

# **TIBCO® Data Virtualization**

## **Business Directory Guide**

*Version 8.0*

***Last Updated:*** November 7, 2018

## Important Information

SOME TIBCO SOFTWARE EMBEDS OR BUNDLES OTHER TIBCO SOFTWARE. USE OF SUCH EMBEDDED OR BUNDLED TIBCO SOFTWARE IS SOLELY TO ENABLE THE FUNCTIONALITY (OR PROVIDE LIMITED ADD-ON FUNCTIONALITY) OF THE LICENSED TIBCO SOFTWARE. THE EMBEDDED OR BUNDLED SOFTWARE IS NOT LICENSED TO BE USED OR ACCESSED BY ANY OTHER TIBCO SOFTWARE OR FOR ANY OTHER PURPOSE.

USE OF TIBCO SOFTWARE AND THIS DOCUMENT IS SUBJECT TO THE TERMS AND CONDITIONS OF A LICENSE AGREEMENT FOUND IN EITHER A SEPARATELY EXECUTED SOFTWARE LICENSE AGREEMENT, OR, IF THERE IS NO SUCH SEPARATE AGREEMENT, THE CLICKWRAP END USER LICENSE AGREEMENT WHICH IS DISPLAYED DURING DOWNLOAD OR INSTALLATION OF THE SOFTWARE (AND WHICH IS DUPLICATED IN THE LICENSE FILE) OR IF THERE IS NO SUCH SOFTWARE LICENSE AGREEMENT OR CLICKWRAP END USER LICENSE AGREEMENT, THE LICENSE(S) LOCATED IN THE "LICENSE" FILE(S) OF THE SOFTWARE. USE OF THIS DOCUMENT IS SUBJECT TO THOSE TERMS AND CONDITIONS, AND YOUR USE HEREOF SHALL CONSTITUTE ACCEPTANCE OF AND AN AGREEMENT TO BE BOUND BY THE SAME.

This document contains confidential information that is subject to U.S. and international copyright laws and treaties. No part of this document may be reproduced in any form without the written authorization of TIBCO Software Inc.

TIBCO and the TIBCO logo are either registered trademarks or trademarks of TIBCO Software Inc. in the United States and/or other countries

TIBCO, Two-Second Advantage, TIBCO Spotfire, TIBCO ActiveSpaces, TIBCO Spotfire Developer, TIBCO EMS, TIBCO Spotfire Automation Services, TIBCO Enterprise Runtime for R, TIBCO Spotfire Server, TIBCO Spotfire Web Player, TIBCO Spotfire Statistics Services, S-PLUS, and TIBCO Spotfire S+ are either registered trademarks or trademarks of TIBCO Software Inc. in the United States and/or other countries.

All other product and company names and marks mentioned in this document are the property of their respective owners and are mentioned for identification purposes only.

THIS SOFTWARE MAY BE AVAILABLE ON MULTIPLE OPERATING SYSTEMS. HOWEVER, NOT ALL OPERATING SYSTEM PLATFORMS FOR A SPECIFIC SOFTWARE VERSION ARE RELEASED AT THE SAME TIME. SEE THE README FILE FOR THE AVAILABILITY OF THIS SOFTWARE VERSION ON A SPECIFIC OPERATING SYSTEM PLATFORM.

THIS DOCUMENT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. THIS DOCUMENT COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN; THESE CHANGES WILL BE INCORPORATED IN NEW EDITIONS OF THIS DOCUMENT. TIBCO SOFTWARE INC. MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED IN THIS DOCUMENT AT ANY TIME.

THE CONTENTS OF THIS DOCUMENT MAY BE MODIFIED AND/OR QUALIFIED, DIRECTLY OR INDIRECTLY, BY OTHER DOCUMENTATION WHICH ACCOMPANIES THIS SOFTWARE, INCLUDING BUT NOT LIMITED TO ANY RELEASE NOTES AND "READ ME" FILES.

Copyright © 2002-2018 TIBCO Software Inc. All rights reserved.

TIBCO Software Inc. Confidential Information

# Contents

<b>Preface</b>	<b>5</b>
Product-Specific Documentation	5
How to Access TIBCO Documentation	6
How to Contact TIBCO Support	6
How to Join TIBCO Community	6
<b>Install Business Directory</b>	<b>7</b>
Business Directory Requirements	7
Business Directory Limitations	10
Installing Business Directory	10
Preparing for Installation on UNIX	11
Running the Business Directory Installer for Windows and UNIX	11
Setting the Business Directory Server to Start Automatically on UNIX	12
Running Silent Mode Installation	13
Creating the Options File for a Silent Installation	13
Running the Installer in Silent Mode	15
Configuring Security Enhanced Linux Environments	16
Keystore and Truststore Files for Business Directory	16
Setting up a Keystore File for Business Directory	17
Customizing the Business Directory Server Startup Scripts on UNIX	18
Tips from an Expert if the Server Does Not Start	19
Tips from an Expert on Controlling Cipher Suite Information	20
Removing Business Directory Service Files on UNIX	21
Removing Files before Uninstalling on UNIX	21
Uninstalling Business Directory On UNIX	21
Business Directory Log and Out File Reference	22
<b>Business Directory Introduction</b>	<b>23</b>
Overview of Business Directory	23
Configuring Business Directory	24
Starting and Stopping Business Directory Services	24
Configuring Published Studio Locations for use within Business Directory	25
Configuring the Business Directory Server	26
Configuring LDAP Access for Business Directory	27
Understanding How Business Directory Works with LDAP Domains and Passwords	27
Defining LDAP Domain Access for Business Directory	28
Changing the Repository Password	29

.....	31
How Business Directory Works with the composite Domain. ....	31
How Business Directory Works with Escape Characters .....	31
<b>Using Business Directory .....</b>	<b>33</b>
Logging into Business Directory .....	33
Sites .....	34
Adding a Site .....	35
Removing a Site. ....	36
Site Metadata. ....	37
Business Directory Refresh Limitations .....	37
Refreshing Site Data on Demand. ....	37
Refreshing Site Data Automatically .....	38
Canceling Automatic Site Data Refresh .....	38
Editing a Site .....	38
Resources. ....	39
Searching Resources. ....	39
Refining the Search with Filters .....	40
Browsing and Watching Published TDV Resources .....	41
Adding Comments to Objects .....	42
Previewing Resource Data in Business Directory .....	43
Categories. ....	44
Defining Categories and Values. ....	45
Adding Bulk Classifications for Resources .....	45
Adding Categories to a Resource .....	46
Custom Properties .....	46
Defining and Editing Custom Property Groups and Properties .....	46
Defining and Editing Custom Groups and Properties .....	48
Specifying the Custom Property Value for a Resource Tab. ....	49
Resource Data Lineage .....	49
What Data Lineage Reveals .....	49
Viewing Data Lineage .....	50
Access Rights .....	51
Viewing Users on the Access Control Page. ....	52
Managing User Access .....	53
Changing the Admin Password After Installation. ....	54
<b>Business Directory API and System Tables .....</b>	<b>55</b>
Using the Business Directory REST API .....	55
Using Business Directory to Run the REST API Methods. ....	55
Using cURL Commands to Run the REST API Methods. ....	56
Setting Up Secure cURL Execution Example .....	57

Characteristics of Programmatic Use of the REST API .....58

Backing Up and Restoring Business Directory Information .....59

    Backing Up Business Directory .....59

    Restoring Business Directory .....60

Accessing Business Directory System Table Information .....61



# Preface

---

Documentation for this and other TIBCO products is available on the TIBCO Documentation site. This site is updated more frequently than any documentation that might be included with the product. To ensure that you are accessing the latest available help topics, please visit:

- <https://docs.tibco.com>

## Product-Specific Documentation

The following documents form the TIBCO® Data Virtualization(TDV) documentation set:

- *TIBCO TDV and Business Directory Release Notes* Read the release notes for a list of new and changed features. This document also contains lists of known issues and closed issues for this release.
- TDV Installation and Upgrade Guide
- TDV Administration Guide
- TDV Reference Guide
- TDV User Guide
- TDV Security Features Guide
- Business Directory Guide
- TDV Application Programming Interface Guide
- TDV Tutorial Guide
- TDV Extensibility Guide
- TDV Getting Started Guide
- TDV Client Interfaces Guide
- TDV Adapter Guide
- TDV Discovery Guide
- TDV Active Cluster Guide
- TDV Monitor Guide
- TDV Northbay Example

## How to Access TIBCO Documentation

Documentation for TIBCO products is available on the TIBCO Product Documentation website mainly in the HTML and PDF formats.

The TIBCO Product Documentation website is updated frequently and is more current than any other documentation included with the product. To access the latest documentation, visit <https://docs.tibco.com>.

Documentation for TIBCO Data Virtualization is available on <https://docs.tibco.com/products/tibco-data-virtualization-server>.

## How to Contact TIBCO Support

You can contact TIBCO Support in the following ways:

- For an overview of TIBCO Support, visit <https://www.tibco.com/services/support>.
- For accessing the Support Knowledge Base and getting personalized content about products you are interested in, visit the TIBCO Support portal at <https://support.tibco.com>.
- For creating a Support case, you must have a valid maintenance or support contract with TIBCO. You also need a user name and password to log in to <https://support.tibco.com>. If you do not have a user name, you can request one by clicking **Register** on the website.

## How to Join TIBCO Community

TIBCO Community is the official channel for TIBCO customers, partners, and employee subject matter experts to share and access their collective experience. TIBCO Community offers access to Q&A forums, product wikis, and best practices. It also offers access to extensions, adapters, solution accelerators, and tools that extend and enable customers to gain full value from TIBCO products. In addition, users can submit and vote on feature requests from within the [TIBCO Ideas Portal](https://community.tibco.com). For a free registration, go to <https://community.tibco.com>.



# Install Business Directory

This topic describes the installation of Business Directory.

