

SIEMENS



Application Example • 08/2016

# Basics and Plant Configurations of PH / IS 2014 SP2

SIMATIC Process Historian / SIMATIC Information Server



<https://support.industry.siemens.com/cs/ww/en/view/106264271>

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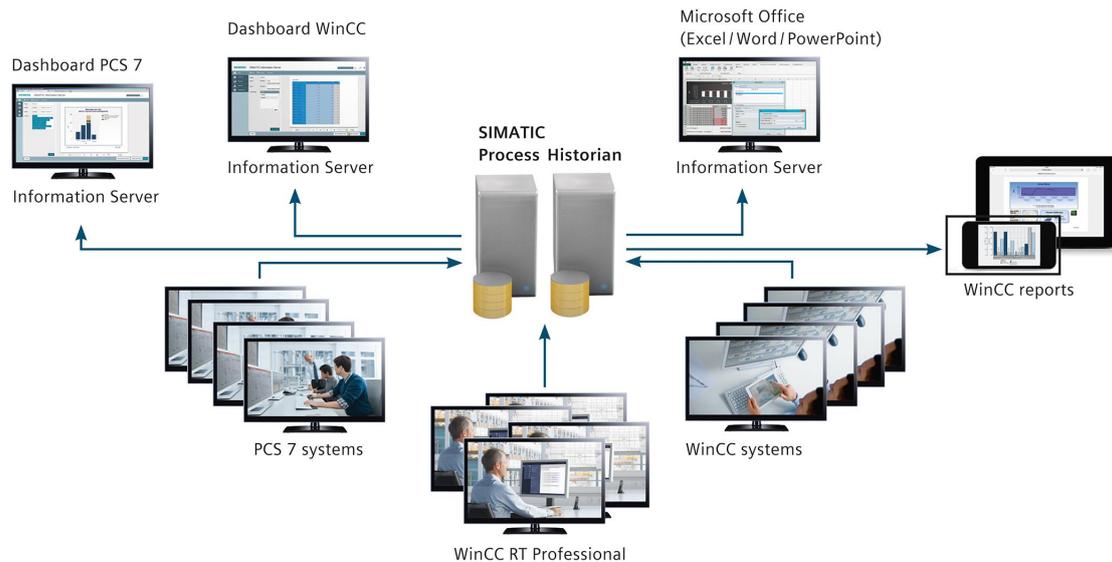
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# 1 Task

## Introduction

Using the SIMATIC Process Historian as well as the central archiving system and the SIMATIC Information Server as the respective reporting system enables you to archive process data, such as process values and alarms for example, from single-user applications as well as complex multi-user systems with redundant servers and clients and access this data.

Figure 1-1



## Process Historian and Information Server on one system

**Note** Process Historian and Information Server can be installed and operated on the same system. In this case, both server applications share the existing hardware resources. Depending on the frequency of the data requests by the WinCC Client systems and Information Server clients, systems with higher-value equipment are recommended. The main memory should at least have 32 GBytes.

**Note** Commissioning and installation of SIMATIC Process Historian and SIMATIC Information Server is described in the document "Installation and Commissioning of PH / IS 2014 SP2" contained in this entry.

## Main topics of this application

The following topics will be discussed in this application example:

- Various plant configurations with Process Historian and/or Information Server
- Required licenses
- Examples of quantity frameworks
- Overview of the various segment types

### **Assumed knowledge**

Basic knowledge of the topics listed above is assumed.

- Basic configuration with WinCC V7.4. Only the steps required additionally for the respective setup will be explained.
- Network configuration
- Process connection of WinCC V7.4 components
- Basics of Microsoft Windows operating systems

## 2 Process Historian, general information

### 2.1 Process Historian is the archive server for PC 7, WinCC and WinCC TIA Portal

SIMATIC Process Historian is the central, high-performance archiving tool for all SIMATIC SCADA and process control systems.

You can archive all process data and messages of WinCC V7 and WinCC Professional (TIA Portal), as well as batch reports of SIMATIC Batch on a central server and in real-time.

Access to the relocated data on the Process Historian without adaptation, modification or similar, is handled from WinCC

**Note** Using the current PHready component enables storing data of an older system on the current Process Historian. This storage is performed system granular, that is, process data of another system cannot be displayed on the client side (controls).

### 2.2 Hardware selection

For the application of a Process Historian, selecting the suitable hardware is **important**. Before deciding on a hardware, variable load and alarm load to be expected needs to be determined or estimated. It must be clarified in advance how long the data shall be stored in the Process Historian. Using these values, the hard disk size needs to be determined. Only then is it possible to select a suitable hardware.

The Process Historian is not a revolving archive. That is, the data is not written after a configured period of time. The Process Historian creates database segments until the hard disk capacity is exhausted. To prevent the hard disk capacity from running out, automated database segments can be secured, and after successful saving be deleted from the database. This prevents the PH from not recording any further data due to lack of hard disk space. Securing the database segment requires supplying sufficient storage space.

Due to the available hard disk size, an IPC 547G or 847D can only be employed for small quantity frameworks. Hardware recommendations for small, medium and large quantity frameworks are available in the Process Historian product documentation.

**Note** If you require support for suitable Process Historian hardware selection, please contact your SIEMENS contact persons.

