



# ALM Synchronizer

Software Version: 15.5

## User Guide

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# Welcome to This Guide

Welcome to ALM Synchronizer. Synchronizer enables you to synchronize Application Lifecycle Management (ALM) data with data in another application.

This guide describes how to create and manage synchronization links, and how to run tasks on these links.

For information on system requirements, supported environments, and technical specifications, see [ALM Synchronizer Technical Specifications](#).

**Note:** The usage of ALM Synchronizer or ALM Synchronizer Adapter SPI to develop an adapter for ALM is not supported.





# Getting Started

This chapter explains how to start ALM Synchronizer and introduces the Synchronizer window.

This chapter contains the following topics:

- [Starting and Stopping the Synchronizer Service](#) ..... 9
- [Starting the Synchronizer Client](#) .....10
- [The Synchronizer Client Window](#) .....11
- [Synchronizer Client Window Toolbar Buttons and Menu Options](#) .....12
- [Managing Users](#) .....14

## Starting and Stopping the Synchronizer Service

This section describes how to start and stop the Synchronizer service.

### To start the Synchronizer service:

1. Prerequisites:
  - a. You start the Synchronizer service from the Synchronizer server machine. The Synchronizer service must be running to work with the Synchronizer client.
  - b. If you encounter problems starting the Synchronizer service, refer to the Micro Focus ALM Synchronizer Installation Guide for troubleshooting suggestions.
2. On the Synchronizer server machine, choose **Start > Programs > ALM Synchronizer > Start Synchronizer**.

**Note:** The Synchronizer service is started in the background. It may take a few minutes before the Synchronizer client can connect to the server.

### To stop the Synchronizer service:

1. **Prerequisite.** You stop the Synchronizer service from the Synchronizer server machine.
2. Make sure that no tasks are running for any link. You can check whether link tasks are currently running from the **Running** field in the Links Grid. For more information on the Links Grid, see "[Viewing Link Details](#)" on page 61.

**Tip:** To ensure that no tasks can run on any link, disable all links before you stop the Synchronizer service. For more information on disabling links, see "[Enabling and Disabling Synchronization Links](#)" on page 74.

3. On the Synchronizer server machine, choose **Start > Programs > ALM Synchronizer > Stop Synchronizer**.

## Starting the Synchronizer Client

After you have installed the Synchronizer server and client, and started the server, you can start the Synchronizer client and connect to the server.

### Notes

- You can work with more than one client connected to the server at the same time. To avoid unexpected results, if you work with more than one client, you must make sure that no link is worked on by more than one client at the same time.
- The Synchronizer client is automatically disconnected from the Synchronizer server after an extended period of inactivity. For information on reconnecting, see ["Connecting to the Synchronizer Server" on the next page](#).

To start the Synchronizer client:

1. On the Synchronizer client machine, choose **Start > Programs > ALM Synchronizer Client > ALM Synchronizer Client**. The Connect to Synchronizer Server dialog box opens.
2. In the **Server name** and **Port** boxes respectively, type the machine name and port of the Synchronizer server to which you want to connect.

**Tip:** To connect to a Synchronizer server installed on your local machine, type **localhost**.

3. Select the **Use Https** checkbox if you want to use Hypertext Transfer Protocol Secure (HTTPS) for a secure connection between the Synchronizer server and the Synchronizer client.
4. In the **User Name** box, type your user name.  
The first time you connect to a Synchronizer server, you must log in as the Synchronizer administrator, with the user name **admin**. After you connect, you can create additional users. For more information, see ["Managing Users" on page 14](#).
5. In the **Password** box, type your password. The initial password is blank.

**Note:** To increase the security of your Synchronizer data, change the password from the default blank password as soon as possible. For more information on changing the server password, see ["Changing Your Password" on page 80](#).

6. Click **Connect**. The Synchronizer connects to the server you specified and the Synchronizer

client opens.




**Tip:** To close the Synchronizer client, choose **Connection > Exit**.

## Connecting to the Synchronizer Server

You can disconnect from the Synchronizer server manually when needed. For example, you may want to connect to a different server. Additionally, if you receive a warning that the Synchronizer client is not connected to the server, you need to manually disconnect from the Synchronizer server. This can occur, for example, after an extended period of inactivity.

After you disconnect from a server, you must connect to another server or reconnect to the same server to continue working with the Synchronizer.

To disconnect from, and reconnect to, a Synchronizer server:

1. Select **Connection > Disconnect**, or click the **Disconnect**  button. The Connect to Synchronizer Server dialog box opens.
2. Click the **Disconnect** button. The **Server name**, **User Name**, and **Password** boxes become editable.
3. Enter the logon credentials as described in step 2 in ["Starting the Synchronizer Client" on the previous page](#).
4. Click the **Connect** button. The Synchronizer connects to the server you specified and the Synchronizer client opens.

## The Synchronizer Client Window

The Synchronizer client enables you to manage the synchronization links stored in the Synchronizer database. For more information on starting the Synchronizer client, see ["Starting the Synchronizer Client" on the previous page](#).

The Synchronizer client window contains the following key elements:

- **Synchronizer menu bar.** Contains drop-down menus of the Synchronizer commands. For details, see ["Synchronizer Client Window Toolbar Buttons and Menu Options" on the next page](#).
- **Synchronizer toolbar.** Contains buttons of commands commonly used when managing synchronization links. For details, see ["Synchronizer Client Window Toolbar Buttons and Menu Options" on the next page](#).
- **Links list.** Contains a list of the synchronization links available on the Synchronizer server. Located on the left of the Synchronizer client window.
- **Link Details pane.** Contains information about your synchronization links. Located on the upper right of the Synchronizer client window.








- **Execution pane.** Contains information about link task execution. Located on the bottom right of the Synchronizer client window.




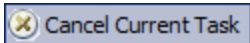

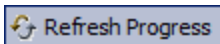
For details on how to work with the Synchronizer client window, see ["Viewing Link Details" on page 61](#).

## Synchronizer Client Window Toolbar Buttons and Menu Options

This section describes the menus and buttons available in the Synchronizer client window.

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Element (A - Z)	Menu	Description
	Connection	<b>Connect / Disconnect.</b> Connects or disconnects the Synchronizer client to/from the Synchronizer server.
	Link	<b>Refresh All</b> or <b>Refresh Selected.</b> Refreshes the display of all, or selected, links.
	Link	<b>Create.</b> Enables you to create a link using the Create Link wizard. For details, see <a href="#">"Creating Links" on page 26</a> .
	Link	<b>Enable.</b> Enables the selected link. For details, see <a href="#">"Enabling and Disabling Synchronization Links" on page 74</a> .
	Link	<b>Disable.</b> Disables the selected link. For details, see <a href="#">"Enabling and Disabling Synchronization Links" on page 74</a> .
	Link	<b>Reset Link.</b> Opens the Reset Link dialog box, which enables you to reset the time stamp and/or record version for the selected link. For details, see <a href="#">"Resetting a Link" on page 73</a> .
	Run Task	<p><b>Run.</b> Run one of the following tasks:</p> <ul style="list-style-type: none"> <li>• <b>Run Integrity Check.</b> For details, see <a href="#">"Integrity Checks" on page 19</a>.</li> <li>• <b>Run Incremental Synchronization.</b> For details, see <a href="#">"Incremental Synchronization" on page 1</a>.</li> <li>• <b>Run Full Synchronization.</b> For details, see <a href="#">"Full Synchronization" on page 1</a>.</li> </ul>

UI Element (A - Z)	Menu	Description
		<b>Edit.</b> Enables you to edit the selected link's configuration.
		<b>Discard changes.</b> Discards any changes made to the selected link's configuration and converts the link to read-only mode.
		<b>Save.</b> Saves changes made to the selected link's configuration.
		<p>Cancels the currently-running task.</p> <p><b>Available from:</b> Execution pane, when a task is running.</p>
		<p>Views a report summarizing the task run. For details, see "Viewing Task Run Reports" on page 93.</p> <p><b>Available from:</b> Execution pane, after a task has run.</p>
		<p>Displays the next information message on the task's progress.</p> <p><b>Available from:</b> Execution pane, while a task is running and Auto Refresh is not selected.</p>
<input checked="" type="checkbox"/> Auto Refresh		<p>Enables the client to periodically sample the information messages generated by the server as the task progresses and displays them in the Execution pane.</p> <p><b>Available from:</b> Execution pane.</p>
<b>About</b>	Help	Displays the version and build number for your installed version of Synchronizer.
<b>Change Password</b>	Connection	Opens the Change Password dialog box. For details, see <a href="#">"Changing Your Password" on page 80.</a>
<b>Create From</b>	Link	<p>Enables you to create a link from an XML file or a backup file:</p> <p><b>Link Configuration XML File.</b> For details, see <a href="#">"Importing Link Definitions" on page 77.</a></p> <p><b>Link Backup File.</b> For details, see <a href="#">"Importing Link Data" on page 78.</a></p>
<b>Delete</b>	Link	Deletes the selected link.

UI Element (A - Z)	Menu	Description
<b>Exit</b>	Connection	Closes the ALM Synchronizer client.
<b>Export</b>	Link	Enables you to export link data to a file:  Link Configuration into XML File. For details, see <a href="#">"Exporting Link Definitions" on page 77</a> .  Link Data into Backup File. For details, see <a href="#">"Exporting Link Data" on page 78</a> .
<b>Local Client Options</b>	Tools	Enables you to configure the options for the local Synchronizer client. For details, see <a href="#">"Configuring the Client Options" on page 79</a> .
<b>Server Options</b>	Tools	Enables you to configure the options for the Synchronizer server. For details, see <a href="#">"Configuring the Server Options" on page 79</a> .
<b>User Guide</b>	Help	Opens this user guide.
<b>User Management</b>	Tools	Enables the Synchronizer administrator to manage other users, including adding and deleting users, resetting a user password, and specifying which links are displayed to each user. For details, see <a href="#">"Managing Users" below</a> .


## Managing Users

The Synchronizer administrator can manage other users. As Synchronizer administrator, you can add and delete users, reset a user password, and specify which links are displayed to each user.

When you define visible links for users, consider the following:


- If a link is visible to a user, the user has full privileges and can run, edit, and delete the link.
- By default, all links are visible to the **admin** user.
- When you create a new user, no links are visible to the user by default. You can assign existing links to the user.
- When a user creates a new link, the link is visible to the user and to the **admin** user by default.

To manage users:

1. Connect to the Synchronizer server using the **admin** user.
2. Select **Tools > User Management**. The User Management dialog box opens.
3. To add a new user, click the **Add User**  button .

In the User Name box, type a name for the user, with a maximum length of 60 characters. The user name cannot include the following characters: ( ) @ \ / : \* ? " ` < > | + = ; , % . It is also recommended to create user names according to ALM user names.

Click **OK**. The user name is added to the Users list.

4. To specify which links are visible to a user, select the user in the Users list. Select one or more links and click the arrow ( > and < ) buttons to move the links between the **Available Links** and **Visible Links**. **Available Links** lists all links that exist on the Synchronizer server. **Visible Links** list the links that are displayed when the selected user is logged in.
5. To reset a user's password, select the user in the Users list and click **Reset Password**. Click **Yes** to confirm. The selected user's password is reset to the default blank password. The user should change the default blank password on the next login.
6. To delete a user, select a user in the Users list and click the **Delete User**  button. Click **OK** to confirm. The user is deleted from the Users list.





# Synchronizing at a Glance

This chapter provides an overview of synchronizing data and describes the ALM Synchronizer infrastructure.

This chapter contains the following topics:

- [About Synchronizing at a Glance](#) ..... 17
- [Synchronization Links](#) ..... 17
- [Integrity Checks](#) ..... 19
- [Incremental Synchronization](#) ..... 23
- [Full Synchronization](#) ..... 24
- [Working with ALM Version Control](#) ..... 24

## About Synchronizing at a Glance

Synchronizer enables you to synchronize data between Application Lifecycle Management (ALM) and other applications, or between two ALM projects.

To manage synchronization between applications, you create synchronization links. Synchronization links define which data is synchronized and how it is synchronized. For more information on synchronization links, see "[Synchronization Links](#)" below.

After you create a synchronization link, you run an integrity check to validate the link and to highlight problems that may occur during synchronization. For more information on integrity checks, see "[Integrity Checks](#)" on page 19.

You can run two types of synchronization: incremental synchronization and full synchronization. For more information on these synchronization types, see [Incremental Synchronization and Full Synchronization](#).

The following ALM data is not synchronized: history, test coverage, requirements traceability, and defect linkage.

## Synchronization Links

You create synchronization links between two endpoints. An **endpoint** is an application containing data that is synchronized by Synchronizer. The first endpoint is always an instance of ALM, while the second endpoint is another application such as Rational ClearQuest or Rational RequisitePro.

A **synchronization link** or **link** defines which entities are included in the synchronization, and how the synchronization is performed. For example, you can define whether Synchronizer synchronizes only new records that were added since the last synchronization, or also

synchronizes existing records that were updated. You also define which fields and field values in one endpoint are mapped to corresponding fields and field values in the other endpoint.

For a mapping between fields or field values, the **source** endpoint refers to the endpoint **from** which data is synchronized. Data in the source endpoint for the mapping remains unchanged. The **destination** endpoint refers to the endpoint **to** which data is synchronized. Data in the destination endpoint is updated according to the data in the source endpoint and the mapping's settings.

Each link contains information to determine which data to synchronize and how to perform the synchronization.

This section includes the following topics:

- ["Time Stamp, Identity Mappings, and Record Versions" below](#)
- ["Cycle Redundancy Checks" below](#)

## Time Stamp, Identity Mappings, and Record Versions

Synchronizer stores various data during the synchronization process. During subsequent synchronization runs, Synchronizer uses this data to determine if a record needs to be synchronized. The stored data includes:

- **Time stamp.** Indicates when the last synchronization task started running on a specific link.
- **Identity mappings.** For each link, Synchronizer stores a table of identity mappings between records in each endpoint. Each record in each endpoint is identified by a unique ID, and this table records the correspondence between each pair of records.
- **Record versions.** Indicates the version of each synchronized record in each endpoint. During synchronization, each synchronized record receives a unique version.

## Cycle Redundancy Checks

After Synchronizer has determined that a mapping is a candidate for synchronization, a **cycle redundancy check** (CRC) is performed to determine whether to synchronize the records in the mapping. A cycle redundancy check is a mathematical operation used to indicate whether data in an endpoint has changed.

Synchronizer performs a cycle redundancy check for each endpoint on the mapped fields only. This enables Synchronizer to determine whether the modifications made to the records in the mapping necessitate synchronizing the records.



**Example:** Suppose you are mapping defects in ALM with defects in ClearQuest, and the only field mapping for the link is between the Status field in ALM and the State field in ClearQuest. Suppose the Priority field is updated for a defect in ALM. As the defect was modified, the mapping that includes the defect is a candidate for synchronization, based on the link time stamp. However, as the mapped fields were not modified, the records



should not be synchronized, even though there were other modifications to the records. During synchronization, Synchronizer performs a cycle redundancy check on the mapping. The check indicates that the mapped fields were not modified, and therefore the records are not synchronized.

## Integrity Checks

An **integrity check** identifies possible problems that can occur during the synchronization process. You must run an integrity check on a link before you can run a synchronization task on that link. When an integrity check passes successfully, you can enable the link and run synchronization tasks on it.

You run an integrity check to validate a link when you:

- Create a new link
- Modify an existing link
- Modify the schema for one of the link's endpoints

An integrity check verifies both general settings for the link, and the field mappings defined for the link. Each individual check within the integrity check can **pass** or **fail**. The integrity check passes only if none of the individual checks within it fail.

If you do not run an integrity check, or if the integrity check does not pass, the link remains **unvalidated** and cannot be enabled for synchronization.

Synchronizer generates a report for each run, which you can open by clicking the **View Report** button in Execution pane (in the lower part of the Synchronizer window). After an unsuccessful integrity check run, you can review this report to identify which individual checks failed and to determine how to fix the link. After the link is fixed, run the integrity check again.

This section includes the following topics:

- ["Checks Performed on General Link Settings" on the next page](#)
- ["Checks Performed on Link Field Mappings" on page 21](#)

## Checks Performed on General Link Settings

The following table displays which checks Synchronizer performs for each endpoint when you run an integrity check. Depending on the entity type synchronized in the link, not all of these checks are performed for every link.

Check Name	Check Description
<b>Endpoint Connection</b>	Checks that Synchronizer can successfully connect to the endpoint using the settings defined.
<b>User permission check</b>	Checks that the user used to connect to the endpoint has sufficient permissions to perform the required tasks.
<b>License check</b>	For a link between two ALM endpoints, check that the endpoint is not Quality Center Essentials Edition, Quality Center Enterprise Edition, ALM Essentials Edition, or ALM LoadRunner Enterprise Edition.
<b>Endpoint parameters check</b>	Checks and validates additional parameters that may be defined for the endpoint.  For example, if an alternate root folder is defined for requirement synchronization, checks that the folder exists in ALM.
<b>Fetching endpoint schema</b>	Checks that Synchronizer can obtain the database schema for the endpoint.
<b>&lt;requirement type&gt; Subtype: Mapped fields check</b>	Performs checks on fields that are mapped for the endpoint.
<b>Specified filter exists</b>	If a filter is defined for the endpoint in the link, checks that the filter exists in the endpoint.
<b>Subtype exists check</b>	Checks that the mapped requirement type exists in the endpoint.

Check Name	Check Description
<b>Endpoint events check</b>	<p>Checks the following:</p> <ul style="list-style-type: none"> <li>• If the endpoint is set to handle record creation in the other endpoint, it is also set to update the other endpoint.</li> <li>• If the endpoint is set to recreate records, the other endpoint is set to handle record creation.</li> <li>• One endpoint only is set to handle record creation for the mapped requirement type.</li> </ul>
<b>Fields mapping defined</b>	Checks that a field mapping is defined between the endpoints and that it can be obtained by the Synchronizer.
<b>Consistency of mapping and endpoint events</b>	Checks that if a field mapping is defined from the endpoint, the link is set to handle record creation or updates in the other endpoint. Also checks that if the link is set to handle record creation or updates in the endpoint, a field mapping is defined to the endpoint.

## Checks Performed on Link Field Mappings

An integrity check performs the following checks on the field mappings you define for the link. Synchronizer also performs these checks when you check the field mappings when you create or configure a link. Depending on the type of field mapped, not all of these checks are performed for every identity mapping.

Check Name	Check Description
<b>Required fields check</b>	<p>Checks that required fields in the destination endpoint are mapped to a field in the source endpoint, or are assigned a constant value. If this is not the case, the check fails.</p> <p>In addition, checks that recommended fields in the destination endpoint are mapped to a field in the source endpoint, or are assigned a constant value. If this is not the case, the check passes with a warning.</p>
<b>Field existence check</b>	Checks that the field exists in the endpoint.

<b>Check Name</b>	<b>Check Description</b>
<b>Field types match check</b>	Checks that if a mapping exists between fields of different types, the values can be converted between the types.
<b>Fields length match check</b>	For string type fields ( <b>String, Multi value list, Single value list, User list</b> ), checks that the maximum length for values for each of the fields in a mapping is the same. If the maximum length is different, the check passes with a warning that some values may be truncated.
<b>Fixed list mapping check</b>	Checks whether the source field of a mapping is not a verified list field, whereas the destination field is a verified list field. In such a case, the check passes with a warning as it is possible that values will be mapped to the destination that are not in its list.
<b>User list check</b>	Checks whether the source field of a mapping is not a user list field, whereas the destination field is a user list field. In such a case, the check passes with a warning as it is possible that values will be mapped to the destination that are not in its user list.
<b>Value mapping types check</b>	Checks that it is possible to convert between the type of the value mapped to a field and the type of the field.
<b>Values length match check</b>	For string type fields ( <b>String, Multi value list, Single value list, User list</b> ), checks that the length of values mapped to the field in a field value mapping is not greater than the maximum length for the field. If a value is mapped that is longer than the maximum length, the check passes with a warning that the value will be truncated.
<b>Values mapping in mandatory field check</b>	Checks that no field value mapping maps an empty string to a mandatory field.
<b>Fixed list values mapping check</b>	Checks that no field value mapping exists that maps values to a verified list field that are not in the list associated with the destination field.

<b>Check Name</b>	<b>Check Description</b>
<b>Read only check</b>	Checks that there is no mapping to read-only fields.

## Incremental Synchronization

This section explains how incremental synchronization handles link endpoint data.

You run an **incremental synchronization** on a link to determine which records in the endpoints were created or modified since the previous synchronization task, and then synchronize data between the two endpoints according to the mapping and settings you defined for the link.

