Archiving Best Practice

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Audience	Users and Administrators
Summary	The topic of archiving in Exaquantum is complex and often neglected. This guide will cover the terminology used and offer guidance on the correct way to archive.
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Chapter 1 Introduction

Archiving is the process of moving data from the main historian database into individual archive databases. This is required to ensure that the main database does not fill and that both system and database efficiency is maintained.

The topic is often misunderstood and an effective archiving strategy often not in place. Archiving is very flexible with a number of operations available which can make it difficult to choose the Most appropriate settings. This guide explains the topic and offers guidance on the best way to archive.

1.1 Audience

This guide is intended for system integrators and administrators. Specifically, it is intended for the person responsible for maintaining the Exaquantum database set.

Chapter 2 Purpose of an Archiving Strategy

A successful Archiving Strategy has the following main goals:

Prevent the Exaquantum historian database from filling up

If the database fills up, important data will be lost. If the problem is not noticed in time, it may be too late to recover the data. Even if the data is recovered, there could be disruption to system data availability.

Maintaining a fixed amount of space used by Exaquantum

Exaquantum systems are typically installed on systems with fixed size hardware. Although this can be increased, an optimized Exaquantum system requires minimal user administration and intervention.

The amount of disk space used should remain constant within a certain range. This covers the historian database but also the amount of disk space used by archiving.

Ease of administration

The strategy should ensure that the required amount of data is available to the system and that data not online is correctly catalogued in case it is needed in the future.

Self-sufficiency

A good archiving strategy should not require significant user attention. If run optimally, the only ongoing actions required are the annual creation of new archive devices (see section 5.6).

Chapter 3 Archiving Basics

Archiving in Exaquantum is crucial to ensure that the main historian database does not fill up. If it becomes full, data will be lost.

Setting the historian database to auto-expand is not a solution because in time the disk will become full which is even more difficult to recover from.

This chapter describes the basics of archiving and explains the terminology that is used.

The term archiving suggests that data is being removed from use as it is no longer in frequent use. Archiving does have that purpose, but it also deals with current data that is still needed.

Having data in multiple smaller databases improves data reading speed and makes it easier to recover should the system fail.

An archiving strategy should be designed alongside an effective backup strategy, so the data availability and recovery are optimized.

A backup strategy is not in the scope of this document, partly because there are many different ways that it can be achieved depending on customers' own requirements and IT policies.

More information is available in the Exaquantum manual set. The subset contained in this document is that required to configure an archiving strategy.

See Chapter 7 Further Reading for more details.

3.1 Glossary

The table below covers terms that need to be understood to work with the archiving process.

Term	Meaning
Main Historian	The QHistorianData database that stores process and alarm and event data as it arrives.
Archive Database	A SQL database that contains a subset of data moved from the main historian, delimited by start and end time.
Archive Group	One of a number of categories by which data is grouped. Each archive database contains data from only one archive group.
Archive Device	A SQL backup device that contains database backups of archive databases so that they can be restored in the future as needed.
File backup device	Used only during Manual archiving, each archive has a distinct SQL backup file.
Manual Archiving	An archive database created by manually clicking the save button in the Archiving UI.
Automatic Archiving	A process whereby archives are created automatically based on threshold settings.
Online Archive	An archive database which has data is immediately available to users.
Offline Archive	An archive database which has data that is not immediately available to users. An offline archive must be restored to become an online archive.
Restore	The process of moving an offline archive to an online archive, thus making the data contained immediately available to users.
Unrestore	The process of moving an online archive to an offline archive, thus making the data contained unavailable to users.
Save	The process of creating an archive and taking a backup of it. Or if already created, making a database backup of the archive.
Candidate	An amount of data that is available to archive based on the number of days requested set in the Archive Period and the maximum allowed size of an archive. Candidates can be changed by altering the number of days and the maximum size.
Retention Period	The minimum amount of data that must be present in the main historian. Data that exceeds the retention period will be considered for archiving.
Archive Period	The amount of data in days or months that each archive should contain. Note that if the archive period would cause the maximum archive size to be exceeded, the candidates are split to ensure the size is not exceeded.

3.2 Archiving Mechanism

The basic steps of an archive operation are:

3.2.1 Create blank database

When data is marked for archiving, a new archive database is created. This is first created as a blank database using standard SQL function which is to take a copy of the model database. At this point, the database has no data and no users and is called QArcTemp. Note that the model database must not contain specific user groups as this can lead to a duplication error when security groups are added in the next step.

3.2.2 Copy data from historian to new database

The data marked as being contained within the archive candidate is copied from the main historian to the archive database.

At this point, the data is in the new database and the historian. Once copied, security is added to the archive database and it is renamed. Note that if the security groups are already added to the blank database, a failure may occur. Archive databases are named with an ascending number shared by all archiving groups. No reference to the archiving group is included in the number.

