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Spectrum™ Technology Platform

Version 12.0 SP2

Installation Guide

Unix and Linux

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In this section

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.
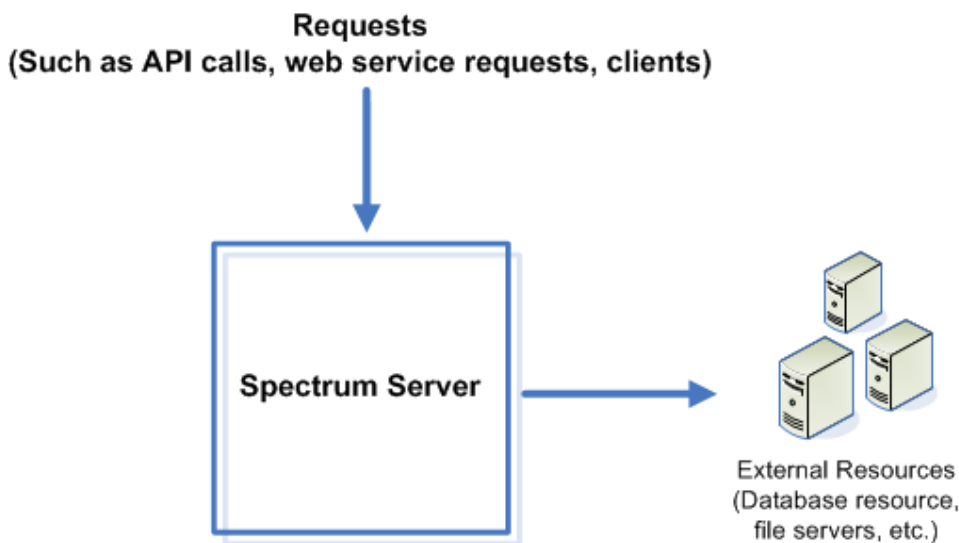
Remote Servers

Remote servers are useful if you have licensed many modules. To use remote servers, you install Spectrum™ Technology Platform on several different servers, installing different modules on each server. You then configure the individual services to execute on one of the remote servers. This approach has the following advantages:

- Improved performance, especially for web service and API calls. For jobs, there may be some performance improvement, but the time it takes to send data across the network to the remote server may offset any performance gains.
- Ability to perform database updates on individual modules without interrupting the availability of other modules. For example, if you need to update a postal database for the Universal Addressing Module, you could install the update by stopping just the remote server handling the Universal Addressing Module, allowing other modules to remain available on other remote servers.
- Startup time can be reduced. With all modules on one server, it can take a long time for the server to start up. With modules installed on separate servers, each server will start up more quickly.
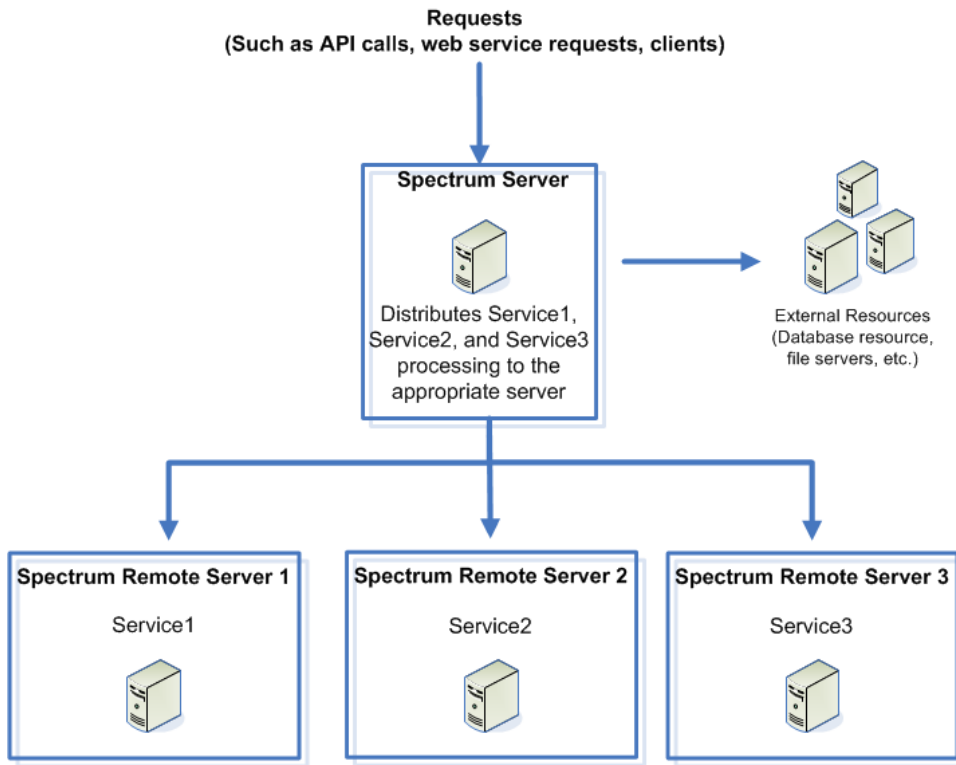
Cluster

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.

This diagram illustrates the cluster architecture:
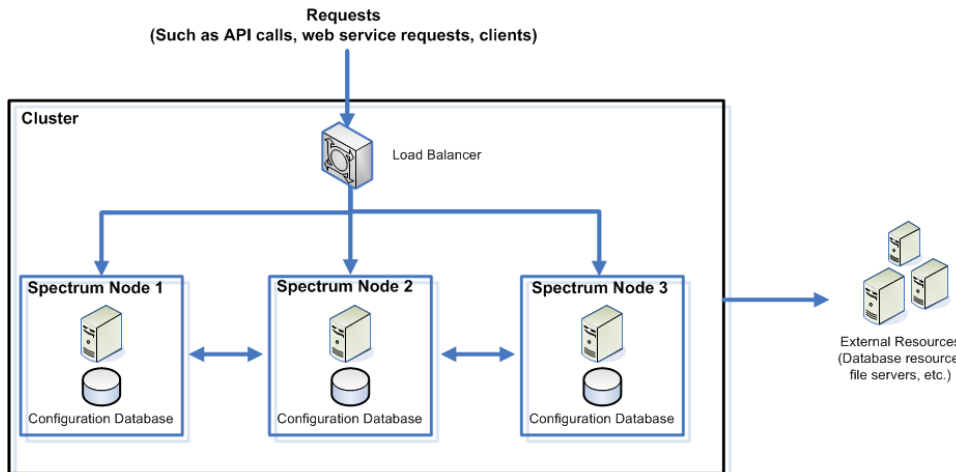
This approach has the following advantages:

- 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.
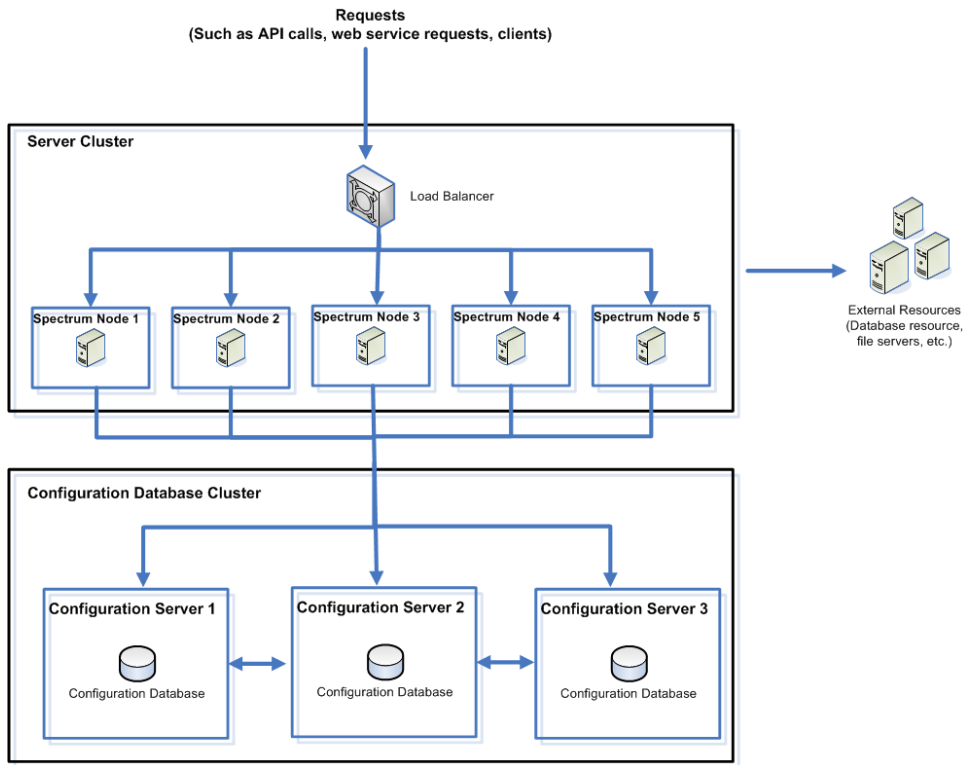
System Requirements

Server

Operating Systems

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

Supported Operating System	Notes
CentOS 7.x	MrSID raster images require `libpng12.so` on this operating system
HP-UX 11.31 (Itanium)	
Oracle Linux 6.x	
Oracle Linux 7.x	
Red Hat Enterprise Linux 6.x	
Red Hat Enterprise Linux 7.x	
Solaris 10 (SPARC only)	
Solaris 11 (SPARC only)	

SUSE Enterprise Linux Server 11.x	Requires the following:
	`glibc-2.9 or glibc-2.11`
	installed as follows:
	
	`zypper install libstdc++33-32bit zlib-32bit`

SUSE Enterprise Linux Server 12.x	Requires the following:
	
	`glibc-2.9 or glibc-2.11`
	installed as follows:
	
	`zypper install libstdc++33-32bit zlib-32bit`

Ubuntu 14.04 LTS	Requires these runtime libraries installed as follows: `apt-get install libstdc++5:i386 zlib1g:i386`
Ubuntu 16.04 LTS	Requires these runtime libraries installed as follows: `apt-get install libstdc++5:i386 zlib1g:i386`

Unsupported Operating Systems by Module

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

Module	Not Supported
Analytics Scoring Module	AIX 7.1, 7.2 HP-UX 11.31 (Itanium) Solaris 10 (SPARC only), Solaris 11 (SPARC only)
Enterprise Geocoding Module (U.S.)	AIX 7.2 Oracle Linux 6.x, 7.x SUSE Enterprise Linux Server 12.x Ubuntu 14.04 LTS
Enterprise Tax Module	AIX 7.2 Oracle Linux 6.x, 7.x Solaris 11 (SPARC only) SUSE Enterprise Linux Server 12.x Ubuntu 14.04 LTS
GeoConfidence Module	HP-UX 11.31 (Itanium)
GeoEnrichment Module	AIX 7.2 Oracle Linux 6.x, 7.x SUSE Enterprise Linux Server 12.x Ubuntu 14.04 LTS
Global Geocoding Module	AIX 7.2 (not supported for U.S.) Oracle Linux 6.x, 7.x (not supported for U.S.) SUSE Enterprise Linux Server 12.x (not supported for U.S.) Ubuntu 14.04 LTS (not supported for U.S.)