- [Business Directory Requirements, page 7](#)
- [Business Directory Limitations, page 10](#)
- [Installing Business Directory, page 10](#)
- [Keystore and Truststore Files for Business Directory, page 16](#)
- [Customizing the Business Directory Server Startup Scripts on UNIX, page 18](#)
- [Tips from an Expert if the Server Does Not Start, page 19](#)
- [Removing Business Directory Service Files on UNIX, page 21](#)
- [Business Directory Log and Out File Reference, page 22](#)

## Business Directory Requirements

- A minimum of 500MB of free disk space before installation.
- That TIBCO® Data Virtualization (TDV) 7.0 is already installed before proceeding. Supported versions of TDV Server are 7.0 and above.
- Port number availability for TDV and Business Directory:
  - TDV ports

TDV Ports Default	Description
9400	Web services HTTP port <— port needs to be exposed for non SSL TDV http access
9401	JDBC, ODBC, and ADO.NET <— port needs to be exposed for non SSL TDV client access
9402	Web services HTTP SSL <— port needs to be exposed for SSL TDV http access
9403	JDBC SSL, ODBC SSL, and ADO.NET SSL <— port needs to be exposed for SSL TDV client access
9404	Default caching database port
9405	[reserved]

TDV Ports Default	Description
9406	Monitor Daemon
9407	Active Cluster - JGroups (when installed) <— used for internal cluster communication only (more details in ActiveClusterGuide.pdf), needs to be exposed if cluster nodes are in different networks though
9408	Repository
9409	Monitor (when installed)

— BD ports

Business Directory Ports Default	Description
9500	Web services HTTP port
9501	JDBC, ODBC, and ADO.NET
9502	Web services HTTP SSL <— expose this port to enable HTTP access
9503	JDBC SSL, ODBC SSL, and ADO.NET SSL
9404	[reserved]
9405	[reserved]
9406	Monitor Daemon
9407	[reserved]
9408	Repository
9409	Monitor (when installed)

For operating systems requirements, see the *TDV Installation and Upgrade Guide*, Operating System Support for Server topic.

TDV web-based products runs on these Web browsers:

Web Browsers	TDV Support	Notes
Microsoft Internet Explorer	Active	Business Directory, Deployment Manager and Web Manager support IE 11.0 on Windows 7 and IE 11.2 on Windows 10.
Mozilla Firefox	Active	Business Directory, Deployment Manager and Web Manager support Mozilla Firefox v62.0.3 on Windows 7 or 10 and v60.0.2 on macOS Sierra 10.  Monitor supports the same on Windows 10 and does not run on macOS
Chrome	Active	Business Directory, Deployment Manager and Web Manager support Chrome 69 on Windows 7 and 10 and 62 on macOS Sierra 10.  Monitor supports the same on Windows 10 and does not run on macOS
Safari	Active	Not supported for web service API calls.  Business Directory, Deployment Manager and Web Manager support v10.1.2.
Edge	Active	Business Directory, Deployment Manager and Web Manager support v42 on Windows 10.

Monitor requires a Web browser running Adobe Flash Player Version 10 or greater.

For the Monitor and Deployment Manager client web applications to function properly, the machine that is running a compatible browser must be running on a machine with Windows 7 or higher. For Windows 8, if you are using IE, then make sure all compatibility settings are enabled or specifically configure it for compatibility view for each of the TDV web based products. Occasionally the login screen for these web applications does not close automatically, you can close it and continue using the product or you can choose to run in a different browser.

For best results, when running Business Directory and Deployment Manager concurrently, use different browsers.

Online help (and long lists in Manager) might not display as expected in Chrome. You can switch to another browser to resolve the issue.

The TDV and Business Directory servers require a secure connection. So when you first connect a browser to any TDV web-based application, you might get a warning about connecting to an untrusted site.

Depending on your browser:

- You might be asked to allow the connection process to continue.
- You might want to configure it to trust the site so that warning messages no longer appear. For some site configurations this might require configuration of SSL connections for your entire TDV environment.

To set up Business Directory for SSL communication with other TDV components, see [Keystore and Truststore Files for Business Directory, page 16](#).

## Business Directory Limitations

You can sometimes mix versions of Business Directory and TDV as follows.

BD Version	TDV Version	Support
older	newer	Active
newer	older	Limited, Not active

For example:

- Business Directory 7.0.2 and 7.0.3 clients are not compatible with published resources from TDV 7.0.1.
- The use of Business Directory 7.0.3 clients with published resources from TDV 7.0.2 is supported.

## Installing Business Directory

This section describes how to install Business Directory:

- [Preparing for Installation on UNIX, page 11](#)
- [Running the Business Directory Installer for Windows and UNIX, page 11](#)
- [Setting the Business Directory Server to Start Automatically on UNIX, page 12](#)

- [Running Silent Mode Installation, page 13](#)
- [Configuring Security Enhanced Linux Environments, page 16](#)

## Preparing for Installation on UNIX

You can skip these steps if you are installing on Windows.

### To prepare for installation on a UNIX computer

1. Make sure you have reviewed and completed any necessary preparation.
2. For Red Hat Enterprise Linux, and Oracle Red Hat Enterprise Linux systems Security-Enhanced Linux (SELinux) must be disabled or in permissive mode.
3. If necessary, log into the installation machine as a non-root user. Change your working directory to the user’s home directory.
4. Run the following command for your platform:  
`chmod 755 <installer file name>`

For example:  
`chmod 755 installBDv7000_lin64.bin`

5. Make sure that you have READ and WRITE permissions on the installation directory.
6. If installing on AIX, make sure that MAX\_MEMORY >1500MB is in <CIS\_install\_dir>/conf/server/server.properties.

## Running the Business Directory Installer for Windows and UNIX

### To run the installer

1. Make sure you have enough space for the temporary installation files. If you get an error, see the *TDV Installation and Upgrade Guide*, for how to resolve it.
2. Run the installer executable for your platform.

Platform	Instructions
UNIX	Run the following command <code>./&lt;installer file name&gt;</code>  For example: <code>./installBDv7000_lin64.bin</code>

Platform	Instructions
Windows	Double-click the install .exe file.

- 3. Follow the prompts on the screen.  
The installation process might take a few minutes, during which progress windows are displayed.
- 4. Finish to exit the installer when the installation is completed.  
The Server starts automatically at the completion of the installation process.  
Install and uninstall logs are called bitrock\_installer\_<number>.log while the installer is running. After installation is complete, the logs are named <product>\_install or <product>\_uninstall.log. The log files can be found in the following directories:

Platform	Default Location of Log Files
Unix	/tmp
Windows 2008, Windows 2012, Windows 7, Windows 8	C:\Users\<username>\AppData\Local\Temp

- 5. Optionally, download and install the latest Business Directory patch as described in *TDV Release Notes*.

Setting the Business Directory Server to Start Automatically on UNIX

If at any time after installing the software, you restart the UNIX installation machine, Server and the metadata repository do NOT start automatically (unlike when they start automatically after a successful installation of the software).

To configure the Business Directory service files bd.repository and bd.server

- 1. Log into the installation machine as root.
- 2. Change the working directory to <bd\_install\_dir>/bin.
- 3. Run the following command as the root user:  
bd\_install\_services.sh

This command prompts for a user name, and other details to install and configure the service files `bd.repository` and `bd.server`.

4. Enter the name of the user to start Business Directory (not the root user) and the other information requested.

The script then installs `bd.repository` and `bd.server` into an appropriate location on the installation machine and configures them. The location will be printed on your screen when the configuration is successful, so make note of this location, because you need this to perform verification of the service files.

Do not run the `cis.repository` or `cis.server` scripts in the `<bd_install_dir>/bin/` directory. These are template files used by `bd_install_services.sh` only and are not meant to be run.

Running `bd_install_services.sh` does not interrupt any repository or server processes that are running, but prepares the machine for automatically starting those processes during restart of the UNIX-based computer.

### To verify the Business Directory service files configuration

1. Go to the location noted previously from running `bd_install_services.sh`.
2. Enter these commands:  

```
./bd.repository restart
./bd.server restart
```
3. Optionally, you might need to restart your TDV Server.

Now if the machine is rebooted, the monitor, server, and repository processes should automatically start once the machine is ready to go.

## Running Silent Mode Installation

You can install in silent mode. A silent mode installation does not require any user input at the time of installation to complete the installation process. It does not have a graphical user interface (GUI) but instead uses the values from a response file to perform the installation.

Topics covered include:

- [Creating the Options File for a Silent Installation, page 13](#)
- [Running the Installer in Silent Mode, page 15](#)

### Creating the Options File for a Silent Installation

Optionally, when running a silent mode installation you can use an options file that has specific key-value pairs.

To create the options file for a silent install

- 1. In a text editor, create a options file similar to the following:

Business Directory

```
# Modify install directory and all port number references
#
mode=unattended
install_directory=/opt/Cisco_Systems/BD_7.0
server_port=9500
repository_admin_password=password
-----
```

TDV

```
# Modify install directory and all port number references
#
mode=unattended
install_directory=/opt/Cisco_Systems/CIS_7.0
server_port=9400
repository_admin_password=password
database_admin_password=password
-----
```

- 2. Edit the values within the file for your installation.
- The following table describes the variables in the response file:

Variable	Description and Value
INSTALL_DIRECTOR Y	Directory in which to install the software referred to as <CIS_install_dir>. <p>The value can be empty, or the directory can be non-existent. On UNIX, there can be no space in the directory name. Examples:</p> <pre>install_directory=/opt/Cisco_Systems/CIS_7.0 install_directory=C:\Program Files\TDV\Studio 7.0 install_directory=/opt/TDV/BD_7.0</pre>
REPOSITORY_ADMIN _PASSWORD	Password to access the repository database, which is automatically installed during the installation. PostgreSQL requires that the password you choose cannot contain a # or \$.
SERVER_PORT	Defaults to 9400 for TDV and 9500 for Business Directory.
DATABASE_ADMIN_ PASSWORD	The password used to access the default caching database, which is automatically created during installation. PostgreSQL requires that the password you choose cannot contain a # or \$.

- 3. Save the file as <installer.properties>.



## Running the Installer in Silent Mode

### To run the installer in silent mode

1. Create the response file according to your system environment, and place it anywhere on the installation machine. See [Creating the Options File for a Silent Installation, page 13](#).
2. Run one of the following commands:

Component	Command Options
TDV Server	<ul style="list-style-type: none"><li>• command line options &lt;instFILE&gt;.bin --mode "unattended" --install_directory "&lt;/opt/TDV/CIS_7.0&gt;" --server_port "9400" --repository_admin_password "password" --database_admin_password "password"</li><li>• command line with option file &lt;instFILE&gt;.bin --optionfile &lt;OPTION_FILE&gt;</li></ul>
Studio	<ul style="list-style-type: none"><li>• command line options &lt;instFILE&gt;.bin --mode "unattended" --install_directory "/C:\Program Files\TDV\Studio 7.0"</li><li>• command line with option file &lt;instFILE&gt;.exe --optionfile &lt;OPTION_FILE&gt;</li></ul>
Business Directory	<ul style="list-style-type: none"><li>• command line options &lt;insFILE&gt;.bin --mode "unattended" --install_directory "/opt/TDV/BD_7.0" --server_port "9500" --repository_admin_password "password"</li><li>• command line with option file &lt;instFILE&gt;.exe --optionfile &lt;OPTION_FILE&gt;</li></ul>

The variables are as follows:

- <instFILE> is the file name. For example, installCISv7000\_win64.exe for a Windows TDV Server.
- <OPTION\_FILE> is the name of the response file.

