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Software Engineering

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Objectives

- To acquire knowledge of Software Engineering
- Hands-on experience in Project Management

Course Coverage

- Introduction
  - Software and Software Engineering
  - Software Process
- SDLC and Process Models
- Requirement Engineering
  - Requirement Gathering / analysis
- Use case approach
  - Use cases & usage scenarios
  - Use cases & functional requirements, Benefits of Use cases
- Design concepts

Course Coverage…..

- Software implementation and maintenance
- Software testing
- Software Quality Assurance & Quality Attributes
- Configuration management
- Project Management
  - Scope, Organizing, Planning
  - Scheduling, Activity Organization, Milestones, Deliverables
- Risk Management
  - Risk Identification, Analysis, Monitoring & Control

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Reference Books

- Software Engineering: A Practitioner's Approach by Roger S. Pressman
- Fundamentals of Software Engineering by Rajib Mall
- Brook's paper on Mythical man month Addison-Wesley 1975
- Software projects are different, Max Bullock & Wideman

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Introduction

What is Software?

- Software is the product that software professionals build and then support over a long term
- It encompasses
  - programs that execute within a defined computer size and architecture
  - content that is presented as the programs execute.

Software acts with a dual role

- Software product
- Application tool or environment for software product development.

Introduction…..

Features of Computer Application

- Accuracy
- Diligence – repeated activity over time
- Speed
- Storage

Usage of Computers

- Games
- Data Storage (Music, Photos, Videos, and …..)
- Send emails
- E-shopping / e-commerce
- Animation, Movies
- Document generation
- Science – space, meteorology
- Accounts – various applications including reservations
- Architecture and Design

Introduction…..

Characteristics of Software

- Software is developed or engineered, it is not manufactured in the classic sense
- management style is different
- Software does not ‘wear out’ – it deteriorates over time
- Replacement of parts may not be the ideal solution
- Though reusability is increasing, most of the software tends to be custom built

Introduction…..

Categories of Software

- System Software
  - Compilers, editors, file management
- Application Software
  - Standalone programs that solve a specific business need
- Engineering / Scientific
  - Astronomy, geography, meteorology ….
- Embedded
  - Resides within a product
- Product-Line Software
  - Specific products e.g. inventory control, banking
- Web Applications
  - Static sites, interactive sites, e-business programs
- Artificial Intelligence Software
  - Non-numerical formulae to solve complex programs, robotics, etc

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Software Engineering

Definition

- More than a discipline, or a body of knowledge, engineering is a verb, an action word, a way of approaching a problem – Scott Whitmire
- 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 - Fritz Bauer
- The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering software – IEEE

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Software Engineering ??

- The term “S*oftware Engineering”* first appeared in the 1968 NATO SE Conference
- To provoke thought about "software crisis”
- Relatively young than its sister fields of Eng
- What *software engineering* actually is, and if it deserves the title “engineering”
- We build systems like the Wright brothers built airplanes — build the whole thing, push it off the cliff, let it crash, and start over again
- “Software Development” is a term sometimes preferred by practitioners in the industry

Software Engineering ??

History

- Modern digital computer first appeared in 1941
- Wired operating instructions into the machine
- Design was not flexible
- Introduction of "stored program architecture" or von Neumann architecture.
- Division between "hardware" and "software" began with abstraction being used to deal with the complexity
- Programming languages started to appear in the 1950s
- OS was also introduced by Unix in 1969
- Key concept of modularity and information hiding in 1972
- “Simula” introduced the OOP paradigm.
- Mid 70s, the microcomputer was introduced

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Software Engineering ??