- In an incremental synchronization, Synchronizer first sends a request to each endpoint to supply a list of records created or modified since the time indicated by the time stamp for the link. The time stamp for a link is the time the last synchronization task started running. The endpoint supplies this list by comparing the time stamp for the link with the time each record was last modified as recorded by the endpoint. If a record was modified after the time indicated by the time stamp for the link, it is included in the list.
- If a record that is included in the list for one of the endpoints is not previously known to Synchronizer, and therefore does not appear in the identity map table for the link, Synchronizer infers that the record was created after the last synchronization. If you enabled record creation in the other endpoint, Synchronizer creates a corresponding record in that endpoint and updates the identity map table to include this correspondence.
- If a record in the list already appears in the identity map table for the link, and the record's version is different from the version in the identity mapping record, Synchronizer infers that the record has been updated since the last synchronization. Synchronizer then performs a cycle redundancy check to determine if fields included in the mapping were modified and require synchronization. If synchronization is necessary, Synchronizer updates the corresponding record in the other endpoint, depending on the settings for the link.
- An incremental synchronization does not handle deleted records. In addition, it can cause data consistency issues. For example, consistency issues could arise if Synchronizer tries to update a record but is unable to do so for some reason, such as the record being locked in the endpoint. In such a case, Synchronizer updates the time stamp for the link even though the records have not been synchronized. In future synchronization, Synchronizer will not detect that these records still need to be synchronized. To handle deleted records and data consistency issues, you can run a full synchronization. For more information, see ["Full Synchronization" on the next page](#).

## Full Synchronization

This section explains how full synchronization handles link endpoint data.

You can run a **full synchronization** to perform a full comparison of the records in each endpoint. This is useful if you want to handle records that were deleted from one of the endpoints, or if you want to synchronize records that were not synchronized in an incremental synchronization.

In a full synchronization, Synchronizer requests from each endpoint a list of all the records in that endpoint, not just those created or modified since the previous synchronization task. It then compares this list of records with the list of records included in the identity mapping table. If a record appears in the identity mapping table but no longer appears in the endpoint, Synchronizer infers that the record was deleted from the endpoint and deals with this case according to the options specified in the link's configuration.

If a record appears in both the endpoint and the identity mapping table for the link, Synchronizer synchronizes the record based on the link's time stamp, the record's version, and the cycle redundancy checks, as it would in an incremental synchronization. However, some records may be synchronized that would not otherwise be synchronized in an incremental synchronization. This is because in a full synchronization, all records are requested from each endpoint, and not just those modified since the previous synchronization task.

## Working with ALM Version Control

This section explains how Synchronizer handles requirement synchronization with an ALM version control enabled project. For more information on working with version control in ALM, refer to the *Micro Focus Application Lifecycle Management User Guide*.

Consider the following when synchronizing requirements with an ALM version control enabled project:

- When a requirement is created in the ALM endpoint during synchronization, it is created with a checked in status. A comment is added to the requirement's version history specifying that this requirement was created automatically.
- When a requirement is updated in the ALM endpoint during synchronization, Synchronizer creates and checks in a new version of the requirement. A comment is added to the requirement's version history specifying that the requirement was modified by the ALM Synchronizer.
- When synchronizing a requirement that is checked out by the ALM user defined for the link, the requirement is updated and the new version of the requirement is checked in.
- A requirement checked out by an ALM user other than the user defined for the link is not synchronized.



# Creating Synchronization Links

Using ALM Synchronizer, you create synchronization links to synchronize data between Application Lifecycle Management (ALM) and another endpoint.

This chapter contains the following topics:

• <a href="#">About Creating Synchronization Links</a> .....	25
• <a href="#">Creating Links</a> .....	26
• <a href="#">Setting Link Properties</a> .....	31
• <a href="#">Setting Scheduling Options</a> .....	33
• <a href="#">Setting Filter Options</a> .....	35
• <a href="#">Creating Requirement Type Mappings</a> .....	37
• <a href="#">Configuring Synchronization Rules</a> .....	38
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## About Creating Synchronization Links

You create synchronization links from the Synchronizer client. The link defines synchronization of defects or requirements between ALM and another endpoint.

Creating synchronization links involves the following stages:

1. Determine basic settings for the link and define its endpoints. For more information, see ["Creating Links" on the next page](#).
2. Confirm the basic settings and define additional general settings. For more information, see ["Setting Link Properties" on page 31](#).
3. Define whether synchronization will be run manually, or automatically at regular time intervals. For more information, see ["Setting Scheduling Options" on page 33](#).
4. Define which records created in an endpoint are synchronized. For more information, see ["Setting Filter Options" on page 35](#).
5. If you are synchronizing requirements, create mappings between requirement types in the endpoints. For more information, see ["Creating Requirement Type Mappings" on page 37](#).
6. Define which types of changes to data in an endpoint are synchronized. You can synchronize records added since the previous synchronization, records updated since the previous synchronization, or records deleted since the previous full synchronization. For more information, see ["Configuring Synchronization Rules" on page 38](#).
7. Define how fields are mapped between the two endpoints. You can also map specific field values in one endpoint to fields values in the other endpoint. For more information, see ["Creating Field Mappings" on page 41](#).
8. Run an integrity check to verify the settings and mappings for the link. For information on

integrity checks, see ["Integrity Checks" on page 19](#). For information on running an integrity check, see ["Running Link Tasks Manually" on page 67](#).

9. Save the link by clicking the **Save**  button. Click **Yes** to confirm. This saves the link and converts it to read-only mode. To edit the link configuration again, click the **Edit**  button.

After you have defined a synchronization link, you can run tasks on it to synchronize data between ALM and another endpoint. For more information on running synchronization link tasks, see ["Running Link Tasks" on page 65](#).

## Creating Links

Synchronizer provides a wizard that enables you to create a link. For each link, you assign a name and description, and define its two endpoints. One endpoint is always an ALM instance. The other endpoint is the project in the application you want to synchronize. You also define which type of entity to synchronize in each endpoint, such as defects or requirements. Each link can synchronize only one entity type in each endpoint. The entity types you choose determine which fields are available for synchronization in each endpoint, based on the database schema for the types in their endpoints.

You can create only one synchronization link between the same entity types in the same two endpoints, and each synchronization link must be unique. The uniqueness of a link is defined by its connection data. This means that you can create as many links as needed to one ALM project, as long as the other endpoints are all unique.



### Example:

```
ALM/MyProject <---> RequisitePro/Project_A
```

```
ALM/MyProject <---> RequisitePro/Project_B
```


In this example, the pair of endpoints for each link are unique, so you can create these synchronization links.

If you then try to create another synchronization link using

```
ALM/MyProject <---> RequisitePro/Project_B
```

as endpoints, the link creation fails because the projects in both endpoints are already paired in an existing link.

To start creating a link using the wizard:

1. **Prerequisite for working with TFS:** Before you create a link between ALM requirements and TFS work items, you must configure several parameters. For details, see ["Requirement Synchronization with TFS" on page 106](#).
2. Select **Link > Create** or click the **Create Link**  button. The Create Link wizard opens to the General Properties dialog box.


The wizard contains the following pages:

<b>Specify general settings</b>	For details, see <a href="#">"Setting General Link Properties" below</a> .
<b>Specify connection properties for the ALM endpoint</b>	For details, see <a href="#">"Setting ALM Endpoint Connection Properties" on the next page</a> .
<b>Specify connection properties for the other endpoint</b>	For details, see <a href="#">"Setting the Other Endpoint's Connection Properties" on page 30</a> .
<b>Specify endpoint types</b>	For details, see <a href="#">"Setting Entity Types for Both Endpoints" on page 30</a> .

## Setting General Link Properties

This wizard page enables you to set general properties for the link.

To set general link properties:

1. Select **Link > Create** or click the **Create Link**  button. The Create Link wizard opens to the General Properties dialog box.
2. Define the general link properties:
  - a. In the **Link name** box, type a name for the link.
  - b. In the **Description** box, type a description for the link.
  - c. In the **Endpoint 1 type** box, select either **Micro-Focus-ALM-REST** or **Micro-Focus-ALM** as your endpoint.
  - d. In the **Endpoint 2 type** box, select the application you want to synchronize with ALM.
3. Click **Next**. The ALM Endpoint dialog box opens. For details, see ["Setting ALM Endpoint Connection Properties" on the next page](#).

## Setting ALM Endpoint Connection Properties

This wizard page enables you to set connection properties for the ALM endpoint.

To set connection properties for the ALM endpoint:

- After setting general link properties, the wizard opens the ALM Endpoint dialog box:  
 Specify connection settings for the ALM endpoint doing one of the following:
  - Specify settings directly in the grid, and proceed to step 2
  - Specify settings directly using the ALM Connection dialog box, and proceed to step 3  
 For details on using the ALM Connection dialog box, see ["Connecting to ALM While Creating a Link" on the next page](#).
- Enter the connection settings for the ALM project:

<b>Authentication Mode: User Name/Password</b>	<p><b>For ALM 11.xx - ALM 15.00:</b></p> <ul style="list-style-type: none"> <li><b>User name:</b> The user name for an ALM user. This user must have create, modify, and delete permissions for the entity being synchronized (defect or requirement) in the ALM project.</li> <li><b>Password:</b> The password for the user you specified.</li> </ul> <p><b>For ALM 14.00 SaaS or ALM 14.00 SaaS Patch 1:</b></p> <p>No need to enter the <b>user name</b> and <b>password</b>. You only need to enter the <b>Server URL</b>, <b>Project</b>, and <b>Domain</b>. For additional instructions needed for ensuring the ALM Synchronizer can connect to ALM 14.00 SaaS or 14.00 SaaS Patch 1, see the <i>Micro Focus ALM Synchronizer Installation Guide</i>.</p>
<b>Authentication Mode: API Key</b>	<p><b>For ALM 12.60, ALM 15.00, ALM 14.00 SaaS Patch 2 or ALM 14.01 SaaS:</b></p> <ul style="list-style-type: none"> <li><b>Client ID:</b> The client ID generated for the API key authentication.</li> <li><b>Secret:</b> The API key secret generated for the API key authentication.</li> </ul> <p>For more information on generating API keys in ALM, see <a href="#">How to Manage API Keys</a>.</p> <p>For more information on generating API keys in ALM SaaS, see the <b>API Key Management page</b> of the SaaS add-on. The SaaS add-on is available in ALM Site Administration.</p>
<b>Server URL</b>	<p>The URL of the ALM server. For example, <code>http://MyServer:8080/qcbin</code>.</p>

<b>Domain</b>	The domain containing the project whose data you want to synchronize.
<b>Project</b>	The name of the project whose data you want to synchronize.

For more details on ALM servers, domains, and projects, refer to the *Micro Focus Application Lifecycle Management Administrator Guide*.

3. To verify the connection to the ALM project, click the **Check Connectivity** button. For example, you may want to test the connectivity to several projects before finalizing a project for this link. If Synchronizer is able to connect to the project, a confirmation message displays.

**Tip:** If you encounter problems connecting to an endpoint, refer to the *Micro Focus ALM Synchronizer Installation Guide* for troubleshooting suggestions.

4. Click **Next**. Synchronizer tries to connect to the ALM project and retrieve the available entity types. If successful, the <Endpoint Application> Endpoint dialog box opens. For details, see ["Setting the Other Endpoint's Connection Properties" on the next page](#).

## Connecting to ALM While Creating a Link

The ALM Connection dialog box enables you to specify ALM connection settings while creating a link. This dialog box also enables you to select a project from the list of available domains and projects.

To connect to ALM:

1. When running the Create Link wizard, In the ALM Endpoint dialog box, click **Set Connection**. The ALM Connection dialog box opens.

**Note:** This dialog box is available only if both the ALM client and the Synchronizer client are installed on the same machine.

2. In the **Server URL** box, type the URL for the ALM server in the following format: **http://<ALM server name>[<:port number>]/qcbn**. Click **Connect**. The Authenticate User options are enabled.
3. In the **Login Name** box, type the user name for an ALM user. This user must have create, modify, and delete permissions for the entity being synchronized (defect or requirement) in the ALM project.
4. In the **Password** box, type the ALM password for the user. Click **Authenticate**. The Log in to Project options are enabled.
5. In the **Domain** and **Project** boxes, select the domain and project whose data you want to synchronize.
6. Click **OK** to close the ALM Connection dialog box.

For more details on ALM servers, domains, and projects, refer to the *Micro Focus Application Lifecycle Management Administrator Guide*.

## Setting the Other Endpoint's Connection Properties

This wizard page enables you to set connection properties for the second endpoint.

To set connection properties for the second endpoint:

1. After setting the ALM endpoint connection properties, the wizard opens the <Endpoint Application> Endpoint dialog box:
2. Enter the connection settings for the endpoint you want to synchronize with ALM. The settings available depend on which type of endpoint you are working with. For details on the settings available for a particular endpoint, see:
  - ["RequisitePro Connection Properties" on page 99.](#)
  - ["ClearQuest Connection Properties" on page 97.](#)
  - ["TFS Connection Properties" on page 105](#)
  - ["JIRA Connection Properties" on page 87](#)
  - For ALM connection settings, refer to ["Setting ALM Endpoint Connection Properties" on page 28.](#)
3. Click the **Check Connectivity** button if you want to verify the connection to the project in the application you are synchronizing with the ALM entities. For example, you may want to test the connectivity to several projects before finalizing a project for this link. If Synchronizer can connect to the project, a confirmation message displays.
4. Click **Next**. Synchronizer tries to connect to the endpoint project and retrieve the available record entity types. If successful, the Entity Types dialog box opens. For details, see ["Setting Entity Types for Both Endpoints" below.](#)


## Setting Entity Types for Both Endpoints

This wizard page enables you to set the entity types (requirements, defects) for each endpoint.

To set entity types:

1. After setting the other endpoint's connection properties, the wizard opens the Entity Types dialog box:
2. In the **Entity 1** and **Entity 2** boxes, select the entity types you want to synchronize.
  - For more details on selecting TFS entity types for requirement synchronization, see ["Requirement Synchronization with TFS" on page 106.](#)
  - For more details on selecting JIRA entity types for synchronization, see ["Guidelines for Working with JIRA" on page 83.](#)
3. Click **Finish**. A message box opens, prompting you to select one of the following options:

- Click **Yes** to begin configuring the link. For more information, see "[Setting Link Properties](#)" below.
- Click **No** to open the link in read-only mode.

**Tip:** If you choose to open the link in read-only mode, you can edit the link later by clicking the **Edit**  button .


## Setting Link Properties

After you have defined the link name, description, and endpoints, you define the basic properties for the link.

To set properties for a link:

1. Create the link and define its connection settings as described in "[Creating Links](#)" on page 26.
2. In the Links list, select the link you created. The **General** tab is displayed.

**Note:** The tabs displayed in the Link Details pane vary depending on which type of entity you are working with.

3. Review the link details. To edit or set additional link properties, click the **Edit**  button. For more information on editing links, see "[Editing Synchronization Link Settings](#)" on page 72.  
Under **General Details**, you can edit the following fields:
  - In the **Link name** box, edit the name of the link.
  - In the **Link description** box, edit the description of the link.
4. Under **Endpoint 1** and **Endpoint 2**, in the **Name** box, you can edit the name for the endpoint. Synchronizer displays this name to identify the endpoint in the other tabs and in reports for the link.
5. Click the **Connectivity** tab.
6. You can edit the settings used to connect to each endpoint. This is useful, for example, if the logon credentials change. For more information on these settings, see "[Creating Links](#)" on page 26.
7. To check the connection to an endpoint, click the **Check Connectivity** button for the endpoint. If Synchronizer can connect to the endpoint, a confirmation message displays.
8. If you are synchronizing requirements, you can specify an alternate root folder for synchronization under the ALM requirements tree. Select **Use alternate root folder** and enter the path of the root folder you want to synchronize.

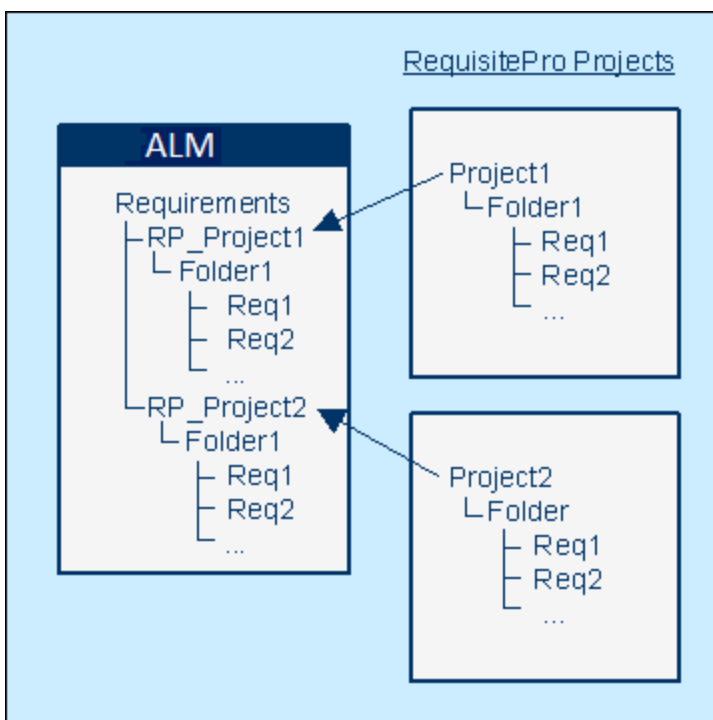
**Caution:** Specifying an alternate root folder can cause unexpected behavior. Review ["Guidelines for Defining an Alternate Root Folder in ALM"](#) below before specifying an alternate root folder.

9. You can now define the scheduling options for the link, including how and when you want to run tasks for the link. For more information, see ["Setting Scheduling Options" on the next page](#).

## Guidelines for Defining an Alternate Root Folder in ALM

By default, Synchronizer synchronizes all requirements in the ALM Requirements root folder.

You can specify an alternate root folder if you want to synchronize only a subset of the requirements in your ALM project. For example, you may want to synchronize multiple projects from the RequisitePro endpoint to different folders in one ALM project, as shown in the following illustration.



In the example above, the requirements in the RequisitePro endpoint's **Project 2** are synchronized with the requirements in the ALM **RP\_Project 2** folder instead of the **Requirements** folder.

Consider the following when specifying an alternate root folder.

- The path you specify must replicate the exact hierarchy in ALM. For example: **Requirements\MyProject** (Note that **Requirements** is already defined for you in the dialog)



box.)



**Tip:** You can copy/paste each folder name to ensure exact spelling.

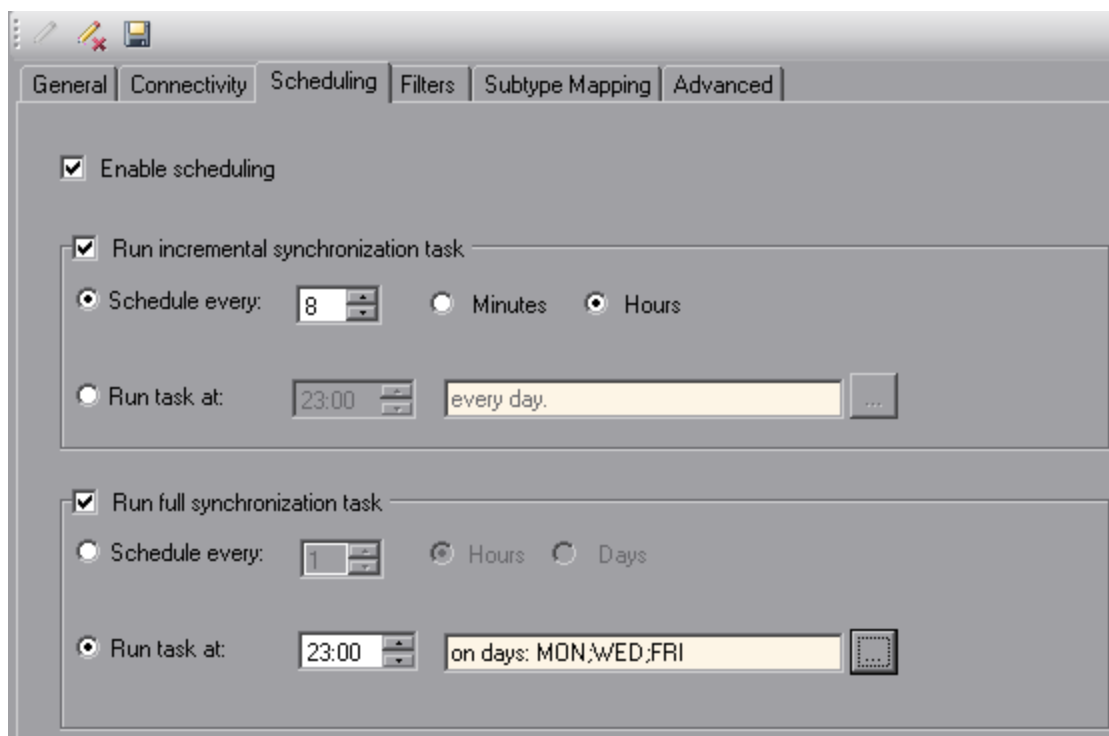
- The path of the alternate root folder must be completely different from the path of any other link. For example, if you specify an alternate folder for one link, you can specify a sibling folder for a different link.
- If you want to reorganize the requirements in the Requirements module after one or more synchronization tasks are performed, carefully **move** requirements while **retaining** the same hierarchy, instead of deleting requirements and creating new ones. Synchronizer synchronizes ALM requirements according to their ALM ID. Moving the requirements maintains the requirement ID and helps prevent requirements from being added or deleted during a synchronization task.

