SmartPlant P&ID Automation

An Enabler for Process Solutions

Objectives

- Understand Unified Modeling Language (UML)
- Understand Data Model of SPPID
- Understand Fundamentals of Logical Model Automation (LLAMA)
- Understand Placement Automation (PLAICE)
- Understand PID Automation (PIDAuto)
- Understand and modify Calculation/Validation interface of SPPID
- Understand and modify Import function of SPPID
- Understand the LMAutomationUtil for From/To

Skill Requirements

- Introductory knowledge of SPPID
- Concept of relational database
- Intermediate level of Visual Basic

What is Automation?

- *Automation is the process of using objects that belong to another application to control that application and/or use its functionality.*

The Automation Layer

- *Technology*
- *Structure*
- *Implementation*
- *Capabilities*
- *Limitations*
- *Version Compatibility*

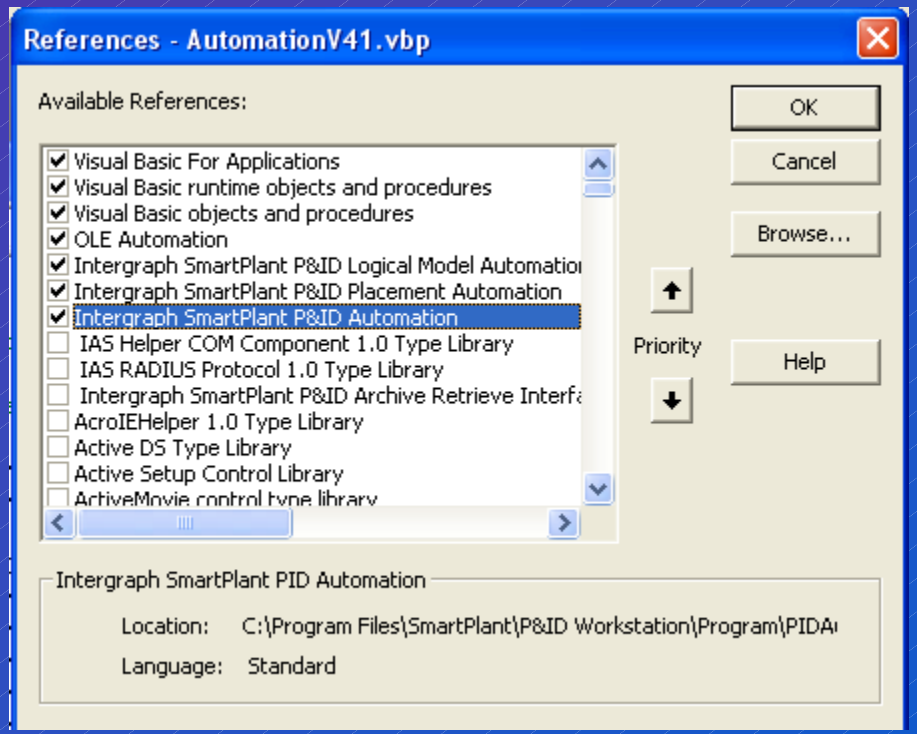
The Technology

- *COM Specifications*
- *OLE Automation*
- *Standard Development Tools – Visual Basic*

The Structure

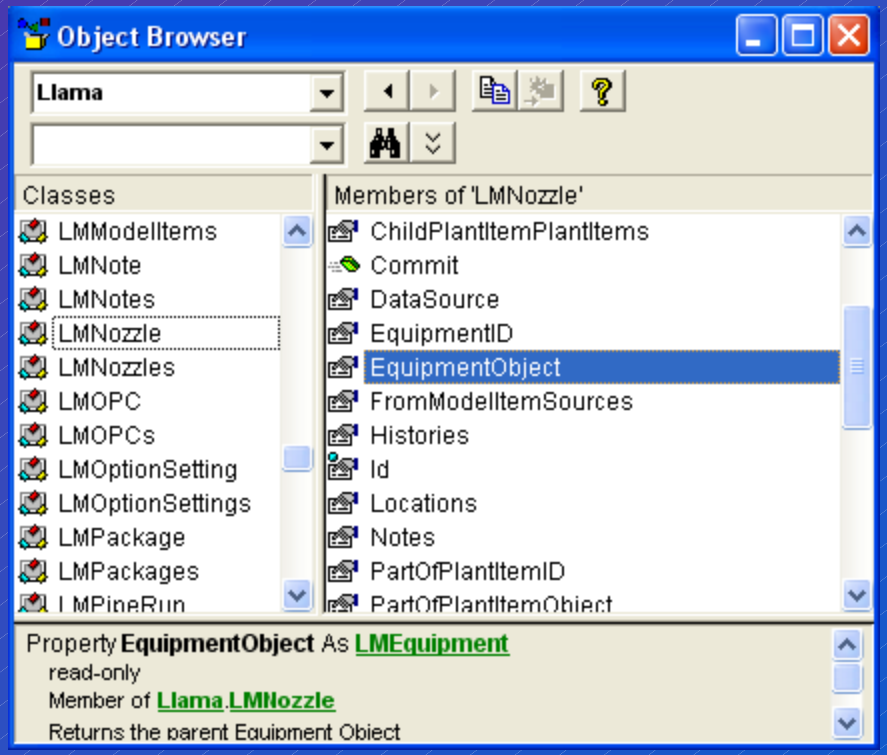
Automation Libraries

- *Can be referenced into any COM compliant development environment*
- *Four libraries provided for external Automation:*
  - LLAMA
  - PLAICE
  - PIDAutomation
  - LMAutomationUtil



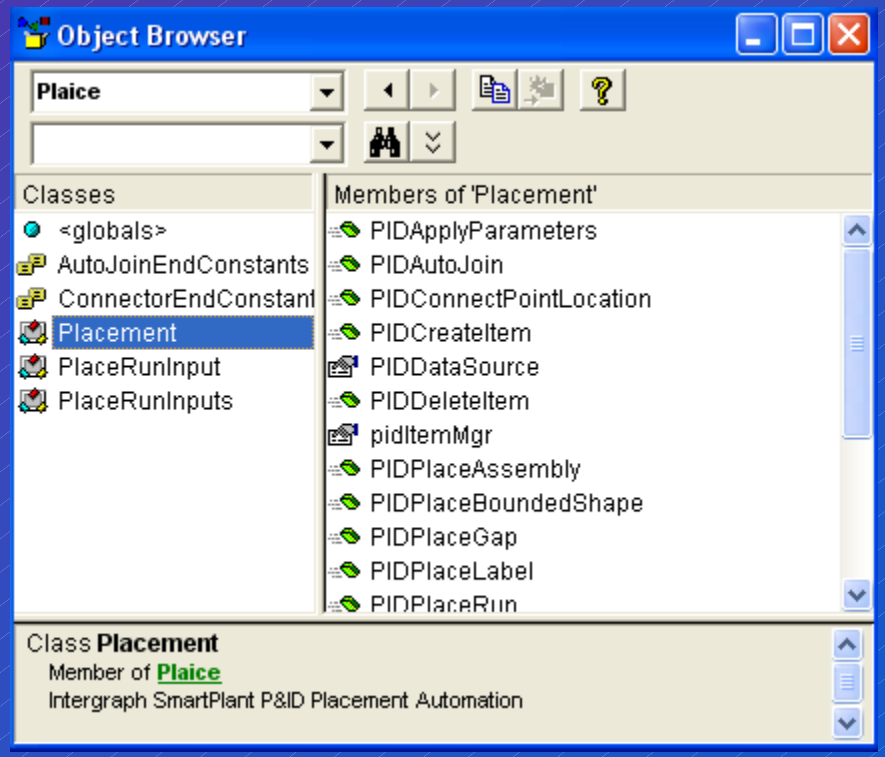
Logical Model Automation

- *A Class library*
- *Classes represent the data model*
- *Methods reflect the properties and data connectivity*
- *Provides a logical structure to access and manipulate data*



