Industrial IT for Power Generation

Title of Event Here

Franco Gatti
Tenore
Functional Architecture

- Client Explorer
- HMI Extensions for DCS
- Historical Data Base Management
- Real Time Data Base Management
- I/O Scanner
- Data Publishing (OLE-DB, ODBC, OPC, DDE)
- System deployment
Data Base Management System - 1

- Up to 130,000 tags configurable
  - 65,000 Boolean
  - 65,000 Non Boolean
- Soft tags (calculated) treated as standard tags
- Short term history stored for all tags (configurable time, default 10 days)
- Data compression based on Boxcar/Backslope algorithm
Data Base Management System - 2

- Off Line (bulk) and On Line (point change)
- Configurable parameters
  - General information
  - Processing information
  - Alarm information
  - Applications
  - Network information
  - Other, type dependent
- Backward compatible with older versions of Tenore
- Improved support of data import from Composer for Harmony
I/O Scanner - 1

- Common Infrastructure
- Available Plug-in Drivers
  - Harmony/INFI
  - Harmony/DCI
  - Freelance (OPC)
  - ControlIT AC800F (OPC)
  - ControlIT AC800M (OPC)
  - OPC and ODBC Client
  - Modbus
  - SPABUS
  - IEC 870-5-101/104
  - Text
  - Siemens Teleperm
  - General Electric GSM (Mark V/VI)
- Quick implementation of new drivers
I/O Scanner - 2

- Off Line (bulk) and On Line (point change)
- Configuration parameters dynamically selected based on driver
Client Explorer - 1

- Multilanguage Support
- Object Oriented Graphics
- Up to 10,000 Pages supported
- Graphical pages can include:
  - Bitmaps (backgrounds)
  - Basic graphical objects
  - Complex objects from libraries
- Object behavior and appearance linked to plant variables
- Client Explorer
  - Up to 16 Independent Windows
  - Explorer Panel Supports Display Hierarchy
- Client access to multiple servers
Client Explorer - 2

- Trends and Plots
  - Time charts and X-Y plots
  - All tags Available for Online Trending
  - Up to 60 tags on a Trend Page
  - Re-Scaling, Panning and Zooming
  - Time cursors
  - Online creation
  - Support for different time on the X axis (for comparison)
Client Explorer - 3

- Pop-up Controls
  - Pop-up Faceplates to Control Process from Graphic Pages
  - Multiple Pop-up Faceplates on the Same Graphic Page for Simultaneous Control of Multiple Field Elements
  - Pop-up Pegboards
Client Explorer - 4

- Display Builder
  - State of the art display builder
  - Templates
  - Symbol Libraries
  - ActiveX
  - Drag and Drop support
  - Support link of object classes with instances
Data Publishing - 1

- OPC Server
  - DA, AE, HDA
- ODBC
  - Support mirroring
- OLE-DB
  - Tenore available as OLE-DB provider
- DDE
  - For Microsoft Office integration
- API
  - For application development
  - Available for Visual Basic and Visual C++, also as a COM object
Alarm Management

Hierarchical Alarm Group Structure

- 16 Primary Groups
- 256 Secondary Groups
- 8 Priorities

Filtering on Group and Priority

Global and Local Acknowledge

Link to Graphic Pages and Standard Operating Procedures
System Management - 2

- System security
  - Flexible scheme based on internal users
  - 16 User levels
  - Security controls performed on actions and areas, down to the tag level
  - Standard password aging
System Management - 3

- Diagnostics and System Management
  - Fast overview by usage of symbols
  - Easy navigation through a tree structure
  - Output of the analysis in a log file
  - User-friendly system and configuration management
System Deployment Options

- All in One for small systems
- Clients on separate PC
- Separate Client and Server
- Dedicated Front Server
- Dedicated Web Server
- Distributed database for large systems
  - Segregation
  - Redundant servers
  - Composite servers
  - Hierarchical architectures
All in One - 2

- Compact configuration for small systems
- Not recommended for more than 2500 tags
- Suitable for standard PC with Windows 2000 Professional (no Windows server required)
- Good solution for local control stations, also on panel PC

Hardware Requirements
- Pentium 4 or later, 1 GHz
- 512 MB RAM
- 40 GB HD

Software Requirements
- Windows 2000 Professional
- Excel (for configuration or reports)
Separate Clients and Server - 1

