Maintenance

The Silent Killer

Stuart Marks
Core Libraries
Java Platform Group, Oracle

Twitter: @stuartmarks
@DrDeprecator
#J1Maintenance

JavaYourNext (Cloud)

JavaOne ORACLE


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Maintenance as a General Phenomenon

- Everything requires maintenance
- Maintenance has costs
- Costs are either paid in cash or are accrued
- Costs are often hidden, thus easily forgotten
- Maintenance is easy to defer
- Deferred maintenance costs can grow superlinearly

"Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance."

— Kurt Vonnegut

Software Doesn't Wear Out

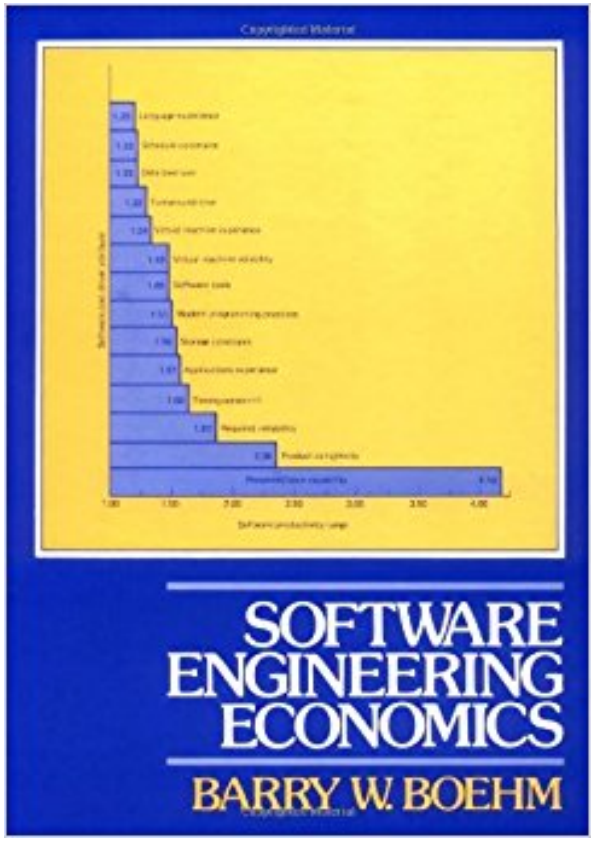
- Software has no moving parts
  - no friction
  - no wear points
  - no stress fatigue
- Therefore, software doesn't need maintenance!
- How many of you believe that?

Sources of “Wear” in Software

- Hardware it runs on can wear out
- The Upgrade Treadmill™
- New feature requests
  - cost of adding new feature
  - evolution may cause introduction of unrelated bugs
- Regulations (GAAP, Sarbanes-Oxley)
- Environment (network config, locale, number of processors)
- Discovery of latent bugs (especially security holes)
- Wear accumulation manifested as technical debt

Boehm, Software Engineering Economics (1981)

- 765 page book
- Chapter on Software Maintenance has 23 pages
- Most software cost estimation material concerns construction
- But majority of software costs incurred after delivery
- Maintenance is 50%-75% of total life cycle costs



Robert L. Glass (2001)

- Maintenance cost is 40%-80% (average 60%) of total software cost
  - on average, maintenance costs more than development
- Software development and maintenance are largely the same activities
  - except for “understand the existing product”
  - that consumes 30% of maintenance time
  - for this reason, maintenance is more difficult than development

Glass, Robert L. “Frequently Forgotten Fundamental Facts About Software Engineering.” IEEE Software V18N3 May/June 2001

JDK Approach to Maintenance

- The JDK is a 21+ year old code base
  - effort divided between new features & maintenance: same engineers!
  - old code occasionally refreshed (warnings cleanup, API & language retrofits)
- Historical & maintainability
  - bug database history, including long-closed bugs
  - source code history, some going back prior to 1.0
  - new features reviewed for maintainability
- Deprecation and removal => reduce maintenance footprint

Open Source Software and Security Vulnerabilities

- "When we are taking in [open source] software, we are taking ownership of it." – David Blevins, CEO TomiTribe
  - that is, ownership of responsibility for maintenance
  - http://blog.sonatype.com/struts2-vulnerabilities-who-is-responsible
- Security company VP: 10% of IT budget goes to keeping SW at current patch levels
- Equifax Breach
  - Struts 2 vulnerability CVE-2017-5638 disclosed and fixed March 2017
  - Equifax was using unpatched Struts 2, was exploited May-July 2017
  - Confidential records of ~143 million consumers were stolen

https://www.wired.com/story/equifax-breach-no-excuse/

Questions for Discussion

- Why is more effort put into planning software construction than maintenance?
- Are there cases when maintenance isn't important?
- What is the design lifetime of the software?
- How can maintenance be made a desirable job role in the project?
- How do we prevent the "race to the bottom"?
- How do you manage OSS or commercial software dependencies?
- If maintenance is important, how can we make sure appropriate attention is paid to it?

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