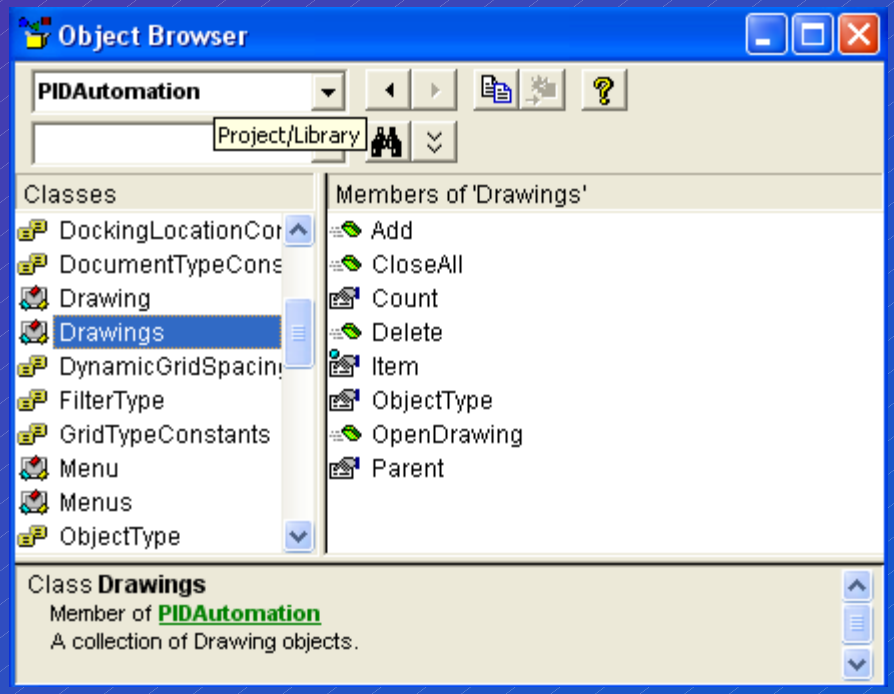
Placement Automation

- *A library of methods*
- *Place items on a drawing*
- *Interface with the Logical Model Automation (Llama) for data manipulation*



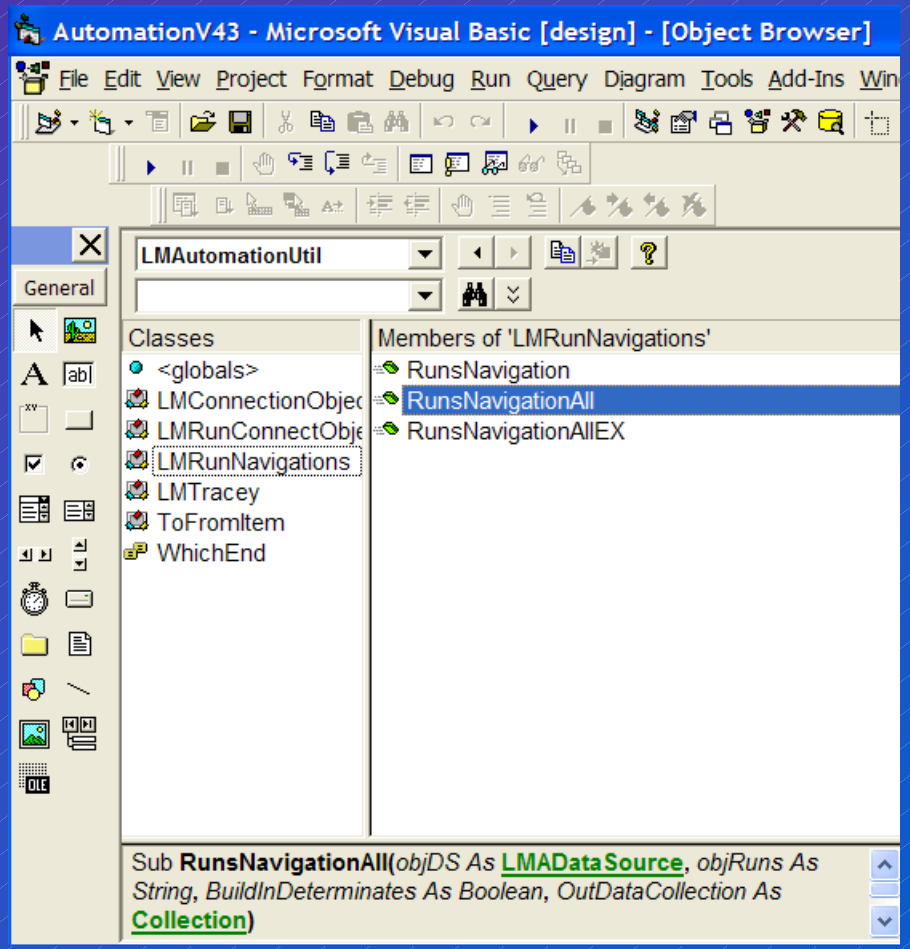
PIDAutomation

- *A Class library*
- *Only utilize three methods*
  - *Drawings.Add*
  - *Drawing.OpenDrawing*
  - *Drawing.CloseDrawing*



LMAutomationUtil

- *A Class library*
- *Only utilize two methods*
  - *RunsNavigation*
  - *RunsNavigationAll*