## Setting Scheduling Options

After you define the general properties for a link, you determine its scheduling options. If you do not determine scheduling options for a link, link tasks do not run automatically and you must run these tasks manually from the Synchronizer client.

To set scheduling options for a link:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. Click the **Scheduling** tab.



3. Select **Enable scheduling** to enable scheduling of link tasks.
4. Select **Run incremental synchronization task** to run incremental synchronization tasks automatically for the link. For more information on incremental synchronization tasks, see "Incremental Synchronization" on page 1.

The following options are available:

- **Schedule every.** Runs incremental synchronization tasks for the link at the specified time interval. The time interval can be specified in minutes or hours. The first time interval starts when you start the Synchronizer server. By default, the time interval is set to 30 minutes for defect synchronization, and 8 hours for requirement synchronization.

**Note:** You cannot schedule an incremental synchronization to run more frequently than five minutes.

- **Run task at.** Runs incremental synchronization tasks on the link at the specified time each day. By default, tasks run every day.

Click the browse button to open the Days of Week dialog box, and select specific days of the week to run the task. On these days, the tasks will run at the time you specified in the **Run task at** option.

5. Select **Run full synchronization task** to run full synchronization tasks automatically for the link. For more information on full synchronization tasks, see "Full Synchronizations" on page 1. The following options are available:

- **Schedule every.** Runs full synchronization tasks for the link at the specified time interval. The time interval can be specified in hours or days. The first time interval starts when you start the Synchronizer server.

**Note:** You cannot schedule a full synchronization to run more frequently than every hour.

- **Run task at.** Runs full synchronization tasks on the link at the specified time each day. By default, tasks run every day.

Click the browse button to open the Days of Week dialog box, and select specific days of the week to run the task. On these days, the tasks will run at the time you specified in the **Run task at** option. For an illustration of the Days of Week dialog box, see step 4 above.

6. You can now define the filters for the link. For more information, see "[Setting Filter Options](#)" below.

## Setting Filter Options

After you define the general properties for a link and its scheduling options, you can define filters to be used during synchronization. You can select a filter for each endpoint from the list of filters that exist in the endpoint.

When Synchronizer looks for new records that have been created in the endpoints since the last synchronization, it includes only records that match the selected filters. Records that have already been mapped are always synchronized, even if the filter for the endpoint changes or if they no longer match the filter.

**Note:** Synchronizer does not automatically refresh the list of filters displayed, as this may take some time. To display the current list of filters available in the endpoints, in the **Filters** tab, click **Refresh Filter Lists**. This refresh process also refreshes the endpoint field schemas that are displayed in the Field Mapping tab.

### To set filters for a defect synchronization link:

1. Verify that you are working in edit mode. For more information, see "[Editing Synchronization Link Settings](#)" on page 72.
2. Click the **Filters** tab. The filter options are displayed, according to the entity type you are synchronizing.
3. For defect synchronization, the Filters tab displays the following filter options.  
For each endpoint, select one of the following options:

- **No filter.** All records are considered for synchronization.
- **Use filter (for creation events).** Select a filter from the list. Only records that match the selected filter are considered for synchronization.

**JIRA:** You can select from filters stored on JIRA that are marked as "Favorites." Only those queries related to the project and the issue types you selected for the synchronization link are displayed.

**Note:** This option is enabled only if there are filters in the endpoint available to the user defined in the link.

4. You can now define which types of changes to data in the endpoints are synchronized. For more information, see ["Configuring Synchronization Rules" on page 38](#).

### To set filters for a requirement synchronization link:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. Click the **Filters** tab. The filter options are displayed, according to the entity type you are synchronizing.
3. For requirement synchronization, the Filters tab displays the following filter options.

For each endpoint, select one of the following options:

- **No filters.** All records are considered for synchronization.
- **Use filters (for creation events).** Records that match any of the selected filters are considered for synchronization. Note that selected filters apply only to the project and the requirement type with which they are associated.

**Note:** This option is enabled only there are filters in the endpoint available to the user defined in the link.

- To add a filter, click the **Add** button. In the Add Filter dialog box, select the filter and click **OK**. The filter is added to the list. To add an additional filter, click the **Add** button.
  - To remove a filter, select the filter from the list and click the **Remove** button.
4. You can now define mappings between requirement types in the endpoints. For more information, see ["Creating Requirement Type Mappings" on the next page](#).

## Creating Requirement Type Mappings


When synchronizing requirements, you create mappings between requirement types in each endpoint. For example, you might map the Functional requirement type in ALM to the Functional requirement type in RequisitePro.

Consider the following points when creating requirement type mappings:

- Each requirement type in an endpoint can be mapped only once to a requirement type in the other endpoint. Records for requirement types that are not mapped are not synchronized.
- For each requirement type mapping, new requirements created in one endpoint only are synchronized. For more information, see ["Configuring Rules for Requirement Synchronization" on page 39](#).
- Folders are automatically mapped if they contain a requirement type that is mapped. They cannot be configured.

For more information on synchronizing requirements between ALM and another endpoint, refer to the appropriate appendix for that endpoint.

To create requirement type mappings for a link:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. Click the **Subtype Mapping** tab.
3. In each of the endpoint-type panes on the left, select one requirement type that you want to map. In the example above, Functional and Functional are selected.
4. Click **Add Mapping** to create the requirement type mapping between the endpoints. The new mapping is displayed in the Mapped Subtypes box.
5. To create additional requirement type mappings, repeat steps 3 through 4.
6. To delete a requirement type mapping, under **Mapped Subtypes**, select the mapping and click the **Delete**  button.

**Note:** Deleting a requirement type mapping deletes all associated link data for the requirement type's records in both endpoints. For additional important information, see ["Deleting Synchronization Links" on page 75](#).

7. You can now define which types of changes to data are synchronized in the endpoints. For more information, see ["Configuring Synchronization Rules" on the next page](#).

## Configuring Synchronization Rules

You configure synchronization rules to direct Synchronizer how to handle the creation, update, and deletion of records in the endpoints. This section includes:

- ["Configuring Rules for Defect Synchronization" below](#)
- ["Configuring Rules for Requirement Synchronization" on the next page](#)

### Configuring Rules for Defect Synchronization

After you define basic properties for the link, and set scheduling and filter options, you define which type of synchronization is performed on each endpoint.

To configure rules for defect synchronization:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).

2. Click the **Rules** tab.

3. For each endpoint, under **Creation**, select how to handle records created in the endpoint.

The following options are available:

- **Create a corresponding record in the other endpoint.** If a record is created in the endpoint, a corresponding record is created in the other endpoint.
- **Do nothing.** No action is taken in the other endpoint in response to records created in the endpoint.

4. For each endpoint, under **Update**, select how to handle records updated in the endpoint.

The following options are available:

- **Update its corresponding record in the other endpoint.** If a record that was previously synchronized is updated in the endpoint, the corresponding record is updated in the other endpoint.
- **Do nothing.** No action is taken in the other endpoint in response to records updated in the endpoint.

5. For each endpoint, under **Deletion (Full Synchronization Only)**, specify how to handle records deleted in the endpoint.

The following options are available:

- **Do nothing.** No action is taken in the other endpoint in response to records deleted in the endpoint.
- **Delete its corresponding record in the other endpoint.** If a record that was previously synchronized is deleted in the endpoint, Synchronizer deletes the corresponding record in the other endpoint.
- **Recreate based on its corresponding record in the other endpoint.** If a record that was

previously synchronized is deleted in one endpoint, Synchronizer recreates the record based on the data for the corresponding record in the other endpoint.

This option is available only if **Create a corresponding record in the other endpoint** is selected in the other endpoint.

Note that Synchronizer handles deleted records only during full synchronization tasks, and not during incremental synchronization tasks.

6. You can now define how data fields and field values are mapped between the endpoints. For more information, see ["Creating Field Mappings" on page 41](#).

## Configuring Rules for Requirement Synchronization

After you define basic properties for the link, set scheduling and filter options, and create requirement type mappings, you define which type of synchronization is performed on each endpoint.

For each requirement type mapping, one endpoint is selected as master for the synchronization of records. The rules for the master and non-master endpoints are summarized in the following table:

<b>Event</b>	<b>Rules for Master Endpoint</b>	<b>Rules for the Non-master Endpoint</b>
<b>Creation</b>	When a record is created in the master endpoint, a corresponding record is created in the other endpoint.	When a record is created in this endpoint, no action is taken in the other endpoint.
<b>Update</b>	When a record is updated in the master endpoint, its corresponding record in the other endpoint is updated.	When a record is updated in this endpoint, the following options are available: <ul style="list-style-type: none"> <li>• No action is taken in the other endpoint.</li> <li>• The corresponding record in the other endpoint is updated.</li> </ul>
<b>Deletion</b>	When a record is deleted in the master endpoint, the following options are available: <ul style="list-style-type: none"> <li>• No action is taken in the other endpoint.</li> <li>• The corresponding record in the other endpoint is deleted.</li> </ul>	When a record is deleted in this endpoint, the following options are available: <ul style="list-style-type: none"> <li>• No action is taken in the other endpoint.</li> <li>• The record is recreated based on its corresponding record in the other endpoint.</li> </ul>

Synchronizer maintains the hierarchical requirements tree structure during synchronization, based on the master endpoint. Consider the following ways in which Synchronizer handles the parent/child relationship between requirements during synchronization:

- When a new requirement is created in the master endpoint, and the requirement is the child of requirements that were not previously synchronized, the parent requirements are also created in the other endpoint. If a filter is defined, the parent requirements are synchronized even if they do not match the filter.
- If a requirement is moved within the requirements tree of the master endpoint, it is moved accordingly in the other endpoint.
- If you selected an alternate root folder for requirement synchronization in the Connectivity tab, a requirement that you move out of the specified root folder is handled as a deleted requirement.
- If a parent requirement is deleted in the master endpoint, and the option to delete corresponding records in the other endpoint is selected, the parent requirement and all child requirements are deleted in the other endpoint.
- When a deleted parent requirement is recreated in an endpoint, the child requirements are also recreated.

To configure rules for requirement synchronization:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. In the **Subtype Mapping** tab, under **Mapped Subtypes**, select the mapping you want to configure and click **Configure**.  
Alternatively, in the Links list, expand a requirement link, select the requirement type mapping, and click the **Rules** tab.  
The options are displayed.
3. To select a master endpoint, click **Master (controls record creation and deletion)** under the relevant endpoint name. Rules associated with the selection of the master endpoint are set.
4. For the master endpoint, under **Deletion**, select how to handle records deleted in the endpoint. The following options are available:
  - **Do nothing.** No action is taken in the other endpoint in response to records deleted in the endpoint.
  - **Delete its corresponding record in the other endpoint.** If a record that was previously synchronized is deleted in the endpoint, Synchronizer deletes the corresponding record in the other endpoint.
5. For the non-master endpoint, under **Update**, select how to handle records updated in the endpoint. The following options are available:
  - **Update its corresponding record in the other endpoint.** If a record that was previously synchronized is updated in the endpoint, the corresponding record is updated in the other endpoint.



- **Do nothing.** No action is taken in the other endpoint in response to records updated in the endpoint.
6. For the non-master endpoint, under **Deletion**, select how to handle records deleted in the endpoint. The following options are available:
    - **Do nothing. No action is taken in the other endpoint in response to records deleted in the endpoint.**
    - **Recreate based on its corresponding record in the other endpoint.** This option is available only if **Create a corresponding record in the other endpoint** is selected in the other endpoint. When a record that was previously synchronized is deleted in one endpoint, Synchronizer recreates the record based on the data for the corresponding record in the other endpoint.
  7. If your link contains additional requirement type mappings, repeat steps 1 through 6 to configure each mapping.
  8. You can now define how data fields and field values are mapped between the endpoints. For more information, see ["Creating Field Mappings" below](#).

## Creating Field Mappings

After you define which changes to endpoint data are synchronized, you specify which fields are mapped and in which direction they are mapped. For example, you might map a field named Priority in one endpoint to a field named Criticality in the other endpoint.

Field mappings must be defined for each defects link, and for each requirement type mapping of a requirements link.

You can also map specific values for a field in one endpoint to specific values of a field in the other endpoint.

**Note:** Synchronizer does not automatically refresh the list of endpoint fields displayed, as this may take some time. To display the current list of endpoint fields, in the **Field Mapping** tab, click **Refresh Schemas**. This refresh process also retrieves the current list of available endpoint filters displayed in the Filters tab.

This section includes the following topics:

- ["Mapping Endpoint Fields" on the next page](#)
- ["Mapping Field Values" on page 49](#)
- ["Mapping Constant Values" on page 53](#)
- ["Mapping Attachment Fields" on page 54](#)
- ["Mapping Comments \(JIRA Only\)" on page 54](#)
- ["Guidelines for Mapping Release and Cycle Fields" on page 57](#)

## Mapping Endpoint Fields

You map fields between the two endpoints in a synchronization link.

To map endpoint fields for a link:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. Navigate to the **Field Mapping** tab.
  - For a defects link, in the Links list, select the link and click the **Field Mapping** tab.
  - For a requirements link, in the Links list, expand the link, select a requirement type mapping, and click the **Field Mapping** tab.

Alternatively, from the Subtypes Mapping tab, under **Mapped Subtypes**, select a requirement type mapping and click **Configure**.

The field mapping configuration options are displayed.

The top part of the tab lists the fields for the entities being synchronized. Mapped entities are displayed in italics, as shown in the Headline field in this example.


HP-ALM Defect Schema				ClearQuest Defect Schema			
Name	Type	Attributes	Mapped	Name	Type	Attributes	Mapped
Actual Fix Time	Number	RW	No	Attachments	Attachm...	RW	No
Assigned To	User list	RW	No	customer	Single v...	RW	No
Attachments	Attachment	RW	No	customer_severity	Single v...	RW	No
Closed in Version	Single val...	RW	No	Description	String	RW	No
Closing Date	Date	RW	No	<i>Headline</i>	<i>String</i>	<i>RW</i>	<i>Yes</i>
Comments	String	RW	No	id	String	R	No
Defect ID	Number	R	No	Keywords	Multi val...	RW	No
Description	String	RW	No	lock_version	Number	R	No



The following columns are displayed for each field:





Column	Description
<b>Name</b>	The name of the field in the endpoint.

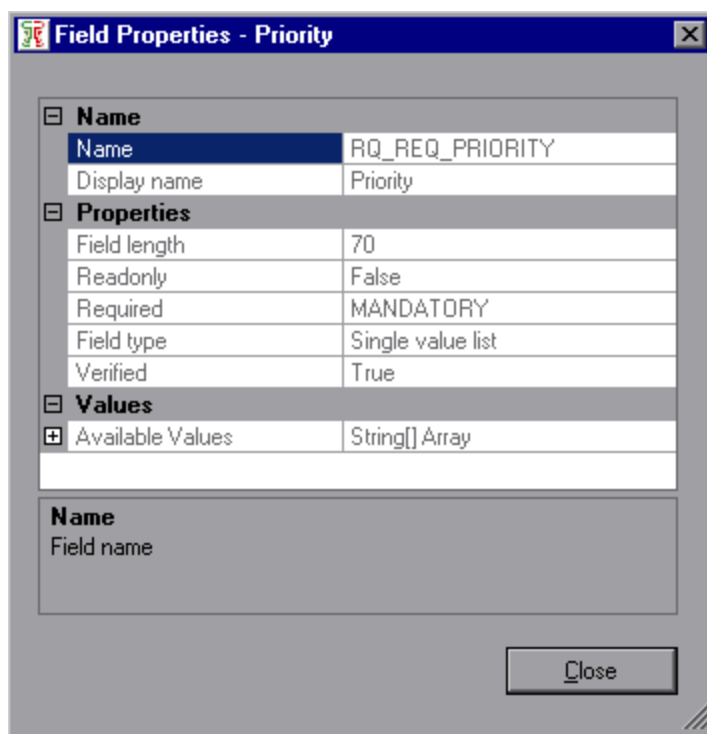
Column	Description
<b>Type</b>	<p>The field type. The following types are available:</p> <p><b>Attachment.</b> The field contains attachments associated with the record. For more information on synchronizing record attachments, see <a href="#">"Mapping Attachment Fields" on page 54.</a></p> <p><b>Date.</b> The field contains a date value.</p> <p><b>Double.</b> The field contains a double-precision, floating point number.</p> <p><b>Memo.</b> The field contains blocks of data.</p> <p><b>Multi value list.</b> The field contains values from a predefined list. The field can contain more than one value from this list.</p> <p><b>Number.</b> The field contains a numerical value.</p> <p><b>Single value list.</b> The field contains a single value from a predefined list.</p> <p><b>String.</b> The field contains string values.</p> <p><b>User list.</b> The field contains a value from a list of users.</p>
<b>Attributes</b>	<p>Indicates whether the field is read-only. You cannot create a mapping to a field that is read-only. The following attribute values are available:</p> <p><b>R.</b> The field can be read but cannot be written to.</p> <p><b>RW.</b> The field can be both read and written to.</p>
<b>Mapped</b>	<p>Indicates whether the field is currently included in a mapping to a field in the other endpoint or a constant value is mapped to the field.</p>

In addition, an icon indicating whether the field is required is displayed adjacent to each field name in the **Name** column. The following table lists the possible options and details on how the level is determined for each field in ALM.

Icon	Level	Description
	<b>Mandatory</b>	<p>The field is mandatory for the endpoint. You must map this field as the destination of a mapping from a field in the other endpoint or map a constant value to the field. A mandatory field that is unmapped causes an error during an integrity check if entity creation is enabled for the endpoint.</p> <p>For an ALM endpoint, a field is <b>Mandatory</b> in Synchronizer if it is a required field in ALM but not given a default value in ALM when a record is created.</p>

Icon	Level	Description
	<b>Recommended</b>	<p>It is strongly recommended that you map this field as the destination of a mapping from a field in the other endpoint, but you are able to run synchronization tasks on the link if you do not create the mapping. A recommended field that is unmapped causes a warning during an integrity check if entity creation is enabled for the endpoint.</p> <p>For an ALM endpoint, a field is <b>Recommended</b> in Synchronizer if it is required in ALM and is given a default value in ALM when a record is created.</p>
	<b>Optional</b>	<p>You do not need to map this field as the destination of a mapping from a field in the other endpoint, but can optionally do so.</p> <p>For an ALM endpoint, a field is <b>Optional</b> in Synchronizer if it is not required in ALM and is not given a default value in ALM when a new record is created.</p>

3. To sort the fields by the data in a particular column, click the column header. Click the column header again to switch between sorting the data in ascending order and sorting the data in descending order.
4. You can filter the fields displayed in the fields list using the filter buttons located above the list of fields:
  - To switch between showing and hiding **Mandatory** fields, click the **Filter mandatory fields**  button.
  - To switch between showing and hiding **Recommended** fields, click the **Filter recommended fields**  button.
  - To switch between showing and hiding **Optional** fields, click the **Filter optional fields**  button.
5. To view the properties for a field, double-click a field, or select a field and click the **View Field Properties**  button. The Field Properties dialog box opens listing the names, values, and descriptions of the field's properties.



Select an item to view its description.

**Note:** Most of these fields can also be viewed in the Field Properties tab described in step 11.

- To import a set of field mappings from an exported XML link configuration file, click the **Import** button. In the Open dialog box, select the XML file from which you want to import the field mappings and click **Open**. The field mappings defined in the XML files are imported. For more information on exporting link configuration files, see ["Exporting and Importing Link Definitions" on page 76](#).

You can also import field mappings from a sample file. Navigate to **<ALM Synchronizer Client directory>\samples** directory, and select the file for the type of endpoint that you are synchronizing with ALM.

- To export a set of field mappings to an XML file, click the **Export** button. In the Save As dialog box, type a file name for the XML file to which you want to export the field mappings and click **Save**.
- To add a mapping between fields in each endpoint, select the field in each endpoint that you want to map and click the **Map Selected Fields** down arrow.

**Note**

**JIRA:** For a list of field types that can be used for mapping when synchronizing with JIRA, see "[JIRA Data Types](#)" on page 88.


