

Outsourcing the Boring Work

Setting up LLM agents for Fixing Bugs in Legacy Software

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Made In Austria 

The Software

- In reliable service for 8 years
- Grown in feature support over time
- Uses unmaintained dependencies (gststreamermm, gst-omx)

The Bugs

- Bug 1: 20 minutes of continual starting and stopping streams causes crash
- Bug 2: 5 minutes of source changes streams causes crash

The Hardware

- Embedded Linux system
- ARM (requires cross-compilation)
- Low power processor (logging changes timing)
- Low storage (limited debug symbols and tools)

Fixing Bugs

1. Reproduce the bug reliably
2. Identify crash site and gather information
3. Loop
 - 3.1 Form hypothesis
 - 3.2 Build and load new version with explicit crash at suspected site
 - 3.3 Wait for bug condition
 - 3.4 If explicit crash not hit, repeat

Bug Complexity

- Bug may be in a dependency
- Or, worse, at the interaction between multiple dependencies
- A crash may be symptom of a previously fatal state

Help from an LLM

- An LLM is able to quickly scour all dependencies, their interactions and their assumptions
- Runs a hypothesis-fix loop autonomously
- The setup
 - Access to the machine
 - Access to cross-compiler
 - Access to dependency repositories and documentation
- As a human, it is easier to verify a potential fix than to find it

Results

- Bug 1: a race condition in the wrapping of objects in gstreamermmm
- Bug 2: a triple-free bug that was possible only in a tiny time window from the interaction between vcu-omx-il, gst-omx and vcu-ctrl-sw

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