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SYSTEMS AUTOMATION AND MANAGEMENT (Pty) Ltd

VA HISTORIAN

Storage, Processing and Visualisation

SYSTEMS AUTOMATION AND MANAGEMENT (Pty) Ltd

Setting New Standards in Automation, Industrial IT, BMS and MES
for Power, Mining and General Industries

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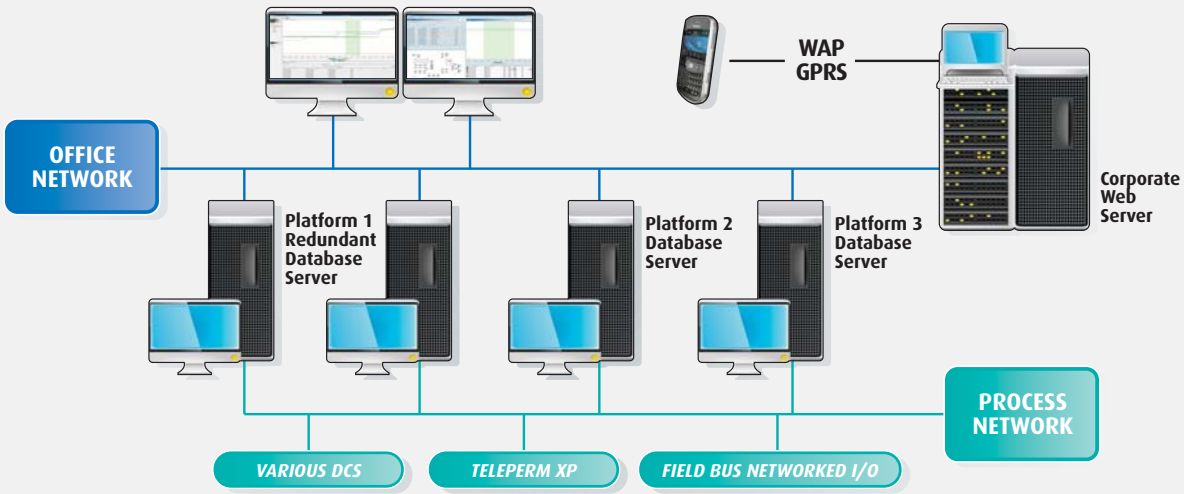
VA HISTORIAN

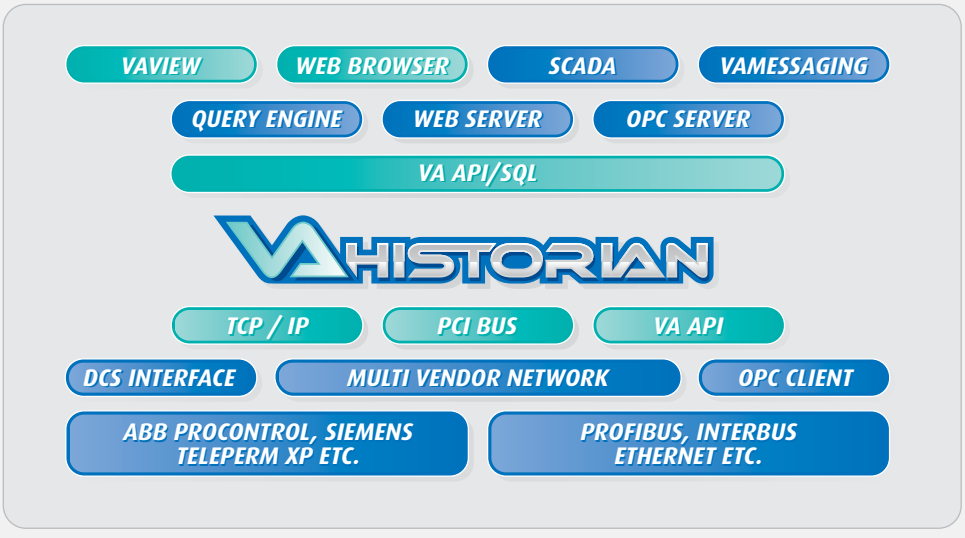
The VA Historian

The ***VA Historian*** product allows storage, processing and visualisation of process data from heterogeneous industrial systems. It forms the basis for a complete Plant Information Management System, or a Business Server.