3.2.3 Delete data from historian

Once copied successfully, data is then deleted from the historian. At this point, the data is only in the archive database.

3.2.4 Backup archive database

After the data is copied and deleted, a backup of the archive database is made to a SQL Server backup device.

In auto-archiving, the backup can be performed separately to the creation of the archive.

3.2.5 Update configuration database

Once all operations are completed, the QHistorianAdmin database is updated. This includes an Archives table in QHistorianAdmin database that stores information about each archive such as the data range, the archive group that it belongs to and the archive status including availability.

3.3 Archive Groups

Exaquantum data is divided into archive groups. Each archive contains data from only one archive group. Each archive group can have individual settings to suit its specific purposes.

Note: The maximum archive size is common to all archive groups.

Full details of the archive groups can be found in the manual set but they are covered in brief in the table below:

Archive Group	Description
Raw Slow	Process data with update rates of more than 5 seconds (default value which can be changed).
Raw Fast	Process data with update rates of less than 5 seconds (default value which can be changed), calculation tags and manual tags.
Reference Data	Engineering units, descriptions and engineering range.
Alarm and Events	Alarm and event messages from the DCS such as process alarms and mode operation messages.
Hourly and Custom Aggregations	Data calculated on an hourly or custom period such as min, max and mean.
Daily Aggregations	Data calculated on a daily period such as min, max and mean.
Monthly Aggregations	Data calculated on a monthly period such as min, max and mean.
System Events	Activities such as restarts, archiving, tag writes and tag creation.
System Audit Trails	Audit trails for tag changes, user connections and other system changes.
Trend Annotations	Markings made to trends.
Exaquantum Diagnostics	Performance tags created within Exaquantum.

Note, some archive groups are only applicable in more recent versions of the software

3.4 Archiving UI

The archiving UI is where all manual archiving operations are performed and where automatic archiving options are set-up.

The archiving UI is accessed via the Exaquantum Administration Tools under Database Management.

Full details of the archiving UI can be found in Exaquantum PIMS Users Guide. Some parts are described below:

3.4.1 Archive Groups

Allows selection of an archive group; see section 3.3 for a list of groups.

3.4.2 Archive Period

This figure defines the amount of data contained in a single archive. The number of days should be considered with the maximum archive size configured via the Advanced button. If the archive period would create a candidate larger than the maximum size, the archive will be split so that the maximum size is not exceeded.

3.4.3 Candidate/Archive List

A list of candidates and archives is shown. This is generally self-explanatory but the Size field needs to be viewed with caution.

When a candidate is shown, an estimated size is also included in the size field. This estimate can be affected by factors such as previous archives and the SQL Server calculation that is used. This means that sometimes this estimate is incorrect.

Once the archive is created, the size field is correct. The size shown in the description is not updated.

3.4.4 File / Device selection

Allows the selection of either file or device as the location of archive backups.

If File is chosen, each archive will be backed up to an individual device on the disk. The location and format of the File device is configured using the Advanced button.

File is only available for manually archives.

If Device is selected, a SQL server backup device can be selected from those configured in SQL Server. It is not possible to create a new device from the UI. The device shown will be the one used for future archive operations until changed. The device does not change if a previous archive is selected in the UI.

3.4.5 Save Button

The button has two purposes. If a candidate is selected the Save button will create an archive and create an archive backup. Only the oldest candidate can be selected.

If an archive is created manually, it cannot be considered for automatic offline.

If an archive is selected, the Save button will make a backup of the archive database, stored as a file or in a device as selected in the UI (see section 3.4.4).

3.4.6 Restore Button

Changes an archive from offline to online making it available for system users. The correct archive device must be selected from the drop down before the archive can be restored.

3.4.7 Unrestore Button

Changes an archive from online to offline making it unavailable for system users. Archiving can be set to automatically set an archive offline when it is first created. This is set via the Advanced button.

3.4.8 Delete Button

This button allows the data in an archive candidate to be deleted. This means that no archive database will be created and the data cannot be restored to the system at a later date.

It is not possible to delete an archive using this button.

The Delete button should only be used if the data will never be required by the system.

3.4.9 Group Advanced Button

This button controls Auto-archiving. It is covered in a later section that covers the settings required.

3.4.10 Advanced Button

The advanced button is used to set certain parameters that apply to all archive groups.
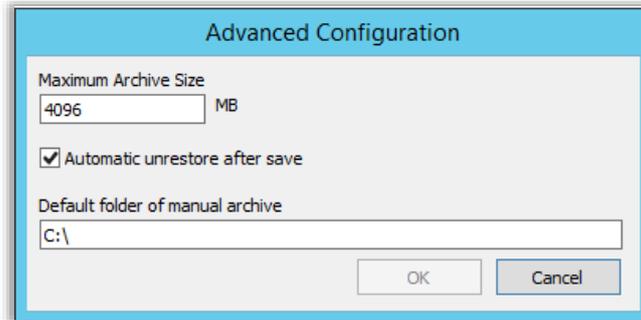
3.4.10.1 Maximum archive size

The largest size in MB that an archive database should be. The optimal size is around 2-8 GB. More information on setting this can be found in section 5.3.1.