### Hardware configuration

To provide an appropriate Process Historian for your plant configuration and the respective volume of process values and messages, you can view the recommended hardware configuration “Process Historian Administration”, chapter [Hardware Configurations](#) following this link.

**Note** In principle, a better hardware configuration should be the minimum requirement fulfilled, since this is an advantage especially for larger and simultaneous evaluation of process data.

## 2.3 Archiving

For any kind of archiving it is important to determine the required storage capacity. Put in a simple way, the memory size is the product of the number of variables and alarms times the time and the cycle.

Using the “Swinging Door” principle enables reducing the memory size. Information available in the WinCC V7.4 manual Working with WinCC, chapter [“Archiving methods”](#).

**Note** The more measured values or alarms are archived per second, the smaller the segments should be selected to prevent the individual segments from becoming too large. The upper limit value of 50,000 tags per second should not be exceeded.

Furthermore, it must be noted, that the read data are archived with a separate data structure.

### Data security

For reasons of data security, it is recommended to store all source data as a copy outside of the Process Historian, so the data can be restored in the Process Historian in the case of an emergency.

**Note** For increased data security, or an increased probability of restoring all data in the case of a failed hard disk, we recommend RAID10.

#### 2.3.1 Basics segments

The Process Historian works with various segments which are explained below.

Principally, there are two types of segments:

- **Online segments**  
This includes all segments displayed in WinCC Runtime by means of controls and the Information Server. The segments are called:
  - Runtime segments
  - Archive segments
- **Offline segments**  
These segments cannot be displayed in WinCC Runtime by means of controls and the Information Server. However, they can be read again/ be switched online. The segments are called:
  - Restore segments

A database segment in the Process Historian is the volume of all data in a defined period of time. When selecting a weekly segmentation, a database segment contains all data recorded within a week.

The presetting for the segmentation is:

- Time-period of a segment = 1 week
- Number of prepared segments = 3
- Total number of runtime segments = 8

This is a meaningful presetting suitable for most applications:

#### Note

With regard to segmentation, please also note the Process Historian product documentation.

#### 2.3.2 List of segments

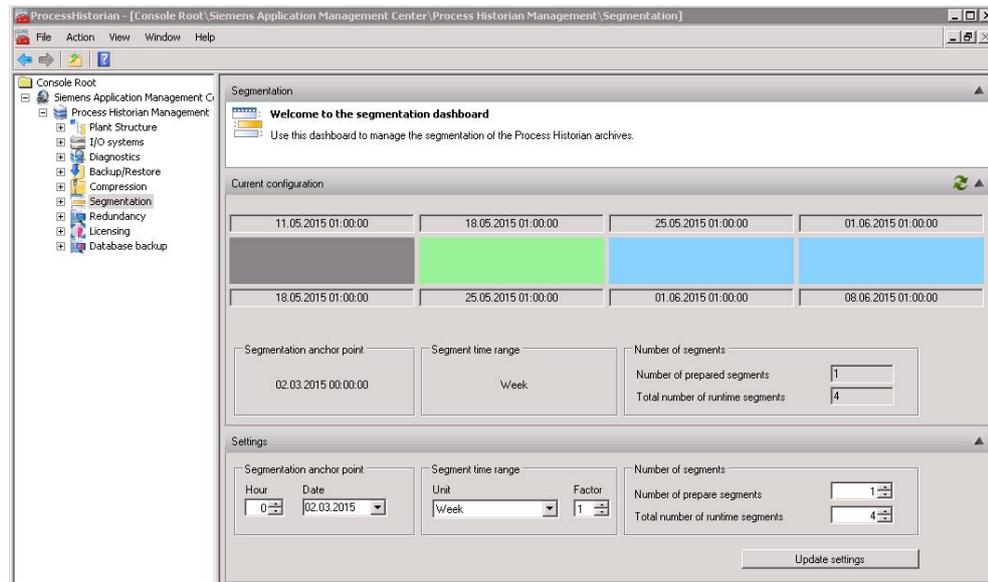
##### Runtime segments

The Runtime segments include the following states:

- Completed Runtime segment (O-RTS)  
Segmentation in dashboard in gray color.
- Current segment (ARTS)  
Segmentation in dashboard in green color.
- Prepared segment (F-RTS)  
Segmentation in dashboard in blue color.

Runtime segments are principally uncompressed and therefore, they take up more memory space on the hard disk. Runtime segments are characterized by the fact that they are always in the online state and the PH can write data to Runtime segments. The Runtime segments are visible in the PH Management Console (MMC) in the Segmentation menu.