Typical Application



Software Application



SQL (Structured Query Language) has become established as the de facto standard for accessing relational database systems within the commercial world. For production systems, however, this has not been popular due to performance related issues, and the sheer volume of data which needs to be processed.

VA offers a high performance storage engine with optimised data retrieval methods suited for time domain operations. It is suited for integrating technical and commercial systems with production systems due to the use of a common database query language SQL. This enables a wide selection of standard office and third-party applications to be utilised.

System Architecture

The ***VA Historian*** consists of a base Storage Engine which includes a relational database with SQL. The storage engine is delivered as a stand alone system or with a High Availability cluster option. Multiple storage engines can be grouped to form a distributed database accessible from a single client connection.

Every VA Historian features a web server with a Java servlet engine for administration and data access.

Storage is independent of the acquisition rate, which allows several acquisition rates to be used at the interfaces. An external timestamp is expected allowing precision master clocks such as a GPS source to write globally synchronised data to the database. This feature is suitable for comparing distributed systems across power transmission lines, where transients occur. An optional high speed feature for analogue data storage at 1 ms is available. This allows transients to be stored continuously in a ring buffer and evaluated several days after an event at full resolution.

Eight different function packages are available with the VA Historian.

- **VADBENGINE**
- **VAINTERFACE**
- **VAVIEW**
- **VACALC**
- **VAOPC**
- **VAREPORT**
- **VAMESSAGING**
- **VAMIMIC**

VADBENGINE

VADBENGINE is the core database and Historian is a pre-requisite component.

- Storage Engine which archives data over an indefinite time period, only limited by disk space.
- It consists of a MySQL relational database for configuration and access to dynamic data stored within the storage engine.
- Web Server for administration of the Historian configuration and access to data.
- Query Engine for distributed data access from a single client view.

Options include a High Availability Cluster package. This allows two or more Servers to run as synchronised data nodes with replicated data. The client application does not experience any communication loss, should one cluster node fail. Data is always continuously available with an online replication for failed nodes which have restarted after a failure. Several availability concepts may be implemented from a simple dual server with a LAN link between them, to a shared RAID system.

VAINTERFACE

VAINTERFACE allows heterogeneous DCS, PLC, SCADA and fieldbus devices to communicate with the Storage Engine.

At least one interface is required for operation. A programming API is available for custom written interfaces. Manual input from operational staff may be stored by means of the Web interface, or a Java servlet. All incoming data is expected to be time tagged externally, which means out of order insertions are possible. This is ideal for consolidation of multi vendor plant wide systems, and also facilitates the realistic comparison of data over large physical distances.

The VA Historian interfaces to SCADA systems such as Adroit, iFix, Wonderware, WinCC, etc. via OPC or VA API.

VACALC

VACALC provides real-time calculations for inclusion into process monitoring displays or storage. Calculations are based on standard mathematical expressions, which are evaluated in real-time. Results can be further chained into subsequent calculations. User defined functions may also be installed, as DLL (Dynamic Link Libraries) or Java classes.

Individual calculations are defined by an expression such as:

sin(rad(second(time))) + ('01MKA10CT102 XQ01' * 2.3)

In this example the tag name 01MKA10CT102 XQ01 is the KKS identifier to be evaluated. All real-time calculations operate with a set cycle time, and produce resultants which are stored directly into the database.

Historical calculations are also possible where aggregate functions may process historical data to evaluate trends or statistical operations. These are available as SQL functions or procedures and are optimised for data access in a time domain. Since the calculations are executed on the server there is no loss of precision and only relevant data points are utilised for the resultant.

