



# BACHELOR OF COMPUTER APPLICATIONS (B.C.A) SEMESTER – IV Software Engineering

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# UNIT – I

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INTRODUCTION

# WHAT IS SOFTWARE?

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- *The product that software professionals **build** and then **support** over the long term.*
- *Software encompasses:*
  - *instructions (computer programs) that when executed provide desired features, function, and performance;*
  - *data structures that enable the programs to adequately store and manipulate information*
  - *documentation that describes the operation and use of the programs.*

# WHY SOFTWARE IS IMPORTANT?

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- The economies of ALL developed nations are dependent on software.
- More and more systems are software controlled ( transportation, medical, telecommunications, military, industrial, entertainment,)
- Software engineering is concerned with theories, methods and tools for professional software development.
- Expenditure on software represents a significant fraction of GNP in all developed countries.

# SOFTWARE PRODUCTS

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- **Generic products**
  - Stand-alone systems that are marketed and sold to **any customer** who wishes to buy them.
  - Examples – PC software such as editing, graphics programs, project management tools; CAD software; software for specific markets such as appointments systems for dentists.
- **Customized products**
  - Software that is commissioned by **a specific customer** to meet their own needs.
  - Examples – embedded control systems, air traffic control software, traffic monitoring systems.

# SOFTWARE ENGINEERING DEFINITION

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- The seminal definition:
  - *[Software engineering is] the establishment and use of **sound engineering principles** in order to obtain **economically** software that is **reliable and works efficiently on real machines**.*
- The IEEE definition:
  - *Software Engineering: (1) The application of a **systematic, disciplined, quantifiable approach** to the **development, operation, and maintenance** of software; that is, the application of engineering to software. (2) The study of approaches as in (1).*

# IMPORTANCE OF SOFTWARE ENGINEERING

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- More and more, individuals and society rely on advanced software systems. We need to be able to produce **reliable and trustworthy systems economically and quickly**.
- It is usually **cheaper, in the long run**, to use software engineering methods and techniques for software systems rather than just write the programs as if it was a personal programming project. For most types of system, the majority of costs are the **costs of changing** the software after it has gone into use.

# ESSENTIAL ATTRIBUTES OF GOOD SOFTWARE

Product characteristic	Description
Maintainability	Software should be written in such a way so 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.
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. Malicious users should not be able to 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, memory utilisation, etc.
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.



# FIVE ACTIVITIES OF A GENERIC PROCESS FRAMEWORK

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- **Communication:** communicate with customer to understand objectives and gather requirements
- **Planning:** creates a “map” defines the work by describing the tasks, risks and resources, work products and work schedule.
- **Modeling:** Create a “sketch”, what it looks like architecturally, how the constituent parts fit together and other characteristics.
- **Construction:** code generation and the testing.
- **Deployment:** Delivered to the customer who evaluates the products and provides feedback based on the evaluation.
- These five framework activities can be used to all software development regardless of the application domain, size of the project, complexity of the efforts etc, though the details will be different in each case.
- For many software projects, these framework activities are applied **iteratively** as a project progresses. Each iteration produces a software increment that provides a subset of overall software features and functionality.

# ADAPTING A PROCESS MODEL

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The process should be **agile and adaptable** to problems. Process adopted for one project might be significantly different than a process adopted from another project. (to the problem, the project, the team, organizational culture). Among the differences are:

- the **overall flow** of activities, actions, and tasks and the interdependencies among them
- the **degree** to which actions and tasks are defined within each framework activity
- the degree to which work products are identified and required
- the manner which quality assurance activities are applied
- the manner in which project tracking and control activities are applied
- the overall degree of detail and rigor with which the process is described
- the degree to which the customer and other stakeholders are involved with the project
- the level of autonomy given to the software team
- the degree to which team organization and roles are prescribed

# CASE STUDIES

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- A personal insulin pump
  - An embedded system in an insulin pump used by diabetics to maintain blood glucose control.
- A mental health case patient management system
  - A system used to maintain records of people receiving care for mental health problems.
- A wilderness weather station
  - A data collection system that collects data about weather conditions in remote areas.

# DECLARATION

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**THANK YOU!!!**

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