The Art of LabVIEW in TestStand

Rejwan Ali
Agenda

• TestStand vs LabVIEW

• The Art

• Additional Resources
Agenda

• TestStand vs LabVIEW

• The Art

• Additional Resources
TestStand AND LabVIEW
TestStand AND LabVIEW

- LabVIEW is a **development environment**
- TestStand is a **test executive**

- LabVIEW could be used to build a test executive
- TestStand is an off-the-shelf test executive
NI TestStand – Test Management Software

- Graphical development environment
- Automate tests written in 10 different test languages
- Multithreaded sequence execution
- ASCII, HTML/Web, XML, and ATML report generation
- Access, Oracle, SQL Server database connectivity
NI TestStand – Test Management Software

- Full Featured and Simple User Interfaces are provided in NI LabVIEW, NI LabWindows™/CVI, C#, C++, and VB.NET
- TestStand Deployment Utility builds a simple installer with necessary dependencies
TestStand AND LabVIEW

- Components of a Test Executive

- LabVIEW Compliments TestStand

- Pick the Right Tool for the Job
TestStand AND LabVIEW

- Components of a Test Executive

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- Layers of an automated test

  - Test Executive
  - Programming Language/Script
  - Drivers
  - Hardware Layer
TestStand AND LabVIEW

- Components of a Test Executive
- LabVIEW Compliments TestStand
- Pick the Right Tool for the Job

Using TestStand as your test executive

Drivers

Code Modules

TestStand

Hardware Layer

LabVIEW CVI VC++ .NET
TestStand AND LabVIEW

- Components of a Test Executive
  - Test Executive
    - User Interface
    - Result Collection
    - Report Generation
    - Database Logging
    - Tools/Utilities
    - Test Flow
    - User Mgmt
    - Test Sequence
    - Engine
  - Code Modules
  - Drivers
  - Hardware Layer
- LabVIEW Compliments TestStand
- Pick the Right Tool for the Job
TestStand AND LabVIEW

• Components of a Test Executive

• LabVIEW Compliments TestStand

• Pick the Right Tool for the Job

- Components that can be customized with LabVIEW
  - Test Executive
    - User Interface
    - Database Logging
    - User Mgmt
  - Result Collection
    - Tools/Utilities
    - Test Sequence
  - Report Generation
    - Test Flow
    - Engine

- Code Modules
  - CVi

- Drivers
  - C

- Hardware Layer
  - National Instruments
TestStand AND LabVIEW

- Components of a Test Executive

- LabVIEW Compliments TestStand

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How do I know if TestStand is the right tool?
TestStand AND LabVIEW

- Components of a Test Executive
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Key Words:
- Volume Production Test
- User Management
- Parallel/Multi-head Test
- Report Generation
- Database Logging
- Product Family
- Multi-Developer Environment
- Framework
- Phased Approach
TestStand AND LabVIEW

• Components of a Test Executive

• LabVIEW Compliments TestStand

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Scenario 1-
“We want to test 15 UUTs in a temperature chamber at the same time AND simultaneously. If certain people log in to the test they need to be able to debug the UUTs.”

• Batch/Parallel Testing

• User Management
TestStand AND LabVIEW

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Scenario 2-
“We want to be able to do extensive troubleshooting of our contraption. We only make 2 contraptions per year”

- Not production but could tests be reused by production?
- Low Volume
TestStand AND LabVIEW

- Components of a Test Executive
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Other considerations:
- Are there multiple groups making similar tests in the company?
- Can I meet my customer’s deadline?
- Will this grow over time?
- Training costs? Both on in house test executive and COTS test executive
TestStand AND LabVIEW

- Components of a Test Executive
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Summary:
- LabVIEW and TestStand can be used together to create a fully automated test
- Choosing the right tool for the right job can save you time and money
Agenda