Figure 2-1



##### Archive segments

Offline segments include the states:

- Non-compressed archive segment (NCAS)
- Compressed archive segment (C-AS)
- Past archive segments (PAS)
- Secured archive segment (S\_AS)
- Offline (exported) archive segment (O\_AS)
- External archive segment

2.3 Archiving

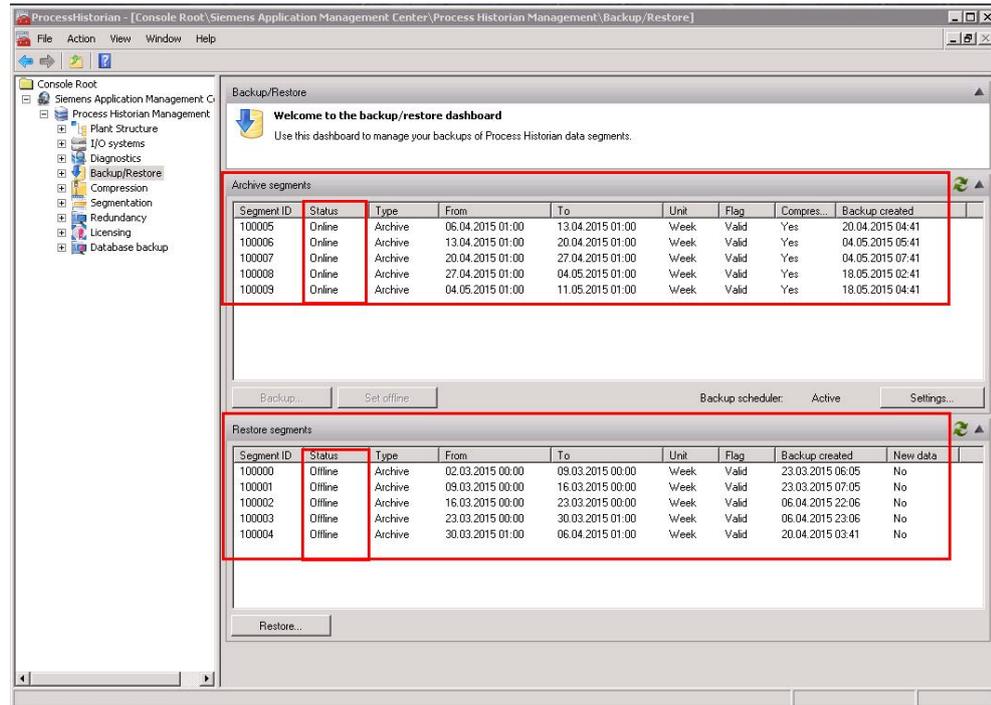
Archive segments can be viewed in the PH MMC menu “Backup/Restore”. An archive segment can be in the online or offline state.

If an archive segment is in the online state, the PH has read access to the data.

If an archive segment is in the offline state, the data was secured successfully as a backup file and the data deleted from the database. The PH can only access data again after the database segment is in the “online” state.

In this sense, “Set offline” = Delete data of a segment from the database. “Restore” = Restore data of a database segment.

Figure 2-2



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Group segments

Group segments take up data whose time range is outside the Runtime segments. This also includes data for all kinds of archive segments, since these cannot be written to any longer.

These segments are created by the Database Installation Wizard when creating the Process Historian database.

- CAL segment
- CAU segment

The Process Historian continuously creates segments for a defined period of time. To ensure, that all data can be saved independently of the time stamp, there is an upper and a lower “Catch-all” segment. The special segments collect all incoming data located outside of the current Runtime segments. These segments are referred to as "Catch-all-upper" (CAU) and "Catch-all-lower" (CAL). The segments CAL and CAU exist on a permanent basis and cannot be deleted, removed, or set offline.

**Number of uncompressed segments** = “Total number of runtime segments” + CAL Segment + CAU Segment = **“Total number of runtime segments” +2.**

2.3 Archiving

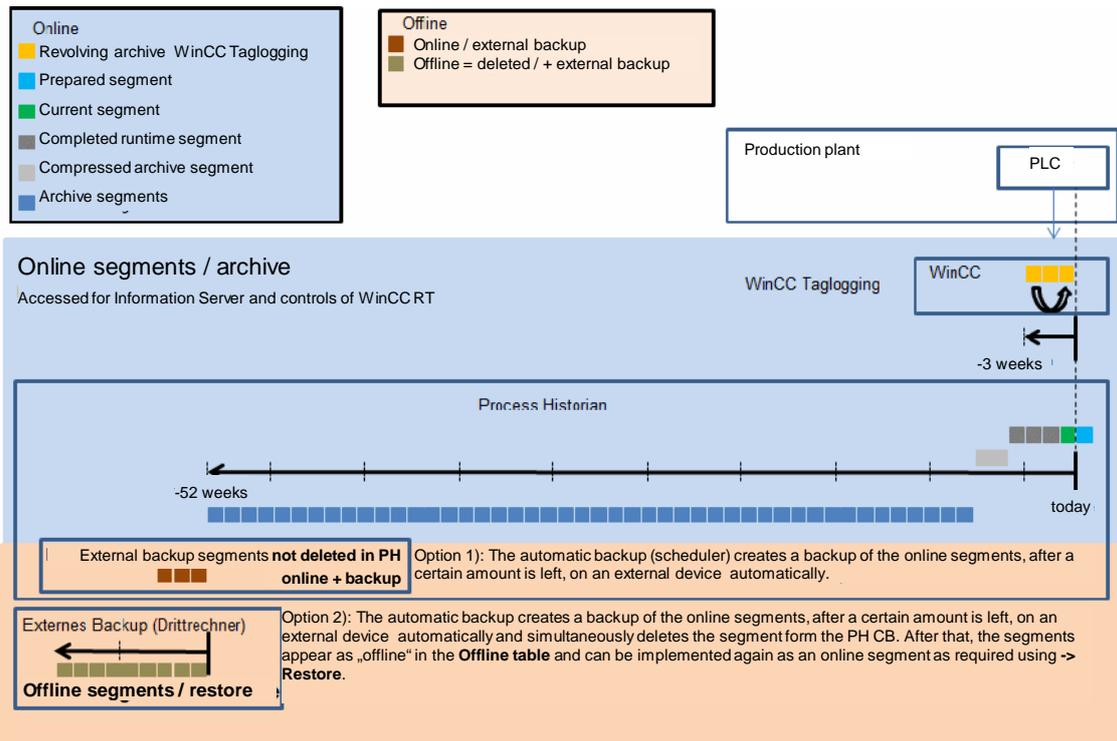
In the example above: Number of uncompressed database segments = 4+2 = 6.  
That is, 6 segments are always uncompressed.