Choose the direction of the mapping using one of the following options:

Option	Description
<b>Create bidirectional mapping</b>	Changes made to data in each endpoint are updated in the other endpoint. If you select this option, you must select which endpoint is the dominant endpoint. For more information on selecting the dominant endpoint, see step 10.
<b>Map &lt;ALM Endpoint 1&gt; field to &lt;Destination Application&gt; field</b>	Changes made to data in ALM are updated in the destination application during synchronization, but changes made to data in the destination application are not updated in ALM. <div data-bbox="597 919 1377 1125" style="background-color: #e6f2e6; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Changes to a record in the destination application may be overridden by changes to the corresponding record in ALM, even if the changes in the destination application were made after those in ALM.</p> </div>
<b>Map &lt;Source Application&gt; field to &lt;ALM Endpoint 1&gt; field</b>	Changes made to data in the source application are updated in ALM during synchronization, but changes made to data in ALM are not updated in the source application. <div data-bbox="597 1297 1377 1503" style="background-color: #e6f2e6; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Changes to a record in ALM may be overridden by changes to the corresponding record in the source application, even if the changes in ALM were made after those in the source application.</p> </div>

The mapping between the fields is added to the Mapped Fields list and the value of the Mapped column for the fields changes to **Yes**.

**Example:**

- A field in one endpoint can be mapped to only one field in the other endpoint.
- If you map string fields with different maximum lengths, during synchronization a string value in the source endpoint will be truncated as necessary if it exceeds the

 maximum length of the corresponding field in the destination endpoint.

- To create a field mapping between a string field and a field of type **Number** or **Double**, you must disable the **Require matching field types** property. For more information, see step 10.
- Instead of mapping fields in each endpoint, you can assign a constant value to a field during the creation of new records. For more information, see ["Mapping Constant Values" on page 53](#).
- You can map attachment fields between the endpoints. For more information, see ["Mapping Attachment Fields" on page 54](#).
- For important information on mapping release and cycle fields, see ["Guidelines for Mapping Release and Cycle Fields" on page 57](#).

9. For fields of type **String**, **Single value list**, **Multi value list**, or **User list**, you can map specific field values between the endpoints. For more information, see ["Mapping Field Values" on page 49](#).
10. To edit a field mapping's properties, in the Mapped Fields list, select the mapping and click the **Mapping Properties** tab. Select the property you want to edit, click the down arrow, and select the new value. You can edit the following options:

Option	Description
<b>Direction</b>	The direction in which the synchronization can be performed. The options include: <ul style="list-style-type: none"> <li>• &lt;----&gt;<b>Bidirectional</b></li> <li>• ----&gt; <b>From Endpoint 1 (ALM) to Endpoint 2</b> (the synchronized application)</li> <li>• &lt;---- <b>From Endpoint 2</b> (the synchronized application) <b>to Endpoint 1</b> (ALM)</li> </ul>
<b>Dominant side</b>	<p><b>Relevant for a bidirectional mapping.</b> If changes are made to the same record in both endpoints since the last synchronization, the change made in the dominant endpoint is updated in the other endpoint. By default, Endpoint 1 (ALM) is the dominant endpoint.</p> <p>For example, suppose that since the last synchronization the value for a field in Endpoint 2 was changed to 20 and that the value for the corresponding field in Endpoint 1 was changed to 10. Suppose also that Endpoint 2 is the dominant endpoint. During the next synchronization, Synchronizer will change the value of the field in Endpoint 1 to 20.</p>


Option	Description
<b>Require matching field types</b>	<p><b>Relevant for mapping between String field type and Number or Double field type.</b> To successfully map a <b>String</b> field and a <b>Number</b> or <b>Double</b> field, set this property to <b>No</b>. If this property is set to <b>Yes</b> (default), mapping fields of different field types is not permitted and the integrity check will fail.</p> <p>For example, to map the TFS Original Estimate field, which is a Double field type, you might create a user-defined string field in ALM. When you map these fields, you must disable the <b>Require matching field types</b> property.</p>
<b>Synchronize back on create</b>	<p><b>Relevant for a single directional mapping.</b> If, during synchronization, the destination endpoint creates a value that does not exist in the source endpoint, the new value is sent to source endpoint. This helps to ensure that both endpoints contain exactly the same data.</p> <p>For example, suppose that you created a new record in ALM. During synchronization, that record is added as a new record in the endpoint application, which subsequently generates an ID for the field. Synchronizer recognizes this new value, sends it to ALM, and adds it to the source record.</p>
<b>Value</b>	<p><b>Relevant for a field to which a constant value has been assigned.</b> Displays the assigned value.</p> <p>You can edit the value by typing directly in the box. For a <b>Multi value list</b> field, you can enter several values, separated by semi-colons.                      For example: English;French;Spanish</p> <p>For more information, see "<a href="#">Mapping Constant Values</a>" on page 53.</p>

- To view details for the fields in a mapping, in the Mapped Fields list, select the mapping and click the **Field Properties** tab. The properties for the fields in the mapping are displayed.

Column	Description
<b>Display Name</b>	The field name used in the endpoint's user interface.
<b>Field Length</b>	The length of the field in the endpoint.
<b>Field Type</b>	The field type in the endpoint.
<b>Name</b>	The field name used in the endpoint's database.
<b>Read only</b>	Indicates if the field is a read-only field in the endpoint.
<b>Required</b>	The level assigned to the field.



Column	Description
Verified	Indicates whether the field's values are validated in the endpoint against a fixed list.


- To delete a field mapping, in the Mapped Fields list, select the mapping. In the toolbar above the Mapped Fields list, click the **Delete Field Mapping**  button. Click **Yes** to confirm.
- To check the field mappings you have defined, click the **Check Field Mapping** button. Synchronizer runs a field mapping check. For information on the checks performed on the mappings, see ["Checks Performed on Link Field Mappings" on page 21](#).  
When the field mapping check has run, the Check Field Mapping report opens, displaying a list of errors that will cause the link to fail when run, warnings that may prevent the link running correctly, and other information. Close the report to continue.

**Note:** You must enable a link before you can run synchronization tasks on it. For more information on enabling links, see ["Enabling and Disabling Synchronization Links" on page 74](#).

## Mapping Field Values

For a field of type **String**, **Single value list**, **Multi value list**, or **User list**, you can map specific values for a field in one endpoint to specific values of a field in the other endpoint. For details, see ["Mapping values for a field" on the next page](#).

You can also add an existing value mapping .csv file to your Synchronizer server or create/modify it directly via Synchronizer Client. For details, see ["Mapping values using external .csv files" on page 52](#).

 **Example:** Suppose an ALM field, Priority, has values Low, Medium, High, and Critical, and a field in the synchronized application, Importance, has values 1, 2, 3, and 4. You might map the values Low to 1, Medium to 2, High to 3, and Critical to 4. If the value of the Priority field in ALM changes from Medium to High, Synchronizer updates the value of the corresponding field in the synchronized application from 2 to 3.

**Note:** If you are using JIRA cloud, when mapping field values for a user list field, you can only use the JIRA account ID (instead of username or email address) as the user list field value.

**Note:** If you map multiple values in one endpoint to a single value in the other endpoint,

! only one value can be synchronized back. This can potentially cause data loss. For example, suppose you map the following **Priority** values:

ALM endpoint	Mapping Direction	Other application endpoint
High	<-->	High
Medium	<-->	Medium
Low	-->	Medium

During a synchronization task, a **Priority** value of Low in ALM will be converted to Medium in the other endpoint. When that same record is synchronized back to ALM, the **Priority** value will be set to Medium, resulting in the loss of the original Low **Priority** value.

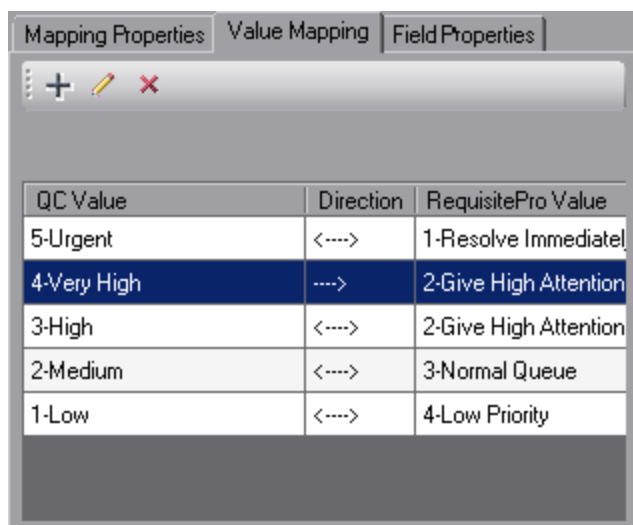
This section includes:

- ["Mapping values for a field" below](#)
- ["Mapping values using external .csv files" on page 52](#)
- ["Defining default user mapping \(ALM and JIRA endpoints\)" on page 52](#)


### Mapping values for a field

1. Select the link and verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72.](#)

- In the Field Mapping tab, in the Mapped Fields list, select the field mapping for which you want to map field values. Click the **Value Mapping** tab. The Value mapping tab displays the field values currently mapped.





QC Value	Direction	RequisitePro Value
5-Urgent	<---->	1-Resolve Immediately
4-Very High	---->	2-Give High Attention
3-High	<---->	2-Give High Attention
2-Medium	<---->	3-Normal Queue
1-Low	<---->	4-Low Priority

- Click the **Add Value Mapping**  button. The Add Value Mapping dialog box opens.
- In the **Endpoint 1 Value** box, select or type the value from Endpoint 1 you want to include in the field value mapping.
- In the **Endpoint 2 Value** box, select or type the value from Endpoint 2 you want to include in the field value mapping.
- In the **Direction** box, select the direction for the field value mapping. The following options are available:
  - <---->**. Occurrences of the value in the **Endpoint 1 Value** box are mapped to the value in the **Endpoint 2 Value** box. Occurrences of the value in the **Endpoint 2 Value** box are mapped to the value in the **Endpoint 1 Value** box.
  - >**. Occurrences of the value in the **Endpoint 1 Value** box are mapped to the value in the **Endpoint 2 Value** box, but occurrences of the value in the **Endpoint 2 Value** box are not mapped to the value in the **Endpoint 1 Value** box.
  - <----**. Occurrences of the value in the **Endpoint 2 Value** box are mapped to the value in the **Endpoint 1 Value** box, but occurrences of the value in the **Endpoint 1 Value** box are not mapped to the value in the **Endpoint 2 Value** box.

Click **OK**.

**Note:** You can map one or more field values in the source endpoint to a single field value in the destination endpoint, but not vice versa.

- To edit a mapping between field values, select the mapping and click the **Edit Value Mapping**  button. In the Add Value Mapping dialog box, edit the mapping and click **OK**.

8. To remove a mapping between field values, select the mapping and click the **Delete Value Mapping**  button.

## Mapping values using external .csv files

When using external files for mapping, note the following:

- Mapping files are stored in the Synchronizer server installation directory: `\dat\Mappings\*.csv`.
- The format of the .csv file is simple and can be easily changed manually:  
**1st value,[<][>],2nd value.**
- Mapping files are reloaded every sync and there is no need to change the link itself – only the file.
- When you already have files in the Mappings directory, you can assign them directly from the **Mapping Properties** tab. New files will appear in a dropdown after you reconnect to the Synchronizer server from your client.

### To map values using external .csv files:

1. In the **Field Mapping** tab, under the **Mapped Fields** pane, select a field mapping.
2. Under the **Mapping Properties** sub-tab, change the mapping method to **File**.
3. Under the **Value Mapping** sub-tab, click the **Add Value Mapping** button (+).
4. Use the **Value Mapping** dialog box to load existing mapping files, create new ones, add or remove value pairs, save changes, and assign mapping files to the current field.

## Defining default user mapping (ALM and JIRA endpoints)

You can also define default user mapping, whereby all values from one side that are not mapped explicitly will be mapped to the default value.

**Note:** Default user is not supported when the **Synchronize back on create** option (in the Mapping Properties tab) is set to **Yes**.

### To define default user mapping:

1. In the **Field Mapping** tab, under the **Mapped Fields** pane, select a user field mapping.
2. Under the **Value Mapping** sub-tab, click the **Add Value Mapping** button (+). The Value Mapping dialog box opens.
3. Changing the default user value may cause the link to fail when synchronizing it, therefore when modifying the mapping of a default user, a warning message is displayed when clicking the **Set as mapping** button.



**Example:** If you want to change a default user, for instance, change the default user of **Endpoint 2** from **A** to **B**, and you have already synced some entities from **Endpoint 1** to



**Endpoint 2** using the default user, perform the following steps:

1. Change **<DEFAULT\_USER> <--> A** to **<DEFAULT\_USER> <--> B**. If there are other user mappings to **B**, it is highly suggested to delete these mappings to avoid any possible conflicts.
2. Access the client of **Endpoint 2**, change all user field values from **A** to **B**.
3. Run the synchronization.
4. The user field values in **Endpoint 1** will not be updated.

## Mapping Constant Values

Instead of mapping a field in one endpoint to a field in the other endpoint, you can assign a constant value to a field. This value is assigned to the field when Synchronizer creates new entities. When Synchronizer updates existing entities, the constant value is not assigned to the field, and the existing value is left unchanged. For a field of type **Multi value list**, you can map multiple constant values.



**Example:** Suppose you have a required field in the ALM endpoint, but you do not have a field to map it to in the other endpoint. You can assign a constant value so that the required field is considered to be mapped, and the integrity check for this link can pass.



**Example:** Suppose you want to distinguish between defects created directly in ALM and those created in ALM by Synchronizer. You could create a defects field named Creation Method in ALM and then assign this field the constant value Created by ALM Synchronizer.



**Note:** If you assign a constant value to a string field and the length of the constant value is longer than the maximum length of the string field, Synchronizer truncates the constant value.

To map constant values:

1. Select the link and verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72](#).
2. In the **Field Mapping** tab, in the fields list for the appropriate endpoint, select the field to which you want to map a constant value.
3. Click the **Add Constant Value** button (located above the endpoint schema grid). The Add Constant Value dialog box opens.

4. Type or select the constant value you want to be assigned to the field during record creation.  
For **Multi value list** fields, you can select multiple values from the drop-down list.
5. Click **OK** to close the Add Constant Value dialog box.

## Mapping Attachment Fields

In addition to mapping regular fields between the two endpoints, you can also map attachment fields between the endpoints. When you synchronize an attachment field, both the attachment and its description are synchronized.

Consider the following guidelines when mapping attachment fields:

- You can create only one mapping between attachment fields per link.
- Synchronizer identifies attachments by their file name, and not by their content. Therefore:
  - If you change the file name of an attachment, even if you do not change its content, Synchronizer determines that the original attachment has been deleted and a new attachment added, and synchronizes the attachment fields accordingly.
  - If you have different attachments in each of the endpoints, but they have the same file name, Synchronizer is not able to distinguish between them and considers them as the same attachment.
- For a bidirectional attachment field mapping, if an attachment was updated in both endpoints since the last synchronization, Synchronizer copies the attachment in the non-dominant endpoint to the **conflict\_backup** directory, located under the main ALM Synchronizer directory. It then overwrites the attachment in the non-dominant endpoint with the attachment in the dominant endpoint.
- When deleting an attachment from one endpoint, it is also deleted from the second endpoint. This applies to one directional mapping and for bidirectional mapping, according to the dominant endpoint.

## Mapping Comments (JIRA Only)

In addition to mapping regular fields between the an ALM endpoint and a JIRA endpoint, you can also map comment fields.

Consider the following when synchronizing comments:

- Synchronizer posts comments to endpoints using credentials provided during link creation. Define users for both the ALM and JIRA endpoints with permissions to create comments. Synchronization is performed using these users' permissions.
- Comments can be synchronized using ALM OTA and ALM REST endpoints.
- You can only map the Comments field in ALM with the Comments field in JIRA. You cannot map other user-defined or memo fields in JIRA to the Comments field in ALM.

- Formatting of comments is retained during synchronization (in either direction). The JIRA wiki-style comments can be converted to ALM HTML-style comments, and vice versa.
- Comments added or updated in ALM by using the features such as Insert Image, Font Background Color, Right to Left Text Direction, Increase Indent, Decrease Indent, and Add Attachment Link will not be synchronized to JIRA.

Comments added or updated in JIRA by using the features that are not applicable to ALM, such as style, text format, link, and icon, will be not synchronized to ALM.

- You should only edit comments on the endpoint on which the comments were created. For example, if a comment was created on the ALM endpoint and after synchronization, this same comment is edited on the JIRA endpoint, comments are not updated on the ALM endpoint after synchronizing again.
- Deletion of comments is not completely synchronized.



**Example:**

- If a comment is created on the JIRA endpoint and removed on the ALM endpoint, after the next synchronization, the comment will still exist on the JIRA endpoint.
- Similarly, if subsequently a new comment is added to the JIRA endpoint, and then synchronization is run again, both the original comment and the new comment will exist on the JIRA endpoint.

To make sure deletion of comments synchronizes accurately, make sure to do the following when deleting comments in ALM:

- If the comment you are deleting is the *first* comment or the in the middle of other comments, make sure to delete the comment ID line (with the date stamp), the actual comment text, and the dividing line that follows the comment.
- If the comment you are deleting is the *last* comment after other comments, make sure to delete the dividing line that precedes the comment, the comment ID line (with the date stamp), and the actual comment text.

## Setting Default Values for Required Fields

In a pair of field mapping, if the field in one endpoint is required, and the mapped field in the other endpoint is optional, you can set a default value for the required field. When Synchronizer creates new entities, and if the optional field is empty, the default value is assigned to the required field.

The default values for required fields do not apply when Synchronizer modifies entities or when the mapped optional fields are filled.



**Example:** Suppose the ALM defect field "Detected in Build" is mapped with the JIRA bug



field "Found in Phase". "Detected in Build" is required and "Found in Phase" is optional. When you create a new bug in JIRA leaving "Found in Phase" empty, Synchronizer will assign the default value to "Detected in Build".

You can set default values for required fields in the endpoints such as Micro-Focus-ALM, Micro-Focus-ALM-REST, and JIRA. To set default values for required fields:

1. Set the `ASSIGN_DEFAULT_VALUE_TO_REQUIRED_FIELDS` site parameter to `Y`, and restart the Synchronizer service to make the setting take effect.

For details of this parameter, see [Site Parameters](#).

2. Go to the directory `<ALM_Synchronizer>\adapters\dat\<endpoint>`.
3. Open the `global.default.properties` file. Follow the comment in the file to set default values for required fields.
  - **Supported field types:** All Synchronizer field types except "Attachment", "Date", and "User list".



**Note:**

- To set default values for date fields, see ["Mapping Constant Values" on page 53](#).
- To set default values for user list fields, see [Defining default user mapping \(ALM and JIRA endpoints\)](#).

- If you do not specify any required fields, Synchronizer will assign hard-coded default values to the required fields based on the field types.

Field Type	Hard-coded default value
String Single Value List Memo Comment List	default string value
Number Double	0
Date	<Today's date>
Multi Value List	default multi value list value

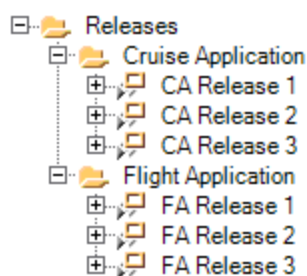


## Guidelines for Mapping Release and Cycle Fields

Consider the following guidelines when mapping release and cycle fields:

- The following ALM release and cycle fields are available for mapping:
  - For requirement synchronization: **Target Release, Target Cycle.**
  - For defect synchronization: **Target Release, Target Cycle, Detected in Release, Detected in Cycle.**
- To map a cycle field, you must also map the corresponding release field. For example, if you map the **Target Cycle** field, you must also map the **Target Release** field.
- Release names must be unique in both endpoints. Unique release names enable Synchronizer to identify releases and cycles. In addition, because other endpoints may not have a hierarchical release and cycle structure, duplicate ALM release names are problematic. If you map release fields, and release names are not unique within an endpoint, an error is written to the log file during a synchronization task run, and the records are not synchronized.

The following example illustrates the use of unique release names in ALM. Suppose you have two release folders in the ALM Releases module named Cruise Application and Flight Application. You can name releases within the folders in the following way:



- If release names are not unique within an endpoint, you can map specific field values to define the full path of the release. For example, you can map each value of the **Target Release** field to a value in a corresponding field in the other endpoint. You define the full path of the ALM release in the format `\<Release_Folder_Name>\<Release_Name>`. For example, `\Flight Application\Release_2`. You do not need to include the root **Releases** folder in the path.

For more information on mapping field values, see ["Mapping Field Values" on page 49](#), or ["Mapping Constant Values" on page 53](#).

## Setting Advanced Link Settings

You can set advanced Synchronizer settings for links, such as:

- Email notifications. For details, see ["Setting Mail Notifications" on the next page](#).
- Setting connection timeout settings (JIRA Only). For details, see ["Setting Connection Timeout \(JIRA Only\)" on page 59](#)
- Adapter parameters. For details, see ["Setting Adapter Parameters" on page 59](#).

