

An Overview of Computer System

Introduction to Software Engineering and
Computing

By Natnael T.

Content

- Computing hardware trends
- Software Vs. Program
- Characteristics of good software
- Type and Classes of Software
- Software development life cycles(SDLC)

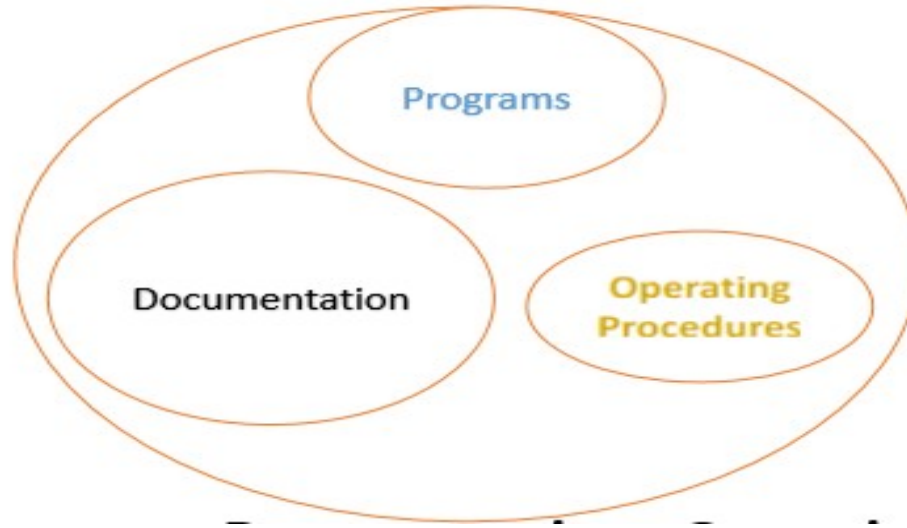
Components of Computing System

Computing Hardware Trends

- **Trend**: a general direction in which something is developing or changing.
- **Computing hardware trends**: changes or evolutions in the ways that computer hardware are used which become widespread and integrated into popular thought with regard to systems and computing devices.

