

# SAP MII 12.1 Data Buffering



## Applies to:

SAP Manufacturing Integration and Intelligence 12.1. For more information, visit the [Manufacturing homepage](#).

## Summary

This article describes the SAP MII Data Buffering feature which enables to run operations in a plant independently of the availability of the external systems.

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**Created on:** 1 April 2011

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## Overview

The SAP MII plays a key role as mediator for the transfer of business data between plant system and external systems. It not only enables the communication between them but it is also able to hold a data copy of data originating in another system in the form of a data buffer, which ensures the reliability of data transfer. Data Buffering enables to run operation in a plant independently of the availability of the external systems. Data Buffering handles communication errors that occur when you send SAP MII query or action requests to external system. The data in the data buffer is time dependent. There is a point in time after which it is considered outdated. This point in is configurable and depends on the nature of the data to be store in the local copy. A typical example is production/process orders which are kept in the data buffer for up to n days for a whole plant in case the ERP system has to be taken down for maintenance.

Data Buffering can be configured for queries and actions. The queries and actions in the Data Buffer are called Data Buffer Entries and they are grouped in Data Buffer Jobs.

## Data Buffer Usage

Data Buffer is used only in cases when a communication error occurs during the execution of a query or an action. A communication error occurs in case when the external system is not available and it is not possible to connect to, for example the system is down for maintenance or there is a network connection problem. A communication error may occur in case of incorrect connection data too, for example if wrong URL is used. In both cases – correct and incorrect connection data, it is not possible to create a connection to the target system and as result of this the action or query is stored in the Data Buffer and tried to be re-executed at a latter point of time.

Please note that wrong connection data does not include wrong authentication data. If you are able to provide authentication credentials to the system, whenever correct or wrong, that means that the system is available and if the provided credentials are not accepted by the system this is not a communication error. That's why in case of authentication error Data Buffer is not used, as its only purpose is to be used in case of communication problems.

In general the rule is: if the connection succeeds and after that an error occurs during the execution then the query or action is not buffered or if it is in the buffer already it is not resubmitted anymore.

## Data Buffer Entry Lifecycle

Every data buffer entry (action or a query) passes through different states while it is in the Data Buffer. This is controlled by the following properties:

Property	Description
DaysRetention	The number of days the system keeps the data buffer entry.
MaxRetryCount	The maximum number of times you can resubmit requests.
RetryInterval	The number of milliseconds the system waits before resubmitting the query or action request. The scheduler adds one minute to this time, so the real interval is the RetryInterval + 1 minute.

Possible statuses are the following:

Status	Description
Initial	The entry is new to the job queue or has been reset. This status is set when there is an entry with status "Error" or "Initial" in the job group.
Error	The entry failed due to a communications error and its maximum retry count is not reached.
Resubmitted	The entry is currently being processed by the Data Buffer.
Completed with errors	The entry was able to communicate with the backend but something else happened that caused an exception. This is usually a misconfiguration of the action/query. As it is not a communication error the entry won't be resubmitted anymore.
Failed	The maximum number of retry attempts, which is determined by the <b>MaxRetryCount</b> property, has been reached and all retries has failed. All entries from the failed entry job group are marked as "Failed" too.
Expired	The number of days to retain the entry, which is determined by the <b>DaysRetention</b> property, has passed.
Waiting	The entry is waiting to be resubmitted for execution. This status is not used in the latest SPs.

Data Buffer entry is created for an action or a query in two cases:

1. There are already entries from the same job group in the Data Buffer that are waiting to be resubmitted (their status is "Initial" or "Error"). In this case the entry is not executed, instead of this it is put in the Data Buffer for further processing. Such entries enter the buffer with status Initial.
2. The execution of the action/query failed due to communication error. Then it goes to Data Buffer with status "Error".

Only entries with status "Initial" or "Error" are tried to be re-executed. During the re-execution the entry status is changed to "Resubmitted" and after that it is changed on dependency of the result of the execution:

- Successfully execution– then the Data Buffer entry is deleted.
- Connection to the system is created and after that an error occurs. As it is not a communication problem (the target system is available) the entry status is changed to "Completed with errors" and it is not processed anymore.
- Communication error still exists - The status is set to "Error".

