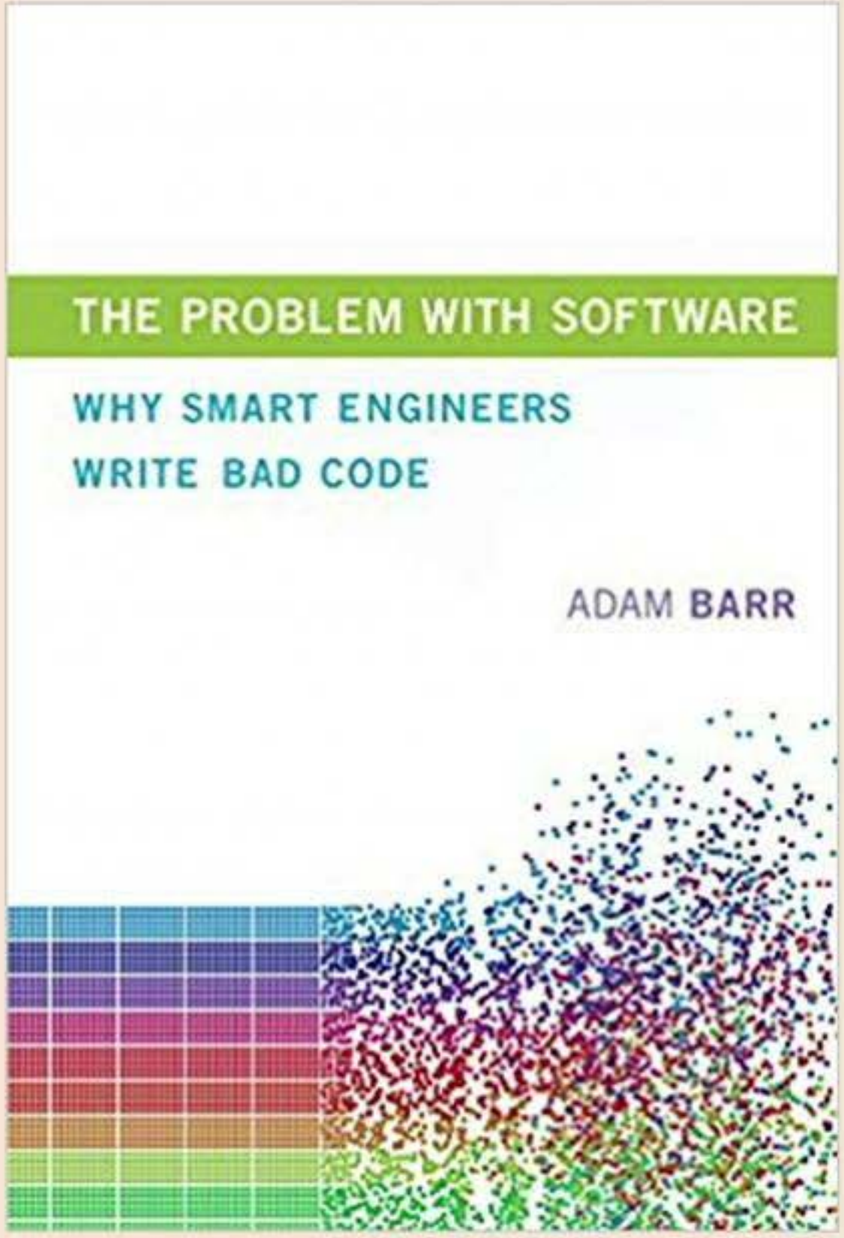
THE PROBLEM WITH SOFTWARE
WHY SMART ENGINEERS
WRITE BAD CODE
ADAM BARR


Dendrite
International, Inc.


Microsoft
PowerShell


Microsoft
Windows 2000
Professional
Built on NT Technology


1 PC
Microsoft
Office
Professional 2013
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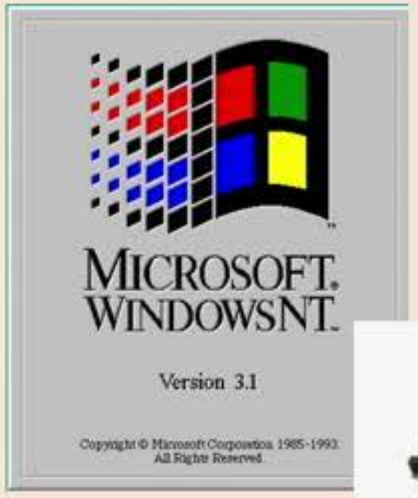
OneNote
Outlook
Publisher
Access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WINDOWSNT
Version 3.1
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Includes
Word
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OneNote
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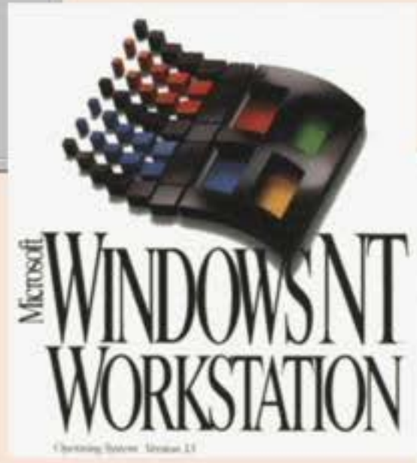
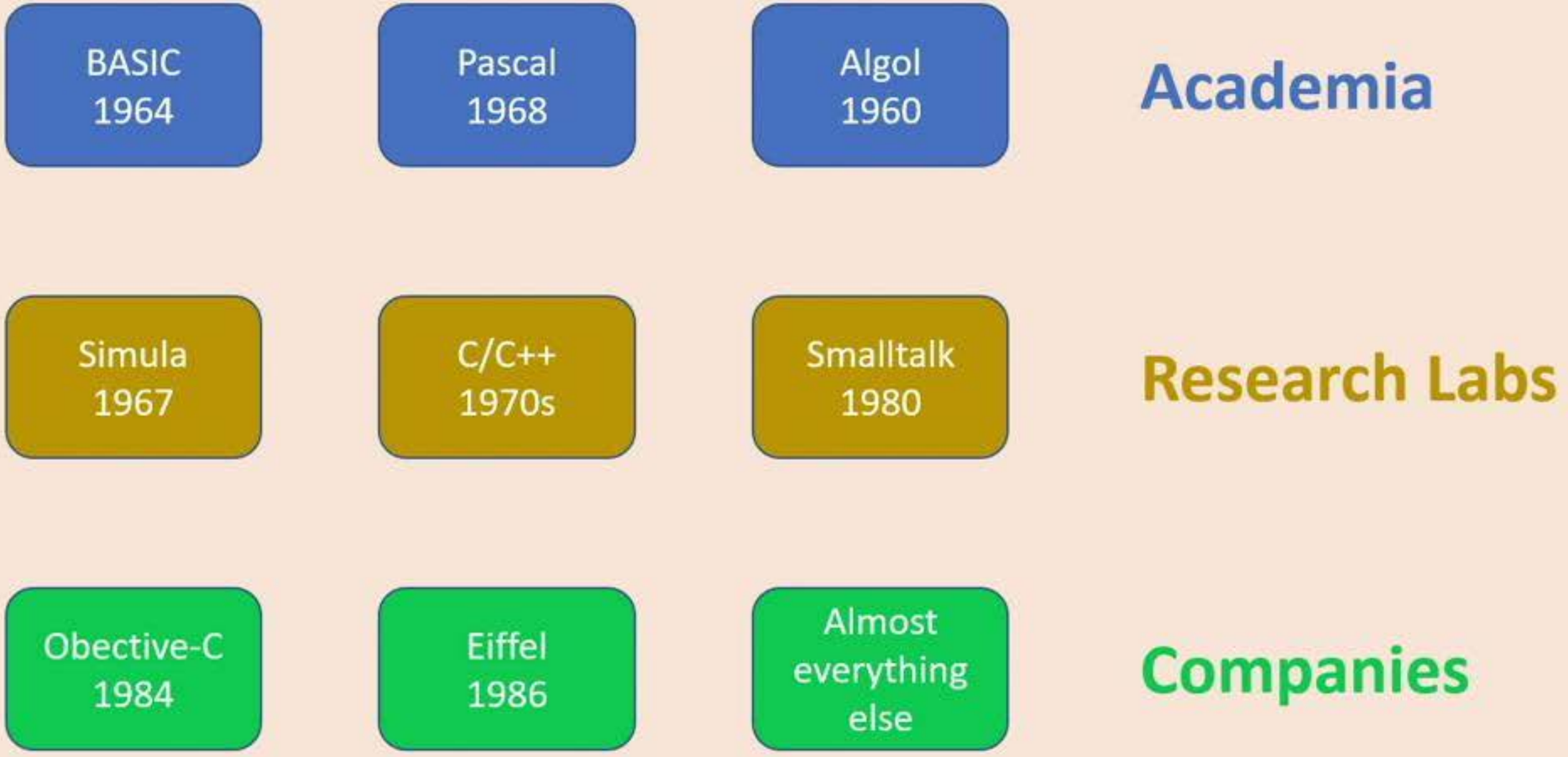
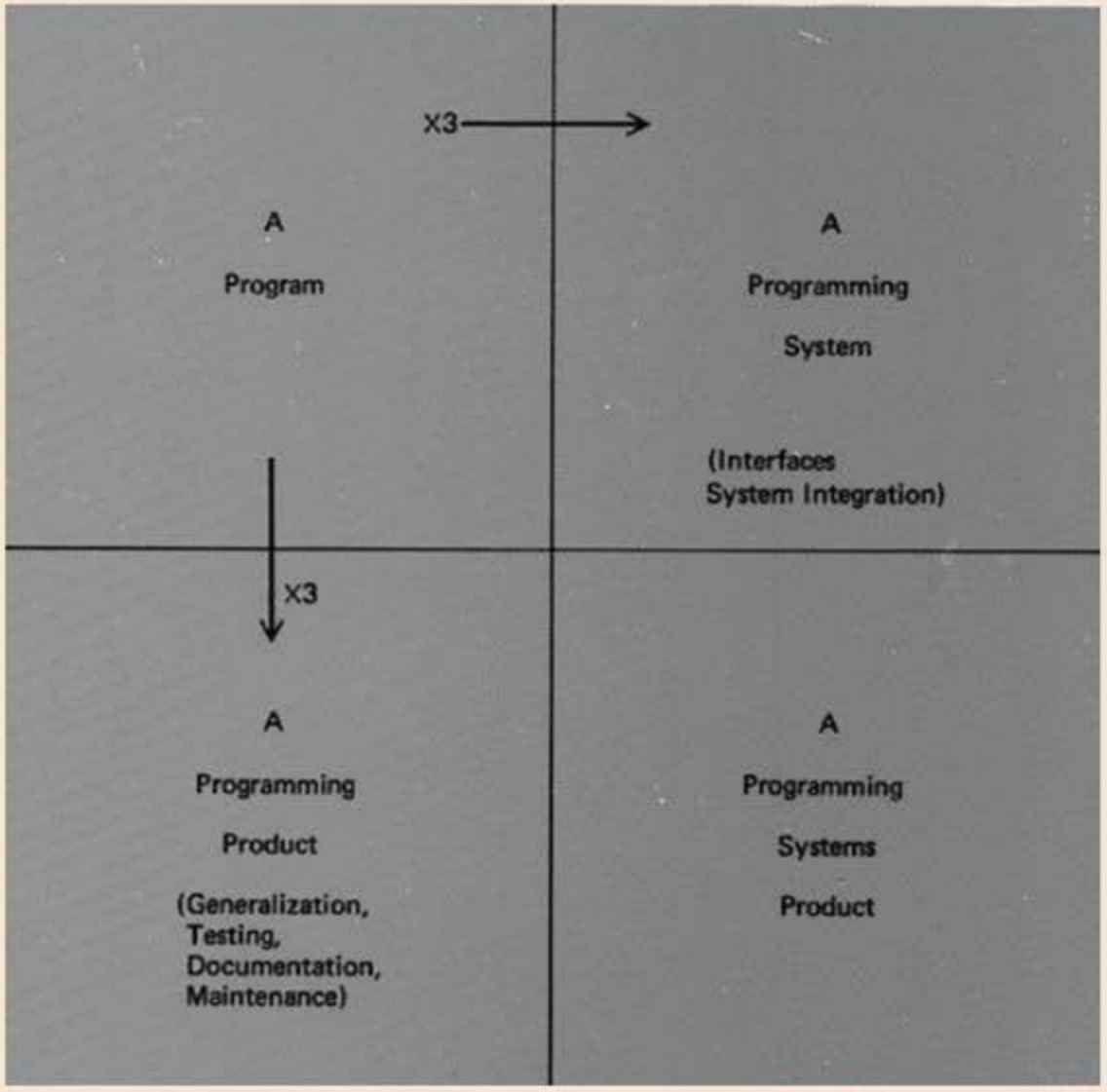
For 1 Windows-PC


