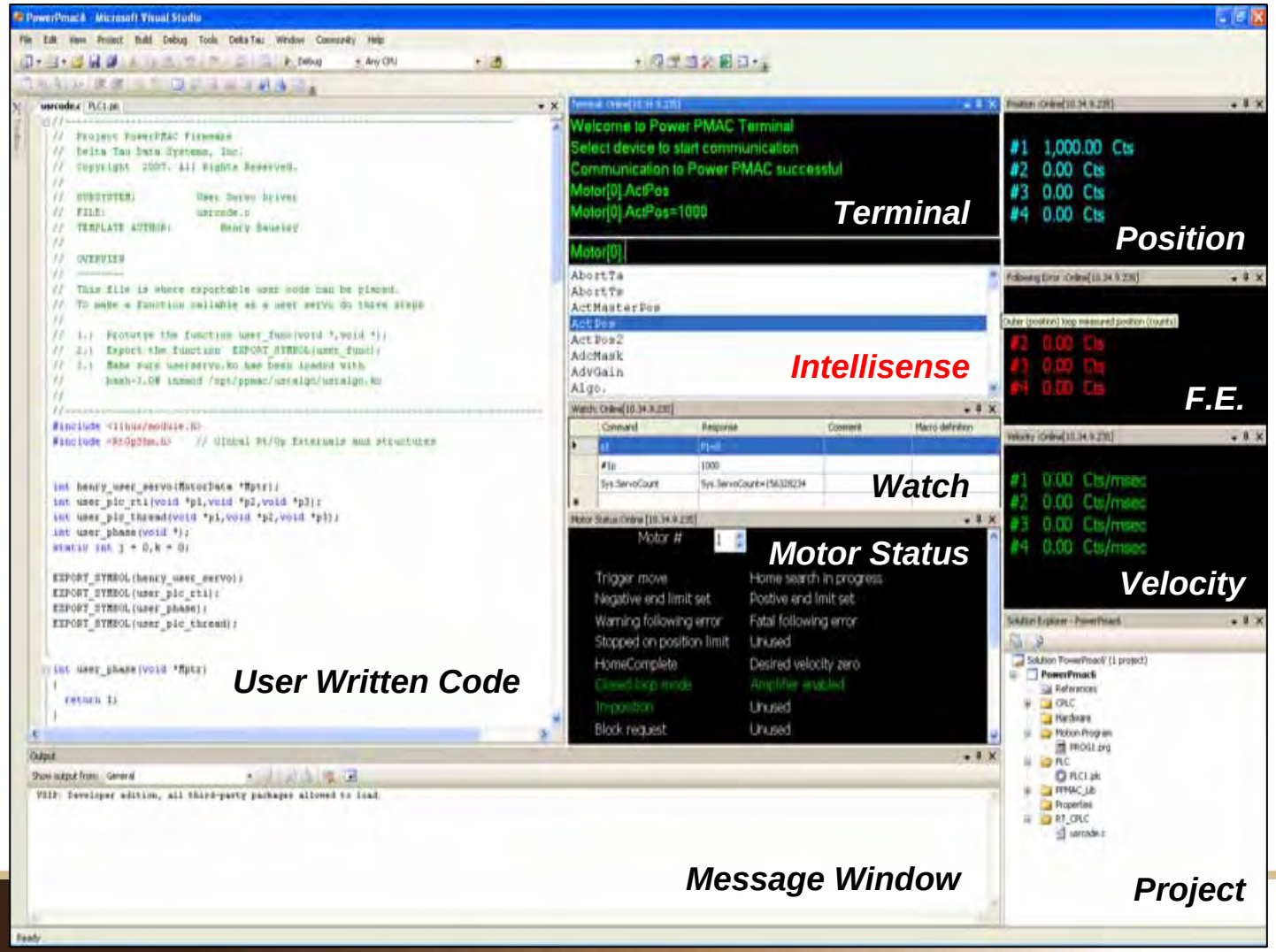
# Power PMAC IDE

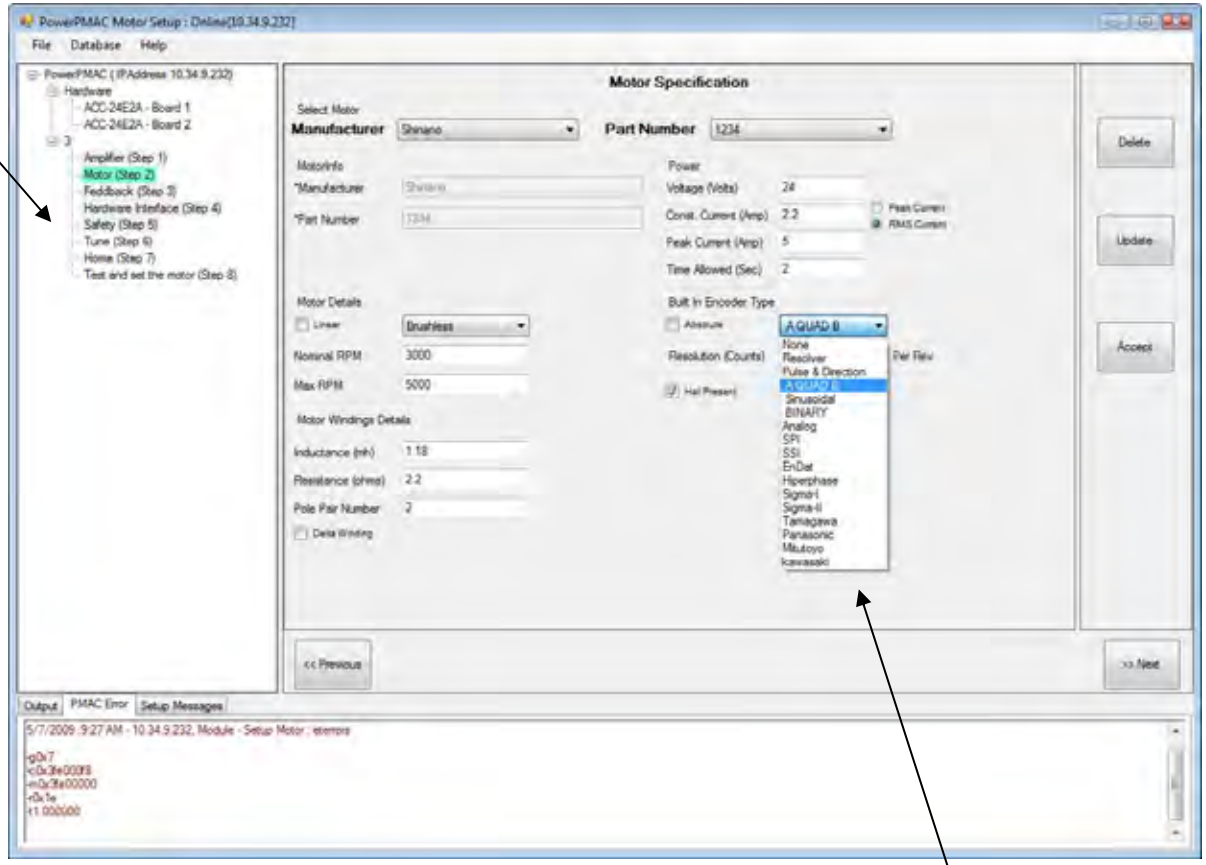
## Typical Screen for Integrated Development Environment (IDE)

DELTA TAU
Data Systems, Inc.



# Power PMAC IDE
## Hardware Setup

Intuitive and Simple
Step-by-Step procedures

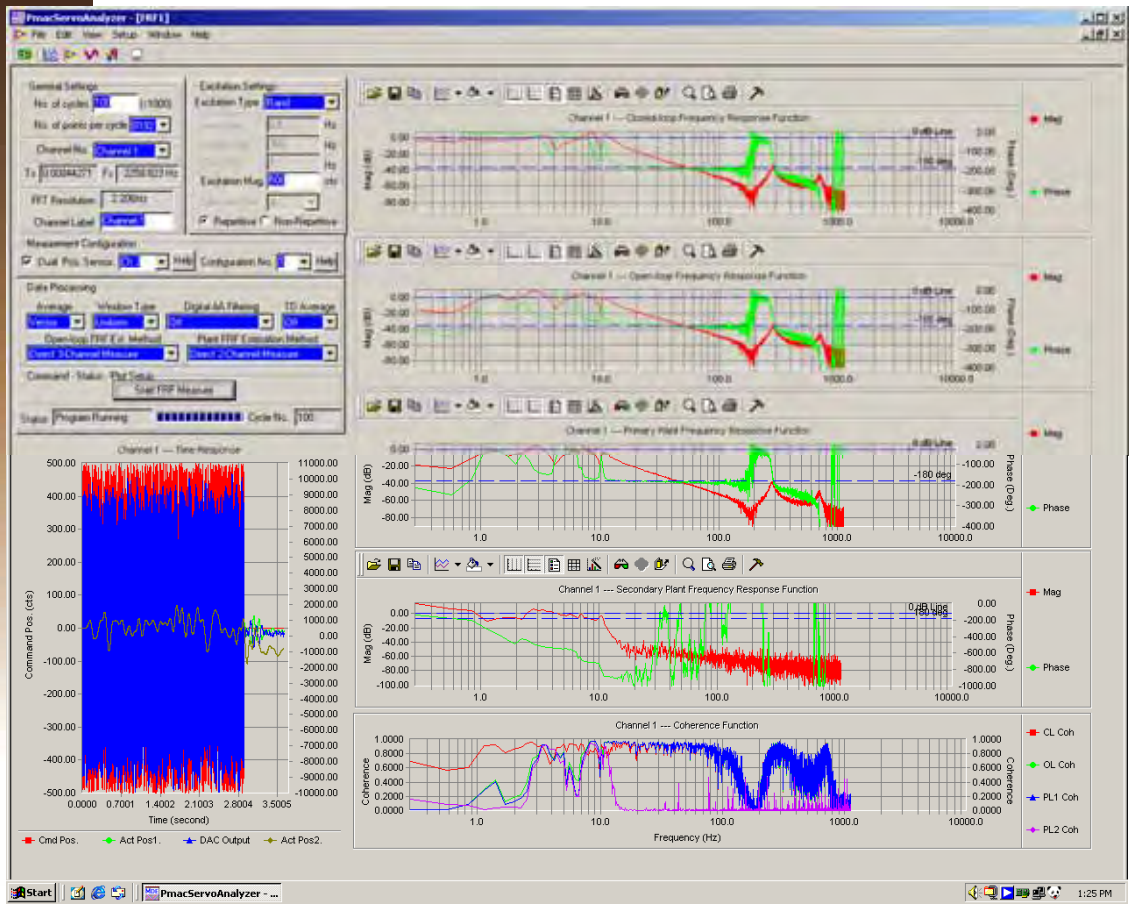


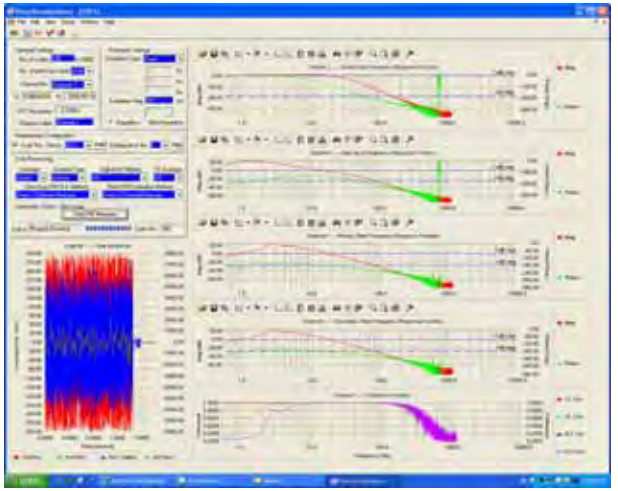

Only allows possible configurations to be displayed

Database structure for previously used hardware or resource library

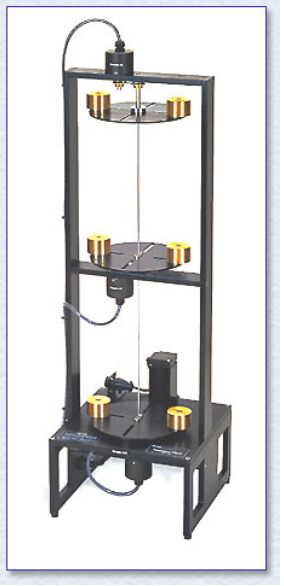
# Dynamic Servo Analyzer for Turbo & Power PMAC

Bode Plot generated for system identification by PMAC Dynamic Servo Analyzer for a **Flexible** or **Rigid** body mechanical structure.



Rigid Body Mechanical Structure



Flexible Mechanical Structure

1. The Bode Plot is generated by using a selectable white noise or other excitation.
2. Bode plot data is used to derive the mechanical transfer function by non-linear curve fitting.
3. Final step derives an automatically generated PMAC servo algorithm for the mechanical structure.

# Power PMAC Script Language Math and Logic

- Ability to mix all variable and data types freely
- Over 24 mathematical functions (e.g. *sin, sqrt, cbrt, exp, abs*)
- 12 math/logic operators (+, - ,* ,/ ,%, &, |, ^, >>, <<, ++, --)
- 12 assignment operators (including delayed synchronous)
- Array access to any numbered variable type
- Vector and 2D matrix operations (e.g. *inv*, *solve*) (new!)
- 8 conditional comparators (==, !=, >, <=, <, >=, ~, !~)
- Logical structures: *while, do..while, if, else, switch*
- Subroutines in motion and PLC programs: *gosub, callsub, call*
  - *Callsub* (in same program) and *call* (to separate program) permit local variables in subroutines (true argument pass and return)
  - Argument passing thru “G-code” letter/number format supported

