New Ways of Test Automation
MC-ST: Framework for System Test Automation with UML and LabVIEW
Save Costs and Time and Improve Quality with MC-ST

Costs

Time

Quality
Automated System Tests with MicroConsult System Test, MC-ST

MC-ST is a framework for automated system tests with UML and LabVIEW. MC-ST consists of the Test Management Center, Test Executor and Test Configurator by MicroConsult. The Test Executor runs on the PXI Box. It contains the test drivers and executes the test sequences modeled in Rhapsody C++, simulating the environment. Test cases can be parameterized and composed to test sequences using the Test Configurator. The test cases are derived from UML sequences in Rhapsody C++. The Test Management Center running on the host communicates with the Test Executor and passes the test sequences to the PXI box via TCP/IP connection. The test documentation is created after a test run.
Sequences from requirements analysis describing the functionality of the system are used as test cases to evaluate the functionality of the system.

The functions (drivers) have to be implemented in LabVIEW.

Additional test sequences can be modeled in Rhapsody C++
Sequences from Rhapsody C++ are imported into the MC-ST Test Configurator.
One sequence diagram can be used for several test cases with different parameters.
The test sequences can be grouped and sorted.
The sorted and parameterized tests are loaded into the Test Management Center.
The Test Executor and the drivers are loaded down into the PXI Box.

The Test Management Center passes the tests on to the Test Executor running on the PXI Box. Tests are executed.
After a test run, protocols are filed in a protocol directory.

The trace protocol shows each step of the test run.
The debugger log file contains the read-out register and variable values. The values are read out using the JTAG emulator.

A test protocol according to IEEE 829 is created.
Test Driver

```plaintext
[sequence]
Name=SEQ_Control] Normal

[parameters_int]
2000 const
20 const
1 const
3000 const

[parameters_double]
1.5 RefValue
0 SensorValue
0 PWMValue
0.0 const
0.1 const

[parameters_string]

[steps]
1 12 2 0 40000004
7 0 3 4 1 80000001 3 3
8 0 4 1 1
1 15 2 0 40000001 3 d
7 0 6 4 3 80000004 3 d
4 0 7 4 80000003 0 80000003 d
7 0 8 4 2 80000002 3 b
1 12 9 2 0 40000003
1 3 a 2 0 40000002
1 4 b 3 0 40000003 40000002
8 0 c 1 2
0 0 6 0
8 0 6 1 3
1 1 f 2 0 40000004
7 0 10 4 4 80000001 3 10
8 0 11 1 4
6 0 12 4 40000002 0 40000001 400
```
A Real System

Constant air flow in the flow channel

Reference Value

to ADC

from PWM

Control Device
Real Environment Simulated by the HIL

Constant air flow in the flow channel

PXI

Environment Model

Control Device

Reference Value
to ADC
from PWM

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Constant air flow in the flow channel
PXI offers a standardized, open hardware platform for generating, measuring and displaying signals with more than 1000 I/O-cards from many different manufacturers.
With LabVIEW, you can program a test environment for generating, measuring and displaying signals graphically.
- Download
- Flash programming
- Program start/stop
- Variable read/write
- Register read/write
- Profiling

LabVIEW controls Debugger
Guaranteed Execution Times for Test Steps

PC Sequencer as SIL
• no real-time

PXI System as HIL
• >= 1 ms

FPGA as HIL
• >= 25 ns
Customized Knowledge for all Project Phases

Consulting, Training, Workshops, Coaching, Engineering

MicroConsult supports you during:

- Specification
- Analysis
- Design
- Implementation
- Unit Test
- Integration Test
- System Test
- Acceptance Test

HW /SW Technologies, Tools, Methods, Process, Team