Microsoft
WINDOWSNT
WORKSTATION


Microsoft
TV


CROSSLAKE


BASIC
1964
Pascal
1968
Algol
1960
Academia
Simula
1967
C/C++
1970s
Smalltalk
1980
Research Labs
Obective-C
1984
Eiffel
1986
Almost
everything
else
Companies

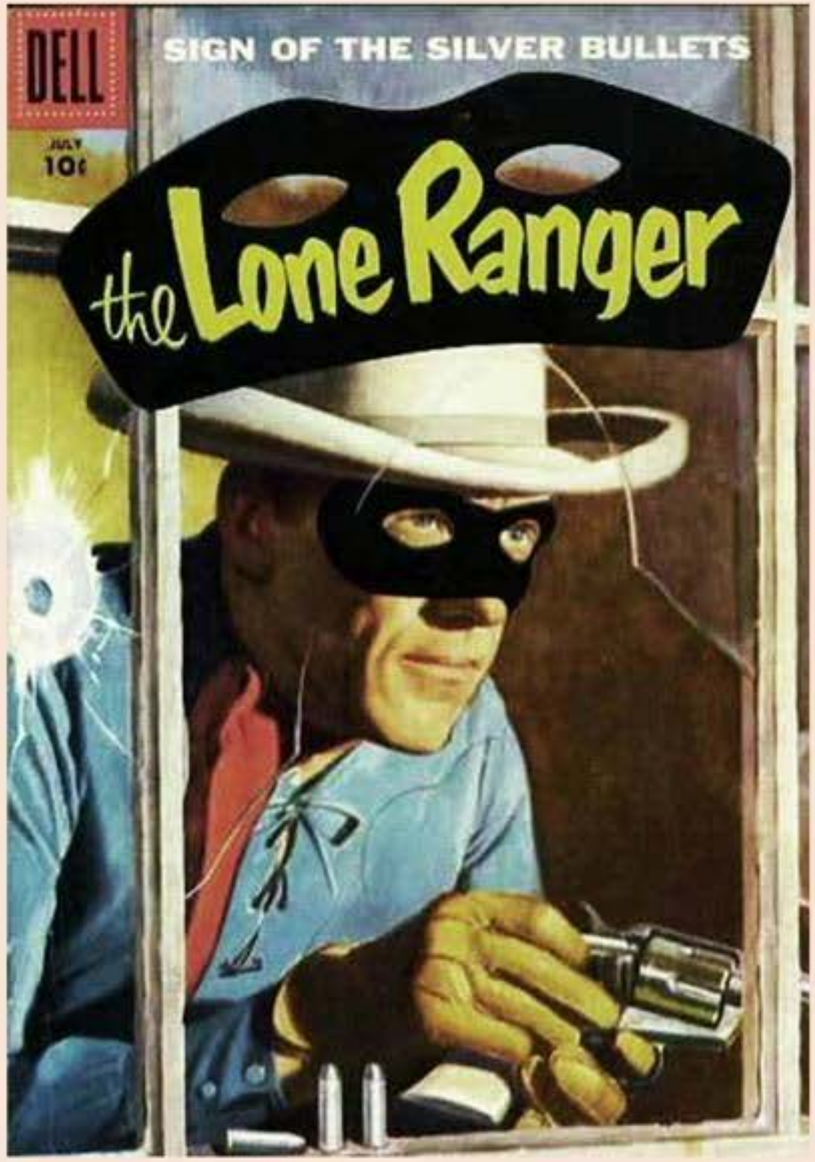

X3
A
Program
A
Programming
System
(Interfaces
System Integration)
X3
A
Programming
Product
(Generalization,
Testing,
Documentation,
Maintenance)
A
Programming
Systems
Product

It would be very nice if I could illustrate the various techniques with **small demonstration programs** and could conclude with "… and when faced with a program **a thousand times as large**, you compose it in the same way." This common educational device, however, would be **self-defeating** as one of my **central themes** will be that any two things that differ in some respect by a factor of already a hundred or more, **are utterly incomparable**."

Edsger Dijkstra, 1972

"It is **characteristic** in software engineering that the problems to be solved by advanced practitioners require **sustained efforts** over months or years from many people, often in the **tens or hundreds**. This kind of mass problem-solving effort requires a **radically different** kind of **precision and scope** in techniques than are required for **individual problem solvers**."

