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1 Scenario

In SAP NetWeaver '04 Exchange Infrastructure 3.0 (SAP XI 3.0), information is often cached to speed up the input help of the tools or improve performance of the runtime. Sometimes you need to manually request an update, for example, when you make changes to objects or when you think the automatic cache update is simply not functioning properly.

This aim of this How-To guide is that you:
- Know where caches are used
- Understand how data is entered and updated in caches in the Integration Builder, the runtime and the adapters, in XI 3.0
- Learn how to troubleshoot problems

The first chapter provides an overview of the XI 3.0 caches. We then provide some troubleshooting tips that you can use to solve problems that may occur. In the appendix, you can find transaction models outlining the communication flow from the moment a change is made to an object to the moment the changed data is updated in the cache. Note that this section is aimed at advanced users of SAP XI only.

2 Introduction

The following figure provides a graphical overview of SAP XI components, caches and update paths.
Figure 1: Graphical Overview of Caches
3 The Step-By-Step Solution

This chapter provides an overview of the XI 3.0 caches. We will take a closer look at:

- Integration Builder
  - Integration Builder (Integration Repository)
  - Integration Builder (Integration Directory)
- ABAP Runtime and Adapter Engine Runtime
- Caches in business systems using XI proxies
- Cache monitoring in the Runtime Workbench

Where possible, we aim to show the content of the cache and how to update the cache.

3.1 The Integration Builder

Data is first entered in the cache for exchangeProfile parameters when the J2EE Engine is started/restarted.

1. Navigate to the Administration section on the SAP Exchange Infrastructure start page.

2. On the Repository tab page, choose All Properties under the heading Administration of Properties.

   All maintained values for the exchange profile are displayed.

   To refresh the cache, choose Refresh.

3.2 The Integration Repository

Software component versions maintained in the System Landscape Directory (SLD) are cached in the Integration Repository when the data is first requested. If you add or change a software component version in the SLD, you will not be able to select it in the Integration Repository unless you manually force a refresh of the cache.

The cache refresh can be requested either in the Integration Repository or in the Administration section. The cache refresh is the same for both options.
3. Start the Integration Repository.

4. In the menu bar, select Environment → Clear SLD Data Cache.

5. Navigate to the Administration section on the SAP Exchange Infrastructure start page.

6. On the Repository tab page, choose Cache overview under the heading Administration of Locks and Caches.
Select the value Cache for Software Components.

   You cannot select or restrict values of software component versions here.

   If you choose Refresh Cache, the cache is refreshed immediately.

7. SLD Cache contains various SLD data, such as SLD associations and classes.

   No values can be displayed.

   If you choose Refresh Cache, the SLD Cache is refreshed immediately.

3.3 The Integration Directory
Business systems maintained in the System Landscape Directory (SLD) are cached in the Integration Directory when the data is first requested. Adapter-specific data for RFC and IDoc adapters is also cached here.
If you add or change data in the SLD, you will not be able to select the changed data in the Integration Directory, unless you manually force a refresh of the cache. The cache refresh can be requested in the Integration Directory or in the Administration section. The cache refresh is the same for both options.

8. Start the Integration Directory.

9. In the menu bar select Environment \(\rightarrow\) Clear SLD Data Cache.

10. Navigate to the Administration section on the SAP Exchange Infrastructure start page.


The cache for adapter metadata is used when you create communication channels. It is empty when J2EE is restarted and data is entered into it step-by-step as it is needed. The cache is refreshed when you import metadata into the Integration Repository, or when you activate metadata changes in the Integration Repository.

No values can be displayed.

If you choose Refresh Object, the cache is refreshed immediately.

No values can be displayed.
If you choose Refresh Cache, the cache is refreshed immediately.

13. The Partial Cache Refresh refreshes change lists with the status new, in work or failed.


3.4 ABAP and Adapter Runtime Cache
For performance reasons, and to keep the runtime components independent from the Integration Repository or the Integration Directory, the ABAP runtime caches the following:

- Integration Directory and Integration Repository data
- Adapter Engine Connection Data Cache and CPA cache
- IDoc adapter data
- SLD data

14. Integration Repository and Integration Directory data that is transferred to the runtime can be viewed in transaction SXI_CACHE. You can trigger a manual refresh by choosing an option under XI Runtime Cache in the menu bar. You can choose from the following options:

- Start Complete Cache Refresh
- Start Delta Cache Refresh
15. The cache for **Adapter Engine** data is used to retrieve the URL for the Adapter Framework.

