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Real "Real-Time:"
LabVIEW and VxWorks,
or LabVIEW in Space!

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Why Bother?

- Research project - to answer the question - Can LabVIEW be used as flight software? Including all the requirements of flight software?
  Can software developed on the ground be transitioned to flight without having to re-write it?
Current Default Real-Time Configuration for S/C

- VME Embedded Power PC Board
  (flight-qualified)
  - Rad hard, conduction cooled,
  - Temperature and materials tested

- VxWorks real-time OS

- C or C++

What’s Wrong With Current Configuration?

- Too expensive
  - Software written on the ground in Labs by PIs needs to be re-written for flight
  - Not user-friendly

- If you know LabVIEW there’s no need to ask
Hardware

- DY4 Power PC Board in a VME Chassis
- Two custom (flight I/O) hardware boards delivered by Ball
- Various support and network equipment
- Delivered for low-temp experiment on Space Station
Software

• Special version of LabVIEW developed by NI to run on VxWorks

• Developed drivers with Ball for boards in C

• Debugged delivered software

What Took So Long?

• Good News - Able to integrate flight-critical hardware boards

• Bad News - You can’t simply integrate flight-critical hardware boards
  – Issues
    • Power
    • Grounding
    • ESD
    • Availability
Status

- Running experiment scripts
- Simulating data and reading it from boards
- Displaying it on another computer via internet

What Now?

- Develop new scripts - see if they can be developed better, faster and cheaper in LabVIEW
- Begin to address software issues
  - Timing
  - Restart
  - Fault detection
Where would we like to go

- LabVIEW in space

- Technology Experiment
e.g., Remote Agent Experiment

How can NI Help?

- Re-write LabVIEW timing to equal VxWorks

- Reduce ‘footprint’ or memory size required

- Optimize where needed