Harlan Mills, 1980


DELL
JULY
10¢
SIGN OF THE SILVER BULLETS
the Lone Ranger

"We hear desperate cries for a **silver bullet**, something to make software costs drop as rapidly as computer hardware costs do. But, as we look to the horizon of a decade hence, **we see no silver bullet**. There is no single development, in either **technology** or **management technique**, which by itself promises even one order of magnitude improvement **in productivity, in reliability, in simplicity**. … Not only are there **no silver bullets** now in view, the very nature of software makes it **unlikely that there will be any**."

Fred Brooks, 1986

- Structured programming
- Formal testing
- Object-oriented programming
- Design patterns
- Unit tests
- Test-Driven Development
- Agile

- Functional programming
- Dev ops

"Every **Turing machine** is **reducible** into, or in a determined sense is **equivalent** to, a program written in a **language** which admits as **formation rules** only **composition** and **iteration**."

Corrado Böhm and Giuseppi Jacopini, 1966

“Program testing can be used to show the **presence** of bugs, but never to show their **absence**.”

Edsger Dijkstra, 1969

“It is well known that you **cannot test reliability** into a software system.”

Harlan Mills, 1976

Commenting style - Ben Shneiderman, 1980

Variable names – Larry Weissman, 1974

Indenting – Tom Love and Ben Shneiderman, 1977

GOTO - Max Sime, Thomas Green, and John Guest, 1973; Henry Lucas and Robert Kaplan, 1976

"In preparing my retrospective and update of ***The Mythical Man-Month***, I was struck by **how few** of the propositions asserted in it have been **critiqued, proven, or disproven** by ongoing software engineering **research and experience**."

Fred Brooks, 1995

“**Coding style wars** are a waste of **valuable resources**, although the **confusion** caused by Hungarian probably **wastes more time**.”

Unidentified Windows NT 3.1 developer, ~1992

"Since there was no **mathematical rigor** to inhibit these discussions, some became quite **vehement**."

Harlan Mills, 1988

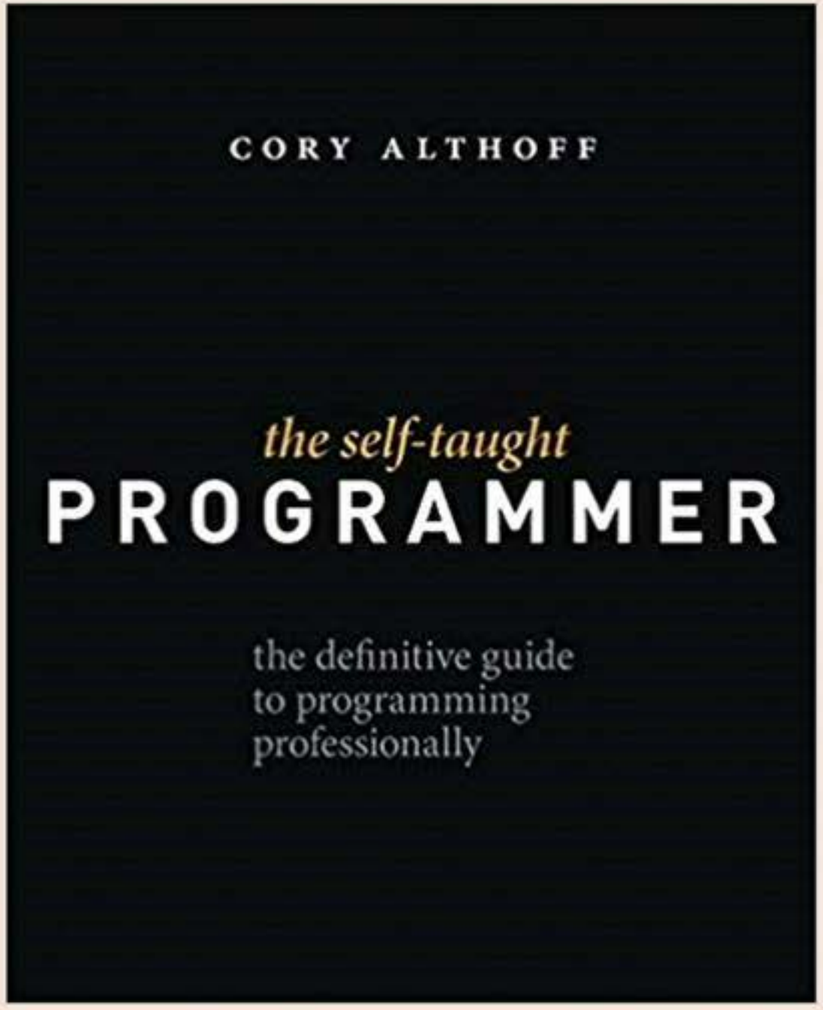

So what
happened?

"More interesting, however, was the coincidence that all of them had **learned to program** *before* they **studied programming formally** in school. That's a major change brought about by the personal computer. In my day, **I had not even *seen* a computer** before I went to work for IBM in 1956."

Gerald Weinberg, 1998

"It is practically **impossible** to teach good programming to students that have had a **prior exposure to BASIC**: as potential programmers they are **mentally mutilated** beyond hope of regeneration."

Edsger Dijkstra, 1975


CORY ALTHOFF
the self-taught
PROGRAMMER
the definitive guide
to programming
professionally

"Our present programming courses are patterned along those of a **"course in French Dictionary."** In such a course we study the dictionary and learn what the meanings of **French** words are in **English** (that corresponds to **learning what PL/I or Fortran statements do to data**). At the completion of such a course in French dictionary we then invite and exhort the graduates to **go forth and write French poetry**. Of course, the result is that **some people can write French poetry** and some not, but the **skills critical to writing poetry were not learned** in the course they just took in French dictionary."

Harlan Mills, 1972

"If the **precision** and **scope** are not gained in **university education**, it is difficult to acquire them later, no matter how well **motivated** or **adept** a person might be at **individual, intuitive approaches** to problem solving."

Harlan Mills, 1980

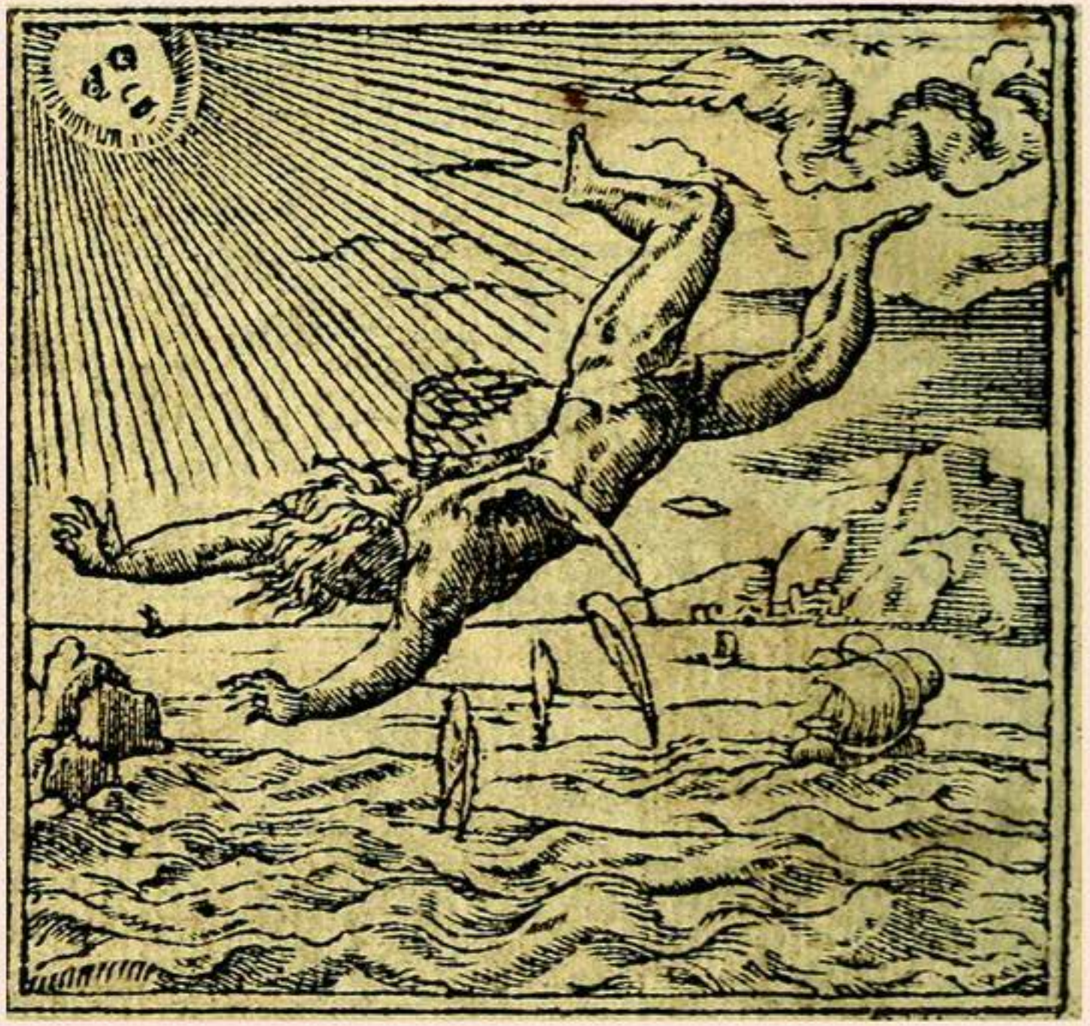
Things you may not know as much about as you would like

- What **programming language** to use
- What to look for in **code reviews**
- What to look for when **hiring**
- How **reliable** your software is
- Is your software about to **fail**
- Is your software **obsolete**


PROGRAMMERS ARE
CONTENT USING THEIR
OWN EXPERIENCE AS A GUIDE
CHANGE MY MIND

"Most of these attack the central argument that **there is no magical solution**, and my clear opinion that there **cannot be one**. Most **agree** with the arguments in 'No Silver Bullet,' but then go on to assert that **there is indeed a silver bullet** for the software beast, which **the author has invented**."

