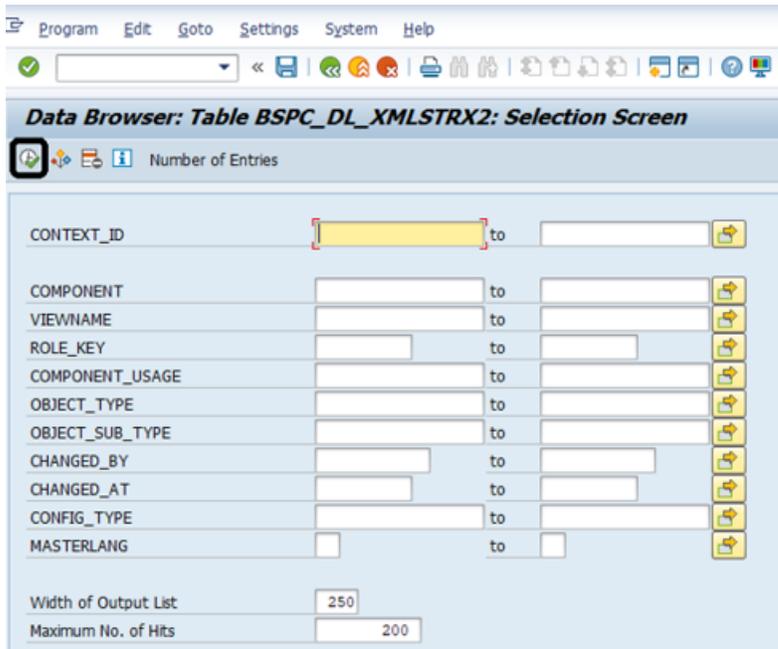
- c. Locate the `CQ7_All_Screen_Configurations.cfg` file and select it.
- d. Grant access as shown in the image below.



- e. Go to tcode SE16.
- f. Enter **Table Name** as BSPC\_DL\_XMLSTRX2.
- g. Click **Table Content** icon.



- h. Click the **Execute** icon.



i. Check these entries:

| CLIENT | CONTEXT_ID                               | COMPONENT       | VIEWNAME              | ROLE_KEY   | COMPONENT_USAG | OBJECT_TYPE      | OBJECT_SUB_TYPE    |
|--------|--|-----------------|-----------------------|------------|----------------|------------------|--------------------|
| 100    | 1A84D4F2EF74558AA39B8015AEFF27B10AAA4EB  | BP_ADDR         | STANDARDADDRESS       | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | CORP_US            |
| 100    | 26C90585C4D6015EB110A21BFF2A6D07476A71DE | BP_ADDR         | STANDARDADDRESS       | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | INDIVIDUAL_DISPLAY |
| 100    | 37603F62407D299C02F1DDE47E9AE535ECB9272F | ICOMP_BP_DETAIL | BUPADDETAILB2B        | DEFAULT_IC | BPdetail       | BP_CREATEPERSON  |                    |
| 100    | 3B4C5FF37DF76BC326639371F8EFC201710FB2F6 | BP_ADDR         | STANDARDADDRESS       | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | INDIVIDUAL         |
| 100    | 428849E22D366CF5518F5C9E307EF5C85CC5BE74 | ICOMP_BP_DETAIL | BUPADDETAILB2B        | DEFAULT_IC | BPdetail       | BP_CREATEPERSON  |                    |
| 100    | 43CA280EA21D6675D0FD4247A3773DB91F6459E7 | ICOMP_BP_DETAIL | BUPACREATE            | DEFAULT_IC | BPdetail       | BP_CREATEPERSON  |                    |
| 100    | 461F764BEA84E5234197FE34301D2789A9AD2C85 | BP_ADDR         | STANDARDADDRESS       | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | IND_US             |
| 100    | 49DFC66BF26764F7FE24536590C10B2A36490D70 | BP_ADDR         | STANDARDADDRESS       | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | IND_US_DISPLAY     |
| 100    | 4E920A6F815550BF0C3242CAE818A7CC6E7530C9 | ICOMP_BP_DETAIL | BUPADUPLICATECREATE   | DEFAULT_IC | BPdetail       | BP_CREATEACCOUNT |                    |
| 100    | 5B42A17ADBF58C0820A8A2F9866ADA8483445442 | ICOMP_BP_DETAIL | BUPADUPLICATECREATE   | DEFAULT_IC | BPdetail       | BP_CREATEACCOUNT |                    |
| 100    | 5C8C8B2F2F07BFB3348E6A2462793883288      | ICOMP_BP_DETAIL | BUPARELECTTOPGCTOONER | -DEFAULT-  | -DEFAULT-      | BP_ACCOUNT       | GROUP              |
| 100    | 5D1374A9F8A7847F84827807763959F0131      | ICOMP_BP_DETAIL | BUPACREATE            | DEFAULT_IC | BPdetail       | BP_ADDRESS       | IND_US_DISPLAY     |
| 100    | 60520019A4790714E761E0B7462311866A4      | ICOMP_BP_DETAIL | BUPACREATE            | DEFAULT_IC | BPdetail       | BP_CREATEACCOUNT |                    |
| 100    | 68FB42493444CEC3693D38A2577F980979       | BP_ADDR         | ACCOUNTADDRESSREF     | -DEFAULT-  | -DEFAULT-      | BP_ADDRESS       | -DEFAULT-          |
| 100    | 6F0B14138E3174824A2558B310C2F78892D0     | ITOTORD         | BILLREADER            | -DEFAULT-  | -DEFAULT-      | BP_ACCOUNT       | INDIVIDUAL         |
| 100    | 6F0B14138E3174824A2558B310C2F78892D0     | ICOMP_BP_DETAIL | BUPACREATE            | DEFAULT_IC | BPdetail       | BP_CREATEACCOUNT |                    |

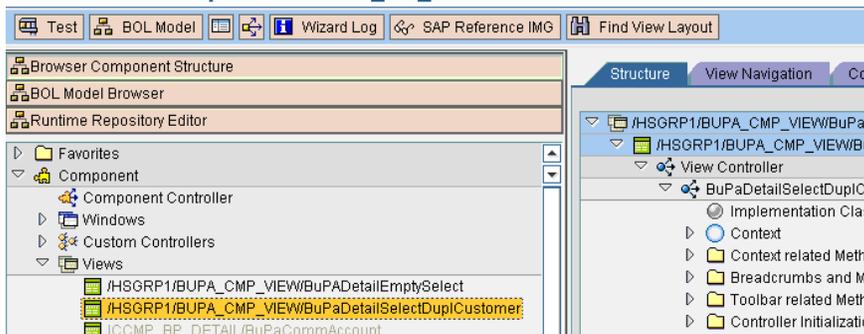
**Note:** Ignore errors or warning messages related to missing users, as shown in the image below.