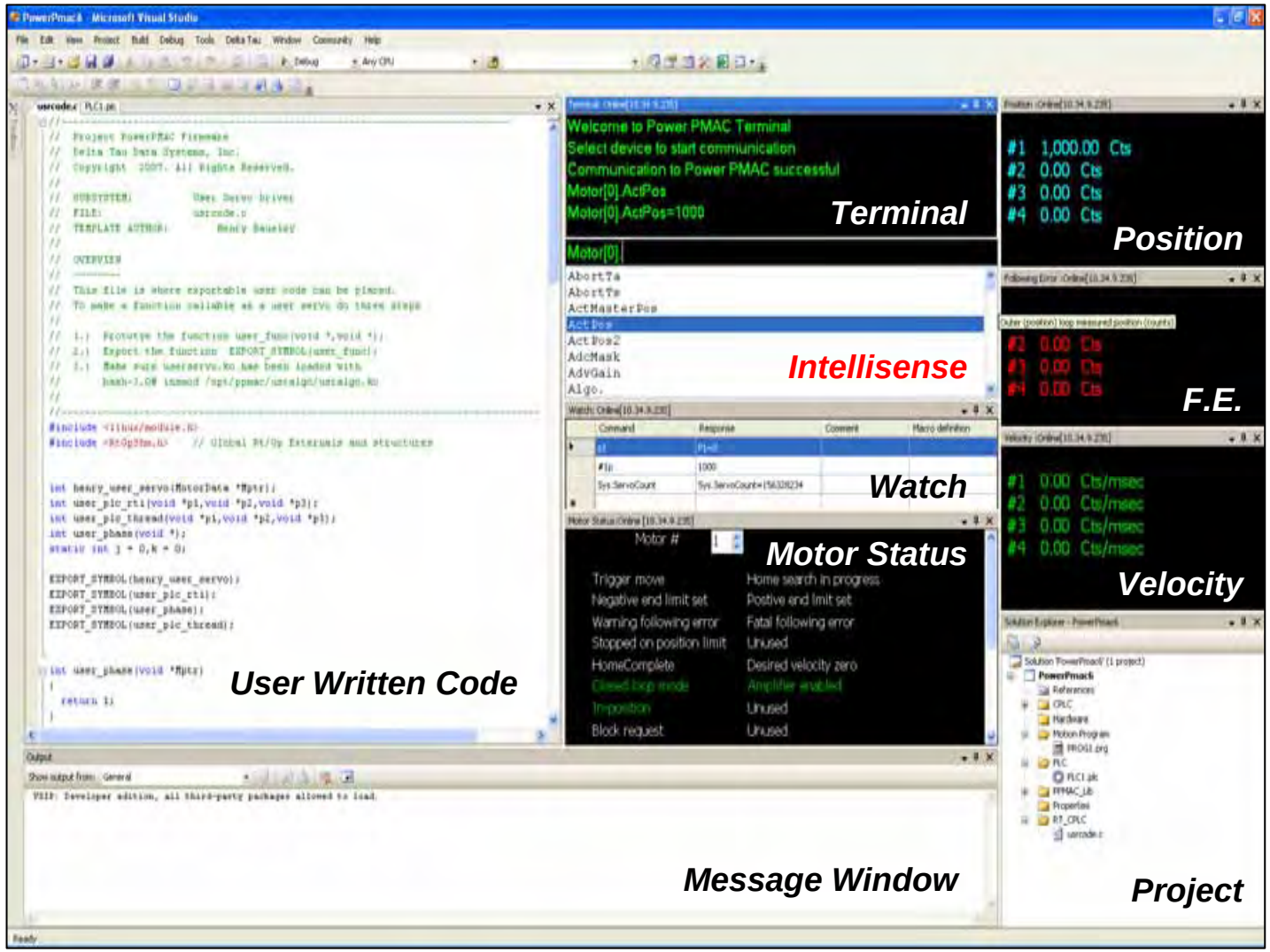
# Power PMAC Built-In Data Structures

- Main technique for user access to Power PMAC registers
  - Will largely replace I and M-variable use
  - For hardware and software registers, control and status elements
  - Key setup elements saved to flash memory (like I-variables)
  - Accessible from Script & C programs, on-line commands
- Major structures pre-defined:
  - *Sys, Motor[ ]., Coord[ ].,  Gaten[ ].Chan[ ]., CompTable[ ].* etc.
  - Indexable for easy program access
  - e.g.: *Motor[Num].JogSpeed=133.3333*
  - Note that index numbers start at 0 (C convention)!
- User can substitute own name for structure element
  - e.g.: *#define M2Vj  Motor[2].JogSpeed*
- User can define M-variable to any structure element

# Running C/C++ Code on Power PMAC

- GNU public-domain cross-compiler built into Power PMAC IDE
- Advanced editing/debugging features in IDE
- Code can be for both real-time (e.g. servo) and non-real-time (e.g. PLC) tasks
- Can use automatically generated C code: e.g.:
  - IEC-1131 graphical programming for PLCs
  - MATLAB/Simulink Real Time Workshop™ for servos (*planned*)
- Supplied header files give access to Power PMAC data structures through shared-memory interface
  - Structure names in C are case-sensitive (unlike in Script)
- Supplied API gives access to Power PMAC function calls

# IDE stands for Integrated Development Environment



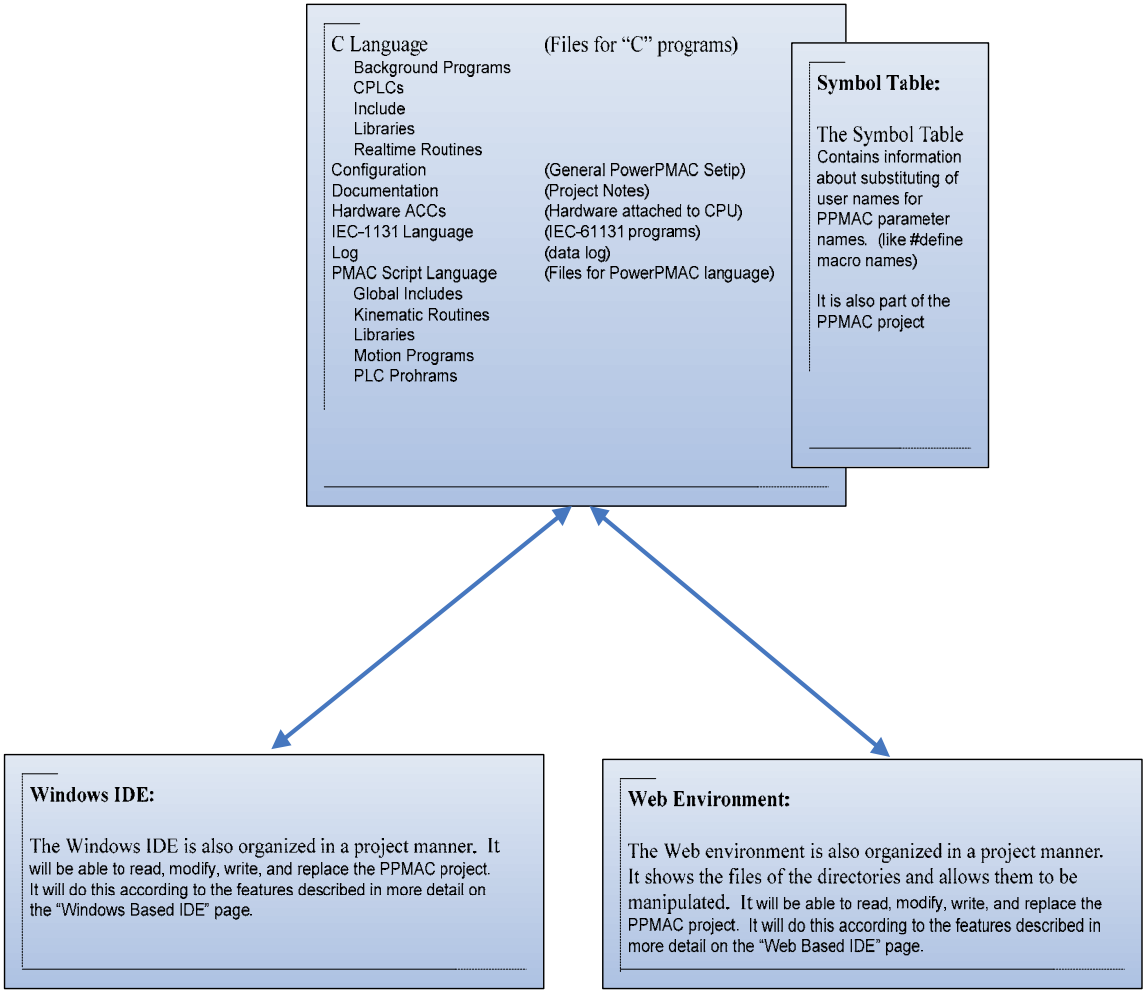
# Power PMAC PLC Program Enhancements

- Expanded math and logic capabilities of Power PMAC Script
- Subroutine and subprogram calls added
  - Local variables permit true argument passing
- Ability to command axis motion directly
  - RAPID-mode point-to-point or triggered moves
  - Can break into ongoing move at any point
  - Program execution does not pause until move over (unlike motion programs)
- Improved debugging features
  - Automatic cycle counters can be put on instructions
  - Breakpoint capability (on specified cycle count)
  - Single-step capability

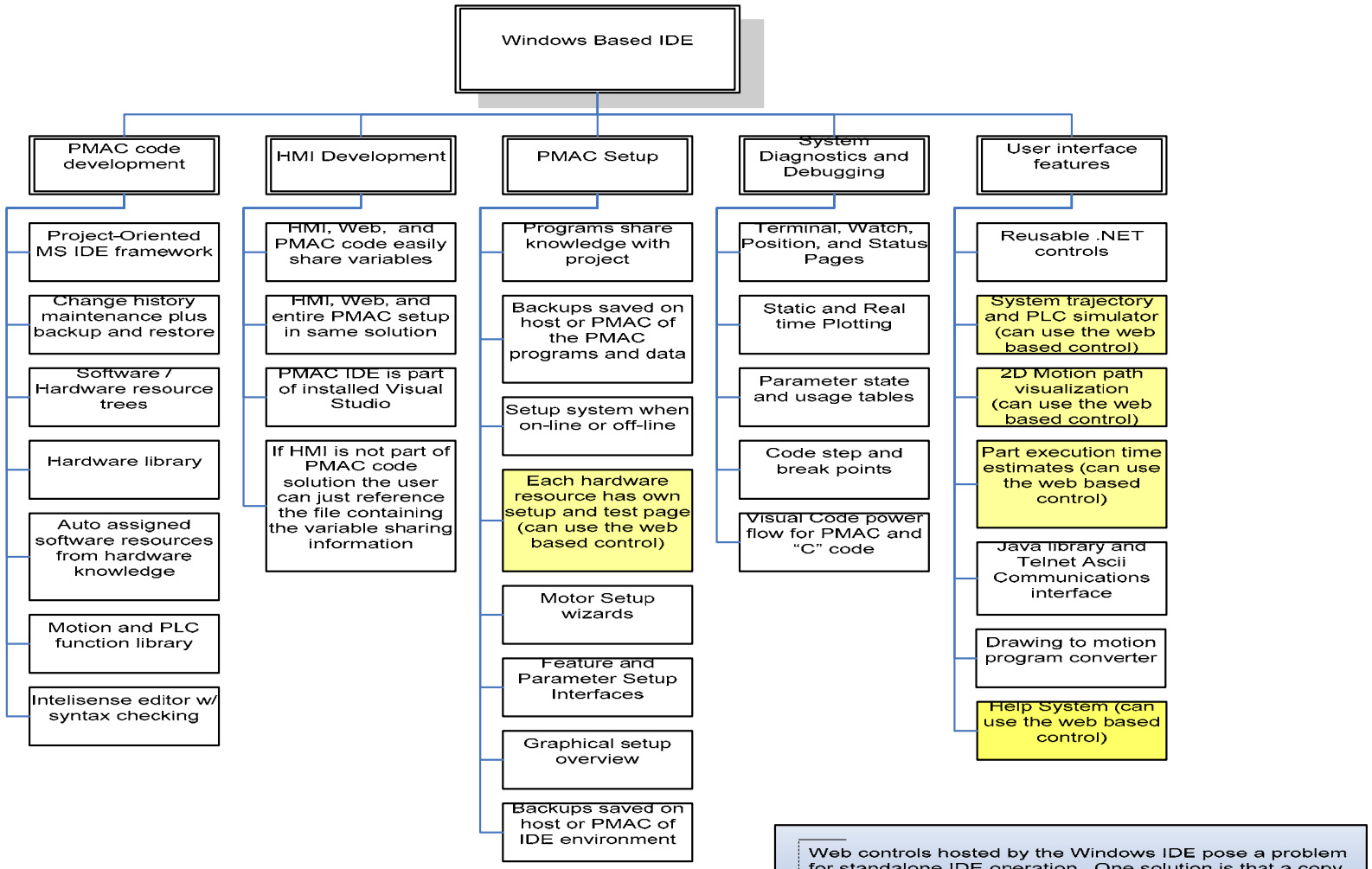
# Power PMAC IDE

- Powered by VS 2008
- Full featured Windows-based system
- Limited featured web-based system
- Familiar environment for those who already program
- Easy to use for non-programmers
- Modular re-usable importable PMAC functions
- IDE components available as customer ...