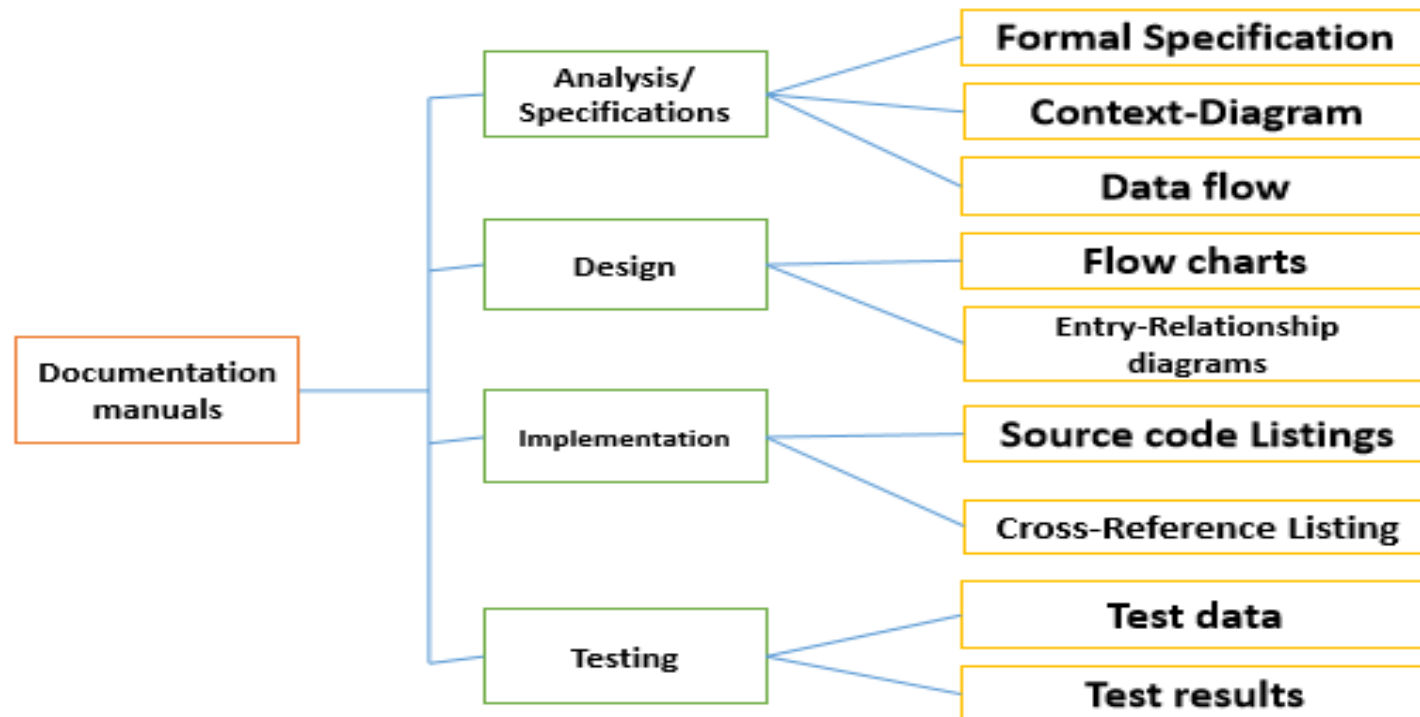
Software Vs. Program

- Components of software



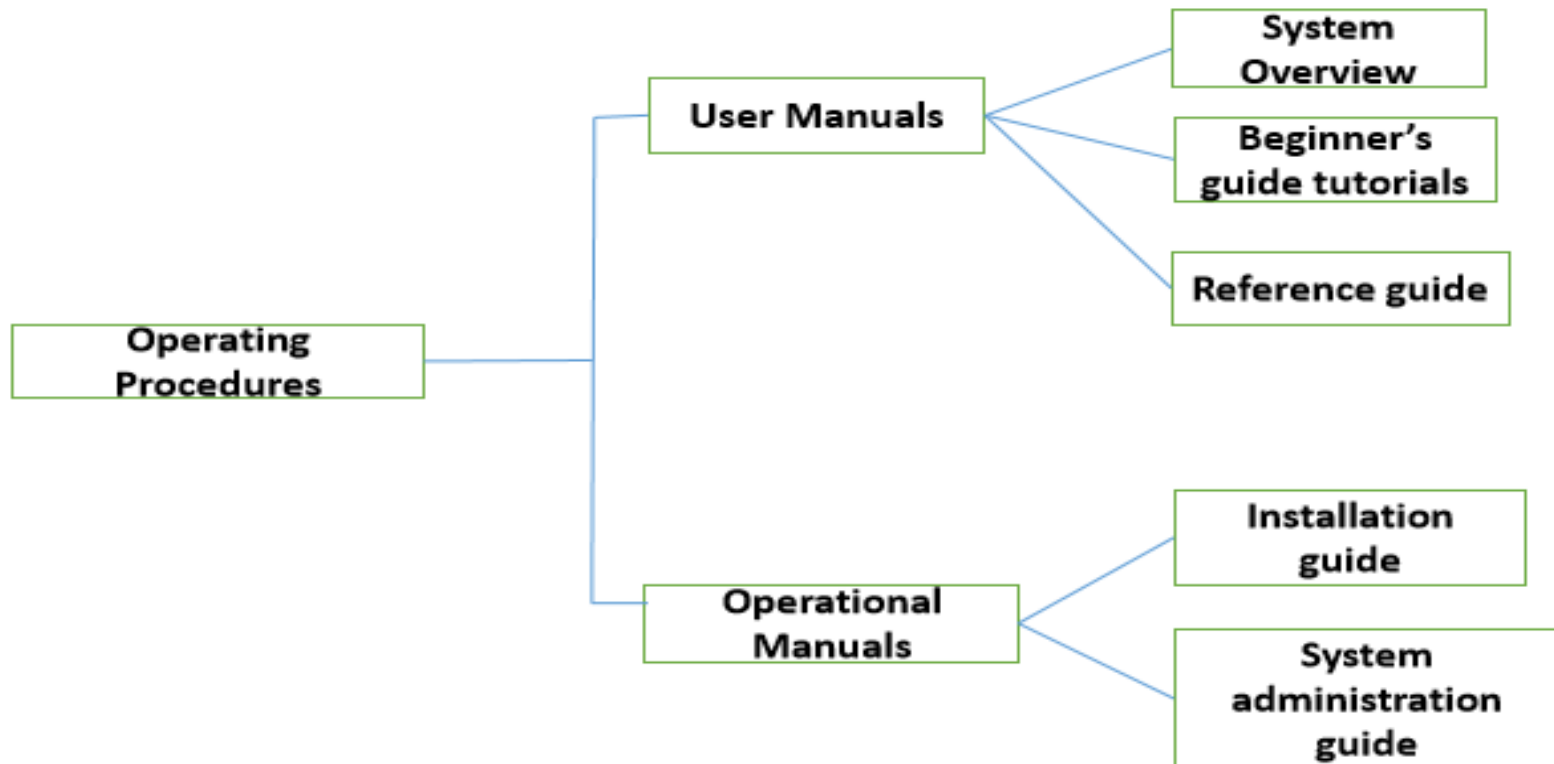
- Software = Program + Documentation + Operating Procedures
- Software is more than programs.

