Automating Test Procedure to Test Sequence with the TestStand API

Do you ever wish TestStand would write itself?

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Bloomy Quick Facts

- NI Platinum Alliance Partner
  - Designated LabVIEW NXG Migration Services Partner in 2018
  - Awarded America’s Partner of the Year in 2017
  - Awarded “Outstanding Technical Resources” 2013 and 2014
  - 15 NI Certified LabVIEW Architects
  - 3 NI Certified LabVIEW Embedded Systems Developers
  - 3 NI Certified TestStand Architects
  - 3 NI Certified Training Centers
  - 9 NI Certified Professional Instructors
- Published “The LabVIEW Style Book” © 2007, Prentice Hall
- ISO 9001:2015 Certified Quality Management System
Agenda

- Test Procedures
- Proposed Solution
- Procedure to Code
- Demo
- Summary
- Questions
In the beginning…
There were test procedures

<table>
<thead>
<tr>
<th>Test 02 – Power Up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESCRIPTION</strong></td>
</tr>
<tr>
<td><strong>PRECONDITIONS</strong></td>
</tr>
<tr>
<td><strong>INPUTS/OUTPUTS</strong></td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>STEP #</strong></th>
<th><strong>DESCRIPTION</strong></th>
<th><strong>REQUIREMENTS/DETAILS</strong></th>
<th><strong>PASS CRITERIA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Apply 24V to DUT Input</td>
<td>Apply 24V @ 0.25A across J1.1 to J1.2</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Verify Input Current between 10 and 15mA</td>
<td>Measure Input current across J1.1 to J1.2</td>
<td>10mA &lt; I &lt; 15mA</td>
</tr>
<tr>
<td>30</td>
<td>Send “Enable” Command</td>
<td>Serial Interface “Enable”</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Verify Enable Current (100 to 125mA)</td>
<td>Measure Input current across J1.1 to J1.2</td>
<td>100mA &lt; I &lt; 125mA</td>
</tr>
<tr>
<td>50</td>
<td>Verify 5V_A Voltage</td>
<td>Measure Voltage at 5V_A @ TP 109/110</td>
<td>4.95 &lt; V &lt; 5.05</td>
</tr>
<tr>
<td>60</td>
<td>Verify 3V3 Voltage</td>
<td>Measure Voltage at 3V3 @ TP 25/26</td>
<td>3.27 &lt; V &lt; 3.33</td>
</tr>
</tbody>
</table>

- Defines
  - Signal characteristics
  - Order of Tests
  - Limits
- Used to determine:
  - Critical UUT specification coverage
  - Automated Test Equipment (ATE) hardware needs
The Problem

- Requirements documents are not standardized
- When requirements are nailed down, it's several days to go from words to code
  - Errors can occur when manually transcribing
- The person defining the requirements is often not the person writing the code (or perhaps should not be)
- How do you streamline getting the requirements in the head-of-test’s brain into working code?
- Can you write code at the requirements stage, before any hardware has been designed?
Proposed Solution

- Impose a bit more structure on a test requirements document
- Automate the process to go from test requirements to code
  - Reduce Effort
  - Reduce Errors
  - The person defining requirements directly defines code
- Abstract hardware from the code so that hardware changes do not feedback into test plan changes
How do we turn a test procedure into code?

Enter: the TestStand API

- The TestStand API allows you to build and modify TestStand sequences from LabVIEW (Or C, .NET, etc.)
- We used the API to create test steps and subsequences based on the test procedure
How do we know what drivers to call?

Enter: the Hardware Access Framework

- What code modules am I going to call from my TestStand sequence?
- Define what sort of signal you expect, then provide the plugin driver later
- In other words—let the software wonks figure out the drivers!
  - Or use ones that have already been developed
Create test procedures based on Abstractions

- Test Procedures can be written without hardware
- For Example:
  - We know we need an analog voltage measurement, we don’t know where it will come from or what connections will be needed
Demo
Take Aways

- Wait—we didn’t even open up the TestStand Sequence Editor!
- As long as the testing criteria doesn’t change, we never even have to look at our sequence file
- The hardware design team can make (almost) any decision they want to about specifics, you don’t need to care
- Test procedure stays as a human-readable (and manager-readable) document that links directly to code
Next Steps

- **Web Interface**
  - Fill in a test procedure, get some sample code!

- **Hardware selector/PXI configurator integration**
  - We know what sort of signals you need to handle, so we can make good automated recommendations of what HW config you will need
Before you go, take the survey.
Slide Divider Topic Place Here
Questions?

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