Module	Not Supported
Location Intelligence Module stages Closest Site and Legacy Point in Polygon	HP-UX 11.31 (Itanium) Oracle Linux 6.x Red Hat Enterprise Linux 6.x, 7.x Solaris 10 (SPARC only), 11 (SPARC only) SUSE Enterprise Linux Server 11.x, 12.x Ubuntu 14.04 LTS
Machine Learning Module	AIX 7.1, 7.2 HP-UX 11.31 (Itanium) Solaris 10 (SPARC only), 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 Address Module - Validate Address AUS	This module does not support UNIX/Linux platforms.
Universal Address Module - Validate Address Global	Ubuntu 16.04 LTS Solaris 10 (SPARC only) HP Itanium

Disk Space

New Installation	Upgrade
• 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.	• 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 x 5 GB) + 10 GB = 30 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

• 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 Machine Learning Module requires a minimum of 1 GB RAM.

Additional Requirements

• For all Unix and Linux systems, a minimum of 8192 file descriptors is required. This can be set by running the `ulimit` command:

```
ulimit -n 8192
```

> **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.

- The file size limit needs to be set to 2 GB in order to install Spectrum™ Technology Platform. To set the file size limit, use the `ulimit` command:

```
ulimit -f 4194304
```

This is only required to run the installer. It is not required to run Spectrum™ Technology Platform after installation.

- For CenOS 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 Java 8, both the 32-bit version and the 64-bit version, before installing Spectrum™ Technology Platform. If you do not have Java 8 installed, download and install it from:

  www.ibm.com/developerworks/java/jdk/aix/service.html

System Requirements for Enterprise Geocoding and Global Geocoding modules

- The Enterprise Geocoding Module and Global Geocoding Module system requirements:

  - minimum: 16 GB RAM, 8 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 on the sytem 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.

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.

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 7.1

- 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 wrapper log. This log shows which port is causing the problem. You can find the Spectrum™ Technology Platform wrapper log in:

`server\app\repository\logs\wrapper.log`

You can change the ports by modifying the properties in this file and restarting the server:

`server\app\conf\spectrum-container.properties`

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

Port	Description
5001	This port is used by the Spectrum™ Technology Platform configuration database. To use a different port in a non-clustered environment, modify this property: `spectrum.repository.server.coordinator.port` To use a different port in a clustered environment: • Specify the port you want instead of 5001 in `spectrum.repository.server.coordinator.port`. • Specify the seed nodes for the configuration database in `spectrum.repository.server.cluster.seeds`.
5701	This port is used by Hazelcast for managing distributed processing between Spectrum™ Technology Platform servers in a cluster. To use a different port in a non-clustered environment, modify this property: `spectrum.hazelcast.port` To use a different port in a clustered environment: • Specify the port you want to use instead of 5701 in `spectrum.hazelcast.port`. • Include the Hazelcast port number after each IP address specified in `spectrum.cluster.seeds`. For example, if `spectrum.hazelcast.port` is set to 5702 and the IP address of a seed node is 1.2.3.4.5, you would specify `1.2.3.4.5:5702` in `spectrum.cluster.seeds`.
6362	This port is used if you enable backups of the Spectrum™ Technology Platform configuration database. To use a different port, modify this property: `spectrum.backup.http.port`
7474	This port is used by the Spectrum™ Technology Platform configuration database. To use a different port, modify this property: `spectrum.repository.server.connector.http.port`
7687	This port is used by the Spectrum™ Technology Platform configuration database. To use a different port, modify this property: `spectrum.repository.server.connector.bolt.port`

Port	Description
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: `spectrum.http.port`
9200	This port is used by the search index engine used by the Advanced Matching Module. To use a different port, modify this property: `spectrum.index.http.port`
9300	This port is used by the search index engine used by the Advanced Matching Module. To use a different port in a non-clustered environment, modify this property: `spectrum.index.tcp.port` To use a different port in a clustered environment: • Specify the port you want to use instead of 9300 in `spectrum.index.tcp.port` and after the colon in `spectrum.index.client.addresses`. • Specify the seed nodes for the search index in `spectrum.index.server.cluster.seeds`.
10119	This port is used for API calls made to services. To use a different port, modify this property: `spectrum.socketgateway.port`
10119	This port is used for API calls made to services. To use a different port, modify this property: `spectrum.socketgateway.port`
15431-15432	These ports are used by the Machine Learning Module.
32751	This port is used for ODBC connections model stores which are created in Metadata Insights. To use a different port, modify this property: `spectrum.metadata.odbc.port`

Enterprise Designer

Enterprise Designer is compatible with all currently supported Spectrum™ Technology Platform operating systems, as it is Java-based.

System requirements:

- 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

This release requires the following browsers:

- Internet Explorer 11
- Google Chrome 65.0 or later
- Mozilla Firefox 59 or later
- To use the Data Hub Relationship Analysis Client, you must use a browser with Microsoft Silverlight 5 installed. See **www.microsoft.com/getsilverlight**. Because Google Chrome no longer supports Microsoft Silverlight, you will need to access these client tools using Internet Explorer or Firefox.

Command Line Tools

Administration Utility

The Administration is Java-based and available for all currently supported platforms. The Administration Utility requires Java 8 or later. Verify that Java 8 is in the system's path before running the Administration Utility.

Job Executor and Process Flow Executor

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

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 1.5 is required to install the Client SDK. Be sure that JDK 1.5 is in the PATH environment variable. Once installed, the Client SDK supports JDK 1.4 and greater.

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 the Java JDK, version 1.4 or higher. This is not installed with the Client SDK.

Windows 64-bit

• JDK: 1.4
• C Compiler: MSVC 2005, MSVC 2008
• C++ Compiler: MSVC 2005, MSVC 2008

HP-UX RISC

• JDK: 1.4
• 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: 1.4
- 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 8 (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 5.8
- 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 5.1.0.0
- 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

Location Intelligence Module Support

Database

The Location Intelligence Module supports the following spatial databases for use with the spatial services, data, and resources:

- Oracle 11gR2, Oracle 12C
- SQL Server 2012, 2014, and 2016
- SAP HANA 9.3
- PostgreSQL 8+ (PostGIS 2.x)

    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 Format

The Location Intelligence 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

Raster Format

The following raster and grid formats (64-bit only) are supported in the Location Intelligence Module:

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) **Note:** Supports MG4 (MrSID Generation 4). On CentOS 7.1, libpng12.so is required for reading MrSID rasters.	.sid
NITF	.ntf
PNG	.png
TIFF **Note:** TIFF files used by the Feature Service and Mapping Service cannot exceed 2GB.	.tif

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

Grid Formats

Format	File Extension
Defense Digital Terrain Elevation Data (DTED)	.dt0, .dt1, .dt2, .dt3
MapInfo Grid	.mig
MRR (Multi-Resolution Raster)	.mrr

Note: This support is provided on Windows.

Note: This support is provided on the following Linux environments:

- Oracle Linux 6.5 and 7.1
- CentOS 6.4 and 7.1
- Ubuntu 12.04, 14.04, and 16.04

Vertical Mapper Classified Grid	.grc
Vertical Mapper Continuous Grid	.grd

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.

Utilities

The Location Intelligence Module utilities (Tile Generator, WMTS Tile Generator, and the Geometry Validator) require at a minimum Java 8. If you are installing these utilities on the same computer where the Spectrum™ Technology Platform server is installed, Java 8 will be installed since it is included with the server. If you want to install the utilities on another computer, make sure that the computer has Java 8 or later installed.

Samples

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

MapInfo Professional Compatibility

The Location Intelligence Module is compatible with MapInfo Professional up to version 16.x. See Tools > MapInfo Pro in the *Spectrum Spatial Getting Started Guide* for more information about the interoperability of the two products.

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.

For client machines running on Windows 7 SP1, Windows Server 2008 R2 SP1, and Windows Server 2012, you must apply a security patch and registry update to leverage this protocol. For instructions, see the "Managing Security" chapter in the Administration section of the *Spectrum Spatial Guide*.

2 - Standard Installation

In this section

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 execute the following command:

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

    - Perform a media-based rpm install. 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 execute permission on 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.

- 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 19.

8. For CentOS 5, CentOS 6, Red Hat Enterprise Linux 5, and Red Hat Enterprise Linux 6, you must modify a server property in order for the server to start successfully.

   a) Open the file
      SpectrumLocation`/server/app/conf/spectrum-container.properties` in a
      text editor.
   b) Change the property `spectrum.index.bootstrap.system_call_filter` to `false`.
   c) Save and close the file.

9. 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
        ```

10. To ensure that Spectrum™ Technology Platform has started, open the log file `<Spectrum Installation Location>/server/app/repository/logs/wrapper.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.

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.

Upgrading a Server

Prerequisites:

• Before upgrading, be sure to read the release notes for the new version. The release notes contain 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.

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 56.

If you use remote servers, you must upgrade the remote servers and start them before upgrading the main server. If you upgrade the main server and start it before upgrading and starting the remote servers, you will need to recreate the remote server 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*.

   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.

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

Module	Items to Back Up
Advanced Matching Module, Data Normalization Module, and Universal Name Module	Back up the contents of these subfolders located in *SpectrumLocation*/server/modules: • cdqdb • lucene • matcher • parser • searchindex • tables
Data Hub Module	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: • server\modules\hub\hub.properties • server\modules\db\neo4j.properties
Location Intelligence 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 9.0 SP3 or 10.0 SP1, delete old history records manually using Management Console.

   If you are upgrading from version 11.0, 11.0 SP1, or 12.0, use the JMX console to delete old history records. This process is faster than manually deleting records in Management Console, but is only available on versions 11.0, 11.0 SP1, and 12.0. For more information, see **Purging Execution History** on page 33.