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The Art

- Drawing the Line
- Examples
- Making the Right Choice
The Art

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• Because some functionality in TestStand and LabVIEW overlap it is an art to know which tool to use for which task
  - Does it make sense to keep this functionality in TestStand
  - Does it make sense to push this functionality to LabVIEW
The Art Chart

NI TestStand

- Native Functions/Operators
- TS Datatypes
- Limit Evaluation
- Result Collection
- Locking
- Synchronization

LabVIEW

- API
- Looping
- Database Com.
- FTP
- Popups
- Executables
- Options Loading
- Limit Loading

- Hardware Communication
- Data Display
- Advanced Math
- Network Communication
- User Event Driven
The Art Chart

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Native Functions/Operators

For Instance:
Generate a random number between 1000 and 2000
The Art

• Drawing the Line
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Native Functions/Operators

• TestStand:

• LabVIEW:
The Art

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Native Functions/Operators

• Using native functions eliminates code modules
• However, some advanced functions may not exist in TestStand but are available in LabVIEW
  • (e.g. Reverse 1D Array)
The Art Chart

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- Hardware Communication
- Communicate with Instruments and UUT
- For Instance: Set a current limit on a power supply
The Art

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Hardware Communication

• TestStand:
  • Need a code module

• LabVIEW:
The Art

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• Hardware Communication
  
  • TestStand cannot directly call drivers without a code module
The Art Chart

NI TestStand

Native Functions/Operators
TS Datatypes
Limit Evaluation
Result Collection
Locking
Synchronization

TestStand API
Looping
Database Com.
FTP
Popups
Executables
Options Loading
Limit Loading

LabVIEW™

Hardware Communication
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• API Calls

• For Instance: Programmatically returning the result of a specific step by name
The Art

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- API Calls

- TestStand:

- LabVIEW:
The Art

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Example: API Calls

- Simpler in TestStand
- Unnecessary code module
- Do not need to close refs
- However, one must use API in LabVIEW when creating a standalone TS application (such as a custom UI)
The Art Chart

NI TestStand

Native Functions/Operators
TS Datatypes
Limit Evaluation
Result Collection
Locking
Synchronization

LabVIEW

Hardware Communication
Data Display
Advanced Math
Network Communication
Data Analysis

API
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The Art

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• Shared Functionality
  • How complex is it in LabVIEW?
  • How complex is it in TestStand?
  • Can I reuse it in a LabVIEW only app?
  • Do I already have something?
  • What are my company’s standards?
  • Which is easier to maintain?
  • What is the performance?
### The Art

- Drawing the Line
- Examples
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#### Making the Right Choice

<table>
<thead>
<tr>
<th>LabVIEW</th>
<th>TestStand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros:</strong></td>
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</tr>
<tr>
<td>• Faster</td>
<td>• Garbage Cleanup</td>
</tr>
<tr>
<td>• More Flexible</td>
<td>• Less Code (maintain)</td>
</tr>
<tr>
<td>• Lower Level Access</td>
<td>• Direct API Access</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Cons:</strong></td>
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<tr>
<td>• Deployment</td>
<td>• Step Action Overhead</td>
</tr>
<tr>
<td>• Maintenance</td>
<td></td>
</tr>
<tr>
<td>• Close References</td>
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</table>
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• TestStand AND LabVIEW

• Most Common Mistakes

• Additional Resources
Additional Resources

• Using LabVIEW with TestStand

• Advanced Architecture Series

• I’m still hungry for information?
  
  • UsingLabVIEWLabWindowsCVIwithTestStand.pdf
    
    • Located on the web and on disk: <TestStand>\Doc\Manuals

• Key topics:
  
  • Using LabVIEW Data Types with TestStand
  
  • Effectively Using LabVIEW with TestStand
The Art

- Using LabVIEW with TestStand
- Advanced Architecture Series

- I’m still hungry for information?
- Advanced Architecture Series
- Key topics:
  - NI TestStand Type Management Best Practices – Santiago Delgado
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