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Introducing MIStudio  
Manufacturing Intelligence and  
Productivity Solution Software

*MIStudio*

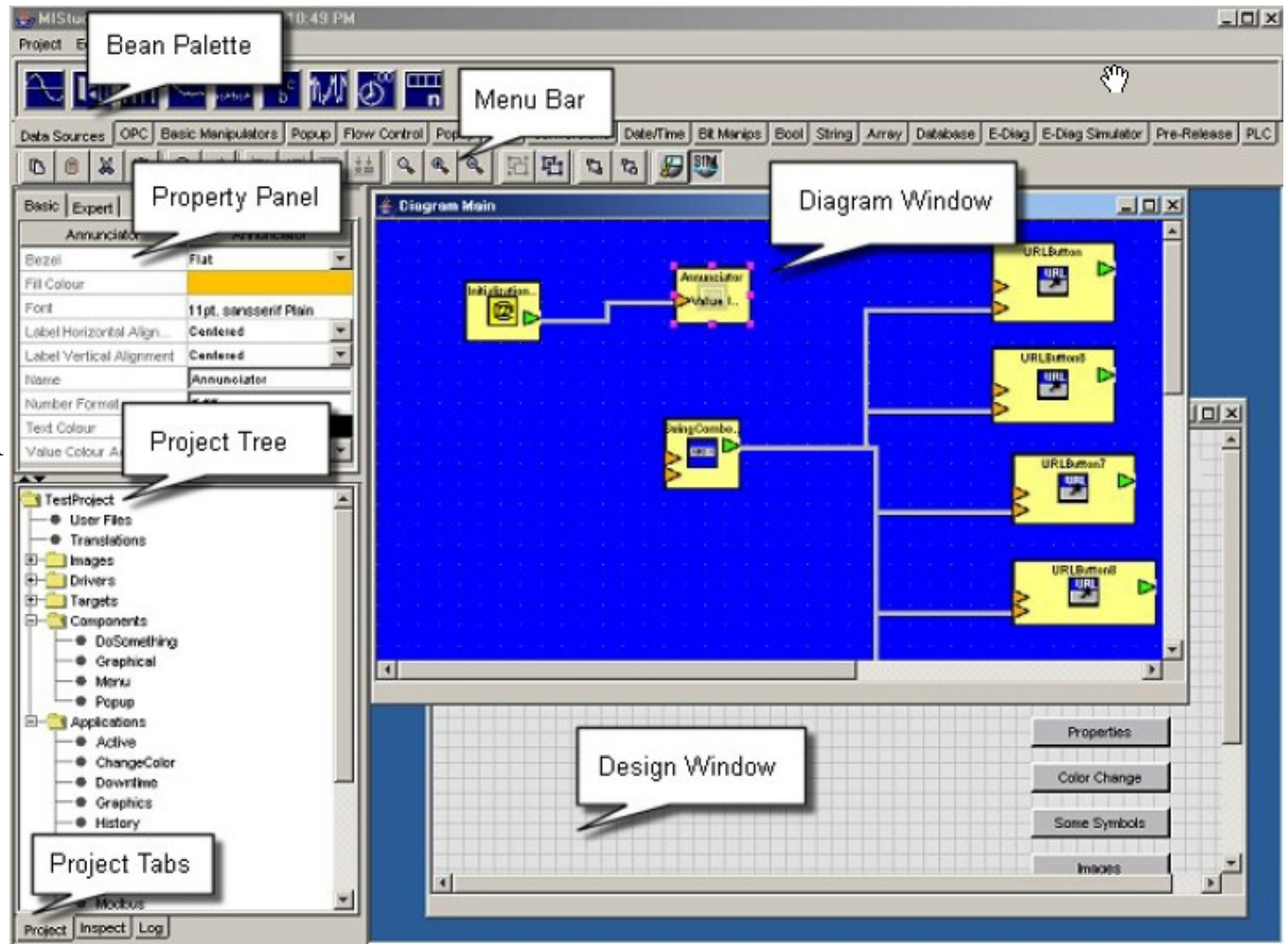
“An open standards, platform and  
device independent productivity  
solution”

# MIStudio – Product Overview

- 1. Integrated Design Environment, IDE, Software Toolkit
  - Create Real-Time, Web-enabled Manufacturing Intelligence applications
- 2. Component Library - Virtual Instrumentation Beans - VIB
  - 300 + Visual and Logic Components
    - Enterprise Java Beans - EJB compatibility
  - Graphical Editor - create your own Visual components
- 3. Runtime Execution Engine - MIX Application Server
  - Execution engine embeddable on a variety of hardware platforms (Java JVM enabled)
  - Embedded Linux, PLC module, Windows PC or Enterprise Server

# MIStudio - Integrated Development Environment

- A graphical tool used to design, create, and deploy Manufacturing Intelligence applications for MIX application server