3. Verify that the installation was successful by looking for the TDV installation directory. You can also view success or failure messages in:
  - %HOMEDRIVE%\BD\_install.log (Windows) or /tmp/BD\_install.log (UNIX)
  - %HOMEDRIVE%\CIS\_install.log (Windows) or /tmp/CIS\_install.log (UNIX)

Optionally for TDV, complete the configuration in Configuring Security Enhanced Linux Environments, in the *TDV Installation Guide*.

## Configuring Security Enhanced Linux Environments

All UNIX instances that have SELinux = enabled need to be reconfigured to SELinux = permissive to allow connections to TDV and Business Directory. The SELinux configuration file is located under /etc/selinux/config.

### To configure SE Linux environments

4. Run /usr/sbin/sestatus to validate the setting for SELinux. If the value is enabled, you must change it.
5. Login as root.
6. Edit your environment configuration file.
7. Change the value of SELinux to permissive (SELINUX=permissive).
8. Reboot.
9. Run /usr/sbin/sestatus to validate the setting for SELinux.

## Keystore and Truststore Files for Business Directory

For TDV components (Studio, all TDV server instances, and so on) to use SSL for communications among themselves, each component must have a keystore file containing its own SSL key, and a truststore file containing the SSL key for each authenticated component with which it will communicate. You can use keytool to generate a key for each component, or store an existing key that has a chain of Certificate Authority behind it. If you do not generate a key for a given component, it uses a self-signed certificate by default, which is unsafe.

The following procedure describes the setup procedure:

- [Setting up a Keystore File for Business Directory, page 17](#)

## Setting up a Keystore File for Business Directory

The Java key and certificate management tool, `keytool`, is available for administering public/private key pairs and certificate authorities.

This topic describes how to set up a keystore file for Business Directory. A generalized description of the procedure for setting up keystore and truststore files for all TDV components is in the *TDV Administration Guide*.

### To set up a keystore file for Business Directory

1. Verify that a key exists in the keystore you want to use:

```
cd <BD_install_dir>/jre/bin
keytool -list -keystore <keystore_location> -storepass <password>
-v > keystore.txt
```

If no Business Directory key exists, obtain one or generate one using the `keytool` utility.

2. Search the text file for `Entry type: PrivateKeyEntry`.

Make note of the value from `Alias name: <alias_name>`.

3. Copy the keystore to a directory of your choice.
4. Open `<BD_install_dir>/bd/conf/server/server_values.xml` in a simple editor like Wordpad.

**Note:** If you open the file in Word, it will display an interpreted form of the XML file instead of the raw file.

5. Change the values of three attributes:

Keystore Key Alias (On Server Restart)

For example, the alias name might be `cis_server`

`<common:attribute>`

```
<common:name>/server/communications/KeystoreKeyAliasOnServerRestart
</common:name>
<common:type>STRING</common:type>
<common:value>[alias_name]</common:value>
</common:attribute>
```

Keystore File Location (On Server Restart)

For example, `C:/Program Files/TDV/BD`

`7.0/conf/server/security/cis_server_keystore.jks`

`<common:attribute>`

```
<common:name>/server/communications/KeystoreLocationOnServerRestart
</common:name>
<common:type>STRING</common:type>
```

```
<common:value>[keystore_location
<fulldirectorypath>/mykeystore.jks]</common:value>
</common:attribute>
```

Keystore Password (On Server Restart), which will be encrypted automatically when the server restarts

```
<common:attribute>
```

```
<common:name>/server/communications/KeystorePasswordOnServerRestart</common:name>
<common:type>PASSWORD_STRING</common:type>
<common:value>[unencrypted_password_string]</common:value>
</common:attribute>
```

6. If necessary, change the value of one other attribute:

Keystore File Type (On Server Restart)

For example, JKS or PKCS12

```
<common:attribute>
```

```
<common:name>/server/communications/KeystoreTypeOnServerRestart</common:name>
<common:type>STRING</common:type>
<common:value>[JKS]</common:value>
</common:attribute>
```

7. Restart Business Directory.

## Customizing the Business Directory Server Startup Scripts on UNIX

The Business Directory installation provides a startup script for UNIX that you can customize for your own purposes; but to maintain customizations you might have made to this script across hotfix or patch updates, you must activate an environment variable.

**Note:** You can also use this functionality to add JRE VM arguments or run commands automatically before launching Business Directory.

The procedure below describes how to configure the startup script for UNIX.

### To configure the Business Directory startup scripts for UNIX

1. Stop the Business Directory Server.
2. Navigate to the <bd\_install\_dir>/conf directory.  
cd <bd\_install\_dir>/conf

3. Copy `script_env.sh.sample` to `script_env.sh`.
4. Open `script_env.sh` with a text editor and uncomment the last two lines:
 

```
# BD_SERVER_VM_ARGS=
# export BD_SERVER_VM_ARGS
```
5. Change the value of `BD_SERVER_VM_ARGS` to include all the values in `VM_ARGS` from `<bd_install_dir>/bin/bd_server.sh`.
  - a. Retrieve the platform-specific value of `VM_ARGS` from `<bd_install_dir>/bin/bd_server.sh`. Locate the line for your platform:
    - SunOS and Linux platforms should use the `VM_ARGS` definition on the "Linux" | "SunOS" line.
    - AIX platform should use the `VM_ARGS` definition on the "AIX" line.
    - HP-UX platforms should use the `VM_ARGS` definition on the "HPUX" line.
  - b. If you are on the SunOS or HP-UX platform and using 64-bit, add "-d64" to the beginning of the `BD_SERVER_VM_ARGS` definition.
  - c. Make sure you add double-quotes around the value specified for `BD_SERVER_VM_ARGS`.
  - d. If you want to run an executable or command-line utility at this point, make sure the command returns control to `bd_server.sh`. If it does not, Business Directory does not start correctly.

Each command you add should be on a new line.
6. Start the Business Directory Server.
7. Check the end of the newest `<bd_install_dir>/logs/<x>_server.out.<timestamp>` file to ensure the script environment functionality is working.

## Tips from an Expert if the Server Does Not Start

If the TDV server does not start and the log files indicate that the cause is not enough heap memory, you can modify the default max memory setting.

**To modify the max memory setting**

1. Stop the server.
2. Increase the MAX\_MEMORY value in the one of the following location depending on your server:
  - <CIS\_install\_dir>/conf/server/server.properties
  - <bd\_install\_dir>/bd/conf/server/server.properties
3. If adjusting the heap size with MAX\_MEMORY is not enough to allow large CAR files to load, you can try setting the following Studio configuration parameters back to their default values:
  - Default Bytes to Fetch—Default value is 100.
  - Default Rows to Fetch—Default value is 1000.
4. From the process manager for your platform, shut down and restart all TDV processes (such as the TDV Server and monitor).

**Tips from an Expert on Controlling Cipher Suite Information**

By default, Business Directory displays information about cipher suites that are a part of your data sources. You can control this behavior by editing TDV configuration parameters through the TDV Studio user interface.

**To modify the SSL cipher suites setting**

1. Stop the server.
2. Open Studio > Administration > Configuration.
3. Locate the Disabled Cipher Suites for SSL Connectors configuration parameter.
4. Adjust the value.
5. Sets the cipher suites to disable when creating an SSL connector.

The string should be a comma separated list of cipher suites, that can be fed by the exact cipher suite name used in the JDK or by using a regular expressions.

Default values are ".\*NULL.\*", ".\*RC4.\*", ".\*MD5.\*", ".\*DES.\*", ".\*DSS.\*" for eliminating old/insecure/anonymous ciphers.

Removing the string will cause the default JRE settings to take effect.

6. From the process manager for your platform, shut down and restart all TDV processes (such as the TDV Server and monitor).

## Removing Business Directory Service Files on UNIX

You can use the `bd_remove_services.sh` script from a command line to uninstall the Business Directory services files that are used to restart the server and repository automatically on UNIX. This command does not interrupt any repository or server processes that are running, but removes the Business Directory Service files.

This section includes the following:

- [Removing Files before Uninstalling on UNIX, page 21](#)
- [Uninstalling Business Directory On UNIX, page 21](#)

### Removing Files before Uninstalling on UNIX

Before you uninstall Business Directory, remove the service files from the installation machine, because the uninstaller does not remove these files automatically.

#### To remove the service files `bd.repository` and `bd.server`

1. Log into the installation machine as root.
2. Change the working directory to `<bd_install_dir>/bin`.
3. Run the following command:  
`bd_remove_services.sh`
4. Navigate up the directory structure and delete `<bd_install_dir>`.

### Uninstalling Business Directory On UNIX

During the uninstallation process, all the components from the previous installation are removed. You cannot uninstall the components individually.

#### To remove the Business Directory service files

1. Log into the installation machine as the user that installed the software.
2. Run the following command:  
`<bd_install_dir>/Uninstall/Uninstall_BD<version>`

For a silent uninstall, a message is displayed indicating that the uninstall is occurring. For an interactive uninstall, go to step 3.

- 3. Press the Enter key.  
You will see a warning about loss of data.
- 4. Press the Enter key to complete the uninstallation process and leave the uninstaller.
- 5. Make sure to delete <bd\_install\_dir>.

## Business Directory Log and Out File Reference

The following table lists the Business Directory log and out files. These files are stored in <BD\_install\_dir>\logs. For the most accurate and current list of files, see the *TDV Administration Guide* under TDV Logging Information.



# Business Directory Introduction

---

This section describes how use Business Directory regardless of what type of Business Directory user you are.

