Software Engineering

CO2307

Lecture 01 : Introduction

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Course Information

- Lectures
  - Friday 8.30 am – 10.30 am
- Practical Work
  - Monday 3.30 pm – 6.30 pm
- References
  - Software Engineering, Ian Summerville, Pearson- 9th edition
  - Software Engineering: A practitioner's 2. approach by Roger S. Pressman, 6th edition, McGraw-Hill International edition, 2005.
  - Http://www.softwareengineering-9.com

Course evaluation

- Continuous Assessments 40%
  - Requirement engineering assignment
  - Software engineering Design project
  - Project management
  - Assignments/Quiz/ Spot tests
- Semester – End theory exam 60%

Eligibility criteria for Sitting for the End-Semester Examination

- Attendance for Lectures :- ≥ 80%
- Attendance for Practical Work :- All are Compulsory
- Total CA marks :- ≥40%

Course Outline

1. Overview of Software engineering and system engineering
2. Software process
3. Requirement engineering
4. System modelling
5. Architectural styles and documentation
6. User interface design
7. Software quality management and verification and validation
8. Software testing
9. Software project management

Learning objectives

- Explain the nature and characteristics of software engineering and development process

Outline

- Software
  - What is software?
  - Types of software
  - Characteristics of Software
  - Attributes of good software
- Software Engineering
  - Software engineering
  - Members of software engineering
  - Key challenges facing software engineering
  - Problems of software development
  - Systems engineering & software Engineering

Software :What is software?

- Software is the **set of instructions** that makes the computer work or Instructions given to a computer (computer programs).
  - Ex : Drawing a picture in Paint
- Software is held either on your computer' s hard disk, CDROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) into the computer's RAM (Random Access Memory), as and when required.
- Software products may be developed for a **particular customer** or may **be developed for a general market**
- Software is a general term for the **various kinds of programs used to operate computers** and **related devices**

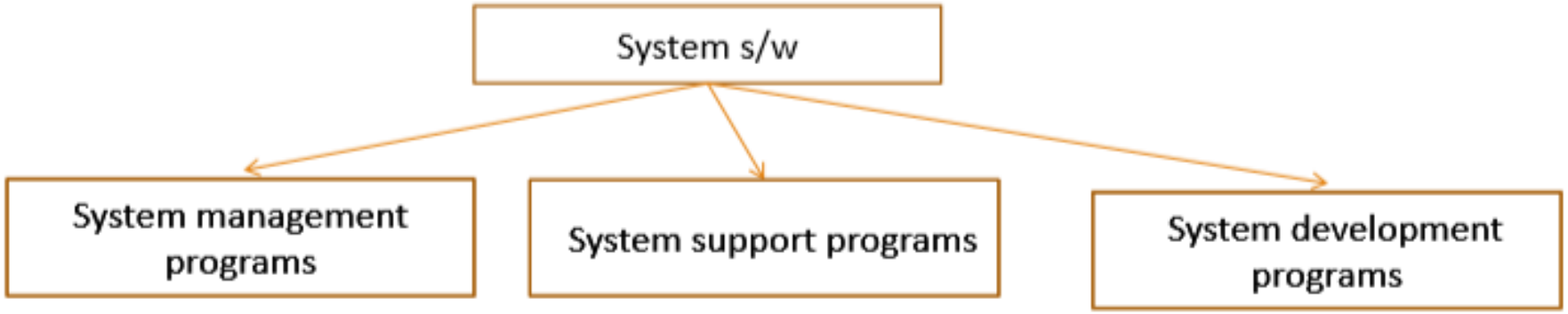
Software :What is software?

- Definition
  - Computer programs and **associated documentation** developed for a particular customer or may be developed for a general market to achieve specific task(s).
- It can be ;
  - System Software
  - Application Software

Software :Types of software

- There are two main types of software;
  1. System Software
     - computer software designed to **operate and control the computer hardware** and to **provide a platform for running application software**
  2. Application Software
     - set of one or more programs designed to **carry out operations for a specific application**