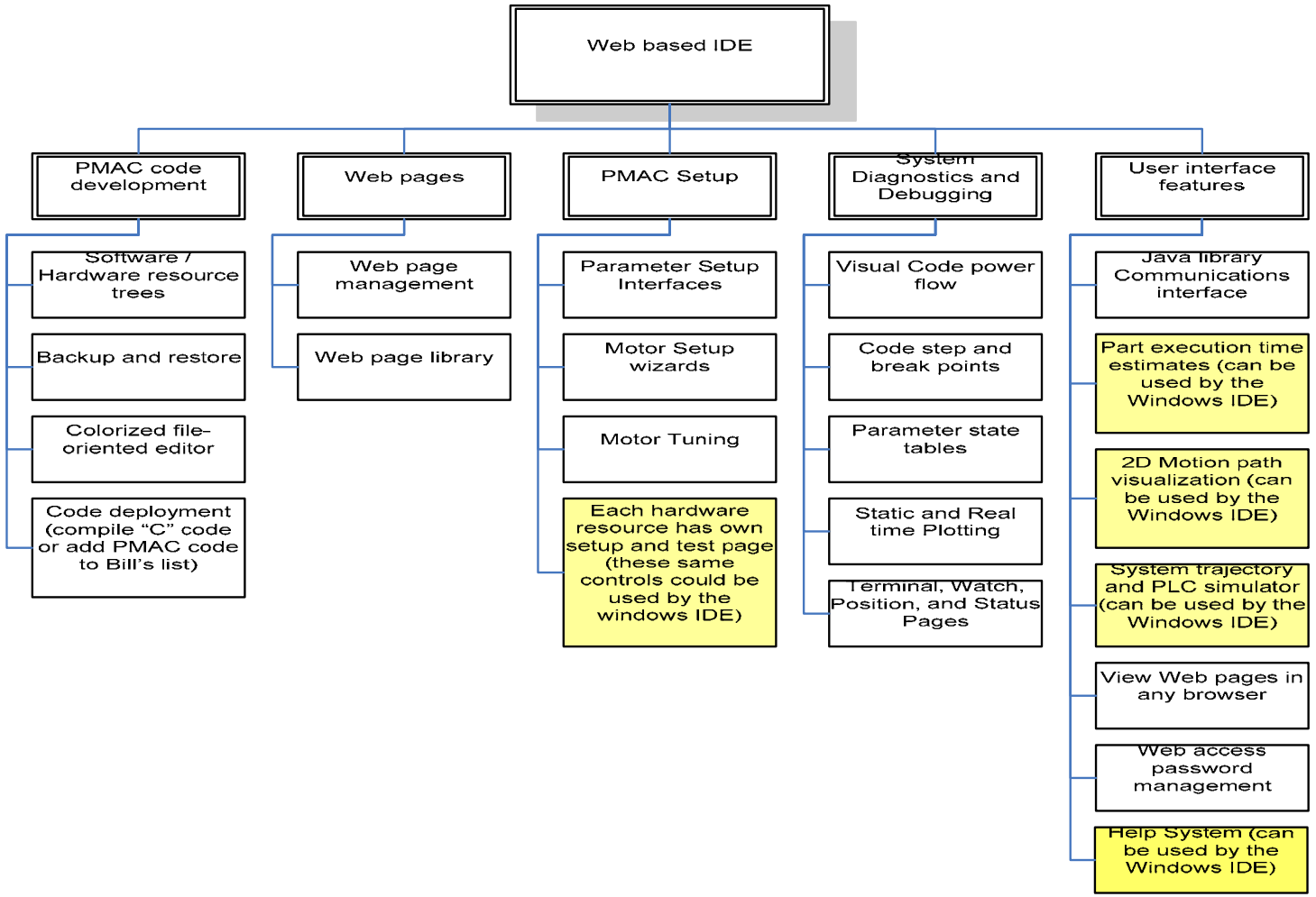
# Power PMAC Project



# Windows IDE Overview

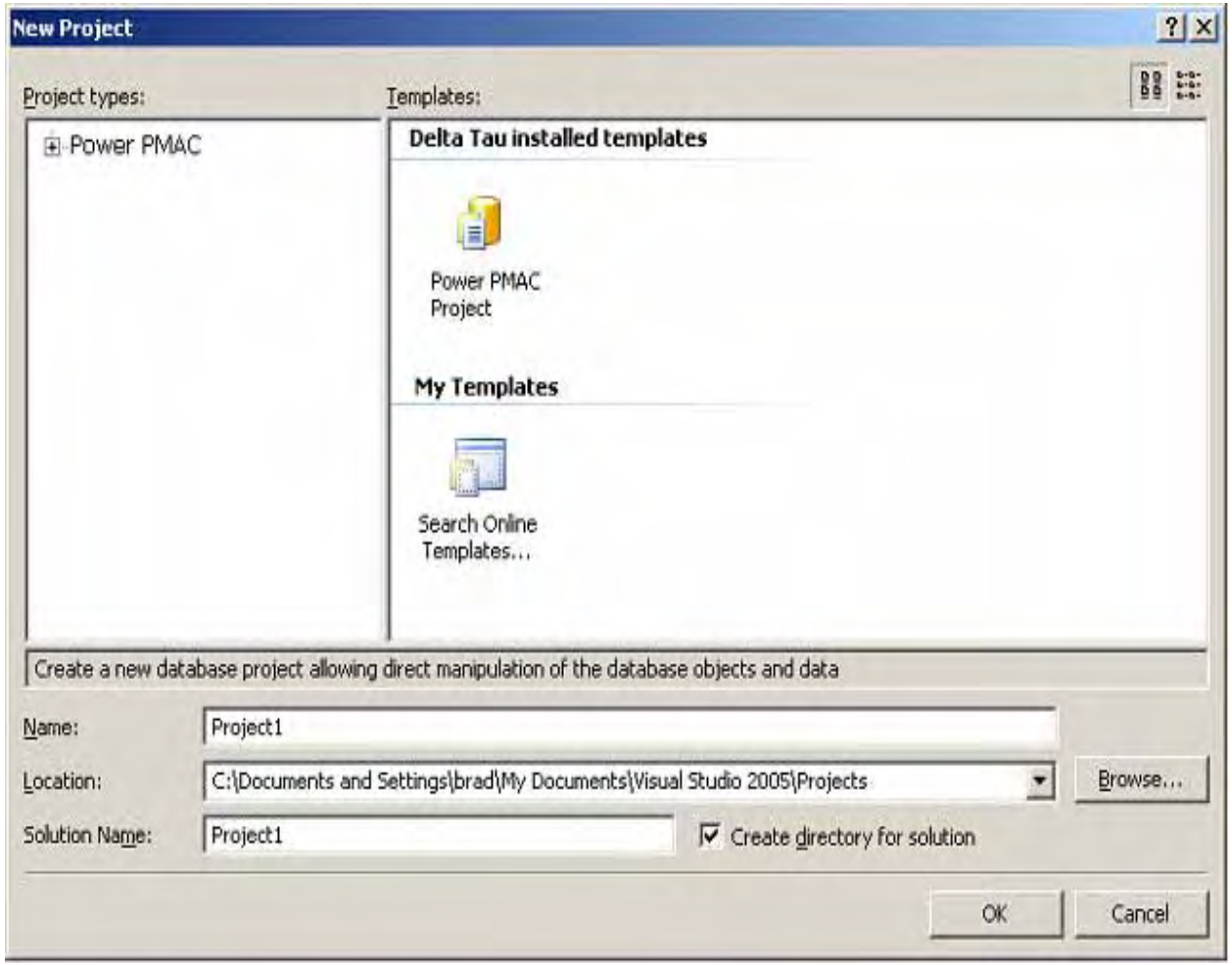


# Web IDE Overview



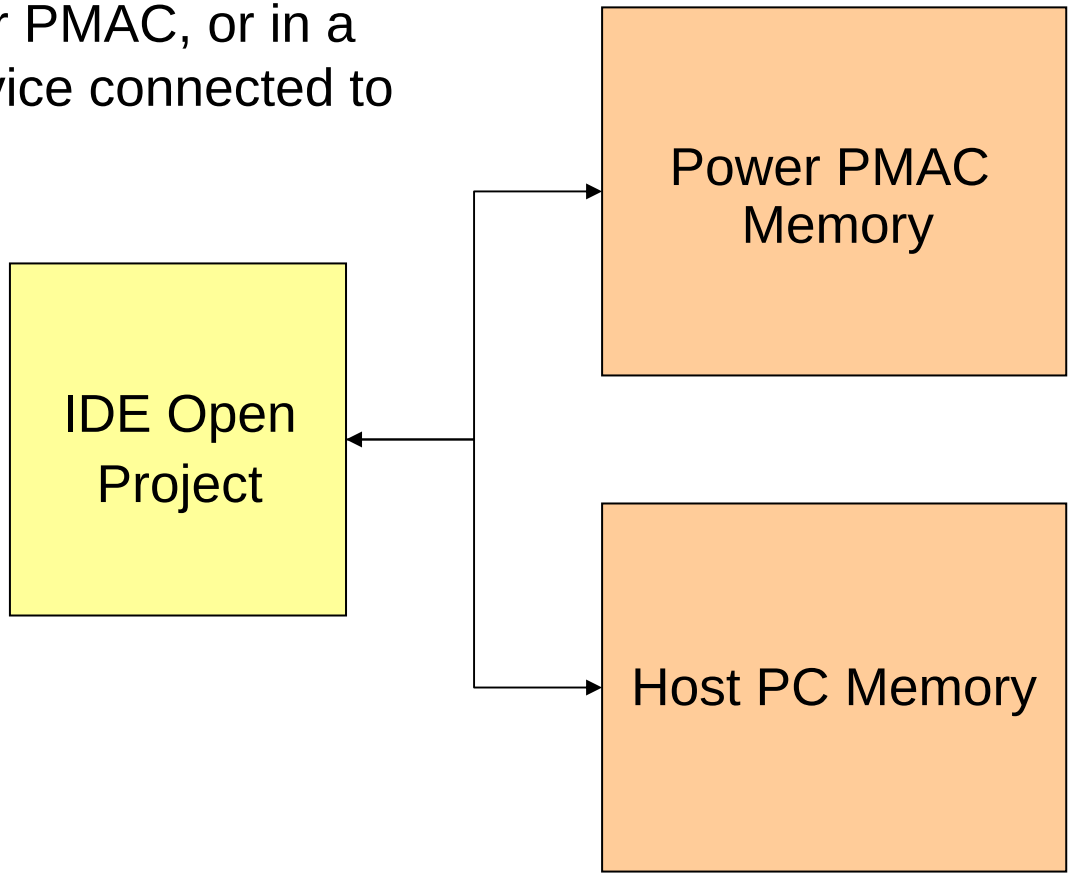
# Power PMAC Project Integration

The Power PMAC project shows in the MS IDE as just another programming language.



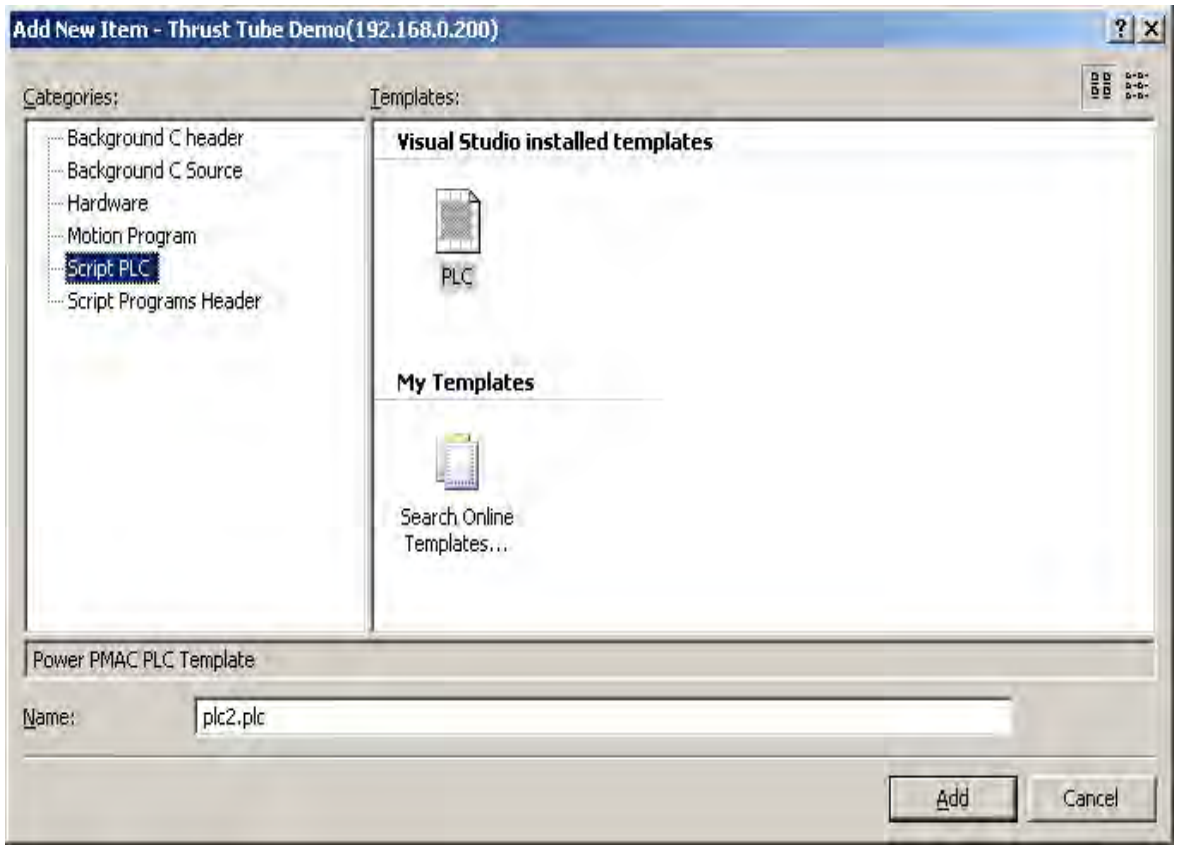
# Project Location

- Project data can be on the PC, in the Power PMAC, or in a memory device connected to either.



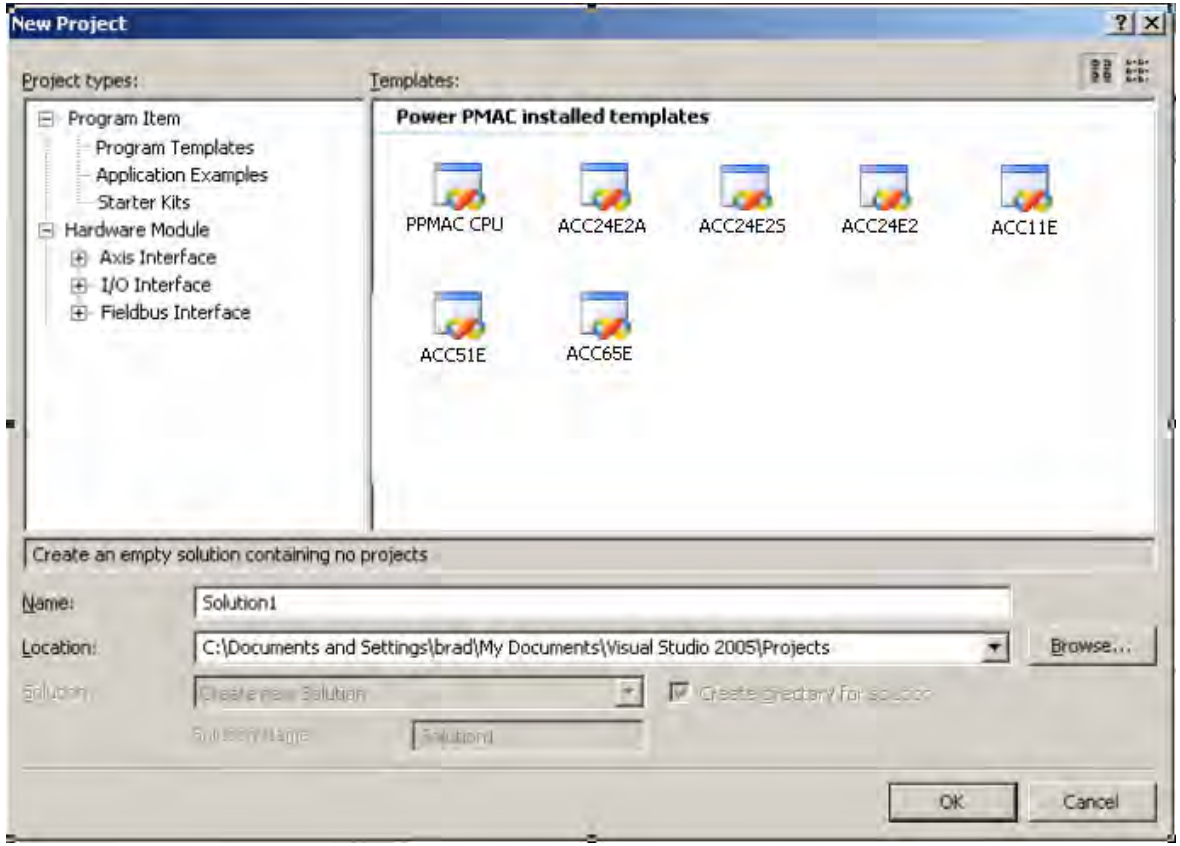
# File Templates

Add files from different software templates, which add structures to the active data base.

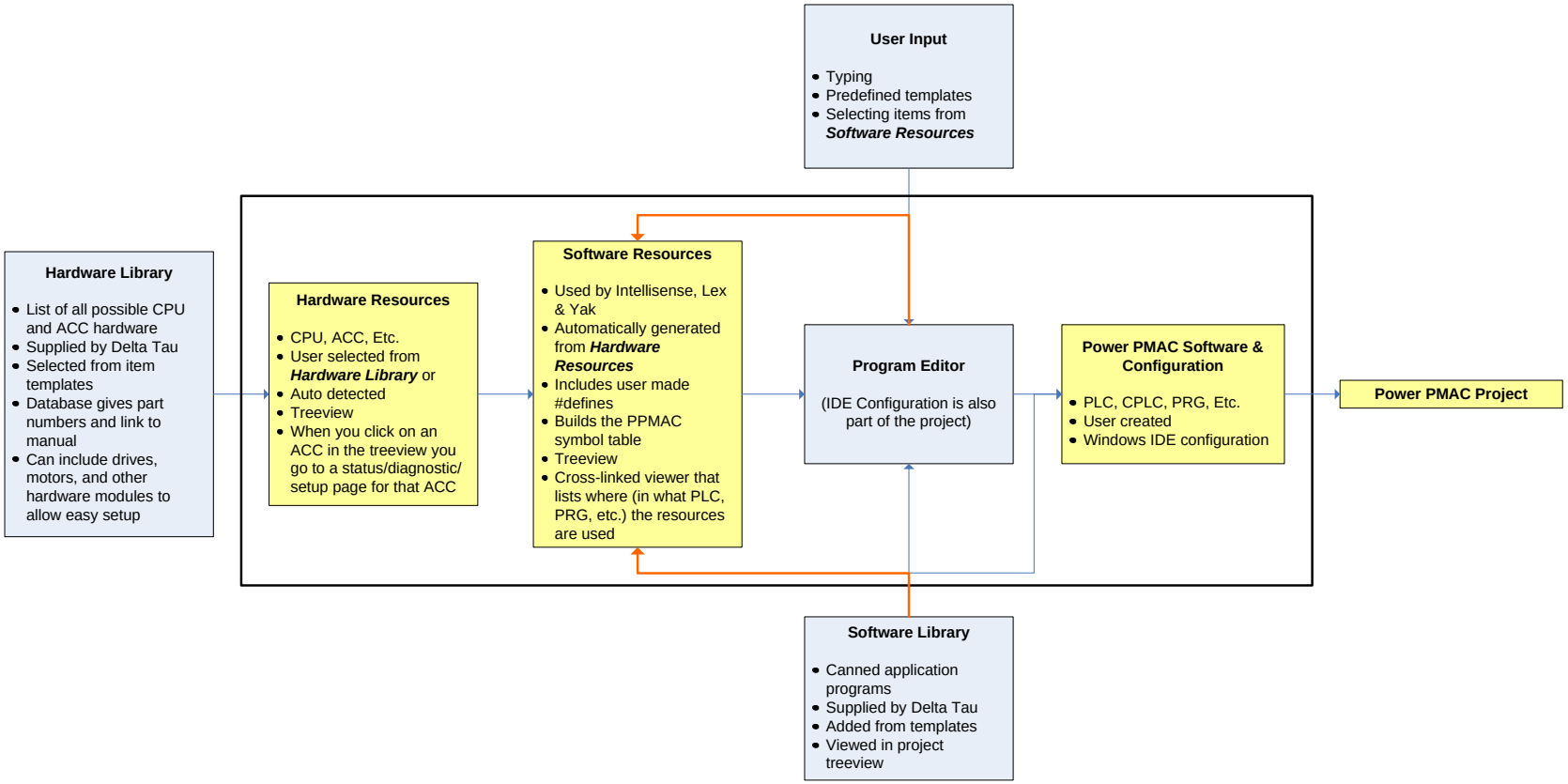


# Hardware Templates

Add hardware from different hardware templates, which add structures to the active data base.