Fred Brooks, 1995



I thought I was the **hardest-working person** on the planet. I thought we were the **hardest-working industry**. That's what we tell ourselves. It's all **malarkey**. I've had this front-row seat over the last three years to **greatness**. It's a **humbling experience**…seeing just what it takes to **actually be that great**."

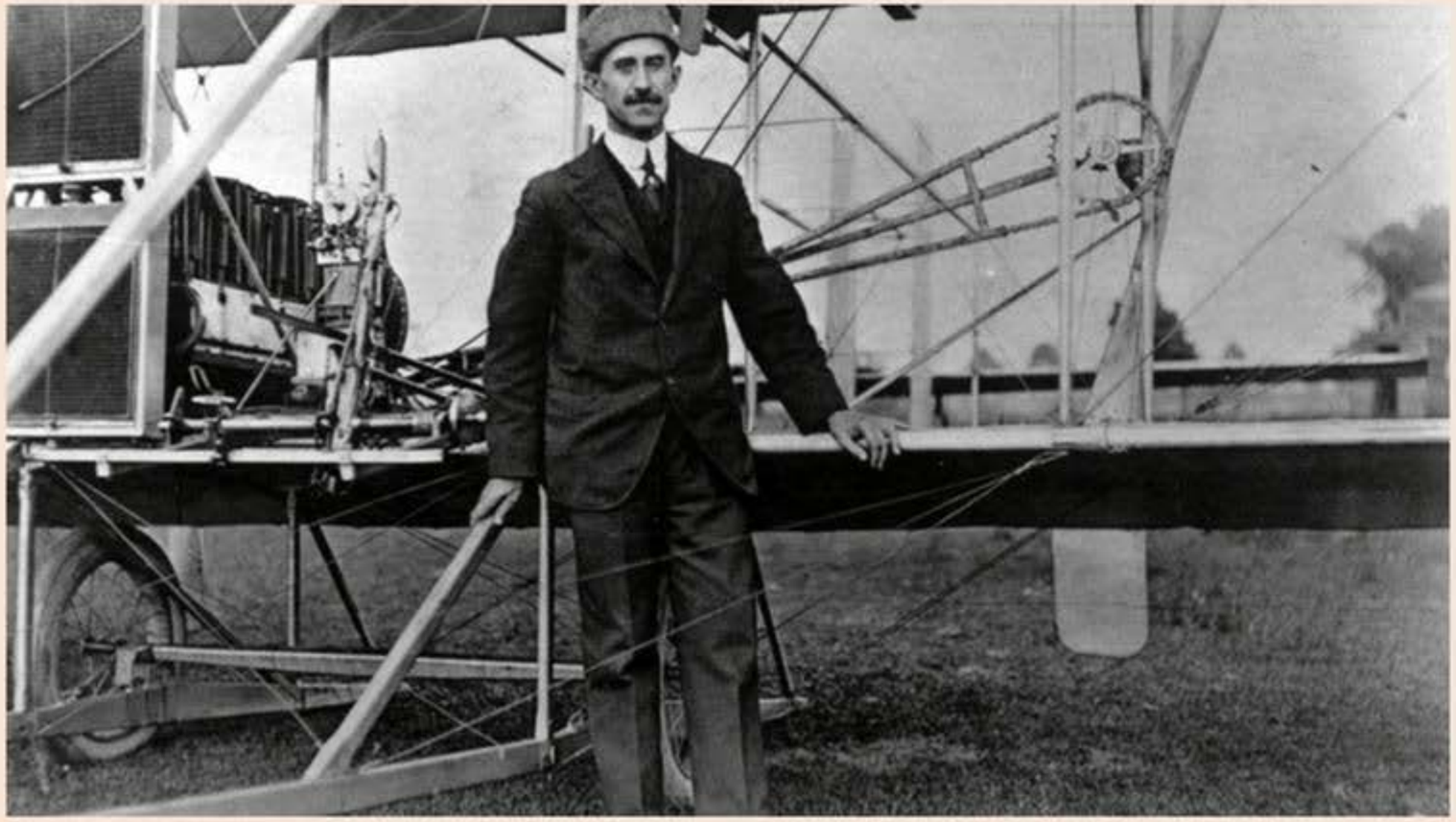
Alexis Ohanian, 2018

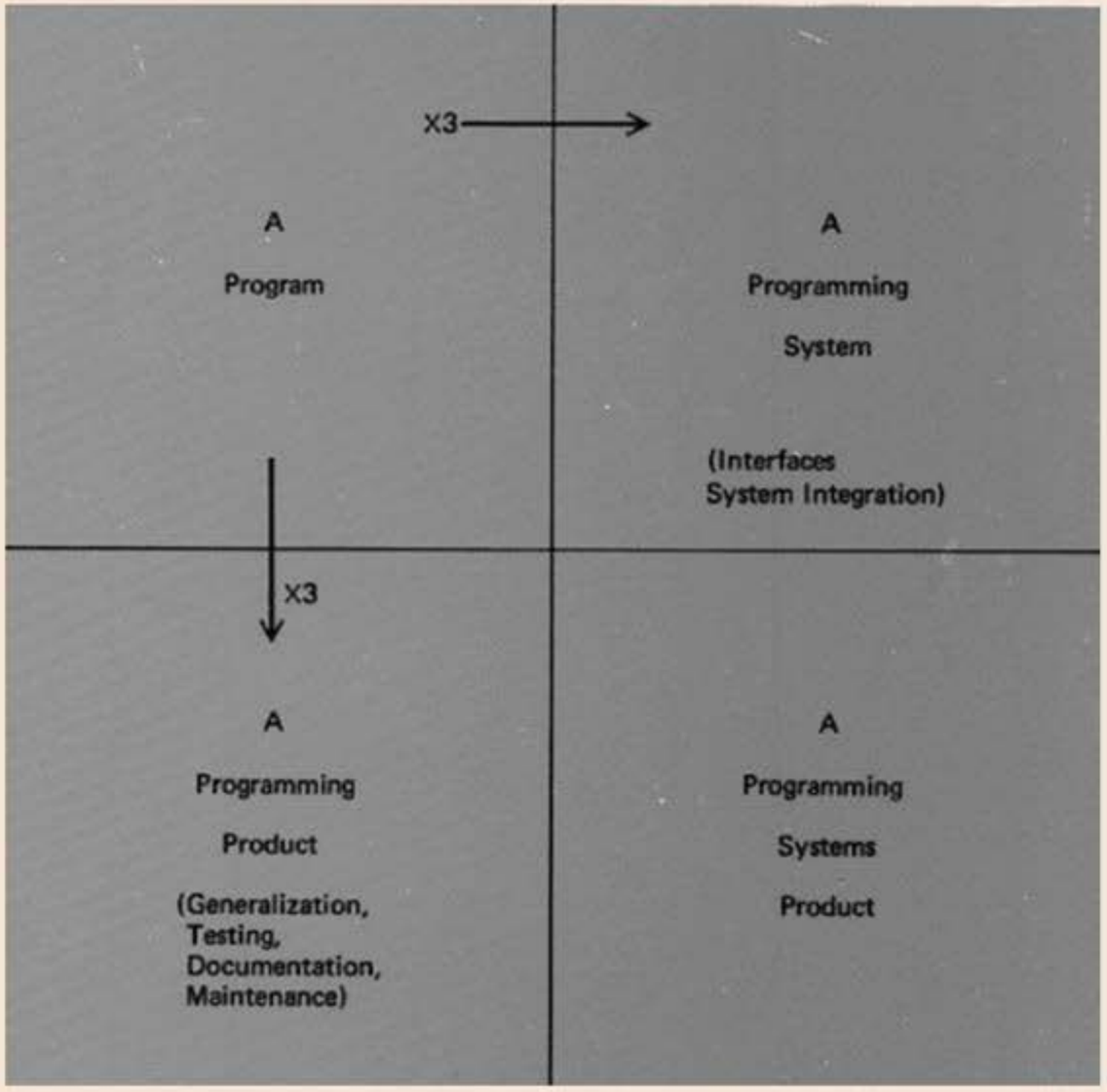
"Another essential personality factor in programming is at least a small dose of ***humility***. Without humility, a programmer is **foredoomed** to the classic pattern of Greek drama: success leading to overconfidence (***hubris***) leading to blind **self-destruction**. Sophocles himself could not have invented a better plot (to reveal the **inadequacy of our powers**) than that of the programmer learning a few **simple techniques**, feeling that he is an **expert**, and then being **crushed** by the **irresistible power** of the computer."