| Report / HSGRPL/IMPORT_SCRN_CFG |  |                 |  |
|---------------------------------|--|-----------------|--|
| Config for                      | 1A84D4F2EF74558AA39B8015AEFF27B10AAA4EB  | BP_ADDR         | STANDARDADDRESS Same as in the file        |
| Config for                      | 26C90585C4D6015EB110A21BFF2A6D07476A71DE | BP_ADDR         | STANDARDADDRESS Same as in the file        |
| Config for                      | 37603F62407D299C02F1DDE47E9AE535ECB9272F | ICOMP_BP_DETAIL | BUPADDETAILB2B Same as in the file         |
| Config for                      | 3B4C5FF37DF76BC326639371F8EFC201710FB2F6 | BP_ADDR         | STANDARDADDRESS Same as in the file        |
| Config for                      | 428849E22D366CF5518F5C9E307EF5C85CC5BE74 | ICOMP_BP_DETAIL | BUPADDETAILB2B Same as in the file         |
| Config for                      | 43CA280EA21D6675D0FD4247A3773DB91F6459E7 | ICOMP_BP_DETAIL | BUPACREATE Same as in the file             |
| Config for                      | 461F764BEA84E5234197FE34301D2789A9AD2C85 | BP_ADDR         | STANDARDADDRESS Same as in the file        |
| Config for                      | 49DFC66BF26764F7FE24536590C10B2A36490D70 | BP_ADDR         | STANDARDADDRESS Same as in the file        |
| Config for                      | 4E920A6F815550BF0C3242CAE818A7CC6E7530C9 | ICOMP_BP_DETAIL | BUPADUPLICATECREATE Same as in the file    |
| E: Cfg for                      | 5B42A17ADBF58C0820A8A2F9866ADA8483445442 | ICOMP_BP_DETAIL | BUPADUPLICATECREATE GW_ADMIN was not found |

7. Set up the Spectrum Technology Platform Logging Object

- a) Enter transaction code SLG0.
  - b) Click **New Entries**.
  - c) In the **Object** column, enter /HSGRP1/DQC.
  - d) In the **Object text** column, enter DQC Logging.
  - e) Save the change.
8. Enable the Precisely IC WebClient Enhancement Set.
- a) Enter the transaction code SM30.
  - b) In the **Table/View** field, enter BSPWDV\_EHSET\_ASG.
  - c) Click **Maintain**.
  - d) Click **New Entries**.
  - e) In the **Client** field, enter the client number where the enhancement set will take effect.
  - f) In the **Enhancement Set** field, enter /HSGRP1/ENHANCEMENT\_SET.
9. Add the IC WebClient Configurations.
- a) Enter the transaction code BSP\_WD\_CMPWB.
  - b) In the **Component** field, enter ICCMP\_BP\_DETAIL.
  - c) Click the check icon.
  - d) In the **Enhancement Set** field, enter /HSGRP1/ENHANCEMENT\_SET.
  - e) Click **Display**.
  - f) Expand the **Views** folder and select **/HSGRP1/BUPA\_CMP\_VIEW/BuPaDetailSelectDuplCustomer**.

**Structure of Component ICCMP\_BP\_DETAIL - Enhancement Set /HSGRP1/E**



- g) Click the **Configuration** tab.
- h) On the edit screen select Full Name, Telephone, Street, City and Country context then click the right arrow button and arrange them in this order:
  - Full Name
  - Telephone
  - Street
  - City
  - Country
- i) Save the configuration.

10. If you will be using French address validation, you must install the Data Normalization Module table `cdq-TableLookup-SAP.tba` on the Spectrum Technology Platform server. For more information, see the *Spectrum Technology Platform Installation Guide*.

## Compatibility Matrix

These tables give a list of SAP add-on versions and system kernel levels that are compatible with the various releases of Spectrum Technology Platform for installation and upgrade of ECC 6.0 and CRM 7.0.

**Table 3: Compatibility Matrix for New Deployment**

| Spectrum Release | SAP Add-on Version | SAP System Kernel Level |
|------------------|--------------------|-------------------------|
| 10.x             | 10.x               | 741 and above           |
| 11.x             | 11.x               | 741 and above           |
| 12.x             | 12.x               | 741 and above           |
| 2018.2.0         | 2018.2.0           | 741 and above           |
| 2019.1.0         | 2019.1.0           | 741 and above           |

**Table 4: Compatibility Matrix for Upgrade**

| Spectrum Release | SAP Add-on Version | SAP System Kernel Level |
|------------------|--------------------|-------------------------|
| 10.x             | Any to 10.x        | 741 and above           |
| 11.x             | Any to 11.x        | 741 and above           |
| 12.x             | 12.x               | 741 and above           |
| 2018.2.0         | 2018.2.0           | 741 and above           |
| 2019.1.0         | 2019.1.0           | 741 and above           |

