Software Engineering

Context

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Category	Job Title
software engineering	Software Engineer
software development	Software Developer
programming	Computer Programmer

Software Development Diagram

Best Time to Develop Software

- Free and easy access to tools

- Free and easy access to documentation, examples, etc

- Free and easy ways to post information

- Easy, low overhead, inexpensive ways to distribute and collect payment

Reflected in Career

The U.S. News 100 Best Jobs ranks "Software Developer" as the #3 best job. According to the report, the projected number of new software developer jobs in the next 10 years is estimated at 410,400. This represents 38% of all projected jobs in the top ten and is almost 3 times the number of projected jobs for the next highest-ranked job.

Most software that people use is typically ...

- *buggy*
- *ugly and painful to use*
- *challenging to add new features or get bugs fixed*
- *not updated frequently enough*

Changes in the software environment

- Specific apps for specific purposes: Noted, Agenda

- Multiple types of devices

- Internet of Things

"Software is eating the world"

- A software layer gets introduced into an industry
- Computer hardware iterates faster than mechanical systems or people
- Software iterates faster than computer hardware
- Companies based on a software layer often have reduced costs and can bring features to the unserved
- Older companies are unable to adapt, so they die or become insignificant, e.g., first digital camera

Computing in Companies

- The company provides a software-based service/product
- The company provides a service/product with a (potential) software layer
- The company provides a physical product

Hardware Platforms

- Mainframe (Server)
- Minicomputer (Server)
- Desktop PC
- Laptop PC
- Tablet
- Smartphone
- Smartwatch
- IoT: lights, appliances, locks, etc.