- Ignore parent change settings. For details, see ["Ignore Changes to Parent Requirements" on the next page.](#)

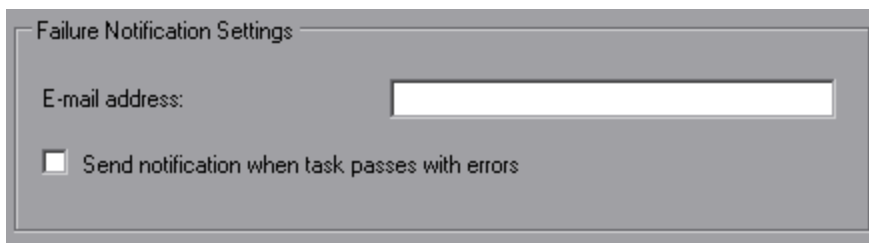
## Setting Mail Notifications

You can instruct Synchronizer to send email notifications for:

- Failed link task runs
- Passed link task runs with errors

To set mail notifications:

1. Verify that you are working in edit mode. For more information, see ["Editing Synchronization Link Settings" on page 72.](#)
2. Select **Tools > Server Options** and specify the email settings. For more information, see ["Configuring the Server Options" on page 79.](#)
3. Click the **Advanced** tab.



Failure Notification Settings

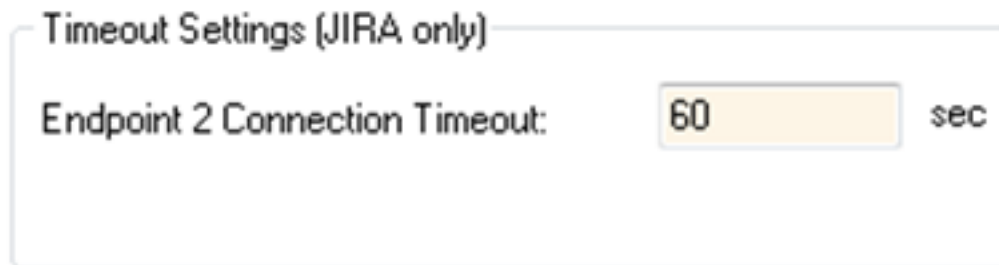
E-mail address:

Send notification when task passes with errors

4. Set the email notification settings:
  - In the **Email address** box, type one or more email addresses to instruct Synchronizer server to send email notifications for failed link task runs (and also for task runs that pass with errors if you select the check box below). Separate email addresses with commas or semicolons. The email notifications are sent according to the email settings defined for the Synchronizer server.
  - Select the **Send notification when task passes with errors** check box to instruct Synchronizer to send an email notification to the email address listed above when a synchronization task passes with errors.

## Setting Connection Timeout (JIRA Only)

When synchronizing requirements or defects, you can set Synchronizer to wait a length of time before a connection to a JIRA endpoint (Endpoint 2) times out. By default, Synchronizer waits 60 seconds.



Timeout Settings (JIRA only)

Endpoint 2 Connection Timeout:  sec

## Setting Adapter Parameters

By default, Synchronizer supports specific connectivity parameters for each adapter type. An **adapter** is the endpoint application to which Synchronizer connects. You can view these connectivity parameters, and the values defined for them, in the Connectivity tab.

If an adapter requires additional parameters, for example, because the adapter was modified, or you are working with an adapter other than the defaults supported by Synchronizer, these additional parameters are displayed in the Advanced tab.

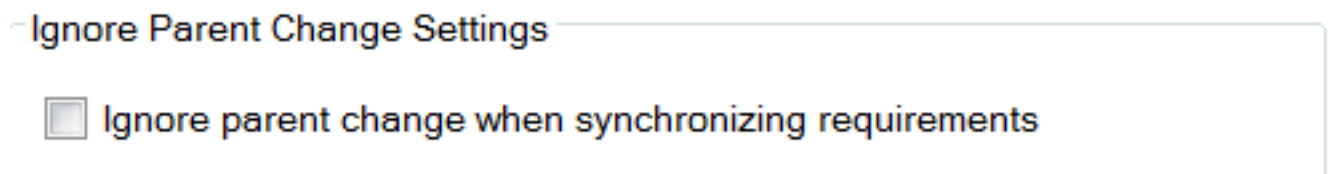
For more information on specific parameters, refer to the appropriate appendix for the endpoint.

To define the value for an adapter parameter:

Click the **Value** cell for the adapter parameter you want to define and enter the parameter value.

## Ignore Changes to Parent Requirements

When synchronizing requirements, you can set Synchronizer to ignore changes made in parent requirements. The changes will be ignored in both master and non-master endpoints.



Ignore Parent Change Settings

Ignore parent change when synchronizing requirements

This option is available for all endpoint types.



# Working with ALM Synchronizer

This chapter describes how to work with ALM Synchronizer. You can run an integrity check to verify configuration settings for a synchronization link. You can also run, configure, enable, disable, and delete synchronization links, and change your Synchronizer password.

This chapter contains the following topics:

- [Viewing Link Details](#) ..... 61
- [Running Link Tasks](#) ..... 65
- [Viewing Task Run History](#) ..... 68
- [Viewing Task Run Reports](#) ..... 69
- [Editing Synchronization Link Settings](#) ..... 72
- [Resetting a Link](#) ..... 73
- [Enabling and Disabling Synchronization Links](#) ..... 74
- [Deleting Synchronization Links](#) ..... 75
- [Automatic Backup of the Synchronizer Database](#) ..... 76
- [Restoring the Synchronizer Database](#) ..... 76
- [Exporting and Importing Link Definitions](#) ..... 76
- [Exporting and Importing Link Data](#) ..... 77
- [Configuring the Synchronizer Options](#) ..... 78
- [Changing Your Password](#) ..... 80

## Viewing Link Details

You can view details for all your synchronization links in a grid. You can also view details for a specific link.

This section contains the following topics:

- ["Viewing Details for All Links" below](#)
- ["Viewing Details for a Specific Link" on the next page](#)
- ["The Link Fields" on page 63](#)

## Viewing Details for All Links

You can view details for all your synchronization links in the Links Grid.


To view details for all links:

1. In the Links list, select the root folder **Links**. The Links Grid is displayed.  
In the left pane, the icon next to each of the links shows its synchronization status (Enabled, Running, Errors, and so on). A tooltip on the icon displays its status.


In the right pane, each row in the Links Grid displays details for a synchronization link. For more information on the fields displayed in the grid, see ["The Link Fields" on the next page](#).

2. To sort the Links Grid by the data in a particular column, click the column header. Click the column header again to switch between sorting the data in ascending order and sorting the data in descending order.

3. To refresh a selected record in the Links Grid, select **Link > Refresh**, or click the **Refresh**

**Selected**  button, or click the down arrow and select **Refresh Selected**. This can be useful as changes to link status that occur due to events in the Synchronizer server, such as an integration check passing successfully, are not automatically updated in the Synchronizer client.

4. To refresh the information in all of the rows in the Links Grid, click the **Refresh Selected** down

 arrow and select **Refresh All**.

## Viewing Details for a Specific Link


You can view details for a specific link.

To view details for a specific link:

1. In the Links list, select a link for which you want to view details. The link's details are displayed in the General tab.

For more information on the fields displayed in the General tab, see ["The Link Fields" on the next page](#).

To view requirement type mappings for a requirements link, expand the link. For more information on mappings between requirement types, see ["Creating Requirement Type Mappings" on page 37](#).

2. To refresh the information displayed in the General tab, click the **Refresh Selected**  button or click the down arrow and select **Refresh Selected**. This can be useful as changes to link status that occur due to events in the Synchronizer server, such as an integration check passing successfully, are not automatically updated in the Synchronizer client.
3. You can view history details of the task runs for the link. For more information, see ["Viewing Task Run History" on page 68](#).

## The Link Fields

The following details are displayed in the Links Grid and the General tab:

Field	Description
<b>AutoMode</b>	Indicates whether the synchronization link is in automatic mode: <ul style="list-style-type: none"> <li>• If the field has value <b>True</b>, the link is in automatic mode and will run automatically at time intervals you specified in the Scheduling tab.</li> <li>• If the field has value <b>False</b>, the link will run only if you manually instruct it to do so. For more information on running links, see <a href="#">"Running Link Tasks" on page 65</a>.</li> </ul>
<b>Endpoint 1</b>	The type of endpoint for Endpoint 1 and the type of entity being synchronized in the endpoint. Possible values are <b>Micro-Focus-ALM:Requirement</b> and <b>Micro-Focus-ALM:Defect</b> .
<b>Endpoint 1 Connectivity Data</b>	Settings for the connection to Endpoint 1. Includes the ALM server, domain, and project with which Synchronizer is synchronizing.
<b>Endpoint 1 Entity Name</b>	The type of entity being synchronized in Endpoint 1. Possible values are <b>Requirement</b> and <b>Defect</b> .
<b>Endpoint 1 Name</b>	The name assigned to the endpoint. By default, this is the endpoint type. For more information on editing the endpoint name, see <a href="#">"Setting Link Properties" on page 31</a> .
<b>Endpoint 1 Type</b>	The type of endpoint for Endpoint 1, which must always be <b>Micro-Focus-ALM</b> .
<b>Endpoint 2</b>	The type of endpoint for Endpoint 2 and the type of entity being synchronized in the endpoint.
<b>Endpoint 2 Connectivity Data</b>	Settings for the connection to Endpoint 2. The information displayed is dependent on the type of endpoint used. For more details on the settings available for a particular endpoint, refer to the appropriate appendix for that endpoint.
<b>Endpoint 2 Connection Timeout</b>	<b>JIRA only:</b> The number of seconds Synchronizer waits before a connection to a JIRA endpoint (Endpoint 2) times out. By default, Synchronizer waits 60 seconds.
<b>Endpoint 2 Entity Name</b>	The type of entity being synchronized in Endpoint 2. Possible values are <b>Requirement</b> and <b>Defect</b> .

Field	Description
<b>Endpoint 2 Name</b>	The name assigned to the endpoint. By default, this is the endpoint type. For more information on editing the endpoint name, see <a href="#">"Setting Link Properties" on page 31</a> .
<b>Endpoint 2 Type</b>	The type of endpoint for Endpoint 2.
<b>ID</b>	A unique identification number assigned by Synchronizer to the link. This number cannot be modified.
<b>IgnoreParentChange</b>	<p>Indicates whether Synchronizer is set to ignore changes made in parent requirements.</p> <p>If the field has value <b>True</b>, the changes will be ignored in both master and non-master endpoints. If the field has value <b>False</b>, the changes will not be ignored.</p> <p>For more details, see <a href="#">"Ignore Changes to Parent Requirements" on page 59</a>.</p>
<b>Last Full Synchronization</b>	The result of the last full synchronization run on the link and the date and time it was run. For more information on running full synchronization, see <a href="#">"Running Link Tasks" on the next page</a> .
<b>Last Incremental Synchronization</b>	The result of the last incremental synchronization run on the link and the date and time it was run. For more information on running incremental synchronization, see <a href="#">"Running Link Tasks" on the next page</a> .
<b>Last Integrity Check</b>	The result of the last integrity check run on the link and the date and time it was run. For more information on running integrity checks, see <a href="#">"Running Link Tasks" on the next page</a> .
<b>Link Description</b>	A description of the link.
<b>Link Name</b>	The name of the link.
<b>Link State</b>	Indicates whether the link is enabled, disabled, or unvalidated. For more information about these states, see <a href="#">"Enabling and Disabling Synchronization Links" on page 74</a> .
<b>Mapped Records</b>	The number of records mapped for synchronization.
<b>Run ID</b>	A unique identification number of the current task run for the link.



Field	Description
<b>Running</b>	Indicates whether a task for the link is currently running: <ul style="list-style-type: none"><li>• If the field has value <b>True</b>, the link is in the middle of a task execution, such as an integrity check, incremental synchronization, or full synchronization. You cannot perform another operation on the link until the first operation has finished running.</li><li>• If the field has value <b>False</b>, no tasks for the link are currently running, and you can perform an operation on the link, provided it is enabled.</li></ul>
<b>State</b>	Indicates whether the link is enabled, disabled, or unvalidated. For more information about these states, see <a href="#">"Enabling and Disabling Synchronization Links" on page 74</a> .
<b>Time Stamp</b>	Indicates the time when the last synchronization on the link was started. This time is used by Synchronizer to determine which records were created or updated since the last synchronization. To manually change this time stamp, see <a href="#">"Resetting a Link" on page 73</a> .

## Running Link Tasks

You can run incremental synchronization tasks and full synchronization tasks in automatic mode, so that the task is run automatically at specified time intervals. Alternatively, you can run a link task manually. For more information on link tasks, see "Incremental Synchronization" on page 1 and "Full Synchronizations" on page 1.

**Note:** When you run a synchronization task, any locked record in an endpoint is not synchronized. You can check the report at the end of a synchronization task run to determine if any records were not synchronized, and why they were not synchronized. If a mapped record was not synchronized because it was locked during the run, you can update it by:

- Running an incremental synchronization task after the record is modified again. For information on incremental synchronization tasks, see "Incremental Synchronization" on page 1.
- Resetting the time stamp. For more information, see ["Resetting a Link" on page 73](#).
- Running a full synchronization task. For information on full synchronization tasks, see "Full Synchronizations" on page 1.

This section contains the following topics:

- ["Running Link Tasks in Automatic Mode" below](#)
- ["Running Link Tasks Manually" on the next page](#)

## Running Link Tasks in Automatic Mode



You can run incremental synchronization tasks and full synchronization tasks in automatic mode. The task is run at time intervals you specify in the Scheduling tab. This is useful when there are regular changes to the data you want to synchronize.

Synchronizer can run only one task at a time for a particular synchronization link. Synchronizer resolves possible conflicts between tasks using the following rules:

- If a task is already running for a link and the scheduled time for a second task of a different type arrives, the second task waits in a queue and runs immediately upon completion of the first task. If the second task is of the same type, for example if they are both incremental synchronization tasks, the second task does not run at all.
- If both an incremental synchronization task and a full synchronization task for the same link are scheduled for the same time, the full synchronization task runs before the incremental synchronization task. The incremental synchronization task enters a queue and runs upon completion of the full synchronization task.

Synchronizer can run one full synchronization task or five incremental synchronization tasks from different links simultaneously. If the scheduled time for an additional task arrives when the maximum number of tasks is already running, the additional task waits in a queue. When a task that is currently running completes, the additional task runs.

To run a link task in automatic mode:

1. Ensure that the link has passed an integrity check. For information on integrity checks, see ["Integrity Checks" on page 19](#). For information on running an integrity check, see ["Running Link Tasks Manually" on the next page](#).
2. Ensure that the task is set to run in automatic mode in the Scheduling tab. For more information on editing configuration settings for a link, see ["Editing Synchronization Link Settings" on page 72](#). For more information on available settings for running tasks automatically, see ["Setting Scheduling Options" on page 33](#).
3. Ensure that the link is enabled. For more information on enabling links, see ["Enabling and Disabling Synchronization Links" on page 74](#).
4. If a task is currently running for a link, a green arrow is added to the link's icon  in the Links list. To verify that the information displayed is current, click the **Refresh Selected**  button or click the down arrow and select **Refresh Selected**.

To monitor the progress of a task that is currently running, in the Links list, right-click the link on which the task is running and click **View Run**. The task's progress is displayed in the

Execution pane. For more information on viewing and managing a task's progress in the Execution pane, see ["Running Link Tasks Manually"](#) below.

## Running Link Tasks Manually

You can run a link task manually.

**Note:** The maximum number of concurrent tasks that can run manually or in automatic mode are as follows:

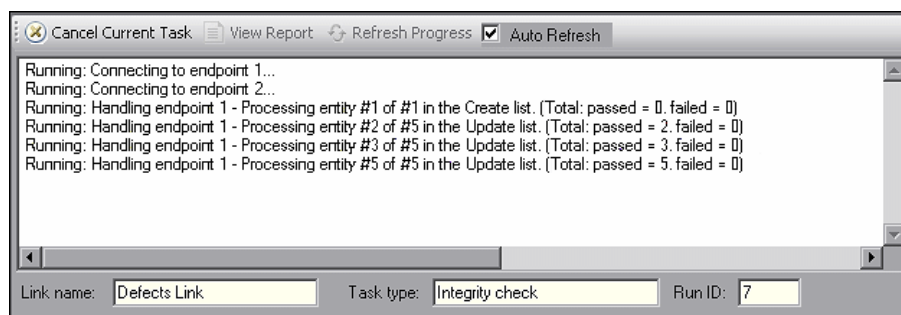
- Only one task can run at a time for a particular synchronization link.
- One full synchronization task or five incremental synchronization tasks from different links can run concurrently.

If the maximum number of tasks are already running, the link task does not run.

To run a link task manually:

1. Ensure that the link is enabled. For more information on enabling links, see ["Enabling and Disabling Synchronization Links"](#) on page 74.
2. In the Links list or Links Grid, perform one of the following actions:
  - To run an integrity check task, select the link on which you want to run the task. Choose **Run Task > Run Integrity Check** or click the **Run** button and choose **Integrity Check**.
  - To run an incremental synchronization task, select the link on which you want to run the task. Choose **Run Task > Run Incremental Synchronization** or click the **Run** button and choose **Incremental Synchronization**.
  - To run a full synchronization task, select the link on which you want to run the task. Choose **Run Task > Run Full Synchronization** or click the **Run** button and choose **Full Synchronization**.

The task starts running in the Execution pane.



3. If the **Auto Refresh** check box is selected, the client periodically samples the information messages generated by the server as the task progresses and displays them in the Execution pane. To prevent the automatic display of these information messages, clear the **Auto**

**Refresh** check box.

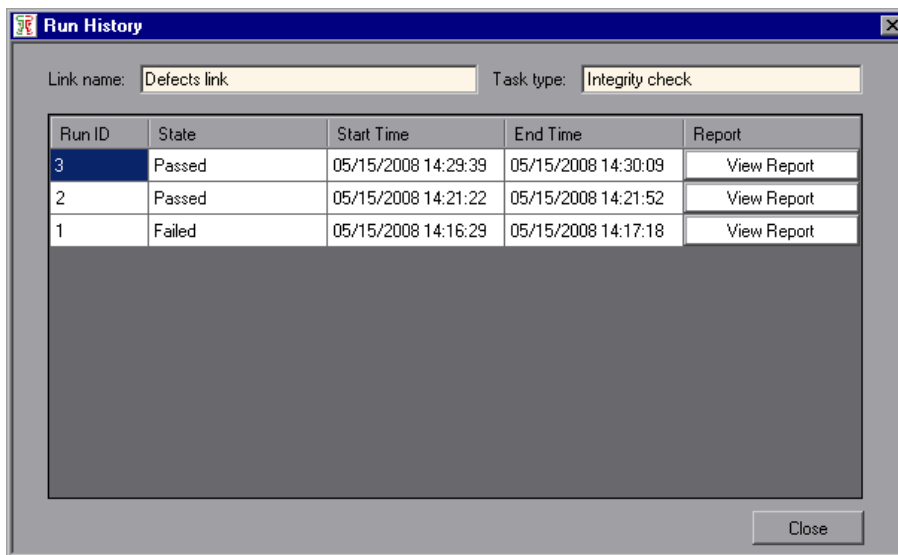
4. If the **Auto Refresh** check box is not selected, you can click the **Refresh Progress** button at any stage during the execution of the task to display the next information message on the task's progress.
5. At any stage during the execution of the task, you can click the **Cancel Current Task** button to cancel the execution of the task.
6. When the task has finished running, you can click the **View Report** button to view a report summarizing the task run. For more information on viewing reports, see "[Viewing Task Run Reports](#)" on the next page.

## Viewing Task Run History

You can view the history of the tasks run for a link. For each task run, you can view a report detailing the progress of the task.

To view task run history:

1. In the Links list, select a link.
2. In the General tab, under **State Details**, click the **Get History** button for the type of task for which you want to view run history. The Run History dialog box opens.



The task run details for the link are displayed in a grid, which contains the following columns:

Column	Description
<b>Run ID</b>	A unique identification number for the task run, assigned by Synchronizer.

Column	Description
<b>State</b>	The final status of the task run. Possible statuses: <ul style="list-style-type: none"><li>• <b>Passed.</b> Either all records synchronized successfully, or there were no changed records to be synchronized.</li><li>• <b>Failed.</b> No records synchronized successfully.</li><li>• <b>Passed with errors.</b> At least one record synchronized successfully. (Not relevant for integrity check task runs.)</li><li>• <b>Error.</b> System error occurred preventing synchronization.</li><li>• <b>Cancelled.</b> User cancelled synchronization task.</li></ul>
<b>Start Time</b>	The date and time at which the task started running.
<b>End Time</b>	The date and time at which the task finished running.
<b>Report</b>	Enables you to view a report for the task run.