Data is stored in the cache the first time a message requires this data. You can view the cache data in transaction SXI_CACHE. To do this, select Go to → **Adapter Engine Cache**.

You can delete the cache data in transaction SXI_CACHE. To do this, select Go to → **Adapter Engine Cache**. Then choose the recycle bin push button (🗑).

This might be particularly helpful when you manually correct ports or host names in the SLD for a particular Adapter Engine, or if the Adapter Engine registers with the SLD with new information.

16. CPA Cache Refresh from the **Adapter Engine**

To trigger a cache refresh from the individual Adapter Framework, open a browser window and enter the following URL:

`http://<host>:<port>/CPACache/refresh?mode=delta|full`

You can also view the content of the related CPA cache and the history of cache refreshes in a browser window:

`http://<host>:<port>/CPACache`

Choose **Display CPA Cache Content** or **View Cache Update History**.

For further details and information about special permissions used on the SAP J2EE Adapter Engine, check the How-To guide, **How To…Monitor and Analyze Errors Within the SAP J2EE Adapter Engine**.
17. Data is entered in the cache for metadata of function modules of the RFC Adapter at runtime, as soon as a message needs this metadata for the first time.

When an RFC channel is changed in the Integration Directory, the function module cache for this channel is cleared.

The cache is also cleared on restart, for example: J2EE restart, RFC adapter service restart or restart of dependent J2EE services (MessagingSystem, CPACache, and so on).

The manual refresh is triggered by restarting the RFC adapter service in the Visual Administrator.

18. The cache for the IDoc Adapter data caches IDoc metadata. Data is entered into the cache at runtime, as soon as a message needs this metadata for the first time.

You can check the data in transaction IDX2.

There is no automatic refresh. If IDoc metadata is changed, you must force a manual refresh. To clear the cache, you can use transaction IDX2 or the report IDX_RESET_METADATA.

19. SLD data of the business system is cached in table LCRT_CLNTCACHE. To display the table, use transaction SE16.

This table is populated with the data from the first request for this information.

For manual invalidation, use the function module LCR_CLEAR_CACHE in transaction SE37.
3.5 Cache Monitoring in the Runtime Workbench

20. To access information about software component versions, enter the Runtime Workbench.

21. Navigate to the Cache Monitoring area, and select the cache type Search for Software Components or Search for Mapping Programs.

4 Troubleshooting

In this chapter, we outline some tips on troubleshooting, and how you can search for possible errors. We outline the steps you can take under the following headings:

- Executing the Cache Connection Test
- Checking the Cache Notification Status
- Checking the Cache Update Status
- Checking SM59: Connection Between Integration Builder and Runtime
- Checking Integration Directory to Integration Server and Integration Repository to Integration Directory Communication
- Checking Integration Server to Integration Directory and Integration Directory to Integration Repository Communication
- Checking Service User Name and Password
- Checking Profile Generation for User
- Checking the Exchange Profile

4.1 Executing the Cache Connection Test (SPS12)

The cache connection test is a new feature that enables you to check the cache status of the Integration Server, adapters and the Integration Directory. It is available with SAP XI 3.0 SPS 12. You use it to test whether cache connectivity is working correctly, for example, when problems arise during the update of the runtime cache. It provides an overview of the status for components that:

- Could not be reached (status red)
- Were received by a change pointer (status yellow)
The cache has been informed that there are new changes that it has to include; however, these changes have not yet been transferred.

- Execute a cache update (status green)
- Are unknown (status grey)

22. In the Runtime Workbench, select Component Monitoring. Choose Display and then Cache Connectivity Test.

23. To start a new test run, choose Start Test.

The system displays the results of the most recent test run. You can update the displayed results if required, but note that it takes some time for the whole test to complete.

To update the displayed results, choose Refresh Display.

4.2 Checking the Cache Notification Status

Check the cache notification status if you suspect that the cache (transaction SXI_CACHE) on the Integration Server is not up to date. Signs of this are, for example, if an interface determination, interface mapping or mapping program is missing or not present for the correct version.

For the following steps, it is helpful if you have details of the user who submitted the relevant objects, and if you know when this was done. You can get some information by opening the relevant objects in the Integration Directory or Integration Repository and choosing Properties ( ) in the object menu. Details about the most recent changes are displayed in the Object Attributes screen. The object ID is particularly important.