Client/server Network

Workplaces

Client Explorer

Client Explorer

WEB Server

Data Base Management

I/O Scanner

Data Publishing Server

MultiMaster Server

WEB Server

Client Explorer

Client Explorer

Data Publishing

Server

Control Network

Controllers
Separate Clients and Server - 2

- Solution for multiple concurrent users
- Up to 16 concurrent clients supported
- Client server network must be at least 10 Mbit/sec
- Proprietary communication protocol between client and servers (based on DCOM)
- Graphical pages can be client-specific or shared for all clients

Server
- Hardware Requirements
  - Pentium 4 or later, 1 GHz
  - 512 MB RAM for 8 client, 1 GB for 16 clients
  - 40 GB HD
- Software Requirements
  - Windows 2000 Server
  - Excel (for configuration or reports)

Client
- Hardware Requirements
  - Pentium 4 or later, 1 GHz
  - 256 MB RAM
  - 20 GB HD
- Software Requirements
  - Windows 2000 Professional
  - Excel (for client-based reports)
Dedicated Front End Server - 1

Client/Server Network

Client Explorer

MultiMaster Server

WEB Server

Data Base Management

I/O Scanner

Data Base Publishing

Workplaces

Controllers

Control Network

Front End Servers
Dedicated Front End Server - 2

- Solution to segregate data acquisition from data processing
- The Front End node is responsible for data acquisition (even multiple drivers per server) and creates a local copy of the Real Time database
- Data in the Front End node is made accessible to all servers in the system
  - through proprietary InterServer protocol if bandwidth 10 Mbit/sec or higher
  - IEC 870-5-104 if bandwidth lower than 10 Mbit/sec (some limitations apply)

Front End Server

- Hardware Requirements
  - Pentium 4 or later, 1 GHz
  - 512 MB RAM
  - 30 GB HD

- Software Requirements
  - Windows 2000 Professional
Dedicated Web Server - 1

Client/server Network

Client Explorer

Data Base Management

I/O Scanner

WEB Server

Data MultiMaster Server

Controller

MultiMaster Server

Web Server

Data Base Management

Internet

Workplaces

Firewall

WEB Server

Client Explorer

Data MultiMaster Server

Servers

Control Network
Dedicated Web Server - 2

- If web access to the system is required, a dedicated and protected (by a firewall) PC is highly recommended.
- The Web Server is responsible for data publishing on the Internet or Intranet and requires a local copy of the Real Time database.
- Data in the Web Server is retrieved from all servers in the system through proprietary InterServer protocol.
- Minimum bandwidth for the LAN between systems servers and web server is 10 Mbit/sec.

Web Server

- Hardware Requirements
  - Pentium 4 or later, 1 GHz
  - 512 MB RAM (or 1 GB if PGRP with more than 8 clients)
  - 30 GB HD

- Software Requirements
  - Windows 2000 Server
  - IIS
  - FrontPage
Segregated Servers - 1

Unit 1

Unit 2

Unit 3
Segregated Servers - 2

- Solutions when independent servers are required for plant areas (e.g. separate groups)
- Each server only acquires and maintains data from the related plant area
- Clients are logically connected to one server, but graphical pages can include tags from other servers
  - Client 1 is logically connected to Server Unit 1
  - If tags are addressed by name only (e.g. TIC401), its value will be the one available in the connected server (Server Unit 1)
  - If tags are addressed by a fully qualified name (e.g. Server Unit 2\TIC401), its value will be fetched on Server 2 by Server 1 and made available to the client
Redundant Servers - 1

Unit 1

Unit 2

Unit 3
Clients have a Server Access List: if communication with a server is lost, the client reconnect to the next server.

Each server can acquire data in parallel, or, if parallel paths not available, from other servers.

One server is the designated master for actions on the field.

Backfill of data and configuration changes.

Only available if Client/Server network is at least 10 Mbit/sec.
Composite Servers - 2

- Solutions when servers are required to maintain a complete database

- Each server acquires data from the related plant area through the connected controllers. Tags from other plant areas are acquired through the network

- Clients are logically connected to one server, and from that server they can see tags for all plant areas

- Only available if Client/Server network is at least 10 Mbit/sec. For large number of tags (> 5000) 100 Mbit/sec recommended
Hierarchical Architectures - 2

- Solutions when plant areas need dedicated servers and/or workstations, and there is a central control room with access to whole plant
- Each area server acquires data from the related plant area through the connected controllers. Central plant server acquires tags from area servers
  - through proprietary InterServer protocol if bandwidth 10 Mbit/sec or higher
  - IEC 870-5-104 if bandwidth lower than 10 Mbit/sec (some limitations apply)
- Area clients are logically connected to the corresponding area server
- Plant clients are logically connected to the plant server, and have access to tags from the whole plant