Software :Types of software

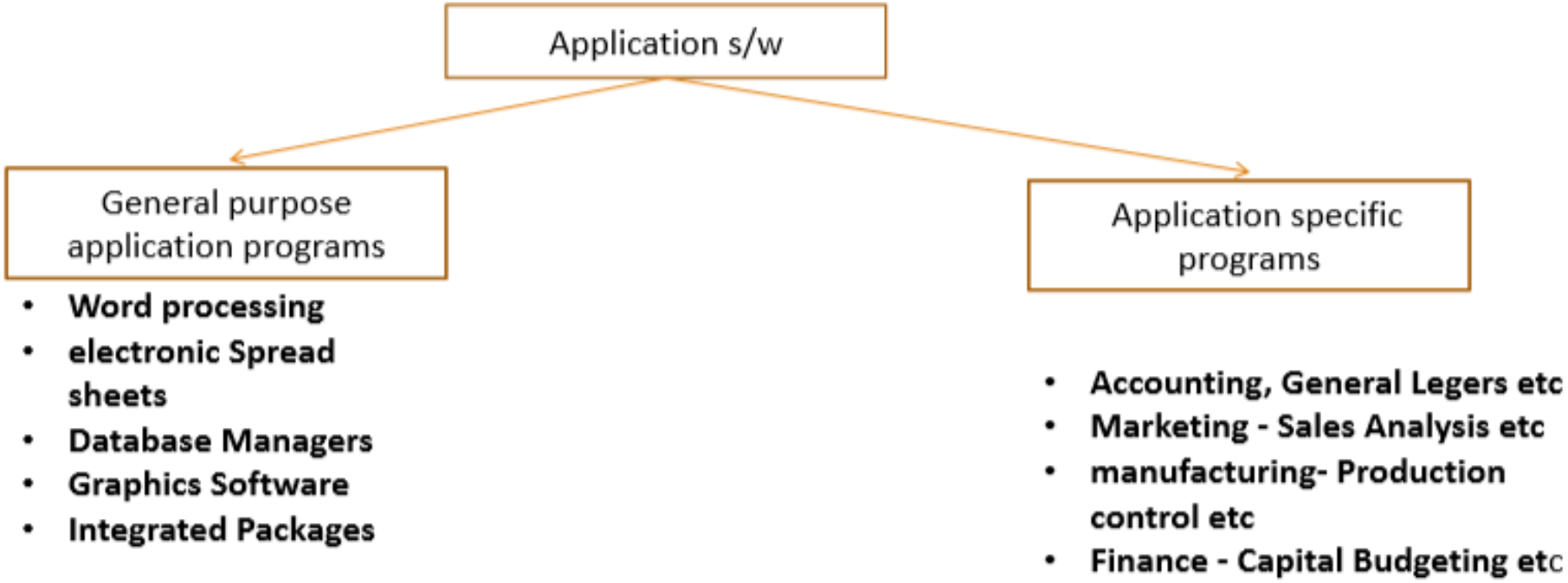


- **Operating systems**
- **Operating environments**
- **Database Management system**

- **System utilities**
- **Performance monitors**
- **security monitors**

- Programing language translator
- Programing environments
- Computer Aided Software Engineering(CASE)

Software :Types of software



Software :Characteristics of Software

- **Intangibility**
  - Cannot touch software
- **Increase use will not introduce any defects**
- **Software is configurable**
  - able to **build software** by **combining** a basic **set of software components in different ways**
  - One can **change the product easily** by **re-implementing it without changing the design**
- **Custom built**
  - Most software are made upon order

Software :Essential Attributes

Product characteristic	Description
Acceptability	Software must be acceptable to the type of users for which it is designed. This means that it must be understandable, usable, and compatible with other systems that they use.
Dependability and security	Software dependability includes a range of characteristics including reliability, security, and safety. Dependable software should not cause physical or economic damage in the event of system failure. Software has to be secure so that malicious users cannot access or damage the system.
Efficiency	Software should not make wasteful use of system resources such as memory and processor cycles. Efficiency therefore includes responsiveness, processing time, resource utilization, etc.
Maintainability	Software should be written in such a way that it can evolve to meet the changing needs of customers. This is a critical attribute because software change is an inevitable requirement of a changing business environment.

Figure 1.2 Essential attributes of good software

Software :Software Engineering

- Software engineering is related to both **computer science and systems engineering**
- **Computer science** is concerned with the **theories and methods that underlie computers** and **software systems**, whereas software engineering is concerned with the **practical problems** of producing software.
  - Some knowledge of computer science is essential for software engineers in the same way that some knowledge of physics is essential for electrical engineers.
- **System engineering** is concerned with all aspects of the development and evolution of complex systems where software plays a major role.
  - System engineering is therefore concerned with **hardware development, policy and process design**, and system deployment, as well as software engineering.

Software :Software Engineering

- Contain millions of lines of code
- Comparably more complex
  - Thus, need a systematic process to produce high quality software product
- Definition
  - Software engineering is an **engineering discipline** that is concerned **with all aspects of software production** from the early stages of system specification through to maintaining the system after it has gone into use.

  Or

  - Simple Definition: Designing, building and maintaining large software system

Software :Software Engineering

- In this definition, there are two key phrases:

1. Engineering discipline :
   - Engineers make things work. They **apply theories, methods, and tools** where these are appropriate.
   - However, they use them selectively and always **try to discover solutions to problems** even when there are no applicable theories and methods.
   - Engineers also recognize that they must work **to organizational and financial constraints** so they look for solutions within these constraints.
2. All aspects of software production
   - Software engineering **is not just concerned with the technical processes** of software development.
   - It also includes activities such as **software project management and the development of tools, methods, and theories** to support software production.

Software :Members of a software engineering team

1. Project manager
2. Systems analyst
3. Designer
4. Programmer
5. Tester
6. Technical clerk

Key challenges facing Software Engineering

- Heterogeneity
  - Developing techniques for building software that can cope with heterogeneous platforms and execution environments
- Delivery
  - Developing techniques that lead to faster delivery of software
- Trust
  - Developing techniques that demonstrate that software can be trusted by it's users

Software Problems

1. Time Schedules and cost estimates of many software projects are grossly inaccurate
2. Software is costly
3. The quality of software is not satisfactory
4. Software is difficult to maintain
5. The productivity of software people is not satisfactory to meet the demand

Problems of software development

- Systems must be designed to last many years in a changing environment.
- The process of efficiently and effectively developing requirements.
- Tooling required to create the solutions, may change as quick as the clients mind.
- Communications:
  - Communications among the various constituencies is a difficult problem. Sometimes different constituencies speak completely different languages.
  - For example, developers may not have the domain knowledge of clients and / or users. The larger the project, the more difficult the communications problems become.

Problems of software development

- Project characteristics:
  - size / complexity
  - novelty of the application
  - response-time characteristics
  - security requirements
  - user interface requirements
  - reliability / criticality requirements

Software engineering vs. system engineering

- System engineering
  - is concerned with **all aspects of computer-based systems development** including hardware, software and process engineering.
- Software engineering
  - is **part of this process** concerned with developing the software infrastructure, control, applications and databases in the system.
- System engineers are involved in system specification, architectural design, integration and deployment

Assignment 01

- Write a 3 (Three) page report about evolution of Software Engineering.
  - Describe roles/characters involved in Software engineering process

- Deadline : 7 September , 2021 Submit to LMS

Further Reading

- Chapter 01
  - Software Engineering, Ian Summerville, Pearson- 9th edition

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