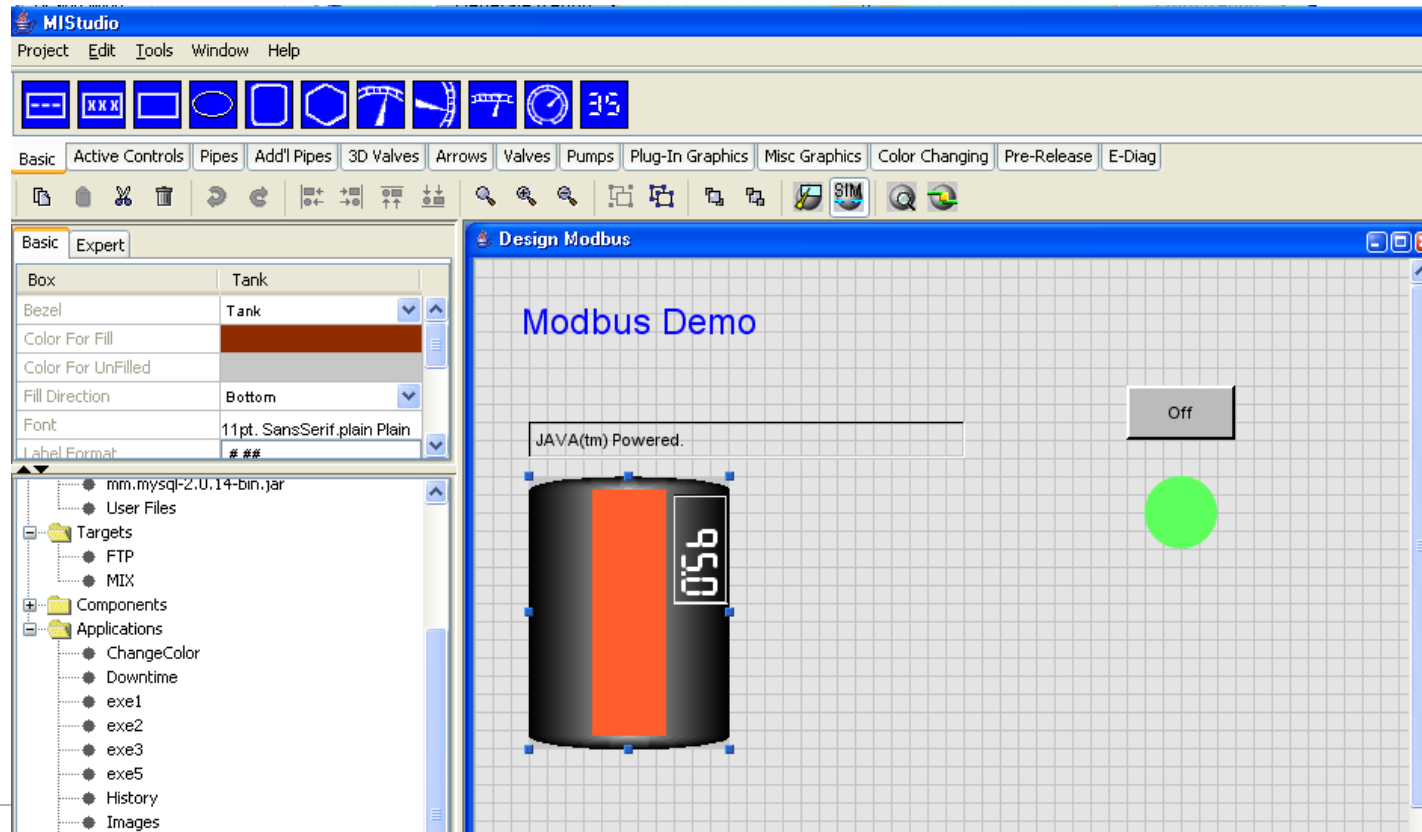




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# MI Studio IDE - Design (Graphic) Window

- This is where you design the graphical user interface for the application or component. It is always associated with its own Diagram (Logic) Window





33.5  
35.7  
32.2  
30.9  
28.5

# MI Studio IDE - Diagram (Logic) Window

- This is where you design the 24/7 execution logic for the application or component. Java bean components are wired together to create the desired logic execution

The screenshot shows the MI Studio IDE interface. The top menu bar includes Project, Edit, Tools, Window, and Help. Below the menu is a toolbar with icons for file operations and simulation. The left sidebar has two tabs: Basic and Expert. The Basic tab is active, showing a configuration table for a Modbus device.

Property	Value
Modbus TCP Device Ser...	ModbusPLC
Hostname	quantum.ergotech-usa.com
MaximumSocketConnecti...	5
Name	ModbusPLC
Reponse Timeout	500
SimulationFlag	True

The main workspace, titled 'Diagram Modbus', contains a logic diagram with the following components and connections:

- ModbusPLC**: A central component with outputs for errorcount, messagestrings, and Output, and inputs for Host/IP and Modbus Port.
- ModbusInt** and **ModbusInt2**: Integer input components connected to the ModbusPLC.
- Modbus0XSe**: Two Modbus output components connected to the ModbusPLC.
- IncrementSe**: Two incrementer components connected to the ModbusInt and ModbusInt2.
- SevenSegm**: A seven-segment display component connected to the ModbusInt2.
- Tank**: A tank component connected to the ModbusInt2.

The diagram shows a flow of data from the ModbusPLC through various ModbusInt and Modbus0XSe components, with IncrementSe and Tank components also receiving input from the ModbusInt components.