Every time when the attempt for the entry re-execution ends with communication error and its status is set to "Error", it is checked if the maximum retry count is reached. In case when it is reached the entry is marked as "Failed" and all entries from its group are marked as "Failed" too. If it is not reached but there is a "Failed" entry in the group then the entry status is also changed to "Failed". Data Buffer does not try to run an entry if its status is "Failed". If you want to enable processing again you have to reset its status manually to "Initial". You can do that through the Data Buffer Entry screen in SAP MII Administration Menu.

You can see the different entry statuses and the transition between them on the diagram below:

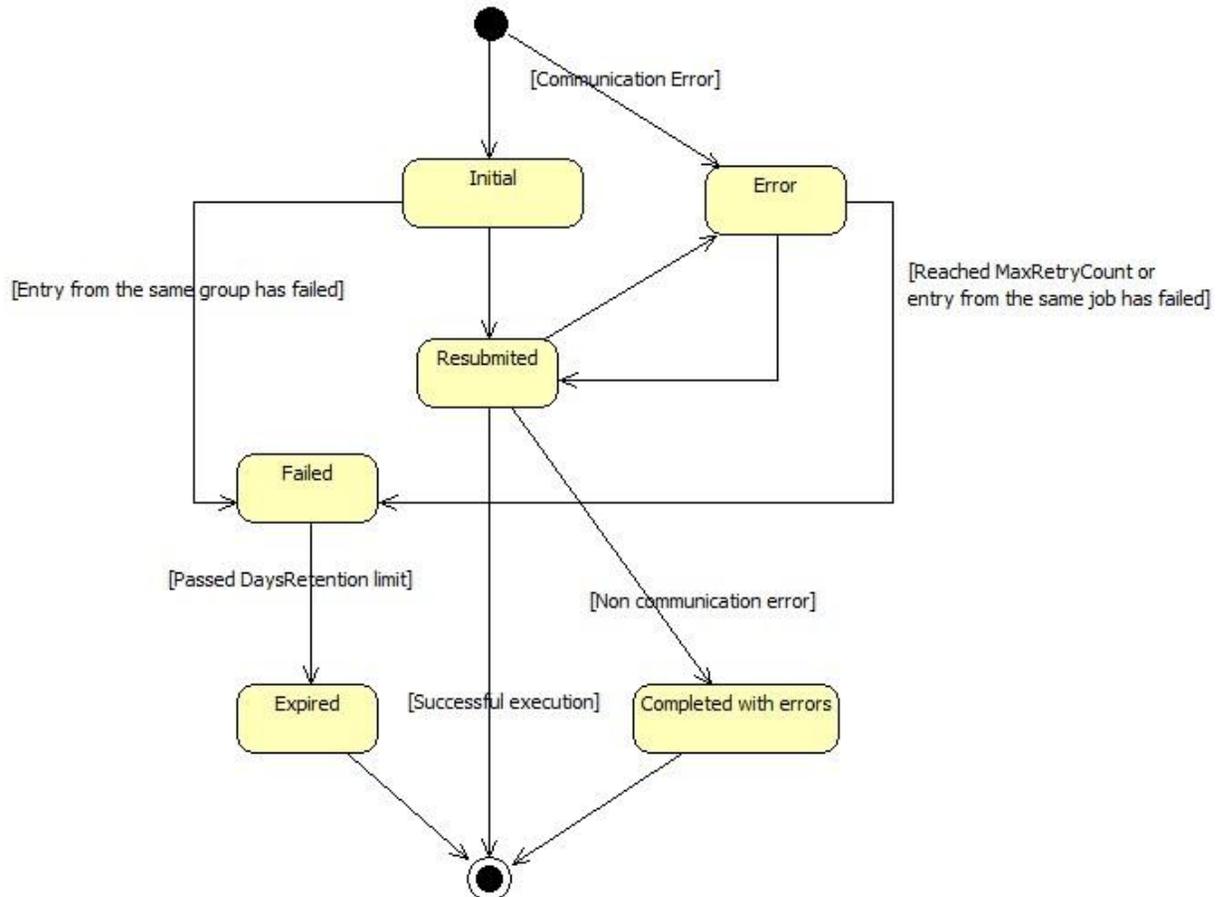


Figure 1: Data Buffer Entry State Diagram

## Data Buffer Jobs

Entries in Data Buffer are not processed one by one independently. Instead of this they are grouped in jobs and the entries are processed within these jobs. Queries are grouped by the Data Server they use. Every action has its own rule for grouping.

Data Buffer Job is created with the first buffer entry and it gets deleted immediately after all the entries were successfully run or completed with non communication errors. If there is at least one entry with status "Expired" the job remains in "Waiting" status until this entry is deleted.

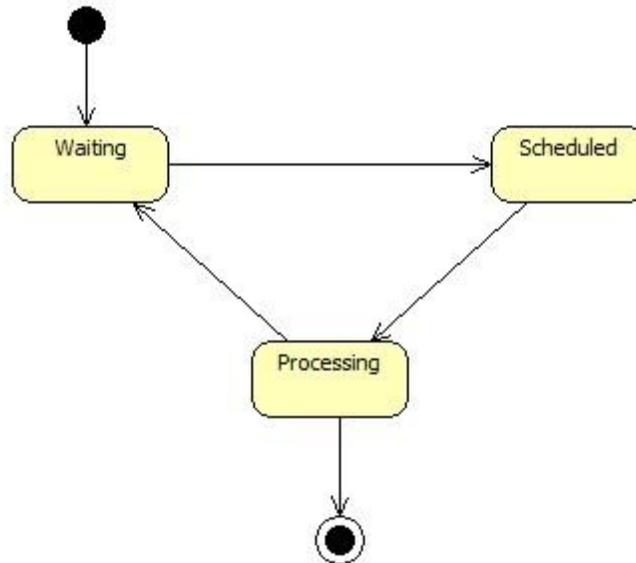


Figure 2: Data Buffer Job State Diagram

The statuses that a job can have are listed below:

Status	Description
Waiting	The job is waiting to be submitted. There is at least one entry waiting to be processed. The job gets back to this status when there a communication error occurs during the resubmission.
Scheduled	Job is submitted for re-execution. Job entries are not resubmitted yet.
