

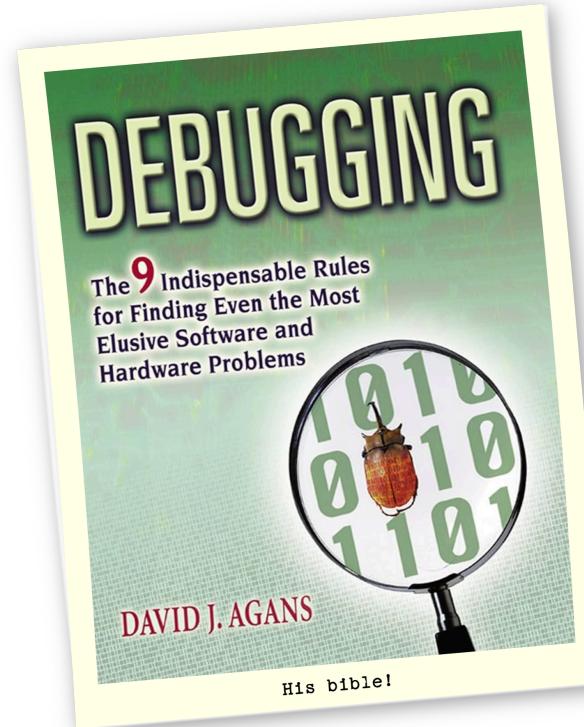
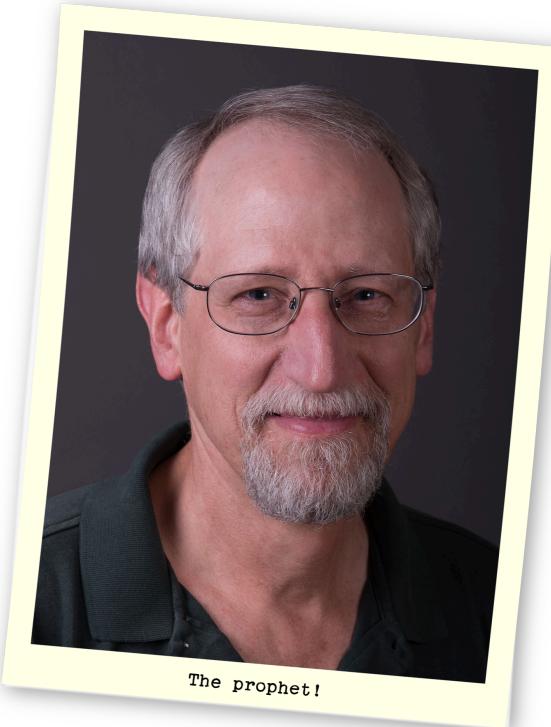


The 10 Debugging commandments

Thou shalt...

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The prophet and his bible



I. Understand the system

- Read everything, cover to cover
- Know what to expect and what is reasonable
- Know your tools
- Lookup the details

II. Make it fail

- Expect that the report is valid
- Reproduce it yourself
- Stimulate, not simulate
- Don't just wait for it too happen again
- Control the condition to find intermittent bugs
- Never throw away a debugging tool

III. Quit Thinking and Look

- Order the symptoms
- Only guess to focus the search
- Find a hypothesis explaining all symptoms
- Apply Occam's Razor generously
- Instrument the system
- Use the 5-Why method



IV. Divide and Conquer

- Use binary search
- Automate the bug checking
- Start with the bad and work to the good
- Fix the issues you know about first

V. Change one Thing at a Time

- Use a rifle, not a shotgun
- Remove the things that had no effect
- Grab the brass bars with both hands
- Compare with a known good state



Bars in the HMS SCEPTRE

VI. Keep an Audit Trail

- Write down what you did, in what order and what happened.
- The devil is in the details.
- Correlate events, find patterns.
- Regression tests are a form of logging.
- Let others read your log.
- Write regression tests.

VII. Check the Plug

- Question your assumptions
- Make a minimal reproducible example.
- Test the tool.

VIII. Get a Fresh View

- Ask for help
- Don't be proud
- Report symptoms, not theories
- Do Rubber Duck Debugging

IX. If you didn't fix it, it
ain't fixed

- Revert the fix, test, revert the revert & test.
- Check that's it's really your fix that fixed it.
- It never just goes away by itself.
- Make sure you fix the root cause.
- Fix the process that caused the bug.

X. Make it easy to debug

- Mind your cognitive load.
- Make your design introspectable.
- Include debugging utilities.
- Keep your log hygiene.
- Train your colleagues.

The End