- Any **program** is a subset of **software** and it becomes software only if **documentation** and **operating procedure manuals** are prepared.
- Documentation consists of different **types of manuals**.



Operation procedures manuals consist of instructions

- to **setup** and **use** the software system and
- how to react to **system failure**.



Software Vs Program

Software	Program
The software is a broad term which is designed to perform some specific set of operations.	A program is set of instructions which perform only a specific type of task.
A software consists of bundles of programs and data files. Programs in a specific software use these data files to perform a dedicated type of tasks.	A program consists of a set of instructions which are coded in a programming language like C, C++, PHP, Java etc.
A software can be classified into two categories: application software and system software.	A program cannot be classified into various categories.
An application software comes in wide range of varieties like a text editor, media player, web browser, video player, video editor, image editor. Different types of application software provide a different type of services.	Source code in a program is written for small jobs.

Characteristics of good SW

- **Operational:** how well it is working
 - Budget
 - Efficiency
 - Functionality
 - Usability
 - Correctness
 - Safety and Security
- **Transitional:** movability across platforms
 - Portability
 - Reusability
 - Interoperability
 - Adaptability
- **Maintenance:** ability to maintain itself in changing environment
 - Maintainability
 - Scalability
 - Flexibility

Types and Classes of Software

System Software

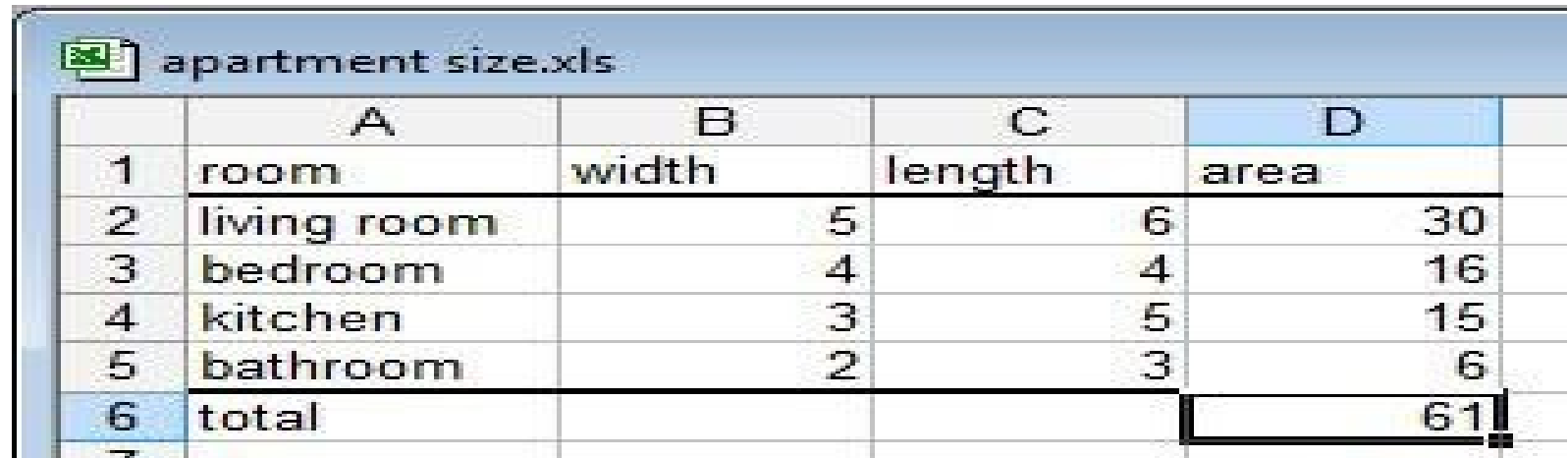
- It is a type of computer software that is designed for running the computer hardware parts and the application programs.
- Operating system is an example of System Software
- For desktop computers, laptops and tablets:
 - Microsoft Windows
 - Mac (for Apple devices)
 - Linux
- For smartphones:
 - Apple's iOS
 - Google's Android
 - Windows Phone OS

