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Software Maintenance

"There is no code so big, twisted, or complex that maintenance can't make it worse."

- Gerald M. Weinberg

Software Maintenance

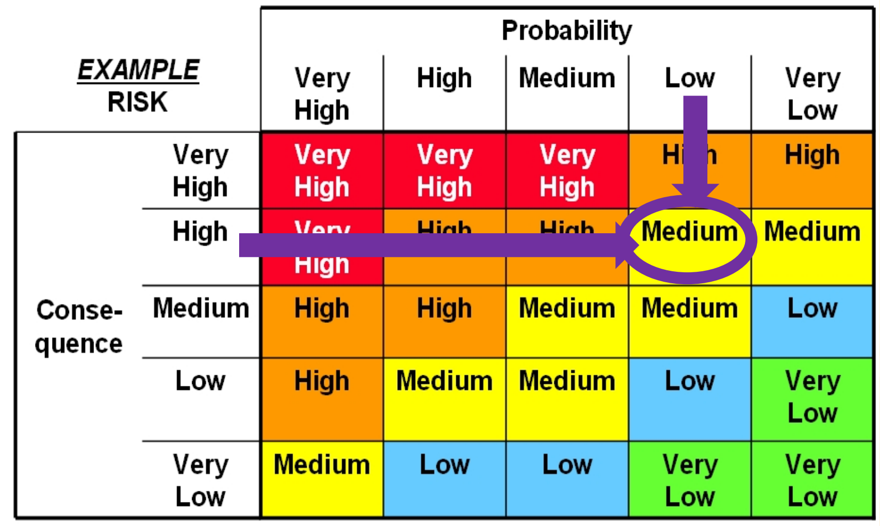
- Anti-Patterns:
  - Informal bug tracking
  - Not allocating post-release staffing
    - Bad prior release distracts team
  - Not paying off technical debt

https://goo.gl/Crc1zq

- Code maintenance during and after development
  - You need a process to identify bugs and track to resolution
  - Most software is an update, not a clean-slate project
  - Ongoing effort is required to repay “technical debt”

Managing Bugs

- Map reported issue to an actual bug
  - L1/L2/L3 support to capture bug report
  - Sorting out duplicate reports takes effort
- Prioritize the bug fix (e.g., risk table)
  - Combination of frequency, business cost
- Find someone with right skills to fix it
  - Does this derail new development tasks?
  - Quick and dirty? Or a solid re-engineer fix?
- Validate the fix
  - Did you inject a new fault with the fix?
- Package the fix and deploy it
  - Hot patch? Defer to future schedule release?



EXAMPLE RISK		Probability				
		Very High	High	Medium	Low	Very Low
Conse-quence	Very High	Very High	Very High	Very High	High	High
	High	Very High	High	High	Medium	Medium
	Medium	High	High	Medium	Medium	Low
	Low	High	Medium	Medium	Low	Very Low
	Very Low	Medium	Low	Low	Very Low	Very Low

- Risk table example:
  - High consequence defect
  - With low probability of occurrence

  ➔ Medium risk / medium priority bug

Maintenance Matters Most

- Most SW work is on existing code, not a clean slate
  - "Clean slate" often works with COTS components