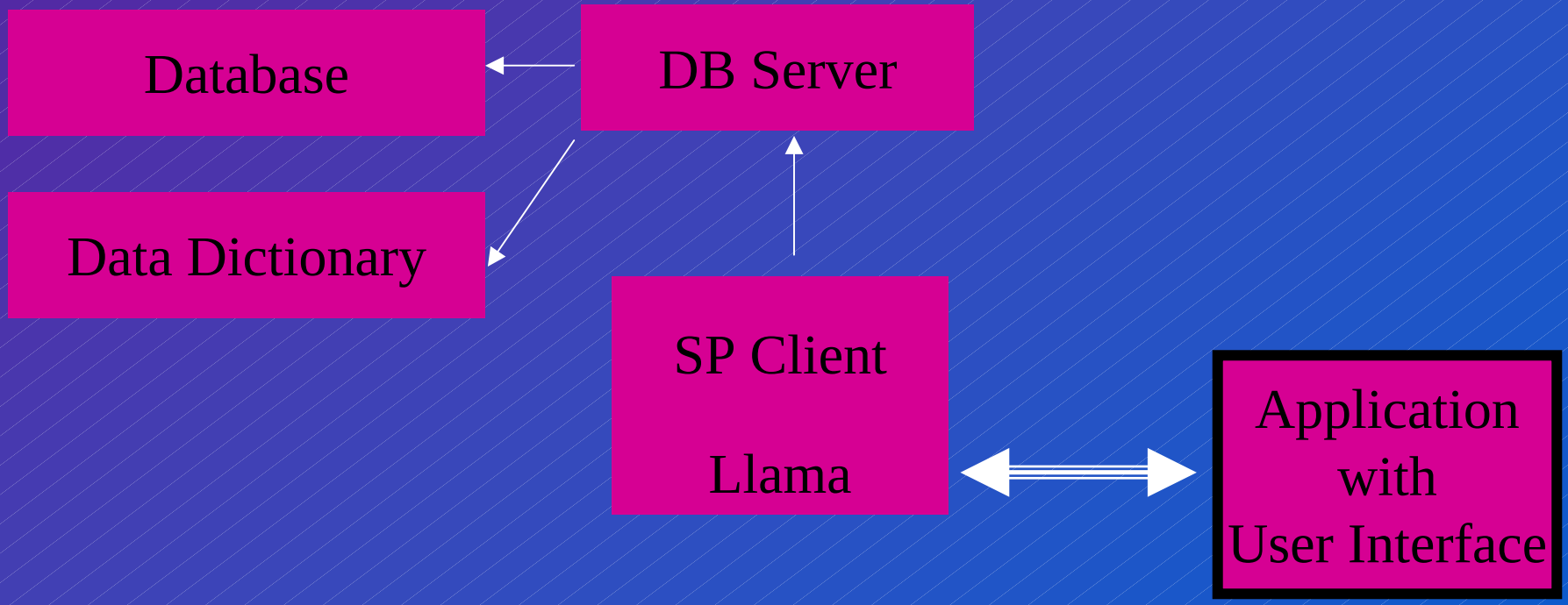


Implementation

Implementation of Automation

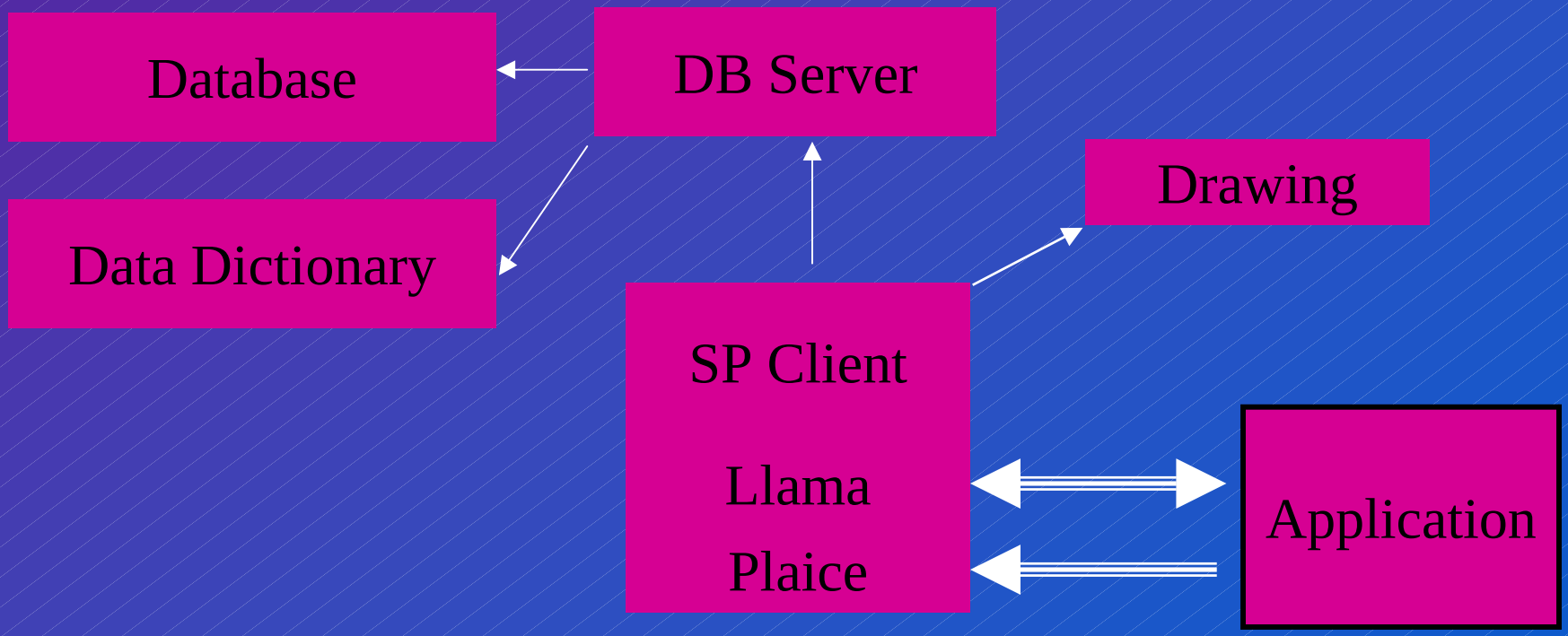
- *Stand-Alone Applications*
- *ActiveX components integrated into the SmartPlant Modeler*