# Component Library - Virtual Instrumentation Beans and Connectors

- Java bean components provide modular software blocks to be assembled according to the customer's rules and application requirements
- 300+ Visual and Logic components
  - Visual and Logic components are JavaBeans
- Use of the common industry standard, open application programming interfaces, provides extensibility
- Java Standards (J2EE Servlets, J2ME)

# Component Library - Graphical and Logic Beans

- Modular Software Block Example : - Modbus TCP Device Server Connector
  - Graphical Component with Property Dialog Box (Basic and Expert properties)



The screenshot shows the MIStudio software interface. The main window has a menu bar (Project, Edit, Tools, Window, Help) and a toolbar with various icons. Below the toolbar is a row of component categories: TCP, D Int, Float, String, 0X, 1X. A secondary row of categories includes Data Sources, OPC, Basic Manipulators, Flow Control, Math, Date/Time, Bit Manips, Bool, Array, Database, E-Diag, and E-Diag Simulator. The main workspace is divided into two panes. The left pane shows the 'Basic' tab of the 'Modbus TCP Device Server' property dialog box, which contains the following table:

Modbus TCP Device Server	ModbusTCPDeviceServer
Hostname	
MaximumSocketConnections	5
Name	ModbusTCPDeviceServer
Reponse Timeout	500
SimulationFlag	True

The right pane shows a logic diagram titled 'Diagram exe1' on a blue background. It features a yellow rectangular component labeled 'ModbusTCPDeviceServer'. The component has three output ports on the right side: 'errorcount', 'messagestrings', and 'Output'. It also has two input ports on the left side: 'Host/IP' and 'Modbus Port'. A small green box labeled 'TCP' is positioned between the 'messagestrings' and 'Output' ports.



# Components Library - Logic Components

- Data Acquisition Connectors
  - PLC Drivers - Ethernet and Serial Protocols
    - Modbus TCP/IP, RTU, DF1, S5-SA511, S7-PPI etc.
  - OPC Client interface
  - Serial (ASCII string)
- Data Manipulation and Conversion
  - Math, Arrays, Rate/Counting, Date/Time Stamping
- Data Management Connectors
  - SQL Database Storage and Retrieval (Read/Write)
  - Data Caching, Security
- SPC and Historical Trending
- Machine Downtime (OEE) analysis
- Alarming, Email Event Management and Embedded Reports
  - XML, PDF, CSV, Excel and HTML file generation

# Data Acquisition Connectors

- PLC Drivers - Ethernet and Serial Protocols
  - Ethernet - Modbus TCP/IP, BACnet, EasyIP (Festo)
  - Serial - Rockwell DF1, Modbus RTU, Siemens S5 - S7 , IDEC, and FX

The screenshot displays the MIStudio software interface. The top menu bar includes Project, Edit, Tools, Window, and Help. Below the menu is a toolbar with icons for TCP, D Int, Float, String, 0X, and 1X. A secondary toolbar contains various data source and manipulation options: Data Sources, OPC, Basic Manipulators, Flow Control, Math, Date/Time, Bit Manips, Bool, Array, Database, E-Diag, and E-Diag Simulator. A third toolbar features standard editing and simulation tools, including a SIM button.

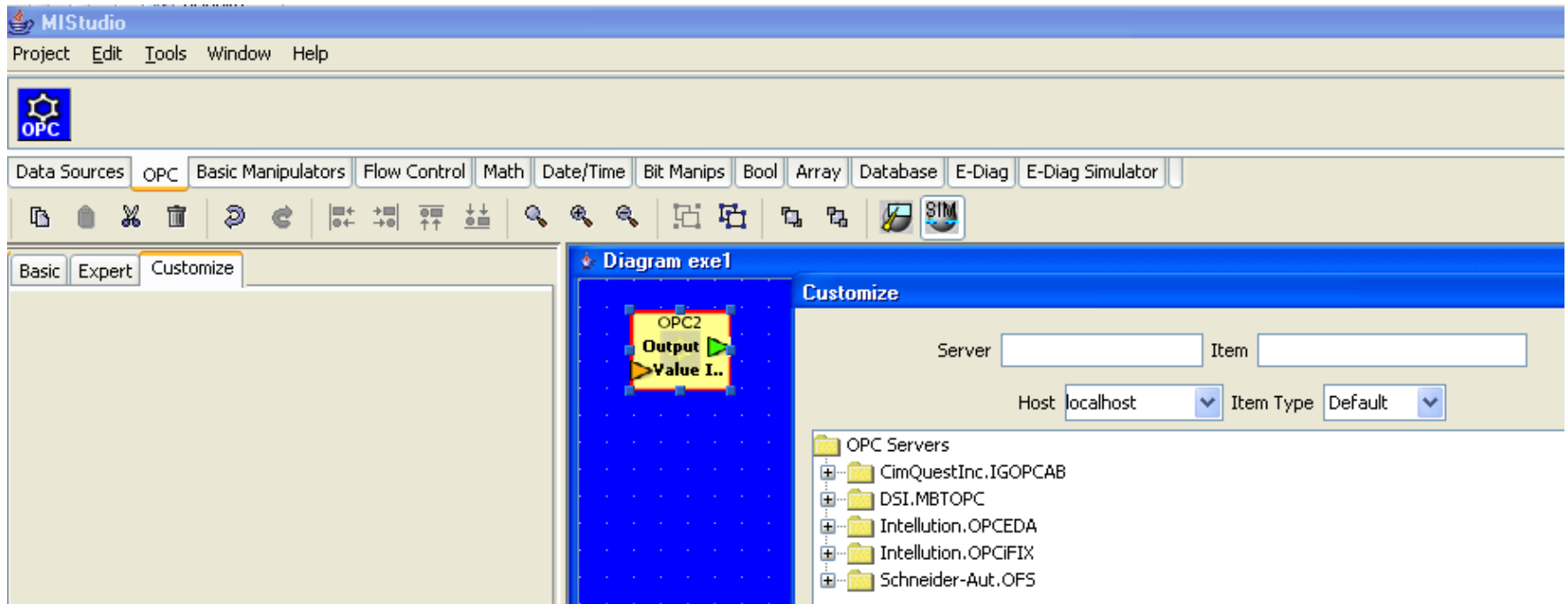
The main workspace is divided into two panes. The left pane, titled 'Basic', shows the configuration for a 'Modbus TCP Device Server'. The configuration table is as follows:

Property	Value
Modbus TCP Device Server	ModbusTCPDeviceServer
Hostname	
MaximumSocketConnections	5
Name	ModbusTCPDeviceServer
Reponse Timeout	500
SimulationFlag	True

The right pane, titled 'Diagram exe1', shows a yellow rectangular block representing the 'ModbusTCPDeviceServer'. It has two input ports on the left: 'Host/IP' and 'Modbus Port'. On the right side, it has three output ports: 'errorcount', 'messagestrings', and 'Output'. A small 'TCP' icon is visible inside the block.

