Design and Analysis of Software Systems (Week 1 – Introduction)

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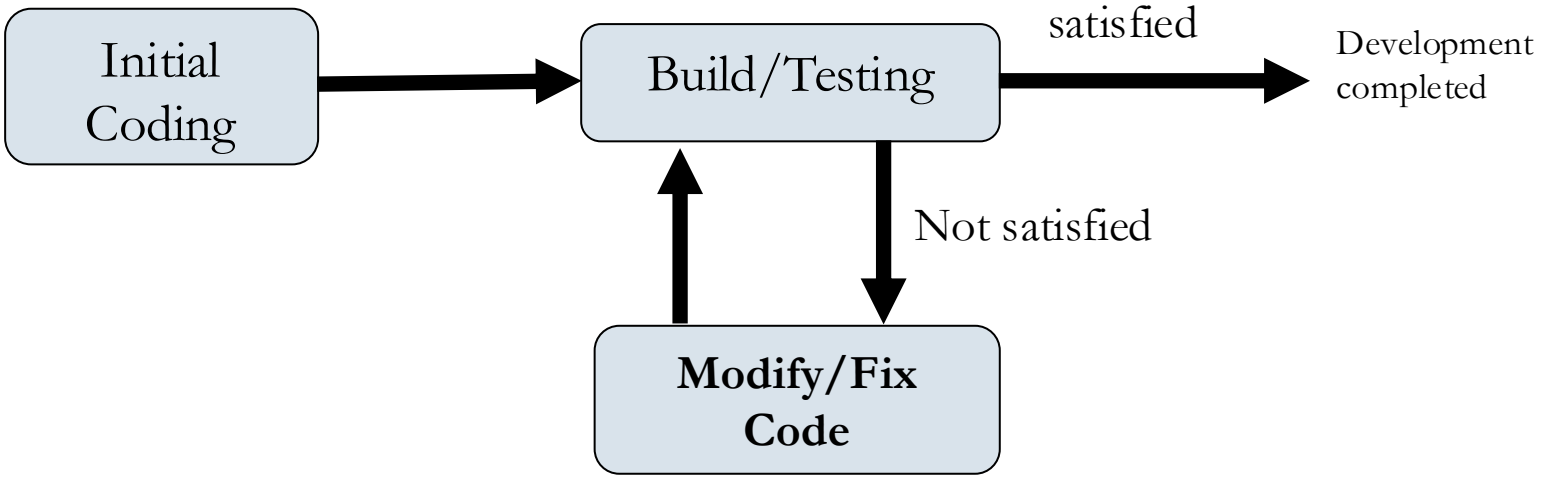
Exploratory programming

- In the build and fix (exploratory) style, initial program is quickly developed.
- The different imperfections that are subsequently noticed are fixed.

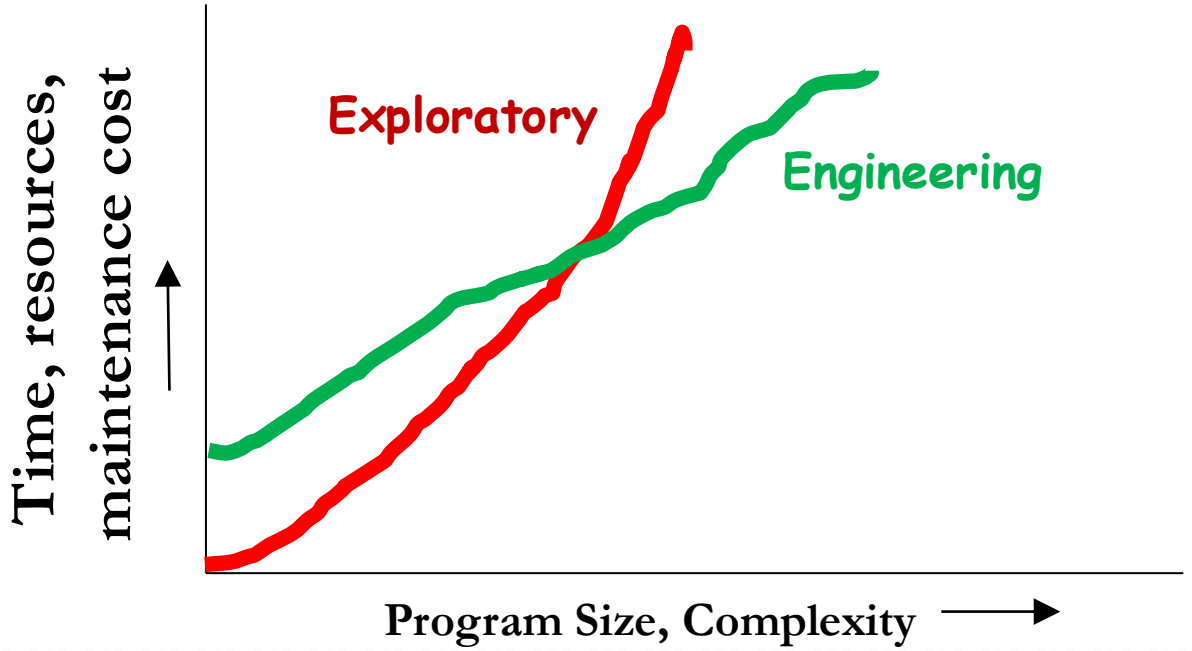


Will Exploratory programming work here ?