- [Overview of Business Directory, page 23](#)
- [Configuring Business Directory, page 24](#)
- [Configuring LDAP Access for Business Directory, page 27](#)
- [Changing the Repository Password, page 29](#)
- [How Business Directory Works with the composite Domain, page 31](#)
- [How Business Directory Works with Escape Characters, page 31](#)

## Overview of Business Directory

Business Directory is a business-friendly interface that provides a catalog of the published resources contained in one or more instances of TDV. The interface provides a seamless way to communicate and distribute information about data across groups within an organization to facilitate collaboration. Business Directory facilitates collaboration, and supports governance of data as it moves through its life cycle.

Core Capabilities	Supporting Features
Governance	<p>Resource lineage can be displayed.</p> <p>Metadata information can be added to the resources and their parent containers. That metadata is saved only within the Business Directory.</p>
Collaboration	<p>Business Directory works across all published resources in a TDV instance, and across any number of TDV instances in an enterprise.</p> <p>Resources within the Business Directory can be commented on.</p> <p>Resources and their parent containers can be followed, allowing for passive communication of resource updates.</p>

Core Capabilities	Supporting Features
Communication	<div>Shared instances of TDV outside of team boundaries.</div> <div>Browse and analyze database resources from disparate groups for potential usage.</div> <div>Carry out simple searches and apply post-search filters.</div> <div>Communicate with other stakeholders.</div> <div>Provide feedback to developers.</div>

Depending on your role and relationship to the data, the value of Business Directory may differ. You could find value simply from knowing what data is available within your larger organization so that you can optimize its usage for your purposes. Or you could provide the metadata information that links the raw data to the business decisions that are critical to the success of your organization.

Exactly how you and your teams implement and use Business Directory will be up to you. This document strives to cover all the potential tasks that you need to understand when creating the custom workflows for your organization.

## Configuring Business Directory

- Business Directory has a server and repository that are separate from your TDV Server and repository. Installation of Business Directory starts them automatically for you.
- [Starting and Stopping Business Directory Services, page 24](#)
  - [Configuring Published Studio Locations for use within Business Directory, page 25](#)
  - [Configuring the Business Directory Server, page 26](#)

## Starting and Stopping Business Directory Services

The Business Directory Server and Repository are started automatically after installation and set to restart automatically when the server machine is restarted.

### To start the Business Directory Services

1. Navigate to <bd\_install\_dir>/bin.
2. Run one of the following from the command line, depending on your platform:

Component	Platform	Command
Server	UNIX	bd_server.sh [run   stop]
	Windows	bd_server.bat [run   stop]
Repository	UNIX	bd.sh repo [start   stop   restart]
	Windows	bd.bat repo [start   stop   restart]
Monitor	UNIX	bd.sh monitor [start   stop   restart]
	Windows	bd.bat monitor [start   stop   restart]

Or use the Windows Task Manager Services tab to start or stop any of the BD services.

3. Log into the Business Directory web application to validate that the Business Directory server started. See [Logging into Business Directory, page 33](#).

## Configuring Published Studio Locations for use within Business Directory

Business Directory cannot display resources published to locations that have slashes in their names.

### To configure your Studio data sources for use with Business Directory

1. Open Studio.
2. Navigate to the database or web service portion of the Studio navigation tree.
3. Validate that the name of the database or web service container that owns the resources you want to see displayed within Business Directory contains no slashes (/).
4. Remove slashes (/) from the names of any published database or web services that you want to be able to view within Business Directory.

## Configuring the Business Directory Server

Using Business Directory requires some minimal configuration of the server. This server configuration is simply to allow for email notifications.

### To configure the Business Directory server

1. Start Business Directory. See [Logging into Business Directory, page 33](#).
2. Navigate to Admin > Server Configuration.
3. Select or type values for the following:

Field	Description
Refresh on server start-up	Enable or disable the reintrospection of each site defined within Business Directory when the server is started. Depending on how many sites are registered within Business Directory, you might consider disabling this for better performance.
SMTP Server address and Port number	Simple Mail Transfer Protocol (SMTP) address, which is typically a server name, and the port, which defaults to 25.
SMTP Authentication Required	Enable or disable this requirement. If enabled, you must enter values for the SMTP user name and password.
SMTP Authentication User Name	
SMTP Authentication User Password	
Send watch notifications from this email address	Email address that you want assigned and attributed to the messages sent from Business Directory to the people who have signed up to watch various resources.
Server max memory size (in KB)	<p>The Current value is a read-only field that displays the current setting.</p> <p>Use the On Server Restart value field to select a new value to set max memory at after the Business Directory server is restarted.</p>
Keystore File Location	Read-only fields used to alert you to the location of the TDV Server keystore and truststore files.
Truststore File Location	

4. Click Save.

## Configuring LDAP Access for Business Directory

Business Directory automatically imports the names of all of the domains, users, and groups from the TDV sites to which it connects. This includes any LDAP server information being used by the TDV site.

LDAP servers are created when adding a TDV Site to the Business Directory that is using LDAP. The user credentials are stored in the domain server and the domain server needs to be available for them to be verified. The connection information is imported from the TDV Site, with the exception of the password.

You can restrict what resources Business Directory users see, by using Studio. LDAP or TDV user profiles. Typically, if you define the user profile through Studio so that a particular user can not see a resource, then that same user in Business Directory would not be able to see that resource. For example, LDAP user profile MMEG in Studio can see compositeView, but not SWsalesView. When user MMEG logs into Business Directory, SWsalesView would not be visible through the web application.

For more information, see LDAP Domain Administration in the *TDV Administration Guide* topic.

All TDV sites that are connected to Business Directory must share the same LDAP server.

This section includes:

- [Understanding How Business Directory Works with LDAP Domains and Passwords, page 27](#)
- [Defining LDAP Domain Access for Business Directory, page 28](#)

### Understanding How Business Directory Works with LDAP Domains and Passwords

LDAP domains are imported automatically if they exist for the TDV sites that you are exposing through Business Directory. Multiple LDAP domains in different TDV instances are consolidated into one LDAP domain in Business Directory.

During a site refresh, new LDAP users and groups are updated to Business Directory, but none are deleted. For example, if an LDAP domain is deleted from within TDV, after refreshing this site in Business Directory, this LDAP domain is not removed from Business Directory.

Password information is never transferred to the Business Directory server.

When the Business Directory server needs to authenticate a user in the composite domain of a TDV site, it uses that TDV site to authenticate the user.

When the Business Directory needs to authenticate a user in an LDAP domain, it relies on the LDAP server to authenticate that user. Authentication of LDAP users in Business Directory is done directly against the LDAP server, without involving the TDV site, using the original LDAP user name.

When you import LDAP server information from a remote TDV server, the Business Directory imports everything needed to connect with the LDAP server except the following:

- LDAP connection password
- ldap.properties file

Depending on how many different instances of TDV you plan to exposed through Business Directory, the domains that you can use to log into Business Directory varies as follows:

For use with	Domains you can use
A single TDV site	<ul style="list-style-type: none"><li>• The composite domain</li><li>• Separately defined LDAP domains</li><li>• A combination of the composite and LDAP domains</li></ul>
Multiple TDV sites	The imported LDAP domains from the TDV sites that you define within Business Directory

## Defining LDAP Domain Access for Business Directory

If the TDV sites that you want to expose within Business Directory have LDAP users defined, you must complete their configuration.

If you want to use LDAP domains with Business Directory, you should configure the ldap.properties file. You should also use the properties file to indicate whether you want permissions granted to nested groups.

The following instructions provide one method for completing the configuration using an ldap.properties file that is distributed with TDV.

### To configure the necessary LDAP access for Business Directory

1. Locate your TDV LDAP properties file in the following directory:  
<CIS\_install\_dir>/conf/server/ldap.properties
2. Copy the file to the following Business Directory location:  
<bd\_install\_dir>\conf\server\ldap.properties

3. Edit the file as necessary. For details, see LDAP Domain Administration in the *TDV Administration Guide* topic.
4. Start Business Directory. See [Logging into Business Directory, page 33](#).
5. Add TDV sites to Business Directory.

The following things happen:

- The LDAP connection information that the TDV site uses is imported into the Business Directory server. This includes everything except the LDAP password.
  - The LDAP domain is imported into the Business Directory server using the same domain name as the one that is used in the TDV server
  - All LDAP-based users and groups registered with TDV are imported to the Business Directory server.
  - By default all imported LDAP users (not groups) get the Access Directory right.
6. Open the Sites page and provide the LDAP password for any sites with the message:  
The ldap password is missing. Please supply the password.  
[bd-200671]
  7. Optionally, grant additional Business Directory access rights for the additional LDAP users.

LDAP users can now use their configured domain and username/password combinations to log into Business Directory.

## Changing the Repository Password

After installation you might periodically need to change your TDV or Business Directory repository password.

In these instructions, <install\_dir> means <BD\_install\_dir> or <TDV\_install\_dir>.

### To change the repository password

1. Stop the repository.
2. Locate and open the `ph_hba.conf` file. The file is typically at:  
<install\_dir>\repository\data\pg\_hba.conf

- 3. Find and change all lines with "password" to "trust" for the METHOD column.  
For example:  
TYPE DATABASE USER ADDRESS METHOD  
"local" is for Unix domain socket connections only  
local all all password  
IPv4 local connections:  
host all all 127.0.0.1/32 password  
IPv6 local connections:  
host all all ::1/128 password
- 4. Start the repository. For example, on Windows:  
composite.bat repo start
- 5. Login to the PostgreSQL database using one of the following commands:

Platform	Command	Notes
Windows	./bin/psql -hlocalhost -p9508 -Uroot -dpostgres	
UNIX	cd <install_dir>/repository; export LD_LIBRARY_PATH=<install_dir>/repository /lib; ./bin/psql -hlocalhost -p9508 -Uroot -dpostgres	Use SHLIB for HP-UX and LIBPATH for AIX platforms instead of LD_LIBRARY_PATH, which is only for Solaris + Linux platforms.

- 6. Run the psql ALTER USER command.  
postgres=# ALTER USER root with password '<NEW\_DBA\_PASSWORD>';  
postgres=# \q
- 7. Stop the repository.
- 8. Locate and open the ph\_hba.conf file. The file is typically at:  
<install\_dir>\repository\data\pg\_hba.conf
- 9. Find and change all lines with "trust" to "password" for the METHOD column.
- 10. Start the repository.
- 11. Log in to the PostgreSQL database with the new password.



## How Business Directory Works with the composite Domain

Composite domain users logging into Business Directory are authenticated against the remote TDV Server. For this to work, the remote TDV Server must be active.