3. To view a report for a task run, click the **View Report** button for the task run. For more information on viewing task run reports, see "[Viewing Task Run Reports](#)" below.
4. To sort the grid by the data in a particular column, click the column header. Click the column header again to switch between sorting the data in ascending order and sorting the data in descending order.
5. Click **Close** to close the Run History dialog box.

## Viewing Task Run Reports

You can view a report from a task run for a synchronization link.

To view a task run report:

1. Open the task report using one of the following methods:
  - You can view a report for a task run in the Execution pane. For more information, see "[Running Link Tasks](#)" on page 65.
  - You can also view a report for a previous task run. For more information, see "[Viewing Task Run History](#)" on the previous page.

The task report opens.

The report contains the following details:

Section	Description
<b>Report For Link</b>	The name of the synchronization link for which the task ran.
<b>Status</b>	<p>The final status of the task run.</p> <p>Possible statuses:</p> <ul style="list-style-type: none"> <li>• <b>Passed.</b> Either all records synchronized successfully, or there were no changed records to be synchronized.</li> <li>• <b>Failed.</b> No records synchronized successfully.</li> <li>• <b>Passed with errors.</b> At least one record synchronized successfully. (Not relevant for integrity check task runs.)</li> <li>• <b>Error.</b> System error occurred preventing synchronization.</li> <li>• <b>Cancelled.</b> User cancelled synchronization task.</li> </ul>
<b>Run ID</b>	A unique identification number for the task run, assigned by Synchronizer.
<b>Run Type</b>	The type of link task.
<b>Run Start Time</b>	The time the execution of the task started.
<b>Run End Time</b>	The time the execution of the task finished.
<b>Summary</b>	<p>A summary of the following task run information, dependent on the type of task run:</p> <ul style="list-style-type: none"> <li>• <b>Integrity check.</b> The number of checks passed, passed with warning and failed.</li> <li>• <b>Incremental synchronization and full synchronization.</b> A list of the number of records created, updated, and deleted in each endpoint and the number of records that Synchronizer failed to synchronize.</li> </ul>
<b>Configuration</b>	Basic connection information about the two endpoints in the link.
<b>General checks</b> (integrity check task only)	Lists the general checks performed on each endpoint. For a list of the general checks performed during an integrity check, see <a href="#">"Checks Performed on General Link Settings" on page 20.</a>
<b>Field mapping checks</b> (integrity check task only)	Lists the field mapping checks performed on each endpoint. For a list of the field mapping checks performed during an integrity check, see <a href="#">"Checks Performed on Link Field Mappings" on page 21.</a>

2. To view a log file displaying events processed by the Synchronizer server during the execution of the task, click the **View Log** link in the bottom left corner of the report. The log file for the task run opens. The log file can be useful when tracing errors and problems that occurred during the execution of the task. For each message, Synchronizer displays the following columns:

Column	Description
<b>Time</b>	The time at which the message was generated.
<b>Level</b>	<p>The level of severity of the message. Can have one of the following values:</p> <ul style="list-style-type: none"><li>• <b>ERROR.</b> A warning of a critical problem with the link. If an error occurs during an integrity check, the integrity check fails and you cannot run tasks on the link. If an error occurs during a synchronization task, it may indicate a general problem with the link, in which case the synchronization tasks fails. Alternatively, it may indicate a problem with synchronizing a particular record, in which case the synchronization passes with errors.</li><li>• <b>WARN.</b> A warning of an issue of which you should be aware. If a warning occurs during an integrity check, the integrity check does not fail, so tasks on the link can run, but it may cause unexpected results. If a warning occurs during a synchronization task, it may indicate that the synchronization had unexpected or undesired results.</li><li>• <b>INFO.</b> A message displayed for information only. No action is necessary.</li></ul>
<b>Category</b>	The category of the message.
<b>Message</b>	The text of the message.

3. To filter the events that are displayed in the log file, select an option from the **Filter log level** drop-down box.

**Note:** This feature is available only when JavaScript is enabled.

## Editing Synchronization Link Settings

You can edit the settings for a synchronization link.


**Note:** When you edit the settings for a synchronization link, the link's state is changed to **Unvalidated**. You must enable the link before you can run synchronization tasks on it. For more information on enabling links, see ["Enabling and Disabling Synchronization Links" on page 74](#).



To edit synchronization link settings:



1. In the Links list, select the link and click the **Edit**  button. The link details are made available for editing.

**Note:** When editing link settings, you must save the new settings before you can enable the link. For more information on enabling links, see ["Enabling and Disabling Synchronization Links" on the next page.](#)

2. Edit the configuration settings. A red asterisk next to the link's icon  in the Links list indicates unsaved changes in that link.

**Note:** You can edit more than one link simultaneously.

For more information on configuration settings, see ["Creating Synchronization Links" on page 25.](#)

3. To undo all changes, click the **Discard Changes**  button.
4. To save the new configuration settings, click the **Save**  button. Click **Yes** to confirm. To run the integrity check, click **Yes**.

## Resetting a Link

Each synchronization link in the Synchronizer has an associated time stamp, and each record mapping within a link has a version. The time stamp represents the time the link was last handled by Synchronizer. The version enables Synchronizer to identify the records that can be synchronized.

When Synchronizer runs a synchronization task for a link, it updates the time stamp for the link at the start of the task's execution. In addition, when Synchronizer handles the successful synchronization of a paired record mapping, it adds a record containing the versions of each pair of synchronized records to the database.

Synchronizer uses the time stamp and versions when it determines which records to synchronize. In some circumstances, you may want to override the automatic time stamp and the record version history:


- **Time stamp.** You can override the automatic time stamp and reset the time stamp to a time prior to the last synchronization. This is useful if there were issues with the latest synchronization of some records, and you want to revert to an earlier version of these records so that you can run a synchronization task again.
- **Synchronization history.** You can perform a complete reset to clear both the time stamp and

the version history for the mapped records. This is useful when a field mapping changes, and you want to synchronize the mapped entities as if you created a new link.

Consider carefully the consequences before deciding to reset the time stamp for a link, and which option to use when resetting it.

**Tip:** You can sometimes achieve the same outcome as resetting the link's time stamp by running a full synchronization task. For more information on full synchronization tasks, see Full Synchronizations.

To reset the time stamp for a link or the entire link:

1. In the Links list or Links Grid, select the link and choose **Link > Reset** or click the **Reset Link**  button. The Reset Link dialog box opens.
2. Select one of the following options to reset the link:
  - **Reset to specific time stamp.** The time stamp for the link resets to a time you specify. To specify a date, you can click the down arrow and select from the calendar. You can also manually edit the time and date in the **Reset to specific time stamp** box.
  - **Complete link reset.** Clears all synchronization version history for mapped records in addition to completely resetting the time stamp for this link. Select this option to clear all synchronization history.
3. Click **OK** to close the Reset Link dialog box. The time stamp is reset in the **Time Stamp** field of the Links Grid and General tab.


## Enabling and Disabling Synchronization Links

Each synchronization link can be in one of the following states: **Unvalidated**, **Disabled**, and **Enabled**. The following table lists these states and their descriptions. It also lists under what circumstances the link moves between states.


State	Description	When State Entered	When State Left
<b>Unvalidated</b>	The link's configuration has not been verified. You cannot run tasks for the link.	Upon creation of a new link or modification of the configuration of an existing link.	Upon execution of an integrity check. For more information on running integrity checks, see <a href="#">"Running Link Tasks Manually" on page 67</a> .

State	Description	When State Entered	When State Left
<b>Disabled</b>	The link's configuration has been verified, but you cannot run tasks on the link.	Upon successful completion of an integrity check, or manually from status <b>Enabled</b> .	Manually to status <b>Enabled</b> , or after modification of link configuration to status <b>Unvalidated</b> .
<b>Enabled</b>	The link's configuration has been validated, and you can run tasks on the link.	Manually from status <b>Disabled</b> .	Manually to status <b>Disabled</b> , or after modification of link configuration to status <b>Unvalidated</b> .

### To enable a synchronization link:

1. In the Links list or Links Grid, select the link you want to enable.
2. Make sure that the link is in the state **Disabled**. If the link is in the state **Unvalidated**, you must run an integrity check to change its state to **Disabled**. For more information on running integrity checks, see ["Running Link Tasks Manually" on page 67](#).
3. Click the **Enable Link**  button or choose **Link > Enable**.

### To disable a synchronization link:

1. In the Links list or Links Grid, select the link you want to disable.
2. Click the **Disable Link**  button or choose **Link > Disable**.

## Deleting Synchronization Links

You can delete a link from the Synchronizer database.



**Caution:** Consider carefully before you delete a synchronization link, as deleting links can have unintended consequences. If you create and run a synchronization link, run an updated record synchronization, delete the link, and create the same link again, the next updated record synchronization you perform duplicates the records in both endpoints.

For example, suppose you synchronized your records so that defects Bug 1 and Bug 2 exist in both your ALM project and your other endpoint. After deleting the synchronization link, creating the same link again, and performing another record

synchronization, Bug 1 and Bug 2 will each appear twice in both ALM and the other endpoint.

To delete a synchronization link:

1. In the Links list or Links Grid, select the link you want to delete and choose **Link > Delete**.
2. Click **Yes** to confirm.

## Automatic Backup of the Synchronizer Database

The Synchronizer database is backed up automatically every eight hours. Three previous backup files are maintained and then overwritten as new backups are created.

The backup file is named **qcsync\_db.backup** and is located by default in the **<ALM Synchronizer installation directory>\backup** directory on the Synchronizer server. It is recommended that you back up this directory regularly, or change the default backup location to a network drive that is regularly backed up, in order to ease data restoration in the event of local hard disk failure.

For information on changing the default backup location, see ["Configuring the Server Options" on page 79](#).

## Restoring the Synchronizer Database

You can restore the Synchronizer database from an automatic backup file. For more information on automatic database backup, see ["Automatic Backup of the Synchronizer Database" above](#).

To restore the Synchronizer database from a backup file:

1. Open the Windows command prompt by clicking **Start > Run** and typing cmd. Click **OK**.
2. Navigate to the **<ALM Synchronizer installation directory>\bin** directory, and run the following command line:

```
restore_data.bat <backup filename>
```

where <backup filename> is the backup file you want to restore. By default, the Synchronizer backup files are located in the **<ALM Synchronizer installation directory>\backup** directory on the Synchronizer server.

## Exporting and Importing Link Definitions

You can export the definition of a synchronization link to an XML file. This enables you to reuse configuration settings for existing links when creating new links. Exporting the link definition does not export the identity mapping data for the link. If you want to also export the identity mapping

data, you can export the link data. For more information, see ["Exporting and Importing Link Data" below](#).

You can also export and import only the field mappings from a synchronization link definition. For more information, see ["Creating Field Mappings" on page 41](#).

This section includes the following topics:

- ["Exporting Link Definitions" below](#)
- ["Importing Link Definitions" below](#)

## Exporting Link Definitions

You can export the definition of a synchronization link to an XML file.

To export a link definition:

1. Select **Link > Export > Link Configuration Into XML File**. The Save As dialog box opens.
2. In the Open dialog box, in the **File name** box, type the name of the XML file to which you want to export the link configuration data.
3. Click **Save**. The link configuration data is exported to the XML file you specified.

## Importing Link Definitions

You can import the definition of a synchronization link that has been saved as an XML file.

To import a link definition:

1. Select **Link > Create From > Link Configuration XML File**. The Open dialog box opens.
2. In the Open dialog box, select the XML file that defines the link you want to import.
3. Click **Open**. A new link is created in the Links Grid based on the settings defined in the XML file.

## Exporting and Importing Link Data

You can export the data for a synchronization link to a .zip file. Both the link configuration data and the record identity mapping data are exported as separate files within the .zip file. This enables you to backup link configuration data and identity mappings.

You can also export and import only the field mappings from a synchronization link definition. For more information, see ["Creating Field Mappings" on page 41](#).



**Tip:** To move Synchronizer to a different machine, you can export link data, install Synchronizer on the new machine, and then import the link data to the new machine.

This section includes the following topics:

- ["Exporting Link Data" below](#)
- ["Importing Link Data" below](#)

## Exporting Link Data

You can export link data to a .zip file. The file is named **<link name>.zip** and is located by default in the **<ALM Synchronizer installation directory>\backup** directory on the Synchronizer server. For information on changing this location, see ["Configuring the Server Options" on the next page](#).

**Note:** The name of the exported file is not editable and is based on the name of the link. If you have already backed up data for the link or a link with the same name, exporting link data will overwrite the existing backup file.

To export link data:

Select **Link > Export > Link Data Into Backup File**. The link's configuration data and record identity mapping data are exported.

## Importing Link Data

You can import previously exported link configuration data and record identity mapping data.

To import link data:

1. Select **Link > Create From > Link Backup File**. The Create From Link Backup File dialog box opens.
2. In the **File name** box, select the name of the backup file containing the data you want to import. Link backup files are located in the backup directory on the Synchronizer server. By default, this directory is **<ALM Synchronizer installation directory>\backup**. For information on changing this directory, see ["Configuring the Server Options" on the next page](#).
3. Click the **Submit** button. A new link is created in the Links Grid based on the settings defined in the XML file included in the .zip file. This link also includes the imported identity mapping data.

## Configuring the Synchronizer Options

You can configure the Synchronizer client and server options. This section includes the following topics:

- ["Configuring the Client Options" on the next page](#)
- ["Configuring the Server Options" on the next page](#)

## Configuring the Client Options

You can configure the options for a local Synchronizer client.

To configure the client options:

1. Choose **Tools > Local Client Options**. The Local Client Options dialog box opens.
2. In the **Number of runs to display** box, type the number of runs you want to display when viewing the task run history for a synchronization link.
3. Click **OK**.

## Configuring the Server Options

The Synchronizer administrator can configure the Synchronizer server options.

To configure the server options:

1. Connect to the Synchronizer server using the **admin** user.

**Note:** If you are working with the ALM Synchronizer server by proxy, the user you use to work with the ALM Synchronizer server should have the same settings as the proxy server user, not the local system user.

2. Choose **Tools > Server Options**. The Options For Server dialog box opens.
3. In the **General** tab, under **Run History**, specify the number of days for which you want to keep the history of tasks run for a synchronization link.
4. Under **ALM Settings**, select the ALM version with which you are working.
5. Under **Adapter Settings**, set the following options:
  - Adapter log level.** Select an option to determine which events are written to the Synchronizer server log, located in the **<ALM Synchronizer installation directory>\log** directory. Options include: **DEBUG**, **INFO**, **WARN** (default), **ERROR**, and **FATAL**.
  - Visible adapters.** Specify which adapters are available when selecting an endpoint type during link creation.
6. Under **Server Backup Location**, type the location on the server machine to which you want to save backup data.

**Note:** If you choose to save backup data to a network drive not on the server machine, the user configured to log on as a service must have permissions to write to the specified location. For more information, refer to the *Micro Focus ALM Synchronizer Installation Guide*.

The backup location you specify applies to files created during automatic backup of the Synchronizer database and files created when you export link data manually. For more information on automatic backup of the Synchronizer database, see ["Automatic Backup of the Synchronizer Database" on page 76](#). For more information on exporting link data, see ["Exporting Link Data" on page 78](#).

7. Under **Log Settings**, select **Enable advanced logging** to instruct Synchronizer to store extended log information for each link task run. These log files are not generated by default and can use a significant amount of disk space.

By default, Synchronizer stores details of a task run in a log file that you view from the **Task Run Report**. For more information on the default log, see ["Viewing Task Run Reports" on page 69](#).

If this option is selected, Synchronizer generates an additional log file for each link task that is run. The log files are located in the **<ALM Synchronizer installation directory>\log** directory, and named with the following format: run\_<Run ID>\_link\_<Link ID>.log. For information on locating the Run ID for a task run, see ["Viewing Task Run History" on page 68](#). For information on locating the Link ID for a link, see ["The Link Fields" on page 63](#).

8. Click the **Email** tab. Under **Email Settings**, specify the details of the SMTP mail server you want to use for sending notifications of link task run failures. The following settings are available:
  - **SMTP Server.** The SMTP server host name.
  - **User name.** The user name used to connect to the mail server.
  - **Password.** The password for the user specified to connect to the mail server.
  - **Sender.** The email address for the user from which the mail server sends emails.
  - Click the **Test** button to try sending a test email to an email address. The Test Mail dialog box opens. Enter a valid address and click **Send**.

**Note:** You can determine for each link individually whether to send mail notifications in the case of task run failure. For more information, see ["Setting Mail Notifications" on page 58](#).

9. Click **OK**.

## Changing Your Password

You can change the password you use to log in to the Synchronizer server.

To change the Synchronizer password:

1. In the Synchronizer client, choose **Connection > Change Password**. The Change Password dialog box opens.
2. In the **Old password** box, type the current password.



3. In the **New password** box, type the new password.
4. In the **Retype password** box, retype the new password.
5. Click **OK** to save your new password. A confirmation message displays and the Change Password dialog box closes.



## Working with JIRA

This appendix describes notes and limitations specific to synchronizing requirements between Application Lifecycle Management (ALM) and JIRA issues (including default, customized, and user-defined issue types).

This appendix contains the following topics:

• <a href="#">Guidelines for Working with JIRA</a> .....	83
• <a href="#">Required JIRA Permissions</a> .....	85
• <a href="#">JIRA Connection Properties</a> .....	87
• <a href="#">JIRA Data Types</a> .....	88
• <a href="#">JIRA Hierarchy</a> .....	89
• <a href="#">JIRA Troubleshooting</a> .....	91

## Guidelines for Working with JIRA

Before you begin using Synchronizer with JIRA, make sure that you follow these guidelines to customize your ALM project and JIRA database:

### General

- The Atlassian Cloud version of JIRA (JIRA on Demand) is supported, but HTTPS is required. For details, see information about [running JIRA over SSL or HTTPS](#).
- Basic authentication proxies are supported for HTTP only.

### Localization

Localized JIRA endpoints are not supported.

### Link creation

- Does not support password encryption mechanisms on authentication procedures.
- Supports the SSL protocol. For details, see information about [running JIRA over SSL or HTTPS](#).
- ALM Synchronizer does not make any assumptions on entity types on JIRA. The administrator must manually select the entity type that matches the ALM defect or requirement.

### Entity Types

You can synchronize data between ALM defects, ALM requirements, and JIRA issues, including default, customized, and user-defined issue types.

For defect synchronization, ALM project defects can only be mapped to non-subtask issue types available in the JIRA project.

Unlike ALM defect synchronization, ALM requirements synchronization does allow mapping to the subtask issues in JIRA. There are two possible synchronization modes in this case:

- Just one issue type with its subtypes
- All JIRA issue types, both subtype and non-subtypes

To select the requirement synchronization mode, create a new link and select the entity type in the *Create Link - Step 4 of 4 - Entity Types* dialog window.

If you select the *All issues* entity type, this synchronizes all issue types simultaneously.

All other options have an "*as Requirement*" suffix after the issue type. For example, if you select the *Improvement as Requirement* option, this allows implementation of synchronization of improvement type issues with all subtasks.

## Synchronization

- One-way synchronization of ID fields for various JIRA entities is supported, in the JIRA to ALM direction.
- For defect synchronization, ALM defects can only be mapped to non-subtask issue types in the JIRA project.
- Unlike ALM defect synchronization, ALM requirements synchronization does allow mapping to subtask issues in JIRA. There are two possible synchronization modes in this case:
  - Just one issue type with its subtypes.
  - All JIRA issue types, both subtype and non-subtypes.

To select the requirement synchronization mode, create a new link and select the entity type in the *Create Link - Step 4 of 4 - Entity Types* dialog box.

If you select the *All issues* entity type, this synchronizes all issue types simultaneously.

All other options have an "*as Requirement*" suffix after the issue type.



**Example:** If you select the *Improvement as Requirement* option, this allows implementation of synchronization of improvement type issues with all subtasks.

- JIRA's subtask issues synchronization is available for requirement synchronization only.
- ALM Synchronizer will not create links between ALM and JIRA entities, since they are not supported by the ALM Synchronizer infrastructure. Only children (subtasks) of parent issues with link types available in requirements synchronization mode are linked.
- Subtask synchronization is not supported for defect synchronization.
- For the Memo field (multi-valued formatted text), the JIRA adapter recognizes only the description issue field. Other text fields are recognized as strings.

- The JIRA adapter does not support HTML-to-Wiki format conversion.
- Attaching more than one attachment to an issue with the same name can cause the synchronization process to be interrupted.
- If you map the JIRA issue fields that are non-required and single value, you must also map the empty value on ALM to a valid value from the list on JIRA to avoid synchronization errors.
- If JIRA issues have states marked as non-editable, the synchronization process can have issue field update problems. This is related to attachment managements also. To mitigate this limitation, see ["Procedures to mitigate limitations" on page 91](#).