**Note** A detailed explanation of the individual segments is available in the manual "Process Historian Administration > Appendix > [Basics on Segments](#)

**Storage location of the individual segments**

Using this representation, the archiving principle and the difference as well as storage path of the individual segment types are illustrated.

Figure 2-3



**Note** Among the prepared segments, week segments take up less hard disk space than, for example, a month segment.

Manual backup or restore requires more clicks for week segments than for month segments over the same period of time.

## 2.4 Determining the hard disk capacity

Calculating the hard disk size is always an estimate for the following reasons.

- Recovery mechanisms may, for example, produce more uncompressed data in the database. Since recoveries cannot be predicted, the exact data volume cannot be calculated.
- The number of occurring alarms over a period of time is an assumption and can only be estimated in advance.
- The compression factor of “Post compression” may vary. The compression factor of “Post compression” is not a fixed parameter; it depends on the stored values. If, for example, a value does not change over a longer period of time, the compression factor is high. If a value changes constantly, the compression factor is lower. A compression factor of 5 is a conservative assumption.

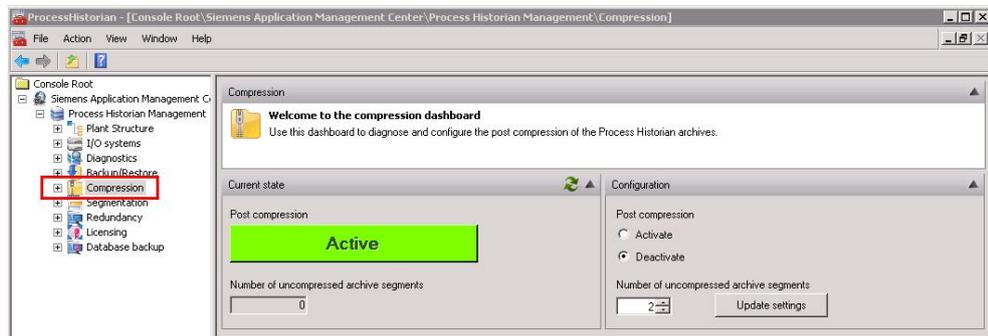
We recommend planning a buffer of 10% of the hard disk capacity.

Since Runtime segments require more storage space on the hard disk than archive segments, the required hard disk space also depends on the segmentation.

**Note**

“Post compression” can be deactivated in the PH MMC menu “Compression”. Furthermore, the number of uncompressed segments can be defined. When modifying the standard settings, the required memory space increases.

Figure 2-4



## 2.4 Determining the hard disk capacity

### Required memory space:

- Process variable uncompressed = 63 bytes.
- Process variable compressed ~12 bytes, for an assumed compression factor ~ 5.
- Alarm ~ 4096 bytes ~ 4 KB for all 5 standard languages, alarms are not compressed.

### Example:

- Number OS servers = 2
- Archive load per OS server = 400 variables / s
- Alarm load per OS server = 1 alarm / min
- Time-period of a segment = 1 week
- Number of prepared segments = 3
- Total number of runtime segments = 8
- Post compression = Active
- Number of uncompressed archive segments = 0
- Assumed compression factor = 5
- Demanded storage time of the data in the PH database = 2 years = 104 weeks

### Determination of the number of uncompressed and compressed segments:

- Number of uncompressed database segments = 8+2 = 10 weeks.
- Number of compressed database segments = 104 - 10 = 94 weeks.

### Memory space requirement of the uncompressed values

$$10[\text{weeks}] \times 7[\text{days}] \times 24[\text{hours}] \times 60[\text{minutes}] \times 60[\text{seconds}] \times 800[\text{variables/s}] \times 63[\text{bytes}] / (1024[\text{KB}] \times 1024[\text{MB}] \times 1024[\text{GB}] \times 1024[\text{TB}]) = \mathbf{0.277 \text{ [TB]}}$$

### Memory space requirement of the compressed values

$$94[\text{weeks}] \times 7[\text{days}] \times 24[\text{hours}] \times 60[\text{minutes}] \times 60[\text{seconds}] \times 800[\text{variables/s}] \times 12[\text{bytes}] / (1024[\text{KB}] \times 1024[\text{MB}] \times 1024[\text{GB}] \times 1024[\text{TB}]) = \mathbf{0.496 \text{ [TB]}}$$