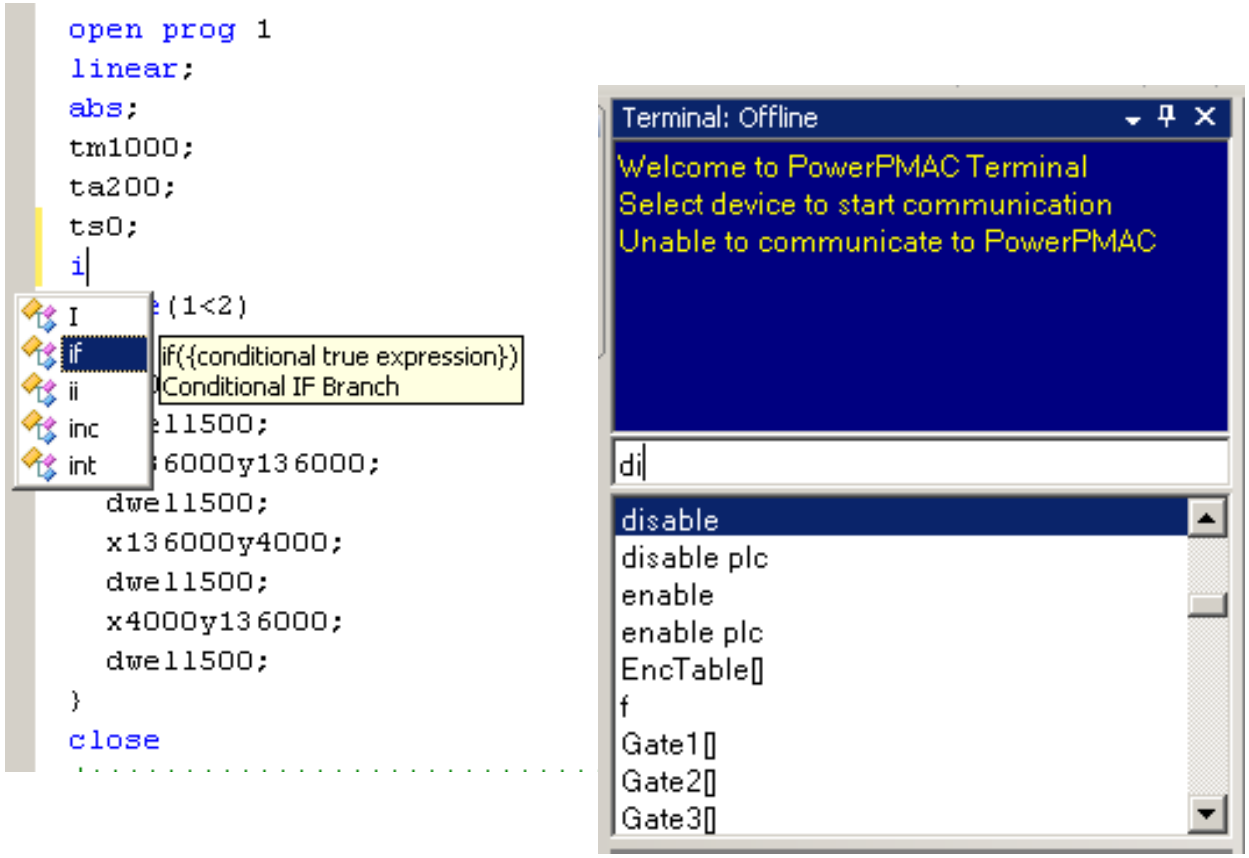


# Power PMAC IDE Database



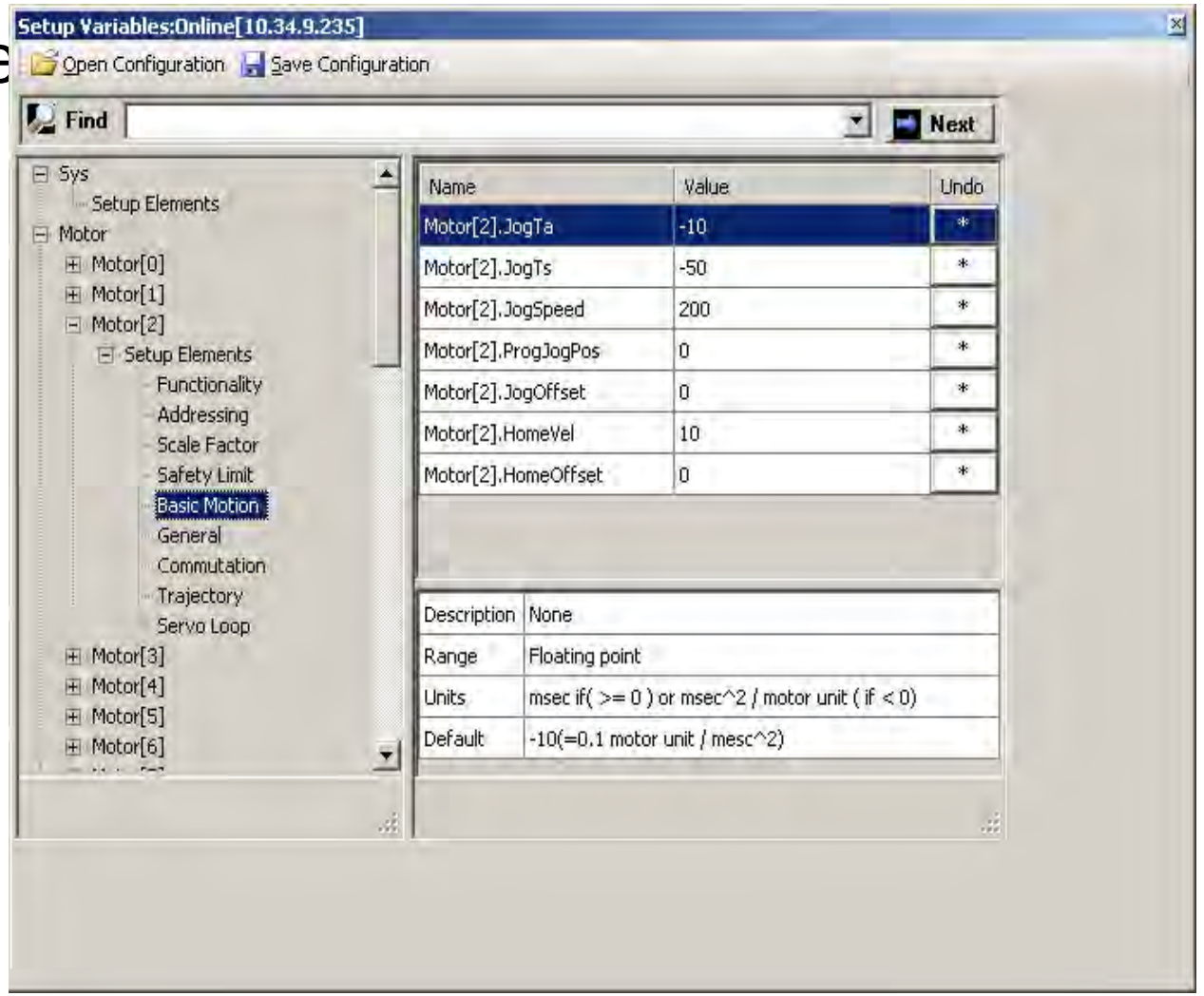
# Why have a database?

A Database gives the ability of intellisense and Lex and Yac syntax parsing.



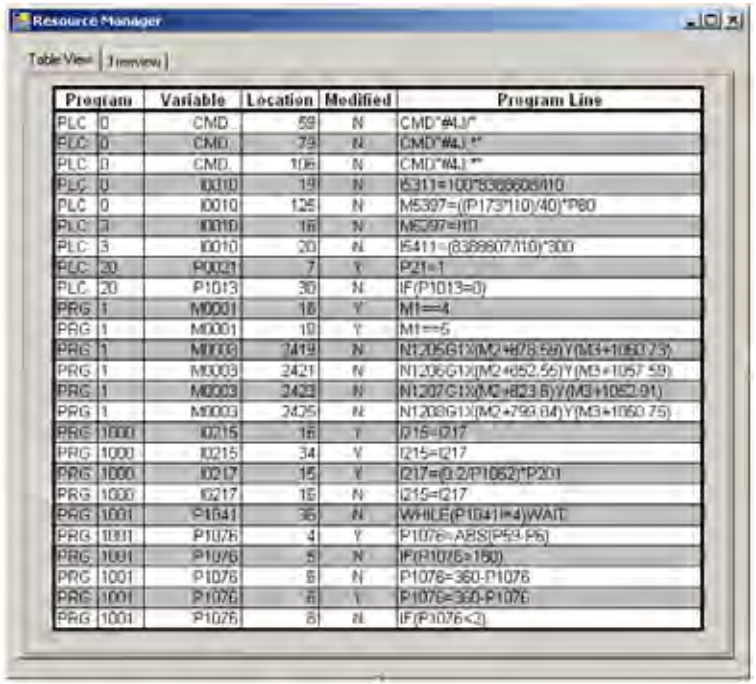
# Why have a database?

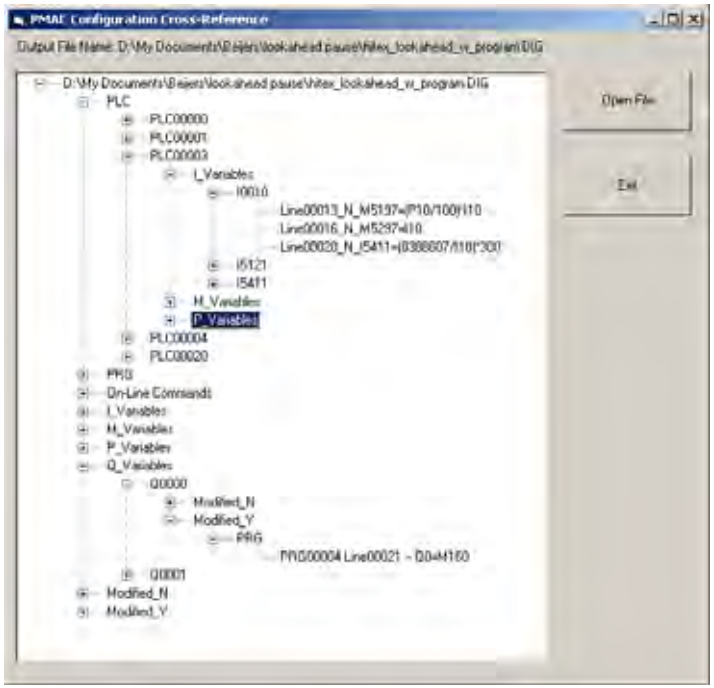
A Database gives the ability of integrated help.



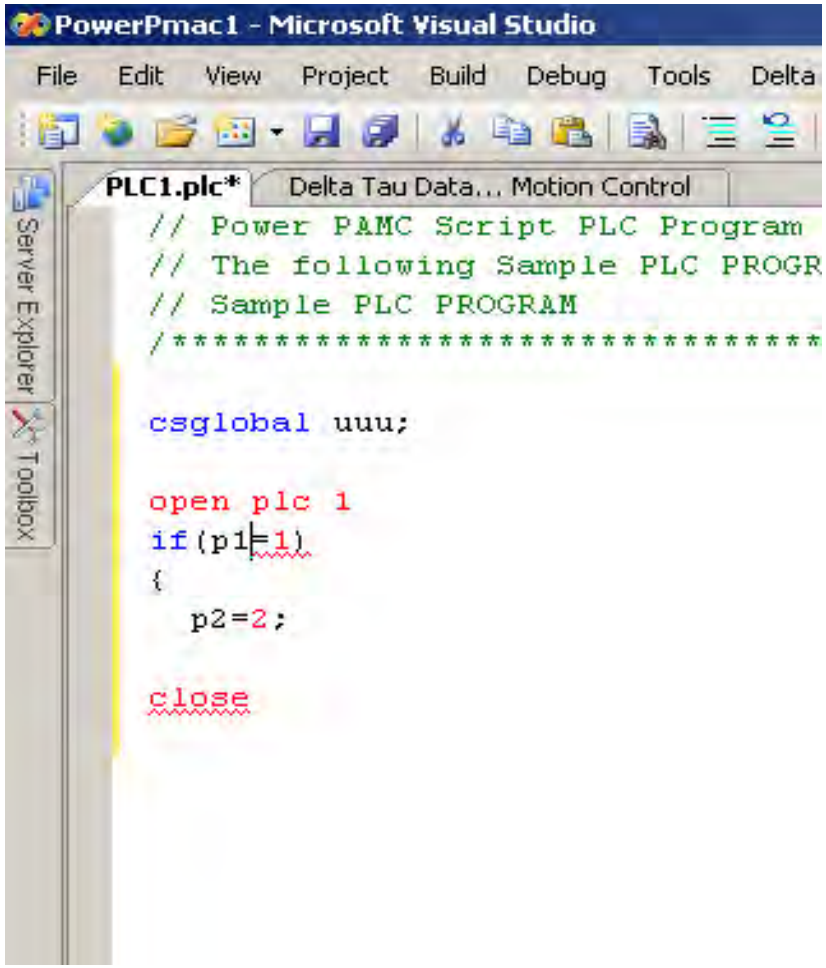
# Why have a database?