## Comments

For guidelines on synchronizing comments, see ["Mapping Comments \(JIRA Only\)" on page 54](#).

## Required JIRA Permissions

The following settings are required to connect to a JIRA endpoint. For more information on defining the connection settings to endpoints, see ["Creating Links" on page 26](#).

### JIRA User Permissions

To perform ALM-to-JIRA synchronization, you must have the correct level of permissions on the JIRA application instance.

The JIRA adapter checks your permissions when performing the following processes:

- Connecting to JIRA
- Creating a new link
- Integrity Check procedure

### Connecting to JIRA

To connect to JIRA, the following permissions are required:

<b>Permission name UI</b>	<b>Permission name REST</b>	<b>Description</b>
Browse Projects	BROWSE	Ability to browse projects and the issues within them

<b>Permission name UI</b>	<b>Permission name REST</b>	<b>Description</b>
Browse Users	USER_PICKER	Ability to select a user or group from a pop-up window as well as the ability to use the share issues feature. Users with this permission can also see the names of all users and groups in the system  <b>Note:</b> Browse Users is from the Global JIRA permission list

## Integrity Check Permissions

The following permissions may be required during the Integrity Check procedure:

<b>Permission name UI</b>	<b>Permission name REST</b>	<b>Description</b>
Create issues	CREATE_ISSUE	Ability to create issues
Delete Issues	DELETE_ISSUE	Ability to delete issues
Edit Issues	EDIT_ISSUE	Ability to edit issues
Create Attachments	CREATE_ATTACHMENT	Ability to create attachments
Modify Reporter	MODIFY_REPORTER	Ability to modify the reporter when creating or editing an issue
Delete Own Attachments	ATTACHMENT_DELETE_OWN	Ability to delete your own attachments
Delete All Attachments	ATTACHMENT_DELETE_ALL	Ability to delete all attachments
Resolve Issues	RESOLVE_ISSUE	Ability to resolve and reopen issues, including the ability to set a fix version
Transition Issues	TRANSITION_ISSUE	Ability to transition issues
Close Issues	CLOSE_ISSUE	Ability to close issues. Often useful when developers resolve issues and QA closes them.

## Synchronizing Comments

To create a new JIRA link that synchronizes comments, the following permissions are required:

Permission name UI	Permission name REST	Description
Add Comments	ADD_COMMENTS	Ability to add comments.
Delete Own Comments	DELETE_OWN_COMMENTS	Ability to delete your own comments.
Edit Own Comments	EDIT_OWN_COMMENTS	Ability to edit your own comments.

## Administrative Permissions

The following are administrative permissions:

Permission name UI	Permission name REST	Description
JIRA Administrators	ADMINISTER	Ability to perform most administrative functions (excluding Import & Export, SMTP Configuration, and so on)
Administer Projects	PROJECT_ADMIN	Ability to administer a project in JIRA

## JIRA Connection Properties

The following settings are required to connect to a JIRA endpoint. For more information on defining the connection settings to endpoints, see "[Creating Links](#)" on page 26.

- **User name.** The JIRA user name. This user must have the permissions listed under "[Required JIRA Permissions](#)" on page 85.
- **Password.** The JIRA user password.

**Note:** For an Atlassian Cloud version of JIRA (JIRA on Demand), you generate an API token from your Atlassian account, then copy and paste it to the Password field. For details on how to create an API token, see <https://confluence.atlassian.com/cloud/api-tokens-938839638.html>.

- **JIRA server URL.** The URL of the JIRA server, in the following format: `http://<server name>:<port number>`

**Note:** **JIRA server URL** can contain the URL of an Atlassian Cloud version of JIRA (JIRA on Demand), but HTTPS is required. For details, see information about [running JIRA over SSL or HTTPS](#).

- **JIRA project key.** The JIRA project key (not the project name), containing the data you want to synchronize with ALM.
- **Proxy host.** The forward proxy host address (can be an IP address or a domain).
- **Proxy port.** The forward proxy port.
- **Proxy user.** The name of the user for authentication on the forward proxy. If blank, basic forward proxy authentication is not enabled. Non-authenticated forward proxies are still enabled.
- **Proxy password.** The user proxy password. The password can be edited.

**Note:** The password is encrypted automatically, so after refreshing (or during link configuration on a client), only the encrypted value is displayed. To change the password, enter a new password in the dialog box again.

**Proxy host** and **Proxy port** are available if Synchronizer is configured for JIRA to work with non-authenticated forward proxies.

**Proxy host**, **Proxy port**, **Proxy user**, and **Proxy password** are available if Synchronizer is configured for JIRA to work with forward proxies.

For details, see information about enabling forward proxy support for JIRA endpoints in the *Synchronizer Installation Guide*.

## JIRA Data Types

### Data Types

Default and custom data types are not supported by the adapter.

### Field Types

The following JIRA field data types are available for synchronization:

<b>JIRA field type</b>	<b>Field type displayed in Synchronizer field mapping</b>
attachment	<b>Attachment</b>



<b>JIRA field type</b>	<b>Field type displayed in Synchronizer field mapping</b>
comment	<b>Comments list</b>
date	<b>Date</b>
datetime	<b>Date</b>
issuetype	<b>Single value list</b> with the list of values available for mapping
number	<b>Double</b>
priority	<b>Single value list</b> with the list of values available for mapping
project	<b>Single value list</b>
resolution	<b>Single value list</b> with the list of values available for mapping
securitylevel	<b>Single value list</b> with the list of values available for mapping
sprint	<b>Single value list</b> with the list of values available for mapping
status	<b>Single value list</b> with the list of values available for mapping
string	<b>String</b> or <b>Single value list</b> . If the issue field has a list of allowed or suggested values attached, the field is defined as <b>Single value list</b> with the list of values available for mapping
user	<b>User list</b>

## JIRA Hierarchy

Synchronizer only supports a two-level hierarchy in JIRA. The sub-task type must be set in level-2, all other requirement types must be set in level-1.

JIRA can be set as a master or a non-master endpoint. In the following example, the sub-tasks (**sub-task-child1** and **sub-task-child2**) are set in level-2, a non sub-task type (**epic-parent**) is set in level-1.

The screenshot shows a JIRA epic page for 'test / TEST-157' with the title 'epic-parent'. The page includes a header with navigation buttons: Edit, Comment, Assign, More, To Do, In Progress, Workflow, and Admin. Below the header is the 'Details' section with the following information:

Type:	Epic	Status:	TO DO (View Workflow)
Priority:	Medium	Resolution:	Unresolved
Labels:	None		
Epic Name:	epic		

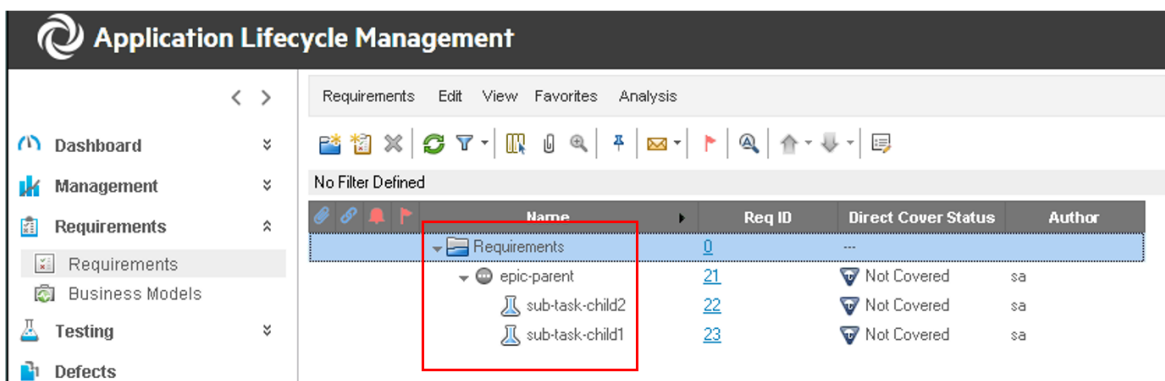
The 'Description' section contains the text 'Click to add description'. The 'Attachments' section has a dashed box with the text 'Drop files to attach, or browse.' Below this is the 'Sub-Tasks' section, which is highlighted with a red border. It contains two sub-tasks:

Sub-Task	Status	Assignee
1. sub-task-child1	TO DO	Unassigned
2. sub-task-child2	TO DO	Unassigned

To synchronize the JIRA hierarchy, perform the following steps:

- When setting the requirement entity type in the Create Link - Step 4 of 4 - Entity Types dialog window (see "[Setting Entity Types for Both Endpoints](#)" on page 30), make sure to select the **All issues** entity type for the JIRA endpoint.
- In the Subtype Mapping tab (see "[Creating Requirement Type Mappings](#)" on page 37), under the JIRA endpoint pane, an entire list of the JIRA subtypes is displayed. Map the sub-task type as in the following example:

After synchronization, the requirements on the JIRA side will be synced to the ALM side while keeping the hierarchy.



## JIRA Troubleshooting

### Procedures to mitigate limitations

To avoid synchronization problems related to JIRA issues in non-editable states:

1. In JIRA, go to **Settings > Issues > Issue Attributes > Statuses** as the project administrator.
2. Select a non-editable status (for example, **Closed**) in the workflow used on the project under synchronization.
3. Open the **View Properties** dialog box of the selected status.
4. Delete the **jira.issue.editable** property.

**Note:** You can edit non-system workflows only, so if you are using a system workflow (such as a jira), create a copy, assign this workflow to the project, and then edit it as described above in the steps above.



# Working with Rational ClearQuest

This appendix describes how to use ALM Synchronizer to work with synchronization links between Application Lifecycle Management (ALM) and Rational ClearQuest.

This appendix contains the following topics:

- [Guidelines for Working with Rational ClearQuest](#) .....93
- [Synchronizer Settings for ClearQuest](#) ..... 97

## Guidelines for Working with Rational ClearQuest

Before you begin using Synchronizer with ClearQuest, make sure that you follow these guidelines to customize your ALM project and ClearQuest database:

- In ClearQuest, the **Submitter** field and the **Submit\_date** field are given default values when an entity is created. It is recommended that you map the corresponding ALM fields to these fields to make sure that they contain the correct data. If these field are set as **Read only**, it is recommended that you set them to **Mandatory** to enable you to map data to them.
- ClearQuest's default configuration imposes restrictions on the permissible state changes. This may prevent Synchronizer from being able to synchronize the defect. For more information, see "[Configuring the Permissible State Changes](#)" below.
- Synchronizer cannot mark ClearQuest defects as **Duplicate**, because ClearQuest requires the ID of the duplicate defect, which Synchronizer is not able to supply. For more information, see "[Setting ClearQuest Defects as Duplicate](#)" on page 95.
- Synchronizer considers ClearQuest Submit, Modify and Delete actions based on action type and not action name. Consider the following ways in which Synchronizer addresses issues related to action name and action type:
  - If no action of the type exists, Synchronizer interprets this to mean that the user does not have permissions for this action type. This generates an error during the Synchronizer integrity check.
  - If there is more than one action of the type, one of the actions must have the default ClearQuest action name for the type. For example, if there are two actions of the **SUBMIT** action type, the name of one of the actions must be **Submit**. If none of the actions have the default action name, this generates an error during the Synchronizer integrity check.
- When mapping constant values to a **REFERENCE\_LIST** field, you should enter the values of the field which is marked as the Unique Key of the object.

## Configuring the Permissible State Changes

To synchronize records correctly according to the defined field mappings, Synchronizer must be able to move a ClearQuest record from any state to any other state. However, ClearQuest places

restrictions on state transitions. To enable Synchronizer to make the necessary state transitions, you must add a new state called **SyncTmpAction**, which can be moved to and from any other state. Synchronizer uses this state as a temporary state when performing state transitions.

To configure the permissible state changes:

1. Open the ClearQuest Designer. In the Actions screen, add the **SyncTmpAction** action name. Set the type to **CHANGE\_STATE**.

Action Name	Type	Access Control	Initialization
Submit	SUBMIT	All Users	
Assign	CHANGE_STATE	All Users	
Open	CHANGE_STATE	All Users	
Resolve	CHANGE_STATE	All Users	
Validate	CHANGE_STATE	All Users	
Reject	CHANGE_STATE	All Users	
Re_open	CHANGE_STATE	All Users	
Close	CHANGE_STATE	All Users	
Duplicate	DUPLICATE	All Users	
Unduplicate	UNDUPLICATE	All Users	
Postpone	CHANGE_STATE	All Users	
Modify	MODIFY	All Users	
Delete	DELETE	All Users	
Import	IMPORT	All Users	
Init_Note_Entry	BASE	All Users	BASIC_PERL
Send_Email_Notif	BASE	All Users	
SyncTmpAction	CHANGE_STATE	User Groups	
TD_Duplicate	CHANGE_STATE	User Groups	

2. In the State Transition Matrix screen, add a new state transition called **SyncTmpState**. You must configure it as shown below. In addition, the state should be assigned to the **Complete** state type. For more information on assigning a state to a state type, refer to the ClearQuest documentation.

From	Submitted	Assigned	Opened	Resolved	Closed	Duplicate	Postponed	TD_Duplicate	SyncTmpState
Submitted									
Assigned	Assign						Assign	Assign	Assign
Opened		Open		Reject	Re_open			Open	Open
Resolved			Resolve					Resolve	Resolve
Closed	Close	Close		Validate			Close	Close	Close
Duplicate	Duplicate		Duplicate	Duplicate	Duplicate			Duplicate	Duplicate
Postponed	Postpone	Postpone	Postpone					Postpone	Postpone
TD_Duplicate	TD_Duplicate	TD_Duplicate	TD_Duplicate			TD_Duplicate	TD_Duplicate		TD_Duplicate
SyncTmpState	SyncTmpAction	SyncTmpAction	SyncTmpAction	SyncTmpAction	SyncTmpAction	SyncTmpAction	SyncTmpAction	SyncTmpAction	

- In the Behaviors screen, configure **SyncTmpState**, ensuring that all fields except for **Headline** are configured as optional, as shown in the following example. The **Headline** field should be configured as mandatory for all states, including **SyncTmpState**.

	Submitted	Assigned	Opened	Resolved	Closed	Duplicate	Postponed	TD_Duplicate	SyncTmpState
dbid	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
is_active	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
id	READONLY	OPTIONAL	READONLY	READONLY	READONLY	READONLY	OPTIONAL	OPTIONAL	OPTIONAL
State	READONLY	OPTIONAL	READONLY	READONLY	READONLY	READONLY	OPTIONAL	OPTIONAL	OPTIONAL
version	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
lock_version	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
locked_by	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
history	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
is_duplicate	READONLY	OPTIONAL	READONLY	READONLY	READONLY	READONLY	OPTIONAL	OPTIONAL	OPTIONAL
unduplicate_state	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY
Headline	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY
Description	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Priority	OPTIONAL	MANDATORY	MANDATORY	MANDATORY	MANDATORY	OPTIONAL	OPTIONAL	MANDATORY	OPTIONAL
Severity	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	OPTIONAL
Submitter	MANDATORY	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	READONLY	READONLY	READONLY	OPTIONAL
Submit_Date	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	MANDATORY	OPTIONAL
Owner	OPTIONAL	MANDATORY	MANDATORY	MANDATORY	MANDATORY	OPTIONAL	OPTIONAL	MANDATORY	OPTIONAL
old_id	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	OPTIONAL
Keywords	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Symptoms	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Note_Entry	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Notes_Log	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	READONLY	OPTIONAL
Resolution_StateType	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Resolution	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK	USE_HOOK
Attachments	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Project	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
customer_severity	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
customer	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
TD_ID	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
dynamic	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
Tool	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL
number	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL	OPTIONAL

- Check in the schema and upgrade the database.

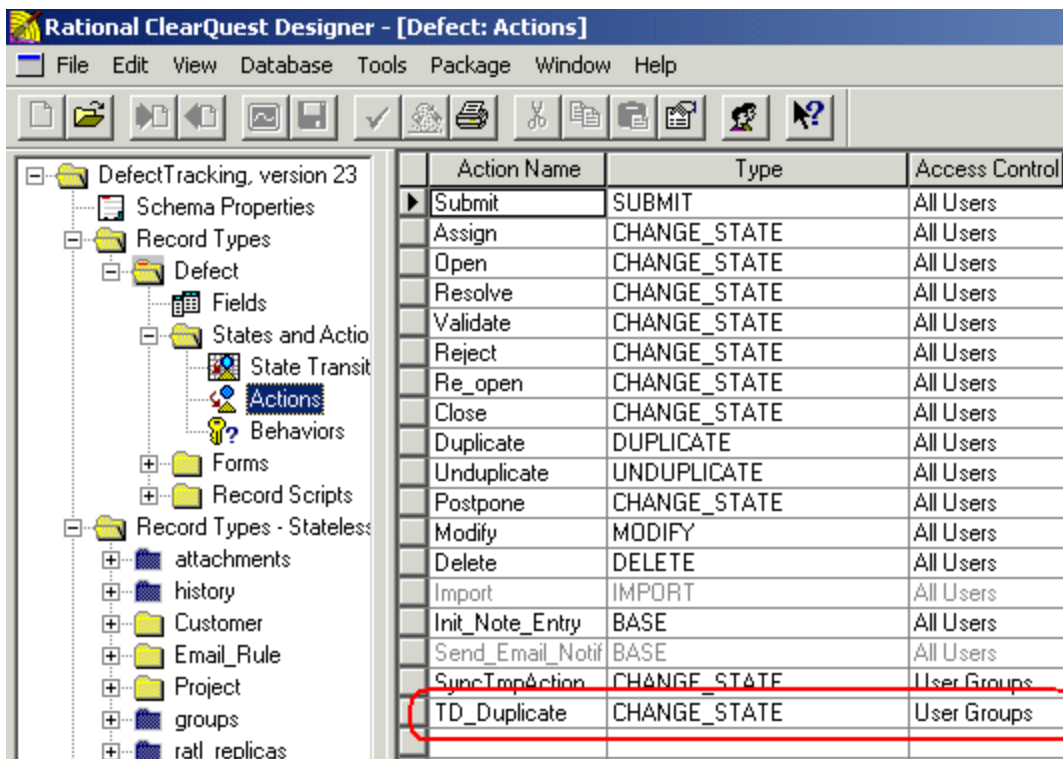
## Setting ClearQuest Defects as Duplicate

Synchronizer cannot set the state of ClearQuest defects to **Duplicate** as ClearQuest requires the ID of the defect which is being duplicated to set the state of a defect to **Duplicate**. Synchronizer is not able to determine from the ALM defect which defect is being duplicated.

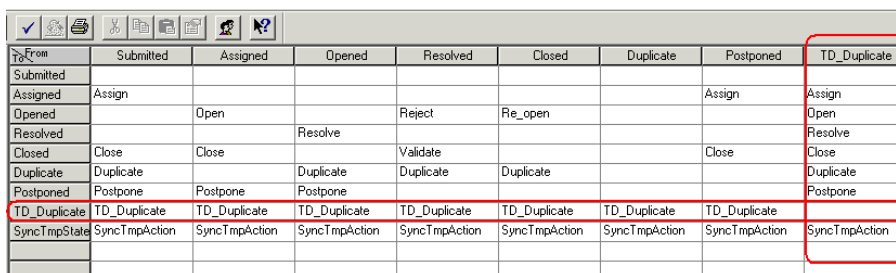
To enable Synchronizer to set the state of a ClearQuest defect to **Duplicate**, you must create a new state of type **CHANGE\_STATE** and map defects to this state rather than to **Duplicate**.

To create a new state for mapping duplicate defects:

1. Open the ClearQuest Designer.
2. In the Actions window, add a new state, for example, **TD\_Duplicate**.



3. In the State Transition Matrix window, add and configure the state transition for the new state as shown in the image below. In addition, the state should be assigned to the **Complete** state type. For more information on assigning a state to a state type, refer to the ClearQuest documentation.



4. Check in the schema and upgrade the database.
5. In Synchronizer, map ALM defects that represent duplicates to the state you create instead of to the state **Duplicate**.



## Synchronizer Settings for ClearQuest

This section describes the Synchronizer settings that are specific to working with ClearQuest. This section includes the following topics:

- ["ClearQuest Connection Properties" below](#)
- ["ClearQuest Mandatory and Recommended Fields" below](#)
- ["ClearQuest Adapter Parameters" on the next page](#)

### ClearQuest Connection Properties

The following settings are available when connecting to a ClearQuest endpoint. For more information on defining the connection settings to endpoints, see ["Creating Links" on page 26](#).