### Memory space requirement of the alarms

$$104[\text{weeks}] \times 7[\text{days}] \times 24[\text{hours}] \times 60[\text{minutes}] \times 2[\text{alarms/min}] \times 4096[\text{bytes}] / (1024[\text{KB}] \times 1024[\text{MB}] \times 1024[\text{GB}] \times 1024[\text{TB}]) = \mathbf{0.008 \text{ [TB]}}$$

### Total memory space required

- Memory space requirement of raw data = 0.277[TB]+ 0.496[TB]+ 0.008[TB] = **0.781[TB]**
- Required memory space for PH internal data aggregation = + 6% of the memory capacity for variables = (0.277[TB] + 0.496[TB]) x 0.06 = **0.046[TB]**
- Planned buffer = **0.1[TB]**
- **Total required memory space = 0.781[TB]+ 0.046[TB]+ 0.1[TB] = 0.927[TB]**

### Conclusion

In this example, the hard disk should have a capacity of approx. **1[TB]**.

**Note** This hardware corresponds to the minimum requirement and primarily serves for archiving the data.

If a larger exported time period from the past should be switched back online, sufficient memory space must be provided for this.

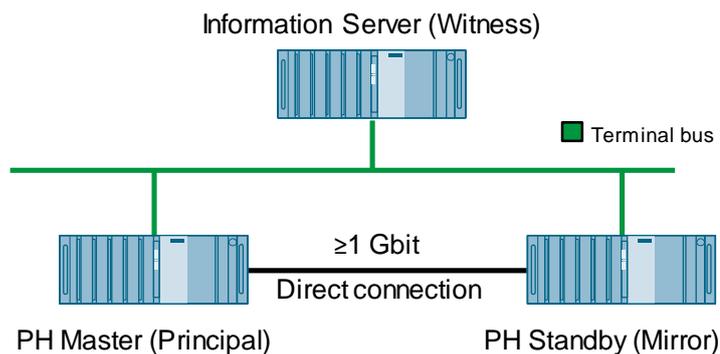
## 2.5 Redundant Process Historian server

A redundant Process Historian system is composed of symmetrically configured servers for master (principal) and standby (mirror).

A dedicated redundancy connection with at least 1 Gbit bandwidth between the redundant Process Historian servers is recommended.

The Witness Server component has been designed for scenarios with automatic redundancy switch. Additionally, it is installed on a further computer of the system, such as an Information server or WinCC server, depending on the availability.

Figure 2-5



## 2.6 Migration

You can migrate your WinCC V7 projects, Central Archive Server (CAS) data, Storage Plus and Process Historian 2013 into the current SIMATIC Process Historian 2014. This means, all data is still available to you after updating to a current Process Historian.

**Note** Further information and instructions are available in the manual "Process Historian 2014 SP2: Administration" > [Migrating archive data from projects](#)

## 3 Information server, general information

### Description

SIMATIC information server is a reporting system which is used by the Microsoft Reporting services and accesses historical data of process control systems. The historical data consists of process values, alarms or recipe data. The used data source can be the Process Historian, WinCC and PCS 7 OS. The collected data are evaluated and visualized by reports.

For the evaluation, reports can have contents in form of tables or graphics. For creating reports, various report templates are available.

For report writing, the following applications are available:

- Information Server web application
- Office Add-Ins for Microsoft Excel, Word and PowerPoint

### Note

The Information Server can only process own data structures (SQL tables) from WinCC and Process Historian, and represent these in reports.

### Reporting

Reports refer to the representation of process values and/or alarms over a defined period of time. This type of information can be provided in various ways.

- As PDF document
- As Excel list

The reports can also be provided in various ways:

- Sending as e-mails
- In the dashboard of the Information Server

The maintenance staff of a plant is interested in the alarms, for example. These can be viewed via the dashboard of the Information Server.

For the plant operator, an e-mail with information on the produced volume and its quality is more useful for every-day plant operation.

### Automatic generation of reports

- Dashboard
- E-Mail: notification

## 4 Configuration Options

Here you see possible plant configurations with SIMATIC Process Historian server and the SIMATIC Information server.