Processing	Job is running. Entries from the job are currently processed. If all entries are re-executed without communication error the job is deleted.

MII checks once per minute if there are any Data Buffer Jobs ready to run. A job is ready to be run if its status is "Waiting" and the time of its next run is reached. If such jobs are found their status is set to "Scheduled" and they are submitted for execution. MII uses JMS to submit jobs for execution and this enables clustering. Data Buffer Jobs are sent into the JMS queue and every one of them can be processed on a different server. When a job is running its status is changed to "Processing".

Data Buffer Job processes the entries in the order they entered the Data Buffer (first in first out processing method). It looks for the earliest entry with status "Initial" or "Error". If such entry is found its status is changed to "Resubmitted" and it's re-executed. If the entry is processed successfully it is removed from the buffer or if there was a non communication error its status is changed to "Completed with errors" and it is not processed anymore. In both cases the Data Buffer Job looks for the next earliest entry and continues its performance.

If the entry execution ends with communication error then Data Buffer Jobs stops and its status is set to "Waiting". It will only try the first (earliest) entry at the job group. If that errors it doesn't try any others in the list. The logic is that if you can't talk to the first entry data source then chances are you won't be able to process the rest of them.

Every time when an entry is resubmitted for execution its retry counter is increased and if it reaches the maximum allowed retries the entry is marked as "Failed".