6. Source the `<SpectrumLocation>/server/bin/setup` script.

7. Run the `<SpectrumLocation>/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 shut down properly. 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

```
<SpectrumLocation>/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/neo4j.properties` and set the property `dbms.allow_format_migration` property to true. The purpose of this property is to protect 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/app/repository/logs/wrapper.log` for errors or warning messages. Once all models have been upgraded, go back to the `hub.properties` file and comment out the `allow_store_upgrade` property.

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.

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

   Where:

   server is the IP address or hostname 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.config**, click **com.pb.spectrum.platform.config:manager=ArchiveTransactionManager**.

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 flow and transaction history at midnight every Sunday:

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

   For more information about cron expressions, see **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.

6. (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.

7. In the **PurgeOperation** field, leave the value set to `ALL`.
8. To run the purge, click **Invoke**.

You have purged flow and 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 Pitney Bowes.

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

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

   `$G1DCG/server/app/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:

`$G1DCG/server/app/repository/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:

- `$G1DCG/server/app/import/archive/license-keys`
- `$G1DCG/server/app/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 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:

    ```
    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 and 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 86.

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 instructions, see **Installing a License Key** on page 35.

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. If the Spectrum™ Technology Platform server is running, run the *SpectrumLocation*`/server/bin/server.stop` script to stop it.

2. Source the setup file. For example,

```
. ./setup
```

3. Uninstall the Spectrum™ Technology Platform modules by running the uninstall script for each module. The scripts are located in the `Uninstall/Uninstall_IUCode` directory, where *IUCode* is the installation unit code for the module you want to uninstall.

Module Name	IU Code
Analytics Scoring Module	AAM
Advanced Matching Module Data Normalization Module Universal Name Module	CDQ
Big Data Integration Module	BDI
Business Steward Module	BSM
Data Federation Module	SDF

Module Name	IU Code
Data Hub Module	GRF
Enterprise Data Integration Module	EDI
Enterprise Geocoding Module (Australia)	IAU
Enterprise Geocoding Module (Global)	GLOBAL
Enterprise Geocoding Module (U.K.)	IGB
Enterprise Geocoding Module (U.S.)	KGL
Enterprise Geocoding Module (World)	IXW
Enterprise Routing Module Location Intelligence Module	LIM
Enterprise System Connector	ESC
Enterprise Tax Module	GSL
GeoComplete Module	GCM
GeoConfidence Module	GCO
Global Address Validation Module	GAV
Global Sentry Module	OIS
Information Extraction Module	IEM
Microsoft Dynamics CRM Module	MSD
SAP CRM 7.0 Module	70S
SAP ECC 6.0 Module	E6C
Universal Addressing Module	UNC

Module Name	IU Code
Visual Insights Module	SBI

4. After uninstalling all Spectrum™ Technology Platform modules, uninstall Spectrum™ Technology Platform by running the uninstall script located in the `Uninstall/Uninstall_LES` directory.
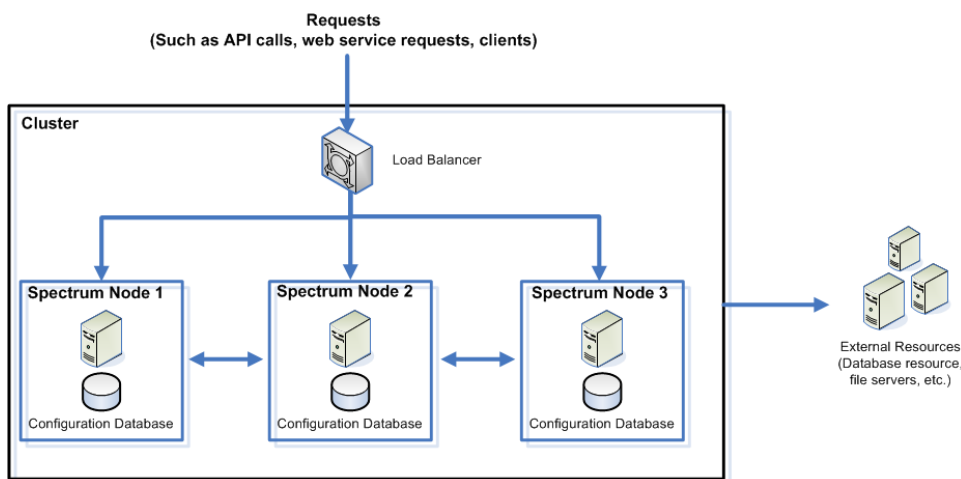
3 - Cluster

In this section

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.

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's 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's 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

For instructions on installing a cluster, see the *Spectrum™ Technology Platform Installation Guide*.

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 provide better resiliency per server than an even-numbered cluster. We make these recommendations because once the model is running, the system will continue running as long 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.
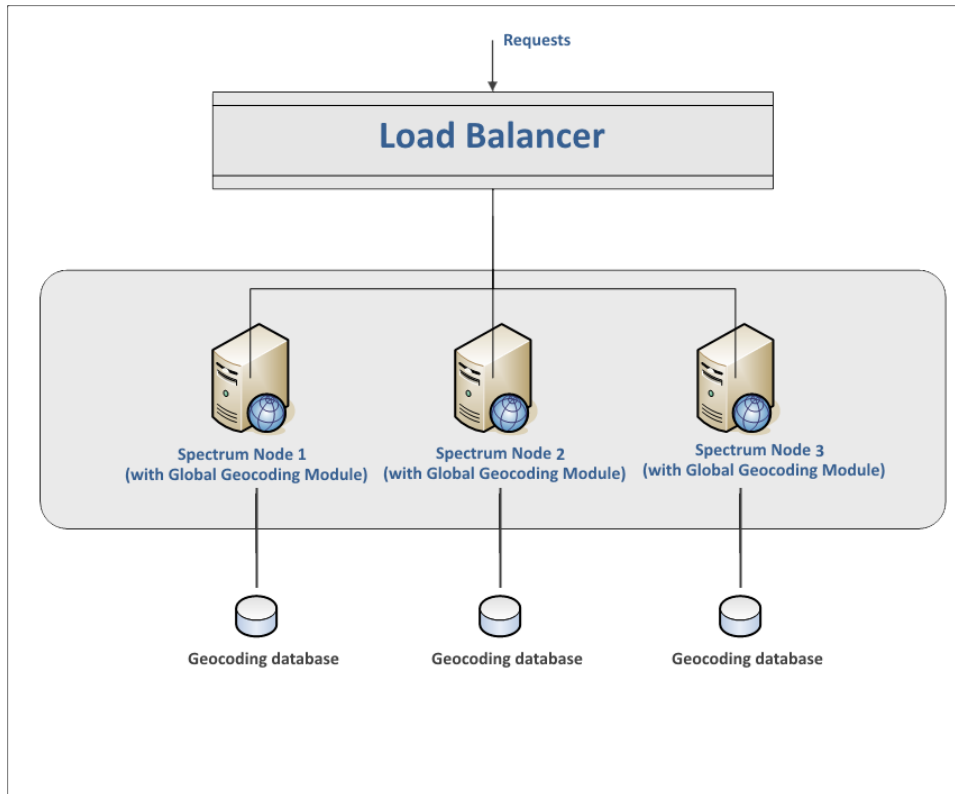
Note: Each Geocoding database MUST be installed in the same location on all of the nodes for the cluster to work properly. For example, if the Geocoding database for "Spectrum Node 1" is installed on `C:\data\`, then the other Spectrum nodes' Geocoding database must also reside on `C:\data\`.

Clustered Architecture for the Location Intelligence 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 Location Intelligence Module with or without platform clustering.

Note: Setting up both a Spectrum™ Technology Platform cluster and a Location Intelligence 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 Location Intelligence Module demo pages and utilities (such as Spatial Manager) can and should point to the load balancer.
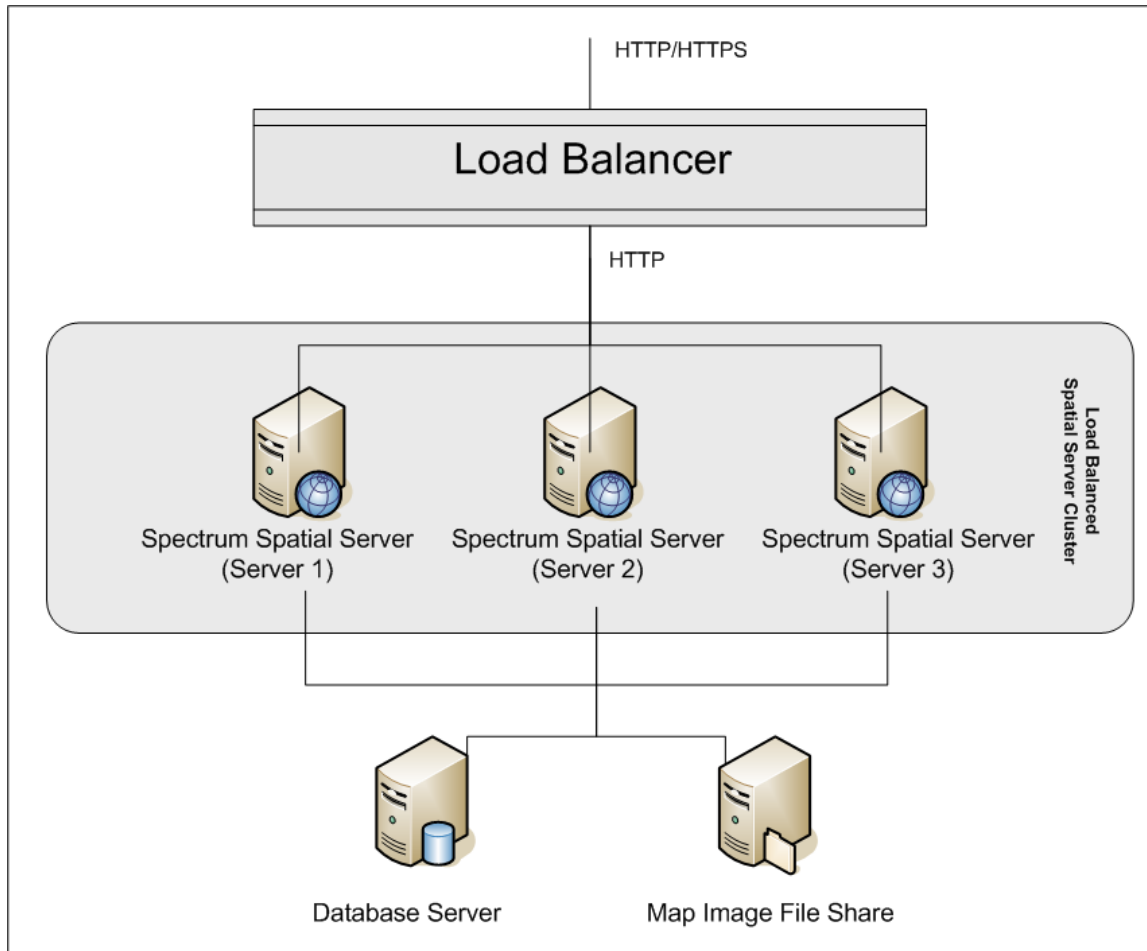
Load Balancer

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 LIM 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. The following diagrams illustrate this process.

After installing the first node you will in effect have a cluster with only one node:
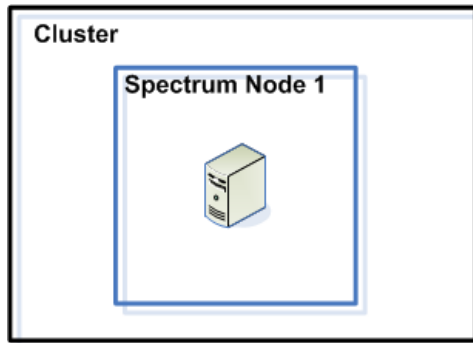
When you install the second node it must point to the first node as a seed node. This will enable the second node to receive a copy of the first node's configuration database, resulting in a cluster with two nodes with synchronized configuration information.
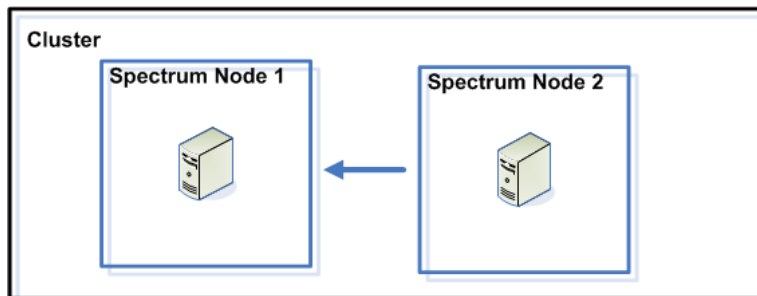
As you add additional nodes, the new nodes can point to any of the existing nodes as a seed node. You must also configure the first node to point to at least one other node in the cluster so that if it is ever brought down it can rejoin the cluster.
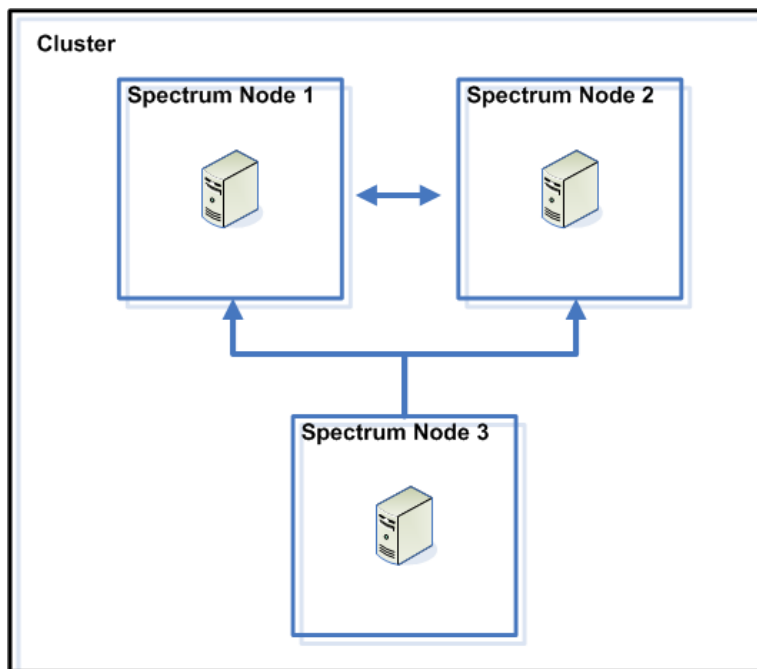
Before you begin, Install an appropriate load balancer. Follow the procedures described in the load balancer's documentation when installing.

> **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 29.

   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/app/conf/spectrum-container.properties`, as described in **Cluster Properties** on page 50.
   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	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.

Open this file in a text editor:

SpectrumFolder\server\modules\searchindex\ es-container.properties

Configure these properties:

es.index.default_number_of_replicas 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.

es.index.default_number_of_shards 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.

Save and close es-container.properties when you are done editing these properties.

Note: 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 es-container.properties file.

Module	Cluster Configuration Settings
Data Hub Module	Open this file in a text editor:

Open this file in a text editor:

SpectrumFolder\server\modules\hub\hub.properties

Configure these properties:

hub.models.path.base   Specifies the folder where models are stored. By default, each model is placed in a subdirectory under the *SpectrumFolder*\server\modules\hub\db folder. If you want to store models in a different location, uncomment this property and specify the folder where you want to store models.

hub.neo4j.database.type   Change the value of this property to ha. The default value embedded is for non-clustered installations.

hub.servers.per.cluster   Uncomment this line. Set the value of this property to the number of Spectrum™ Technology Platform servers in the cluster.

Save and close hub.properties when you are done editing these properties.

The *SpectrumFolder*\server\modules\hub\db\neo4j.properties 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 this property file into the store directory for that model.

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/app/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 73.

Property	Description
`spectrum.cluster.enabled`	Set this to true.
`spectrum.cluster.name`	If this is the first node in the cluster, set this to the name you want to give to the cluster.
	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 `spectrum.cluster.name` property on another node in the cluster.
`spectrum.cluster.address`	Specify the node's own IP address.
`spectrum.cluster.seeds`	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. Do not specify 127.0.0.1.
	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, the node will attempt to access each seed node in the order listed. If none of the seed nodes can be reached, the node will not join the cluster.
	Tip: 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.

Property	Description
`spectrum.cluster.nodeID`	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. **Tip:** We recommend that the first node you install have a node ID of 1, the second one 2, and so on.
`spectrum.repository.server.cluster.nodeCount`	This property sets the number of repository nodes in the cluster. This property must be set on nodes that run a Neo4j instance. The way in which you specify this property depends upon your cluster configuration: • **For cluster configurations with separate servers and repositories**: Set this flag in the **spectrum-container.properties** file on *each repository* node configuration, and not on the server node configurations. • **For combined server-repository configurations**: Set the property in the **spectrum-container.properties** file on *each node* of the cluster.
`spectrum.runtime.hostname`	Un-comment this property and set this property to the load balancer host name.
`spectrum.runtime.port`	Un-comment this property and set this property to the port on which you have configured the load balancer to listen.
`spectrum.repository.addresses`	Set this to the same IP address specified in `spectrum.cluster.address.` The default value localhost cannot be used in a clustered environment. If you are configuring a server node in a server-only cluster, specify the IP addresses of the nodes in the configuration database cluster. Separate each with a comma.

Installing a Cluster for the Location Intelligence Module

To set up a cluster for the Location Intelligence 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 Location Intelligence 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 Location Intelligence Module demo pages and utilities (such as Spatial Manager) can and should point to the load balancer.

Setting Up a Common Repository Database

You must configure the Location Intelligence 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 65.)

3. On all nodes of 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_fsentry
- 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 64).
   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 64).

Configuring Your System

Once the Spectrum™ Technology Platform is installed and you have configure 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 55.

> **Note:** To create a Windows map file share, see **Creating a Map Image File Share on Windows** on page 55.

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>
    ```

2. 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, e.g., `/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:

1. 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=pbi
```

