

INTRODUCING RAPID™

BACKGROUND

ABOUT AUTOSOFT

Automsoft is a leading provider of advanced database software for Global 2000 companies. Automsoft's database software is specifically designed to manage production data for process industries in a highly secure environment. Customers around the world are using the RAPID product suite to move from laboratory to full-scale production, gain regulatory compliance and to optimize the production process. Automsoft's customers include some of the most successful organizations in the pharmaceutical, bio-tech, utilities, food and beverage, and oil and gas industries.

PROCESS MANUFACTURING AND INFORMATION MANAGEMENT

Traditionally, Data Management Systems have fallen into three categories:

1. Proprietary historian products that interfaced to a DCS, SCADA, or PLC system through a specially written driver.
2. Add-on historian products from the major DCS and SCADA vendors, which worked only with their systems.
3. Historical log files produced by SCADA/HMI systems, which were stored in a proprietary fashion: these log files had special tools that extracted data to a spreadsheet before analysis could be carried out.

None of the above satisfies the requirements of today's business environment. This new environment requires that data be available immediately and easily to its users' computers across the enterprise. Automsoft's RAPID technology is the next generation of data management software for process industries and is a solution that answers the need of this new economy.

RAPID enables the immediate collection and analysis of all production data in processes, plants and multiples of plants across geography, giving a true picture of manufacturing operations both real-time and historic. The application of leading edge architectural approaches coupled with new industry standards such as OPC Data Access and OPC Historical Data Access has taken data management software a substantial step ahead. Automsoft's RAPID solution has emerged as the leader in what is now the next generation of data management software for process industries.