If all entries are completed successfully or with non communication error then the Data Buffer Jobs is deleted. Note that Data Buffer Job stays in "Waiting" status even if all entries are "Expired". In such case it is still checked for scheduled entries every one minute. If you want to avoid that you have to delete all job entries, which will lead to Data Buffer Job deletion, and it won't be checked anymore.

### Data Buffer Job Scanner

As previously mentioned, MII checks once per minute if there is a Data Buffer Job ready to run. This is done by one of the System Jobs and its name is DataBufferJobScanner. It is scheduled to run every one minute and it looks for a Data Buffer Job which has reached its next run time and its status is "Waiting". The time of the next run is calculated by using the RetryInterval configured for the first Data Buffer Entry in the Job and the time of its unsuccessful execution. Note that Data Buffer Job Scanner process only Jobs that already had reached their retry time – this could happen at the moment the scanner started its job or some seconds before that (but not more than 60 seconds because this jobs runs once per minute). For example if the Data Buffer Job Scanner runs at the 20<sup>th</sup> second of every minute, the RetryInterval is configured to be 15 seconds and the connection error happened at 10:10:10am then the next run time of DataBufferJobScanner will be 10:11:20am and this is the time when the entry will be re-run. It won't be processed and 10:10:25 and 10:10:40 as you might expect because of the small RetryInterval. You can see more examples in the table below:

Entry communication error time	Entry RetryInterval	Calculated next run time	DataBufferJobScanner next run time	Actual next run time
10:10:10	15s	10:10:25	10:10:20	10:11:20
10:10:30	15s	10:10:45	10:10:20	10:11:20
10:10:10	3 min	10:13:10	10:10:20	10:13:20
10:10:30	3 min	10:13:30	10:10:20	10:14:20

As the scanner job runs once per minute then the real retry interval that you could expect is RetryInterval + 1 minute. You can see the next time when Data Buffer Job Scanner will be run in the System Jobs Screen in SAP XMII Menu.

## Query

A query goes to the data buffer in two cases (buffering must be allowed):

- There is a query in the data buffer that uses the same Data Server which is waiting to be re-executed (the status of this entry is "Initial" or "Error"). In this case the query goes automatically to the Data Buffer and it is not executed.
- Communication error occurs during the execution of the query.

Note that if the connection succeeds and after that an error occurs during the query execution then the query is not buffered or if it is in the buffer already it is not resubmitted anymore.

Query is stored to the Data Buffer with all the information which is needed for its execution such as the username used to run the query and the input parameters. The only things which are not stored are the Data Server configuration parameters – they are retrieved dynamically during the execution of the query.

Therefore if you had a bad SQL connection for example you can simply modify the Data Server and the next time the Query buffer item runs it will work.

### Query Data Buffer Jobs

Queries which use same Data Server are grouped in one Data Buffer Job. You can see all available jobs through the Data Buffer Job screen in SAP MII Administration Menu.

### Query Data Buffer Configuration

The following queries support data buffering:

- [Alarm Query](#)
- [OLAP query](#)
- [SQL Query](#)
- [Tag Query](#)

To enable data buffering of a query you have to go to **General** screen of your query in the **SAP MII Workbench** and select **Allow Buffering** checkbox.

You can provide a short description that will be visible in the [Data Buffer Entries](#) screen if the query is buffered. The place where you can enter this description is the **Comment** text field in the **General** screen of your query.

How long the query stays in the data buffer and how often it is tried to be executed depends on the configuration of the Data Server used by the query. **DaysRetention**, **MaxRetryCount** and **RetryInterval** properties are configurable on Data Server level, not on a query level.

## Data Servers

The following data servers support data buffering:

- [AlarmSuite Connector](#)
- [IDBC Connector](#)
- [InSQL Connector](#)
- [IP21 Connector](#)
- [OLAP Connector](#)
- OLEDB
- [Open Connector](#)
- [Universal Data Connector \(UDC\)](#)
- [Xacute Connector](#)

The lifetime of the data in the data buffer and the interval for its resubmission is control by the following data server properties:

Property	Default value	Description
DaysRetention	7	The number of days the system keeps the data buffer entry.
MaxRetryCount	5	The maximum number of times you can resubmit requests.
RetryInterval	60000	The number of milliseconds the system waits before resubmitting the query request. The scheduler adds one minute to this time, so the real interval is the RetryInterval + 1 minute.