VAVIEW

VAVIEW is the standard data visualisation package which is distributed license free with every VA Historian. It incorporates a client interface across multiple VA historians allowing distributed queries across geographical boundaries.

Trends are grouped in an unlimited number of Tag combinations, which are stored on the central database server. Displayed trends may be zoomed and rescaled to fit the exact time window for analysis. All signal tags may be trended against each other irrespective of the data acquisition rate or the storage resolution. Groups are freely definable and also independent of storage parameters.

activeX

Java

OPC

VAVIEW

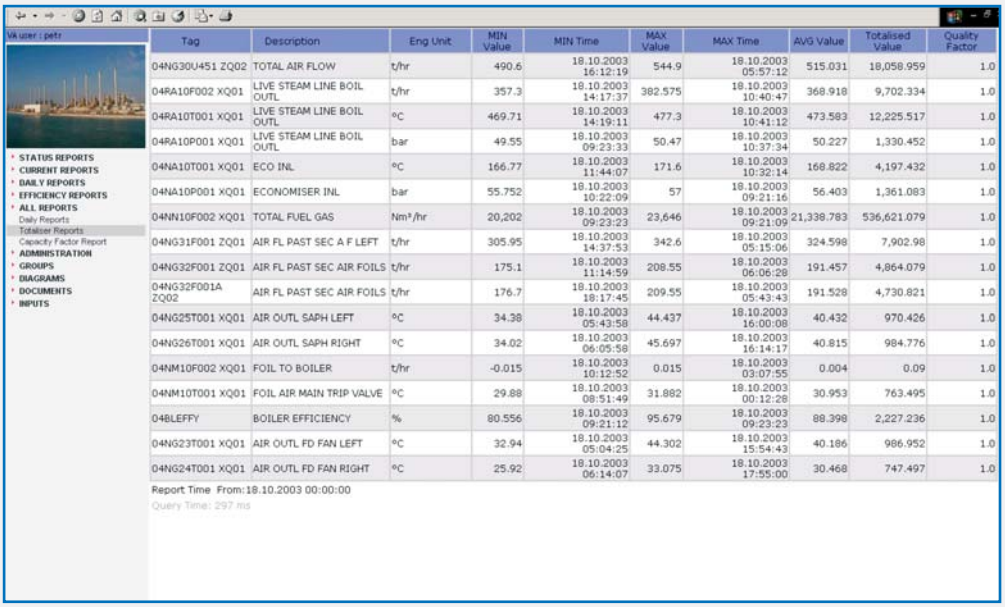
Data Analysis is enhanced through integration with Office applications such as Microsoft Excel or with an Add-in, import or database access.

Binary Events are stored in chronological order with a resolution of 1 ms, and may be retrieved with various filters. Trending of binary signals together with analog signals is possible.