3.4.10.2 Automatic unrestore after save

Checkbox that will automatically set an archive to be offline after it is created and saved. This should be unchecked when creating an archiving strategy using automatic archiving.

3.4.10.3 Default folder of manual archive

This file location is only for archives that are created manually and use the File device selection. It is not relevant when creating an archiving strategy using automatic archiving.

3.4.11 Status Key

A key showing the different archive statuses is included in the UI. The table below describes them.

Symbol	Status	Meaning
None	Candidate	The selected data block is listed as a candidate. It resides in the QHistorianData database. The size and the number of days covered can be adjusted.
	Online, saved	The data block is in an archive which is available to users (online) and has been backed up (saved)
	Online, not saved	The data block is in an archive which is available to users (online) but yes not been backed up (saved).
	Online, needs re-save	The data block is in an archive which is available to users (online). It has been restored from a backup taken from a previous Exaquantum release and updated automatically to be compatible with the current release. It is possible to make a further backup in the current form which would be compatible with the current release without need for a configuration update. This is not a mandatory action and best practice does not require a further backup to be taken.
	Offline	The data block has been archived and backed up but the archive database is currently not available to users (offline). It can be restored from an archive device if needed.
	Removed	The data block was deleted from the system without being archived. This data is not available to users and cannot be restored as there is no backup.

3.5 Movement of data through the Archiving process

The table below shows an illustration of how data is located as it is archived. The illustration uses an example set of configuration parameters. The parameters set at each site will vary depending on customer requirements and data throughput.

It is important to note that data is only in one place at a time.

For the example, the following settings are applied to the system:

Setting	Value
Archive period	30 days
Retention Period	60 days
Automatic offline period	90 days

January data starts in the main historian as it is collected. After the 60 day retention period it becomes available for archiving once the amount of data equals the archive period. This means that the data is in the historian for 60 days + 30 days before it is archived.

Once archived, the data is removed from the QHistorianData database and is held in an archive database, Archive databases are named using a system generated sequential number.

The archive database is kept online until the Automatic offline period is reached. This value sets the number of days that an archive is kept online. The setting does not consider archive period or retention period. When the archive exceeds the automatic offline period, the archive database is taken offline and the data is not available to system users.

If the data is needed again in the future, the archive database can be restored from the relevant archive device.

Month	Location of January data	Archive Status
January	QHistorianData	None
February	QHistorianData	None
March	Archive Database	Online, saved
April	Archive Database	Online, saved
May	Archive Database	Online, saved
June	Not available	Offline

Chapter 4 Manual and Automatic Archiving

There are two ways that archives can be created, manually and automatically. The two methods are compared in this chapter.

4.1 Manual Archiving

As the name suggests, manual archiving requires each step to be executed via the UI.

4.1.1 Advantages of Manual Archiving

Manual archiving is useful when archiving is being configured to test that archives can be created and that archive device locations are available.

Manual archiving is useful for troubleshooting the archiving process. If an archive or save has failed, activities can be carried out manually. For example, if an archive device did not have room for more archives, this situation can be corrected and the archive save retried.

Another good use of manual archiving is if a device is changed or an archive is saved to the incorrect device. Manual archiving allows a second copy of an online archive database to be saved to a second archive device.

Manual archiving must be used if individual File backups are required (as opposed to Device backups). An Individual File Backup is a SQL Server backup file created for a single archive. This topic is covered earlier in section 3.4.4.

4.1.2 Disadvantages of Manual Archiving

Manual archiving is time consuming since each operation must be executed individually. The UI does not contain provision for bulk archiving operations that allows multiple candidates or archives to be selected.

Using manual archiving makes it more difficult to maintain a fixed historian database size as it relies on user operation. There is a risk that the database will fill up if manual operations are missed.

Manual archives are not considered for automatic offline. Therefore any archives that are created manually, must also be taken offline manually.

4.2 Automatic Archiving

Automatic archiving is configured using the archiving UI. It then carries out activities automatically, starting at midnight local time each day.

4.2.1 Advantages of Automatic Archiving

The main advantage of automatic archiving is that once configured, actions are taken without the need for significant user actions. This makes it the obvious choice when the objectives of archiving are considered since it is the more reliable way to ensure that database sizing and data availability are kept consistent.

Automatic archiving overcomes the absence of a bulk archiving function as archiving is performed as needed including multiple operations. This is useful if a strategy is altered. For example, if the amount of data to be held in archives is increased from 90 to 180 days, a simple change in the archiver UI will ensure that all the changes are made automatically.

4.2.2 Disadvantages of Automatic Archiving

Automatic archiving is not designed for trouble shooting. If archiving is failing, manual archiving is best suited to investigate.