Gerald Weinberg, 1971

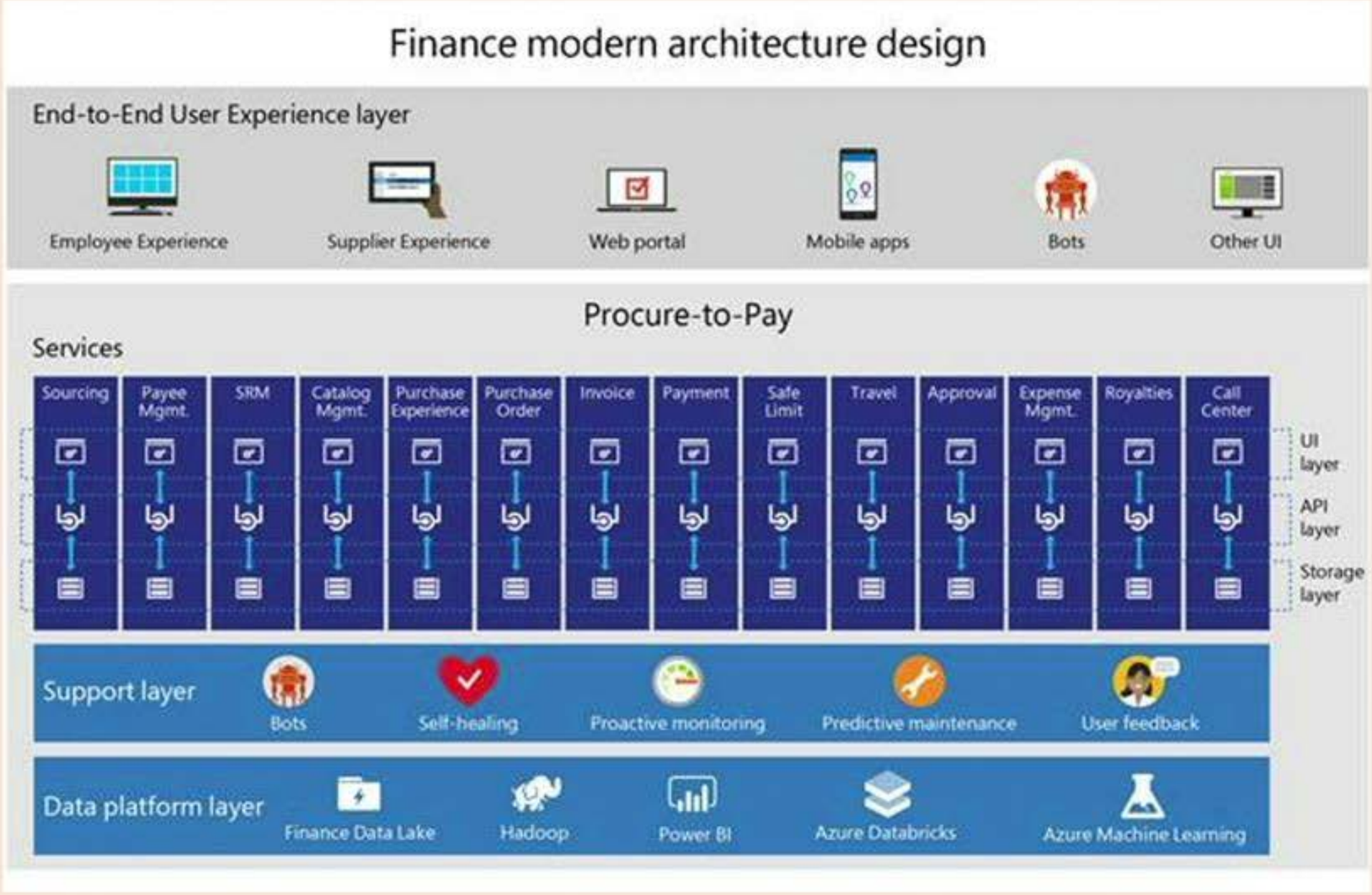
"In the past twenty-five years a **whole new data processing industry** has exploded into a critical role in business and government. Had this hardware development been spaced out over **125 years**, rather than just **25 years**, a **different history** would have resulted. For example, just imagine the **opportunity** for orderly industrial development with **five human generations** of university curriculum development, education, feedback for the **expansion of useful methodologies** and **pruning of less useful topics**."

Harlan Mills, 1976




X3
A
Program
A
Programming
System
(Interfaces
System Integration)
X3
A
Programming
Product
(Generalization,
Testing,
Documentation,
Maintenance)
A
Programming
Systems
Product

Finance modern architecture design




Spirit
of
t.Louis

“There is no doubt that the **grail of efficiency** leads to **abuse**. Programmers **waste enormous amounts of time** thinking about, or worrying about, the speed of **noncritical parts** of their programs, and these attempts at efficiency actually have a **strong negative impact** when **debugging** and **maintenance** are considered. We should forget about **small efficiencies**, say about 97% of the time: **premature optimization** is the **root** of all **evil**.”

Donald Knuth, 1974

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The first complete, low-priced, fully assembled microcomputer!

Radio Shack® TRS-80. Here's the answer for the thousands of people who need a complete, inexpensive, ready-to-use computer without the delay and problems of building one! Designed in the U.S.A. by Radio Shack, the TRS-80 is 100% wired and tested. It's ideal for finances, accounting, education, laboratory, even games. Use your imagination, or use Radio Shack's expanding line of prepared cassette programs. And Tandy will provide FULL support in software and accessories. The advanced Z-80-based CPU includes 4K bytes RAM, Radio Shack floating-point Level-1 BASIC stored in 4K ROM, integrated 53-character ASCII keyboard, computer-controlled interface with expansion port, regulated power supply, 12" video monitor that displays 16 lines of 64 characters, battery/AC data recorder, 300-page instruction/programming manual, and a 2-game cassette. Computer, 16½x8x3½". Video display, 16½x13½x12". For 120VAC. U.L. listed. **Complete System.** Shpg. wt., 35 lbs. **599.95**