POWERED BY MySQL

Excel

Access

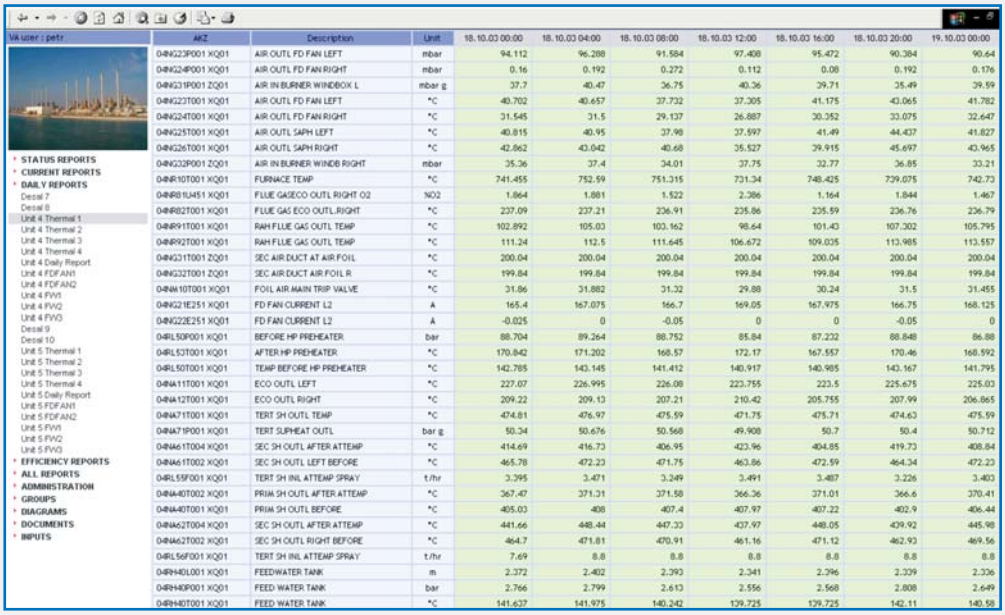


Tag	Description	Eng Unit	MIN Value	MIN Time	MAX Value	MAX Time	AVG Value	Totalised Value	Quality Factor
04NG30U451 ZQ02	TOTAL AIR FLOW	t/hr	490.6	18.10.2003 16:12:19	544.9	18.10.2003 05:57:12	515.031	18,058.959	1.0
04RA10F002 XQ01	LIVE STEAM LINE BOIL OUTL	t/hr	357.3	18.10.2003 14:17:37	382.575	18.10.2003 10:40:47	368.918	9,702.334	1.0
04RA10T001 XQ01	LIVE STEAM LINE BOIL OUTL	°C	469.71	18.10.2003 14:19:11	477.3	18.10.2003 10:41:12	473.583	12,225.517	1.0
04RA10P001 XQ01	LIVE STEAM LINE BOIL OUTL	bar	49.55	18.10.2003 09:23:33	50.47	18.10.2003 10:37:34	50.227	1,330.452	1.0
04NA10T001 XQ01	ECO INL	°C	166.77	18.10.2003 11:44:07	171.6	18.10.2003 10:32:14	168.822	4,197.432	1.0
04NA10P001 XQ01	ECONOMISER INL	bar	55.752	18.10.2003 10:22:09	57	18.10.2003 09:21:16	56.403	1,361.083	1.0
04NN10F002 XQ01	TOTAL FUEL GAS	Nm³/hr	20,202	18.10.2003 09:23:23	23,646	18.10.2003 09:21:09	21,338.783	536,621.079	1.0
04NG31F001 ZQ01	AIR FL PAST SEC A F LEFT	t/hr	305.95	18.10.2003 14:37:53	342.6	18.10.2003 05:15:06	324.598	7,902.98	1.0
04NG32F001 ZQ01	AIR FL PAST SEC AIR FOILS	t/hr	175.1	18.10.2003 11:14:59	208.55	18.10.2003 06:06:28	191.457	4,864.079	1.0
04NG32F001A ZQ02	AIR FL PAST SEC AIR FOILS	t/hr	176.7	18.10.2003 18:17:45	209.55	18.10.2003 05:43:43	191.528	4,730.821	1.0
04NG25T001 XQ01	AIR OUTL SAPH LEFT	°C	34.38	18.10.2003 05:43:58	44.437	18.10.2003 16:00:08	40.432	970.426	1.0
04NG26T001 XQ01	AIR OUTL SAPH RIGHT	°C	34.02	18.10.2003 06:05:58	45.697	18.10.2003 16:14:17	40.815	984.776	1.0
04NM10F002 XQ01	FOIL TO BOILER	t/hr	-0.015	18.10.2003 10:12:52	0.015	18.10.2003 03:07:55	0.004	0.09	1.0
04NM10T001 XQ01	FOIL AIR MAIN TRIP VALVE	°C	29.88	18.10.2003 08:51:49	31.882	18.10.2003 00:12:28	30.953	763.495	1.0
04BLEFFY	BOILER EFFICIENCY	%	80.556	18.10.2003 09:21:12	95.679	18.10.2003 09:23:23	88.398	2,227.236	1.0
04NG23T001 XQ01	AIR OUTL FD FAN LEFT	°C	32.94	18.10.2003 05:04:25	44.302	18.10.2003 15:54:43	40.186	986.952	1.0
04NG24T001 XQ01	AIR OUTL FD FAN RIGHT	°C	25.92	18.10.2003 06:14:07	33.075	18.10.2003 17:55:00	30.468	747.497	1.0

