INTRODUCTION

SOFTWARE ENGINEERING

CSE-317

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PREFACE

- What is Software?
- What is Engineering?
- What is software engineering?
- What is a software process?
- Different types of process models?
- Different Models with Strengths and Weaknesses
- Agile Software Development

WHAT IS SOFTWARE?

- **Definition:** The software is collection of Integrated programs
  - ✓ Software consists of carefully-organized instructions and code written by programmers in any of various special computer languages.
  - ✓ Software products may be developed for a particular customer or may be developed for a general market.
- **There are two fundamental types of software product:**
  - **Generic products**
    - ✓ Stand-alone systems that are marketed and sold to any customer who wishes to buy them.
    - ✓ The specification of what the software should do is owned by the software developer and decisions on software change are made by the developer.
    - ✓ **Examples:** PC software such as 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.
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    - ✓ **Examples:** Embedded control systems, air traffic control software, traffic monitoring systems.

TYPES OF SOFTWARE PRODUCTS?

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TYPES OF SOFTWARE?
(ON THE BASIS OF APPLICATIONS)

TYPES OF SOFTWARE? (1)
(ON THE BASIS OF APPLICATIONS)

On the basis of application software can be divided in 10 types:

1. **System Software:** It is necessary to manage the computer resources and support the execution of application programs.
   - ✓ Software like operating systems, compilers, editors and drivers etc.
2. **Networking and Web Applications Software:** It provides the required support necessary for computers to interact with each other. The networking software is also used when software is running on a network of computers (such as World Wide Web).
   - ✓ It includes all network management software, server software, security and encryption software and software to develop web-based applications like HTML
3. **Embedded Software:** This type of software is embedded into the hardware normally in the Read Only Memory (ROM) as a part of a large system and is used to support certain functionality under the control conditions.
4. **Reservation Software:** A Reservation system is primarily used to store and retrieve information and perform transactions related to air travel, car rental, hotels, or other activities.

TYPES OF SOFTWARE? (2)

(ON THE BASIS OF APPLICATIONS)

On the basis of application software can be divided in 10 types:

5. Business Software

- ✓ This category of software is used to support the business applications and is the most widely used category of software.
- ✓ Examples are software for inventory management, accounts, banking, hospitals, schools, stock markets, etc.

6. Entertainment Software

- ✓ Education and entertainment software provides a powerful tool for educational agencies, especially those that deal with educating young children.
- ✓ There is a wide range of entertainment software such as computer games, educational games, translation software, mapping software, etc.

7. Artificial Intelligence Software

- ✓ Software like expert systems, decision support systems, pattern recognition software, artificial neural networks, etc. come under this category.
- ✓ They involve complex problems which are not affected by complex computations using non-numerical algorithms.

TYPES OF SOFTWARE? (3)

(ON THE BASIS OF APPLICATIONS)

On the basis of application software can be divided in 10 types:

8. **Scientific Software**
   - ✓ Scientific and engineering software satisfies the needs of a scientific or engineering user to perform enterprise specific tasks.
   - ✓ Examples are software like MATLAB, AUTOCAD, PSPICE, ORCAD, etc.
9. **Utilities Software**
   - ✓ The programs coming under this category perform specific tasks and are different from other software in terms of size, cost and complexity.
   - ✓ Examples are anti-virus software, voice recognition software, compression programs, etc.
10. **Document Management Software**
   - ✓ A Document Management Software is used to track, manage and store documents in order to reduce the paperwork.
   - ✓ Such systems are capable of keeping a record of the various versions created and modified by different users (history tracking).
   - ✓ They commonly provide storage, versioning, metadata, security, as well as indexing and retrieval capabilities.

TYPES OF SOFTWARE?
(ON THE BASIS OF COPYRIGHT)

TYPES OF SOFTWARE? (1)

(ON THE BASIS OF COPYRIGHT)

On the basis of copyright software can be divided in 4 types:

1. **Commercial Software**
   - ✓ It represents the majority of software which we purchase from software companies, commercial computer stores, etc. In this case, when a user buys a software, they acquire a license key to use it.
   - ✓ Users are not allowed to make the copies and changes of the software. The copyright of the program is owned by the company.
2. **Shareware Software**
   - ✓ Shareware software is also covered under copyright but the purchasers are allowed to make and distribute copies with the condition that after testing the software, if the purchaser adopts it for use, then they must pay for its.

TYPES OF SOFTWARE? (2)

(ON THE BASIS OF COPYRIGHT)

On the basis of copyright software can be divided in 4 types:

3. **Freeware Software**
   - ✓ Freeware software licenses, copies of the software can be made both for archival and distribution purposes but here, distribution cannot be for making a profit.

4. **Public Domain Software**
   - ✓ In case of public domain software, the original copyright holder explicitly relinquishes all rights to the software. Hence software copies can be made both for archival and distribution purposes with no restrictions on distribution.
   - ✓ Modifications to the software and reverse engineering are also allowed.

ATTRIBUTES OF GOOD SOFTWARE

- **Maintainability** - change is inevitable, software must evolve to meet changing customer needs
- **Dependability** - software must meet appropriate levels of reliability, security and safety
- **Efficiency** - not wasteful of system resources
- **Usability** - appropriate user interface and support for the target population of users

WHAT IS ENGINEERING?

WHAT IS ENGINEERING?

Definition: **Engineering** is the application of **scientific** and **practical** knowledge in order to **invent, design**, **build**, **maintain**, and **improve systems**, **processes,** etc.

WHAT IS SOFTWARE ENGINEERING?

Definition: Software engineering is an engineering discipline that is concerned with all aspects of software production.

What are the fundamental of software engineering activities?

- Software specification
- Software development
- Software Validation
- Software Evolution

SOME IMPORTANT NOTES

- What is the different between software engineering and computer science?
  - ✓ Computer science focuses on theory and fundamentals; software engineering is concerned with the practicalities of developing and delivering useful software.

- What is the different between software engineering and 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 more general process.

CHALLENGES IN SOFTWARE ENGINEERING

- **Time to market** - the emphasis has moved from how long to deliver functionality to what can be delivered by a given date. Time versus functionality and quality
- **Rapid evolution** - customers (businesses) demand rapid changes in software to meet their needs (-> interest in Agile development processes)
- **Outsourcing** - moving software development 'offshore', where there are lower development costs. (-> pressure for more precise requirements)
- **Legacy systems** - how to integrate legacy software with new software? Maintaining legacy systems.

SOFTWARE ENGINEERING ETHICS

- Software engineering involves wider responsibilities than simply the application of technical skills.

- Software engineers must behave in an honest and ethically responsible way if they are to be respected as professionals.

ISSUES OF PROFESSIONAL RESPONSIBILITIES

1. **Confidentiality:** Engineers should normally respect the confidentiality of their employers or clients irrespective of whether or not a formal confidentiality agreement has been signed.
2. **Competence:** Engineers should not misrepresent their level of competence.
   - ✓ They should not knowingly accept work which is out with their competence.
3. **Intellectual property rights**
   - ✓ Engineers should be aware of local laws governing the use of intellectual property such as patents, copyright, etc.
   - ✓ They should be careful to ensure that the intellectual property of employers and clients is protected.
4. **Computer misuse:** Software engineers should not use their technical skills to misuse other people's computers.
   - ✓ Computer misuse ranges from relatively trivial (game playing on an employer's machine, say) to extremely serious (dissemination of viruses).


thank you