You can manage these properties through [Data Servers](#) screen in SAP MII Administration Menu.

## Action

An action goes to the data buffer in three cases (buffering must be allowed):

- Action is configured to run “Asynchronous on Error” and there is an action in the data buffer from the same Data Buffer Job group which is waiting to be re-executed (the status of this entry is “Initial” or “Error”). In this case the action goes automatically to the Data Buffer and it is not executed.
- Action is configured to run “Asynchronous on Error” and communication error occurs during the execution of the action.
- Action is configured to run asynchronously. In such case the action is not executed and it goes automatically to the Data Buffer.

Note that if the connection succeeds and after that an error occurs during the action execution then the action is not buffered or if it is in the buffer already it is not resubmitted anymore.

Action is stored to the Data Buffer with all the information which is needed for its execution such as the username used to create the session and the input parameters. Note that only the action is stored to the Data Buffer not the whole transaction and as only the action is buffered it is the only piece of the transaction that is re-run. When the Data Buffer tries to re-execute the action it does not try to execute the whole transaction, it only tries to execute the action which is buffered. All needed information for the action execution is stored to the Data Buffer entry such as the username, connection data and the parameters used to call the action. Once the entry is stored in the Data Buffer there is no way to change these properties. If you modify them in the transaction it won't affect the properties stored in the data buffer entry. They will take effect from the next time transaction is run and action is stored to the data buffer. So if you have a bad configuration the only way to fix it is to delete it so the other entries will be processed. The buffer always tries the topmost entry and if it can't run it never tries the rest in the Data Buffer Job.

For example when a JCo Function Action is stored to the Data Buffer, the JCo Start Session and JCo End Session actions are not stored to the Data Buffer. All connection parameter are cached within the JCo Function action buffer entry. If you change the connection parameters in the transaction they won't be updated in the Data Buffer entry.

## Action Data Buffer Configuration

The following actions support data buffering:

- [SAP JCo Interface](#)
- [SAP JCo Function](#)
- [SAP JCo Execute Queue](#)
- [SAP JRA Function](#)
- [Web Service](#)
- [HTTP XI](#)
- [Web Service XI](#)
- [HTTP Post](#)

Every one of these actions has a set of parameters that control how the action is processed and its lifetime in the data buffer. The following table lists these properties:

Name	Property	Data Type	Default value	Access	Use
Retention Time in Days	DaysRetention	Integer	7	In and out	The number of days the system keeps the data buffer entry.
Max. Retry Count	MaxRetryCount	Integer	5	In and out	The maximum number of times you can resubmit requests.
Retry Interval	RetryInterval	Integer	30000	In and out	The number of milliseconds the system waits before resubmitting the query or action request. The scheduler adds one minute to this time, so the real interval is the <b>RetryInterval</b> + 1 minute.
Processing Type	ProcessingMode	Integer	1	In and out	Specifies the way the action is executed. The values that this parameter accepts are:  <b>1 = Synchronous Processing</b> – the action is executed synchronously. If there is a communication error during its execution it is NOT stored in the Data Buffer.  <b>2 = Asynchronous Processing on Error</b> – Action goes to Data Buffer only if there is a communication error or there is an existing entry in the buffer job for the same group.  <b>3 = Asynchronous Processing</b> – the action is not executed during the transaction execution instead of that it is put directly to the Data Buffer.

## Action Data Buffer Jobs

As it was mentioned before Data Buffer entries are grouped in jobs. Every action type has its own criteria for grouping.