Report Time From:18.10.2003 00:00:00

Query Time: 297 ms

A Web interface allows powerful server side applications to retrieve data and present it to standard browsers. The flexible JSP (Java Server Pages) are utilised for this although other scripting languages such as PHP or ASP may be used. This is due to the use of a standard MySQL database, which is supported virtually by any database aware client or language.

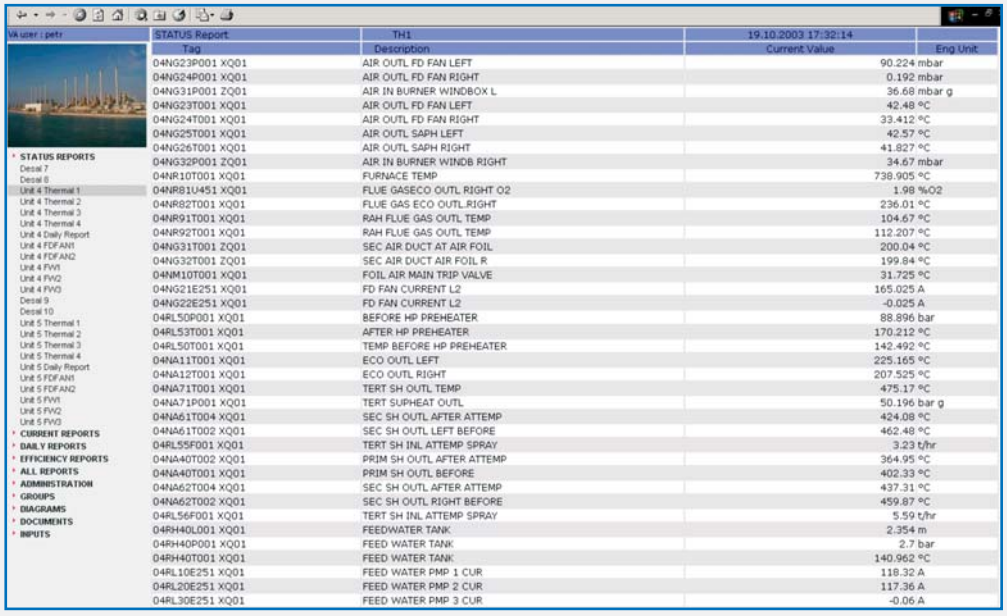


VAREPORT

VAREPORT Standard reporting is based on SQL queries which may be output directly to a web page or through a reporting engine. This allows a comfortable environment to design and view reports. XML (eXtensible Markup Language) is used to define the report structure. Report output can also be in an XML format for data portability.

Reports are created using a graphical editor, which generates an XML and a compiled template. This template is stored in the database and may be processed using the Java Servlet Engine which completes the dynamic portion of the report. The output format of the report may be a streamed Acrobat PDF which may be viewed directly in a web browser. Alternative formats include direct HTML and Microsoft Excel.

Database Access is possible through the JDBC for java applications or ODBC for Microsoft and other Windows applications.