# Data Acquisition Connectors

- OPC Client Interface Component
  - Access any OPC, Data Access 1.0+ server
  - Local and remote (OPC Gateway )data access





# Data Management Connectors

- SQL Database Storage and Retrieval (Read/Write)

MIStudio Test Build 4-July-2005 03:24 AM

Project Edit Tools Window Help

Math Conversions Date/Time Bit Manips Bool String Array  
Data Sources OPC BACnet Basic Manipulat

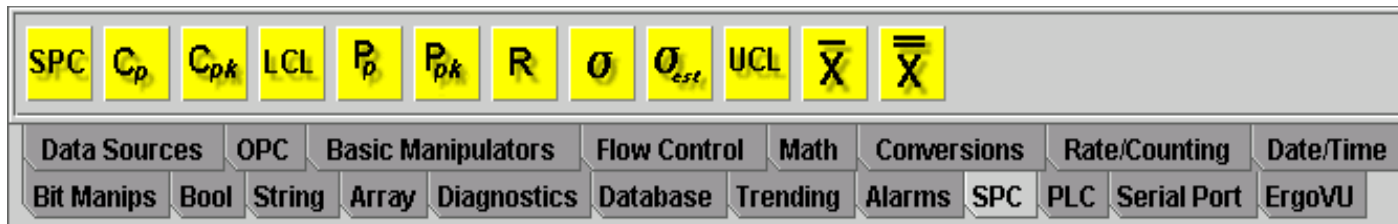
DatabaseConnectionManager	Test Database Connection
Database Driver Class Name	org.gjt.mm.mysql.Driver
Database Password	
Database URL	jdbc:mysql://localhost/test
Name	Test Database Connection
Username	root

Diagram Main

Test Database Connection

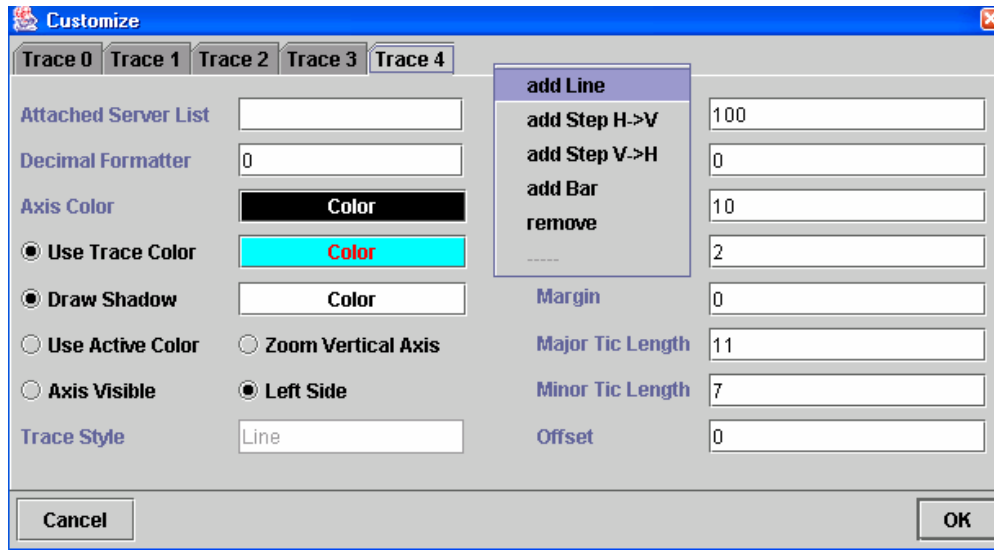
# Logic Bean Components - SPC and Trending

