23 Saturday 06/01/2020 Software Engineering

I Introduction

II Requirements Specifications

III Design
Project Management

IV Reliability & Quality Assurance

V

1. Software Engg Introduction

What is computer software ?

It is the product that software professionals build & then support over the long term

It encompasses programmes that execute within a computer of any size and architecture, content

24 Sunday that is presented as the programmes execute, and descriptive information in both hard copy and virtual forms that encompass virtually any electronic media.

Prop. that make Software diff from Hardware

Software does NOT age but may become Obsolete
(wear away)

Components of Software

- Programme(s)
- Documentation
- Operating Procedures

Models of Software building

{Defⁿ by IEEE}

Software is a collection of computer programmes, procedures, rules and associated documentation and data.

Software has No mass, No volume, No colour which makes it a non-Degradable entity.

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It does not wear or get tired.

Software instructs the computer about what to do and how to do it.

Software is more than programmes.

Software vs. Programme

encompass programme, procedures, documentation.

a part of software. Not usable w/o doc. & ops.

Software Process.

The way in which we produce software is called Software Process.

Software Characteristics → varied as per requirements.

Intangible

✡ Does NOT wear out

28 Thursday Not Manufactured.

✡ Components are re-usable (flexible)

✡ Factors → Time and cost.

Applications of Software

We groups the applications of software in Eight areas for convenience.

- System software
- Real-Time S/W.
- Embedded SW
- Business SW
- P.C. SW
- AI SW.
- ~~Reactive SW~~
- Web based SW
- Engg & Scientific SW

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System SW → Machines to perform tasks

Real Time SW → Monitoring situations. eg weather forecast

Embedded SW → SW in ROM & controls various f^n's. comes w/ the system. eg automobile, aircraft, security sys.

↳ handles HW components and is also known as Intelligent software.

Business SW → a very large area of application (largest) designed to process business applicatn. eg account mngement, payroll.

Personal computer SW → SW used in PCs are P.C. SW.

eg word processors, graphics, games, DBMS.

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Artificial Intelligence SW → makes use of non-numerical algos to solve complex problems, that are not amendable to computation or straightforward analysis.

eg ANN, signal processing SW, expert systems, Robotics

Web based SW - web appl^n. softwares

eg Common Gateway Interface, Java, DHTML

Engg & Scientific SW - eg MATLAB, SPSS, CAD circuit analyser, CAM pkg

31 Sunday Software Product - something delivered to the customer

Deliverables (Deliverables) - Different deliverables are generated during Software Development / source code, documentation

Milestones - The milestones are events that are used to ascertain the status of the project.
eg completion of design documentation, finalization of specifications

ARIANE 5 → (French word) Space satellite launcher
ESA - European Space Agency
$17 Billion → crashed 16 mins in flight → Software Failure.

Y2K → 2 digit format of date failed in 2000.
shift to 4 digit format became necessary

Notes Measures → provide quantitative indication of extent, dim, size, or capacity
efficiency, productivity or reliability of some attributes of a product or process.

Metrics
Measurements
↳ act of evaluating a measure

↳ Metric : Quantitative measure of the degree to which a system, component or process possesses a given attribute.

Process Metrics (productivity, quality, failing rate)

Product Metrics (complexity, size)

1 Monday Module and Software component

Module → independent unit of bid system having own fality

Component → anything from a block of code to a whole appl?

Software Development Life Cycle (SDLC)

Software Engineering - The establishment and use of sound engineering principles in order to obtain economically developed software that is reliable and works efficiently on real machines.

OR

2 Tuesday A discipline whose aim is the production of quality software; software that is delivered on time, within budget and that satisfies its requirements.

☆ Software Life Cycle Models / SW dev life cycle (SDLC)

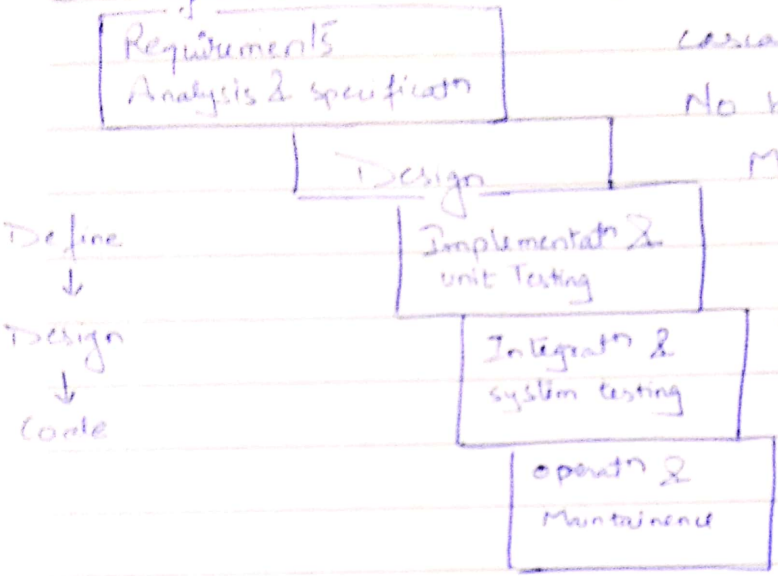
☆☆☆ dfn from Prof Yogesh Singh's book

arts requirement gathering ⟶ SW is obsolete.

Concept exploration ⟶ ends retirement of the software

3 Wednesday SDLC Models

① Waterfall Model (unrealistic model)



Define
↓
Design
↓
Code

cascade waterfall
No backtracking
Must follow the order ↓
Have to start frm Scratch if any change in b/w

4 Thursday The phases always occur in fixed order and do NOT overlap

The model is called 'Waterfall' as its diagramatic rep resembles a cascade of waterfalls.

i) Requirements: Analysis & spec. - Understand the exact requirements of the customer & document them properly. concerned with "What to do"

The requirements describe the "What" of the system NOT the "How"

This phase produces a large doc known as Software Req. Spec (SRS) and it contains a description of what the system will do w/o describing How will it be done

ii) Design – Transform the requirement specs into a structure that is suitable for implementation in some programming language. In this phase the overall SW architecture is defined and the high level and detailed design work is performed. This work is documented and known as Software Design Description (SDD) document.

iii) Implementation & Unit Testing – Design is implemented. If the SDD is complete, the implementation or coding phase proceeds smoothly, because all the information needed by Software Developers is contained in the SDD. During testing, the major activities are centered around the examination and modification of the code. Small Modules are tested in isolation from rest of the software product.

iv) Integration & System Testing – Purpose of unit testing is to determine that each independent module is correctly implemented. This gives little chance to determine that interface b/w modules is also correct; for this Integration testing is performed. System testing involves the testing of the entire system whereas a software is a part of the system.

v) Operation & Maintainence – After the release of software, comes the ops and maintainence phase of the life cycle. Software maintainence includes error correction, enhancement of capabilities, deletion of obsolete capabilities, and optimization. Preserves the value of SW over Time.