Similarly, since automatic is an unattended operation, if it fails it is possible that this will not be noted. This can lead to the database filling. It is therefore important to monitor the Exaquantum system including the success of archiving.

It is also important to monitor the size of archive devices as these will become large over time. The refreshing of these devices should be part of the archiving strategy and is covered elsewhere in this document.

Automatic archiving does not consider manually created archives for automatic offline. If archives are created manually, they will need to be taken offline manually.

4.3 Summary

Automatic archiving is the best method to use for an archiving strategy. Manual archiving is best used for troubleshooting and special operations.

Even with automatic archiving, it is necessary to monitor the system from time to time.

Chapter 5 Recommended Archiving Strategy

Once a solid understanding of the archive process has been achieved, it is possible to create an effective archive strategy.

5.1 Preparation

In order to create an effective strategy, some knowledge of the system and data requirements is needed.

5.1.1 Disk Space for Historian

The size of the disk available will affect the maximum size possible for the historian. This in turn will affect the amount of archiving that is needed.

The goal is to have a fixed size historian database that is easy to backup and small enough to allow efficient reading.

A size of between 100 and 200 GB is recommended.

5.1.2 Disk space available for Archive databases

It is common to have archive databases on the same physical disk as the historian. If this is the case, it is important to understand how much space will be allocated to the main historian and how much to archives.

The amount chosen will depend on the data requirements.

5.1.3 Disk space available for archive backups (Devices)

Archive devices contain SQL backups of archive databases. It is bad practice to have the archive devices so that they only exist on the same physical disk since if the disk fails, you lose the database and the backup.

However, it is acceptable to have the devices on a local disk as long as they are backed up regularly to an external device/location.

Archive devices should not be allowed to grow large as this makes them difficult to manage. It is recommended that a new set of devices is created for each year of data.

5.1.4 Data Requirement

It is important to understand the data requirements of the system in order to create an archive strategy. This should be agreed with the customer.

There are three states for data to be in. Data is either:

Online – available instantly to the business. This includes data that is in the main historian and data that is in online archives. Data in this stage can be requested on demand by the business at any point. The balance between data that is in the historian and data that is in online archives is determined by other factors defined in this chapter.

Offline – Available to the business by restoring an archive. This includes data that is in offline archives. This is data that can be restored to the system, for example to compare current performance to that of a period of time from the past.

Discarded – This is data that the business will no longer require at any time in the future. There will be no copy of this data available, even if it was originally archived.

5.1.4.1 Example Data Requirement

A business may need to have data instantly available from the last 12 months. It may then need data from the last 5 years to be available if needed but have no requirement for any data that is older than 5 years.

This means that 12 months of data is online, data between 12 months and 5 years is available offline in archive devices and archive devices with data older than 5 years is not kept.

Data Range	Data Requirement	Data Location
0-12 months	Online	Historian or online archive
12 months to 5 years	Offline	Archive devices
Over 5 years old	Discarded	None

It is important to note that the archiving strategy needs to cover all archive groups and the data requirements may not be the same for all groups.

As an example, a business may want to retain Raw data for only 6 months but keep aggregation data for 2 years.

5.2 Strategy Checklist

The following information is needed to create the archiving strategy. An example is included in the tables below. This can be modified to suit specific customer requirements.

5.2.1 System Items

Item	Value
Agreed Target size of QHistorianData database	200 GB
Amount of space available for archives	500 GB
Amount of space available for archive backups	500 GB

5.2.2 Data Requirements

Archive Group	Range online	Range Offline	Range Discarded
Raw Fast	1 year	1-5 years	5 years +
Raw Slow	1 year	1-5 years	5 years +
Reference Data	1 year	none	1 year +
Hourly/Custom Aggs	2 years	2-5 years	5 years +
Daily Aggs	2 years	2-5 years	5 years +
Monthly Aggs	2 years	2-5 years	5 years +
System Events	1 year	None	1 year +
System Audit Trails	1 year	None	1 year +
Trend Annotations	1 year	None	1 year +
Exaquantum Diagnostics	1 year	None	1 year +

5.3 Strategy Creation

Once the sizing and data requirements are known, the strategy can be created.

5.3.1 Determine the archive period for each group

The size of each archive can be tuned by using the UI. It is important to have the size set appropriately.

Archives that are too small bring unnecessary administration and cause a problem if the number of archives becomes large, particularly for alarm and event archives which have a limit.

Archives that are too large can cause problems for system performance since tables need to be locked when data is removed.

An optimum size for a single archive is between 2 and 8 GB. It is recommended that the maximum archive size is set to 4 GB. Note that this is a global setting that applies to all archive groups.

To tune an archive group, open the Administration Tools and open the Archiving Page, found under Database Management.

The example below shows the Raw Slow Archive Group. Note that Size is shown in MB.

The screenshot below shows the effect of a 1 day archive period. The archives are generally around 115 – 120 MB.