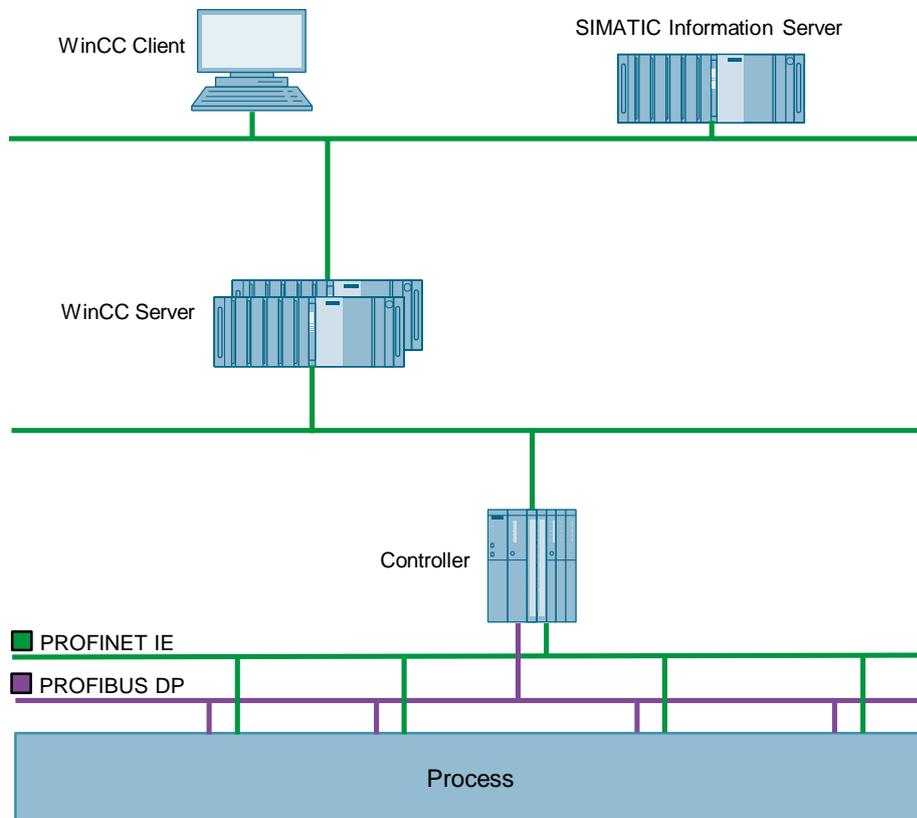
### 4.1 WinCC single-user system with Information Server

#### Description

For a WinCC single-user system with Information Server, the reports are created from the revolving archive of the single-user system. There is no separate long-term archiving.

#### Setup

Figure 4-1



#### Required licenses

- SIMATIC Information Server 2014 SP2 "Basic Package"
  - InformationServer
  - InformationServer - Client Access (3)
  - InformationServer - Datasource Access (1)

The licenses are all located on the Information server or a license server.

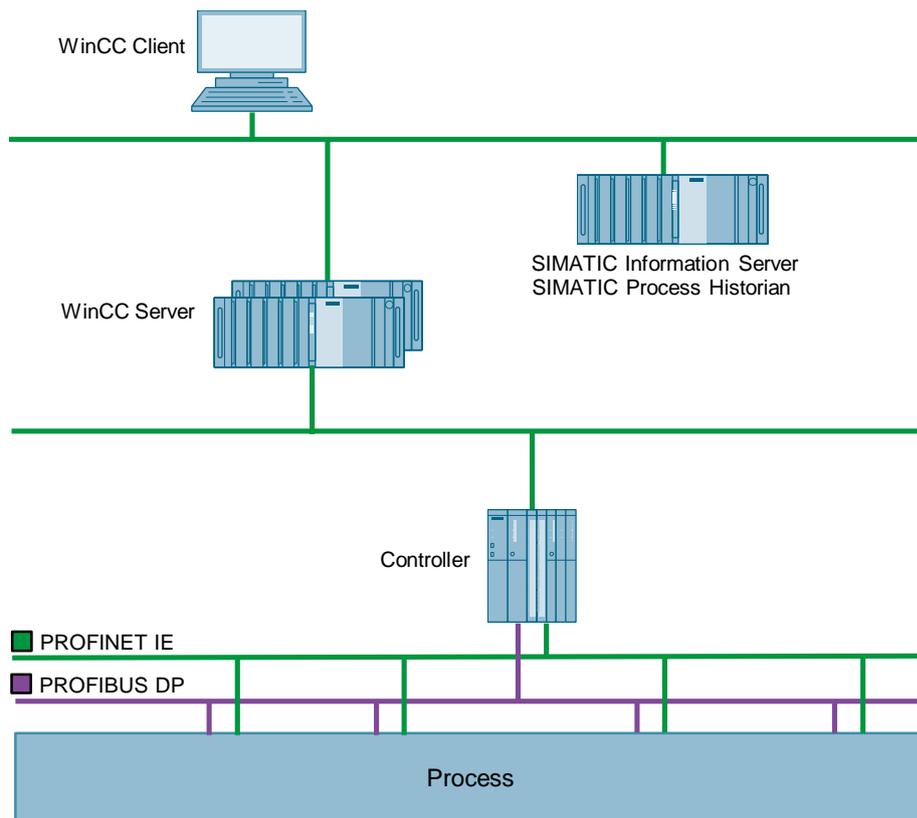
## 4.2 Information Server and Process Historian together

### Description

When configuring Information Server and Process Historian on one server, a larger main memory (RAM) is recommended.

### Setup

Figure 4-2



### Required licenses

- SIMATIC Process Historian 2014 SP2 Single
- SIMATIC Information Server 2014 SP2 "Basic Package"
  - InformationServer
  - InformationServer - Client Access (3)
  - InformationServer - Datasource Access (1)

The licenses are all located on the Information Server / Process Historian or a license server.