This table gives the compatibility matrix for new deployment of **SAP S/4 HANA 1610** for Spectrum Technology Platform:

| <b>Spectrum Release</b> | <b>SAP S/4 HANA 1610 Add-on Version</b> | <b>SAP S/4 HANA 1610 System Component Level</b> |
|-------------------------|---|---|
| <b>New deployment</b>   |   |   |
| 12.x                    | 12.x                                    | 751 (SAP_BASIS)<br>75B (SAP_ABA)                |
| 2018.2.0                | 2018.2.0                                | 751 (SAP_BASIS)<br>75B (SAP_ABA)                |
| 2019.1.0                | 2019.1.0                                | 751 (SAP_BASIS)<br>75B (SAP_ABA)                |

**Note:** It is recommended that you contact the Precisely representative or coordinator assigned to you before starting the process.

This table gives the compatibility matrix for new deployment of **SAP S/4 HANA 1709** for Spectrum Technology Platform:

| <b>Spectrum Release</b> | <b>SAP S/4 HANA 1709 Add-on Version</b> | <b>SAP S/4 HANA 1709 System Component Level</b> |
|-------------------------|---|---|
| <b>New deployment</b>   |   |   |
| 12.x                    | 12.x                                    | 752 (SAP_BASIS)<br>75C (SAP_ABA)                |
| 2018.2.0                | 2018.2.0                                | 752 (SAP_BASIS)<br>75C (SAP_ABA)                |
| 2019.1.0                | 2019.1.0                                | 752 (SAP_BASIS)<br>75C (SAP_ABA)                |

**Note:** It is recommended that you contact the Precisely representative or coordinator assigned to you before starting the process.

This table gives the compatibility matrix for new deployment of **SAP S/4 HANA 1809** for Spectrum Technology Platform *2019.1.0*:

| Spectrum Release      | SAP S/4 HANA 1809 Add-on Version | SAP S/4 HANA 1809 System Component Level |
|-----------------------|----------------------------------|--|
| <b>New deployment</b> |                                  |  |
| <i>2019.1.0</i>       | <i>2019.1.0</i>                  | 754 (SAP_BASIS)<br>75D (SAP_ABA)         |

The **SAP Data Quality Connector** is certified for *ECC 6.0 EHP 7.0* and *CRM 7.0 EHP 3.0* with *HANA* database.

## Configuring SugarCRM

### Integrating with SugarCRM

To integrate Spectrum Technology Platform with SugarCRM, you must install the supporting databases and dataflows on the Spectrum™ Technology Platform server, and deploy Spectrum on your SugarCRM. Once you do this, users of SugarCRM will have access to address validation, geocoding, and duplicate detection functionality from within SugarCRM.

#### Before you begin:

#### Entities Supported:

You can validate and geocode the addresses of the entities:

- Accounts
- Contacts
- Leads

#### Supported SugarCRM Versions

*SugarCRM 7.7.1.1*

Browse to the the folder `Sugar CRM DQ Objects\sugarcrm` in the Spectrum Technology Platform installation package and copy the file `PBSugarCRMConnector.zip` to any location on your SugarCRM server.

1. If you are using Spectrum Technology Platform for address validation or geocoding, install the databases required to perform address validation and geocoding and define database resources for each database.

**Note:** If you are using Spectrum Technology Platform for duplicate detection only, you can skip this step.

You must give the database resources these names:

| Database                                      | Required Name for Database Resource |
|---|-------------------------------------|
| Enterprise Geocoding Module - Canada Database | IGEO_CAN                            |
| Enterprise Geocoding Module - U.S. Database   | EGM_US                              |
| Universal Addressing Module - Canada Database | Canada                              |
| Universal Addressing Module - Loqate Database | Loqate                              |
| Universal Addressing Module - U.S. Database   | UAM_US                              |

**Note:** You must install the Delivery Point Validation (DPV) data and the Residential Delivery Indicator (RDI) data in order to perform DPV and RDI processing on U.S. addresses.