Cont'd

Application Software

- It is designed for the users to perform some specific tasks like writing a letter, listening to music or watching any video.

Example: An application software program for making spreadsheets.



The screenshot shows a Microsoft Excel spreadsheet titled "apartment size.xls". The spreadsheet has four columns labeled A, B, C, and D. Column A lists different rooms, column B lists their widths, column C lists their lengths, and column D lists their areas. The rows are numbered 1 through 6. Row 1 contains the headers: room, width, length, and area. Rows 2 through 5 contain data for living room, bedroom, kitchen, and bathroom respectively. Row 6 contains a total row with the word "total" in column A and the value 61 in column D.

	A	B	C	D
1	room	width	length	area
2	living room	5	6	30
3	bedroom	4	4	16
4	kitchen	3	5	15
5	bathroom	2	3	6
6	total			61

Cont'd

Application Software Type	Examples
Word processing software	MS Word, WordPad and Notepad
Database software	Oracle, MS Access etc.
Spreadsheet software	Apple Numbers, Microsoft Excel
Multimedia software	Real Player, Media Player
Presentation Software	Microsoft PowerPoint, Keynotes
Enterprise Software	Customer relationship management system
Information Worker Software	Documentation tools, resource management tools
Educational Software	Dictionaries: Encarta, Britannica Mathematical: MATLAB Others: Google Earth, NASA World Wind
Simulation Software	Flight and scientific simulators
Content Access Software	Accessing content through media players, web browsers
Application Suites	OpenOffice, Microsoft Office

Programming Software

- is the type of software that is used by software programmers
- are programs that are used to write, develop, test, and debug other software, including apps and system software.
- They are facilitator software used to translate programming languages (i.e., Java, C++, Python, PHP, etc) into machine language code.

Examples: Different programming language editors, debuggers, compilers and IDEs are examples of programming software like Eclipse, Notepad++, Android studio etc...

Driver Software

- They **operate** and **control** devices and peripherals plugged into a computer.