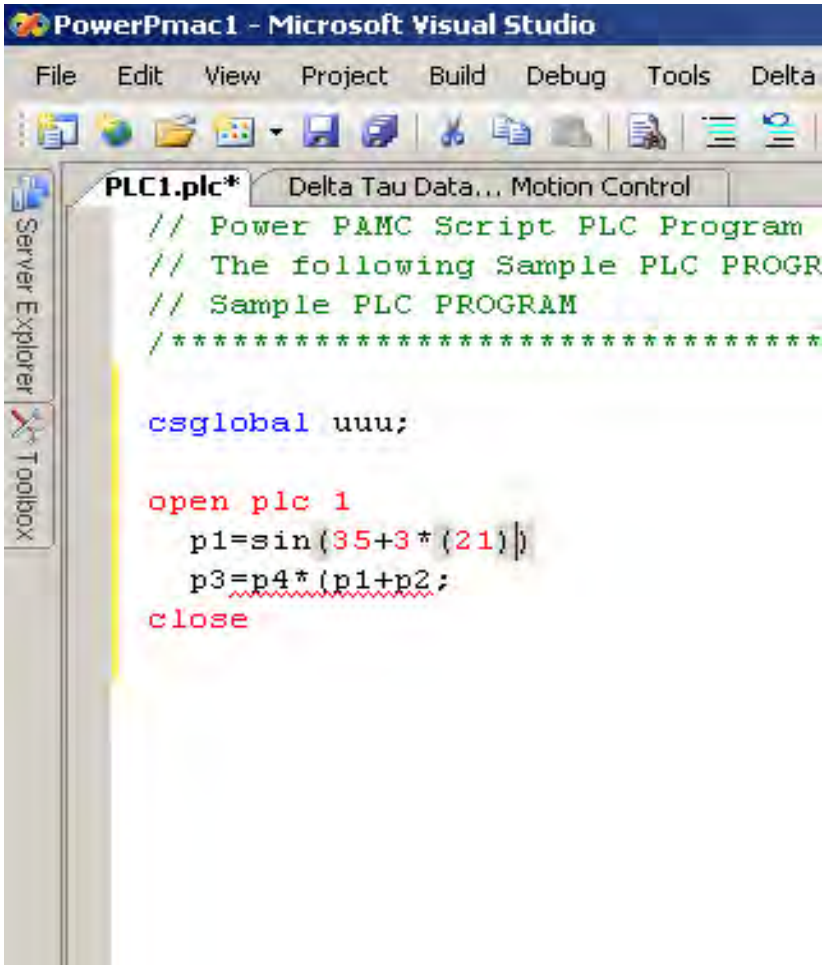
A Database gives the ability of resource tracking and mapping.



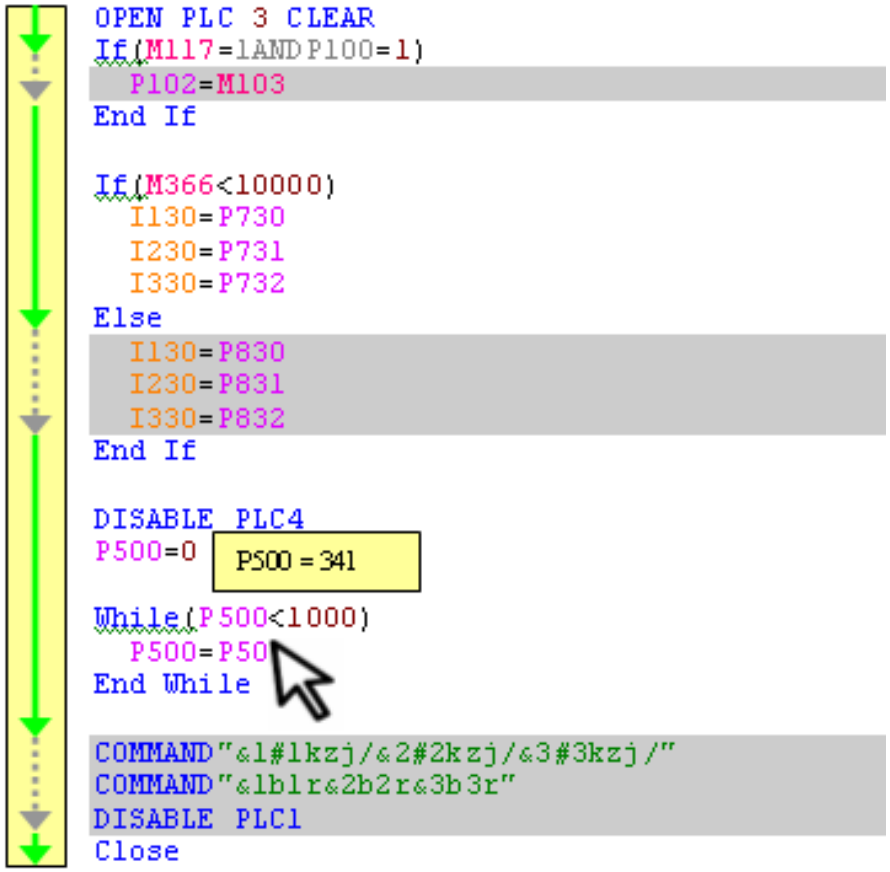
# Editor Error and Bracket Matching



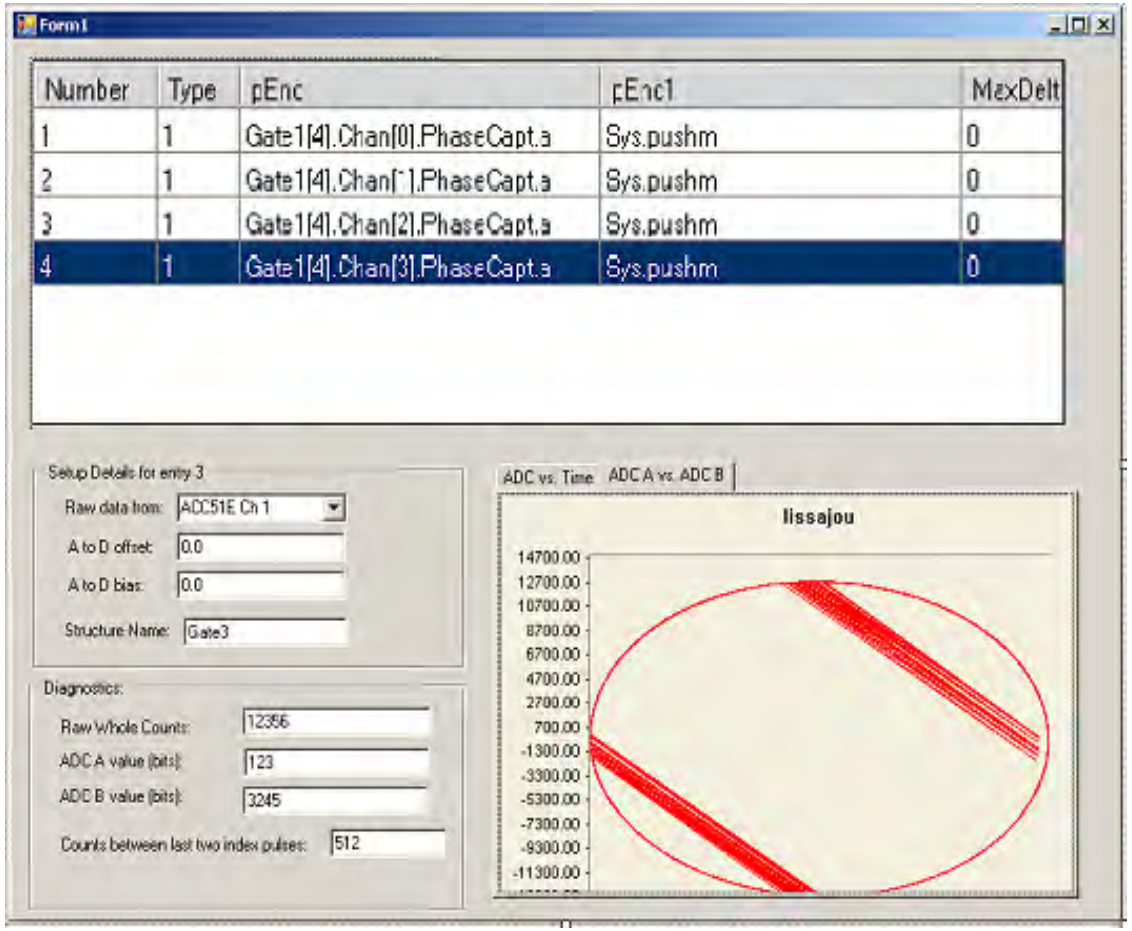
# Power-flow debugging

PMAC script language allows sophisticated breakpoints for debugging program logic and Power-flow visualization for debugging machine problems.



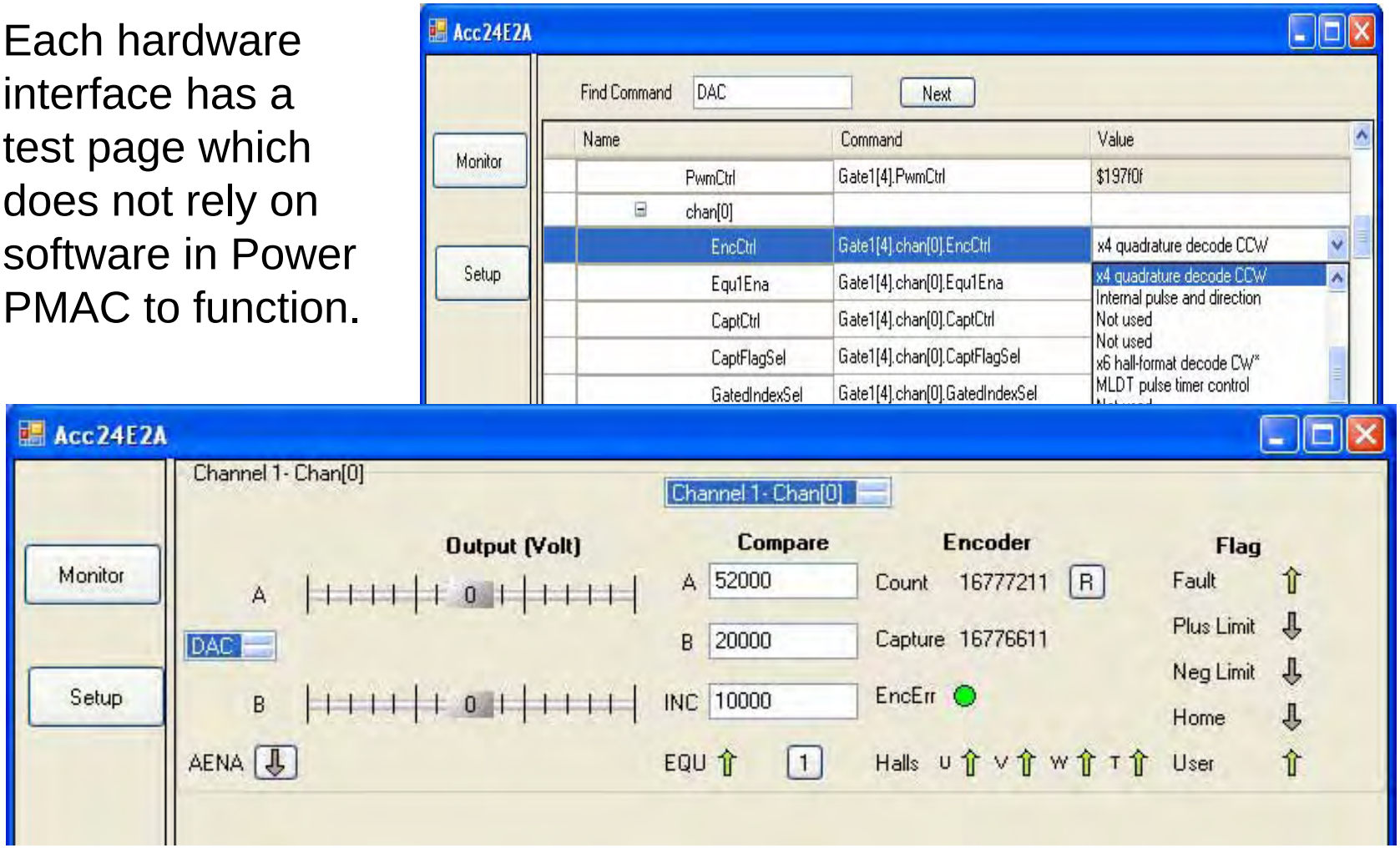
# Setup & Diagnostics

Combined function of setup and diagnostic screens to allow immediate testing of the software configuration.