STATUS Report | TH1 | 19.10.2003 17:32:14

Tag	Description	Current Value	Eng Unit
04NG23P001 XQ01	AIR OUTL FD FAN LEFT	90.224	mbar
04NG24P001 XQ01	AIR OUTL FD FAN RIGHT	0.192	mbar
04NG31P001 ZQ01	AIR IN BURNER WINDBOX L	36.68	mbar g
04NG23T001 XQ01	AIR OUTL FD FAN LEFT	42.48	°C
04NG24T001 XQ01	AIR OUTL FD FAN RIGHT	33.412	°C
04NG25T001 XQ01	AIR OUTL SAPH LEFT	42.57	°C
04NG26T001 XQ01	AIR OUTL SAPH RIGHT	41.827	°C
04NG32P001 ZQ01	AIR IN BURNER WINDB RIGHT	34.67	mbar
04NR10T001 XQ01	FURNACE TEMP	738.905	°C
04NR81U451 XQ01	FLUE GASECO OUTL RIGHT O2	1.98	%O2
04NR82T001 XQ01	FLUE GAS ECO OUTL.RIGHT	236.01	°C
04NR91T001 XQ01	RAH FLUE GAS OUTL TEMP	104.67	°C
04NR92T001 XQ01	RAH FLUE GAS OUTL TEMP	112.207	°C
04NG31T001 ZQ01	SEC AIR DUCT AT AIR FOIL	200.04	°C
04NG32T001 ZQ01	SEC AIR DUCT AIR FOIL R	199.84	°C
04NM10T001 XQ01	FOIL AIR MAIN TRIP VALVE	31.725	°C
04NG21E251 XQ01	FD FAN CURRENT L2	165.025	A
04NG22E251 XQ01	FD FAN CURRENT L2	-0.025	A
04RL50P001 XQ01	BEFORE HP PREHEATER	88.896	bar
04RL53T001 XQ01	AFTER HP PREHEATER	170.212	°C
04RL50T001 XQ01	TEMP BEFORE HP PREHEATER	142.492	°C
04NA11T001 XQ01	ECO OUTL LEFT	225.165	°C
04NA12T001 XQ01	ECO OUTL RIGHT	207.525	°C
04NA71T001 XQ01	TERT SH OUTL TEMP	475.17	°C
04NA71P001 XQ01	TERT SUPHEAT OUTL	50.196	bar g
04NA61T004 XQ01	SEC SH OUTL AFTER ATTEMP	424.08	°C
04NA61T002 XQ01	SEC SH OUTL LEFT BEFORE	462.48	°C
04RL55F001 XQ01	TERT SH INL ATTEMP SPRAY	3.23	t/hr
04NA40T002 XQ01	PRIM SH OUTL AFTER ATTEMP	364.95	°C
04NA40T001 XQ01	PRIM SH OUTL BEFORE	402.33	°C
04NA62T004 XQ01	SEC SH OUTL AFTER ATTEMP	437.31	°C
04NA62T002 XQ01	SEC SH OUTL RIGHT BEFORE	459.87	°C
04RL56F001 XQ01	TERT SH INL ATTEMP SPRAY	5.59	t/hr
04RH40L001 XQ01	FEEDWATER TANK	2.354	m
04RH40P001 XQ01	FEED WATER TANK	2.7	bar
04RH40T001 XQ01	FEED WATER TANK	140.962	°C
04RL10E251 XQ01	FEED WATER PMP 1 CUR	118.32	A
04RL20E251 XQ01	FEED WATER PMP 2 CUR	117.36	A
04RL30E251 XQ01	FEED WATER PMP 3 CUR	-0.06	A

* KKS - Kraftwerk Kennzeichen System | alphanumeric numbering system for Power Stations