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
```

Creating a Map Image File Share on Windows

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 Windows:

1. In Windows Explorer, select the image folder you want to share.
2. Right-click, and then click **Share** or **Share with**.
3. Select the users who will be writing to the image folder. These users must have read/write privileges.

Modifying OGC Service Configurations for Clustering

To ensure clustering works when you have both a Spectrum™ Technology Platform cluster and a Location Intelligence Module cluster, changes are required to the Open Geospatial Consortium (OGC) services configuration files using 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 *Spatial Manager Guide* in the Utilities section of the *Spectrum Spatial Guide* for more information.

Modifying the Java Properties Files in All Nodes

You must change the java property file in all nodes of the cluster. To modify the java properties for Spectrum™ Technology Platform:

1. Modify the java.properties file, located in
   `<spectrum>/server/modules/spatial/java.properties`, to point repository.host to localhost.

2. Change the images.webapp.url and all of the service host and port numbers to point to the load balance server.

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/app/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

Prerequisites:

- Before upgrading, be sure to read the release notes for the new version. The release notes contain 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.

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...
...have separate clusters for server nodes and configuration database nodes	**Upgrading a Cluster with a Separated Database** on page 74.
…are upgrading a cluster for the Location Intelligence Module only	**Upgrading a Cluster with the Location Intelligence Module** on page 61
...are upgrading both Spectrum and Location Intelligence Module clusters	**Upgrading a Cluster with the Location Intelligence Module** on page 61
...are upgrading a cluster running the Data Hub Module	Before shutting down all nodes, see **Upgrading a Cluster with the Location Intelligence Module** on page 61 for some required pre-upgrade steps.

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 65. When you stop all nodes of the cluster, manually, or if all nodes are down, you must start up as a new cluster/session. To refresh, start node 1 of the cluster with spectrum.cluster.seeds IP address as node 1's IP alone. Do not include other nodes' IP addresses when re-starting.
3. On the last node that you stopped:

   a. Open the file `server/app/conf/spectrum-container.properties` in a text editor.
   b. In the `spectrum.cluster.seeds` property, remove all nodes except for the current node.
   c. Make a note of the nodes you remove so you can add them back later.
   d. Save and close `spectrum-container.properties`
   e. Upgrade the node. For more information, see **Upgrading a Server**.
   f. Open the file `spectrum-container.properties` in a text editor and configure the cluster properties. For more information, see **Cluster Properties** on page 50. Be sure to leave `spectrum.cluster.seeds` set to only the current node's IP address or host name.

      Note: Be aware that the container property definitions are dependent upon your server configuration and whether you are running clusters on Neo4j instances. Review the **spectrum.repository.server.cluster.nodeCount** property to determine the definitions for your setup.

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 these properties:

      • `spectrum.cluster.address` – Specify the node's IP address.

- `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:
   SpectrumLocation`\server\app\repository\store\databases`

c. Upgrade the node. For more information, see **Upgrading a Server** on page 31.

d. Open the file `spectrum-container.properties` in a text editor and configure the cluster properties. For more information, see **Cluster Properties** on page 50. Save and close the file when you are done.

e. Start the Server.

5. After you have upgraded and started all the nodes, go back to the first node you upgraded, open `spectrum-container.properties`, and add the seed nodes you removed from `spectrum.cluster.seeds.`

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 up as a new cluster/session. To refresh, start node 1 of the cluster with the spectrum.cluster.seeds IP address as node 1's IP address only. Do not include other node's IP address at startup.

Upgrading a Cluster with the Data Hub Module

Prerequisites:

- Before upgrading, be sure to read the release notes for the new version. The release notes contain 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.

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:

   - `server\modules\hub\hub.properties`
   - `server\modules\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\app\repository\logs\wrapper.log` file for errors during shutdown.

5. Upgrade the master server.
   a) If you are upgrading from Spectrum™ Technology Platform 10.0 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) Run the Spectrum™ Technology Platform installer to upgrade the master server to the new version of Spectrum™ Technology Platform.
   c) Open the file *SpectrumFolder*`\server\modules\hub\hub.properties` in an editor and confirm that the property `hub.neo4j.database.type` is set to embedded:

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

d) Open the file *SpectrumFolder*\server\modules\hub\db\neo4j.properties in an editor and set the allow_store_upgrade property to true:

```
allow_store_upgrade=true
```

e) Start the Spectrum™ Technology Platform server.

f) Open each model in the Relationship Analysis Client and run a query. Any query is sufficient.

g) Stop the Spectrum™ Technology Platform server.

h) Open the file *SpectrumFolder*\server\modules\hub\hub.properties in an editor and set the property hub.neo4j.database.type 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.

6. 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) 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 file *SpectrumFolder*\server\modules\hub\hub.properties in an editor and set the property hub.neo4j.database.type to ha:

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

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 the *SpectrumFolder*\server\modules\hub\db\model.* directories from the master server to the non-master server.

f) Repeat these steps for each non-master server in the cluster.

7. Start the cluster.

a) Start the master server, followed by non-master servers.

b) Ensure that each server in the cluster is functioning. Check *SpectrumFolder*\server\app\repository\wrapper.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 wrapper.log file for errors.

Upgrading a Cluster with the Location Intelligence 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 45).
   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 65).
   b) Delete the repository, version, workspaces folders and the `lock.properties` file (if available) from the jackrabbit folder (`Spectrum\server\modules\spatial\jackrabbit`).
   c) Copy the contents of `repository.standalone.xml` to `repository.xml`.
   d) Start the Spectrum™ Technology Platform server on all nodes (for instructions, see **Starting a Cluster** on page 64).
   e) Import the repository content (backed up in Step 1b) into the repository using the `limrepo import` command with ACL for all nodes.
   f) Stop the Spectrum™ Technology Platform server.

3. Follow normal procedures in **Upgrading a Cluster** on page 56 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) On the seed node, download the Administration Utility from the upgraded Spectrum™ Technology Platform server.

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 65).

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 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.

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_fsentry
- 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 64).

    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 64).

Removing a Node from a Cluster

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

1. To stop the server, right-click the Spectrum™ Technology Platform icon in the Windows system tray (shown below) and select **Stop Spectrum™**.
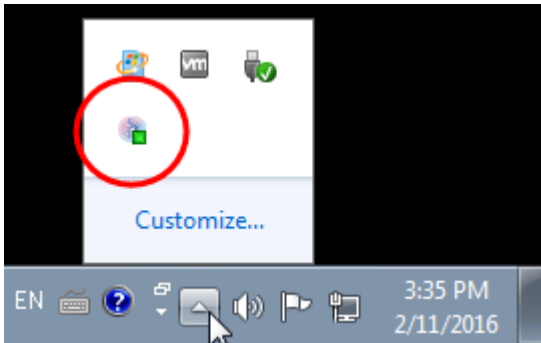
2. Stop the node you want to remove:

    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/app/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 Location Intelligence 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 Modules to a Cluster

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

1. Stop all the Spectrum™ Technology Platform nodes in the cluster. For more information, see **Stopping a Cluster** on page 65. 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 65.

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/app/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

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

1. On the last node that was stopped last, remove the seed nodes and start the server.

Warning: The first node that you start must be the last node that was stopped, and that node must be a seed node. 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 wrapper log for the time stamp of the shutdown message. You can find the wrapper log in: *Spectrum Location*\server\app\repository\logs\wrapper.log.

a) Open this file in a text editor:

   server/app/conf/spectrum-container.properties

b) 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.

c) Save the file.

d) Start the server.

e) Wait for the Spectrum™ Technology Platform server to *completely* start.

   You can tell when the Spectrum™ Technology Platform server has completely started by looking in the wrapper log: *Spectrum Location*\server\app\repository\logs\wrapper.log. This message is displayed when the server is completely started:

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

f) In the properties file spectrum-container.properties, in the spectrum.cluster.seeds property, add the host names or IP addresses that you had removed, separating each with a comma.

g) Save and close the file. You do not need to restart the server.

2. Start the other nodes in the cluster.

   Warning: Be sure to wait for the first node to start *completely* before starting additional nodes. Starting additional nodes before the first one is started may result in loss of data.

Stopping a Cluster

To stop an entire cluster:

1. Identify which nodes are seed nodes. To do this, open the file *SpectrumFolder*/server/app/conf/spectrum-container.properties and look at the nodes listed in the spectrum.cluser.seeds property.

2. Stop each Spectrum™ Technology Platform server in the cluster, making sure that the last node you stop is a seed node. 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, the last node you stop must be a seed node.

3. Make a note of the last node you stopped. You will need this information when starting up the cluster. Right-click the Spectrum™ Technology Platform icon in the Windows system tray and select **Stop Spectrum**™.

   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.

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:
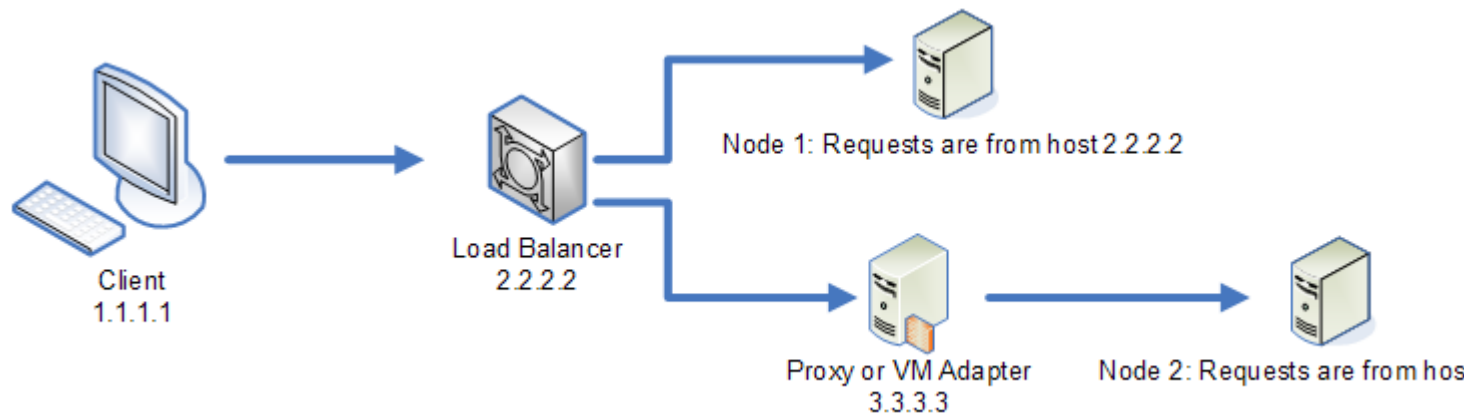
Let's say that the client makes a request and is the request is routed to Node 1. A token is created and tied to host 2.2.2.2 (the load balancer) since the node views the request as coming from the load balancer. If the next request from the client is routed to Node 2, the token will still be tied to 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:

   SpectrumLocation/server/app/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.

4 - Cluster with Separated Configuration Database

In this section

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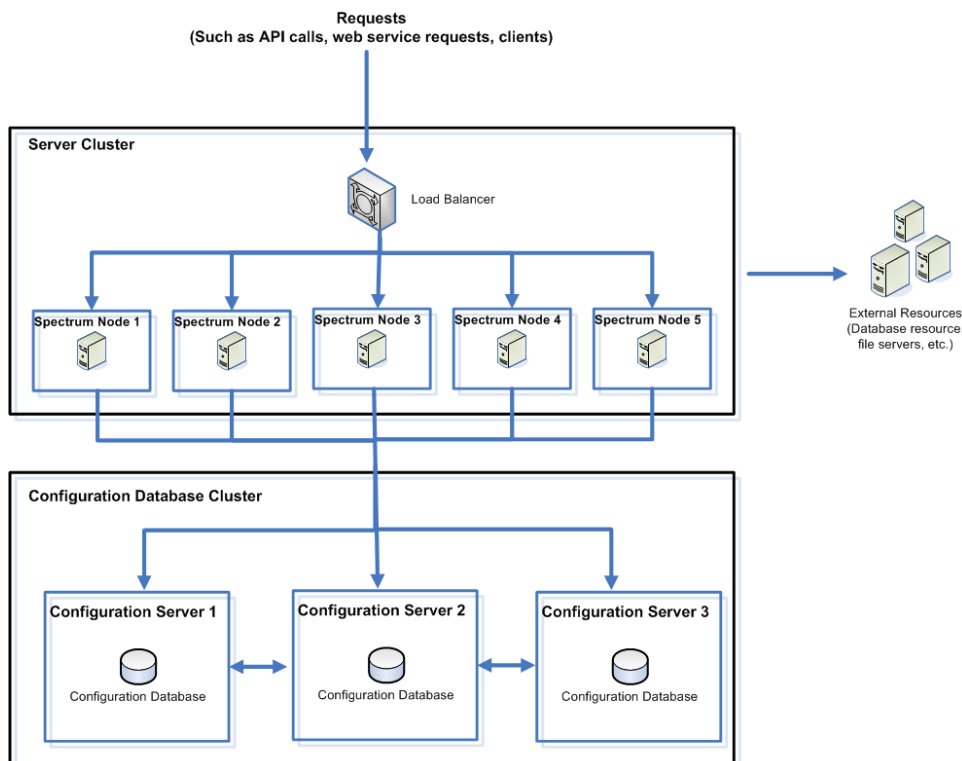
To install a separate database repository, you first install the configuration database on servers in a cluster, then install the server on nodes in a separate cluster. At least one configuration database must be running before you can install the server.

> **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 73.

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 server's `bin` directory, 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 29.

   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 *InstallationLocation*`\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/app/conf/spectrum-container.properties`, as described in **Cluster Properties** on page 50.

   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	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.

Open this file in a text editor:

SpectrumFolder\server\modules\searchindex\
es-container.properties

Configure these properties:

es.index.default_number_of_replicas	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.
es.index.default_number_of_shards	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.
	Save and close es-container.properties when you are done editing these properties.

Note: 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 es-container.properties file.

Module	Cluster Configuration Settings
Data Hub Module	Open this file in a text editor: *SpectrumFolder*\server\modules\hub\hub.properties Configure these properties:

hub.models.path.base	Specifies the folder where models are stored. By default, each model is placed in a subdirectory under the *SpectrumFolder*\server\modules\hub\db folder. If you want to store models in a different location, uncomment this property and specify the folder where you want to store models.
hub.neo4j.database.type	Change the value of this property to ha. The default value embedded is for non-clustered installations.
hub.servers.per.cluster	Uncomment this line. Set the value of this property to the number of Spectrum™ Technology Platform servers in the cluster.

Save and close hub.properties when you are done editing these properties.

The *SpectrumFolder*\server\modules\hub\db\neo4j.properties 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 this property file into the store directory for that model.

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/app/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 50.

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
`spectrum.cluster.enabled`	Set this to true.
`spectrum.cluster.name`	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.
	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.
`spectrum.cluster.address`	Specify the node's own IP address.

Property	Description
spectrum.cluster.seeds	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.
	If this is not the first node in the cluster, use the host name or IP address of the Spectrum™ Technology Platform server whose configuration will be replicated on this node when it joins the cluster, resulting in synchronized configuration. You can specify multiple seed nodes by separating each with a comma. When starting up, the node will attempt to access each seed node in the order listed. If none of the seed nodes can be reached, the node will not join the cluster.
	Tip: 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.
spectrum.cluster.nodeID	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

Prerequisites:

• Before upgrading, be sure to read the release notes for the new version. The release notes contain 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.

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.

Module	Items to Back Up
Advanced Matching Module, Data Normalization Module, and Universal Name Module	Back up the contents of these subfolders located in *SpectrumLocation*/server/modules: • cdqdb • lucene • matcher • parser • searchindex • tables
Data Hub Module	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: • server\modules\hub\hub.properties • server\modules\db\neo4j.properties
Location Intelligence Module	Back up your named resources, data, and configuration files.

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 65.

4. On the *last* node that you shut down in the configuration database cluster, execute installdb.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 wrapper log for the time stamp of the shutdown message. You can find the wrapper log in: *Spectrum Location*\Database\repository\logs\wrapper.log.

5. After the upgrade is complete, the configuration database starts up automatically. Verify that the configuration database is fully started before continuing by opening the log file `SpectrumInstallationLocation\Database\repository\logs\wrapper.log` and looking for the message `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.

6. Stop the configuration database. To stop the configuration database, right-click the Spectrum™ Technology Platform icon in the Windows system tray and select **Stop Spectrum**™. Alternatively, you can use the Windows Services control panel to stop the configuration database by stopping the **Spectrum Database** service.

7. Configure clustering for the database cluster.

   a) Edit the file `Database/repository/spectrum-container.properties` as described in **Cluster Properties for a Configuration Database Cluster** on page 73.

   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) 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 56.

   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 `InstallationLocation\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/neo4j.properties` and set the property `dbms.allow_format_migration` property to true. The purpose of this property is to protect 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/app/repository/logs/wrapper.log` for errors or warning messages. Once all models have been upgraded, go back to the `hub.properties` file and comment out the `allow_store_upgrade` property.

Upgrading a Cluster with a Separated Database and Data Hub Module

Prerequisites:

• Before upgrading, be sure to read the release notes for the new version. The release notes contain 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.

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:

   - `server\modules\hub\hub.properties`
   - `server\modules\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\app\repository\logs\wrapper.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 `installdb.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 wrapper log for the time stamp of the shutdown message. You can find the wrapper log in: `Spectrum Location\server\app\repository\logs\wrapper.log`.

7. Configure clustering for the database cluster.

   a) Edit the file `server/app/conf/spectrum-container.properties` as described in **Cluster Properties for a Configuration Database Cluster** on page 73.

   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, and that node must be a seed node. 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 wrapper log for the time stamp of the shutdown message. You can find the wrapper log in: *Spectrum Location*`\server\app\repository\logs\wrapper.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 10.0 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) Run the Spectrum™ Technology Platform installer to upgrade the master server to the new version of Spectrum™ Technology Platform.

   c) Open the file *SpectrumFolder*`\server\modules\hub\hub.properties` in an editor and confirm that the property `hub.neo4j.database.type` is set to embedded:

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

   d) Open the file *SpectrumFolder*`\server\modules\hub\db\neo4j.properties` in an editor and set the `allow_store_upgrade` property to true:

```
allow_store_upgrade=true
```

   e) Start the Spectrum™ Technology Platform server.

   f) Open each model in the Relationship Analysis Client and run a query. Any query is sufficient.

   g) Stop the Spectrum™ Technology Platform server.

   h) Open the file *SpectrumFolder*`\server\modules\hub\hub.properties` in an editor and set the property `hub.neo4j.database.type` 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.

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 *InstallationLocation*\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) 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 file *SpectrumFolder*\server\modules\hub\hub.properties in an editor and set the property `hub.neo4j.database.type` to ha:

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

    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 the *SpectrumFolder*\server\modules\hub\db\model.* 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 *SpectrumFolder*\server\app\repository\wrapper.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 `wrapper.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.

Module	Items to Back Up
Advanced Matching Module, Data Normalization Module, and Universal Name Module	Back up the contents of these subfolders located in *SpectrumLocation*/server/modules: • cdqdb • lucene • matcher • parser • searchindex • tables
Data Hub Module	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: • server\modules\hub\hub.properties • server\modules\db\neo4j.properties
Location Intelligence Module	Back up your named resources, data, and configuration files.

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 31 (for upgrading a single server) or **Upgrading a Cluster** on page 56 (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 `Database\repository\data\databases` folder from your existing server to the server where you installed the separate configuration database. Replace the existing folder.

   e) 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 73.

   f) Save and close the `spectrum-container.properties` file.

   g) 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`.

   h) 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 45.

      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 *InstallationLocation*`\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.

Module	Items to Back Up
Advanced Matching Module, Data Normalization Module, and Universal Name Module	Back up the contents of these subfolders located in *SpectrumLocation*/server/modules: • `cdqdb` • `lucene` • `matcher` • `parser` • `searchindex` • `tables`
Data Hub Module	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: • `server\modules\hub\hub.properties` • `server\modules\db\neo4j.properties`
Location Intelligence Module	Back up your named resources, data, and configuration files.

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. On the *last* node that you shut down in the configuration database cluster, execute `installdb.sh`. 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 wrapper log for the time stamp of the shutdown message. You can find the wrapper log in: *Spectrum Location*\server\app\repository\logs\wrapper.log.

4. Install a new server. For instructions, see **Installing a New Server** on page 29.

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

5. Stop the server.
6. Copy the *SpectrumLocation*\Database\repository\data\databases folder from the last configuration database server you stopped to the new server, replacing the existing folder.
7. Start the server.

Adding Modules to a Cluster

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

1. Stop all the Spectrum™ Technology Platform nodes in the cluster. For more information, see **Stopping a Cluster** on page 65. 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 65.

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/app/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.

5 - Spectrum Databases

After you have installed the server you need to install the databases that support the module(s) 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.

In this section

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 the postal authority to compare your address to the official address. Other types of processing that use Spectrum databases include geocoding, location intelligence functions like point-in-polygon or travel directions, 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.

Beginning with Spectrum™ Technology Platform version 12.1, some databases have changed to support a simpler installation and configuration proess. This includes international data that is consumed by **International Geocoding Databases** on page 91, **International Geocoding Databases** on page 104 and **Installing Global Addressing Module Databases** on page 101. Refer to those topics for more information.

1. Download your licensed SPD files from the Pitney Bowes eStore using the link provided in the release announcement or welcome email.
2. Place the `.spd` files in:

   SpectrumLocation`/server/app/dataimport`

The SPD file is automatically extracted to:

SpectrumLocation`/server/app/repository/datastorage`

Once the database has been extracted to the `datastorage` folder, it is installed and you can define it as a database resource using Management Console. Find more information about Management Console in the Administration Guide.

You can modify the Spectrum database installation process if needed:

- You can change the location of the data import directory by altering the **platform** property in the `<SpectrumLocation>/server/app/conf/dataimportdirectories.properties` file.
- You can change the location of the data storage folder by altering the **spectrum.data.manager.storage.directory** property in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file. Consider creating a storage folder outside of Spectrum so it will not be deleted when you uninstall Spectrum.
- By default, the SPD files are deleted after the files are extracted or when Spectrum is uninstalled. However, you can archive SPD files by setting the **spectrum.data.manager.archive.data** property

to "true" in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file.

• With any change to the properties files, you must stop and restart the Spectrum server.

Installing the 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. To stop the server, right-click the Spectrum™ Technology Platform icon in the Windows system tray (shown below) and select **Stop Spectrum**™.

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 **www.g1.com/support**.

   > **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. Execute the script for installing the database by typing the following command:

   `./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 on the tables contained in each database, refer to the reference documentation for each component.

Stage	Available Databases
Advanced Transformer	Data Normalization Module - Base Tables

Stage	Available Databases
Open Parser	• Data Normalization Module - Base Tables • Core Names Database • Company Names Database • Arabic Plus Pack • Asian Plus Pack
Table Lookup	• Data Normalization Module - Base Tables • Core Names Database • Arabic Plus Pack • Asian Plus Pack • ZREPLACE (Used by the SAP Module for French address validation)

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 **www.g1.com/support**.

   > **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. Execute the script for installing the database by typing the following command:

```
./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 Enterprise Geocoding Module Databases

This module has several databases. You may have one or more of these, depending on the features you have licensed.

International Geocoding Databases

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

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

To install the international geocoding databases you need to meet the following requirements:

- You must have Java 8 installed.

- You must point your JAVA_HOME environment variable to your JDK 1.8 installation location.

1. Download your licensed SPD files from the Pitney Bowes eStore using the link provided in the release announcement or welcome email.
2. Place the `.spd` files in:

   SpectrumLocation`/server/app/dataimport`

The SPD file is automatically extracted to:

SpectrumLocation`/server/app/repository/datastorage`

Once the database has been extracted to the `datastorage` folder, it is installed and you can define it as a database resource using Management Console. Find more information about Management Console in the Administration Guide.

You can modify the Spectrum database installation process if needed:

- You can change the location of the data import directory by altering the **platform** property in the `<SpectrumLocation>/server/app/conf/dataimportdirectories.properties` file.
- You can change the location of the data storage folder by altering the **spectrum.data.manager.storage.directory** property in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file. Consider creating a storage folder outside of Spectrum so it will not be deleted when you uninstall Spectrum.
- By default, the SPD files are deleted after the files are extracted or when Spectrum is uninstalled. However, you can archive SPD files by setting the **spectrum.data.manager.archive.data** property to "true" in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file.
- With any change to the properties files, you must stop and restart the Spectrum server.

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 the 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 GSD 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 the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the Pitney Bowes **technical support web site**.
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
3. If you have previously installed the Centrus Data Product Suite, delete any copies of the .gsd, .gsl, .gsi, .gsu, .gsz, .z9, .dir, .las, .los, .apn and .elv files.
4. Copy the files you need to a local directory.
5. After you install the database files, use the Database Resource tool in the Management Console to define the database as a resource. For more information, see the *Administration Guide*.

Points Databases (U.S. Only)

Points databases contain data for locating the center of a parcel. These databases provides enhanced geocoding accuracy for internet mapping, property and casualty insurance, telecommunications, utilities, and others.

- **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.

> **Note:** 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.

1. Insert the database DVD or download the database from **www.g1.com/support**.

    > **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.

2. If you are installing from DVD and your system auto-mounts, skip this step. If you 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.

3. If you are installing a Centrus points database:
    a) If you have previously installed any of the Centrus points databases, delete these files: `cpoints.gsd`, `cpoints.gsi`, `cpoints.apn`, `cpoints2.apn`, `cpoints3.apn`, and `cpoints.elv`.
    b) Copy these files to the Spectrum™ Technology Platform server: `points.gsd`, `cpoints.gsi`, `cpoints.apn`, `cpoints2.apn`, `cpoints3.apn`, and `cpoints.elv`.

4. If you are installing the Centrus TomTom Points database:
    a) If you have previously installed the Centrus TomTom Points database, delete these files: `points.gsd` and `points.gsi`.
    b) Copy these files to the Spectrum™ Technology Platform server: `points.gsd` and `points.gsi`.

5. After you install the database files, use the Database Resource tool in the Management Console to define the database as a resource. For more information, see *Spectrum™ Technology Platform Administration Guide*.

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 Routing Module Databases

1. Insert the database DVD or download the database from **www.g1.com/support**.

   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.

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

3. 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.

4. Routing database is now available in the SPD format. Please refer to the Installation Guide located inside the zipped file that is shipped with the database.

5. After you install the database files, use the Database Resource tool in the Management Console to define the database as a resource. For more information, see the "Configuring Database Resources" chapter of the *Spectrum™ Technology Platform Administration Guide* on **support.pb.com**.

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 technical support web site, **www.g1.com/support**. 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.

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 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 Software 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 Pitney Bowes. 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 GeoComplete Module Databases

Note: The GeoComplete Module is deprecated as of Spectrum 12.0 SP2. The **functionality** has been moved to the Global Geocoding Module (GGM).

This module has databases for every country that implements the GeoComplete feature. The countries are provided in the following bundles, but each country is separately licensed.

Table 1: GeoComplete Database Bundles

Bundles	Country Databases Included
GeoComplete Americas	USA, BRA, CAN, MEX
GeoComplete APAC	JPN, SGP
GeoComplete EMEA	AND, ARE. AUT, BEL, CHE, CZE, DNK, ESP, FIN, FRA, DEU, GBR, HUN, IRL, ITA, KWT, LIE, LUX, NLD, NOR, POL, PRT, RUS, SVK, SVN, SWE, TUR, ZAF

Note: For each country, street, POI, and user dictionaries (if any) must have unique names and be in the same folder. If a country supports multiple languages, the language-specific dictionaries must also be in the same parent folder.