GUITAR HERO

What is Wrong with the Exploratory Style?

- Can successfully be used for very small programs only
- Large programs can become unmaintainable
- Time and Effort required to develop a product can grow exponentially with program size



What do these have in common?

Design

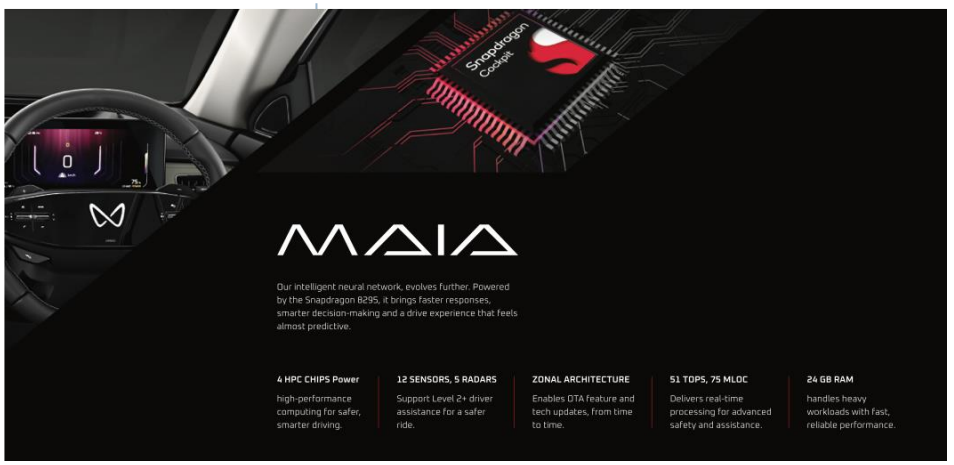
Large systems with different levels of abstractions. **Design** needs to be thought about at different levels – from small modules up to the entire system

Systems are complex…

Modern systems need a ***lot*** of software to operate.

How much?

- Even simple (modern) games have between 1 and 2 MLOC (million lines of code)
- Mahindra XEV 9S has 75 MLOC on-board.



1 LOC/min/SE * 60 min/hr * 40 hrs/wk = 2,400 SLOC/wk/SE

2,400 SLOC/wk/SE * 50 wk/year = 120,000 LOC/year/SE

75 * 10^6 LOC / 1.2 * 10^5 LOC/yr/SE = ~625 SEs for the year

Teamwork

(Software) engineers get their hands dirty writing programs using the latest technologies and techniques.

The software engineer's daily job is to answer questions about the software system…

- How can I help the customer? What is required to solve the customer's problem?
- How will the user interact with the system?
- What operating system, language, hardware is going to be used?
- What is the overall software system structure and how do different components interact with each other?
- What code do I have to write?
- How do I organize my team so we are effective?
- Can we finish the game in time to have it on the shelves for Christmas shopping?

To answer those questions, the software engineer must work with many people.

- Customers asking for the system
- People who will use the system
- Domain experts: banking, avionics, security, medical, scientists, …
- Engineers from other engineering disciplines
- Most closely with the other software engineers on the project

Communication

Electronic Trading Firm

Complex!!!

One small upgrade. Easy???

minute outage.

Estimated millions in lost revenue.

Ended up in selling the company

Process

This is a financial-critical system.

The team needed a better understanding of the configuration and release process for developing a financial-critical system.

DASS - What can we expect?

- Creating user-friendly software
  - Frontend: GUI / Web
  - Backend: Databases + Network

- By the end of this course you
  - should be able to create reasonably large, maintainable software using software engineering principles, processes and more…
  - Should be able to communicate with each other and others
  - Should be able to document

Attitude

- To be confident of setting up your own computer, automate routine tasks, and be skilful with several aspect of software development (most of the time).
- You can't say – I can't do it because no one taught me how.
  - Useful links to online reading material will be provided
  - You are expected to do most of the work
    - Because *doing is learning*.
- The more you struggle now, the easier it will be later.

Important link

Keep checking regularly…

courses.iiit.ac.in