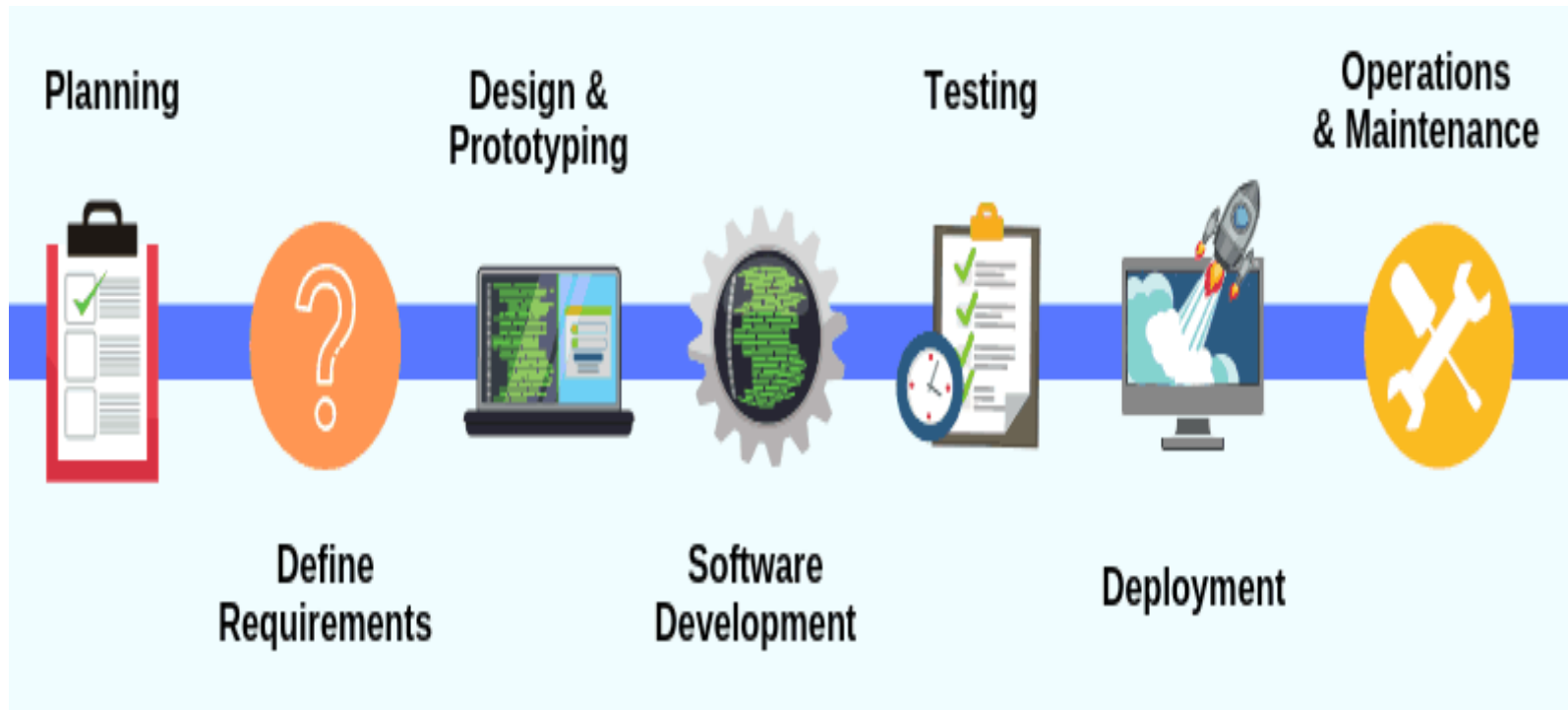


Software Development Life Cycle - SDLC

SDLC

- Software development process
- Sequence of stages in software engineering to develop software product.
- Series of steps to be followed to design and develop a software product **efficiently**

SDLC



Source: Internet

Stages of SDLC

1. Planning and Requirement Gathering

- **Requirement analysis:** Expectations of users from the software product
- **Feasibility study:** Detailed study by the analysts whether the desired system and its functionality are feasible to develop.
- **Planning:** for the quality assurance requirements and identification of the risks associated with the project.

Stages of SDLC- cont'd

2. Defining Requirements

- Clearly define and document the product requirements and get them approved from the customer
- **Software Requirement Specification (SRS)**: document which consists of all the product requirements to be designed and developed during the project life cycle.

Stages of SDLC- con't

3. Designing

- Uses SRS as a reference
- **Design Document Specification(DDS)**: document which clearly defines all the architectural modules of the product along with its communication and data flow representation with the external and third party (if any) modules.

Stages of SDLC- con't

4. Software Development (Implementation)

- The programming code is generated as per DDS
- Different high level programming languages such as C, C++, JavaScript, Java and PHP are used for coding.
- The programming language is chosen with respect to the type of software being developed.

Stages of SDLC- con't

5. Testing

- Software defects are reported, tracked, fixed and retested, until the software product reaches the quality standards defined in the SRS.
- Checks whether the developed system
 - meets the requirements
 - responds correctly to all kinds of inputs,
 - performs its functions within an acceptable time
 - can be installed & run in its intended environment
 - achieves stakeholder's desire.

Stages of SDLC- con't

6. Deployment

- all of the activities that make a **software** system available for use.
- The product may first be released in a limited segment and tested in the real business environment (UAT- User acceptance testing).

Stages of SDLC- con't

7. Maintenance

- is the process of modifying a software product after it has been delivered to the customer.
- **Need for Maintenance**
 - Correcting faults
 - Improving the design
 - Implementing enhancements/new features etc...