- **User name.** The user name for a ClearQuest user.  
This user must have one or more of the following event permissions: defect creation, defect modification, and defect deletion. The permissions needed depend on the rules defined in the **Rules** tab.  
The user should also have the SQL Edit Role in the ClearQuest database.
- **Password.** The password for the user you specified.
- **Database.** The ClearQuest user database that contains the data you want to synchronize with ALM.
- **SchemaRepository.** The schema repository containing the schema for the type of ClearQuest entity you want to synchronize.

### ClearQuest Mandatory and Recommended Fields

Synchronizer assigns one of the following levels to each field: **Mandatory**, **Recommended**, and **Optional**. For a ClearQuest endpoint, Synchronizer assigns the level as follows:

- **Mandatory.** The field is required for records in the **Submitted** state.
- **Recommended.** The field is not required for records in the **Submitted** state, but is required for records of some other state.
- **Optional.** The field is not required for records in any state.

**Note:** When you create a record in ClearQuest with a particular state, you must assign values to all fields that are required for that state. Synchronizer can create records in ClearQuest in any state, even without assigning values to all required fields for the state. However, to avoid the creation of records in ClearQuest that do not have values for all required fields, it is highly recommended that you map all **Recommended** fields in ClearQuest to fields in ALM.

## ClearQuest Adapter Parameters

The **FieldsDependencyChain** parameter is available for a ClearQuest endpoint to control the order of field insertion into ClearQuest. This addresses the issue of a ClearQuest hook resetting a field value based on the value of another field.

You edit this parameter to define the order in which fields are updated in ClearQuest during synchronization. This enables Synchronizer to update the field after the ClearQuest hook has reset it. For example, **FieldsDependencyChain=Priority,Product,AssignedTo**.

For more information on Synchronizer adapter parameters, see "[Setting Adapter Parameters](#)" on [page 59](#).

# Working with Rational RequisitePro

This appendix describes notes and limitations specific to synchronizing requirements between Application Lifecycle Management (ALM) and Rational RequisitePro.

This appendix contains the following topics:

- [Guidelines for Working with Rational RequisitePro](#) .....99
- [RequisitePro Connection Properties](#) .....99

## Guidelines for Working with Rational RequisitePro

When working with Synchronizer, make sure that you follow these guidelines:

Record creation will fail during synchronization if you use the following characters when naming a requirement in ALM, or when naming a project, package, or requirement in RequisitePro: \ / : " ? ' < > | \* %

- For synchronization with a RequisitePro project located on a network drive, the user configured to log on as a service for Synchronizer must have permissions to access the network location.
- In ALM, if you want to move a requirement and make it a child of another requirement, make sure that you move it under a requirement of the same type. This is required because RequisitePro does not allow you to place a requirement of one type under a requirement of another type.
- RequisitePro **Real**, **Time**, and **Userlist** type fields are defined as **String** type in Synchronizer field mappings.
- When synchronizing requirements, ALM adds the RequisitePro prefix tag as part of the requirement name.
- When synchronizing requirements, if a RequisitePro **Name** field is empty, Synchronizer uses the first 128 characters of the RequisitePro **Text** field instead.
  - If the **Name** field contains any of the following characters, Synchronizer replaces them with the underscore character:  
 \ ^ \*
  - Do not include the following characters in the first 128 characters of the RequisitePro **Text** field, because these are not supported in the RequisitePro **Name** field:  
 / : " ? ' < > | %

## RequisitePro Connection Properties

The following settings are available when connecting to a RequisitePro endpoint. For more information on defining the connection settings to endpoints, see ["Creating Links" on page 26](#).

- **User name.** The user name for a RequisitePro user. This user must have one or more of the following event permissions: requirement creation, requirement modification, and requirement deletion. The permissions needed depend on the rules defined in the **Rules** tab.
- **Password.** The password for the user you specified.
- **Project.** The name of the project whose data you want to synchronize. The project must exist on the RequisitePro client machine. The project must also be visible for the user configured to log on to Synchronizer as a service (included in the user's RequisitePro catalog).

# Working with Rational Team Concert (RTC)

This appendix describes notes and limitations specific to synchronizing requirements between Application Lifecycle Management (ALM) and Rational Team Concert (RTC).

This appendix contains the following topics:

- [Guidelines for Working with RTC](#) ..... 101
- [RTC Connection Properties](#) ..... 102
- [Supported RTC Work Item Field Types](#) ..... 102

## Guidelines for Working with RTC

Before you begin using Synchronizer with RTC, make sure that you follow these guidelines to customize your ALM project and RTC database.

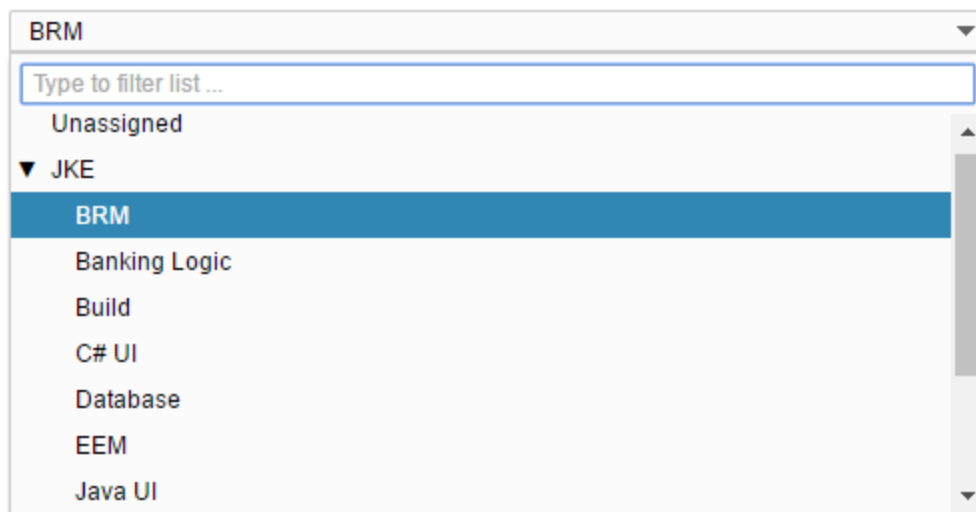
### Synchronization

- RTC work items of any type are available for synchronization with ALM entities.
- Every RTC work item type may be mapped for defect synchronization and as requirement subtypes.
- Work item attachments are available for synchronization.
- To perform ALM-to-RTC synchronization, you should have appropriate permissions on the RTC application instance. The RTC permission system is fairly verbose. The following permissions are necessary:
  - Create work item
  - Delete work item
  - Modify work item
  - Save attachment
  - Delete attachment
- Comment synchronization is not supported in the current version of adapter.
- Synchronization of supported field types is available only. For details see "[Supported RTC Work Item Field Types](#)" on the next page.

### Mapping

- ALM folders are not supported. Do not map requirements that are hierarchical.
- **RTC Categories:** The value for RTC field type 'category' is a user-defined hierarchical value. This type of value is not naturally mapped to mandatory field called 'Filed against'. The RTC Adapter maps 'category' fields to a String that is built like a path, without predefined values.

For example, below are 'category' values in RTC that correspond to **/JKE/BRM/** in ALM:



## RTC Connection Properties

The following settings are required to connect to an RTC endpoint. For more information on defining the connection settings to endpoints, see ["Creating Links" on page 26](#).

- **User name.** User name for a RTC user. This user must have permissions listed above.
- **Password.** The password for the user you specified.
- **projectArea.** The RTC project name containing the data you want to synchronize with ALM (full name including spaces, if any).
- **repositoryURI.** The URL of the RTC server, in the following format:  
`http[s]://<server name>:<port number>/<change and configuration module address>`  
(for example: `https://rtc.example.com:9443/ccm`).

## Supported RTC Work Item Field Types

The following work item field types are available for synchronization:

RTC field type	Field type displayed in Synchronizer field mapping
status	<b>Single value list</b> with the list of values available for mapping
boolean	<b>Number</b> (0 or 1)
category	<b>String</b> reduced to path
contributor	<b>User list</b>

<b>RTC field type</b>	<b>Field type displayed in Synchronizer field mapping</b>
Decimal	<b>Double</b>
duration	<b>Number</b>
fileSize (in RTC 5)	<b>Number</b>
float (in RTC 5)	<b>Double</b>
html	<b>Memo</b>
integer	<b>Number</b>
long	<b>Number</b>
largeHTML (in RTC 6)	<b>Memo</b>
largeString (in RTC 6)	<b>String</b>
mediumHtml	<b>Memo</b>
mediumString	<b>String</b>
priority	<b>Single value list</b> with the list of values available for mapping
severity	<b>Single value list</b> with the list of values available for mapping
smallString	<b>String</b>
string	<b>String</b>
stringList	<b>Multi value list</b>
tag	<b>String</b>
timestamp	<b>Date</b>
wiki	<b>Memo</b> no wiki-to-html conversion available

Work item attachments are handled as the **Attachment** type field of work item.

Other data types (default and custom) are not supported by the adapter.





# Working with Team Foundation Server (TFS)

This appendix describes how to use ALM Synchronizer to work with synchronization links between Application Lifecycle Management (ALM) and Microsoft Team Foundation Server (TFS). You can synchronize data between ALM defects or requirements, and TFS work items, including default, customized, and user-defined work item types.

This appendix contains the following topics:

- [Guidelines for Working with TFS](#) .....105
- [TFS Connection Properties](#) .....105
- [Requirement Synchronization with TFS](#) .....106
- [Field Type Mapping](#) .....110

## Guidelines for Working with TFS

When working with Synchronizer, make sure that you follow these guidelines:

**Mapping Release and Cycle Fields.** TFS includes a hierarchical field called **Iteration Path**, which can be considered a combination of the ALM release and cycle fields. To successfully map these fields, do the following:

1. Add an additional field for release to TFS and map it to the ALM release field.
2. Use a flat (non-hierarchical) list of iterations in the TFS **Iteration Path** field.

For more information on mapping release and cycle fields, see "[Guidelines for Mapping Release and Cycle Fields](#)" on page 57.

## TFS Connection Properties

The following settings are required to connect to a TFS endpoint. For more information on defining the connection settings to endpoints, see "[Creating Links](#)" on page 26.

- "[Connection Properties for TFS On-premise](#)" below
- "[Connection Properties for TFS 2018 in the Cloud](#)" on the next page

### Connection Properties for TFS On-premise

These are connection properties for TFS on-premise.

- **User name.** The user name for a TFS user, in the following format: **<domain>\<username>**. This user must have permissions to create and modify work items in the specified project.
- **Password.** The password for the user you specified.

- **ServerURL.** The URL of the TFS server, in the following format:
  - **TFS 2010, TFS 2012, TFS 2013, TFS 2015, TFS 2017, and TFS 2018:**
    - **http://<server name>:<port number>/tfs** to connect to the default project collection.
    - **http://<server name>:<port number>/tfs/<project collection name>** to connect non-default project collection.
- **Project.** The TFS project containing the data you want to synchronize with ALM.

## Connection Properties for TFS 2018 in the Cloud

These are connection properties for TFS in the cloud (certified Visual Studio Team Services).

**Note:** Microsoft is replacing Visual Studio Team Services (VSTS) with Azure DevOps Services. The ALM Synchronizer only supports Visual Studio Team Services.

- **User name.** The user name for a TFS user, in the following format: **<username>**, which is set for alternative authentication. For details, see the *Micro Focus ALM Synchronizer Installation Guide*.
- **Password.** The password for the user you specified. Use password which is set for alternative authentication. For details, see the *Micro Focus ALM Synchronizer Installation Guide*.
- **ServerURL.** The URL of the TFS server, in the following format:  
**https://<site URL>:<port number>/ProjectCollection**

Where:

- The default port number is **443**.

**Note:** To work with TFS in the cloud, HTTPS is required.

- **Project.** The TFS project containing the data you want to synchronize with ALM.

## Requirement Synchronization with TFS

Before you create a link for synchronizing between ALM requirements and TFS work items, you must determine which TFS entity types to synchronize. You must also configure several TFS adapter properties to enable successful synchronization.

This chapter includes:

- ["Enabling Folder Synchronization" on the next page](#)
- ["Requirement Synchronization with TFS Work Items" on the next page](#)
- ["Configuring the TFS Properties" on page 109](#)

## Enabling Folder Synchronization

To enable the synchronization of folders, you must specify a work item type that represents a folder in TFS. You specify the work item type by configuring properties in the TFS adapter's property file. For details, see ["Configuring the TFS Properties" on page 109](#).

## Requirement Synchronization with TFS Work Items

When you create a link to synchronize ALM requirements with TFS, you must select which TFS entity types to synchronize.

You can synchronize ALM requirements with a specific TFS work item type, or with all work item types.

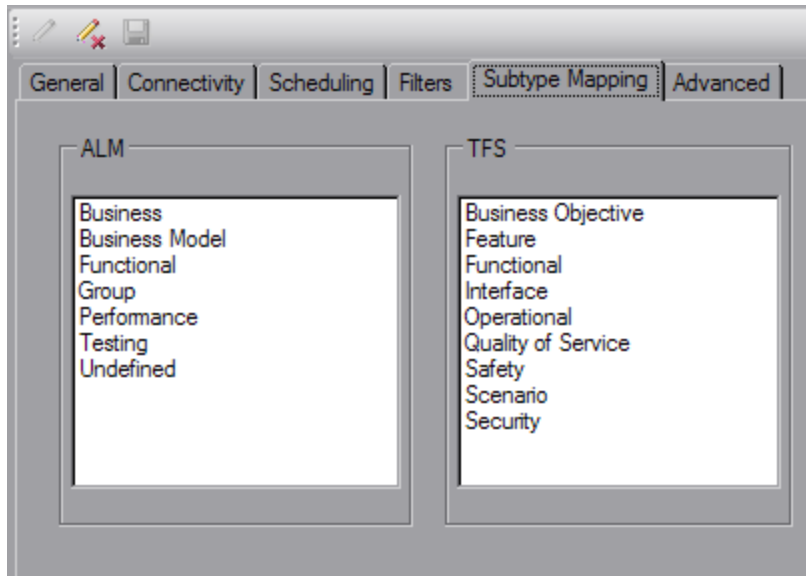
- **Synchronizing requirements with a specific TFS work item type.** For example, you can synchronize ALM requirements with TFS **Requirement** work item type. This enables you to then create requirement subtype mappings to synchronize between ALM requirement types and TFS work items, based on the values of a TFS work item field you specify. This subtype field contains a pre-defined list of values that represent subtypes.

For example, if you are synchronizing requirements with the TFS **Requirement** work item type, you can specify that the values of the **Requirement Type** field represent subtypes, and create the following subtype mappings:

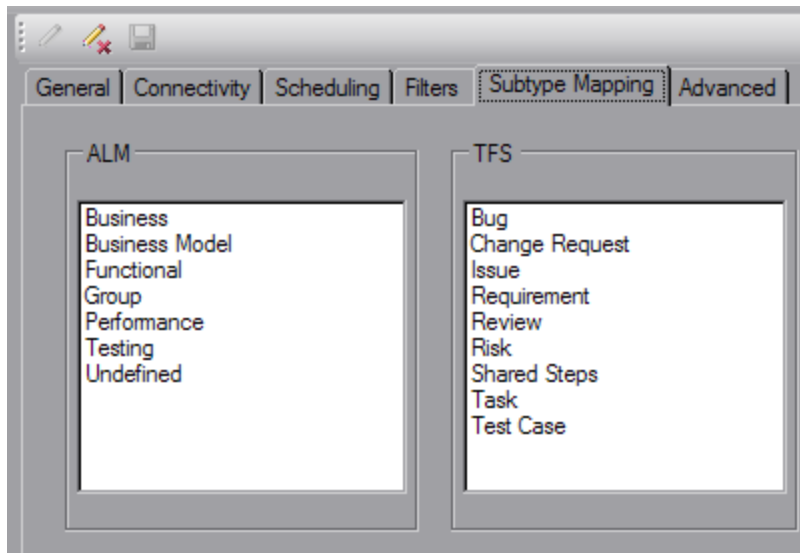
- ALM **Functional** requirement <> TFS **requirement**, where the value of the TFS **Requirement Type** field= **Functional**
- ALM **Security** requirement <> TFS **requirement**, where the value of the TFS **Requirement Type** field= **Security**

Before you create the link, you must specify the TFS field containing the values that represent requirement types. You specify the subtype field by configuring a property in the TFS adapter's property file. For details, see ["Configuring the TFS Properties" on page 109](#).

After you create the link, these values are displayed in the link's **Subtype Mapping** tab.



- **Synchronizing requirements with all TFS work item types.** This enables you to create requirement subtype mappings between ALM requirement types and TFS work item types. For example, you can create a subtype mapping between ALM **Functional** requirements and the TFS work item type **Change Request**.
- After you create the link, all TFS work item types are displayed in the link's **Subtype Mapping** tab. You can create multiple subtype mappings.



## Configuring the TFS Properties

Configure the following properties to enable requirement synchronization with TFS work items.

To configure the TFS properties:

1. Navigate to the **<ALM Synchronizer installation directory>\adapters\dat\TFS** directory. In a text editor, open the **adapter.properties** file. The file contains sample entries that you can edit.

2. To enable folder synchronization, define the following properties:

- **tfs.adapter.folder.work.item=<Work item type>**

where **work item type** is the TFS work item type that represents a folder. For example, `tfs.adapter.folder.work.item=Issue`.

**Note:** The Work item type is case-sensitive. Capitalize it exactly as capitalized in TFS.

You can also create a work item type for this purpose, and name it Folder, for example.

- **tfs.adapter.folder.field.name=<name field>**

where **name field** is the name of the TFS folder work item field that stores the name of the folder. For example, `tfs.adapter.folder.field.name=Title`.

- **tfs.adapter.folder.field.description=<description field>**

where **description field** is the name of the TFS folder work item field that stores the description of the folder. For example, `tfs.adapter.folder.field.description=Description`.

**Note:** The folder name and folder description fields must be of type **String** or **PlainText**:

- **TFS 2010:** These fields must be editable, and cannot have a predefined list of values.
- **TFS 2012:** HTML fields are not supported. These fields are processed as plain text.

3. To configure the TFS subtype field for synchronizing requirements with a specific TFS work item type, define the following property:

**tfs.adapter.subtype.field.<work item type>=<subtype field name>**

where:

- **work item type** is the TFS work item type you select for synchronization when you create the link. For details, see step 16.

The value of **<work item type>** must be entered using lowercase characters only.

If the value for **<work item type>** contains spaces, precede each space with a backslash. For example, to specify work item types “change request” and “special task:”

```
tfs.adapter.subtype.field.change\ request=Change Request Type
```

```
tfs.adapter.subtype.field.special\ task=Type
```

- **subtype field name** is the name of the field whose values represent requirement subtypes. The subtype field must be of type **String**, must be editable, and must have a pre-defined list of values. For example:

```
tfs.adapter.subtype.field.requirement=Requirement Type
```

If this field is not defined in the properties file before you create the link, the only TFS subtype available for mapping that is displayed in the Subtype Mapping tab is **Undefined**.

4. Restart the Synchronizer service to load the new configuration. For more information, see ["Starting and Stopping the Synchronizer Service" on page 9](#).
5. When you create a link, select the relevant entity type in step 16 of the creation process. Select one of the following:
  - Select a TFS work item type. After the link is created, all the values of the subtype field you defined in step ["To configure the TFS subtype field for synchronizing requirements with a specific TFS work item type, define the following property:" on the previous page](#) above are displayed and available for requirement subtype mappings in the link's **Subtype Mapping** tab.
  - Select **Work Item** to synchronize ALM requirements with all work item types. After the link is created, all work item types are displayed and available for requirement subtype mappings in the link's **Subtype Mapping** tab.

## Field Type Mapping

The following TFS work item field types are supported. For more information on field mappings, see ["Creating Field Mappings" on page 41](#).

<b>TFS field type</b>	<b>Field type displayed in Synchronizer field mapping</b>
<b>Attachment</b>	<b>Attachment.</b>
<b>DateTime</b>	<b>Date.</b>
<b>Double</b>	<b>Double.</b>
<b>HTML</b>	<b>Memo.</b> Field contents are displayed without HTML formatting.
<b>Integer</b>	<b>Number.</b>

<b>TFS field type</b>	<b>Field type displayed in Synchronizer field mapping</b>
<b>PlainText</b>	<b>Memo.</b>
<b>String</b>	<b>String</b> or <b>Single value list</b> . If the TFS field has a list of allowed or suggested values attached, the field is defined as <b>Single value list</b> with the list of values available for mapping.
<b>TreePath</b>	There are two TFS TreePath type fields: <ul style="list-style-type: none"><li>• <b>Area Path</b> field is displayed as <b>String</b> type.</li><li>• <b>Iteration Path</b> field is displayed as <b>Single value list</b> type. Displayed without list values.</li></ul>





# Send Us Feedback



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