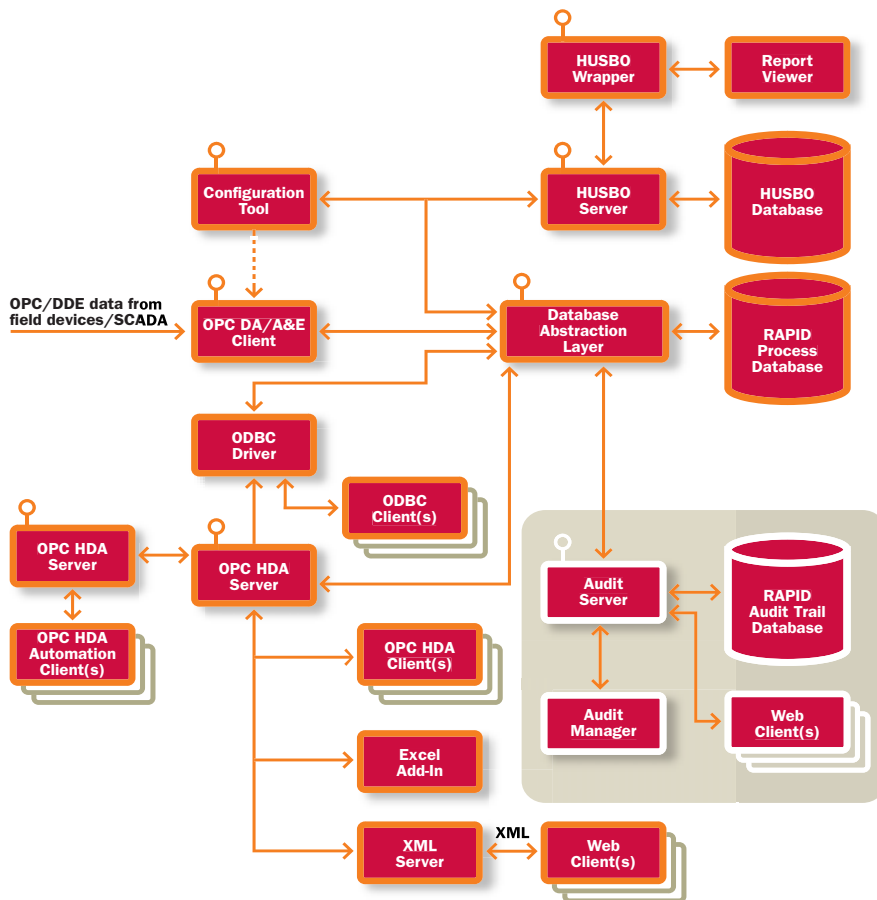
THE RAPID SOLUTION

RAPID IS A SPECIALISED HIGH PERFORMANCE DATABASE, WHICH MANAGES HUGE VOLUMES OF TIME SERIES DATA, WITH EXTRAORDINARY RESPONSE TIMES, IN A HIGHLY SECURE, FDA-COMPLIANT ENVIRONMENT.

RAPID offers the highest level of performance and flexibility in the marketplace today.

The architecture of RAPID is outlined in Figure 1 below. RAPID is an n-tier component-based software suite built with XML, COM, and OPC technology with a fault tolerant object oriented database management system (OODBMS) as the historical data repository.

Figure 1 — Detailed RAPID architecture



THE FUNCTION OF EACH (MAJOR) COMPONENT IS AS FOLLOWS:

Data Abstraction Layer (DAL): The DAL is a COM component which provides high level data management and database services on behalf of the other RAPID components e.g. inserting and retrieving alarms for an OPC alarm source

OPC DA/A&E Client: Collects the process data and alarms and events from OPC DA and A&E Servers (e.g. from a SCADA system, DCS, or a PLC) and stores this data via the DAL in the RAPID Process Database.

Configuration Tool: The Configuration Tool is a collection of COM components. These allow the RAPID administrator user to manage the RAPID environment e.g. configure the items and OPC DA/A&E Servers to collect process data from, or to back up a database. Note that this meta-data is also stored in the RAPID Process Database. The configuration tool allows the RAPID administrator to make changes to a running system without interrupting the collection of data.

THE RAPID SOLUTION



Figure 2 - The Configuration Tool

HUSBO Server: The Hierarchical Uniform Storage of Binary Objects (HUSBO) Server provides a COM interface to the HUSBO Database. This database provides a named BLOB repository semantically similar to the Windows file system. The HSUBO is used to store report templates, PKI certificates and PDF reports. Using the COM interface users may insert and retrieve arbitrary BLOBS to and from the database e.g. Word documents or JPEG images.

OPC HDA Server: An implementation of the OPC HDA specification, which performs both raw and processed (aggregate) data queries against the historical process data stored in the RAPID Process Database on behalf of client programs/components such as the RAPID Designer.

The HDA Server incorporates patent pending technology on date and time conversion between different data formats in computers. This technology, invented by Automsoft allows the HDA Server to very quickly perform data and time calculations – an integral function of any OPC HDA implementation. The algorithm itself is general purpose and may be used wherever high-speed data and time conversion is used.

OPC HDA Client(s): Software components requesting and displaying historical data via the services provided by the OPC HDA Server. RAPID includes a powerful reporting tool —

RAPID Designer — that allows data to be rendered in a spreadsheet, a trend/comparison graph, or any combination of these. Reports may be digitally signed (via PKI) and saved in PDF format in the RAPID HUSBO Database. The RAPID Designer is an ActiveX component and may be embedded into any ActiveX container including leading SCADA systems. Of course, third party OPC HDA clients may also be used.

RAPID-Pharma™

RAPID-PHARMA IS AN EXTENSION OF RAPID SPECIFICALLY DESIGNED FOR THE PHARMACEUTICAL AND BIOTECH INDUSTRIES. RAPID-PHARMA ADDS ADDITIONAL COM COMPONENTS TO FULFILL THE NEEDS OF THIS INDUSTRY, IN PARTICULAR THE 21 CFR PART 11 RULING.

These include integrated security (managed by the Configuration Tool and stored in both the Process and HUSBO databases) and digital signature capabilities and a comprehensive Audit Trail (managed with the Audit Manager and queried via the XML-based Audit Report Tool). The RAPID-Pharma components are boxed in figure 1 above.