1. Download the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the Pitney Bowes **technical support web site**.
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
3. Change the working directory to the `bin` directory of where Spectrum™ Technology Platform is installed.
4. Source the "setup" bourne shell script to setup the environment by typing the following command:

   `. ./setup`

5. Execute the `dbloader.bin` script. Select the databases for each country you wish to install. You can install any database from the bundle, however, you must have a license for every country you wish to use.
6. Follow the prompts as the script verifies your environment and database location.

   Note: Do not install GeoComplete databases on a network drive. Doing so can cause performance problems.

7. After you install the database files, use the Database Resource tool in the Management Console to define the database as a resource. For more information, see the *Administration Guide*.

Installing GeoEnrichment Module Databases

1. Download your database(s). The database is downloaded as a .tar.bz2 file.
2. Extract the .tar.bz2 file.

    Tip: A tool that supports extracting the .tar.bz2 and .tar formats is "7-Zip". This open-source tool can be downloaded from: **http://www.7-zip.org/download.html**

3. Extract the .tar file.
4. Copy the data to any directory. Note the file name and path.

    > **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.

5. After you install the database files, you will need to define the database as a resource. For more information, see "Adding a GeoEnrichment Module Database Resource" in the *GeoEnrichment Guide* on **support.pb.com**.

Installing Global Addressing Module Databases

This procedure describes how to download and install Global Addressing Module databases in the Spectrum™ Product Database (SPD) format from the Pitney Bowes eStore.

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

Memory

The following table provides information on the Global Address Module memory requirements for each country database.

Table 2: Global Address Validation Memory Requirements (in Megabytes)

Country Database Name	Global Address Validation	Global Type Ahead	Both
Argentina (ARG)	700	n/a	n/a
Australia (AUS)	700	n/a	n/a
Austria (AUT)	900	700	1900
Belgium (BEL)	900	700	1900
Brazil (BRA)	700	700	700
Canada (CAN)	n/a	n/a	n/a
China (CHN)	700	n/a	n/a
Czech Republic (CHZ)	700	n/a	n/a
Denmark (DNK)	2100	700	3400
Finland (FIN)	900	700	1900
France (FRA)	2800	700	4100
Germany (DEU)	700	700	1900
Greece (GRC)	700	n/a	n/a
India (IND)	700	n/a	n/a
Ireland (IRL)	900	700	1900
Italy (ITA)	700	700	1900
Japan (JPN)	700	n/a	n/a
Malaysia (MYS)	700	n/a	n/a
Mexico (MEX)	700	n/a	n/a

Country Database Name	Global Address Validation	Global Type Ahead	Both
Netherlands (NLD)	700	n/a	n/a
New Zealand (NZL)	700	n/a	n/a
Norway (NOR)	700	700	1900
Poland (POL)	700	n/a	n/a
Russia (RUS)	700	n/a	n/a
Spain (ESP)	1300	700	1900
Sweden (SWE)	900	n/a	n/a
Switzerland (CHE)	700	700	1900
United Kingdom (GBR)	980	700	1900

To download and install a Global Addressing Module database resource in the Spectrum™ Product Database (SPD) format:

1. Make sure no applications are running.
2. Select and download your licensed SPD files (xxx.spd) from the Pitney Bowes eStore using the link provided in the release announcement or welcome email.
3. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
4. Install the SPD files:

   a) Place the SPD files in `<SpectrumLocation>/server/app/dataimport`. 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 **platform** property in the `<SpectrumLocation>/server/app/conf/dataimportdirectories.properties` file.

   b) When the server detects new SPD files, the server automatically extracts the SPD files to `<SpectrumLocation>/server/app/repository/datastorage`.

   You can change the location of the data storage folder by altering the **spectrum.data.manager.storage.directory** property in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file.

c) By default, the SPD files are deleted after the files are extracted. However, you can archive SPD files by setting the **spectrum.data.manager.archive.data** property to "true" in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file.

d) 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.

e) After you install the database files, use either the Database Resource tool in the Management Console or the Global Addressing Administration Utility database commands to define the database as a resource. For more information on the Administration Utility database commands, see the section "Global Addressing Module Databases" in the *Spectrum™ Technology Administration Guide*.

Installing Global Geocoding Module Databases

This module supports databases for both US and non-US countries.

International Geocoding Databases

International geocoding databases contain the data necessary to perform geocoding and reverse geocoding for locations outside the U.S.

To install the international geocoding databases you need to meet the following requirements:

- You must have Java 8 installed.
- You must point your JAVA_HOME environment variable to your JDK 1.8 installation location.

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

1. Download your licensed SPD files from the Pitney Bowes eStore using the link provided in the release announcement or welcome email.
2. Place the `.spd` files in:

    SpectrumLocation`/server/app/dataimport`

The SPD file is automatically extracted to:

SpectrumLocation`/server/app/repository/datastorage`

Once the database has been extracted to the `datastorage` folder, it is installed and you can define it as a database resource using Management Console. Find more information about Management Console in the Administration Guide.

You can modify the Spectrum database installation process if needed:

- You can change the location of the data import directory by altering the **platform** property in the `<SpectrumLocation>/server/app/conf/dataimportdirectories.properties` file.
- You can change the location of the data storage folder by altering the **spectrum.data.manager.storage.directory** property in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file. Consider creating a storage folder outside of Spectrum so it will not be deleted when you uninstall Spectrum.
- By default, the SPD files are deleted after the files are extracted or when Spectrum is uninstalled. However, you can archive SPD files by setting the **spectrum.data.manager.archive.data** property to "true" in the Data Manager settings section of the `<SpectrumLocation>/server/app/conf/spectrum-container.properties` file.
- With any change to the properties files, you must stop and restart the Spectrum server.

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.

- **TomTom Geocoding**—This database provides street segment data by TomTom, a third-party provider of spatial data, and postal data from the U.S. Postal Service.
- **HERE Geocoding**—This database provides street segment data by HERE, a third-party provider of spatial data.

These databases use proprietary files called GSD 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 the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the technical support web site, **www.g1.com/support**.
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.
3. If you have previously installed the Centrus Data Product Suite, delete any copies of the .gsd, .gsl, .gsi, .gsu, .gsz, .z9, .dir, .las, .los, .apn and .elv files.
4. Copy the files you need to a local directory.
5. After you install the database files, use either the Global Geocoding Database Resource tool in the Management Console or the Global Geocoding CLI database commands to define the database as a resource. For more information, see the *Administration Guide*.

Points Databases (U.S. Only)

Points databases contain data for locating the center of a parcel. These databases provides enhanced geocoding accuracy for internet mapping, property and casualty insurance, telecommunications, utilities, and others.

> **Note:** To use a points database, you must also install a streets database. See **U.S. Geocoding Databases** on page 105 for the list of available US streets databases.

- **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**—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.

> **Note:** 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.

1. Insert the database DVD or download the database from **www.g1.com/support**.

   > **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.

2. If you are installing from DVD and your system auto-mounts, skip this step. If you 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.

3. If you are installing a Centrus points database:

a) If you have previously installed any of the Centrus points databases, delete these files: `cpoints.gsd`, `cpoints.gsi`, `cpoints.apn`, `cpoints2.apn`, `cpoints3.apn`, and `cpoints.elv`.

b) Copy these files to the Spectrum™ Technology Platform server: `points.gsd`, `cpoints.gsi`, `cpoints.apn`, `cpoints2.apn`, `cpoints3.apn`, and `cpoints.elv`.

4. If you are installing the Centrus TomTom Points database:

a) If you have previously installed the Centrus TomTom Points database, delete these files: `points.gsd` and `points.gsi`.

b) Copy these files to the Spectrum™ Technology Platform server: `points.gsd` and `points.gsi`.

5. After you install the database files, use either the Global Geocoding Database Resource tool in the Management Console or the Global Geocoding CLI database commands to define the database as a resource. For more information, see the *Administration Guide*.

Installing the 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
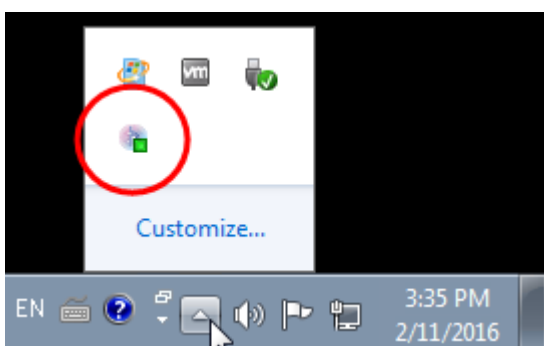- globalsentrydb.ids-sanctions.csv
- globalsentrydb.names-sanctions.csv

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 89 and **Installing the Advanced Matching Module Database** on page 88.

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. To stop the server, right-click the Spectrum™ Technology Platform icon in the Windows system tray (shown below) and select **Stop Spectrum™**.

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 **www.g1.com/support**.

   > **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 bySpectrum™ Technology Platform. By default, the HTTP port is 8080.

    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:hsql://${host}:${port}/${instance}

    f) Add this driver file:

       `<SpectrumPlatformLocation>/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:

- user: sa
- password: <there is no password>
- 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 Location Intelligence Module Databases

1. Place the data on the file system, or install the data into a database.
2. Use Spatial Manager to define Location Intelligence Module database resources (named connections and tables). For more information, see the "Configuring Database Resources" chapter of the *Spectrum™ Technology Platform Administration Guide* on **support.pb.com**.

Installing Universal Addressing Module Databases

This procedure describes how to install databases used by Get Candidate Addresses, Get City State Province, Get Postal Codes, Validate Address, and Validate Address AUS. For instructions on installing databases used by Validate Address Global, see **Installing Validate Address Global Databases** on page 111. For instructions on installing databases used by Validate Address Loqate, see **Installing Validate Address Loqate Databases** on page 112.

> **Note:** 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.

1. Download the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the Pitney Bowes **technical support web site**.
2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.

3. Change the working directory to the `bin` directory of where Spectrum™ Technology Platform is installed.

4. Source the "setup" bourne shell script to set up the environment by typing the following command:

   `. ./setup`

5. Execute the script for installing the database by typing the following command:

   `./installdb_unc`

6. 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.

7. If you choose to install Residential Delivery Indicator, an optional database that you license directly from the U.S. Postal Service, you are prompted for the nine-digit RDI table and the eleven-digit RDI table. These are the .R9 and .R11 files provided from the U.S. Postal Service.

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 the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the Pitney Bowes **technical support web site**.

2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.

3. Unzip the database file to the location you want. The database zip files are:

   • VAGlobal-EMEA.zip—Contains the data for Europe, Middle East, and Africa.
   • VAGlobal-APAC.zip—Contains the data for Asia-Pacific.
   • VAGlobal-Americas.zip—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 them on a network rather than accessing them locally.