2. Import the SugarCRM Module dataflows into your Spectrum Technology Platform server.
  - a) On the Spectrum Technology Platform server, open this folder:
 

```
SpectrumDirectory\server\modules\sugarcrm
```

**Note:** This folder is only available if you have installed the SugarCRM Module.
  - b) As mentioned in the table below, copy the applicable dataflow files to the *import* folder:

```
SpectrumDirectory\server\import
```

If you have installed this set of modules Copy these dataflow files to the import folder

---

Advanced Matching Module

*GenerateMatchKey.df*  
*GenerateMatchScore.df*  
*GenerateSearchKey.Consonant.df*  
*GenerateSearchKey.df*  
*GenerateSearchKey.Metaphone.df*  
*GenerateSearchKey.Substring.df*

---

Universal Addressing Module without  
Loqate

*ValidateAddresswithCandidates\_UAM.df*

---

Universal Addressing Module without  
Loqate  
Enterprise Geocoding Module

*ValidateAddressWithCandidates\_UAM\_EGM.df*

---

Universal Addressing Module with  
Loqate

*ValidateAddressWithCandidates\_UAM\_Loqate.df*

---

Universal Addressing Module with  
Loqate  
Enterprise Geocoding Module

*SugarCRMValidateAddressAndGenerateMatchKey.df*  
*ValidateAddressWithCandidates\_UAM\_Loqate\_EGM.df*

---

Universal Addressing Module, Loqate  
only

*ValidateAddressWithCandidates\_Loqate.df*

---

Universal Addressing Module, Loqate  
only  
Enterprise Geocoding Module

*ValidateAddressWithCandidates\_Loqate\_EGM.df*

---

Enterprise Geocoding Module

*GeocodeUSAddressWithCandidates.df*

---

3. Import the Pitney Bowes SugarCRM module into your SugarCRM system.
  - a) Log in to SugarCRM as an administrator.
  - b) In the profile drop-down menu at the top right corner, click **Admin**.
  - c) In this **Administration** screen, in the **Developer Tools** section, click **Module Loader**.

- The **Module Loader** screen opens.
- d) If you are integrating your SugarCRM system with Spectrum Technology Platform for the first time, you must upload the SugarCRM Connector module of your SugarCRM system:
    1. Upload the ZIP file `PBSugarCRMConnector.zip` of Spectrum copied earlier to the system, using the file uploader field in the centre of the page.
    2. Click **Upload**.
    3. Click **Confirm**. An entry for the *Pitney Bowes* package now shows in the bottom grid.
  - e) Once the *Pitney Bowes* package is uploaded into the system, or if it has been uploaded previously into your SugarCRM system but is uninstalled:
    1. Click **Install** against the Pitney Bowes package entry in the bottom grid on the **Module Loader** screen.
    2. On the **License** screen, select **Accept**, then click **Commit**.
  - f) In the profile drop-down menu at the top right corner, click **Admin**.
  - g) In this **Administration** screen, in the **System** section, click **Repair**. The **Repair** screen opens.
  - h) Click **Quick Repair and Build**.  
The existing SugarCRM configurations are rebuilt to incorporate the custom Objects and Object Layouts imported with the SugarCRM Connector module. The logs are displayed.

Spectrum's SugarCRM Connector module is now successfully integrated with your SugarCRM system.

The menu item **Administration > PB Service Configuration** is now available.

## Creating a Connection to Spectrum

Once the SugarCRMConnector module of Spectrum Technology Platform is uploaded successfully in your SugarCRM, you can create a connection to the Spectrum server.