- SPC Analysis Components

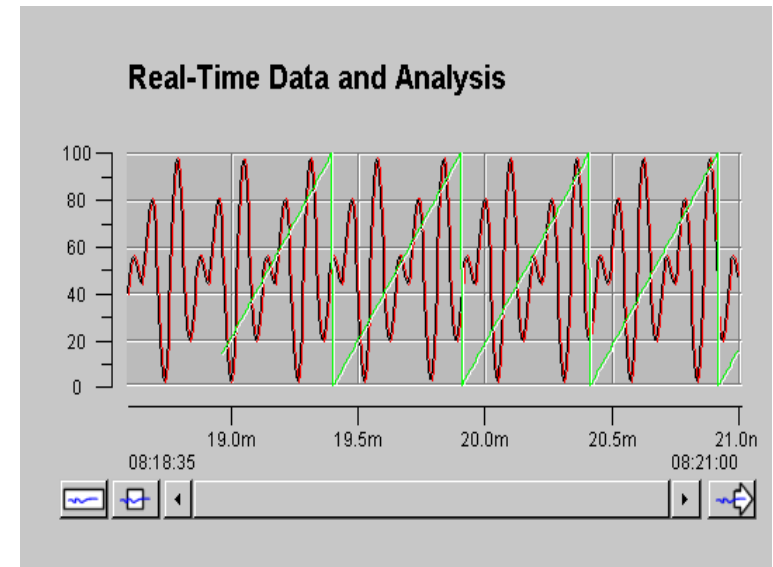


The screenshot shows a menu of SPC analysis components. The top row contains yellow buttons for SPC,  $C_p$ ,  $C_{pk}$ , LCL,  $P_p$ ,  $P_{pk}$ , R,  $\sigma$ ,  $\sigma_{est}$ , UCL,  $\bar{X}$ , and  $\bar{X}$ . Below this is a grid of other menu items: Data Sources, OPC, Basic Manipulators, Flow Control, Math, Conversions, Rate/Counting, Date/Time, Bit Manips, Bool, String, Array, Diagnostics, Database, Trending, Alarms, SPC, PLC, Serial Port, and ErgoVU.

- Historical and Trend Viewing Components

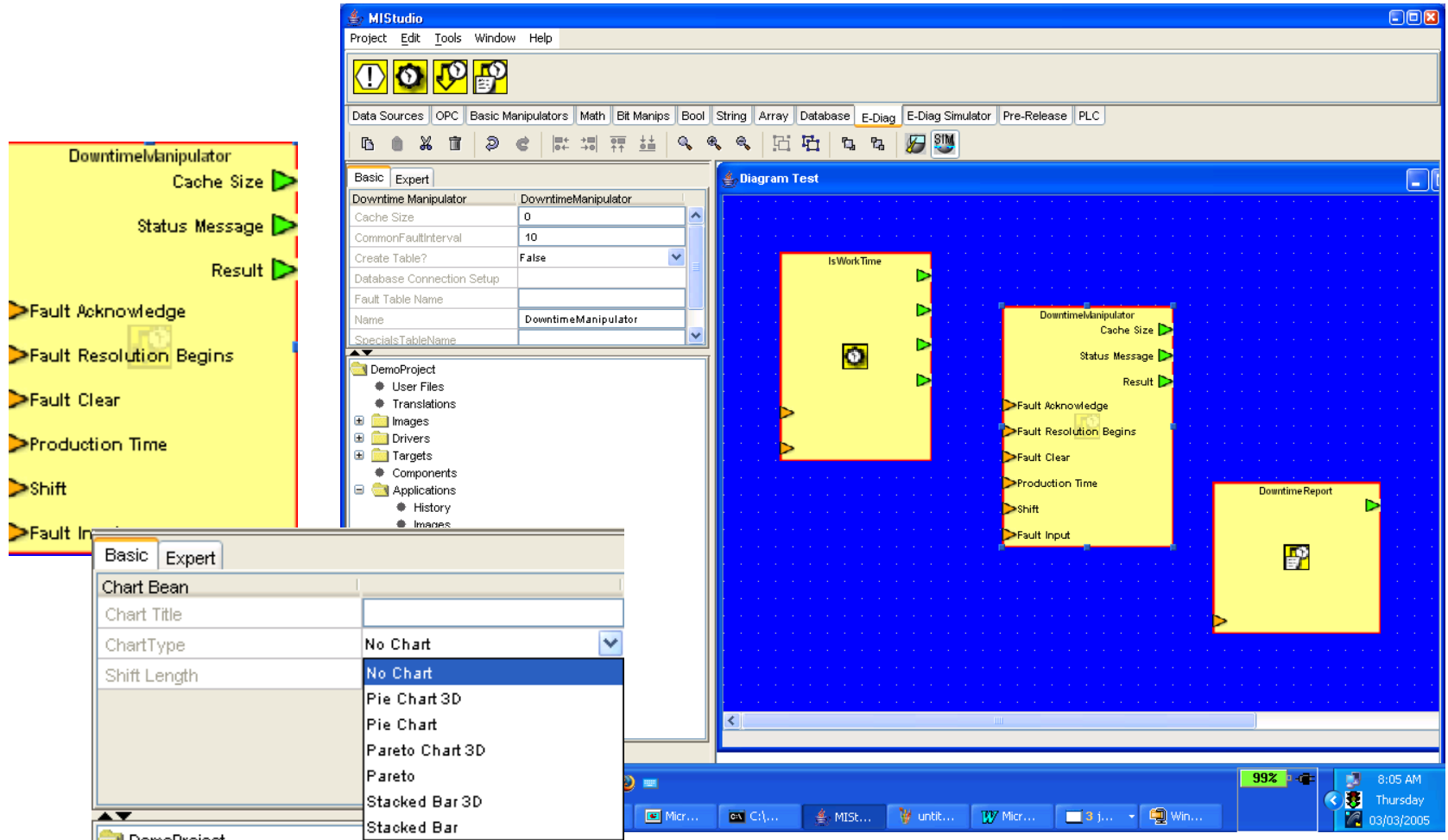


The 'Customize' dialog box is shown with tabs for Trace 0 through Trace 4. It includes settings for 'Attached Server List', 'Decimal Formatter' (set to 0), 'Axis Color' (set to Color), 'Use Trace Color' (checked), 'Draw Shadow' (checked), 'Use Active Color' (unchecked), 'Axis Visible' (unchecked), and 'Trace Style' (set to Line). A 'Margin' section is expanded, showing options for 'add Line', 'add Step H->V' (100), 'add Step V->H' (0), 'add Bar' (10), 'remove' (2), 'Margin' (0), 'Major Tic Length' (11), 'Minor Tic Length' (7), and 'Offset' (0). Buttons for 'Cancel' and 'OK' are at the bottom.