4. To stop the server, right-click the Spectrum™ Technology Platform icon in the Windows system tray (shown below) and select **Stop Spectrum™**.
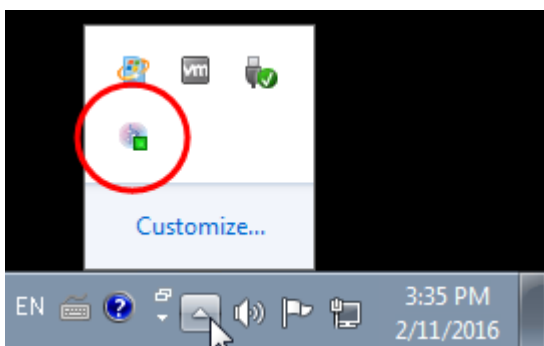
5. Stop Spectrum™ Technology Platform. To do this, change the working directory to the `bin` directory of where Spectrum™ Technology Platform is installed, then type the following command:

   `./server.stop`

6. Install the unlock code:

   a) Open the following file in a text editor:

      `<SpectrumLocation>/server/modules/addressglobal/conf/unlockcodes.txt`

   b) Enter your unlock codes, one per line.

   c) Save and close the file.

7. 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 the database from the Pitney Bowes Software eStore using the link provided in the release announcement or welcome email. You can also download the database from the Pitney Bowes **technical support web site**.

2. The database is downloaded as a zip file. Unzip the database before proceeding with the installation.

3. Unzip the database file(s) to the location you want. If you are installing data from multiple zip files or discs, be sure to unzip them all to the same location. The database zip files are:

   • LQ0/DB_Setup—Contains general database setup files.

   > **Note:** Regardless of which set of data you use, the files in LQ0 must be installed.

   • LQ1/APAC_AFR_ME-I—Contains the data for Asia-Pacific, Africa, and Middle East.
   • LQ2/Americas-I—Contains the data for the Carribbean, Central America, and South America.

- LQ3/Europe-I—Contains the data for Eastern and parts of Western Europe.
- LQ4/Americas-II—Contains the data for parts of North America.
- LQ5/Europe-II—Contains the data for parts of Western Europe.
- LQ6/Americas-III—Contains the data for parts of North America.
- LQ7/APAC_AFR_ME-II—Contains the data for parts of Asia-Pacific, Africa, and Middle East.
- LQ8/Europe-III—Contains the data for parts of Western Europe.

> **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.

4. Change the working directory to the `bin` directory of where Spectrum™ Technology Platform is installed.

5. 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:

   ```
   ./install.sh
   ```

7. Follow the prompts as the script verifies your environment and database location.

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. To stop the server, right-click the Spectrum™ Technology Platform icon in the Windows system tray (shown below) and select **Stop Spectrum™**.

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 **www.g1.com/support**.

    > **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:
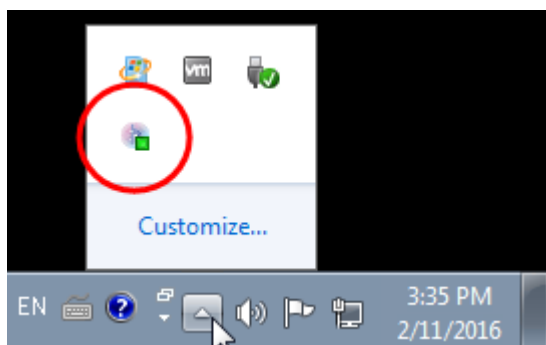
    ```
    . ./setup
    ```

8. Execute the script for installing the database by typing the following command:

    ```
    ./installdb_cdq
    ```

9. 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.

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
```

Using the Database Silent Installer

The silent install process allows you to pre-configure 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** 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.	• U.S. Postal database • Delivery Point Validation database • LACS^{Link} database • Early Warning System database • Residential Delivery Indicator database
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.

6 - Client Tools

In this section

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 important compatibility information as well as release-specific installation notes.

This procedure describes how to install the following client tools:

- **Enterprise Designer**— Use Enterprise Designer to create, modify, and run dataflows.
- **Job Executor**—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.
- **Process Flow Executor**—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.
- **Administration Utility**—The 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.

    Note: As of Spectrum version 11.0, Management Console is a web-based tool rather than installable client as it was in previous releases.

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 pre-configured 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 into 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.

7 - Client API

In this section

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.

8 - SAP, SugarCRM, and Microsoft Dynamics

In this section

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 Address Now Module, 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: *SpectrumFolder*\server\modules\dataflows\sap.

   c) Review the following table then copy the applicable dataflow files to:

`SpectrumFolder\server\app\import`

If you are installing this set of modules	Copy these dataflow files to the import folder
Universal Addressing Module	SAPValidateAddressWithCandidates.df SAPValidateAddressWithCandidates.UAM.df
Enterprise Geocoding Module	SAPValidateAddressWithCandidates.EGM.df
Enterprise Geocoding Module Universal Addressing Module	SAPValidateAddressWithCandidates.UAM_EGM.df
Enterprise Tax Module Universal Addressing Module	SAPAssignGeoTAXInfo.df SAPBatchAssignGeoTAXInfo.df SAPValidateAddressAndAssignGeoTAXInfo.df SAPValidateAddressWithCandidates.UAM_ETM.df
Enterprise Geocoding Module Enterprise Tax Module Universal Addressing Module	SAPValidateAddressWithCandidates.UAM_ETM_EGM.df
Universal Addressing Module without Loqate	SAPValidateAddressWithCandidate_UAM.df
Universal Addressing Module without Loqate Enterprise Tax Module	SAPAssignGeoTAXInfo.df SAPBatchAssignGeoTAXInfo.df SAPValidateAddressAndAssignGeoTAXInfo.df SAPValidateAddressWithCandidates.UAM_ETM.df
Universal Addressing Module with Loqate	ValidateAddressWithCandidates_UAM_Loqate.df
Universal Addressing Module with Loqate 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 ValidateAddressWithCandidates_EGM.df
Enterprise Tax Module	ValidateAssignGeoTAXInfo.df ValidateAddressWithCandidates_ETM.df SAPBatchAssignGeoTAXInfo.df

Note: If errors occur in Management Console or Enterprise Designer, delete the contents of `<WindowsTemporaryDirectory>\g1Assemblies`, where <WindowsTemporaryDirectory> is one of these: *%TMP%*, *%TEMP%*, *%USERPROFILE%*, or the *Windows directory*. Typically, `C:\Documents and Settings\<USERNAME>\Local Settings\Temp\g1Assemblies`. 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 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 /HSGRP1/BCSET_BC_BAS_PV.
4. Activate it with the options **Overwrite All Data** and **Default Mode**.

5. Select and activate the remaining 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_GTX
   /HSGRP1/MERGE_SETTINGS
   /HSGRP1/BCSET_BUPA_CUSTOM
   /HSGRP1/BCSET_BC_BAS_DES
   /HSGRP1/BCSET_DQC_CUSTOM

b) **Activate BC sets for CRM 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 9. /HSGRP1/BCSET_BC_BAS_DES.
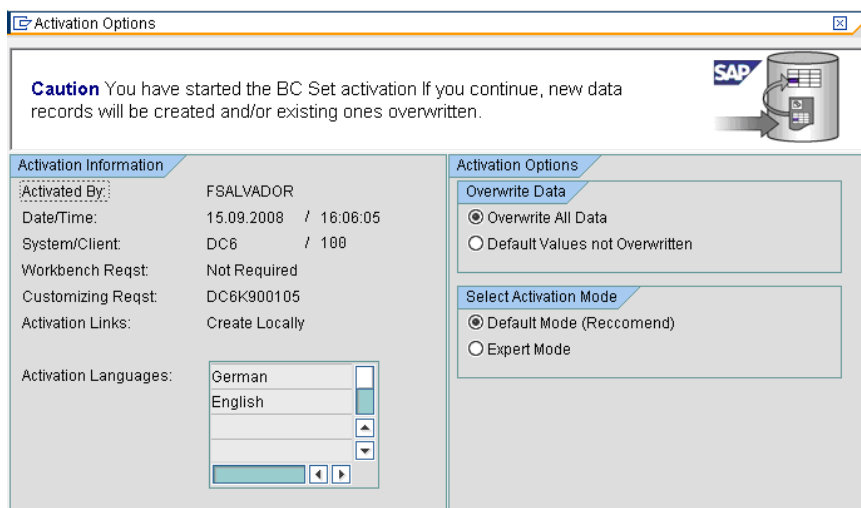4. Activate it with the options **Overwrite All Data** and **Default Mode**.

5. Select and activate the remaining 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_PV
> /HSGRP1/BCSET_BC_BAS_GTX
> /HSGRP1/ICWC_SETTING
> /HSGRP1/MERGE_SETTINGS

5. Set up the RFC destination.
   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.

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 WSProxies** 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 form SAP stage until you perform these steps.

1. Install the SAP Java Connector (SAP JCo).
   a) Go to **service.sap.com/connectors** 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 the following directory on the Spectrum™ Technology Platform server:
   SpectrumDirectory`/server/app/lib`
   g) Copy the .so file to the following directory on the Spectrum™ Technology Platform server:
   SpectrumFolder`/server/bin/wrapper`
   h) Start the Spectrum™ Technology Platform server.
2. Install the SAP Transport Requests that support Read from SAP.

> **Note:** The following 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.

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
9.x	9.x	720 and above
10.x	10.x	741 and above
11.x	11.x	741 and above

Spectrum Release	SAP Add-on Version	SAP System Kernel Level
12.x	12.x	741 and above

Table 4: Compatibility Matrix for Upgrade

Spectrum Release	SAP Add-on Version	SAP System Kernel Level
9.x	Any to 9.3	720 and above
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

This table gives the compatibility matrix for new deployment and upgrade of SAP S/4 HANA 1610 for Spectrum™ Technology Platform 12.x.

Spectrum Release	SAP S/4 HANA 1610 Add-on Version	SAP S/4 HANA 1610 System Component Level
New deployment		
12.x	12.x	751 (SAP_BASIS) 75B (SAP_ABA)
Upgrade		
12.x	12.x	751 (SAP_BASIS) 75B (SAP_ABA)

Note: It is recommended that you contact the Pitney Bowes representative or coordinator assigned to you before starting the process.

This table gives the compatibility matrix for new deployment and upgrade of SAP S/4 HANA 1709 for Spectrum™ Technology Platform 12.x.

Spectrum Release	SAP S/4 HANA 1709 Add-on Version	SAP S/4 HANA 1709 System Component Level
New deployment		
12.x	12.x	752 (SAP_BASIS) 75C (SAP_ABA)
Upgrade		
12.x	12.x	752 (SAP_BASIS) 75C (SAP_ABA)

Note: It is recommended that you contact the Pitney Bowes representative or coordinator assigned to you before starting the process.

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 the Spectrum™ Technology Platform solution 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:

   SpectrumFolder`\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:

   SpectrumFolder`\server\app\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 dropdown at the top right corner, click **Admin**.
   c) In this **Adminstration** 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 dropdown at the top right corner, click **Admin**.

g) In this **Adminstration** 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. Login 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:

   SpectrumFolder\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:

   SpectrumFolder\server\app\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.

9 - Support

In this section

Support

Technical Support

If you run into an issue, Pitney Bowes Technical Support can help guide you to a solution. When you contact Pitney Bowes 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:
  `<SpectrumInstallationLocation>\server\app\repository\logs\wrapper.log`

Contact information for Technical Support can be found at:

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

Digital Insights

Digital Insights is an online resource for Pitney Bowes leadership to share innovations, goals, and product news, as well as exchange ideas with visitors. You can access Digital Insights at:

blogs.pb.com/digital-insights/

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