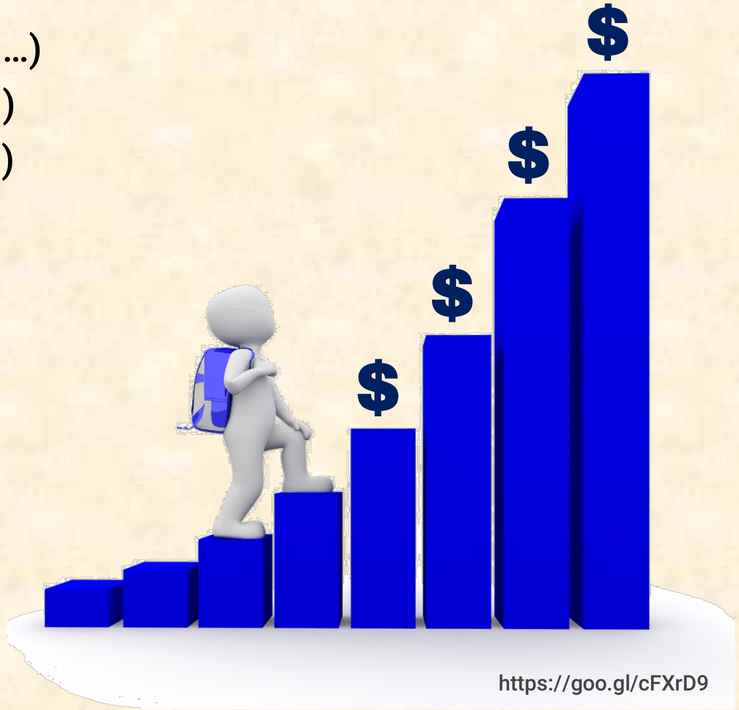
- 60/60 rule [Glass, *IEEE Software* May 2001]
  - Maintenance can average 60% of lifecycle cost
  - About 60% of maintenance is adding new features

- Maintenance is harder than development
  - Need to understand existing system
    - Motivation for keeping entire V document chain up to date
    - Optimized code is more painful to maintain
  - Need to modify system without breaking things
    - Complete rewrite usually impractical – and might be worse

https://goo.gl/1CqN9i

Managing Technical Debt

- Technical debt: messy code/design/architecture that hasn't been cleaned up
  - Some signs of debt:
    - Degraded code quality (spaghetti code, globals, warnings, …)
    - Skipped process steps (missing peer reviews, unit tests, …)
    - High fault reinjection ratio (new bugs when fixing old bugs)
  - You incur debt by taking a shortcut
    - Short-term debt can be useful (e.g., meet a deadline)
  - Repay debt by refactoring the system
- Technical debt incurs interest
  - Shortcuts often lead to bugs, fragility
  - Accumulated debt becomes unsustainable
- Use the right amount of debt
  - It's like using a credit card responsibly
  - Devote part of each development cycle to repaying technical debt