Action	Rule
<a href="#">SAP JCo Interface</a>	They are grouped by the server name they are connecting to. Note that even if the actions are different, if they are configured to connect to same server they are grouped in one job.
<a href="#">SAP JCo Function</a>	The job name is created by using the server name they are connecting to and if a queue is specified it is appended to that name. The format is: <job name> = <server name>   <server name>.”<queue name>
<a href="#">SAP JCo Execute Queue</a>	The job name is created by using the server name they are connecting to and the queue name. The format is: <job name> = <server name>.”<queue name>
<a href="#">SAP JRA Function</a>	These actions are grouped by the JRA Connector Name which is configured in the used SAP JRA Start Session action.
<a href="#">Web Service</a>	They are grouped by the WSDL URL entered in the Web Service Wizard. If the URL is not provided then the WSDL Base URL is used.
<a href="#">HTTP XI</a>	These actions are grouped by the transaction name and the action name. the format of the job name is: <job name> = <transaction name> “.” <action name>
<a href="#">Web Service XI</a>	These actions are grouped by the transaction name and the action name. the format of the job name is: <job name> = <transaction name> “.” <action name>
<a href="#">HTTP Post</a>	These actions are grouped by the URL to which the document is sent.

## Data Buffer Job screen in MII Administration Menu

Data Buffer Screen is available under the Data Services group in MII Administration Menu. You can use it to view information about the available Data Buffer Jobs, such as:

- Job status
- Retry interval
- Next run time
- Job entries - to update or view details of a data buffer job, click View Entry next to the job and Data Buffer screen will appear.

## Data Buffer Entries screen in MII Administration Menu

Data Buffer Entries Screen is available under the Data Services group in MII Administration Menu. You can use it to view the queries or actions which reside within one Data Buffer job and filter by their status. The information which is available for every one entry in the data buffer job is:

Column	Description
Source	The name of the Data Buffer Job
Type	The type of the data buffer entry. There are two available types – “Action” and “Query”.
Status	the status of the data buffer entry
User Name	The name of the user used to run the transaction
Initial Date and Time	The time of the first attempt for process.
Retry Count	The number of attempts for submission.
Comment	If it is a query then the comment entered in the General screen is shown. If it is an action then the error message from its execution is shown.

To view, reset, or delete a data buffer entry click the appropriate icon next to the entry:

Action	Description
Display Data	You can view data stored within the Data Buffer
Display History	You can view the history of entry resubmission. If you reset an entry, the system saves historical data from the initial submissions.
Reset Entry	You can set the number of retries to zero and resubmit an entry the maximum number of times
Delete Entry	you can delete the entry

## Related Content

If you are facing some Data Buffer related issues you can take a look at the following SAP Notes:

SAP Note	Correction
<a href="#">Patch 1 for MII 12.1 SP05</a>	The XI HTTP action not buffering when "Asynchronous mode on error" is selected has been fixed. Data buffering not available with doing JRA calls has been fixed.
<a href="#">Patch 10 for MII 12.1 SP05</a>	The scenario of calling RFC by JRA using data buffering and processing type of "asynchronous processing" has been fixed. Web Service calling asynchronous mode has been fixed. Data not being buffered for virtual data servers has been fixed. The JCo function call producing a data buffer error has been fixed.
<a href="#">Patch 11 for MII 12.1 SP05</a>	The scenario of calling RFC by JRA using data buffering and processing type of "asynchronous processing" has been fixed. Web Service calling asynchronous mode has been fixed.
<a href="#">MII 12.1 SP06</a>	A scenario of calling RFC by JRA using data buffering option and choosing the processing type as 'asynchronous processing' has been fixed. An error message with JCO Function with Data Buffering has been fixed. A scenario of a Web Service calling in asynchronous mode not working has been fixed.
<a href="#">MII 12.1 SP07</a>	Data Buffer Ordering has been corrected.
<a href="#">MII 12.1 SP08</a>	Web Service action corrected so that it will be data buffered when contained in a transaction which also contains a Transaction Call action.
<a href="#">MII 12.1 SP08 Patch01</a>	Message Processing Rules - Transactions used as part of message processing rules use the System User account. An error which prevented data buffering actions in the transaction to fail because of the user account is corrected.

For more information, visit the [Manufacturing homepage](#).

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