This will produce more archives than are needed.

Changing the Archive Period to 14 days gives archives around 1.5 GB. This is better but still not optimum.

Changing the Archive Period to 30 days gives archives around 3.5 GB. This is an optimum size.

The Archive Period can be increased to 60 days. Archive will still be optimum in size but the range of each archive will be reduced since Exaquantum will split the candidate into archives that do not exceed the maximum permitted archive size which has been set at 4 GB.
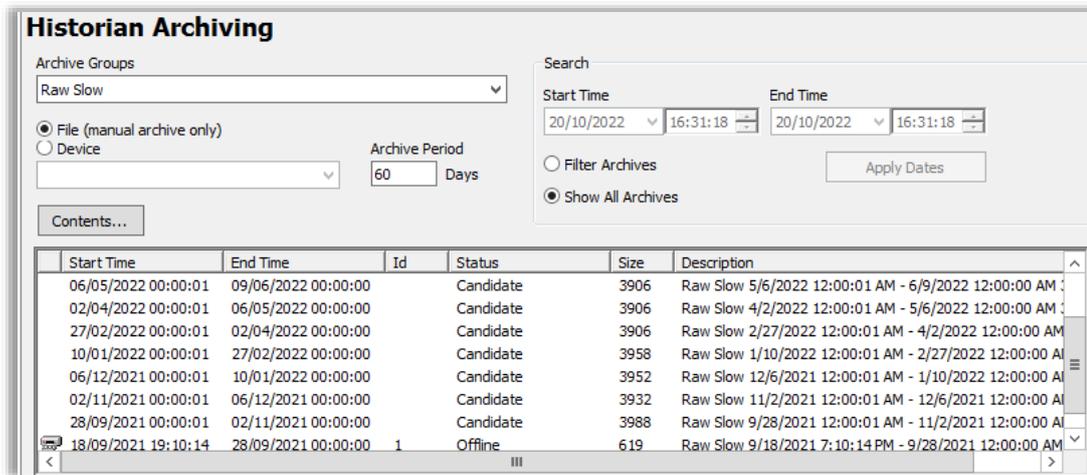
This can make administration difficult since duration is inconsistent.

In this case, an Archive Period of 30 days is optimal.

This process should be carried out for all Archive Groups.

Note that the system in the example above has been running for some time. It is difficult to set the optimum values when a system is first created.

A follow up visit for archiving should be scheduled for some time after initial installation.

5.3.2 Setting the Automatic Archiving Options

There are a number of options that need to be set when setting up automatic archiving. These are accessed by clicking on the Group Advanced button on the Archiving UI.

Settings can be different for each group.

The options available are shown in the dialog below. Explanations can be found in the table.
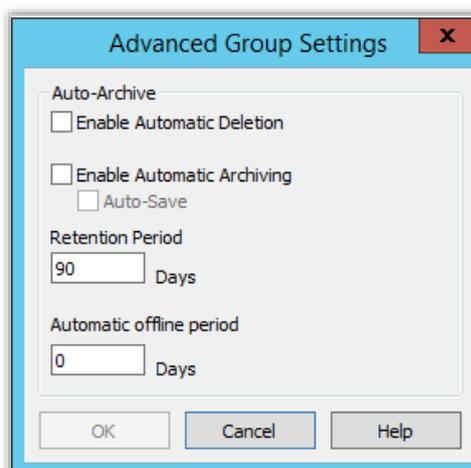

Figure showing default options for automatic archiving.

Setting	Format	Description
Enable Automatic Deletion	Checkbox	When checked, archive candidates will be considered for deletion. This setting will cause data to be removed and not retained in any database.
Enable Automatic Archiving	Checkbox	When checked, archive candidates will be considered for archiving. This setting allows data to be moved to a separate database for efficiency and storage purposes.
Auto-Save	Checkbox enabled when Auto-Archiving is checked	When checked, archives created by auto-archiving are also saved to the nominated device. If they are not saved, they will need to be saved manually.
Retention Period	Field specified in days or months	The amount of days or months that data that will kept in the main historian database before being considered for automatic archiving or deletion. For ease of administration and understanding, this figure should be a multiple of the archive period.
Automatic offline period	Field specified in days or months	The amount of days or months that data will be maintained in an archive before being considered for offline. A value of 0 means that archives are set offline immediately.

It is important to note that there is always a period of data that is held in the main historian that exceeds the retention period but does not exceed the retention period and the archive period combined.

As an example, settings for the Raw Fast archive group may be configured as shown:

| Setting	Value
Archive period	30 days
Retention Period	60 days
Automatic offline period	90 days

With these settings, there will always be 60 days of data in the main historian. After 60 days, the data can be considered for archiving.

Since the archive period is 30 days, it will need 60 + 30 days = 120 days before data can be archived.

The data is then kept in archives for another period which equates to the Automatic offline period. Once that has elapsed, the data will be taken offline.