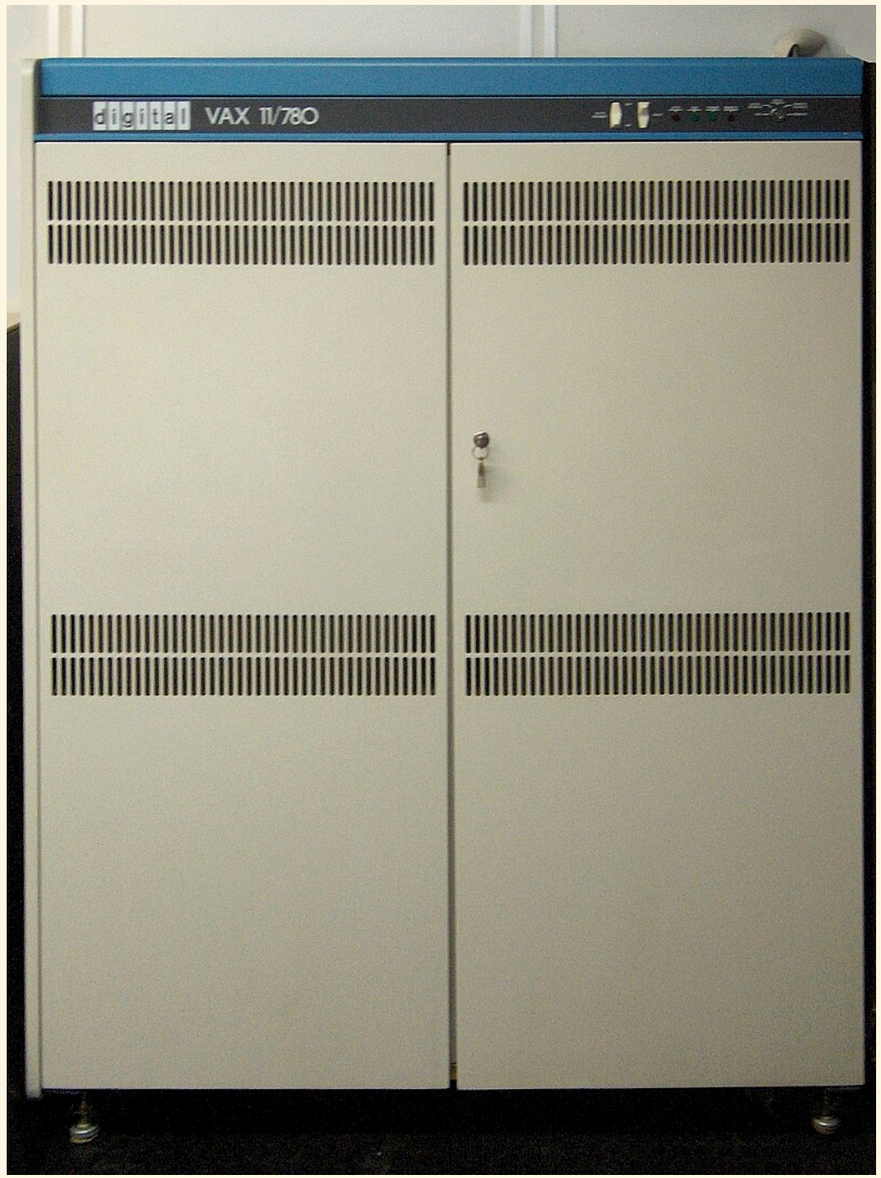
Platform: Mainframe

- AKA "Big Iron"
- Era: 1950s - present
- Cost: 1 Million+
- Large companies, government
- E.g., IBM System/360
- Accessed via *terminals*
- Total Sold: 100,000
- Active: 20,000 - 30,000
- 9 Mainframe Statistics That May Surprise You and 5 Things Everyone Should Know about Mainframes
- Software Focus: heavy-duty data processing tasks, such as database management, transaction processing, and batch processing.

Historical Platform: Word Processors

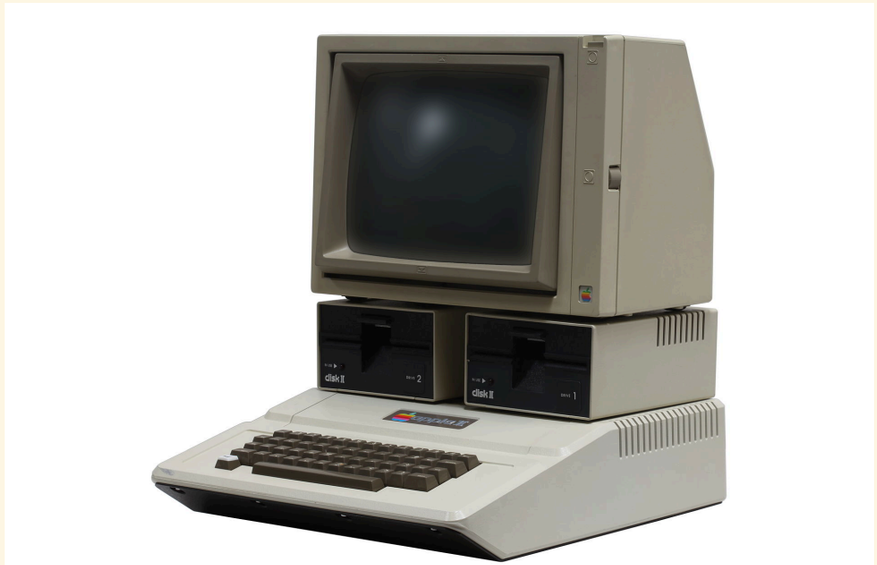
- E.g., Sperry, etc.
- Total Sold: 500,000 - 1 million
- 1972 - 1984 (?)
- Inactive
- Software Focus: Word Processing, not general computing

Historical Platform: Minicomputers



- E.g., DEC VAX
- Cost: $150,000+
- Smaller companies, Math & Engineering departments
- Era: 1964 - 1985
- UNIX O.S.
- Total: 1 million
- Software Focus: More specialized tasks, such as scientific simulations, development environments, or serving as a departmental server

Historical Platform: Apple IIs



- Era: 1977 - 1993
- Cost: $1,000+
- Total: 6 Million
- Software

Current Platform Sizes

Platform	Size
PC	**4.5 Billion**
Installed PC Base	**1.6 Billion**
Yearly PC sales	**275 Million**
Windows 10 & 11	**1.5 Billion**
Active Mobile Phones	**9.2 Billion**
Active Smartphones	**7.2 Billion**
iOS: iPhone, iPad Total	**2.4 Billion**
Active iPhones	**1.25 Billion**
Yearly iPhone sales	**220 Million**
Xbox	**170 Million**
Apple Watch	**145 Million**

Expectations are changing

- Reliability
- Robustness
- Transparency
- New Features
- Rate of Improvements
- Security and Compliance
- Usability and User Experience (UX)
- Scalability and Performance
- Sustainability and Ethical Considerations
- Interoperability and Integration
- Affordability and Business Alignment
- Community and Collaboration
- Support and Maintenance
- Diversity and Inclusivity

Processes needed to...

- fix bugs quickly and safely
- introduce new features quickly and safely
- get users what they need
- stay current with changes in the software environment
- ensure security and compliance
- facilitate collaboration and communication

Stakeholders, i.e., People

- Developers
- Developers' management
- Other parts of the company
- Users
- Users' management
- Other parts of the users' company
- Others in the same industry
- Reviewers and the outside world

Single Project Development

	Education/Class	Industry
Total Time	days	months-years
Time Span	days	months-years
Number of Developers	1 - 3	3 - hundreds
Number of Programming Languages	1	> 1

Goal: Success

- Improve quality
- Add new features
- Update current features
- Reduce needed development resources
- Reduce time-to-market