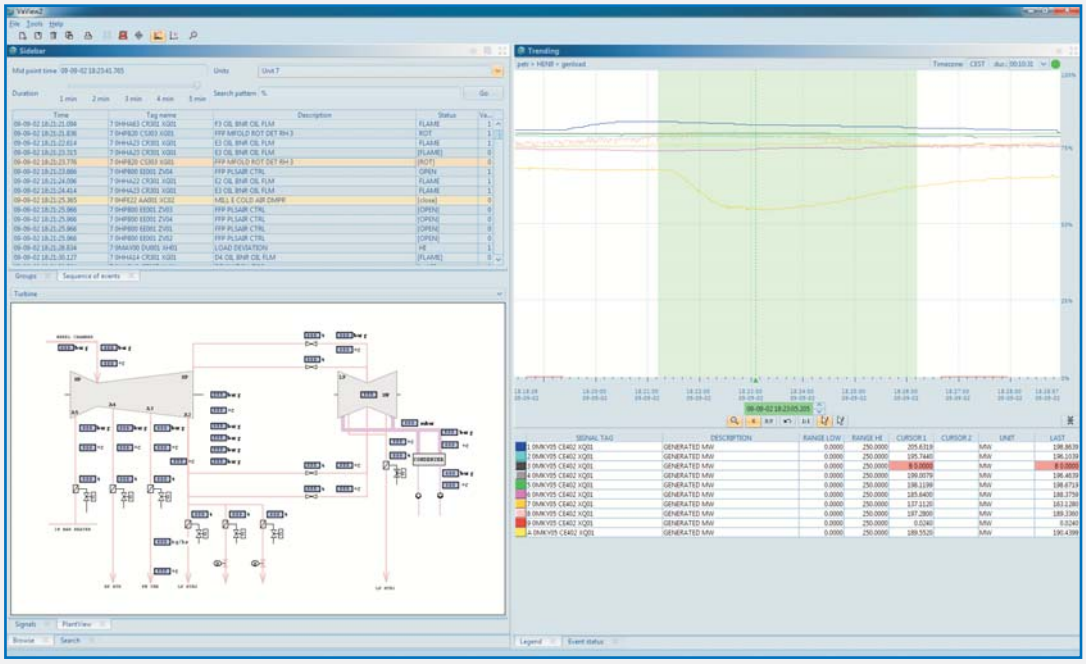
VAMESSAGING

VAMESSAGING provides a simple infrastructure to notify of events to multiple clients. Support for SMS or e-mail based messages or pager systems is possible. Events can be user defined based on limits or critical plant events or production figures at specific time intervals. Multiple recipients are supported.

VAMIMIC

VAMIMIC is provided for applications where live data needs to be visualised for operational purposes. Process mimics present a graphical representation of the plant through Java or ActiveX components for maximum application integration.

