

DFD – Design For Reality

Norm!

Chief Technical Support Engineer

The Tactics and Principles of "Design for Debug"



The Promise

You will* walk away with:

Newfound **enthusiasm** and skills for **proactively** augmenting your development; with a mindful **compassion** towards the **person** who needs to debug your code (who might be **you**)

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"Debugging is a Waste of Time"





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Design For Debug Definition





"It is inevitable" ~Agent Smith

which intentionally enable or accelerate,

the inevitable process of debugging.

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Design for Debug

Design for Reality

This is fine



Why do we waste time?





- Program to the 'happy path'
- Accelerated development cycle



• If it runs, it's good



"It's all bloody well and good... till something stops working" ~DCorney

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What do you want to do? What do you want to do? What do you has an to go want of the source of the set of the



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Design for Debug

The Time Suck

Why does identifying the cause take time? Why does it take longer for some than others?

"Clues Watson, Clues..." ~Sherlock Holmes

- Instinct
- Sniff test
- Observations
- "What happens if I wiggle this"
- Historical Knowledge
- Systematic Understanding





Still Not Sold?

Even with new techniques in development and architectures we still debug a lot

If you're spending ample time trying to track down a problem...you can improve your system

(and likely should)

Not facilitating good debugging is a technical debt issue

Bugs = Technical Debt

Time spent '*finding the problem*' = Paying off interest

Fixing the issue = Paying off Principal

Bad Debug Design = High Interest Rates

What about 'Test Driven Design'/ 'Design for Test'?

Problems in Your Code



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Example Comparing Difficulty (none vs good) design

DQMH

Continuous Measurement and Logging

So now what?

Techniques for Everyone!

L1 User I create systems for me

L3 Architect I make frameworks for others







L2 Developer I build on the shoulders of others to build big systems

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So now what?

What to provide the future?

Because they might know where you live...

Insight

Accelerators



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What to give and how

Insight & Accelerators

Simplified Example

Insight

Accelerators

Information which leads to identification

Tools which lead to access





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Providing Insight

Logging :: (Insight)

General Progress and System Status

• L1

- Custom LabVIEW probes
- UDP Broadcast
- Log Files / IO Trace
- L2
 - DQMHAPI Tester
 - HSE Logging
 - AF Debug Conditional Flag DETT
- L3
 - Configurable Levels of Information
 - Retaining last XX number of system states and actions
 - Bolt-on remote debugging



Providing Accelerators

Code Stack Transporters :: (Accelerator)

No...having 100 windows open to debug, is not ok

• L1

- Corkboard / VI Server Shortcuts
- Custom Projects
- #Bookmarks (Automatic Error Handling)

• L2

- DQMHAPI Tester
- Panther Dashboard PantherLab
- AF BowZer Zayah
- L3
 - Module / Re-entrant VI Registration
 - Custom Framework Browsers
 - Emulation of Familiar Tools Memory Allocation VI Analyzer

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Providing Insight

Data Dumps :: (Insight)

The only bad information, is no information

- L1
 - Errors that provide actionable insight
 - Logging Probes
 - Unceremonious Mother-Cluster to Binary File
 - L2
 - AF Actor Extension
 - HSE (maybe)
 - Kraken
- L3
 - Configuration, Results <u>AND</u> Intermediate Data
 - Diffing tools
 - On-Demand / Periodic / On-Error Klaxon



Providing Accelerators

Issue Recreation :: (Accelerator)

Like a time-machine into your awkward teenage years

- L1
 - Message playback
 - Recorded data as simulation data
 - Functional containment
- L2
 - DQMHAPI Tester
 - Class Extension Injection
- L3
 - Ingest log / dump -> output macro-script / debug VI
 - Debug harness for modules / algorithms



So Now What?

What to provide the future?

Because they might know where you live...

Insight

Accelerators



DFD In the Wild

Wait...doesn't this exist already? Design for Debug – a voice crying out in the desert JTAG Boundary Scan – Joint Test Action Group



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Charge Forward Into the Future

Wait...doesn't this exist already?

Design for Debug – a voice crying out in the desert

2 Hits from the LV Community

1 general SW blog

Remainder is TDD



What do you want to do? What do you want to do? What do you has an to go want of the source of the set of the



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Acts 20:35



Q & A & Ideas!

<Insert Thoughts Here>

• X



Give us your feedback! Quick 2 Question Survey

In the mobile app, click into the session you would like to provide feedback for



10:15 AM Multichannel RF Data Recording 11:15 AM and Analysis

Meeting Room 19A

Aerospace & Defense •
 Technical Session

10:15 AM Optimizing Validation Processes: 11:15 AM Building Complex Test Systems with Distributed I/O

- Meeting Room 19B
- Aerospace & Defense •
 Technical Session

10:15 AM Panel: Continuous Integration (CI/ 11:15 AM CD)—Don't Leave Home without It

- Meeting Room 12A
- Programming Essentials Technical Session

10:15 AM Using Python and TestStand to 11:15 AM Boost Your Test Development

Ballroom G

 Product & Technology • Technical Session

10:15 AM What Does Left Shifting Test 11:15 AM Mean in the NI Ecosystem?

Meeting Room 18A
 Transportation - Technical Session

🕻 Tue May 23

★ Add to Schedule 🛛 🏥 iCal 🛛 👤 Check In

Optimizing Validation Processes: Building Complex Test Systems with Distributed I/O

Tue May 23 10:15 AM - 11:15 AM

Map Meeting Room 19B Aerospace & Defense • Technical Session

Ca Surveys

Take Session Survey

In this session, learn to improve efficiency and reduce non-recurring engineering costs in validation labs by connecting multiple distributed line-replaceable unit (LRU) test systems. Also learn how to abstract LRUs and construct complex test systems faster and more efficiently using existing distributed I/O and edge computation technology.

Click "Take the Session Survey"

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