The Significance of LabVIEW Development Style

Peter Blume
President
Author
Overview

- Introduction
  - Evolution of style convention at Bloomy Controls
- Benefits of good style
  - Single developer / application perspective
  - Multideveloper / organization perspective
  - Examples
- Style resources
About Bloomy Controls

- Systems integrator
  - Founded in 1992
  - Automated test, data acquisition, and control
  - Windsor, CT; Milford, MA; Fort Lee, NJ

- NI Select Partner
  - 13 Certified LabVIEW & TestStand Developers
  - 5 Certified LabVIEW & TestStand Architects
  - 2 NI Certified Training Centers

- CSIA Certified Member
Evolution of Best Practices

- Steady growth
  - Multiple developers
  - Multiple offices
  - Multiple industries and application types
  - Multiple years in business

- LabVIEW experts
  - Professional quality software
  - Good style is essential
Evolution of LabVIEW Style

- Internal style guide developed in mid 1990s
  - 10 Page document
  - Most details passed on verbally
- Opened remote offices in MA and NJ
  - New organizational structure
  - Had to specify standards more explicitly
- NIWeek presentations
  - “Bloomy Controls Professional LabVIEW Development Guidelines” in 2002
Theorem 1.1

A direct relationship exists between LabVIEW development style and:

- Ease of use
- Readability
- Maintainability
- Efficiency
- Reliability
- Simplicity
- Performance

- Development time
- Standards
- Certifications
- Productivity
Ease of Use

- The ease with which the *end user* operates the software to accomplish her objectives
- GUI interaction
  - Layout
    - Size, position, color, spacing, density
  - Control types
  - Navigation
  - Responsiveness
Readability

- Ease with which the developer comprehends the source code
- Front panel & block diagram
  - Intuitive object labels, comments, icons, and descriptions
  - Clear wiring and data flow
Maintainability

- Ease with which the software is *modified and expanded* to change or add new functionality
  - Modular
  - Data structures
  - Standard design patterns
  - Documentation
  - Scalable
- Can *other* developers understand your source code?
Spaghetti VI - Panel
Efficiency

- Application’s utilization of computing resources
  - Processor
  - Memory
  - Hard disk
  - Input/output devices
Theorem 6.1

**Execution speed is inversely proportional to memory use**

- Memory and data storage access rates are the principal latencies
- LabVIEW’s memory manager
  - Automatic
  - Delays
  - Can fragment memory
Rules to Improve Efficiency

- **Rule 6.29**
  - Avoid manipulating nested data structures during critical tasks
  - Avoid unnecessary operations in loops
    - Build array, concatenate string
    - GUI polling
    - Redundant computations
Reliability

- Bug free software that never crashes
  - Controls with range checking
  - Data flow versus variables
  - Modular diagrams
  - Error handling
Error Handling

- Rule 7.1
  - All VIs must trap and report the errors returned from error terminals
  - Trap errors via propagation of the error cluster
  - Report errors using dialog and/or log file

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Simplicity

- Relates to the number of objects, nodes and terminals
- Affected by
  - Application requirements
  - Implementation style
Performance

- Execution speed
- Relates to simplicity
- Choose implementations requiring fewest nodes
Remove Backspace VI

- 13 nodes
  - 5.6 mS execution time
- 25 nodes
  - 12.8 mS execution time
Development Time

- The hours required to develop, document, test, modify, and maintain an application throughout its entire life cycle
- Good style reduces development time and effort
  - Fewer bugs
  - Easier to modify and maintain
- Good style increases productivity
  - Reusable source code
Organizational Perspective

- Standards
  - Quality
  - Commonality
  - Depth and interchangeability of resources
  - Software reuse
  - Qualify for certifications
- Insurance against bad projects & turnover
Certifications

- CSIA Registration
- ISO 9000
- FAA
- FDA
- Six Sigma
Productivity!

- The benefits *scale* across the *organization*
  - Ease of use
  - Readability
  - Maintainability
  - Efficiency
  - Reliability
  - Simplicity
  - Performance
  - Development time
- This makes the *entire organization* more productive!
Style Resources

- The LabVIEW Style Book
  - 200+ Style rules
  - Companion web site at www.bloomy.com/lvstyle
  - Tools and templates
  - The LabVIEW Style Course
- LabVIEW VI Analyzer
- Consulting
  - Application development
  - Code reviews
  - Code refactoring
  - Development processes
- Partnership / automation strategy
Contact Bloomy Controls

- Email info@bloomy.com
- Write or visit

**Headquarters:**
839 Marshall Phelps Rd.
Windsor, CT 06095
(860) 298-9925

**Field Offices:**
Milford, MA
(508) 902-0054

Fort Lee, NJ
(201) 818-0117