# Logic Bean Components - Machine Downtime

- OEE and Machine Downtime Analysis Components



The screenshot displays the MISTudio software interface, which is used for configuring logic beans for machine downtime analysis. The interface is divided into several key areas:

- Left Panel (Logic Bean Properties):** A vertical list of logic bean components, each with a yellow arrow icon indicating its status or configuration. The components include:
  - DowntimeManipulator
  - Cache Size
  - Status Message
  - Result
  - Fault Acknowledge
  - Fault Resolution Begins
  - Fault Clear
  - Production Time
  - Shift
  - Fault In
- Top Panel (MISTudio Window):** The main application window with a menu bar (Project, Edit, Tools, Window, Help) and a toolbar. Below the toolbar is a menu with options: Data Sources, OPC, Basic Manipulators, Math, Bit Manips, Bool, String, Array, Database, E-Diag, E-Diag Simulator, Pre-Release, and PLC. A sub-menu is open for 'Basic Manipulators', showing a table for 'Downtime Manipulator' configuration:
 

Property	Value
Cache Size	0
CommonFaultInterval	10
Create Table?	False
Database Connection Setup	
Fault Table Name	
Name	DowntimeManipulator
SpecialTableName	
- Diagram Test Window:** A large blue workspace containing three yellow logic bean components:
  - IsWorkTime:** A component with a clock icon and three green arrows on its right side.
  - DowntimeManipulator:** A component with a clock icon and several green arrows on its right side, corresponding to the logic bean properties listed in the left panel.
  - DowntimeReport:** A component with a document icon and a green arrow on its right side.
- Bottom Panel (Chart Bean Configuration):** A sub-menu for 'Chart Bean' configuration, showing:
  - Chart Title: [Empty text field]
  - ChartType: No Chart
  - Shift Length: No Chart
  - Available chart types: Pie Chart 3D, Pie Chart, Pareto Chart 3D, Pareto, Stacked Bar 3D, Stacked Bar.

The Windows taskbar at the bottom shows the system time as 8:05 AM on Thursday, 03/03/2005, and the CPU usage is at 99%.



# Logic Bean Components - Report Generation

- Reports Components (PDF, CSV, HTML, Excel)

MISstudio Test Build 4-July-2005 03:24 AM

Project Edit Tools Window Help

Data Sources: Math, Conversions, OPC, Date/Time, BACnet, Bit Manips, Bool, String, Array, Database

SimpleReport	SimpleReport4
Background Color	
Data Font	10pt. Monospaced.plain F
Date Format	d MMM yyyy HH:mm:ss
Intercolumn Gap	14
Label Font	12pt. Dialog.bold
Maximum Report Age	24h
Name	SimpleReport4
Number Format	0.0000
Orientation	Landscape
Outline Color	
OutputFormat	PDF
Page Footer	Tablet Press , Inc.
Page Header	Real time Parameters
Paper Size	Determined by Locale
Report Footer	End Of Report
Report Header	Real-Time Parameters Repor
Report Name	SpecialReport
Row Height	15

Diagram History

```
graph LR; Button[Button] --> HistoricalDatabaseSe...[HistoricalDatabaseSe...]; HistoricalDatabaseSe... --> SimpleReport4[Simple Report4 Output];
```



33.5  
35.7  
32.2  
30.9  
28.2

# Logic Bean Components - Report Generation

Real-Time Parameters Report				
Reading Time	R1	F1	I1	S12
18 Jul 2005 19:07:27	46.0000	49.0000	20.0000	23.0000
18 Jul 2005 19:07:57	52.0000	50.0000	79.0000	22.0000
18 Jul 2005 19:08:27	50.0000	49.0000	38.0000	74.0000
18 Jul 2005 19:08:57	54.0000	50.0000	97.0000	70.0000
18 Jul 2005 19:09:27	49.0000	51.0000	56.0000	45.0000
18 Jul 2005 19:09:57	49.0000	49.0000	15.0000	51.0000
18 Jul 2005 19:10:27	51.0000	50.0000	74.0000	41.0000
18 Jul 2005 19:10:57	49.0000	50.0000	33.0000	19.0000
18 Jul 2005 19:11:27	54.0000	50.0000	93.0000	50.0000
18 Jul 2005 19:11:57	53.0000	48.0000	52.0000	96.0000
18 Jul 2005 19:12:27	48.0000	48.0000	11.0000	69.0000
18 Jul 2005 19:12:57	46.0000	50.0000	71.0000	9.0000
18 Jul 2005 19:13:27	49.0000	50.0000	30.0000	17.0000
18 Jul 2005 19:13:57	45.0000	51.0000	90.0000	68.0000
18 Jul 2005 19:14:27	46.0000	49.0000	49.0000	75.0000
End Of Report				