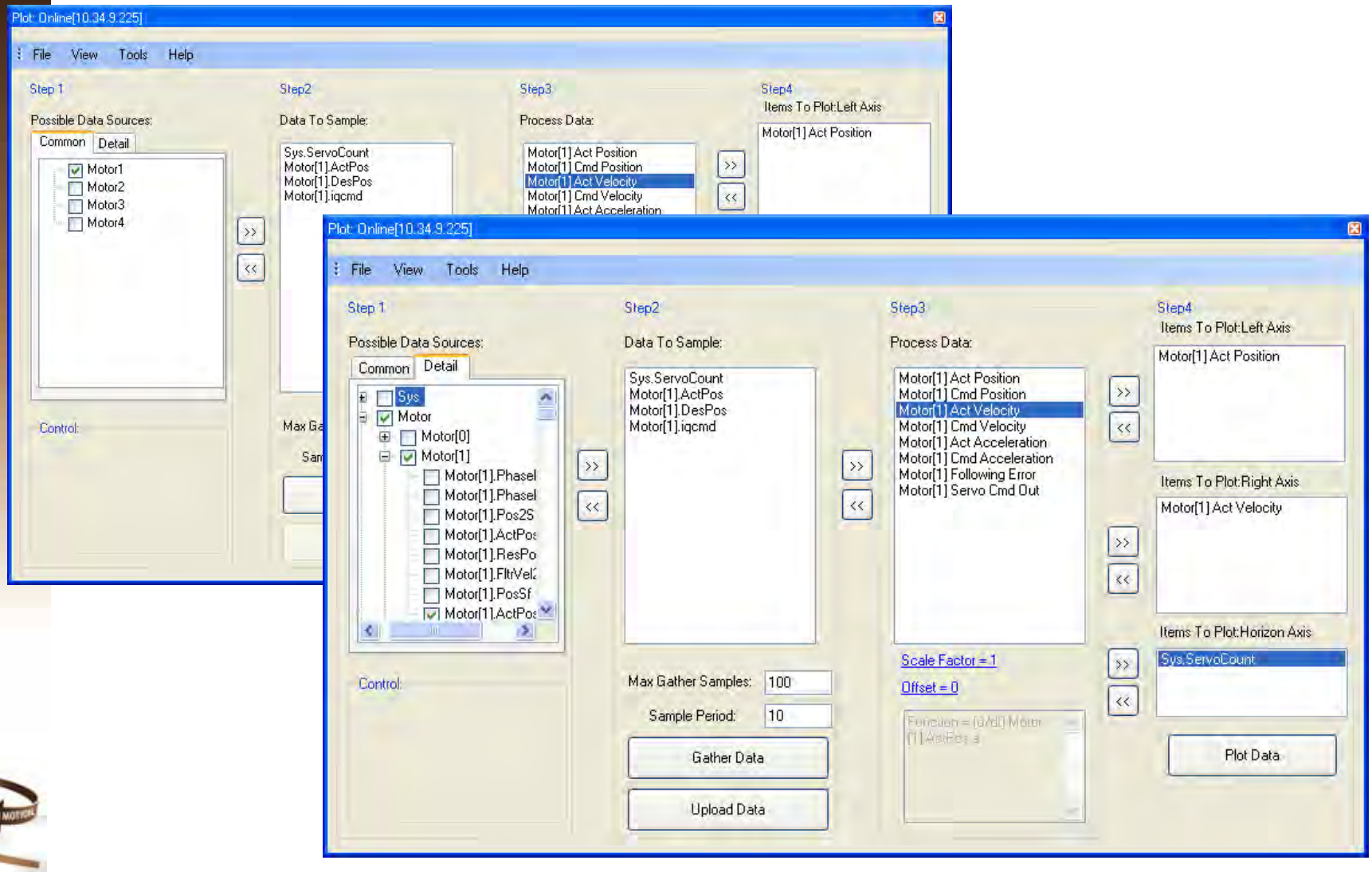


# Hardware Testing

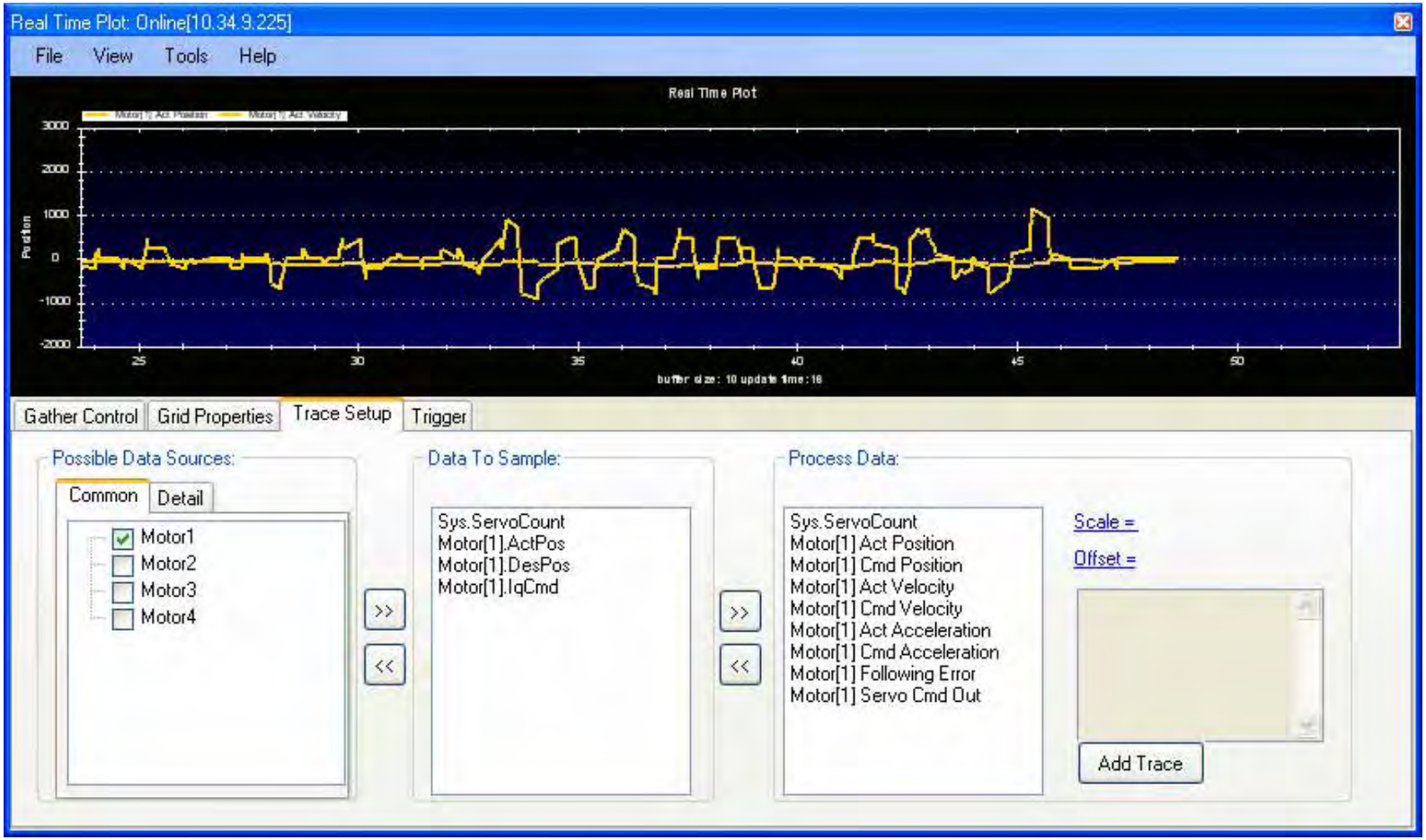
Each hardware interface has a test page which does not rely on software in Power PMAC to function.



# Static Plotting



# Streaming And Static Plotting



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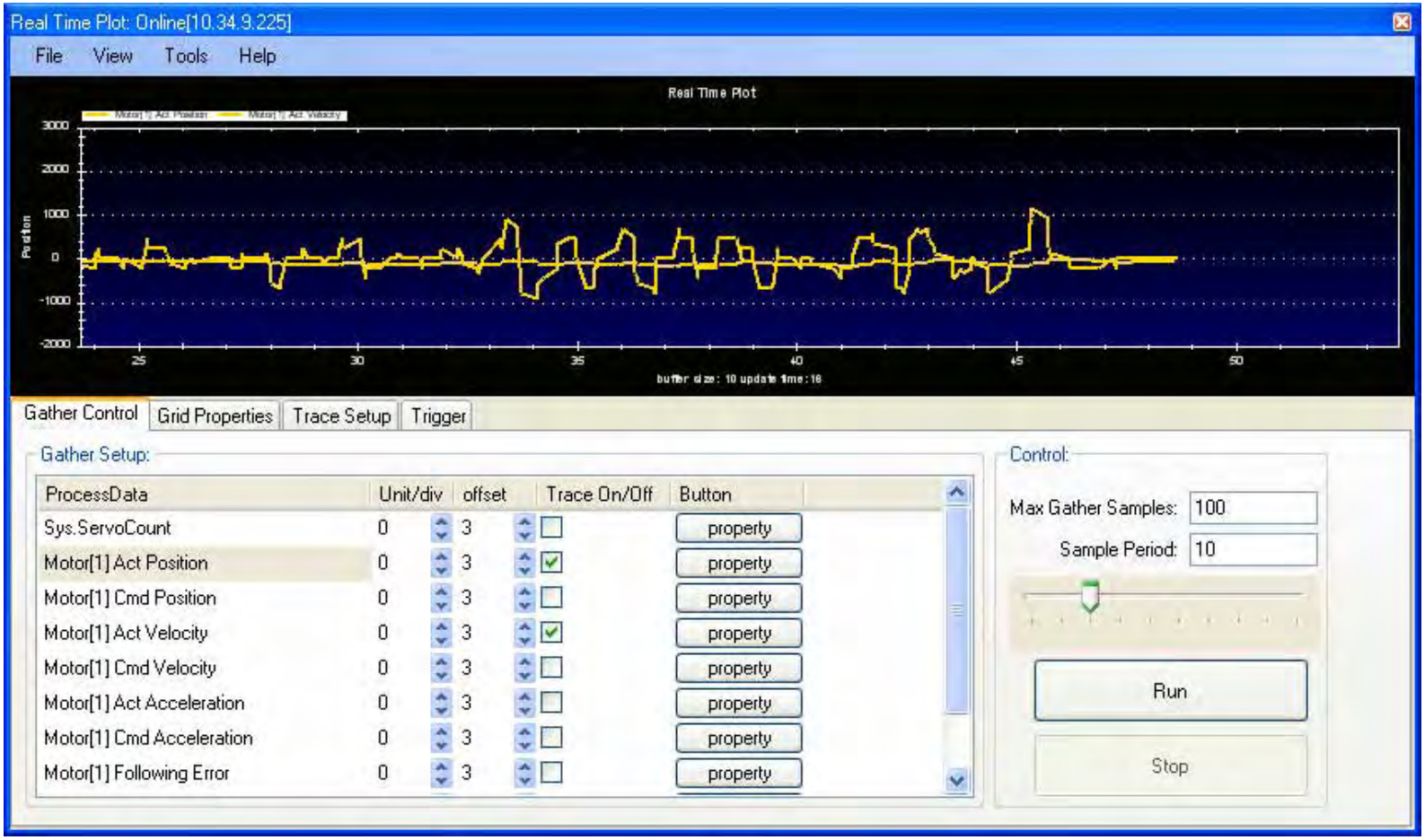
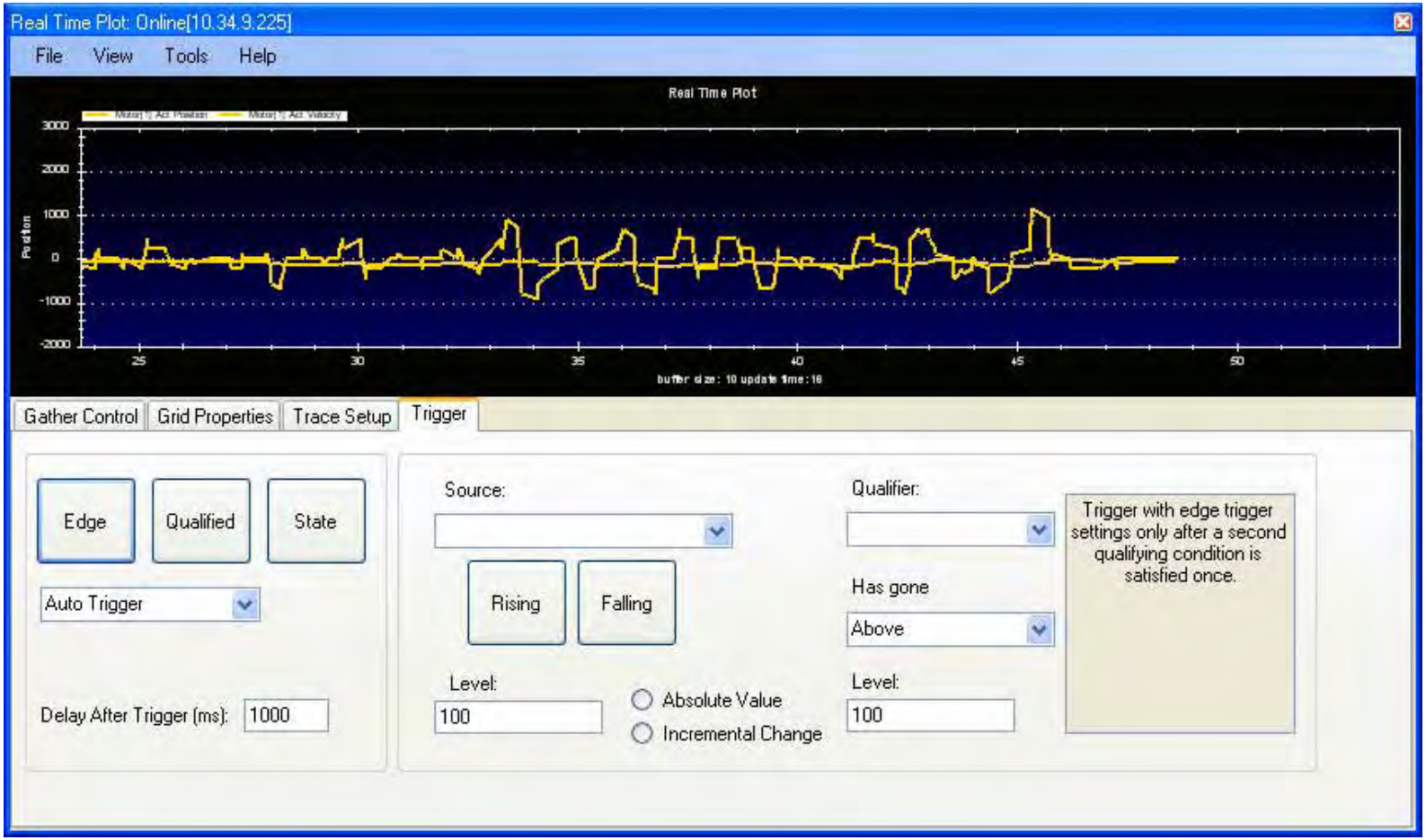