The following table covers the life of a new database set with the above settings for illustration:

Days elapsed	Data in historian	Data in archives	Total data	Comment
1	1	0	1	< retention period of 60
29	29	0	29	< retention period of 60
30	30	0	30	< retention period of 60
59	59	0	59	< retention period of 60
60	60	0	60	retention period of 60 reached so data can be considered for archiving
89	89	0	89	More than retention period but a 30 day archive would go below retention period of 60
90	60	30	90	More than retention period and enough data for a 30 day archive without going below retention period of 60
119	89	30	119	More than retention period but a 30 day archive would go below retention period of 60
120	60	60	120	More than retention period and enough data for a second 30 day archive without going below retention period of 60
149	89	60	149	Data in archives is less than 90 day offline period
150	60	60	120	Data in archives meets 90 day offline period so the first archive can be taken offline
179	89	60	149	Database sizing achieves equilibrium
180	60	60	120	

Data Distribution for first 180 days of System
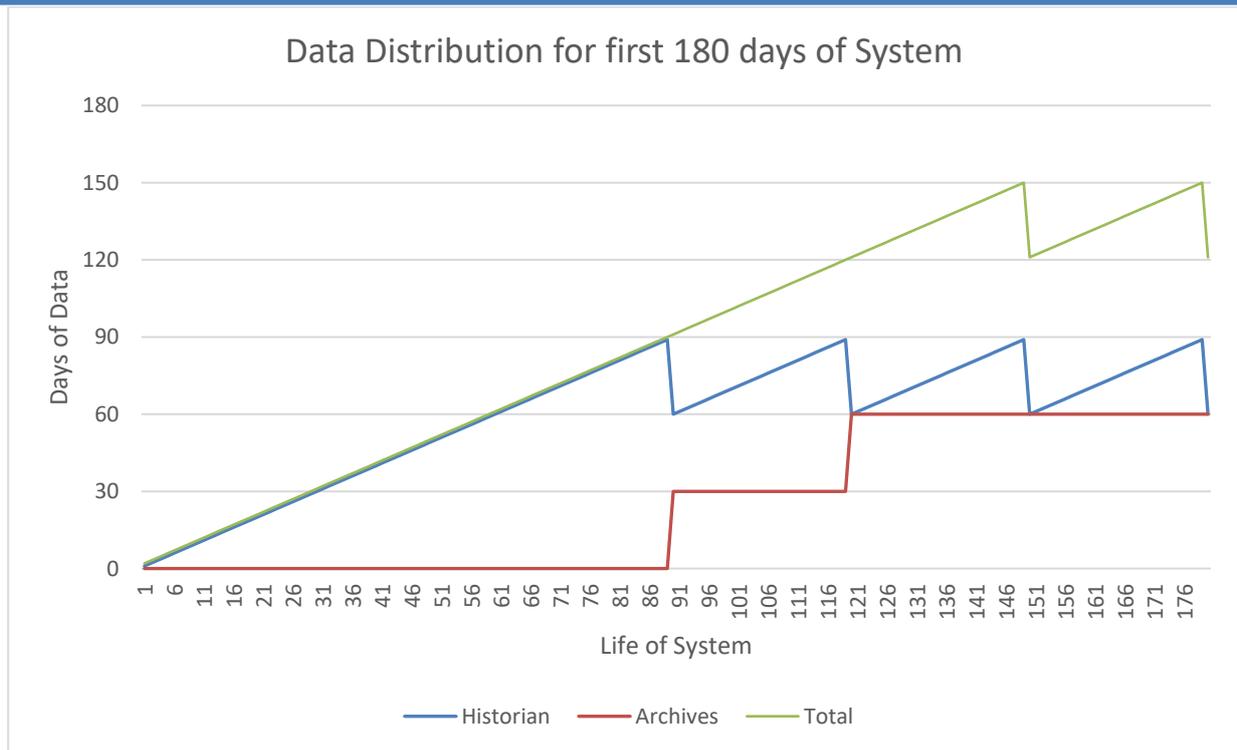
5.4 Creation of Archive Devices

Archive devices contain backups of the archive databases. They do not provide data to users directly. Archives are backed in in archive devices so that the databases can be restored as needed.

An archive device is a standard SQL server backup device and is normally suffixed with .BAK .

Archive devices are created in SQL Server and assigned using the Archiving UI. It is important to note that an archive device is both a logical file held in SQL server and a physical file on the file system.

5.4.1 Naming of Archive Devices

Each archive group requires an archive device. These can be shared among archive groups. For example, Raw Fast and Raw Slow can be stored on a device called Raw_Data and Hourly & Custom, Daily and Monthly aggregations can be stored on a device called Aggregation_Data.

Over time, an archive device will become large and this will impact the available storage capacity.