Choose Environment → Cache Notifications….

Take a look at the entries for the relevant cache instance, user and date.

25. Check the notification status. Green indicates okay; red indicates that an error has occurred.

26. To trigger a cache update when an error has occurred, select the relevant notification(s) and choose Repeat Cache Update for Instance ( ).

4.3 Checking the Cache Update Status

To check the cache update status, perform the steps described in Section 4.2. In addition, check the entry in the Cache Update column. Green indicates okay; red indicates that an error has occurred. If an error has occurred, switch to the Problems tab page.

Note that only the most recent error message for an instance and context is displayed.
27. The **Problems** tab page lists all objects that could not be updated. Using the object ID, search for the interface determination, interface mapping, or mapping program that caused the problem on the Integration Server (incorrect/missing version).

You can determine the object ID from the trace on the Integration Server or by choosing **Properties** in the Integration Repository or Integration Directory, (see Section 4.2).

You can double click on the entry to display the error message that needs to be analysed, (this error message should also appear in the logs). Possible reasons that the update failed are connection problems between the Integration Server and the Integration Directory, or between the Integration Directory and the Integration Repository.

4.4 **Checking SM59: Connection Between the Integration Builder and Runtime**

28. Data is entered in the runtime cache when objects are activated in the Integration Directory. The RFC destination (SM59) **INTEGRATION_DIRECTORY_HMI** is used to store the data in the cache. If there are connection problems, proceed as follows:

Test the connection by using transaction SM59. An HTTP return code 500 (Internal Server Error) indicates that everything is okay.

On the **Technical Settings** tab page, check target host and port (this has to be that of the Integration Directory. You can check this, for example, by using the URL of the SAP Exchange Infrastructure start page).
29. Check the name of the Integration Server service user and retype the password that is stored in the SAP User Management.

If you are not sure about the password, enter it again in transaction SU01.

If you have retyped the passwords and are not sure if you have changed them by doing so, see SAP note 721548 for information about how to adjust other relevant destinations.

Repeat the Connection Test in transaction SM59. An HTTP return code 500 (Internal Server Error) indicates that everything is okay.

4.5 Checking Integration Directory ➔ Integration Server and Integration Repository ➔ Integration Directory Communication

If an HTTP service is not running on the Integration Server, this can cause connection problems, which in turn can cause the notification of the cache on the Integration Server to fail. To check services, proceed as follows:
30. Start transaction SICF.
   Choose `default_host → sap → xi`.
   All services should be active, particularly the services `cache` and `cache_ssl`.
   You can activate a service by choosing the corresponding option in the context menu.

31. Start transaction SICF.
   Choose `default_host → sap → bc → ping` (connection test) and then choose `Test service` in the context menu of the entry.
   A browser should then open, prompting a logon. If the browser does not open, this indicates a possible problem with the HTTP service of the SAP system and needs to be examined.

To log on, use your user for the Integration Directory service (see Section 4.7). If the user and password are correct, an HTML page containing the following message is displayed: `Server reached successfully`. If you get an authorization error, you need to check the user and password for the HTTP connection.

Perform the check of the user name and password for the Integration Directory service user by retyping the values as described in 4.7.

Repeat the connection test in transaction SICF.

The initial notification for mapping objects edited in the Integration Repository is started from the Integration Repository. You therefore also need to check the connection between the Integration Repository and the Integration Directory.

Start a web browser and type in the following URL:
`http://<host name>:<port>/dir/hmidiag/ext?method=info`
(Host name and port can be determined from the SAP Exchange Infrastructure start page.)

A logon dialog should be displayed. If it is not displayed, this indicates that the Integration Repository (or even J2EE) is not running and needs to be started.
In this case, perform the following steps:

32. Start the Visual Administrator and check whether Server → Services → HTTP Provider is running. If not, start it (by using the context menu).

Choose Server → Services → Deploy.

On the Runtime tab page, choose Application and check the status of the entry sap.com/com.sap.xi.directory.

If the application is not running, select it and then start it by choosing Start Application on the right hand side.

If the logon dialog is displayed, use the Integration Repository service user to log on (see 4.7).

33. If both user and password are correct, an HTML page containing some information about the HMI service is displayed.

If you get a message indicating an authorization error, you need to check the user and password for the HTTP connection.
Check the user name and password for the Integration Repository service user by retyping the values as described in 4.7.