18-Jul-2005 19:14:44

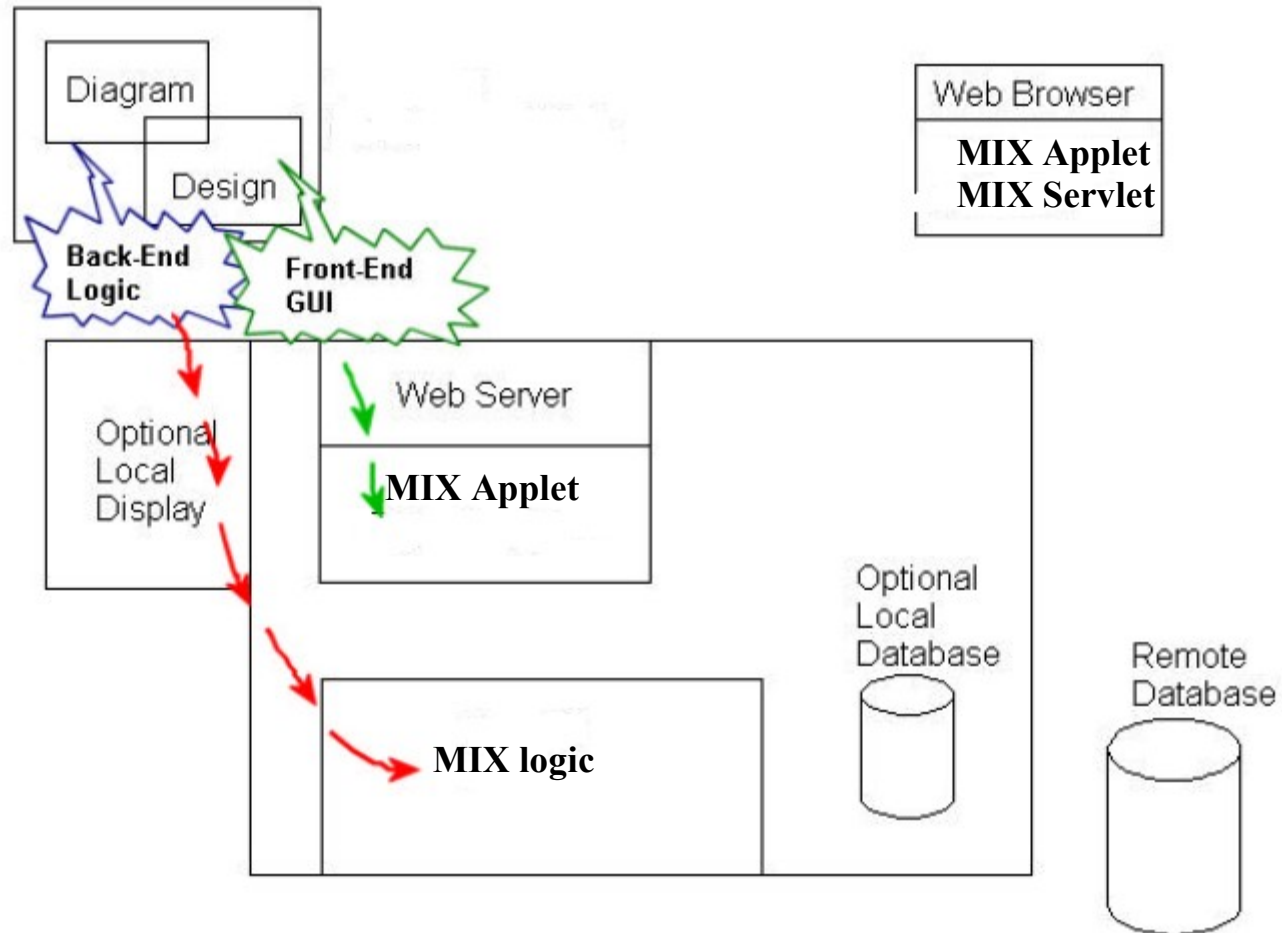
Tablet Press , Inc.