Standalone Application

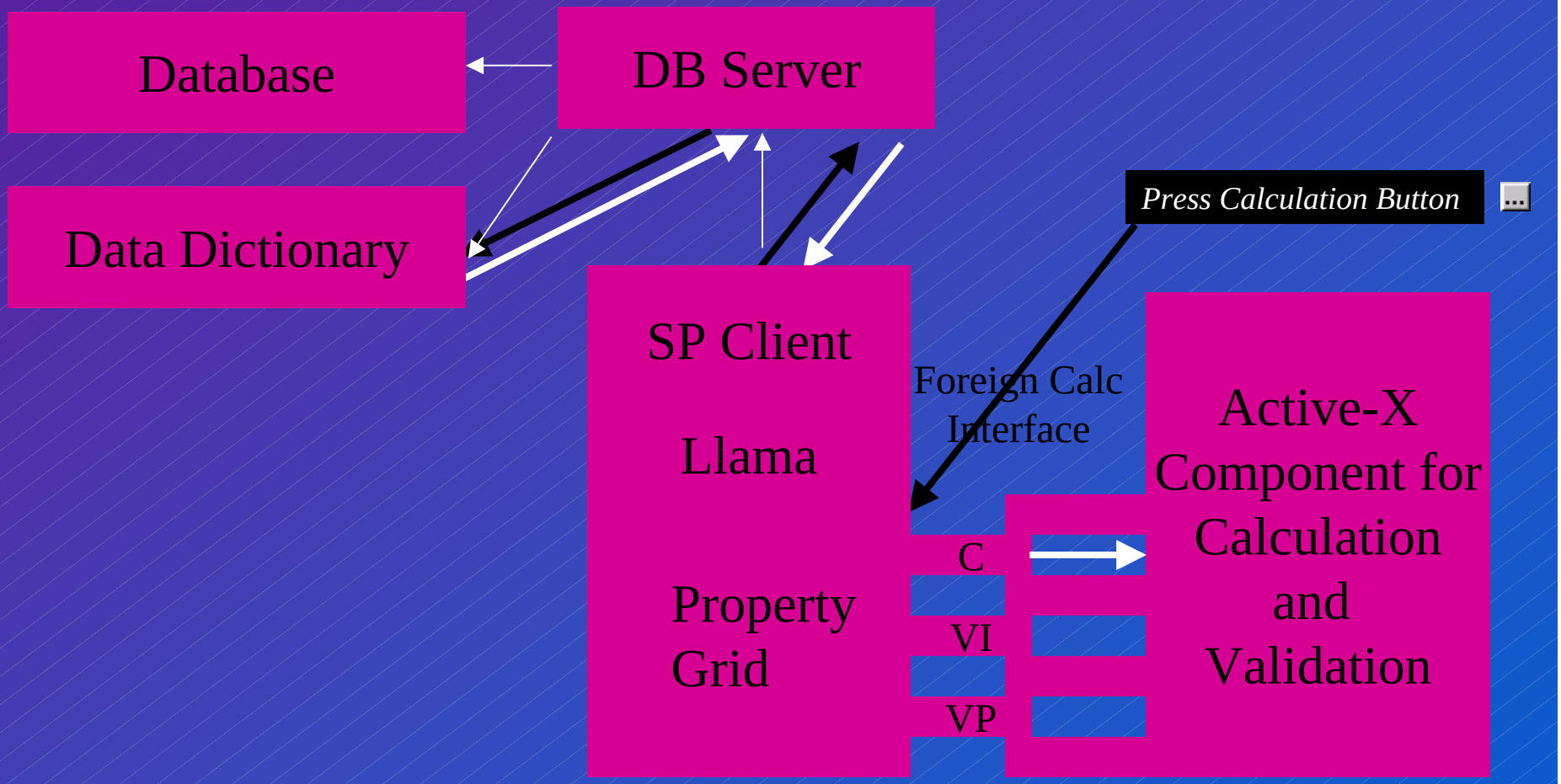


Standalone Application

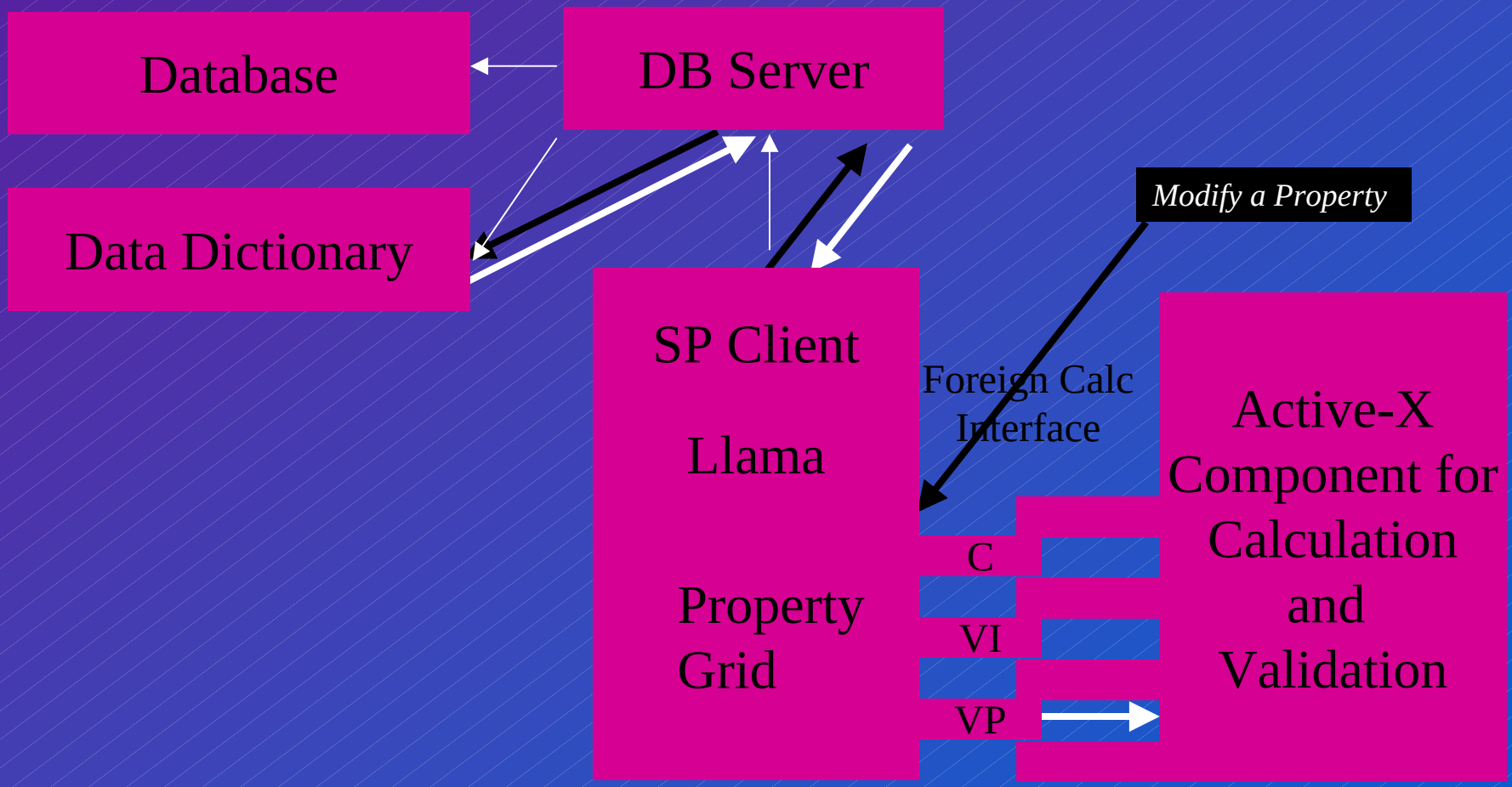
With Placement Automation



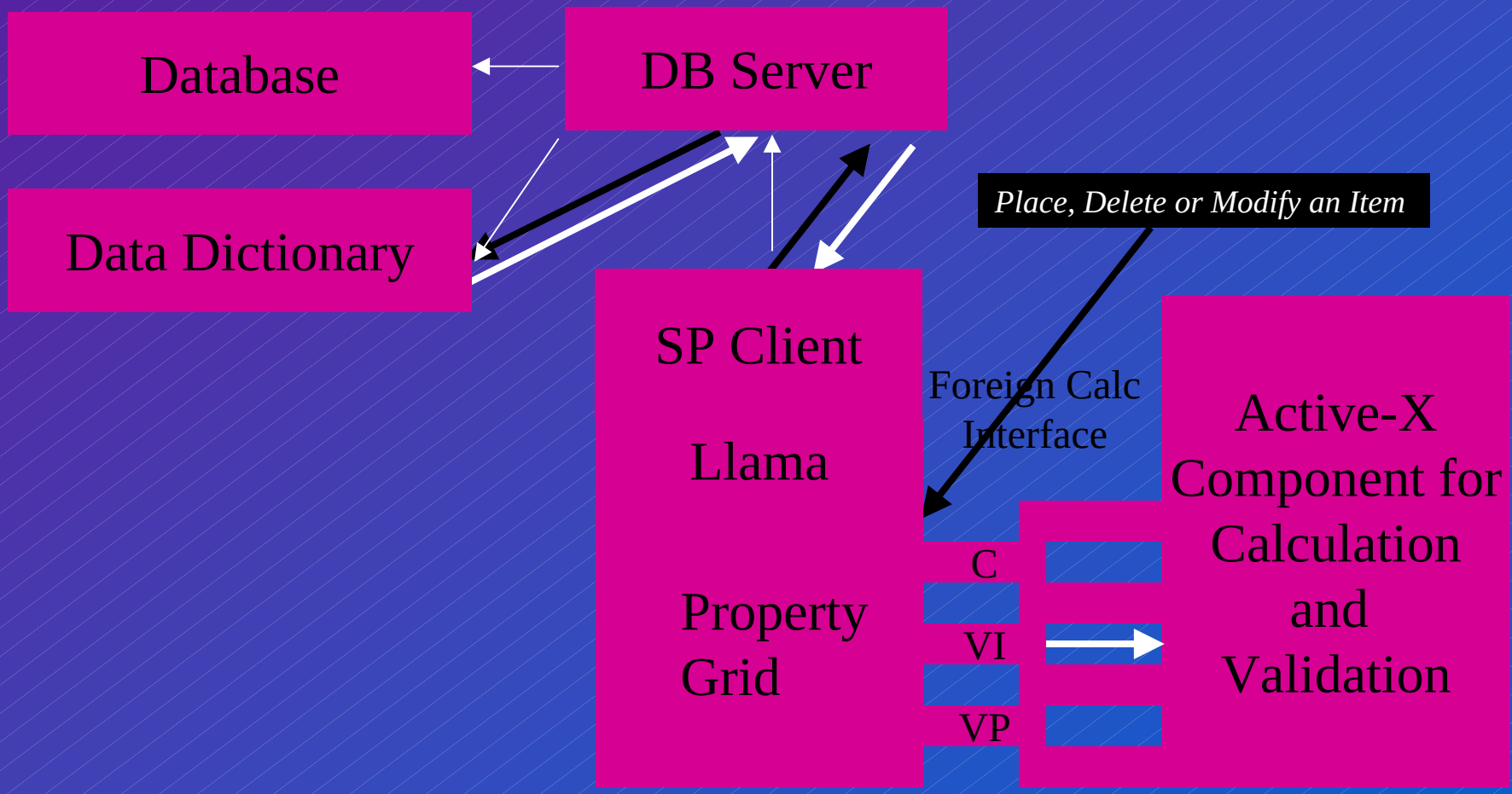
Integration - Calculation



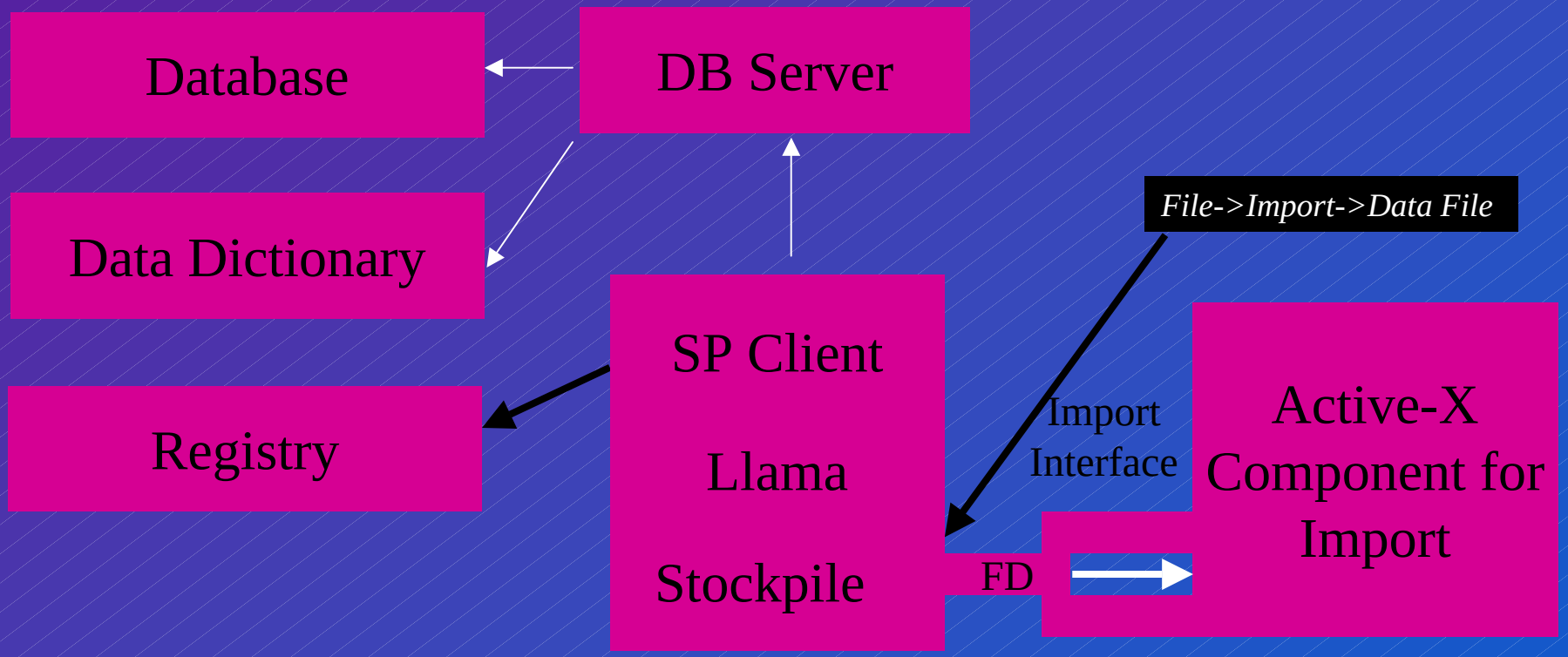
Integration - Property Validation



Integration - Item Validation



Integration - Import of Foreign Data



Capabilities

Power of Automation

- *Application Development (through standalone applications)*
- *Customization (through integration)*
- *Feature Enhancement (through integration)*

Power of Automation

- *Application Development (through standalone applications)*
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Application Development

Examples for application development:

- *Standalone application to access the database and generate a data report*
- *Standalone application to access the database and update property value*