# Streaming And Static Plotting



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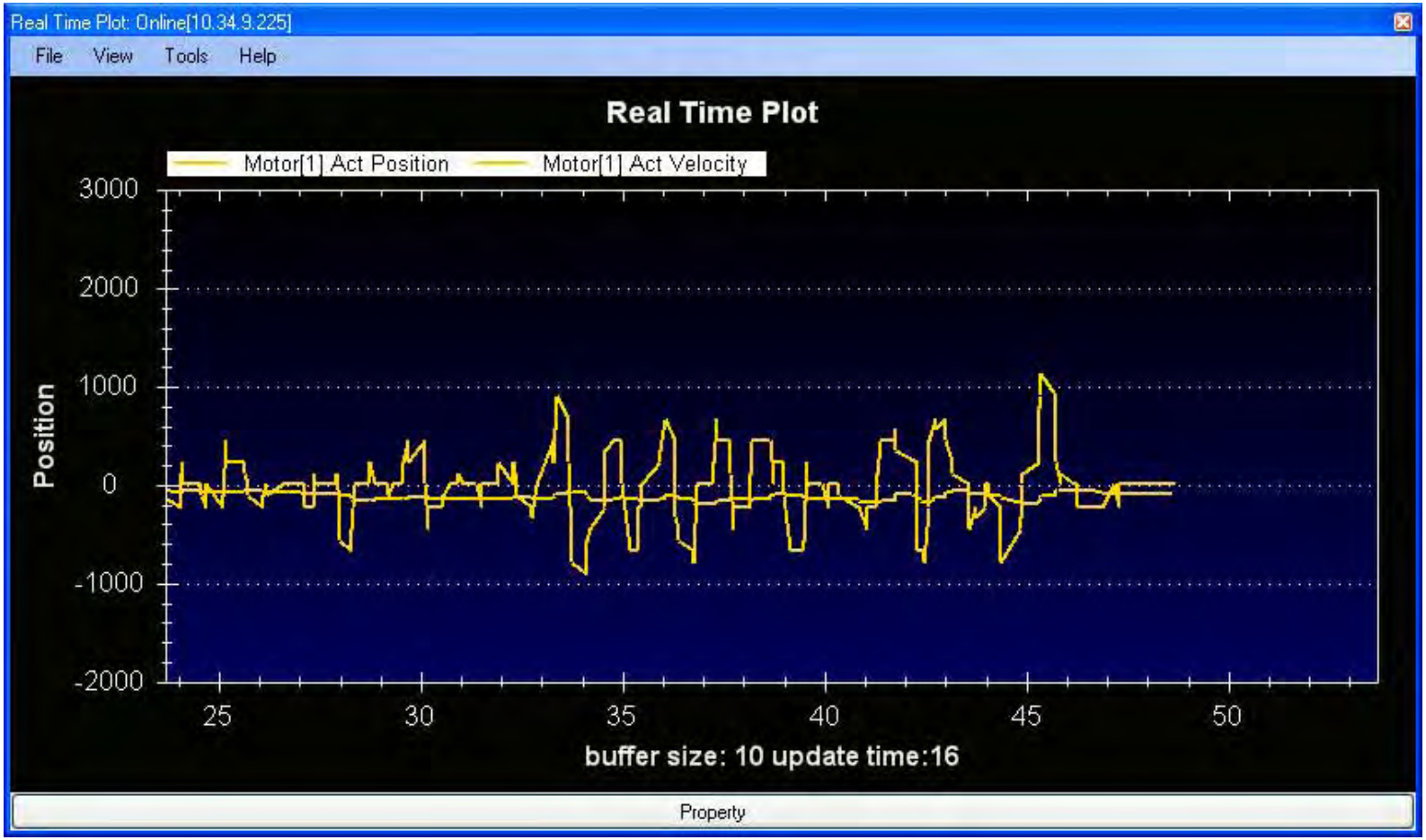
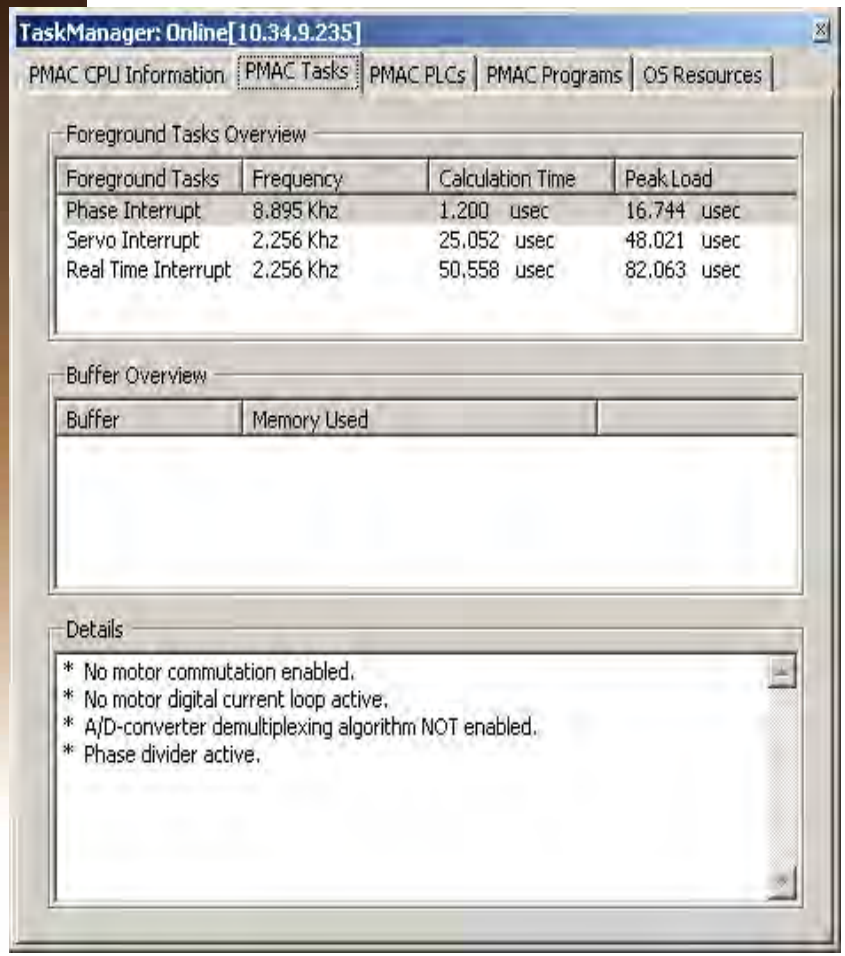
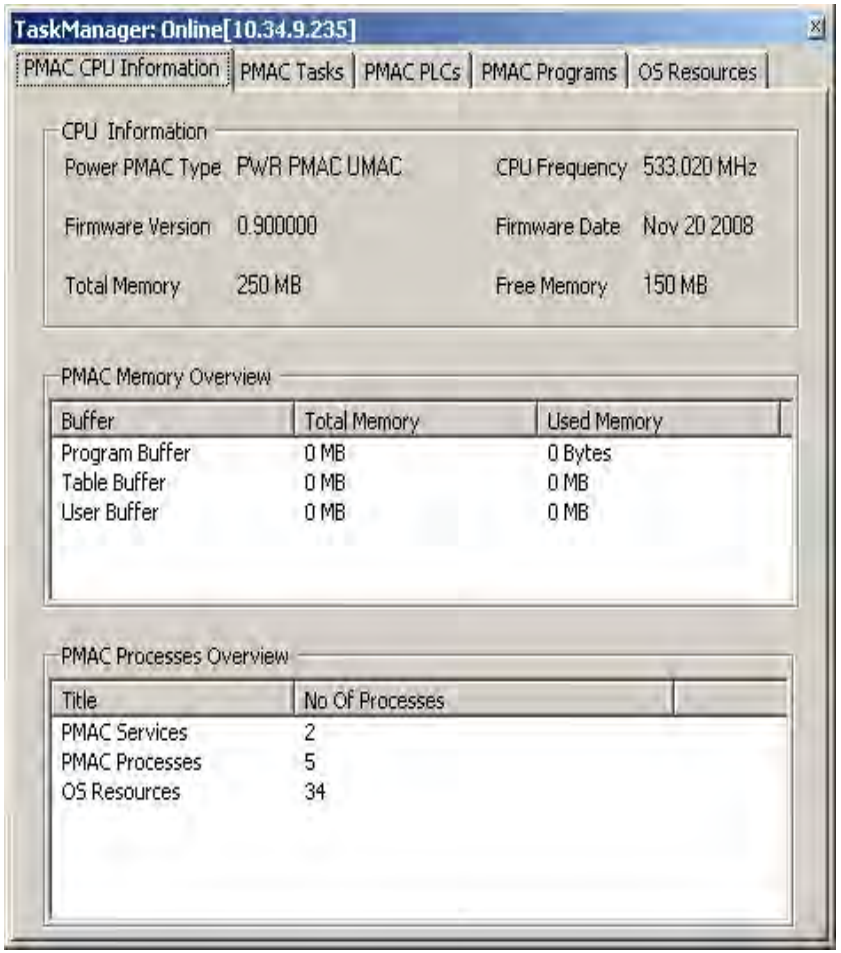
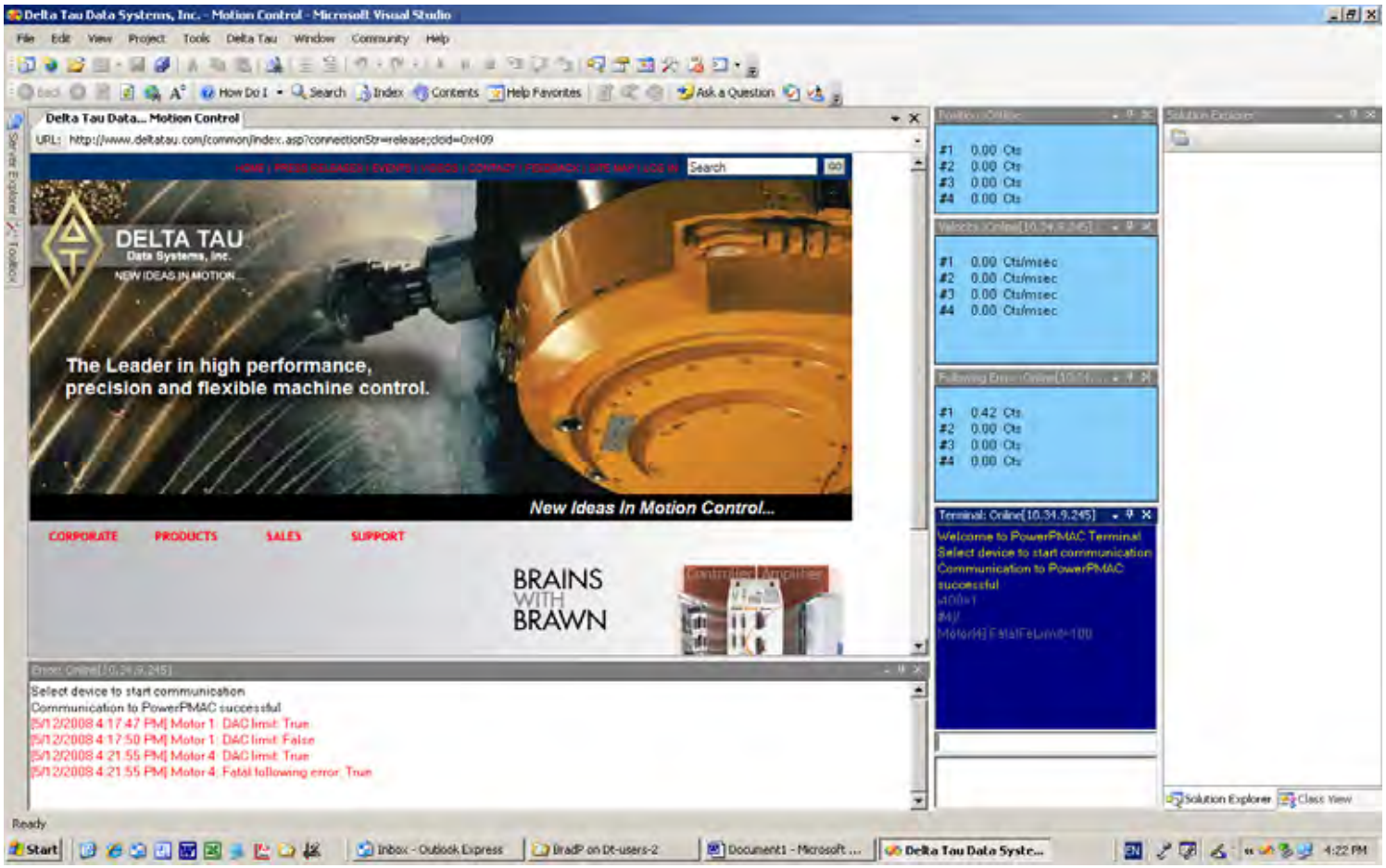


# Power PMAC Task Manager

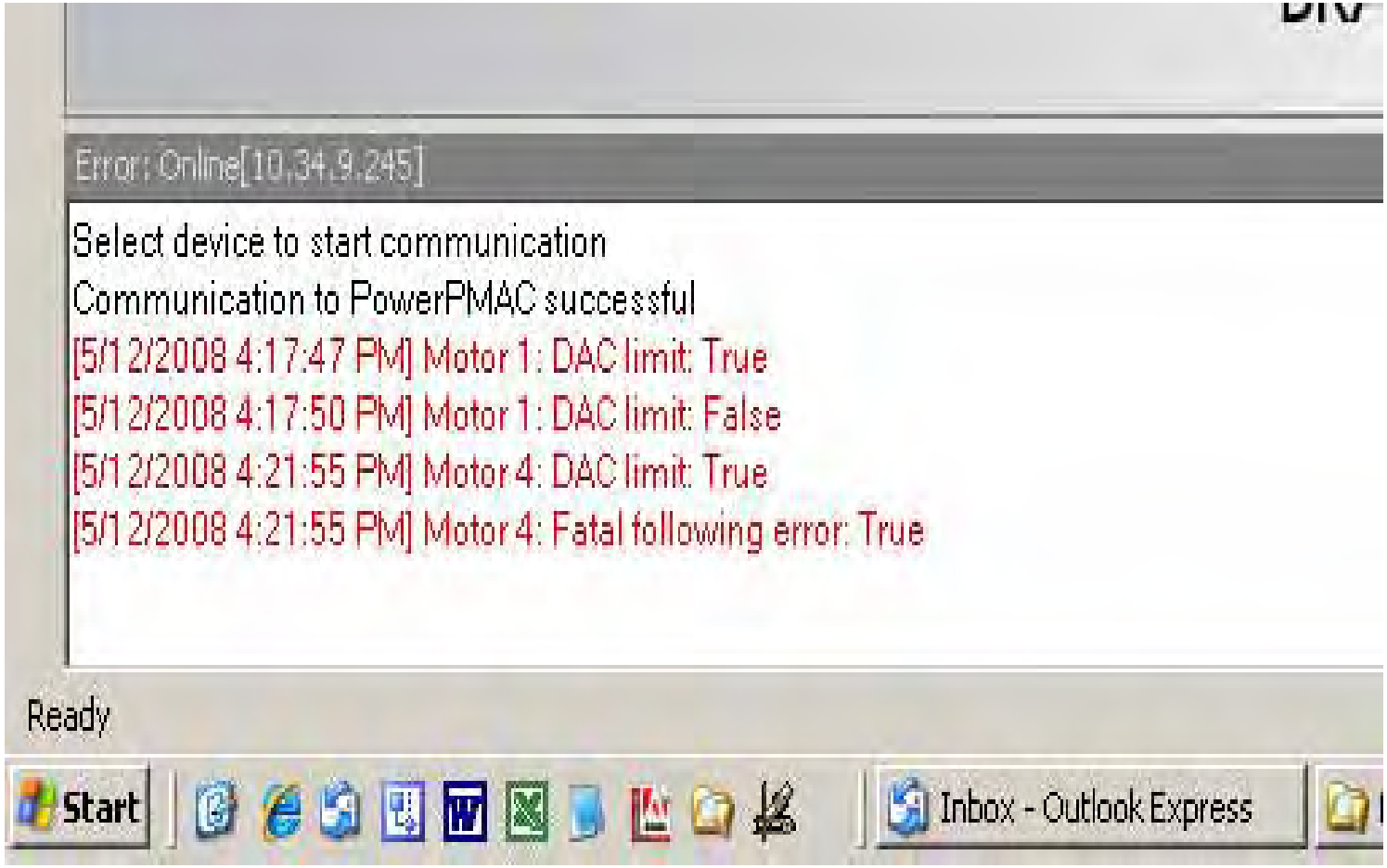


# Error Window



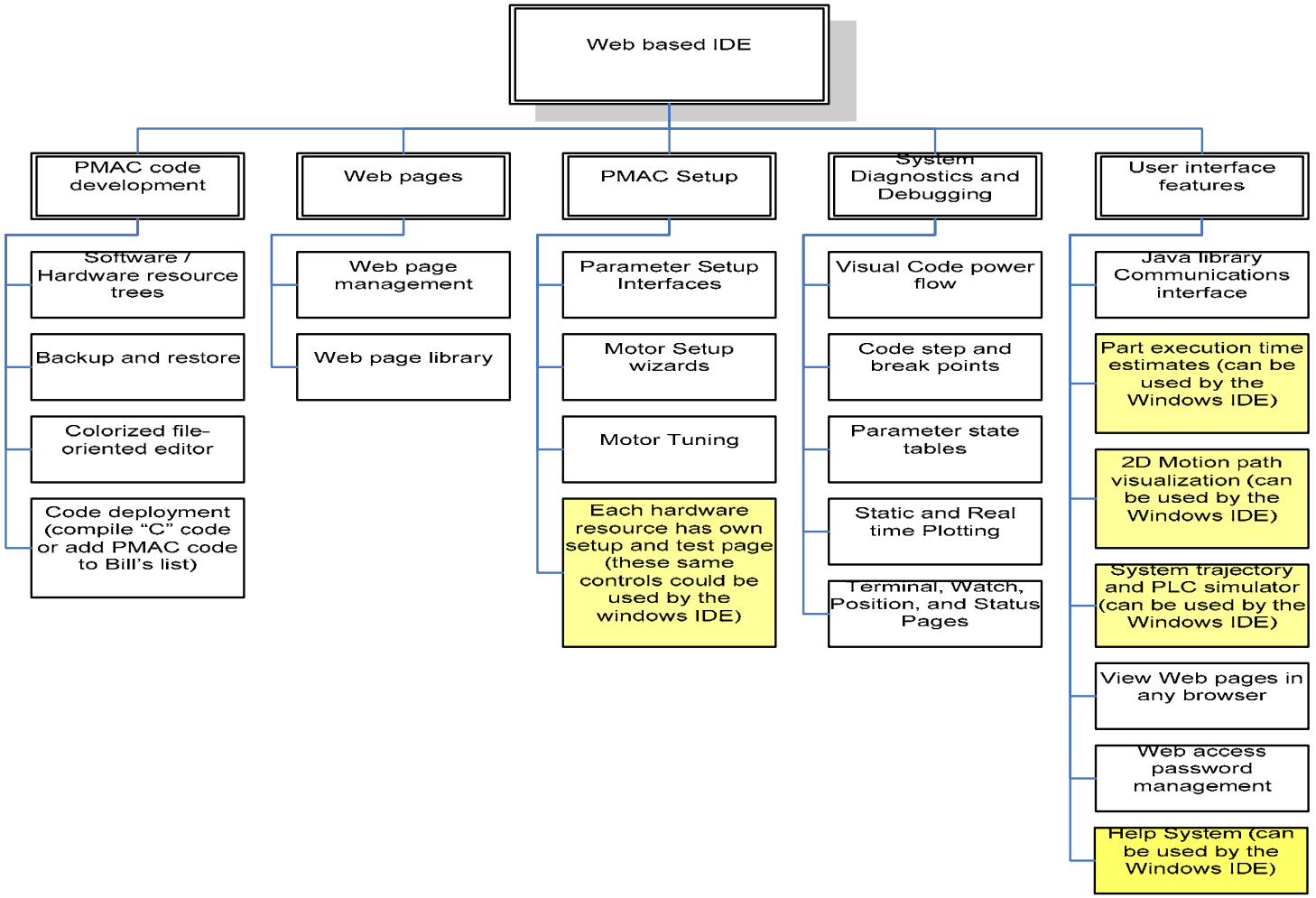
# Error Window Zoom



# First Release IDE (May 2009)

- New Project (project templates)
- New File (Item templates)
- YAC and Lex Parser (Intelisense in editor)
- PPMAC Database (Intelisense for controls)
- Upload/Download Program
- User-Written Servo/Phase Setup
- Open/Close/Save/Save As Files/Project
- Recent Files/ Projects
- Activate Project
- Exclude File From Download
- Communication Setup and Status
- PPMAC Database Viewer
- Terminal & Watch with intellisense
- Motor, CS, Global status
- Hardware Library Explorer
- Basic Static and RT Plotting
- Basic Tuning
- Encoder Setup
- Backup¥Restore
- Program/PLC/CPLC Status and View
- CPLC compile, load, run
- CPU Resource Setup/Status
- I/O, Servo, Feedback ACC Board Setup/Status
- IDE Installation and Operation in MS Vista & XP