Changes to the user access profiles made on the composite domain are not immediately applied to Business Directory. For example, if a user is removed on the remote TDV, this is not reflected in the Business Directory server until the next site refresh. Users might still be able to log into the Business Directory server.

When multiple sites are defined in Business Directory, you can also use the site name as the domain to log in with a composite domain for a particular site. For example, if you have site\_a and site\_b, and you want to log in as browse\_user with the composite domain for site\_b, you can use site\_ as the domain when logging in to Business Directory.

## How Business Directory Works with Escape Characters

Because Business Directory uses a JSON parser and stores data in a PostgreSQL database, there are some ways that your data will be saved and redisplayed when you search it. For example, a comment with the text "bdjonComment World!" will be returned as "E'bdjonComment World\\\\".



# Using Business Directory

---

This section describes how to use Business Directory. However, you need to have the appropriate rights to perform most of these actions. These rights are discussed in the last of the following list of topics:

- [Logging into Business Directory, page 33](#)
- [Sites, page 34](#)
- [Resources, page 39](#)
- [Categories, page 44](#)
- [Custom Properties, page 46](#)
- [Resource Data Lineage, page 49](#)
- [Access Rights, page 51](#)

## Logging into Business Directory

When you start Business Directory, you need to know the Business Directory server instance to which you want to connect.

### To log into Business Directory

1. Type the following URL in your browser:  
`http://<hostname>:9500/directory`

The <hostname> is a fully qualified domain name (FQDN) or specific IP address for your Business Directory instance. If there are published TDV databases on the host, they are immediately registered as a site. Sites added automatically will need to be introspected using the instructions in [Site Metadata, page 37](#).

- 2. Enter your user credentials and information for the Business Directory server to which you are connecting. For example:

Field	Example Value	Notes
Domain	finswest	<p>Use the Business Directory <b>site name</b> in this field if you, the user logging in, belong to the composite domain as defined for that TDV site.</p> <p>You have to use the site name, because there can be one or more composite domain registered within Business Directory depending on how many sites are registered for use. If each site has a composite domain and composite is specified as the domain name, it is unclear which site to use to authenticate the user. To properly authenticate the user, TDV needs the site information, TDV assumes composite for the domain, and then authenticates the user based on username and password.</p>
User	admin	
Password	**&%	

- 3. Click Login.  
Business Directory opens.

Sites

In Business Directory, a site is a TDV instance. Business Directory can view and manipulate published resources from multiple sites. If there are published TDV databases on the host used in your Business Directory URL, they are immediately registered as a site.

This section includes:

- [Adding a Site, page 35](#)
- [Removing a Site, page 36](#)
- [Site Metadata, page 37](#)
- [Editing a Site, page 38](#)

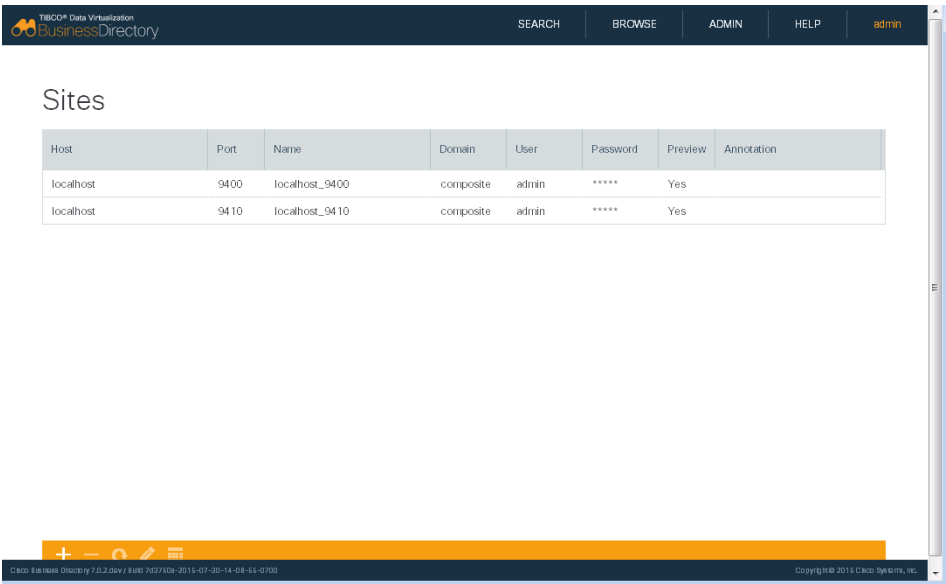
# Adding a Site

Add sites to Business Directory to indicate which instances of TDV you want to view.

When you add a site to Business Directory, you are also adding that site's users to Business Directory. This includes LDAP domains and users, and certain composite domain users. The following composite domain users are not added to Business Directory: anonymous, unknown, monitor, nobody, system.

## To add a site

1. Make sure the user you are logged in as Admin, or as a user with the Admin access right.  
For details, see [Access Rights, page 51](#).
2. Select ADMIN > SITES.



3. Click the Add (plus-sign) icon.
4. Type values for the following fields:

Field	Description of Value to Enter
Host	Enter the name or IP address of the machine where the TDV server is installed.
Port	Enter the port number for the TDV server.

Field	Description of Value to Enter
Name	Type a name for this site to use within Business Directory. If you want to change the name of a site you have defined and saved, you need to delete and redefine it with a new name.
Domain	Enter a domain name that exists in this TDV instance.
User	Enter the name of a user who can access the information stored under this domain.
Password	Enter the user’s password.
Preview	Enable or disable data preview. You can change this after adding a site, after entering the password.
Annotation	Enter a description of the site that can be used to help you find it among similarly named sites.

- 5. Click Save.  
While the site is being added, it is disabled in the Site grid, and a blue spinning icon appears to the left of the host name.  
**Note:** You can also click Cancel if you want to quit without saving the information.
- 6. Provide the LDAP password for any sites that return this message:  
The ldap password is missing. Please supply the password.  
[bd-200671]

Removing a Site

You can remove a site from Business Directory. This does nothing to the TDV instance itself; it affects only the site’s visibility in Business Directory.

To remove a site

- 1. Select ADMIN > SITES.
- 2. Select one or more of the registered sites.
- 3. Click the Remove Site (minus-sign) icon.
- 4. Click Yes in the Remove Site(s) dialog box.  
While the site is being removed, it is disabled in the Site grid, and a red spinning icon appears to the left of the host name.

## Site Metadata

*Introspection* is the process of collecting published resource metadata from a TDV site. When you add a site to Business Directory, introspection is run automatically. You can choose to refresh (update or “reintrospect”) the published metadata on demand, or automatically at scheduled intervals.

**Note:** This introspection or reintrospection process pertains to the availability of the published metadata in Business Directory, not in the TDV instance.

This section includes:

- [Business Directory Refresh Limitations, page 37](#)
- [Refreshing Site Data on Demand, page 37](#)
- [Refreshing Site Data Automatically, page 38](#)
- [Canceling Automatic Site Data Refresh, page 38](#)

### Business Directory Refresh Limitations

When introspecting your TDV sites, there are a few limitations to consider:

- The data that you want to view through Business Directory must exist as valid published data from the TDV site that you have defined.
- If problems or errors occur in the resources that you have published and want to introspect with Business Directory, the introspection process in Business Directory fails.
- Business Directory does not introspect or display published *legacy* web services.
- Web service operations cannot contain commas or parentheses.

### Refreshing Site Data on Demand

You can refresh site data at any time. While the refresh process is running, Business Directory will be placed in a read-only mode.

#### To refresh site data

1. Select ADMIN > SITES.
2. Select one or more of the registered sites.
3. Click the Refresh Sites button.

While the site is being refreshed, it is disabled in the Site grid, and rotating refresh arrows appear to the left of the host name. If the refresh process is brief, however, the icon might not appear.

## Refreshing Site Data Automatically

Depending on the volatility of the published TDV resources that you want to browse with Business Directory, reintrospection might need to be a daily activity.

If a refresh schedule has previously been defined, you can use this same procedure to edit the definition. Deleting the refresh schedule can also be done from within the same edit dialog.

### To schedule site refreshes

1. Select ADMIN > SITES.
2. Select a registered site.
3. Click the Schedule Site Refresh button.
4. Select the interval at which you want the sites to be refreshed (daily or weekly).
5. From the drop-down list, select the time (for the TDV instance in its time zone), at which you want the refresh to occur.
6. Click Save or Cancel to return to the main sites page.

## Canceling Automatic Site Data Refresh

You can delete an existing scheduled site refresh.

### To cancel a scheduled site refresh

1. Select ADMIN > SITES.
2. Select a registered site.
3. Click the Schedule Site Refresh button.
4. Click the X in the upper right corner of the Schedule Refresh dialog box.

## Editing a Site

You can change a number of characteristics of a site.

### To edit a site

1. Select ADMIN > SITES.
2. Select one of the registered sites.
3. Click the Edit Site button.



The site information is displayed with the fields you cannot change grayed out.

4. Type your password in the appropriate field in the row.
5. Select each characteristic you want to change, and type or select a new value for it.
6. Click Save.

## Resources

You can search, browse, or watch resources, add comments, and preview data:

- [Searching Resources, page 39](#)
- [Refining the Search with Filters, page 40](#)
- [Browsing and Watching Published TDV Resources, page 41](#)
- [Adding Comments to Objects, page 42](#)
- [Previewing Resource Data in Business Directory, page 43](#)

## Searching Resources

Searching the Business Directory can help you quickly find resources of interest.

Some items to consider when working with searches and resources that are displayed in Business Directory:

- Searches are simple. Searches do not support complex expressions, such as those containing AND and OR.
- Searching is case-insensitive. It does not matter what case you use when typing search terms.
- Sorting in the Data Preview grid is case-sensitive; that is, items are ordered A, B, ..., Y, Z, a, b... .
- You can search on a custom property *value*, but not on a custom property name.
- When you search on a custom property value, you must escape any slash with a backslash, and any backslash with another backslash. So “/” becomes “\\” in the search string.
- Which resources you can see depends on your access rights. See [Access Rights, page 51](#).

### To search resources within Business Directory

1. Select BROWSE.
2. Type the value for which you want to search in the Search field at the top of the page.
3. Review the data that is returned.
4. Determine if you want to narrow the search. See [Refining the Search with Filters, page 40](#).