Power of Automation

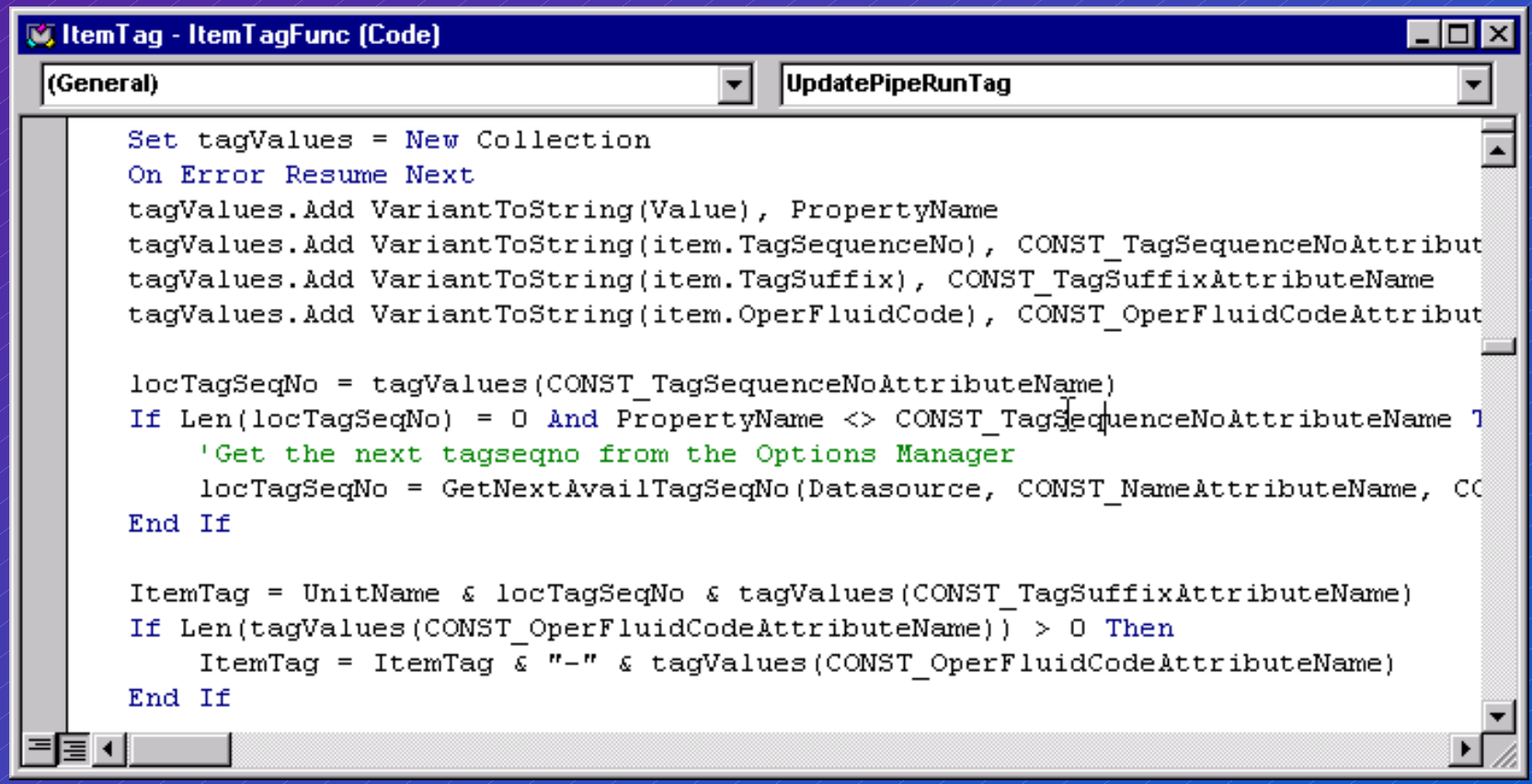
- *Application Development (through standalone applications)*
- *Customization (through integration)*
- *Feature Enhancement (through integration)*

Customization

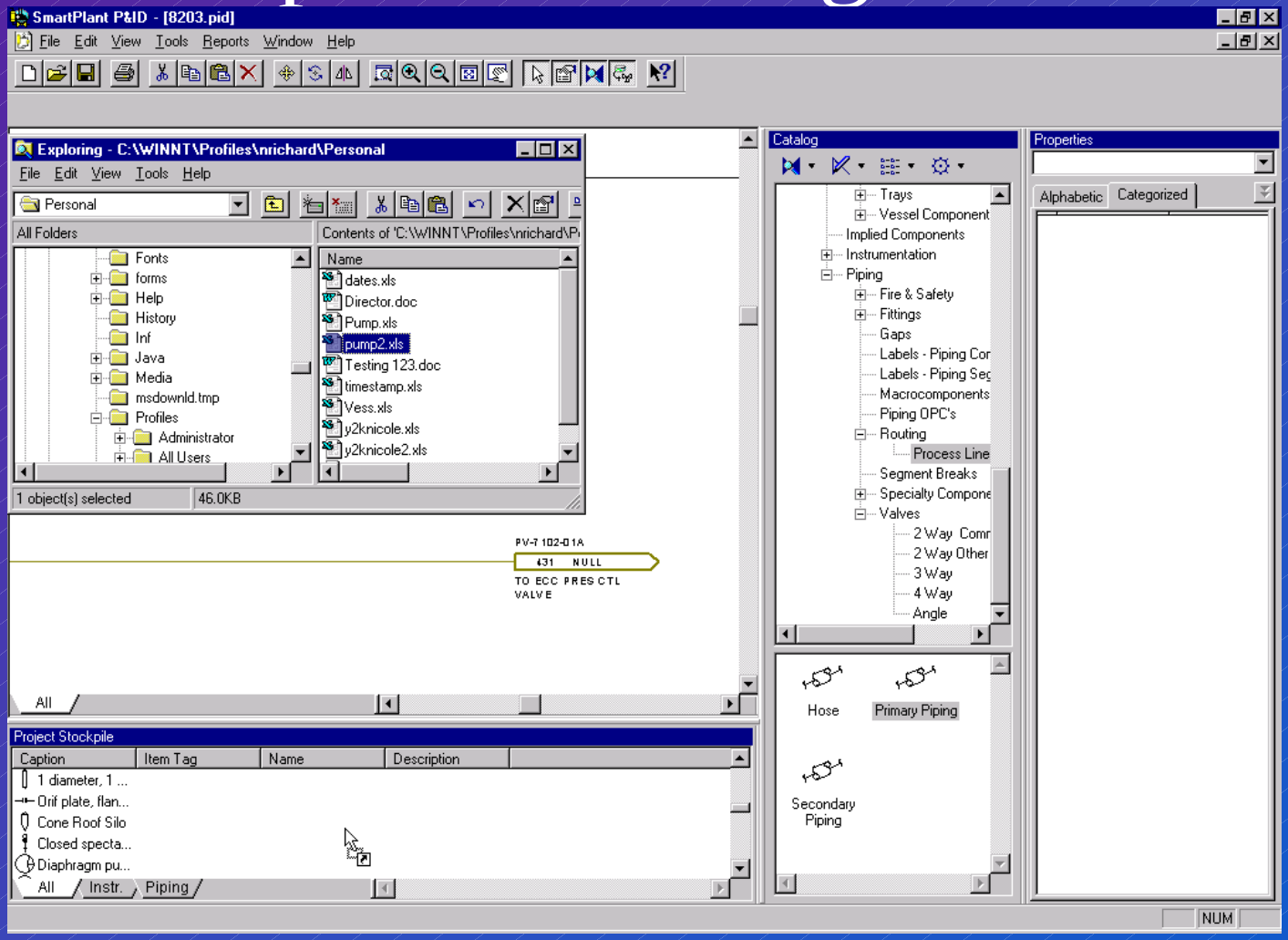
Source code provided to user for:

- *Item Tag validation*
- *Populating the Unit Code*
- *PlantItem validation*
- *Import*
- *Drawing copy/paste*

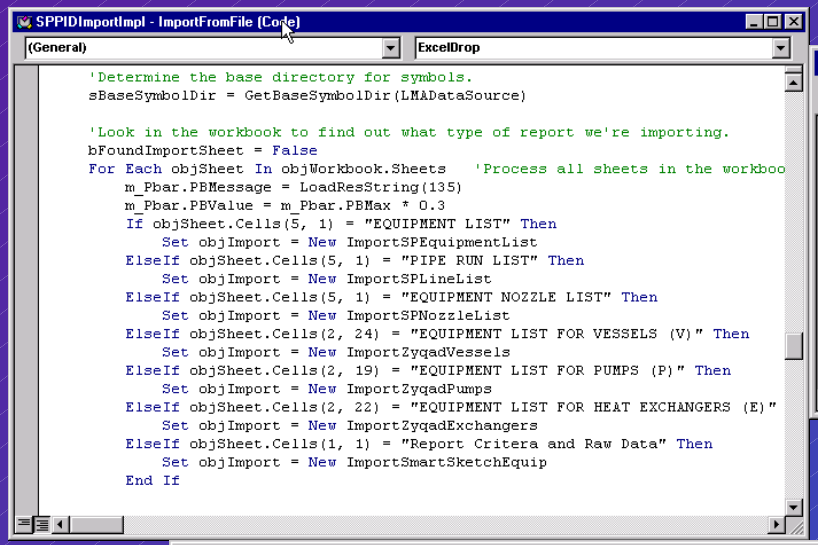
Customizing Item Tag Validation

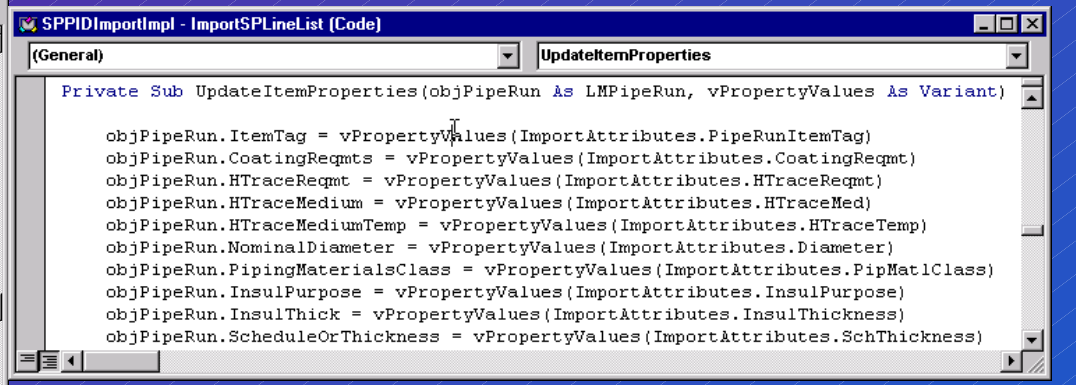


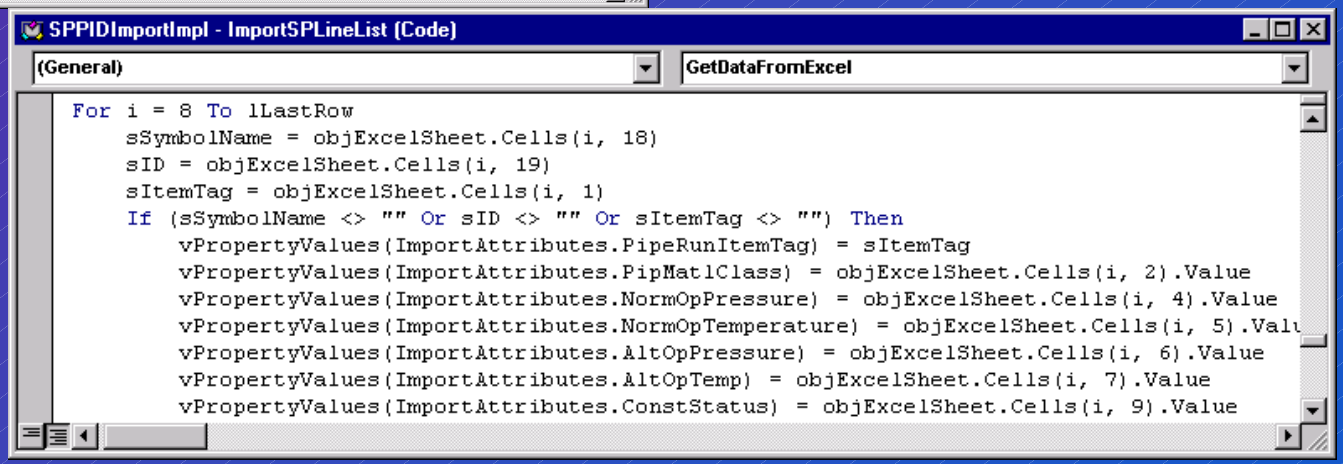
Import of Foreign Data



Customizing Import Module







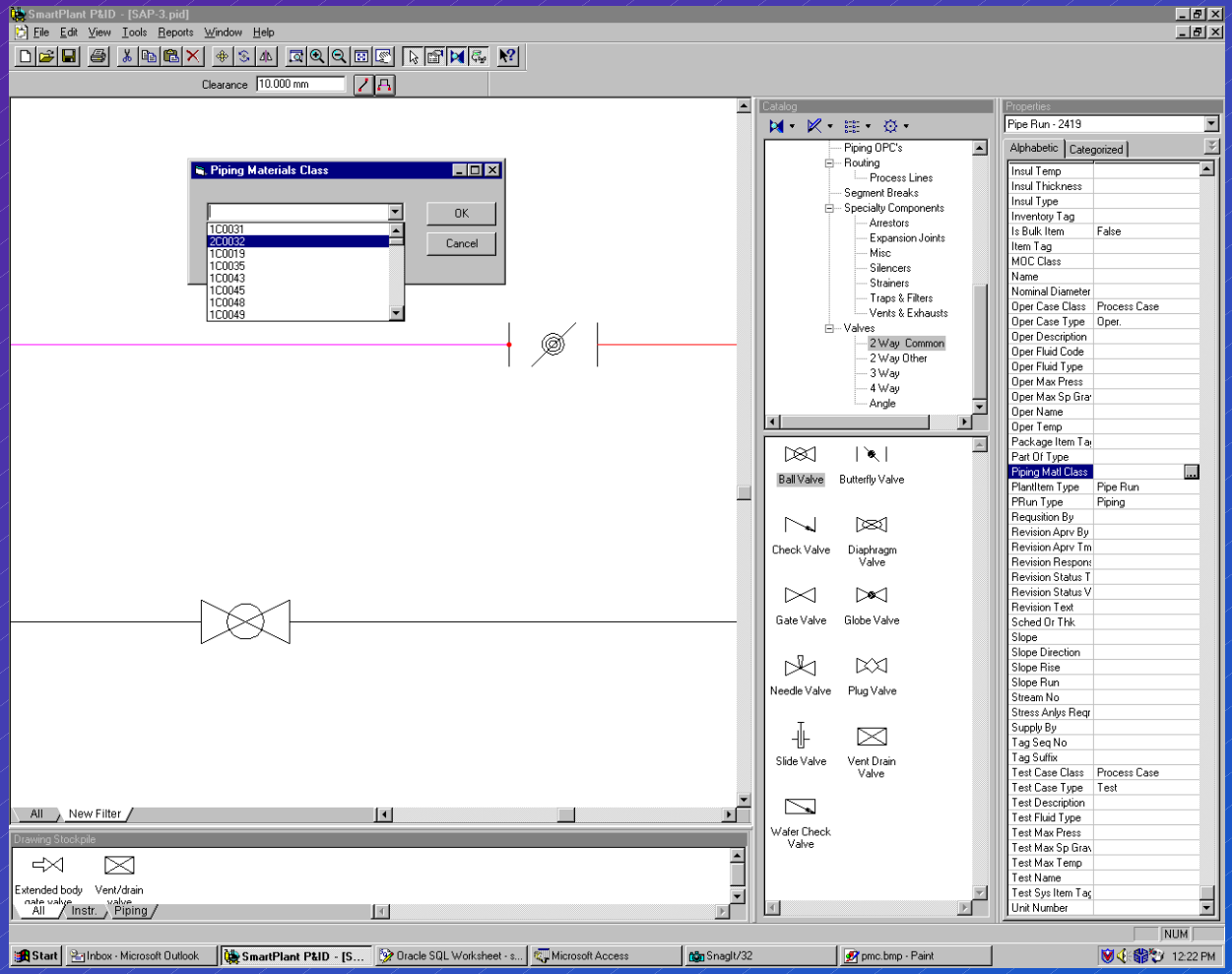
Power of Automation

- *Application Development (through standalone applications)*
- *Customization (through integration)*
- *Feature Enhancement (through integration)*

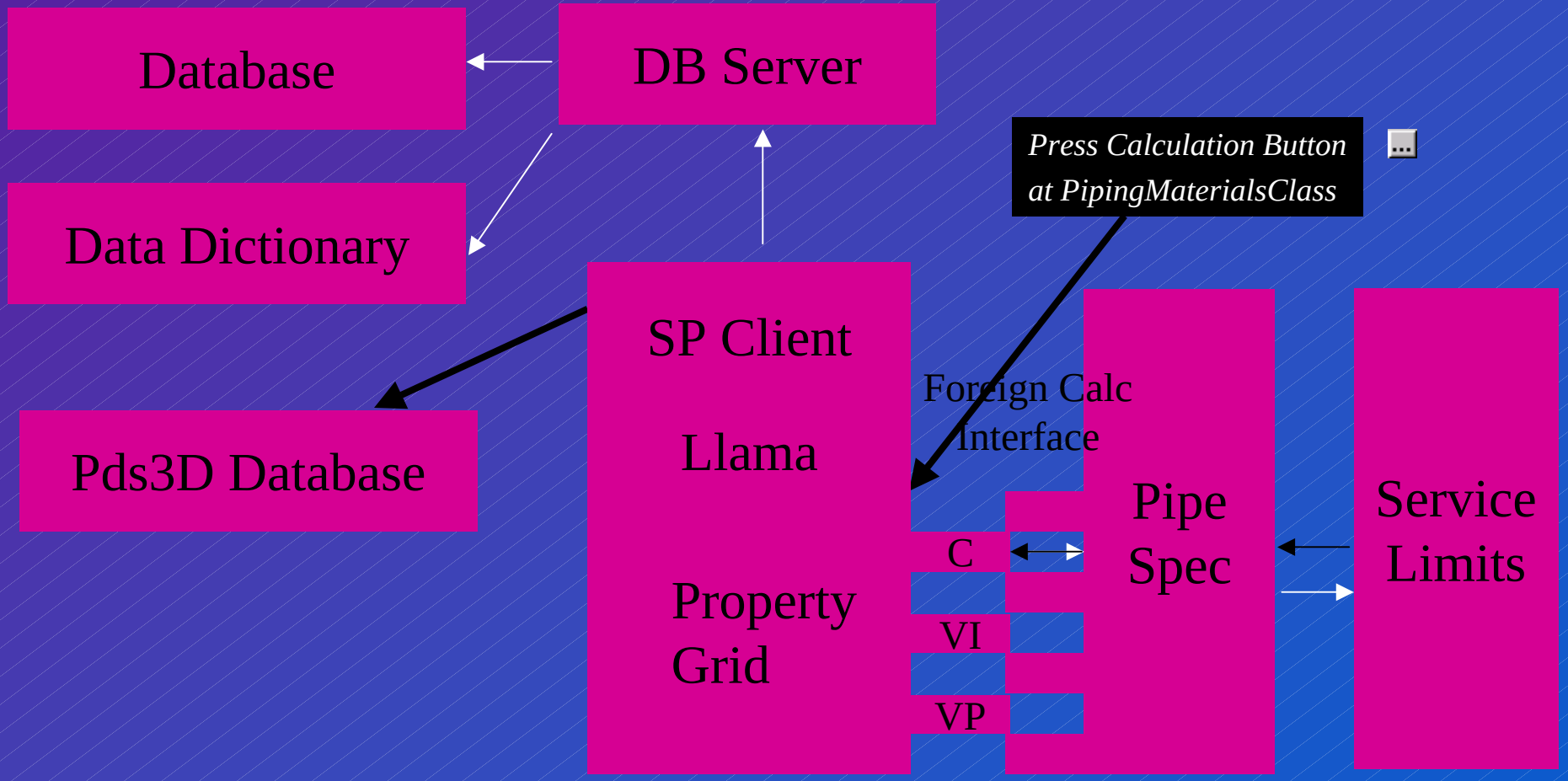
Feature Enhancement

Add new features to SP P&ID

Piping Specifications



Piping Specification Mechanics



Possibilities

- *Retrieve data from DataBase*
- *Modify data in DataBase*
- *Reduce Redundant Data Input*
- *Trace the topology of pipelines*
- *Automate placement of related items*
- *Enhance reporting capability*
- *Integrated with other data source*

Limitations

Limitations

- Only has limited read access to Engineering Manager Compounds Data
- No function to manipulate the graphic objects

Version Compatibility

Version Compatibility

- Intergraph will try its best to keep Dlls binary compatible
- When a Dll's binary compatibility is broken, re-compile is needed
- Usually, all existing functions will keep working even re-compile is needed

At Your Service

Automation Consulting Service

- *Customization of ItemTag Validation*
- *Customization of Import Code*
- *Customization of Report, From/To macro*
- *New Enhancement*
- …