## 4.3 Process Historian redundant with Information Server as witness

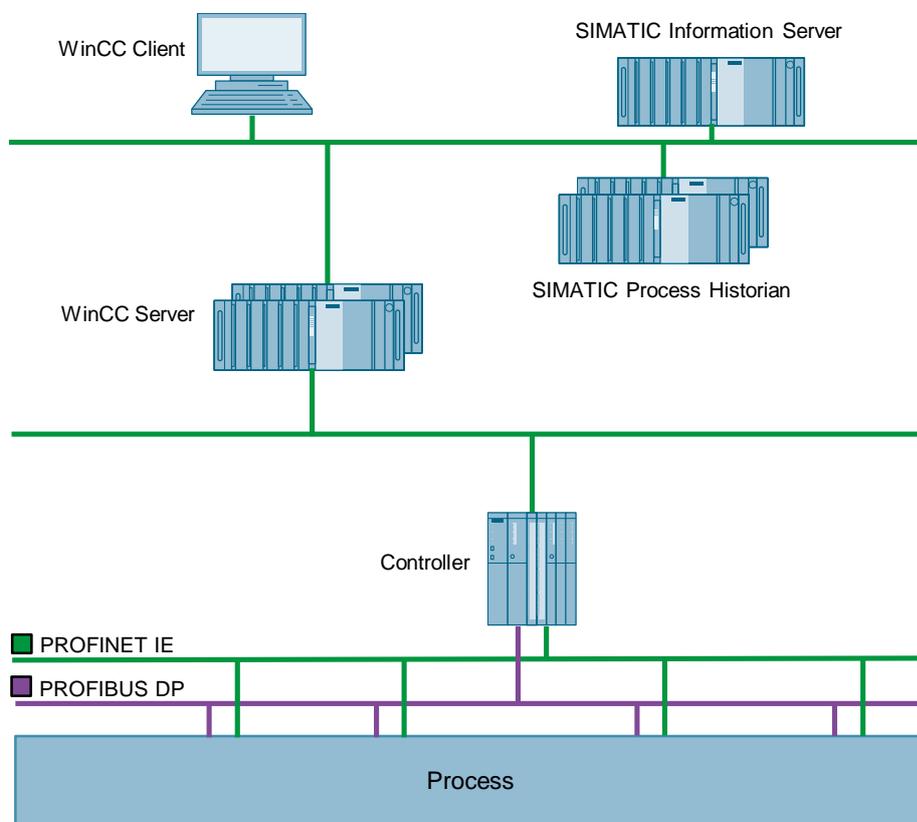
### Description

The redundant systems are based on the Microsoft SQL Server Mirroring. For controlling the availability of the redundancy, the Process Historian requires a third system: the witness.

You can assign the role of 'witness' to the Information Server.

### Setup

Figure 4-3



### Required licenses

- WinCC/ Process Historian Redundancy Complete
- SIMATIC Information Server 2014 SP2 "Basic Package"
  - InformationServer
  - InformationServer - Client Access (3)
  - InformationServer - Datasource Access (1)

The licenses of the Information Server are all located on information server or license server. The licenses of the Process Historian are all located on Process Historian or license server.

## 4.4 Process Historian redundant with Information Server as separate witness

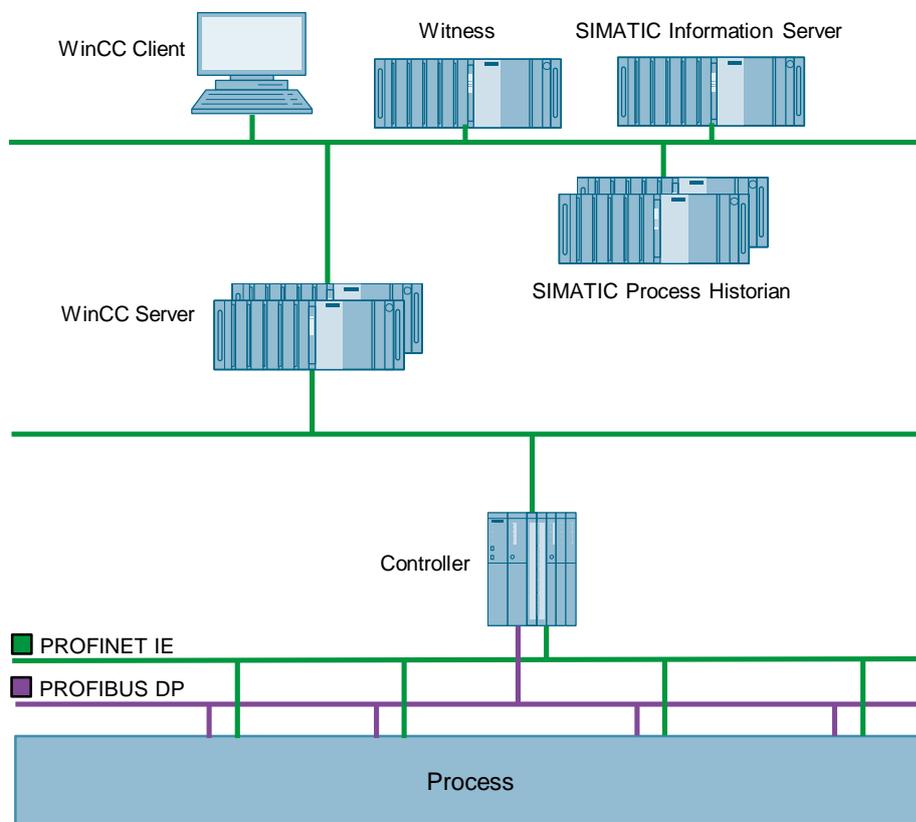
### Description

The redundant systems are based on the Microsoft SQL Server Mirroring. For controlling the availability of the redundancy, the Process Historian requires a third system: the witness.

