

The Evolution of the Software Professional

Changes to the practice and culture of software engineering over the last 35 years

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Computer Science: Who Cares?

Computer Graphics (1970's):

- One department, at one university
- Several faculty, a few more students
- \$5,000,000 grant from ARPA



Computer Science: It Matters

Computer Graphics (2000's):

- Animated Content: \$59b revenues
- Medical Imaging: \$11b revenues
- Video Games: \$46b revenues



Evolution of the Software Professional

Software Engineering

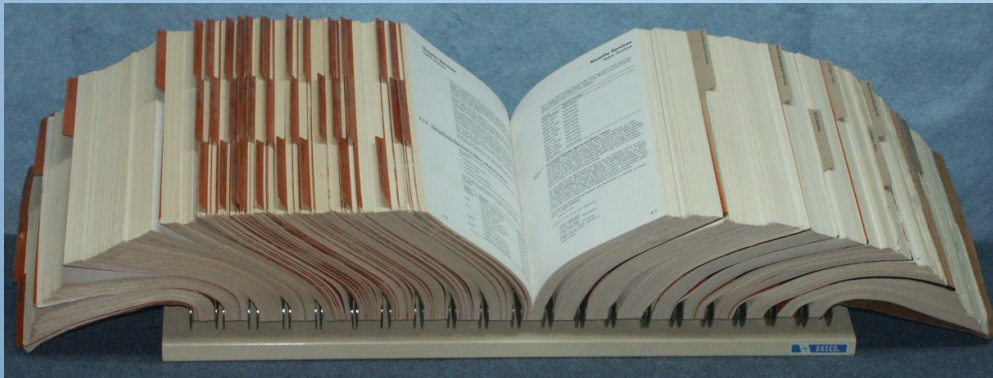
IEEE Computer Society Definition:

“**Software engineering** is the application of a **systematic, disciplined, quantifiable** approach to the development, operation, and maintenance of software, and the study of these approaches; that is, the application of engineering to software.”

Game Changers in Our Profession

#1) The fast and ubiquitous access to the accumulated knowledge of humanity:

- Internet Infrastructure, Internet Content
- Cisco thinks 8.7 billion in 2012



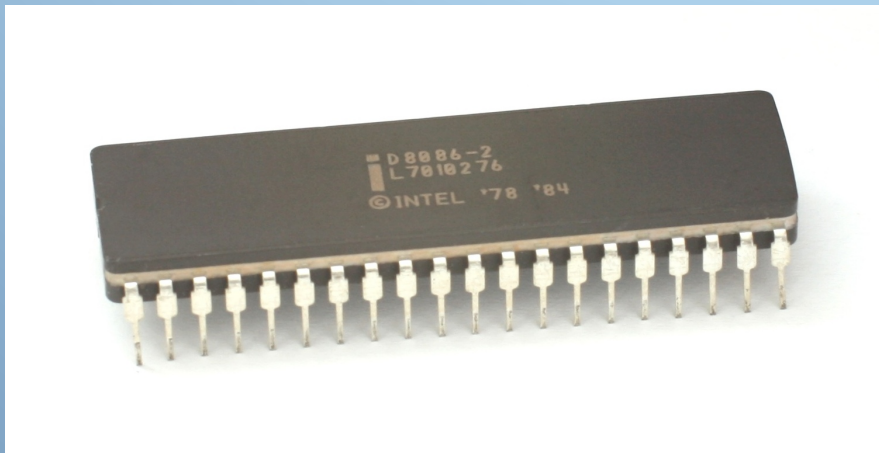
A screenshot of a Stack Overflow question page. The page title is "implements Runnable vs. extends Thread". The question asks for two ways to write threads in Java. The answer shows two code snippets: one using Runnable and one using Thread. The page has 537 votes and 294 answers. The Stack Overflow logo and navigation links are visible at the top.

Evolution of the Software Professional

Game Changers in Our Profession

#2) The evolution of fast, powerful, inexpensive, yet reliable hardware and software systems.