Revisiting the purpose of an archiving strategy, it is important to maintain consistent sizing for all components, including archive devices. It is recommended that archive devices are replaced annually to satisfy this requirement. This also assists with administration as it will become clear which device would be needed should an archive need to be restored.

The table below provides a recommendation for archive devices.

| Archive Group	Archive Device Name	Comments
Raw Slow	Raw_Data_*yyyy*	Example, Raw_Data_2020. Renew annually. Can be combined with Raw Fast
Raw Fast	Raw_Data_*yyyy*	Example, Raw_Data_2020. Renew annually. Can be combined with Raw Slow
Reference Data	Sundry_Data_*yyyy*	Device can be used for multiple low volume groups
Alarm and Events	AE_Data_*yyyy*	Device solely for Alarm and Event data
Hourly & Custom Aggregations	Agg_Data_*yyyy*	Device can be used for all aggregation groups
Daily Aggregations	Agg_Data_*yyyy*	Device can be used for all aggregation groups
Monthly Aggregations	Agg_Data_*yyyy*	Device can be used for all aggregation groups

| Archive Group	Archive Device Name	Comments
System Events	Sundry_Data_*yyyy*	Device can be used for multiple low volume groups
System Audit Trails	Sundry_Data_*yyyy*	Device can be used for multiple low volume groups
Trend Annotations	Sundry_Data_*yyyy*	Device can be used for multiple low volume groups
Exaquantum Diagnostics	Sundry_Data_*yyyy*	Device can be used for multiple low volume groups

5.5 Creation of an Archive device

Archive devices are created in SQL server. Follow the steps below to create a device. The example shows a device that will be used to store Raw data that was collected in 2021.

5.5.1 Procedure

1) Open SQL Server Management Studio

2) Expand Server Objects and select Backup Devices to show current devices
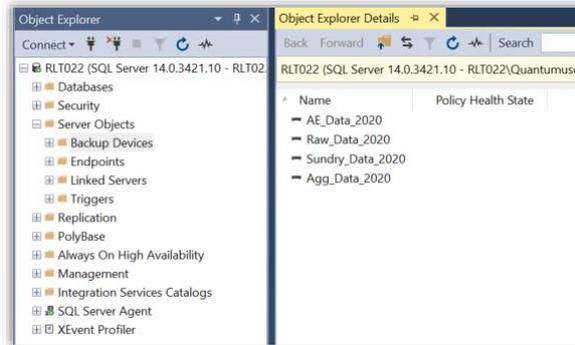
3) Right-click on Backup Devices and select New Backup Device

4) Fill in the fields as shown
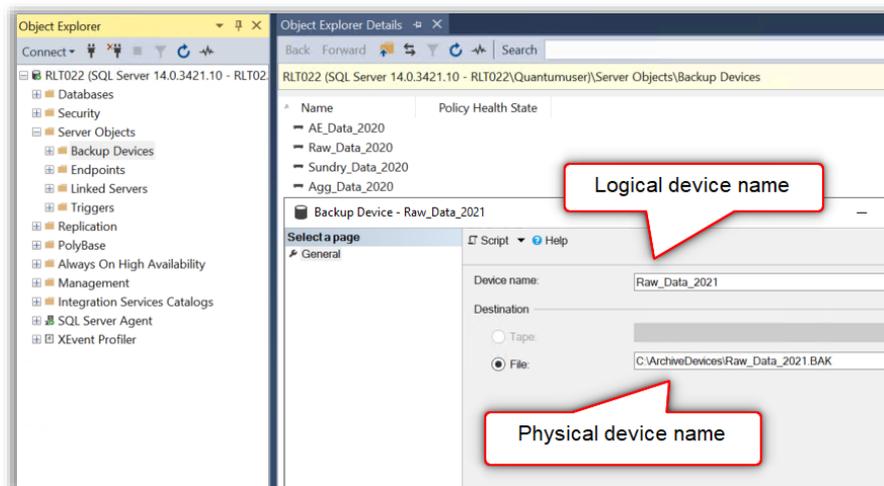
5) Click ok and confirm that the device is added to the list

5.6 Assignment of New Archive Device

When the device is created, it needs to be assigned to the relevant archive group in the Archive UI.