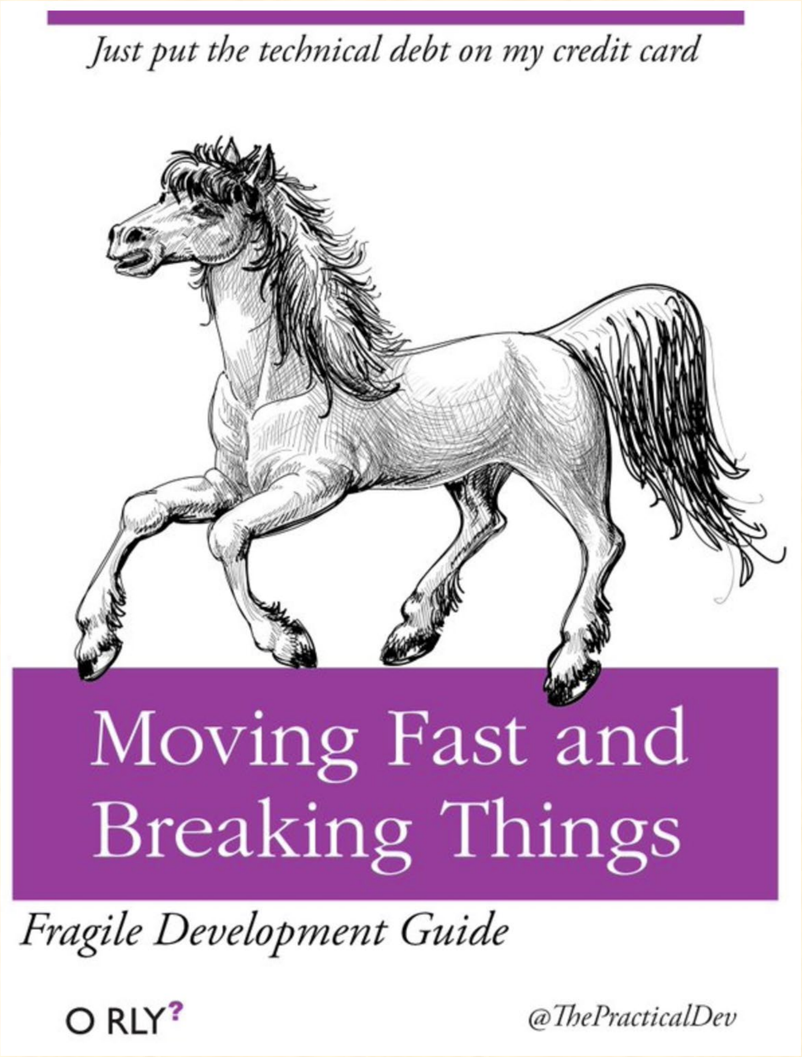
https://goo.gl/cFXrD9

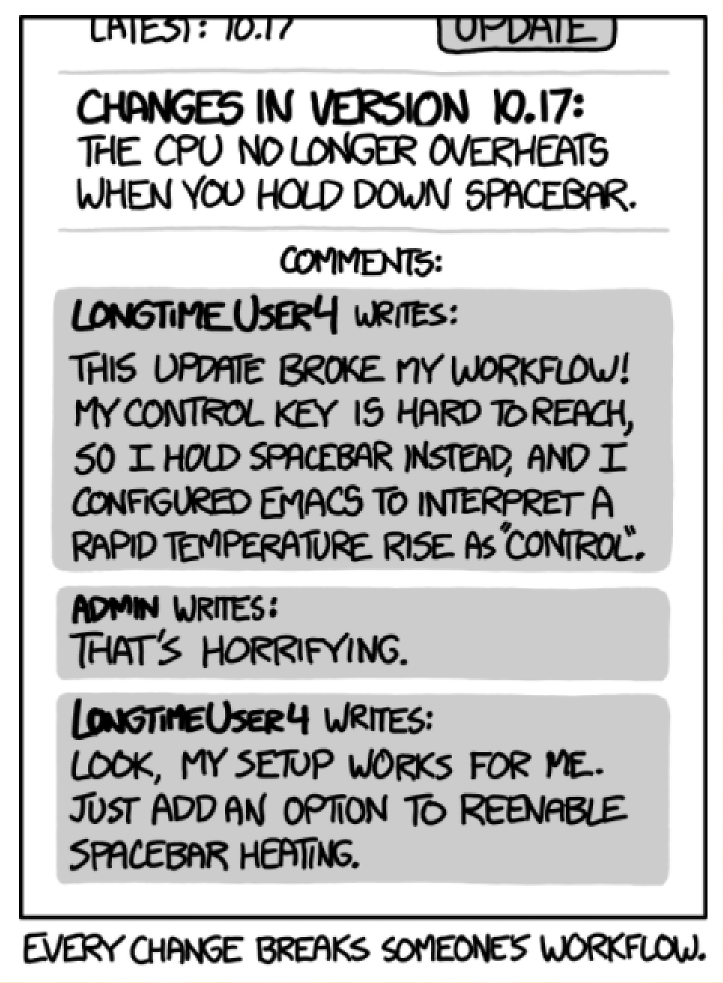
Best Practices for Maintenance

- Most development is maintenance
  - Plan for and staff maintenance
    - Most development is on the next revision
    - Plan for high priority emergency fixes
  - Keep up with technical debt payments