You can assign the role of 'witness' to the standalone server.

### Setup

Figure 4-4



### Required licenses

- SIMATIC Process Historian 2014 SP2 Redundancy Complete
- SIMATIC Information Server 2014 SP2 "Basic Package"
  - InformationServer
  - InformationServer - Client Access (3)
  - InformationServer - Datasource Access (1)

The licenses of the Information Server are all located on information server or license server. The licenses of the Process Historian are all located on Process Historian or license server.

## 5 Process Historian OPC-UA server

### Overview

OPC and OPC UA refer to standardized, manufacturer-independent interfaces and information models of the OPC Foundation.

OPC UA (Unified Architecture) is the successor technology of OPC, developed for reliable data exchange in automation technology as well as other application areas. OPC UA has the following main characteristics:

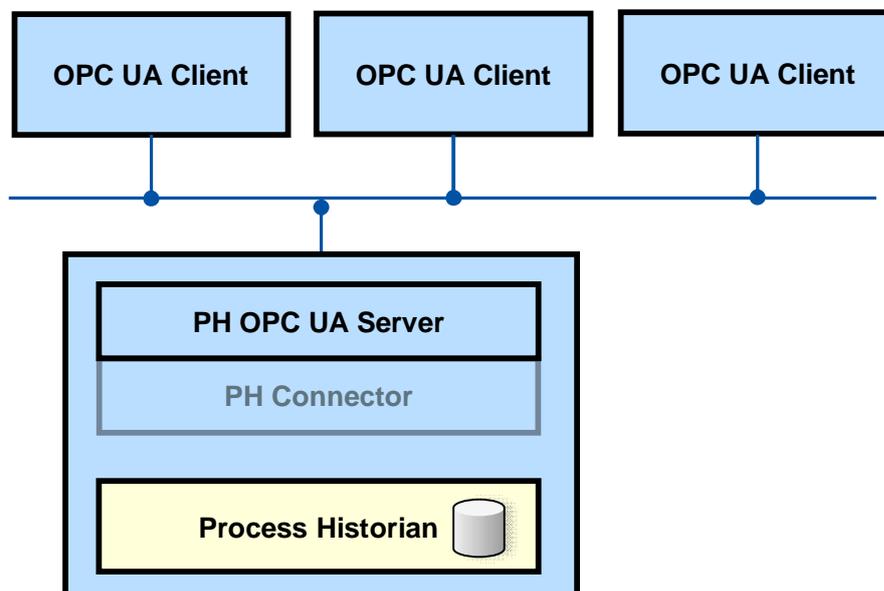
- Platform-independent
- Manufacturer-independent
- Application of standardized protocols as communication medium (e.g. TCP, HTTP)
- Integrated security concept (authentication and authorization, encoded communication and data integrity through signatures)
- Powerful information model and provision of all data in a uniform address space (DA, HDA, A&CE)

### Note

Further information is available in the “Process Historian Administration” manual, chapter [Process Historian OPC-UA server](#)

### OPC UA HDA Server as data provider

Figure 5-1



- **read access** for archive tags and alarms
- **PH OPC UA Server** (Single License, versioned)

## 6 Further Notes, Tips & Tricks, etc.

### 6.1 Using SIMATIC Process Historian 2014 with WinCC V7.2 and WinCC V7.0 SP3

#### WinCC V7.0 SP3

See FAQ:

<https://support.industry.siemens.com/cs/ww/en/view/71748461>

**Note**

For WinCC V7.2 systems, please proceed as follows in the FAQ for WinCC V7.0 SP3.

## 7 Links & Literature

Table 7-1

	Topic
\1\	Siemens Industry Online Support <a href="https://support.industry.siemens.com">https://support.industry.siemens.com</a>
\2\	Download page of the entry <a href="https://support.industry.siemens.com/cs/ww/en/view/106264271">https://support.industry.siemens.com/cs/ww/en/view/106264271</a>
\3\	Using SIMATIC Process Historian 2013 with WinCC V7.0 SP3 <a href="https://support.industry.siemens.com/cs/ww/en/view/71748461">https://support.industry.siemens.com/cs/ww/en/view/71748461</a>
\4\	SIMATIC Information Server 2014 SP2 <a href="https://support.industry.siemens.com/cs/ww/en/view/109738439">https://support.industry.siemens.com/cs/ww/en/view/109738439</a>
\5\	SIMATIC Process Historian 2014 SP2 <a href="https://support.industry.siemens.com/cs/ww/en/view/109738440/81907907211">https://support.industry.siemens.com/cs/ww/en/view/109738440/81907907211</a>
\6\	Installing and Commissioning Process Historian / Information Server in the PCS 7 environment <a href="https://support.industry.siemens.com/cs/ww/en/view/66579062">https://support.industry.siemens.com/cs/ww/en/view/66579062</a>
\7\	Manual WinCC V7.4 <a href="https://support.industry.siemens.com/cs/ww/en/view/109736220/84047979915">https://support.industry.siemens.com/cs/ww/en/view/109736220/84047979915</a>

## 8 History

Table 8-1

Version	Date	Modifications
V1.0	08/2015	First version
V1.1	08/2016	Update to SP2