Casco Systems

High Performance Data Acquisition Systems

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Introduction

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- Specialties:
  - Industrial & Manufacturing
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  - Advanced DAQ & Control Systems

What is a “High Performance” DAQ System?

Definition:

- ✓ Measures what its supposed to, well.
- ✓ Leave no data “on the table.”
- ✓ Doesn’t over tax system resources.

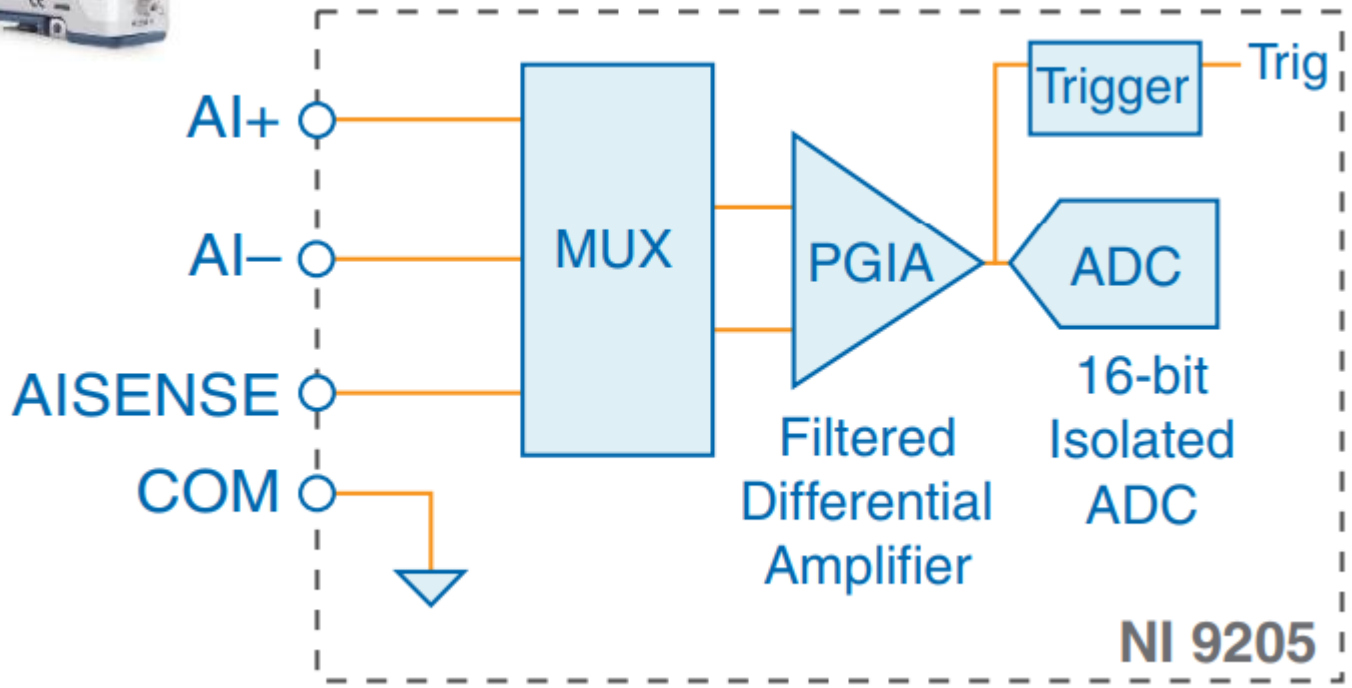
Measures what its supposed to, well.

Example: Measure the voltage sine wave of a 120VAC signal.

Key Measurement Considerations:

- Range of Measurement
  - 10:1 Pt -> ~17V Peak
- Resolution of Measurement
  - Better than 1V Accuracy
- Frequency of Measurement
  - Understand ADC Architecture
  - 60Hz * 100 sample / cycle = 0.000167s (6,000 S/s)
- Figure out about what you need then check that your hardware do it.
  - Very high speed or high accuracy signals may require compromise.

Understand the ADC Architecture



Leave no data “on the table.”

Use all the data the ADC is producing.

Best Practices:

- Example: Operator Screen Updated Once per Second
  - Average at least one seconds worth of data.
  - Data log / make control decisions at full speed.
- Don’t limit your program based on your slowest IO.
  - May need to run different parts of the program at different speeds.

Don’t over tax system resources.

Or:

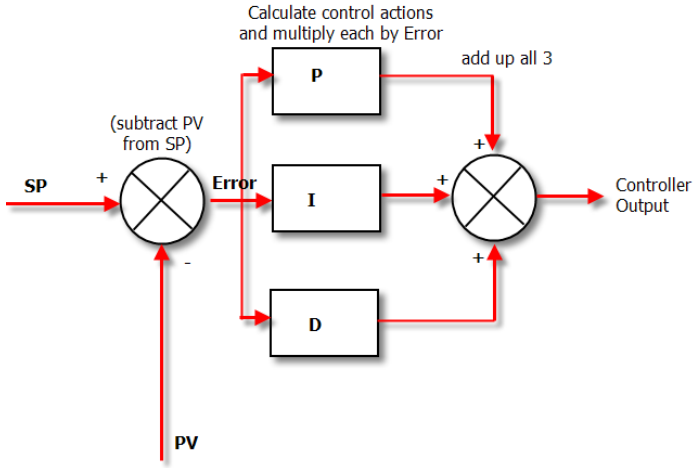
Run data processing loops at consistent speeds.