Page 1 of 1

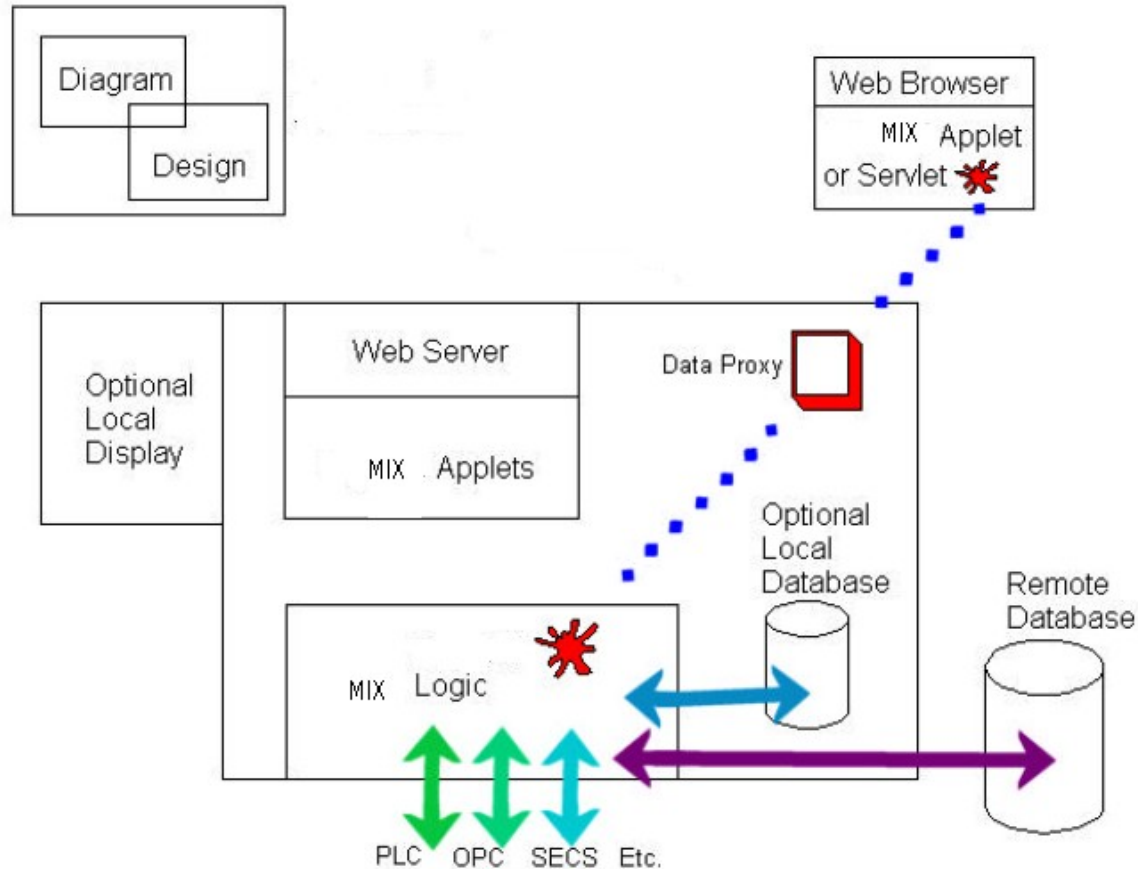


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## MI Studio Execution Engine (MIX) Architecture - Deployment



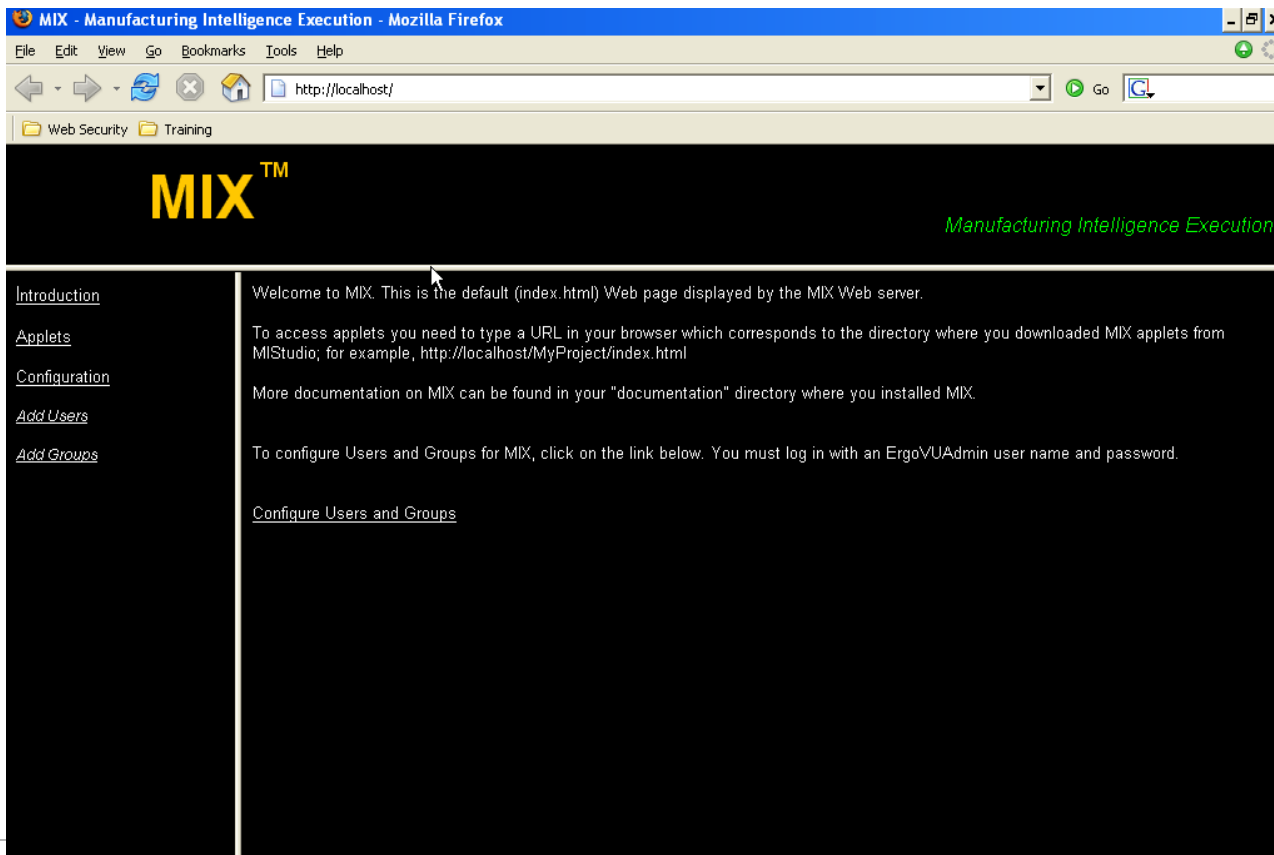
# MI Studio Execution Engine (MIX) Architecture - Runtime



- Data is transferred to and from the MIX applet through “proxies” that the MIX controller sets up between your applet and the logic

# MI Studio Execution Engine (MIX)

- Application Server
  - Group and User Assignment (Security and Alarming)
  - Device configuration (IP address, FTP)



# MI Studio Execution Engine (MIX) - Platforms

- MIX execution engine embeddable on a variety of hardware platforms (JVM enabled)
- Scalable and portable deployment
  - CPU performance, Memory
  - RAID, redundancy



Linux Server

PLC Module (JVM)

Linux Web Appliance