1. Log in to your SugarCRM system as an Administrator.
2. Go to **Administration > PB Service Configuration**.
3. Click **Create**.
4. In the **Name** field, enter the desired name for the connection. For example, `PB_SpectrumConnection`.
5. In the **Server Name** field, enter the server name or IP address of the Spectrum Technology Platform server.
6. In the **Port** field, enter the port used by the Spectrum Technology Platform server for HTTP communication. By default the port is `8080`.
7. In the **User Name** field, enter the Spectrum Technology Platform user name.
8. In the **Password** field, enter the password for the Spectrum Technology Platform user.

9. If you wish to run the duplicate detection feature provided by the Pitney Bowes Address Validation bundle:

- Check **Duplicate Detection**.
- In the **Threshold** field, enter a value between 0 and 100, both inclusive. If you leave this field blank, the default threshold value of 30 is used. The Pitney Bowes Address Validation service fetches those records as duplicate whose match score is equal to or higher than the *threshold* match score.

For more information, see [Threshold](#).

10. Before saving the connection, click **Test Connection** to verify the entered credentials for the Spectrum server.

11. Once the Spectrum connection details are tested successfully, click **Save**.

**Note:** You can either test a connection before clicking **Save**, or test an existing connection by first opting to **Edit** it.

You can now use this connection to validate and geocode the addresses of records in your SugarCRM system using the Spectrum Technology Platform.

**Note:** Only one connection to the Spectrum Technology Platform can exist at a time. To create another connection to Spectrum Technology Platform, you can either delete the existing connection and create a new one, or edit the existing connection.

# Configuring Microsoft Dynamics CRM

## Integrating with Microsoft Dynamics CRM

To integrate Spectrum Technology Platform with Microsoft Dynamics CRM, you must install the supporting databases and dataflows on the Spectrum Technology Platform server, and deploy the Spectrum Technology Platform solution on your Microsoft Dynamics CRM. Once you do this, users of Microsoft Dynamics CRM will have access to address validation, geocoding, and duplicate detection functionality from within Microsoft Dynamics CRM.

**Note:** End users who use Internet Explorer must use Internet Explorer 10 or 11. Older versions of Internet Explorer are not supported. All versions of Chrome and Firefox are supported.

Before you begin, confirm that you are using a compatible version of Microsoft Dynamics. These versions are supported:

Microsoft Dynamics CRM 2013  
 Microsoft Dynamics CRM 2013 SP1  
 Microsoft Dynamics 2015

1. If you are using Spectrum Technology Platform for address validation or geocoding, install the databases required to perform address validation and geocoding and define database resources for each database.

**Note:** If you are using Spectrum Technology Platform for duplicate detection only, you can skip this step.

You must give the database resources these names:

| Database                                      | Required Name for Database Resource |
|---|-------------------------------------|
| Enterprise Geocoding Module - Canada Database | IGEO_CAN                            |
| Enterprise Geocoding Module - U.S. Database   | EGM_US                              |
| Universal Addressing Module - Canada Database | Canada                              |
| Universal Addressing Module - Loqate Database | Loqate                              |
| Universal Addressing Module - U.S. Database   | UAM_US                              |

**Note:** You must install the Delivery Point Validation (DPV) data and the Residential Delivery Indicator (RDI) data in order to perform DPV and RDI processing on U.S. addresses.

2. Import the Microsoft Dynamics CRM Module dataflows into your Spectrum Technology Platform server.

- a) On the Spectrum Technology Platform server, open this folder:

`SpectrumDirectory\server\modules\dataflows\mscrm`

**Note:** This folder is only available if you have installed the Microsoft Dynamics CRM Module.

- b) As mentioned in the table below, copy the applicable dataflow files to the *import* folder:

`SpectrumDirectory\server\import`

If you have installed this set of modules Copy these dataflow files to the import folder

---

Advanced Matching Module

*GenerateMatchKey.df*  
*GenerateMatchScore.df*  
*GenerateSearchKey.Consonant.df*  
*GenerateSearchKey.df*  
*GenerateSearchKey.Metaphone.df*  
*GenerateSearchKey.Substring.df*