Example: PID control process running within the following parameters:

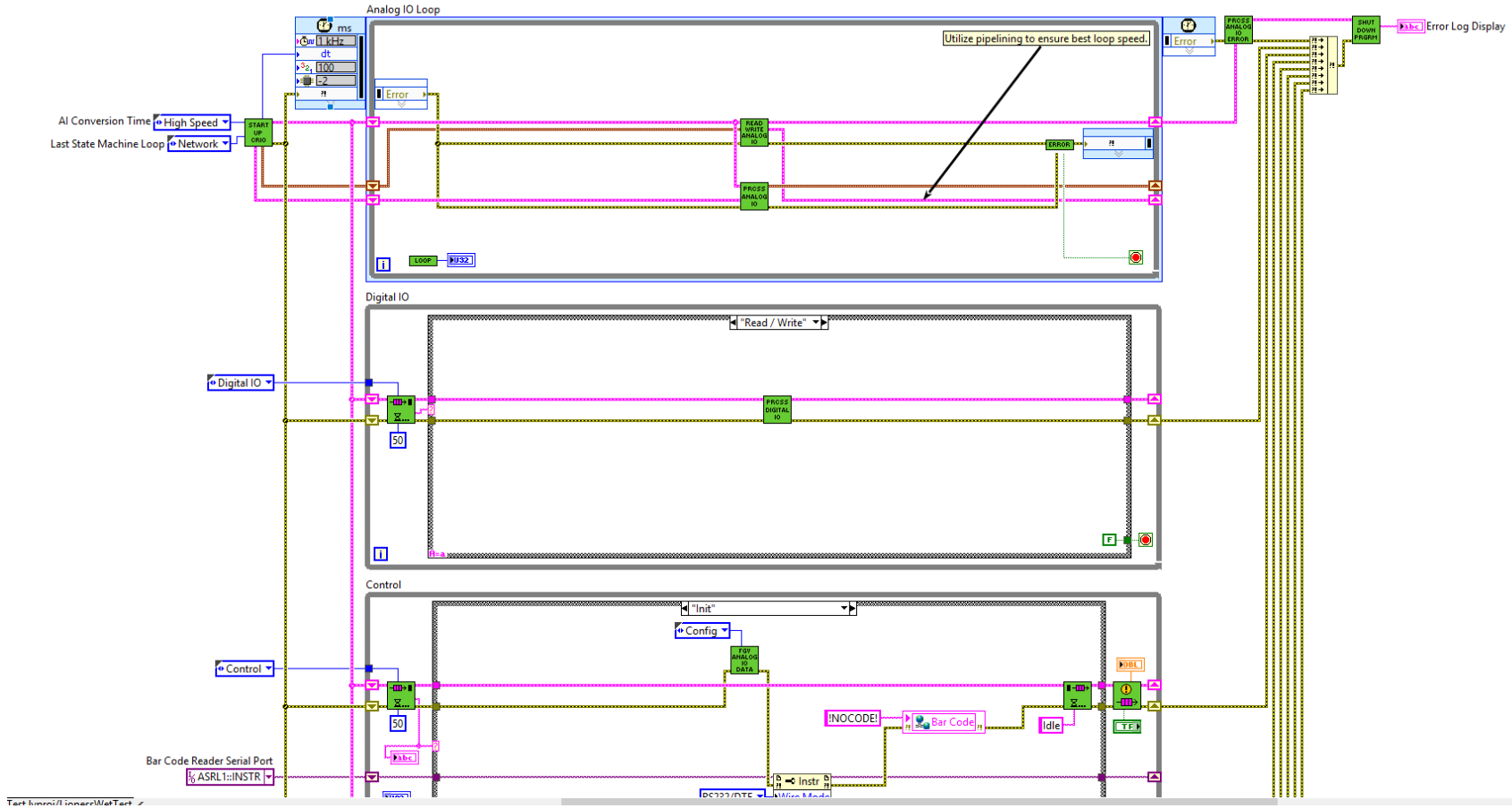
- 0-10VDC Input (PV) at 50 S/s
- 4-20mA Current Output (CV) at 10 S/s
- Loop / Sweep Time of Program 23ms to 35ms

Best Practice Solution:

- Run PID no faster than limiting IO (100ms CV)
- Average faster AI samples (5x PV)
- Run PID loop at a consistent clock speed.



LabVIEW Code Example



SUMMARY

- Know What You're Measuring
- Understand the ADC Architecture
- Don't Leave Data on the Table
- Don't Over Tax System Resource

THANK YOU !

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