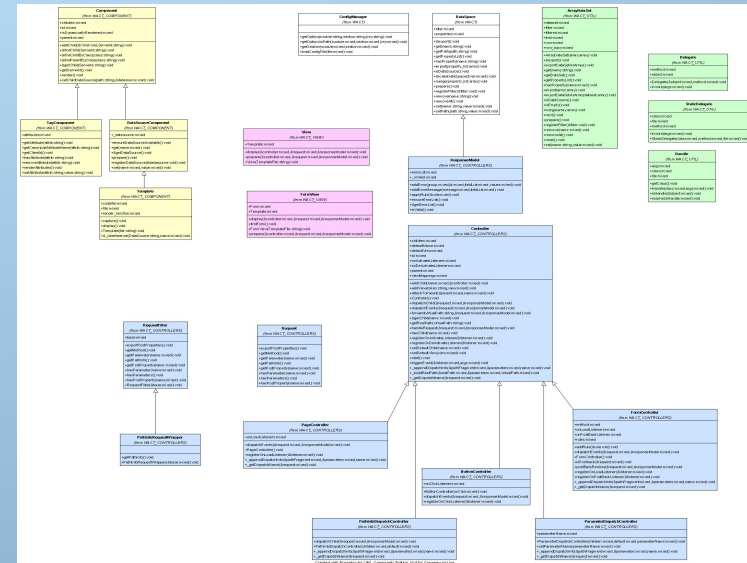
- 1978: Intel, 8086, 16-bit, 10 Mhz, 29K transistors
- 2014: nVidia Tegra, 64-bit, 2.5 Ghz, 1G transistors



Game Changers in Our Profession

#3) Object Oriented Programming

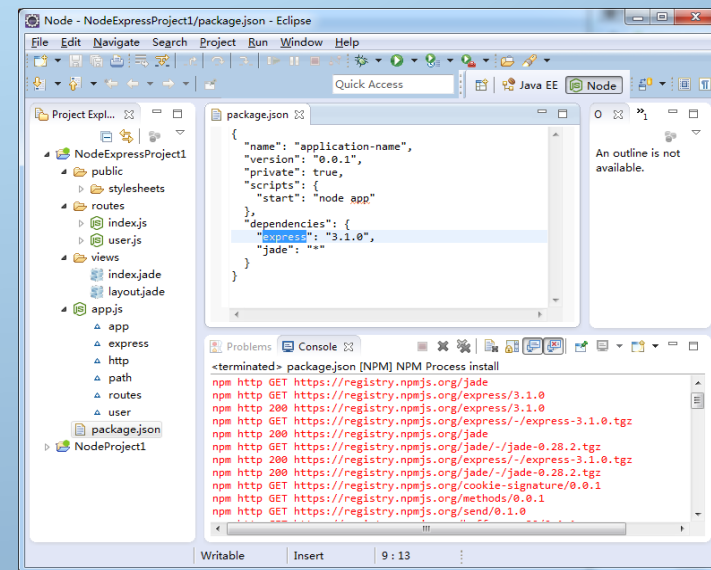
- 1978: Fortran, Pascal, Cobol, C becoming popular
- 2014: Ada, C++, Java, Python, Perl, etc.



Game Changers in Our Profession

#4) Evolving Development Environments

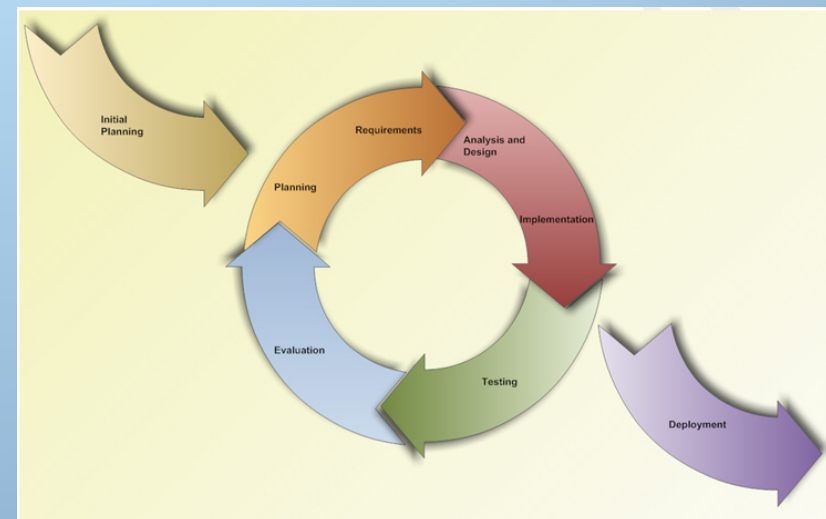
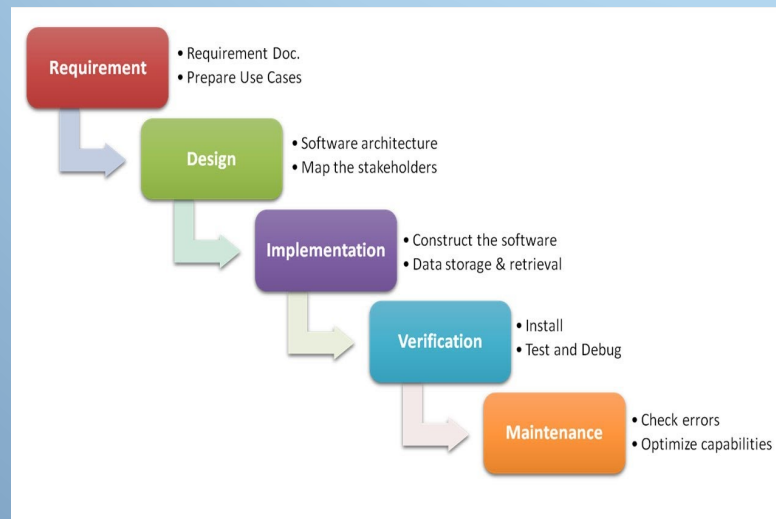
- 1978: Card Reader, VT100 Terminal, Vi or Emacs
- 2014: DevStudio, Eclipse, GitHub, Amazon Cloud