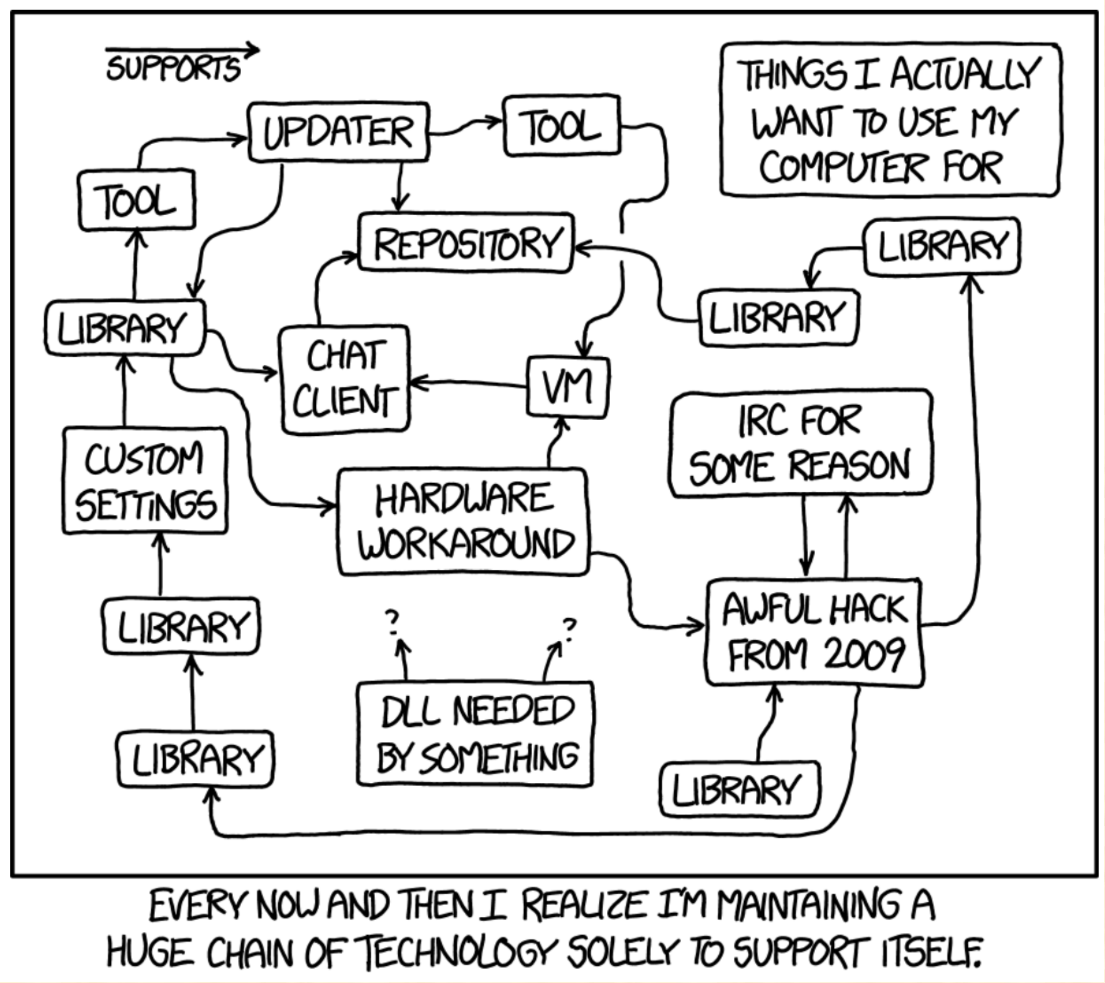
https://goo.gl/DDZfcY

- Maintenance pitfalls
  - Not allocating time for bugs, maintenance & technical debt
    - For example, need perhaps 10% budget for technical debt repayment
    - Leave slack in deadlines for fixing urgent previous-version bugs
  - Evaluating programmers only for clean-sheet development skills


Just put the technical debt on my credit card
Moving Fast and Breaking Things
Fragile Development Guide
O RLY?
@ThePracticalDev


LATEST: 10.17
UPDATE
CHANGES IN VERSION 10.17:
THE CPU NO LONGER OVERHEATS WHEN YOU HOLD DOWN SPACEBAR.
COMMENTS:
LONGTIMEUSER4 WRITES:
THIS UPDATE BROKE MY WORKFLOW! MY CONTROL KEY IS HARD TO REACH, SO I HOLD SPACEBAR INSTEAD, AND I CONFIGURED EMACS TO INTERPRET A RAPID TEMPERATURE RISE AS "CONTROL".
ADMIN WRITES:
THAT'S HORRIFYING.
LONGTIMEUSER4 WRITES:
LOOK, MY SETUP WORKS FOR ME. JUST ADD AN OPTION TO REENABLE SPACEBAR HEATING.
EVERY CHANGE BREAKS SOMEONE'S WORKFLOW.

https://xkcd.com/1172/



https://xkcd.com/1579/