4.6 Checking Integration Server → Integration Directory and Integration Directory → Integration Repository Communication

If there are connection problems trying to reach the Integration Directory, the Integration Repository or the Java stack of the Integration Server (Mapping Runtime), this can cause the update of the cache on the Integration Server to fail. To solve the issue you first need to check whether the Integration Directory, the Integration Repository or the Mapping Runtime (and the HTTP service) is running.

Start a web browser and type in the following URL:

- **Integration Directory**:
  
  http://<host name>:<port>/dir/hmidiag/ext?method=info

- **Repository**:  

  http://<host name>:<port>/rep/hmidiag/ext?method=info

- **Mapping Runtime**:  

  http://<host name>:<port>/run/hmidiag/ext?method=info

  Host name and port can be determined from the SAP Exchange Infrastructure start page.

A logon dialog should be displayed. If it is not displayed, the Integration Directory/Integration Repository/Mapping Runtime (or even J2EE) is not running and needs to be started.

To do this, proceed as follows:

34. Start the Visual Administrator and check whether Server → Services → **HTTP Provider** is running. If not, start it (by using the context menu).

Choose Server → Services → **Deploy**.

On the **Runtime** tab page, choose **Application** and check the status of the entries

- sap.com/com.sap.xi.directory
- sap.com/com.sap.xi.repository
- sap.com/com.sap.xi.services

If the application is not running, select it and then start it by choosing **Start Application** on the right hand side.
35. If you get an authorization error, you need to check the user and password for the HTTP connection. Check the user name and password for the Integration Server service user or the Integration Directory service user by retyping the values as described in 4.7. Repeat the connection test by using the URLs.

4.7 Checking the Service User Name and Password
Various connections are important for the cache refresh. The components involved are: the Integration Directory, the Integration Repository and the Integration Server. Each of these has a service user with a special user role:

- **Integration Directory** - SAP_XI_ID_SERV_USER
- **Integration Server** - SAP_XI_IS_SERV_USER
- **Integration Repository** - SAP_XI_IR_SERV_USER

The following figure provides an overview of notification/update from a communication perspective:
The Integration Directory and the Integration Repository read user and password information read from the exchange profile. The Integration Server uses an SM59 destination (INTEGRATION_DIRECTORY_HMI) to do this. The first thing that needs to be determined is the name of the user that is assigned the required role. To determine this in the Integration Directory or the Integration Repository, call transaction SUIM in the SAP system that is used for the user management (the default should be the client of the Integration Server).
36. If you want to check which SAP system client (ABAP client) the J2EE User Management is integrated in, call the Visual Administrator.

Choose **Server** → **Service** → **UME Provider** and take a look at the following properties:

- `ume.r3.connection.master.client`
- `ume.r3.connection.master.hostname`

37. In transaction **SUIM**, choose **User Information System** → **User** → **User by Complex Selection Criteria → By Role**.
38. Type in the relevant service user role:
   SAP_XI_ID_SERV_USER
   SAP_XI_IS_SERV_USER,
   SAP_XI_IR_SERV_USER

   A list of user names is displayed. The user name is most probably either XIDIRUSER, XIISUSER, or XIREPUSER.

39. Call transaction SU01 to check whether the user is locked. Navigate to the Logon Data tab page. This is where information about the lock status is displayed.

40. You can unlock the user in the initial screen. To do this, choose Lock/Unlock.
41. To display more information about the user, choose Display (F7).

To determine whether the service user has the correct user type, check the radio button for User Type. Make sure the selected value is Service (and not Dialog).

4.8 Checking Profile Generation

42. Check whether the profiles for the user have been generated. Choose the Profiles tab page.

If the profile for the role is not generated, call transaction PFCG.
43. Select the corresponding role SAP_XI_ID_SERV_USER/
SAP_XI_IS_SERV_USER/
SAP_XI_IR_SERV_USER, and display
the definition. Choose the
Authorizations tab page and check
the status of the profile generation.
If the generation is incomplete,
change to edit mode and delete it
first. To generate the profile choose
Display Authorization Data on the
same tab page.

44. Then choose the red/white ball push
button ( screenings button) to start the generation.
45. After successful generation, switch to the User tab page (on the previous screen) and choose User comparison.

At this point, the user name for the service users should now be clear, the users should not be locked and the authorization data should be correct. These steps outlined how to check the settings in the SAP system (ABAP part). If these do not help you solve your problem, you can check if the caller side (XI tools, for example, the Integration Builder) uses the correct entries. To do this, you need to call the exchange profile.