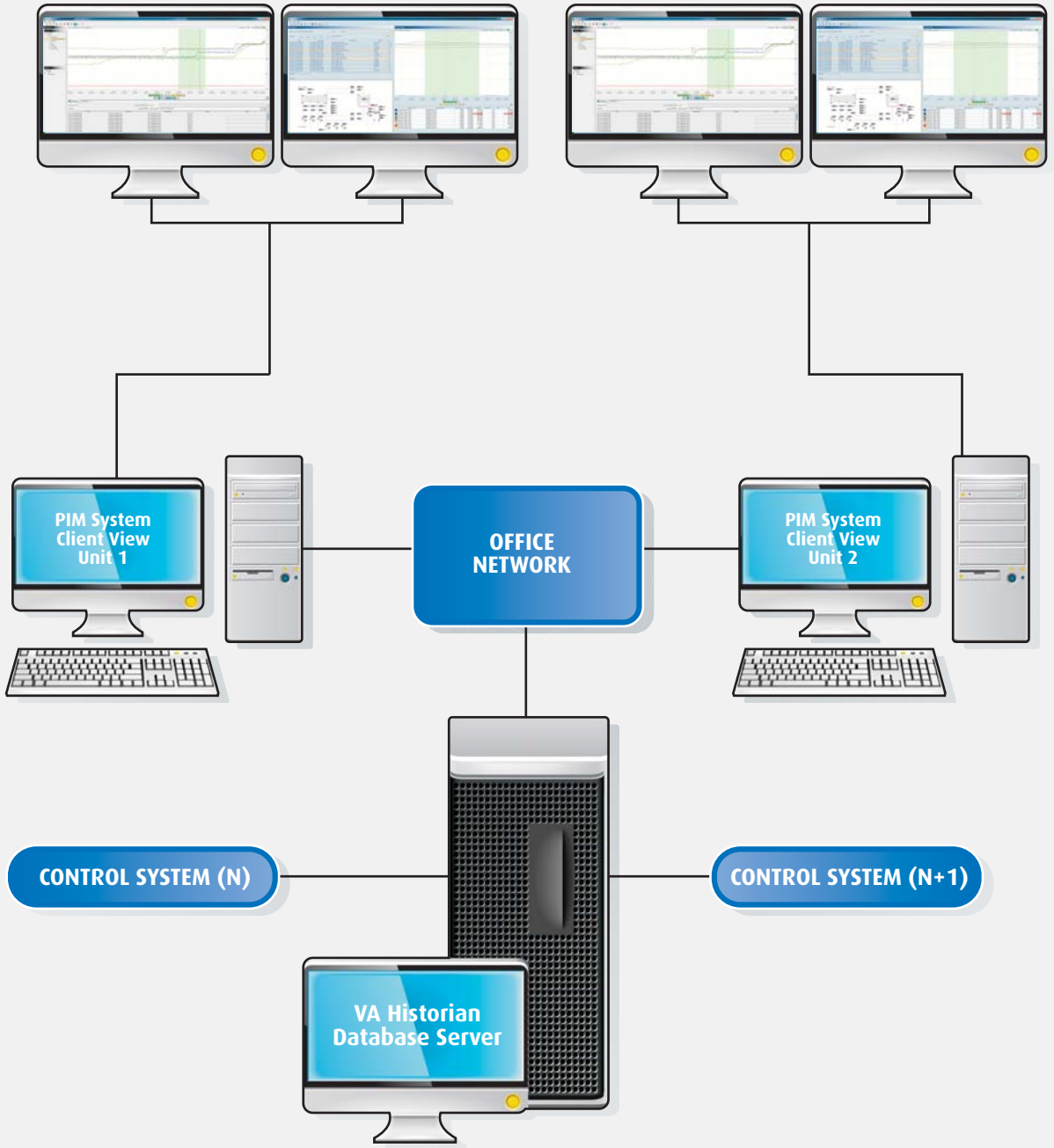
VAMIMIC



activeX Java

Typical Solution

Single database server on multiple block plants.



VHISTORIAN

Technical Specifications

Hardware Requirements

- PC Platform with high capacity disk drives > 1TB.
- Ethernet network adapters for commercial LAN and process LAN.
- CPU Intel 2.3GHz Duo processor or better.
- Memory > 4GHz RAM.

Software Requirements

- Windows 2008 (32-bit and 64-bit)
- Windows 7 (32-bit and 64-bit)

Available Interfaces

- ABB Masterbus 300
- ABB Procontrol-P13/42
- ABB Procontrol-P14
- GE CSF
- InterBus
- Modbus
- OPC
- Profibus
- Siemens Teleperm XP (XU or OPC)
- Siemens SPPA T3000
- TCP/IP sockets

Signal Tag Limits

- 450 000 tags per server

NB: Enterprise wide multiple server hierarchy is possible

Storage Resolution

- Analogue signals at 10 ms. optionally to 1ms with high speed recording feature.
- Binary events at 1ms.

Storage

- Delta compression with user defined hysteresis level
- Approximately 80 Mbytes is required per day for a 12 000 tag database at 1 sec resolution for analogue tags and 1 ms for binary events.
- Fast data access algorithms allow most query operations to complete within 1 sec.

VHISTORIAN

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