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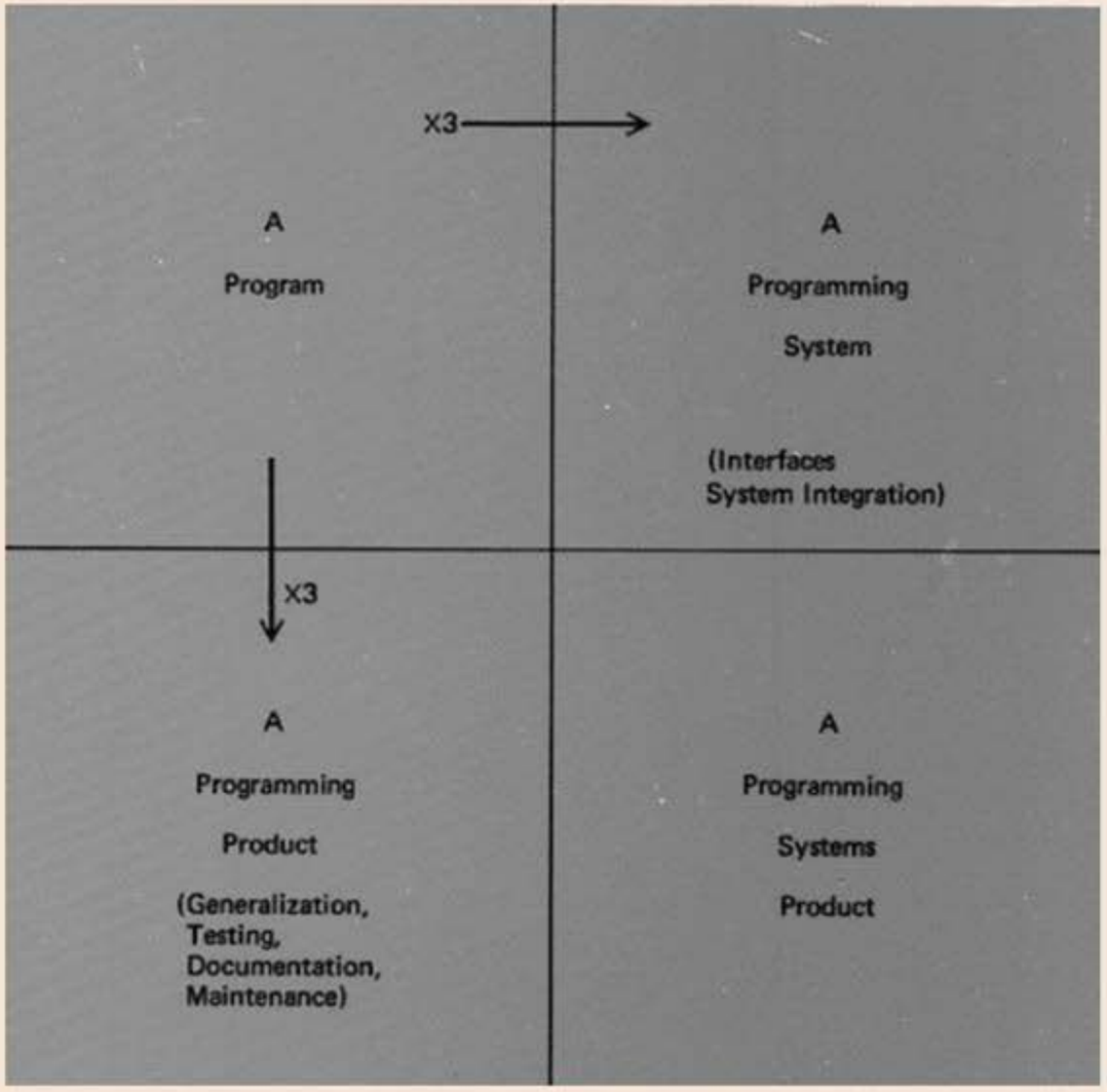

X3
A
Program
A
Programming
System
(Interfaces
System Integration)
X3
A
Programming
Product
(Generalization,
Testing,
Documentation,
Maintenance)
A
Programming
Systems
Product

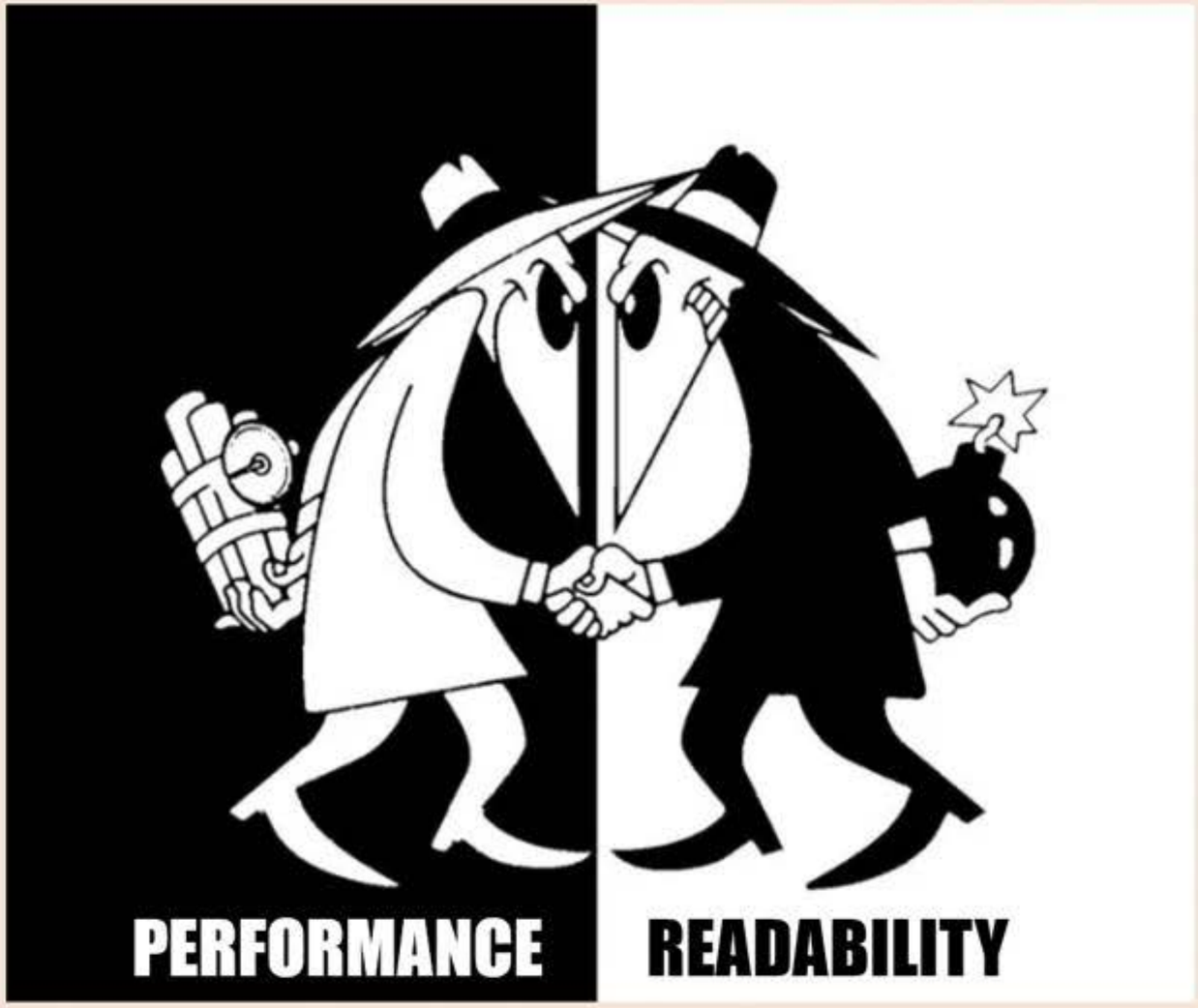
“**Hell** is **other people**.”

Jean-Paul Sartre, 1944

"More recently I discovered why the use of the **goto statement** has such **disastrous effects**.

We should do our utmost to shorten the **conceptual gap** between the **static program** and the **dynamic process**, to make the correspondence between the program (spread out in **text space**) and the process (spread out in **time**) as **trivial** as possible."

Edsger Dijkstra, 1968


PERFORMANCE
READABILITY

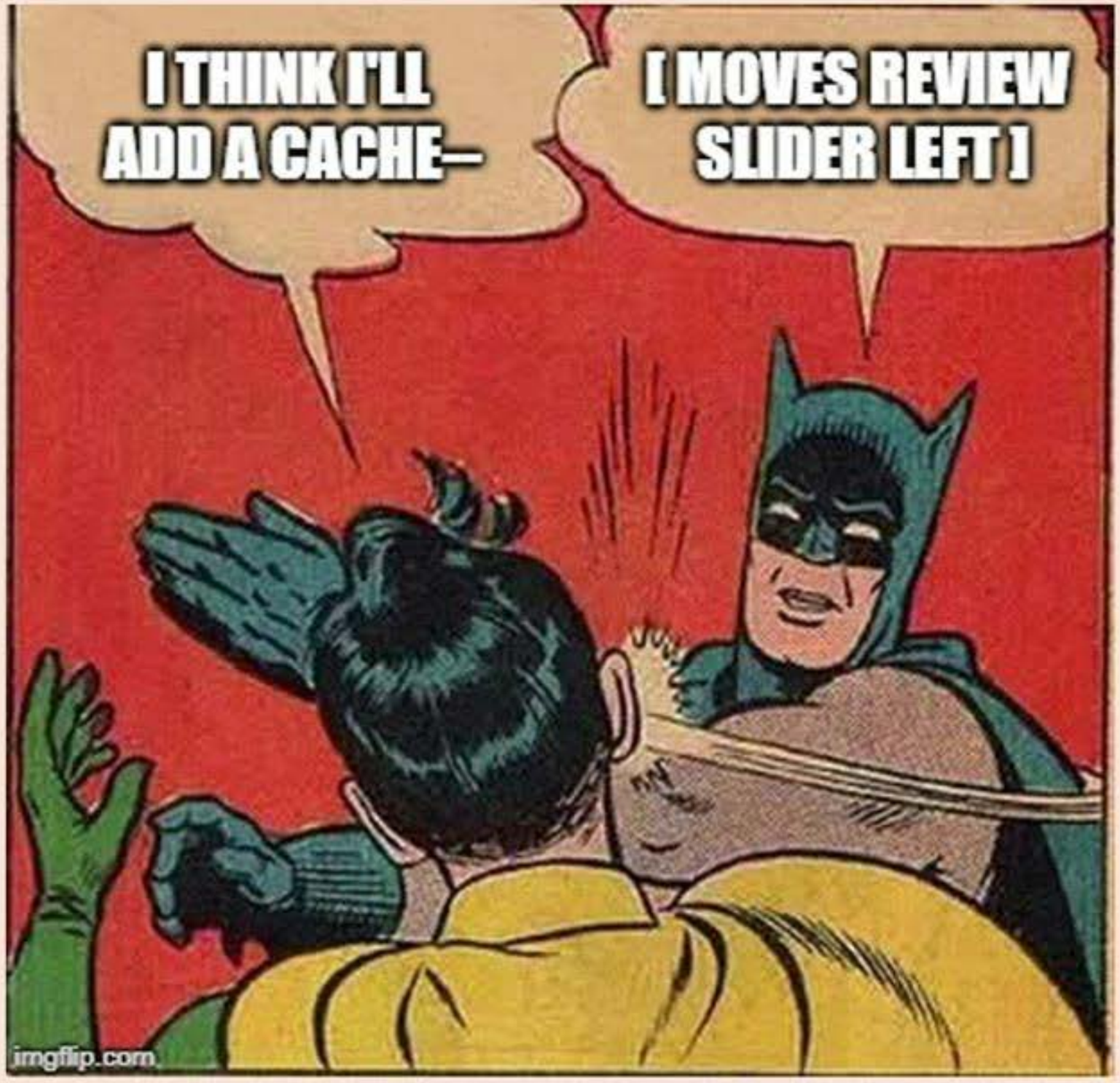
“**Optimization** is the **root** of all **evil**.”