4.9 Checking the Exchange Profile

Open the SAP Exchange Infrastructure start page and choose Administration in the navigation area. You have to log on with an SAP XI administrator user. Choose Administration of Properties → Exchange Profile.
46. Navigate to:


You can also navigate to
IntegrationBuilder → IntegrationBuilder.Repository → com.sap.aii.Repository.serviceuser.name and .pwd

Check the name of the service user and retype the password that is stored in the SAP User Management (if you are not sure about the password, retype it in transaction SU01). Then choose Save.

47. Open the SAP XI administration section and choose Administration of Properties → All Properties. Then choose Refresh in the content area (this reads the properties from the exchange profile).
5 Appendix

5.1 Activation Process

5.1.1 Notification

When an object is activated, a notification is triggered.

Activation Process in the Integration Directory

1. The user activates the change list.
2. Using JMS, a notification is written to the notification table.
   This can be displayed in the Integration Directory. Choose Environment ➔ Cache Notifications in the menu.
3. The information about which Adapter Engines to notify is read from the SLD by HTTP using the user XIDIRUSR.
4. The access URL for the adapter engines is read from the SLD.
5. The access URL for the Integration server and the value mapping runtime (Java runtime) is read from the exchange profile.
6. The notification is sent to the Integration Server, Adapter Engines and value mapping runtime by HTTP using the user XIDIRUSER.
7. Either success or failure is written to the notification table once notification is complete.
Activation Process in the Integration Repository

1. The user activates a change list intended for the cache (mapping, software component version, business processes).
2. Using JMS, a notification is written to the notification table. This can be displayed in the Integration Repository. Choose Environment → Cache Notifications in the menu.
3. The notification is sent to the directory by HTTP using the user XIREPUSER.
4. Either success or failure is written to the notification table once notification is complete.
5.1.2 Update
After successful notification, the cache update is triggered.

Update Process in ABAP Runtime

Workflow Generation from process services (asynchronous) may set error code 99 in sxi_cache
1. When the ABAP Runtime receives the notification, it starts the update asynchronously.
2. Using JMS, an update notification is written to the notification table. This can be displayed in the Integration Directory. Choose Environment → Cache Notifications in the menu.
3. The update is made using the SM59 destination INTEGRATION_DIRECTORY_HMI and the user XIISUSER.
4. The objects from the Integration Repository are accessed from the Integration Directory using the user XIDIRUSER.
5. The mappings are stored in the Java mapping runtime using the user XIDIRUSER.
6. Either success or failure is written to the notification table (overall status of update) once the update is complete.
7. In SAP XI30, all mappings, and not just those that are used, are stored in the cache.
8. If there is an update for business services, workflow processes are generated during the cache update.
   If the generation fails, the error code 99 is set in transaction SXI_CACHE.
   If the generation succeeds, the error code 0 is set in transaction SXI_CACHE.
9. As and from FP (SP4), there will be a new notification error table in the Integration Directory to show the error statuses of single objects.
   - **Complete Cache Refresh in SXI_CACHE** will refresh the whole cache.
     - A batch job is used.
     - This can be checked in transaction SM58 by using the function module.
     SAI_CACHE3_REFRESH_BACKGROUND
     - A lock is set in SM12.
   - **Delta Cache Refresh in SXI_CACHE** will read the notification table and check if a lock is set in transaction SM12. If no lock is set, it will trigger the update for this object.
     - A synchronous call is performed.
     - The error can be seen directly.
Update in AE Runtime

1. When the Adapter Engine runtime receives the notification, it starts the update asynchronously.
2. Using JMS, an update notification is written to the notification table. This can be displayed in the Integration Directory. Choose Environment → Cache Notifications in the menu.
3. The update of the CPA Cache is done using the user XIAFUSER.
4. The objects from the Integration Repository (metadata) are accessed from the Integration Directory using the user XIDIRUSER.
5. Either success or failure is written to the notification table once notification is complete.
Update Process in Value Mapping Runtime

1. When the value mapping runtime receives the notification, it starts the update asynchronously.
2. Using JMS, an update notification is written to the notification table. This can be viewed in the Integration Directory. Choose Environment → Cache Notifications in the menu.
3. The update of Value Mapping is done using the user XIISUSER. Either success or failure is written to the notification table once the update is complete.