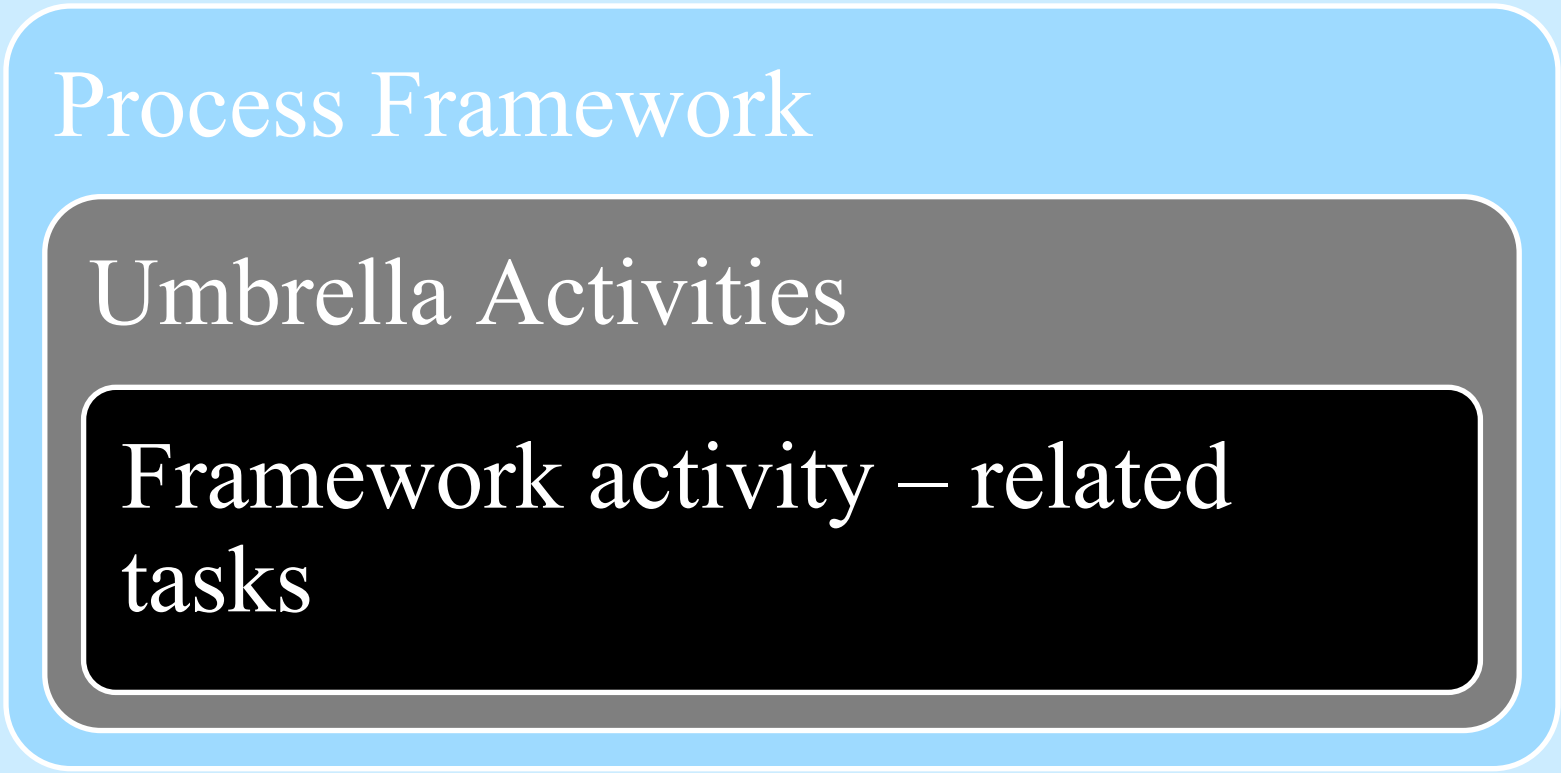
- History Mid 80s & onward…
  - Mid 80, SDLC concept appeared for centralized construction of software
  - Open Source softwares (Linux) in 90s
  - Mid 90s another change in engineering of s/w due to internet
  - Distributed Systems gained sway as a way to design systems
  - Java programming language was introduced - another step in abstraction having its own virtual machine
  - More light weight processes to create cheaper and more timely software

The current definition of *software engineering* is still being debated by practitioners today as they struggle to come up with ways to produce software that is "cheaper, bigger, quicker"

Software Engineering

- Encompasses a process, methods and tools

Software Engineering (Process Framework)



A process defines who is doing what, when and how to reach a certain goal – Jacobson, Booch, Rumbaugh

Software Engineering (Process Framework)

- Generic Process Framework
  - Communication – requirements gathering
  - Planning
  - Modeling / Prototyping
  - Construction
  - Deployment

- The framework activities will remain the same across various projects, but the task within each activity will vary based on project requirement

Software Engineering (Process Framework)

Umbrella Activities

- Project tracking and control
- Risk management
- Quality assurance
- Technical reviews
- Measurement and Metrics
- Configuration Management
- Reusability management
- Documentation
- Product Preparation

Software Engineering (Sub-disciplines)

- Software engineering: sub –disciplines
  - Software requirements
  - Software Design
  - Software development
  - Software testing
  - Software maintenance
  - Software configuration management
  - Software Project Management
  - Software development process
  - Software engineering tools
  - Software quality

Q & A

Any Question?

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Help ?

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