OBJECT DATABASE TECHNOLOGY

RAPID warehouses production data from the manufacturing process e.g. PLC, SCADA, etc. Each PLC etc. may be monitoring many sensors, probes etc. Thus there may be tens or even hundreds of thousands of measurement points in a manufacturing plant. Each point may be sampled (for a change in value) as often as every second. Therefore PIMS databases are typically very large compared to traditional database applications – RAPID for instance can support databases into the PB range. The data itself is always time stamped and is usually queried by time only. A sample query (in English) could be *'Find the Standard Deviation of the temperature from fermentation vessel one from May 1st to May 31st (sampling) every five minutes'*

RDBMS technology breaks down when storing time series data because of indexing problems i.e. because data is queried by time then this presents a significant problem for even the best RDBMS. OODBMS technology is ideal for storing time series data as generated by process plants and offers significant performance advantages over both RDBMS and 'hybrid solutions' particularly with regard to indexing issues. This is because OODBMS do not use rows, columns and indexes, as used by their relational counterparts.

OODBMS store objects directly in the database and any object can be quickly retrieved from the database without requiring that an index be looked up. Complex relationships between objects can also be directly modeled in an OODBMS, and thus it is possible to map in memory data structures directly into the database.

The relative ease of mapping the time series data into the database coupled with no indexing penalty, makes an OODBMS an ideal choice for this type of application.

OPC TECHNOLOGY

Standardizing on OPC mechanisms for collecting and retrieving event data was a conscious design strategy when architecting RAPID.

OPC DA and A&E standards allowed the software development team to concentrate on writing the core RAPID components rather than having to develop proprietary driver software to connect to each SCADA, DCS, or PLC. In addition, customers are free to choose any OPC DA or A&E Server for their environment, i.e. RAPID can connect at the PLC or DCS or SCADA level with the appropriate server. RAPID supports both the OPC DA 1.0x and 2.0x specifications, and the OPC A&E 1.0x specification.

The OPC HDA Server implementation allows RAPID to provide a standard method of requesting and retrieving both raw and summary (aggregate) historical data. The HDA specification itself is very flexible and allows implementers to define their own aggregate functions. For instance, RAPID adds a number of these functions to its server for the power generation industry, e.g. TIME_AT_MIN. Raw data queries may also be executed to display the actual data recorded. In addition, customers may choose best-of-breed client applications that will interoperate with any server. The customer is also future-proofing its investment: as new Clients and Servers emerge with new feature sets, the older ones may be substituted with the new.

However, as there is no equivalent of OPC HDA for OPC A&E data or for batch type data, we at Automsoft added some proprietary interfaces to our HDA implementation to allow historical retrieval of same. This is permitted by both the OPC HDA specification and standard COM programming guidelines and does not impede the core functionality.

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ABOUT AUTOMSOF

Automsoft is a leading global provider of advanced manufacturing intelligence systems for process industries across a range of sectors, utilizing advanced database software to collect and store, consolidate and analyze production data and bridge islands of data within the plant and the enterprise. Its core product suite RAPID™ has been configured for the requirements of different industries while from an early stage its specialist RAPID-Pharma™ system has been focused on the specific needs of the life sciences sector. In recent years that has notably involved the compliance requirements of FDA 21 CFR Part 11 while more recent development involves supporting the new Process Analytical Technology (PAT) approach to manufacturing sponsored by the FDA.

The experienced development and support team of automation professionals has earned an international

reputation for its expertise. At the same time the leading edge development of Automsoft RAPID software has been to a great degree in collaboration with industry partners, addressing real manufacturing challenges and anticipating trends in manufacturing technology.

Founded in 1997, Automsoft has its United States of America head office in New York and its European Union head office in Dublin, Ireland. Automsoft has customers in the United States and Canada, in the EU, Norway and Switzerland.

Automsoft is a member of the OPC Foundation and International Society for Pharmaceutical Engineering (ISPE) and is quality certified to ISO 9001:2000.

For further information, please visit www.automsoft.com