Adam Barr, 2019


digital VAX 11/780


IBM


hulu
More


I THINK I'LL ADD A CACHE–
[MOVES REVIEW SLIDER LEFT]
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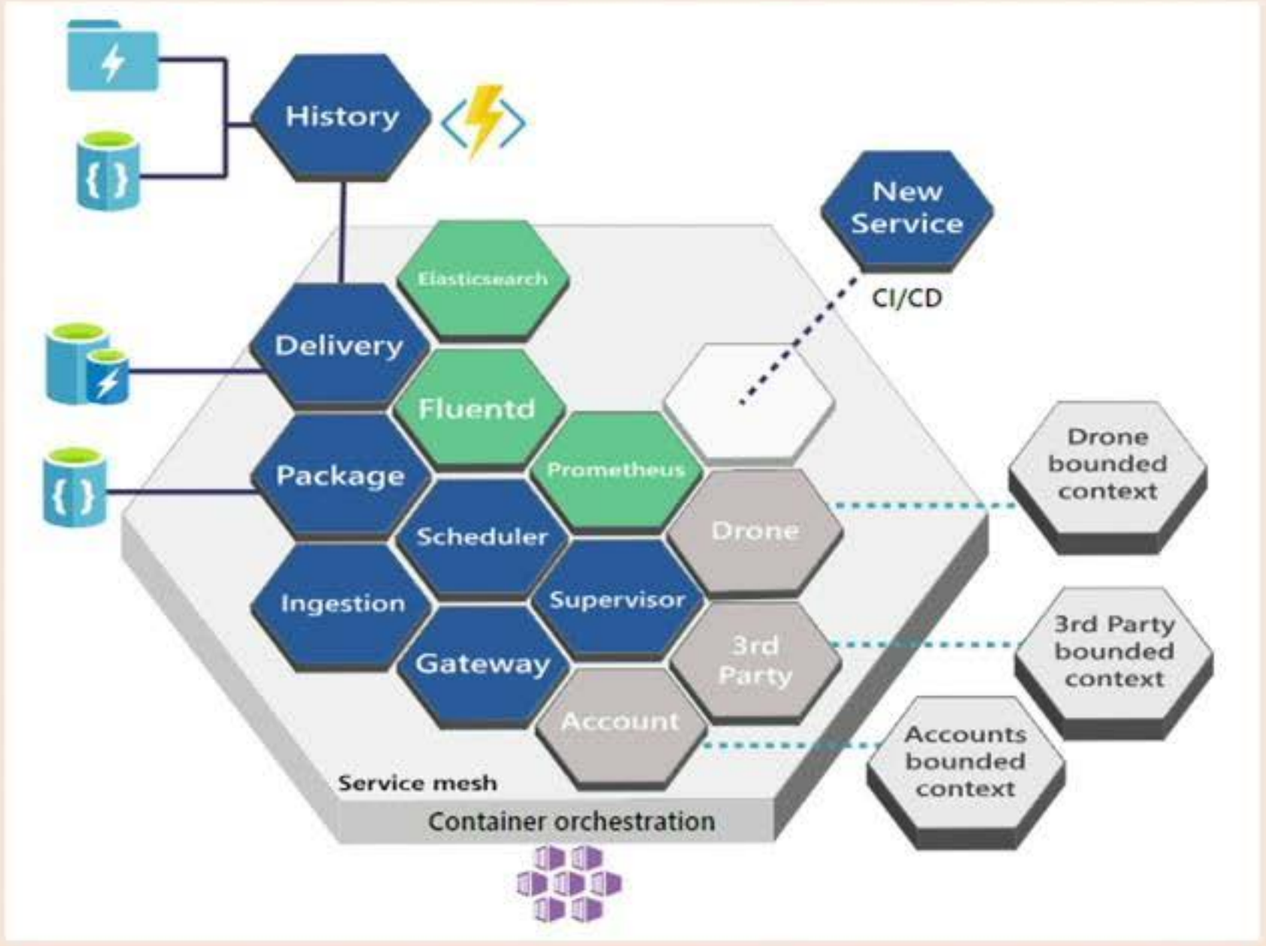
The cloud for modern business.


History
New Service
CI/CD
Elasticsearch
Delivery
Fluentd
Package
Prometheus
Scheduler
Drone
Ingestion
Supervisor
Gateway
3rd Party
Account
Drone bounded context
3rd Party bounded context
Accounts bounded context
Service mesh
Container orchestration


NATIONAL CRANE HIRE

“**Short cuts** makes **long delays**.”

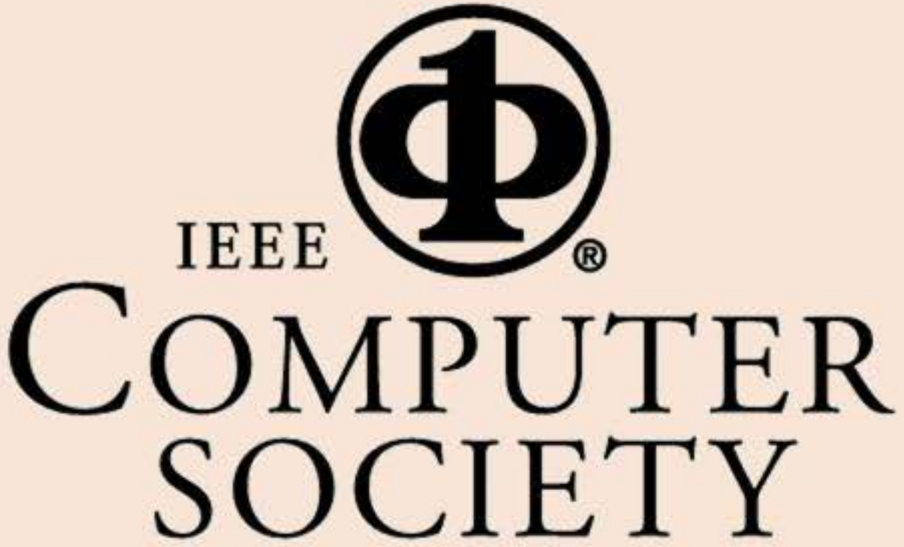
Peregrin Took, 3018 T.A.


INITECH

“The next generation of programmers will be **much more competent** than the first ones. **They will have to be**. Just as it was easier to get into **college** in the ‘good old days,’ it was also easier to get by as a **programmer** in the ‘good old days.’ For this **new generation**, a programmer will need to be capable of **a level of precision and productivity never dreamed of before**.”