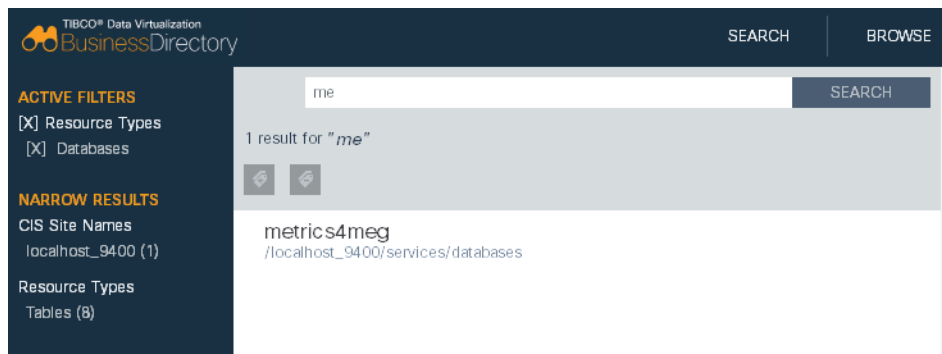
## Refining the Search with Filters

After doing an initial search, you can refine your search using a variety of filters including:

- Category or label
- Site name
- Resource type
- Service name
- Watches

### To search resources within Business Directory

1. Select BROWSE.
2. Type the value for which you want to search in the Search field at the top of the page.
3. Select an item under NARROW RESULTS to further narrow your search for resources.



If a site is removed and you immediately navigate back to this page, the filters are still active. Refresh the page or navigate to the home page to enable searching and filtering again.

## Browsing and Watching Published TDV Resources

You can browse through all of the published TDV resources for the sites registered with Business Directory.

If you decide to watch a resource, you are sent emails anytime a comment is added or if any of the resource metadata changes in any way. For example, if a site refresh is run and a resource has three new columns, you are sent an email.

### To browse published TDV resources

1. Make sure that the site you are interested in browsing has been recently refreshed for the most current view of published resources.
2. Select BROWSE.
3. Select one or more of the registered sites.
4. Expand the site to view the published Database and Web Service resources.
5. Select a specific resource to view properties and details of the resource.

When you select a resource in the left pane, details for the resource are displayed to the right and include some of the following:

- A navigation bar showing the nodes leading to the resource currently selected. You can click any node to view that part of the resource tree.
- The name of the resource.
- WSDL URLs.
- The type of resource (procedure, table, and so on).
- Primary and foreign key information.
- Index.
- The host name and port name, or a name assigned to the resource.

There is also a set of tabs, which vary depending on the type of object you are viewing, with further resource information:

- Parameters (procedure)—Parameter name, data type, direction.
  - Resources (folder)—Resource name and type (web service, database, folder, and so on).
  - Columns (table)—Column name, data type, whether it is a primary or a foreign key, whether it is indexed, and annotations. If a primary key column is displayed, you can navigate to the tables that use this primary key as a foreign key. Additionally, any columns that are foreign keys have a link back to the table in which this foreign key is a primary key.
  - Operations (Web Service)—Operation name and type, and annotations.
  - Properties—Property name, default value, current value.
  - Data—Preview of the data that this resource can retrieve.
  - Lineage—Diagram of the data lineage for the object. For details of what data lineage is within TDV, see the *TDV User Guide*.
6. To watch the object, click Watch.
    - You might be asked to type your name and email address so that notifications can be sent to you.
    - To watch the associated child objects, click Watch Children.

## Adding Comments to Objects

You can comment on any object viewable through the Business Directory Browse feature. The comments are stored in the Business Directory repository.

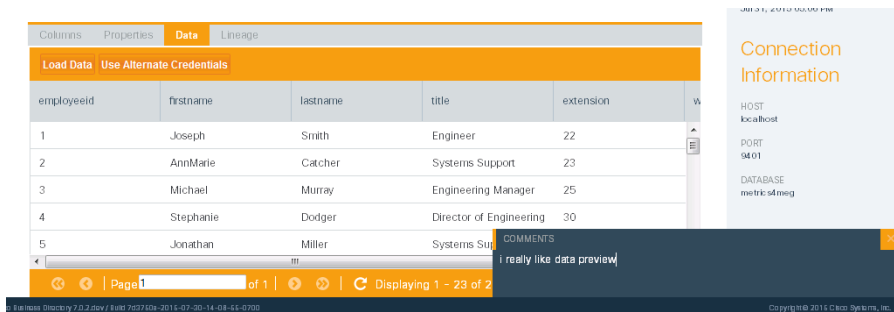
**Note:** Comments are not saved to the TDV repository, and they are not viewable through Studio.

For information on the access needed to edit or delete comments, see [Access Rights, page 51](#).

### To add comments to an object

1. Select BROWSE.
2. Navigate and select a published object or container.

- Click the comment link on the page or the icon in the lower right portion of the screen.



- Type your comment and click Return.

Your comment is added to the object, and now others can see and reply to your comment. Anyone who is watching the resource or container is notified of your comment.

## Previewing Resource Data in Business Directory

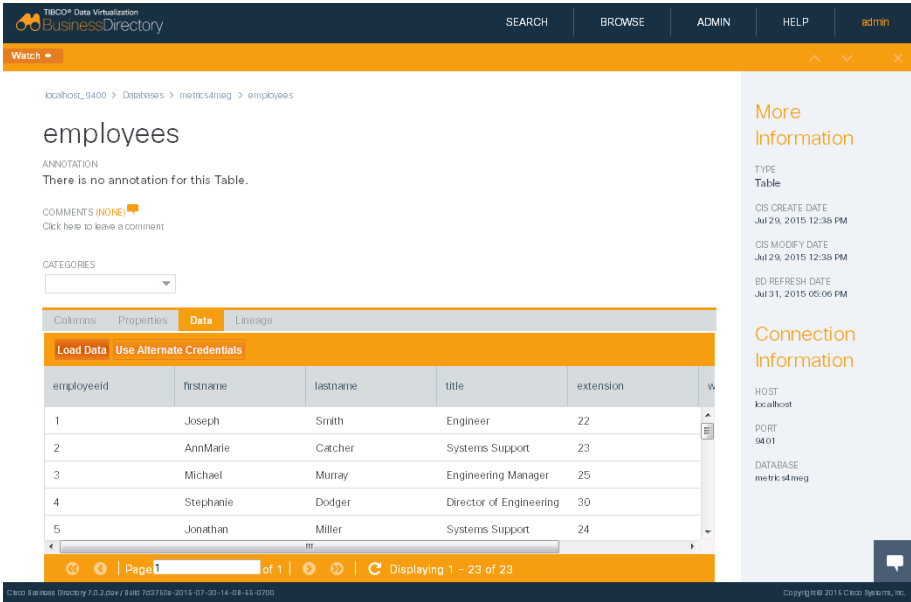
Previewing resource data within Business Directory lets you determine whether the resource you are working with is really the one you are interested in.

**Note:** Data preview must be enabled. See [Adding a Site, page 35](#).

### To preview data

- Follow the instructions in [Searching Resources, page 39](#).
- After selecting the resource you are interested in, select the Data tab.

3. Click Load Data to get data to display.



4. Optionally, to view data you might need to Use Alternate Credentials to authenticate as a user with rights to view the data.

There are many reasons that this might be required, depending on your corporate security requirements. Use the LDAP domain name from the TDV instance rather than the consolidated LDAP domain name that is visible within Business Directory.

5. Optionally, you can use column filtering or write your own filter WHERE clause. This is particularly useful when you are viewing large amounts of data.

## Categories

This section includes:

- [Defining Categories and Values, page 45](#)
- [Adding Bulk Classifications for Resources, page 45](#)
- [Adding Categories to a Resource, page 46](#)

## Defining Categories and Values

Each category that you define must have at least one label so that it can be associated with a resource on the Browse page. For required permissions, see [Access Rights, page 51](#).

Double quotes in the category name are not supported.

### To define categories and values

1. Select ADMIN > CATEGORIES.
2. Select Add Category (the plus-sign icon).
3. Type a category name.
4. Click Save.
5. Hover over the wrench icon and click Add Value.
6. Type a value.

## Adding Bulk Classifications for Resources

Bulk classifications are a quick way to associate many resources with a category or name of a business process so that you and others can easily find them.

During classification, if a resource already has the category applied to it, the category is not reapplied. Similarly, when clearing the classification from resources, if the category is not present on the resource there is no change to the resource.

For information about permissions, see [Access Rights, page 51](#).

### To add or clear classifications

1. Select BROWSE or use SEARCH.
2. Locate and select a resource or container to which you want the classification to apply. Use multi-select options to select more than one resource or container.
3. Click the Add icon above the resource tree pane to classify the resource with the category.  
  
Click the Remove icon above the resource tree pane to clear the classification from the resources with the category.
4. Choose your classification from the list of categories. See [Defining Categories and Values, page 45](#), for how categories are defined.

## Adding Categories to a Resource

Categories associate resources with a name that you or others can easily find. For information on permissions, see [Access Rights, page 51](#).

### To add categories to a resource

1. Select BROWSE or use SEARCH.
2. Expand the tree and navigate to the resources to which you want to associate a category.
3. Select a specific resource to view properties and details of the resource.
4. Below Categories, select the category that you want to associate with the resource.
5. Add more categories or delete them as necessary.

## Custom Properties

You can add groups and properties within Business Directory. The custom properties can be used to facilitate additional logic or reporting that can be driven from the information stored in Business Directory.

- [Defining and Editing Custom Property Groups and Properties, page 46](#)
- [Specifying the Custom Property Value for a Resource Tab., page 49](#)

## Defining and Editing Custom Property Groups and Properties

Before Property groups are available to the resources within Business Directory, a user with administration privileges must add them to the custom properties page. A Property Group must have at least one property defined for it to be viewable from the Properties Tab for a resource.

**Note:** On Firefox, blank custom properties occasionally disappear from the UI; but after a refresh of the browser, the properties appear as expected.

### To add and manage custom properties

1. Select ADMIN > CUSTOM PROPERTIES.
2. Click the Add Group plus-sign icon at the lower left of the page.
3. Type the name of the Group of properties you want to define.



- 4. Optionally, type a description of the Group in the Annotation field. This description is only visible to other administrators who are adding or editing a Property Group. It does not appear on the resource page.
- 5. Select a navigation option to determine where the Property Group appears on the resource detail page:

Option	Description
PROPERTIES_TAB	(Default) Lists the Property Groups.
CUSTOM_TAB	Adds a tab with the Property Group name.
SHARED_AREA	Displays the Property Group and its properties in the shared area above the detail table.