5.6.1 Procedure

1) Open the Exaquantum Administration tools

2) Navigate to the Historian Archiving page and select the Raw Slow group

3) Use the device dropdown to select the New Device
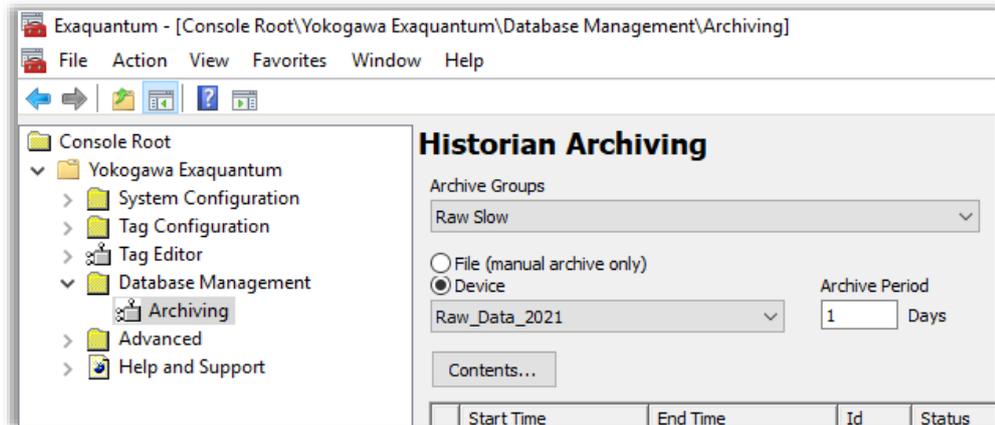
4) Changes should be applied immediately

5) Repeat steps 2 and 3 for the Raw fast Group is the device is shared

5.6.2 Creation of Physical file

The physical archive device file is not created when the logical file is created. It is only created when the first archive is created.

5.6.3 Offline Backup of Archive device

It is common to place the archive backup devices on the Exaquantum server. This is acceptable but regular backups should be taken to an offline location in case the Exaquantum server fails.

5.7 Archives in the wrong device

It is possible that archives may be added to the wrong device due to misadministration or late refresh of archive devices.

This is best rectified by adding the archives to the correct device manually. Although it means that the archives will be present in two devices, this causes no significant issue and will make administration easier.

An example would be if data from 2021 was archived on the Raw_Data_2020 device as a new device was not created in time.

Keeping the archives on the Raw_Data_2020 is not a problem and it is not possible to delete an archive database from an archive device. The correct solution is to make a second copy of the archive in the correct device. This would mean that once the Raw_Data_2021 device was created, the Save button can be used to make a second copy of the archive in the correct device.

This method can also be used for those cases where the archive database covers two years. It is better from an administration point of view to have the databases in both devices so it will be available whichever device is selected.

Chapter 6 Troubleshooting

This document is intended to deal with the understanding and set-up of archiving and the creation of an archiving strategy. It does not deal specifically with problems found during archiving in this version, although common issues found will be included in the next version of the document.

However, this chapter does contain some guidance on troubleshooting the archiving process. This is intended as an initial guide before contacting a support channel.

6.1 Checking Archiving

From time to time, it is recommended that archiving is checked to ensure that it is performing correctly.

This check should cover the following actions.

6.1.1 Check Archive Groups have correct data

Select each archive group in turn and verify that the amount of data seen as online matches the settings configured via Group Advanced button.

This is achieved by subtracting the start date of the oldest online archive from the end date of the most recent archive. This should match the number of days configured in the automatic offline period, i.e., the amount of data held in online archives.

Secondly, subtract the start date of the oldest candidate from the current date. This should equate to the retention period setting.

The results can be out by up to the number of days configured in the archive period as the archiving process needs to wait for enough days to create a new archive database or take an online archive offline. Therefore, small discrepancies do not need to be investigated in depth, particularly if there is a large archive period configured.

If the amount of data is different from the configured settings by more than 2 times the archive period, further investigation is needed.

6.1.2 Check that archives are saved as well as created

If the recommendations of this guide are followed, the archive database should be backed up after it has been saved.

If a check shows archives that are online but not saved, further investigation is needed.

6.1.3 Check Correct Archive devices are in use

Verify that the correct archive devices are assigned to the correct archive groups. If the proposed naming convention is used, it will be easily clear if this is not the base by comparing the start and end dates of the last archive with the name of the archive device assigned.

If the last archive contains a data block from the 1st to the 31st of January 2022 and the archive device is named Raw_Data_2021 then the wrong device is being used. Refer to the section to understand more about this check.

6.2 Investigating failures

If archiving has not been successful, further investigation is needed. The best place to look is the Windows Application Event log.

The event log may contain errors that relate to recent attempts to archive. Auto-archiving errors are likely to be seen starting at just after midnight.

Many of the errors are clear in meaning, reporting failures to access files in certain paths or lack of available space. It may be possible to resolve these issues immediately.

Other errors are more complex and will need to be investigated via a support channel. To progress such issues, the event log needs to be captured and sent to the relevant support channel.

Chapter 7 Further Reading

For more information on archiving, refer to the relevant manual:

Exaquantum Explorer User's Manual Volume 3 – IM 36J04A12-03E.

More support is available from:

- Website www.ymx.yokogawa.com\support
- Knowledge base www.ymx.yokogawa.com/knowledge-base
- Email support@ymx.yokogawa.com

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Highlights

The Highlights section gives details of the changes made since the previous issue of this document.

- ## Summary of Changes

This is Issue 1.0 of the document related to Product Library version 1.0.

- ## Detail of Changes

The changes are as follows:

Chapter/Section/Page	Change