---

Universal Addressing Module without  
Loqate

*ValidateAddresswithCandidates\_UAM.df*

---

Universal Addressing Module without  
Loqate  
Enterprise Geocoding Module

*ValidateAddressWithCandidates\_UAM\_EGM.df*

---

Universal Addressing Module with  
Loqate

*ValidateAddressWithCandidates\_UAM\_Loqate.df*

---

Universal Addressing Module with  
Loqate  
Enterprise Geocoding Module

*SugarCRMValidateAddressAndGenerateMatchKey.df*  
*ValidateAddressWithCandidates\_UAM\_Loqate\_EGM.df*

---

Universal Addressing Module, Loqate  
only

*ValidateAddressWithCandidates\_Loqate.df*

---

Universal Addressing Module, Loqate  
only  
Enterprise Geocoding Module

*ValidateAddressWithCandidates\_Loqate\_EGM.df*

---

Enterprise Geocoding Module

*GeocodeUSAddressWithCandidates.df*

---

3. Import the Microsoft Dynamics CRM Module into your Microsoft Dynamics CRM system.

a) In the Spectrum Technology Platform installation package, browse to this folder:

MS CRM Objects\Proxy

- b) Copy the file `netProxy.aspx` to this folder on your Microsoft Dynamics CRM server:  
`MicrosoftDynamicsCRMInstallation\CRMWeb`
  - c) Copy the file `netProxy.dll` to this folder on your Microsoft Dynamics CRM server:  
`MicrosoftDynamicsCRMInstallation\CRMWeb\Bin`
  - d) Log in to Microsoft Dynamics CRM as an administrator.
  - e) Click **Microsoft Dynamics CRM** then click **Settings**.
  - f) Click **Solutions**.
  - g) Click **Import**.
  - h) Browse to the Spectrum Technology Platform installation package and select the file:  
`MS CRM Objects\mscrm\PBMSDynamicsCRMConnector_4_0_0_managed.zip`
  - i) Click **Next** then **Publish All Customizations**.
  - j) Restart the Microsoft Dynamics CRM server.
4. Define the connection between Microsoft Dynamics CRM and the Spectrum Technology Platform server.
- a) Log in to Microsoft Dynamics CRM as an administrator.
  - b) Click **Microsoft Dynamics CRM > Settings**.
  - c) Click **Settings > Pitney Bowes**. You will have to scroll to the right to find the Pitney Bowes link.
  - d) Click **Administration**.
  - e) Click **New**.
  - f) In the **Name** field, enter `PB`.
  - g) In the **Server Name** field, enter the server name or IP address of the Spectrum Technology Platform server.
  - h) In the **Port** field, enter the port used by the Spectrum Technology Platform server for HTTP communication. By default the port is 8080.
  - i) In the **Account ID** field, enter the Spectrum Technology Platform user name.
  - j) In the **Password** field, enter the password for the Spectrum Technology Platform user.
  - k) Click **Save**

The Microsoft Dynamics CRM system now has access to address validation and, optionally, geocoding services on the Spectrum Technology Platform server.

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In this section

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# Support

## Technical Support

If you run into an issue, Precisely Technical Support can help guide you to a solution. When you contact Precisely Technical Support, please provide the following information:

- A description of the task you were performing
- The level or version of your operating system
- The patch level or service pack
- The log file located in your install directory at:

`SpectrumDirectory\server\logs\spectrum-server.log`

Contact information for Technical Support can be found at:

[support.pb.com/spectrum](https://support.pb.com/spectrum)

**Note:** If you purchased Spectrum Technology Platform through a third-party partner, please contact the partner for technical support.

## Documentation

Product documentation can be found at:

[support.pb.com/spectrum](https://support.pb.com/spectrum)

## Digital Insights

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