# Web IDE Overview

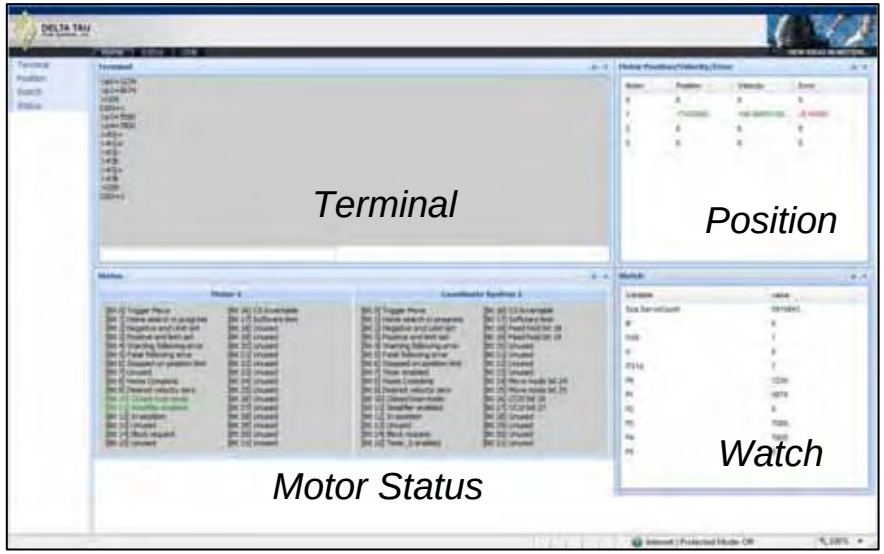


# Power PMAC
# Embedded Web Server

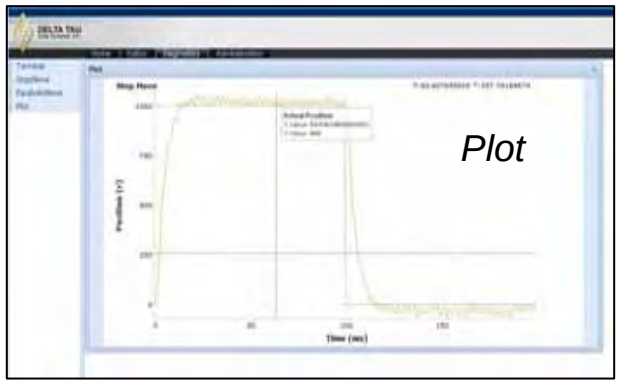
DELTA TAU
Data Systems, Inc.

- Web Server program is written in **C#.asp.net** and is **platform independent**
- Every Power PMAC has a dedicated **IP Address**
- Any computer with a **web browser** can communicate with Power PMAC
  - Laptop with direct connection
  - Over company network*
  - **From anywhere in the world over the Internet***
- **HTTP** and FTP supported
- Many standard windows are built in:
  - Terminal, position, watch
  - Backup and restore
  - **Tuning and plotting**
  - Status reporting
- **Remote upload/download** of firmware, programs and parameters
- **User can add his own web application for easy MMI/HMI implementation**
- PMAC Library is accessible using webservice

* Must arrange to get through any firewalls

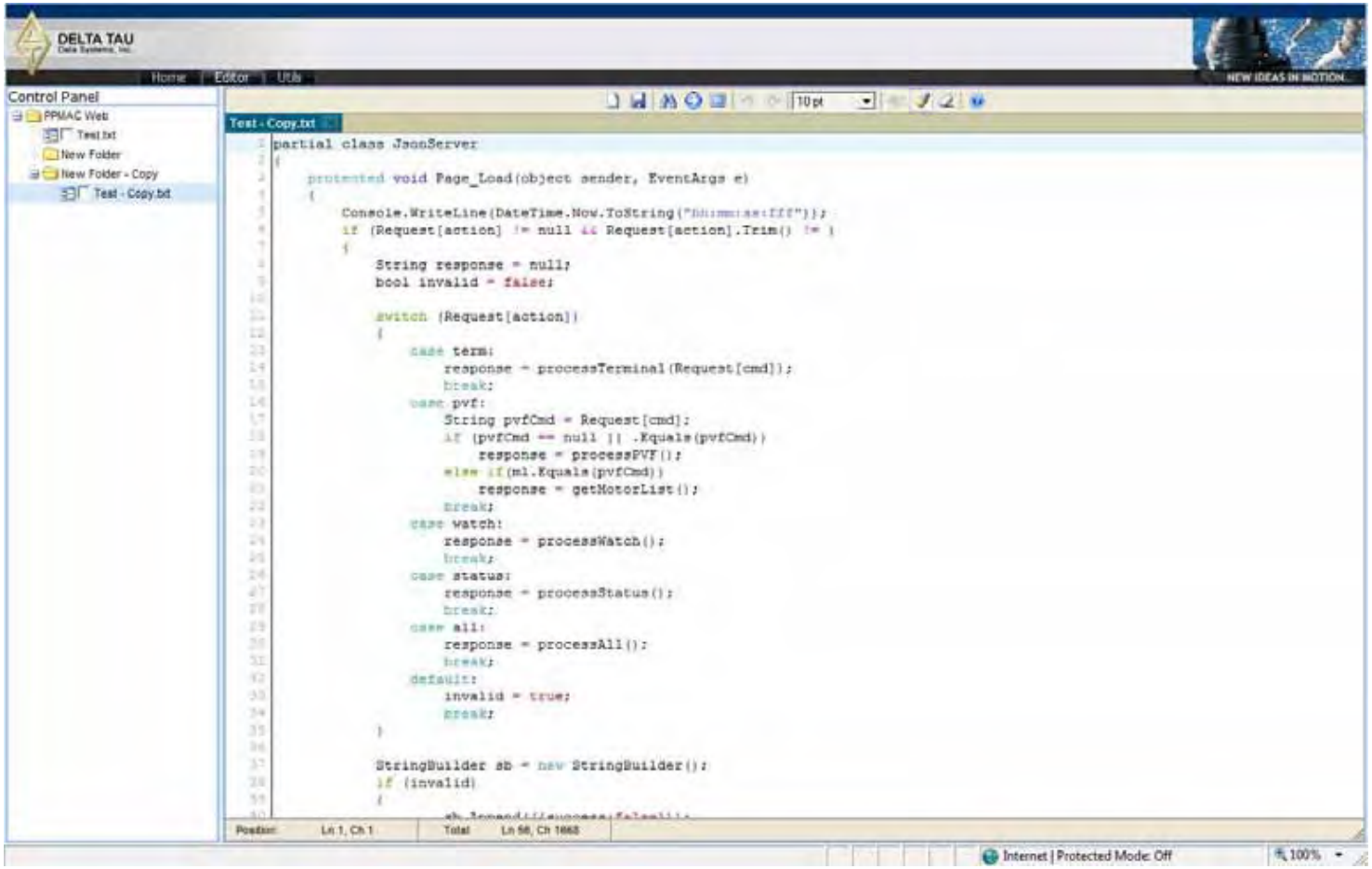



Standard Web Server Page

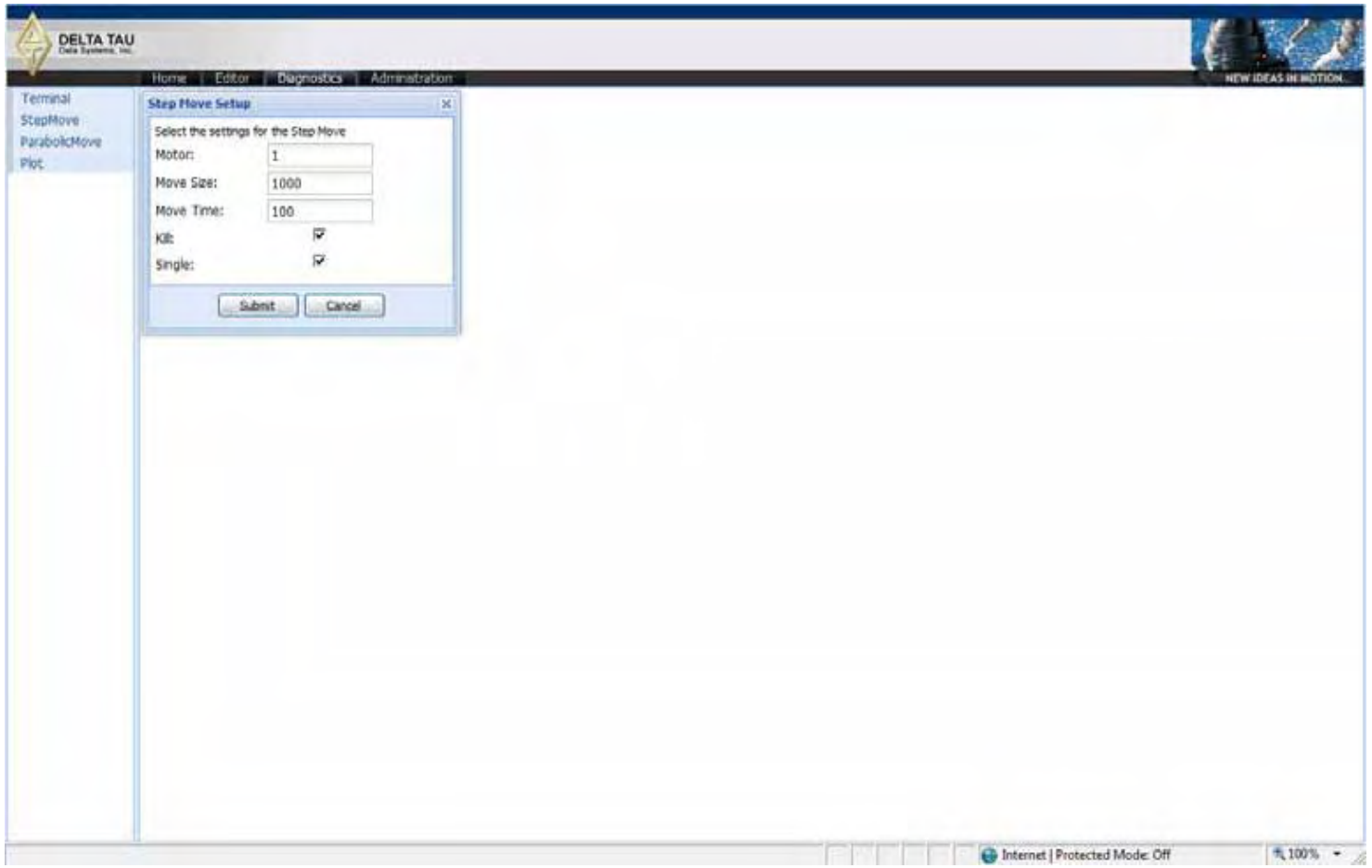



Web Server Plot Screen

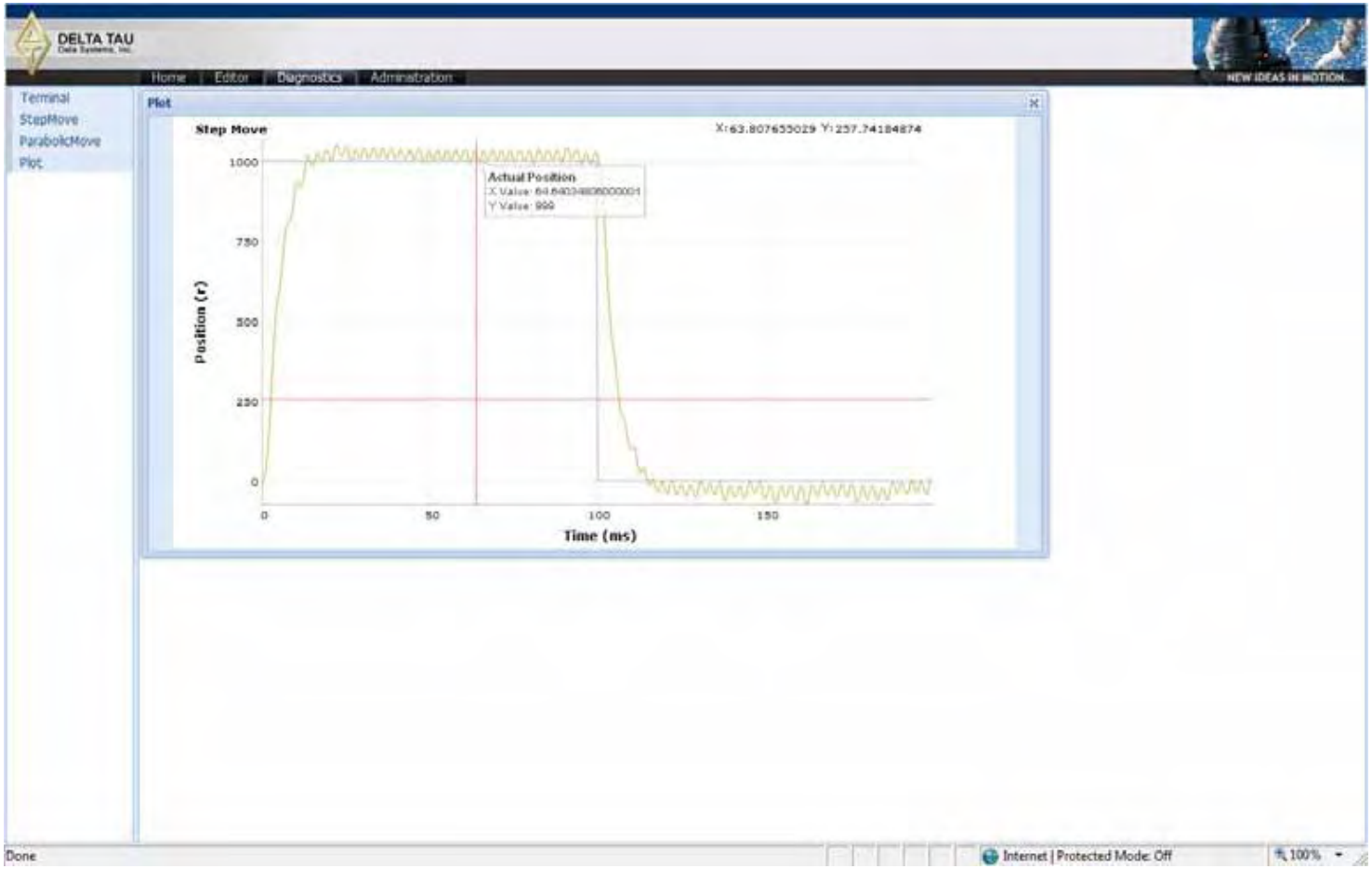
# Webserver Program Editor



# Webserver Step Interface



# Webserver Step Response



# Webserver Change IP