Game Changers in Our Profession

#5) Software Engineering Advances

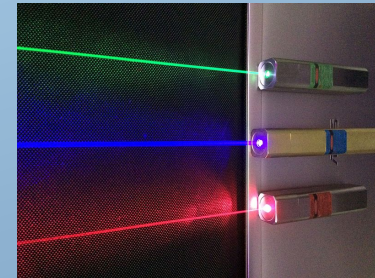
- 1978: Waterfall Model, Source Control (maybe!)
- 2014: Agile Practices, Test Driven Development



Digital Magic

#6) Other advances in technology:

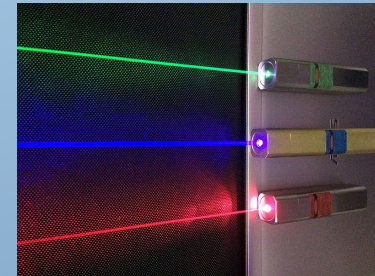
- Transistors (Small, Cheap, Fast Electronics)
- Lasers (Optical Media)
- Charge-Coupled Devices (Digital Imaging)
- Flat Panel Displays (Awesome Output)
- Fiber Optics (Lightspeed Communications)
- Flash Memory (Portable Data)
- Mobile Communications (1G/2G/3G/4G/5G)



Digital Magic

... and when they were invented!

- 1940's: Transistors (Small, Cheap, Fast Electronics)
- 1950's: Lasers (Optical Media)
- 1960's: Charge-Coupled Devices (Digital Imaging)
- 1960's: Flat Panel Displays (Awesome Output)
- 1970's: Fiber Optics (Lightspeed Communications)
- 1980's: Flash Memory (Portable Data)
- 1980's: Mobile Communications (1G/2G/3G/4G/5G)

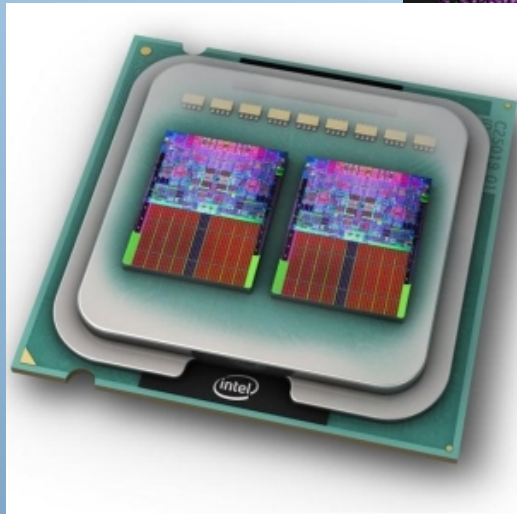
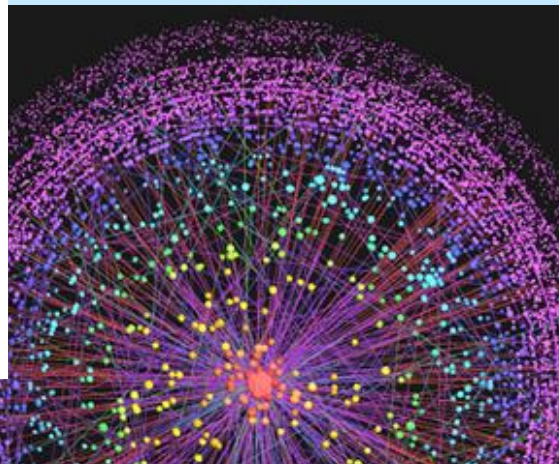


Success Factors in this Profession

- You must know programming, operating systems, software engineering, etc.
- In addition, you must develop expertise that is specific to the domain in which you work
- You must be able to communicate your own ideas and understand those of others.
- You must have the ability to change and evolve along with technology.



Inevitability of Change



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