- 6. Navigate to and select a location.  

This location links the resources to this custom property. You can map more than one location to the property. For example, if you want the ACCT property available to all the views that you have published for SITE! and SITE@, then you need to add both SITE! and SITE@ to the location field.
- 7. Scroll over the Group that you just added.
- 8. Scroll over the tool icon that appears to the left of the group or property and select one of the following:

Option	Description
Add	Type a name for the property. Select the data type for the property. Type a default value for the property. It must be a valid value for the data type you have specified. The value can later be overridden for a specific resource.
Cut	
Paste	
Delete	
Edit	Open the property editor.

- 9. Navigate back to the Browse page and select a resource that belongs to the site location that you defined.

10. Select the Properties tab.

Defining and Editing Custom Groups and Properties

**Note:** On Firefox, blank custom properties occasionally disappear from the UI; but after a refresh of the browser, the properties appear as expected.

To add custom properties

- 1. Select ADMIN > CUSTOM PROPERTIES.
- 2. Highlight a Property Group Name
- 3. Hover over the wrench icon and click Add Property.
- 4. Type the name of the property you want to define.
- 5. Select a property type you want from the drop-down list.

Properties options are:

Option	Note	Option	Note
<ul style="list-style-type: none"><li>• STRING_TYPE</li></ul>	Default	<ul style="list-style-type: none"><li>• TIME_TYPE</li></ul>	
<ul style="list-style-type: none"><li>• BOOLEAN_TYPE</li></ul>		<ul style="list-style-type: none"><li>• TIMESTAMP_TYPE</li></ul>	
<ul style="list-style-type: none"><li>• YES_NO_TYPE</li></ul>		<ul style="list-style-type: none"><li>• URL_TYPE</li></ul>	
<ul style="list-style-type: none"><li>• INTEGER_TYPE</li></ul>		<ul style="list-style-type: none"><li>• SINGLE_ENUMERATOR</li></ul>	Complete Valid Values field
<ul style="list-style-type: none"><li>• DECIMAL_TYPE</li></ul>		<ul style="list-style-type: none"><li>• MULTIPLE_ENUMERATOR</li></ul>	Complete Valid Values field
<ul style="list-style-type: none"><li>• DATE_TYPE</li></ul>		<ul style="list-style-type: none"><li>• RICH_TEXT_TYPE</li></ul>	

- 6. Type the default value.

Note: for Single and Multiple enumerators you must complete the valid values field in addition to the default value.

- 7. Click Save.

To edit custom properties

- 1. Select ADMIN > CUSTOM PROPERTIES.
- 2. Highlight a Property Name

3. Hover over the wrench icon and click Edit Property.
4. Type the modified name of the property you want to define.
5. Select a property type from the drop-down list.
6. Enter a default value.

Note: For Single\_ and Multiple\_Enumerator types you must complete the valid values field in addition to the default value.

7. Click Save.

## Specifying the Custom Property Value for a Resource Tab.

After a custom property has been defined for resources associated with the locations specified in the location field and a default value is defined, you can specify exact values for the property of each resource.

**Note:** On Firefox, blank custom properties sometimes disappear from the UI; but after a refresh of the browser display, the properties appear as expected.

### To manipulate custom properties

1. Select BROWSE and open the resource for which you want to edit custom properties.
2. Select the Properties tab.
3. Double-click a Property Name row that contains a value.
4. Edit the Value and click Save.

## Resource Data Lineage

Business Directory provides a tab that let you view a resource's data lineage. This section contains:

- [What Data Lineage Reveals, page 49](#)
- [Viewing Data Lineage, page 50](#)

## What Data Lineage Reveals

Data Lineage tells you which data sources, tables, and columns provided the data found in a specific resource. This information can help you understand:

- What will be affected by a proposed change to a column or resource.

- How a published resource is provided to a consuming application, so that you can trace dependencies back to their origins.
- What resources you might need to have privileges for, because of resource dependencies.

For further details on how TDV collects and displays data lineage information, see the *TDV User Guide*.

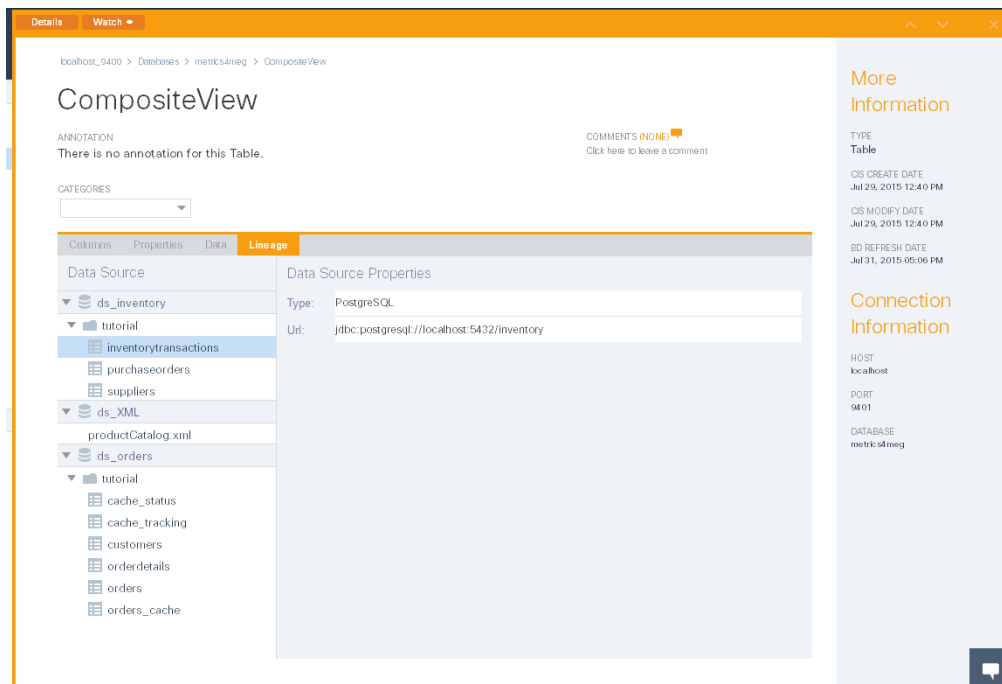
## Viewing Data Lineage

You can view data lineage information in Business Directory. This information reflects the dependencies present in the underlying TDV instance.

### To view data lineage information

1. Select BROWSE and open a resource.
2. Select the Data Lineage tab.
3. Expand the tree under the Data Source column to see which data sources contribute to creating the resource.

- Expand each of the data sources further to see what procedures or tables and columns are used in the creation of the resource in which you are interested.



## Access Rights

The users and groups listed under Access Control are specific to Business Directory. Rights that are displayed in gray are inherited from the group to which the user or group belongs.

This section contains:

- [Viewing Users on the Access Control Page, page 52](#)
- [Managing User Access, page 53](#)
- [Changing the Admin Password After Installation, page 54](#)

Business Directory users can be assigned rights that control what content users and groups can add, edit, or delete. The following rights are available:

Access Level	Description
Access Directory	Access Business Directory and view all information. This right is required to log into the Business Directory.
Apply Comment	Create a comment. Edit or delete one’s own comments.
Moderate Comment	Remove any comment or comment thread. Only the author of a comment can edit that comment.
Apply Category	Assign or unassign category values for any resource.
Manage Category	Create or remove a category. Create, edit, or remove a category’s list of values.
Apply Property	Assign the <i>value</i> of a custom property on a resource.
Manage Property	Create, edit, or delete custom properties and property groups. Assign or remove custom properties from resources.
Read All	Read all resource information listed in the Business Directory. Users who do not also have the Access Directory rights remain in the system, but they are not allowed access beyond the login screen.
Admin	Add, remove, or refresh sites. Administer users and groups, including LDAP. Read and manage all Business Directory content.  If this right is assigned, the user has <b>all</b> rights regardless of other selections.

Viewing Users on the Access Control Page

As the number of Business directory users grows, being able to sort how you view them can help you manage users and their rights.

To view and sort Business Directory users

1. Select ADMIN > ACCESS CONTROL.
2. In the drop-down field, select Users or Groups
3. Optionally, to filter data, in the text field, type criteria to refine how the information is filtered.

- Determine which of the following columns you want to use to sort the data:

User	Domain	Sites
Apply Comment	Moderate Comment	Apply Category
Manage Category	Apply Property	Manage Property
Read All	Access Directory	Admin
Member Of		

- Click a heading again to change sort order.

## Managing User Access

If you have Admin rights for a Business Directory instance, you can manage all of its users and groups.

The resources that users can view depend on their rights as defined in both Business Directory and the TDV sites.

### To manage business directory user access

- Select ADMIN > ACCESS CONTROL.
- Select the row that contains the user whose rights you want to modify.
- Determine which rights you want to grant to the user.

Common Tasks	Rights Needed
Add a comment	Access Directory plus Apply Comment
Create a category and value	Access Directory plus Manage Category
Associate a category value with a resource	Access Directory plus Apply Category
Create a custom property or group	Access Directory plus Manage Property
Associate a custom property with a resource	Access Directory plus Apply Property

- Select or clear check marks depending on which rights you want to grant to the user.

Changes are saved automatically.

## Changing the Admin Password After Installation

Business Directory manages the password for the Admin user (but for no other users).

### To change the Admin user password

1. Log in to Business Directory as the Admin user.
2. Select Admin > PROFILE in the area next to the HELP button.
3. On the User Profile page, select Change Password.

You can also type a first name, last name, and email address on the User Profile pane.

4. Follow the prompts to change the password.

If you typed a first name, it is displayed in place of “admin” next to the HELP button.



# Business Directory API and System Tables

---

This section describes how to use Business Directory REST API, and how to explore the system tables associated with Business Directory.

- [Using the Business Directory REST API, page 55](#)
- [Backing Up and Restoring Business Directory Information, page 59](#)
- [Accessing Business Directory System Table Information, page 61](#)

## Using the Business Directory REST API

Business Directory provides access to the REST API methods through a Swagger web interface. From the API web page you can access information about each method, including what it does and what parameters are required. You can also run the methods directly from the web page.