Harlan Mills, 1978


acm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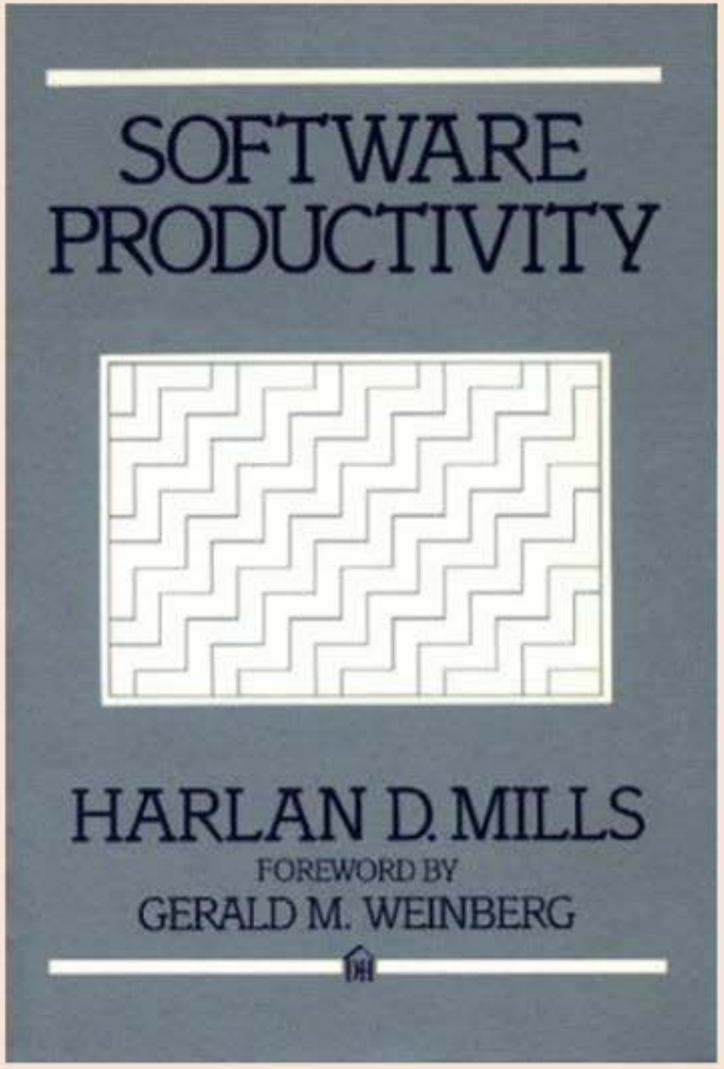
SOCIETY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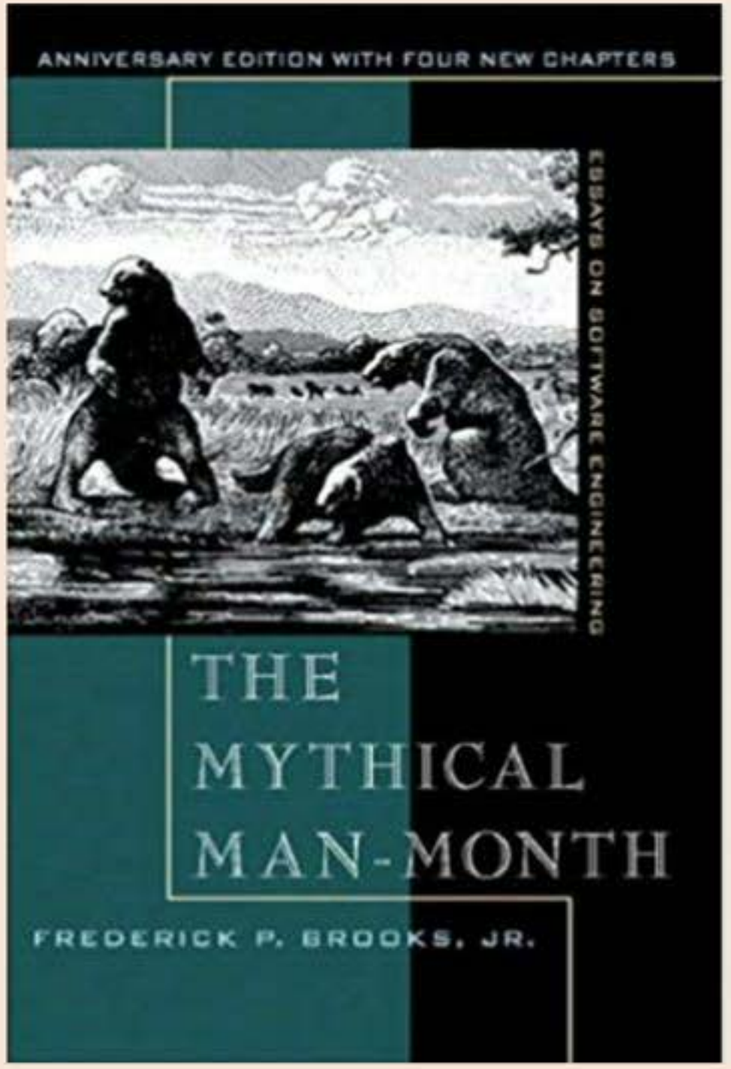
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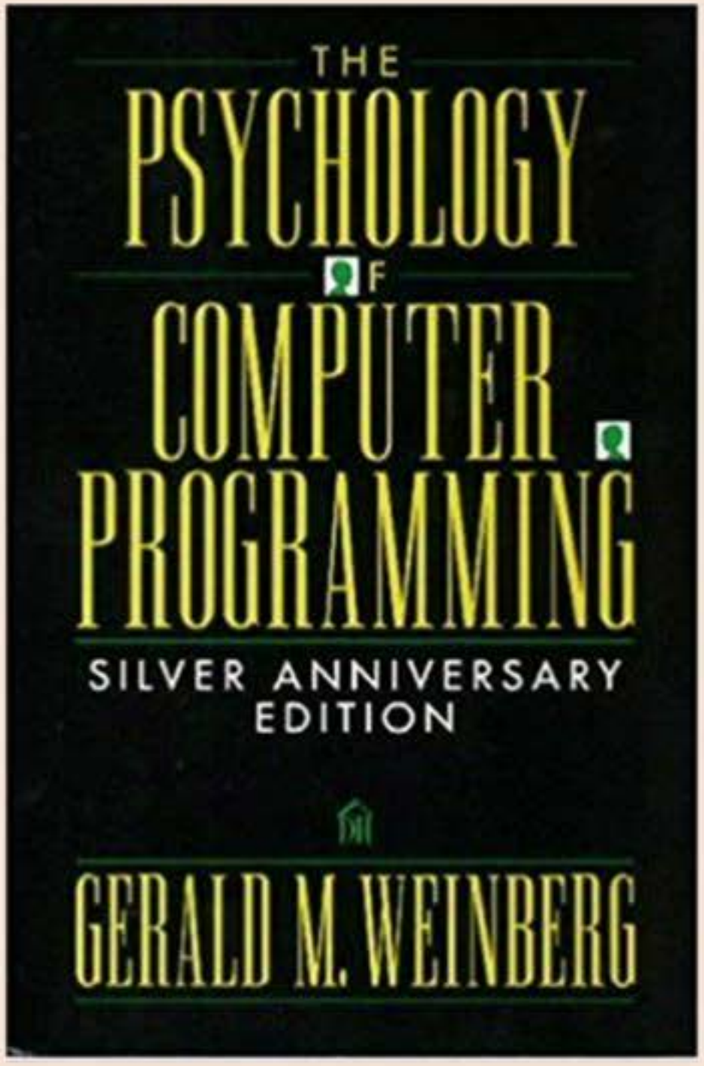
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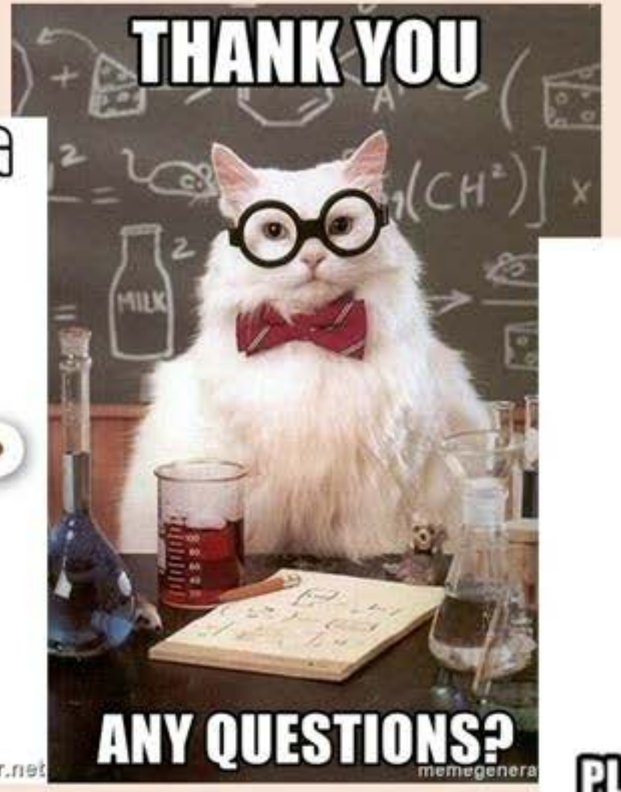

@AdamDavidBarr