You can implement the REST API methods in two ways:

- [Using Business Directory to Run the REST API Methods, page 55](#)
- [Using cURL Commands to Run the REST API Methods, page 56](#)
- [Characteristics of Programmatic Use of the REST API, page 58](#)

## Using Business Directory to Run the REST API Methods

### To use the Business Directory API methods

1. Select Help > REST API.  
A new browser tab opens with a list of REST methods, grouped by what they act on and what they do.
2. Ensure that you have an SSL connection. For example, your URL should be: `https://localhost:9502/directory/api-docs/`
3. Click the text on the method you want to look at or use.  
The method description expands to display its description, the rights required, examples of its use, and a Try it out! button.
4. To use a method, type values for required parameters and click Try it out!.

**Note:** Although the button says Try it out, the method executes “live” on the instance to which it points. Commands the require a file input or output cannot be run from the Try it out! button.

- 5. Review the information.

userProfiles : User Profile Management

GET

/userProfiles

Documentation

Fetch all user profiles.

Required Rights

SELECT privileges on ALL\_USER\_PROFILES

Examples

List all profiles

curl -X GET -u admin:admin "https://localhost:9502/rest/v1/userProfiles"

List all profiles (as ldap user)

curl -X GET -u user@ldapDomain:password "https://localhost:9502/rest/v1/userPr

Equivalent system query

curl -X GET -u admin:admin "https://localhost:9502/rest/v1/data/query" -H "que

Retrieve count of all profiles

curl -X GET -u admin:admin "https://localhost:9502/rest/v1/userProfiles?count"

Try it out!

Hide Response

Request URL

https://localhost:9502/rest/v1/userProfiles

Response Body

```
[
  [
    -1973,
    "meg",
    "miranda",
    "memirand@cisisco.com",
    "admin"
  ]
]
```

Response Code

200

Using cURL Commands to Run the REST API Methods

The REST API page displays several cURL examples for each method on the page. You can use a command window to run the cURL command and get results or modify your Business Directory instance.

Typically, UNIX and Cygwin command line windows come with the Curl tool installed, For Windows, you might need to obtain and install the Curl tool.

These instructions assume that running in insecure mode. If you want to configure secure execution of the cURL commands, see an example set up in [Setting Up Secure cURL Execution Example, page 57](#)

### To use a command window to run the Business Directory REST API methods

1. Select Help > REST API.  
A new browser tab opens with a list of REST methods, grouped by what they act on and what they do.
2. Click the text on the method you want to look at or use.  
The method description expands to display its description, the rights required, examples of its use, and a Try it out! button.
3. Copy the text of the cURL example that appears closest to what you might need to use.
4. Open your favorite command window.
5. Paste the cURL command, optionally add a '-k' to the command to run in insecure mode, and click Return.
6. Review the results.

```
$ curl -X GET -u admin:admin "https://localhost:9502/rest/v1/userProfiles" -k
[{"-1973,"neg","miranda","nenirand@cisisco.com","admin"}]
```

## Setting Up Secure cURL Execution Example

The cis\_server.pem is a certificate which is exported from  
<CIS\_install\_dir>conf\server\security\cis\_server\_keystore.jks.

### To troubleshoot secure cURL execution

1. If you run a curl command similar to:  
curl -X GET -u admin:admin  
"https://localhost:9502/rest/userProfiles" - -cacert  
cis\_server.pem

You will get output similar to:  
curl: (51) SSL: certificate subject name 'cis\_server' does not  
match target host name 'localhost'

2. Make your host name match the certificate, then you can run the cURL command without errors.

For example, update your /etc/hosts file as follows:

```
127.0.0.1 cis_server
```

Curl command:

```
curl -X GET -u admin:admin  
"https://cis_server:9502/rest/userProfiles" --cacert  
cis_server.pem
```

## Characteristics of Programmatic Use of the REST API

When using REST API methods programmatically, be aware of the following.

### SSL

SSL is required. Do not attempt to invoke the API over a non-secured HTTP channel.

### Method Overrides

If your REST client library does not support PUT, PATCH, and DELETE methods, you can include an "X-HTTP-Method-Override" header and use the POST method. For example:

```
curl -X POST -u admin:admin  
"http://localhost:9500/rest/v1/sites/test_site"  
-H"X-HTTP-Method-Override:DELETE"
```

### POST

POST methods that create single entities return a Location header with the path to the new entity. POST methods that create multiple entities do not return the paths to the new entities.

### PUT

PUT methods completely update entities. Omitting a property when using a PUT method results either in an error or in setting the entity's property to a null or default value.

### GET

Many GET methods have equivalent system (TDV SQL) queries. The Swagger documentation provides examples.

If a GET method lists items, it supports several query parameters:

- The "limit" parameter specifies the number of records to return.
- The "offset" parameter specifies the starting record.

- The "orderBy" parameter returns results in a specific order. It uses SQL syntax.
  - Encode the "orderBy" parameter as you would encode a standard URL query string.
  - Escape a field name that contains spaces by surrounding the field name with double quotes.
  - In a field escaped for spaces, escape a double quote with two double quotes.
  - To determine field names for the orderBy clause, refer to Swagger documentation for equivalent system query syntax.
  - Use HELP > SYSTEM TABLES to view documentation of columns in those tables.
- Some orderBy examples:
  - orderBy=City, State, Zip
  - orderBy=City DESC, State ASC, Zip
  - orderBy="First Name" ASC, City, Zip ASC

## Backing Up and Restoring Business Directory Information

The REST API provides export and import commands that you can use to back up and restore the Business Directory system.

The commands as they apply to backup and restore are described, with examples, in the following sections:

- [Backing Up Business Directory, page 59](#)
- [Restoring Business Directory, page 60](#)

### Backing Up Business Directory

You can back up Business Directory metadata (custom properties, catalogs, and other data) by exporting it to a CAR file.

#### To back up Business Directory

1. Select Help > REST API.

A new browser tab opens with a list of REST methods, grouped by what they act on and what they do.

2. Scroll down to the “metadata: System Metadata” group and click “Export metadata to a file.”
3. Make sure you have the required rights.
4. Type values for required parameters, including an appropriate name and location for the CAR file.
5. Copy the cURL command that is the closest to what you think you will need.
6. Open a command window and run the cURL command. See [Using cURL Commands to Run the REST API Methods, page 56](#).

### Export as Admin user Example

Here is an example of the CURL invocation you would use as the Admin user.

```
curl -u "admin:admin" -X GET
"https://localhost:9502/rest/v1/metadata" -o export001.car
```

### Export as an LDAP user Example

Here is an example of the CURL invocation you would use as an LDAP user with BD\_ADMIN and ACCESS\_DIRECTORY rights.

```
curl -u "user@ldapDomain:password" -X GET
"https://localhost:9502/rest/v1/metadata" -o export001.car
```

## Restoring Business Directory

You can restore Business Directory metadata (custom properties, catalogs, and other data) by importing a previously exported CAR file.

### To restore Business Directory

1. Select Help > REST API.  
A new browser tab opens with a list of REST methods, grouped by what they act on and what they do.
2. Scroll down to the “metadata: System Metadata” group and click “Import full metadata from a file.”
3. Make sure you have the required rights.
4. Type values for required parameters.
5. Copy the cURL command that is the closest to what you think you will need.
6. Open a command window and run the cURL command. See [Using cURL Commands to Run the REST API Methods, page 56](#).

### Import as Admin user Example

Here is an example of the CURL invocation you would use as the Admin user.

```
curl -u "admin:admin" -i -F "overwrite=true" -F
"file=@export001.car"
-X PUT "https://localhost:9502/rest/v1/metadata"
```

### Import as Admin user, with method override Example

Here is an example of the CURL invocation you would use as the Admin user, using the X-HTTP-Method-Override option. (See [Method Overrides, page 58.](#))

```
curl -u "admin:admin" -i -H "X-HTTP-Method-Override:
PUT" -F "overwrite=true" -F "file=@export001.car" -X POST
"https://localhost:9502/rest/v1/metadata"
```

### Export as an LDAP user Example

Here is an example of the CURL invocation you would use as an LDAP user with BD\_ADMIN and ACCESS\_DIRECTORY rights.

```
curl -u "user@ldapDomain:password" -i -F "overwrite=true" -F
"file=@export001.car"
-X PUT "https://localhost:9502/rest/v1/metadata"
```

## Accessing Business Directory System Table Information

You can access system table information at any time.

### About System Tables

Business Directory can be used to view system tables. You could then use the information to run an API method that can show its contents.

**Note:** System tables are *virtual tables*. They map to a physical database table, a view, a structure in server memory, or a combination of these. TIBCO reserves the right to change the system tables at any time.

For system tables, what you see depends on the rights and privileges you have. Studio users are limited to executing SQL SELECT statements on these tables. The rights and privileges to change system tables are locked, to prevent changes that could compromise functionality and performance.

To access system table information

- 1. Select Help > System Tables.
- 2. Select one of the tables listed.

System Tables

Table name	Annotation for "ALL_BD_RESOURCES"
ALL_BD_RESOURCES	This table provides a list of BD resources.
ALL_CATALOGS	Column Composite JDBC Nullable Description Data Type
ALL_CATEGORIES	
ALL_CLASSIFICATIONS	RESOURCE_ID INTEGER Resource Identifier.
ALL_CATEGORY_VALUES	RESOURCE_NAME VARCHAR Resource name.
ALL_CUSTOM_PROPERTIES	RESOURCE_TYPE VARCHAR Resource type.
ALL_CUSTOM_PROPERTY_GROUPS	PARENT_DATASOURCE_ID INTEGER Parent Datasource Identifier.
ALL_CUSTOM_PROPERTY_GROUPS ASSO...	PARENT_DATASOURCE_NAME VARCHAR Parent Datasource name.
ALL_COMMENTS	SITE_NAME VARCHAR Site name.
ALL_COLUMNS	PARENT_PATH VARCHAR Resource's Parent Path.
ALL_FOREIGN_KEYS	guid CHAR Global unique identifier.
ALL_GROUPS	CREATION_TIMESTAMP BIGINT Resource creation timestamp.
ALL_INDEXES	MODIFICATION_TIMESTAMP_ON_SITE BIGINT Resource modification timestamp on site.
ALL_LINEAGE	MODIFICATION_TIMESTAMP BIGINT Resource last modified timestamp.
ALL_PROCEDURES	annotation CLOB Resource annotation.
ALL_CUSTOM_PROPERTY_CLASSIFICATIONS	
ALL_DATASOURCES	
ALL_RELATIONSHIP_COLUMNS	
ALL_RESOURCES	

- 3. Review the Annotation information.