Software Engineering

- Introduction to SWE
- What is SDLC
- Phases of SDLC

Software Engineering

- Software engineering is a discipline with the following goals:
  - Fault-free software,
  - on time delivery,
  - within budget,
  - satisfaction of the user's needs.

- Software Engineering deals with:
  - designing,
  - building
  - maintaining software.

Civil Engineering Life Cycle

What is the life cycle of a civil construction?

- The civil engineer discusses with the customer and collects the requirements of the house.
- He plans and designs the model of house in a piece of paper. According to the civil engineering terminology, this model is called a blue print of the house.
- He constructs the house according to the design.
- He tests whether the house is constructed according to the plan.
- He hands over the new house to the customer which is now ready for occupation.

What is SDLC

The SDLC has the same procedures of a civil engineering life cycle as given below:

- Requirements phase
- Design phase
- Implementation phase
- Integration phase
- Testing phase
- Deployment and Maintenance phase

Requirements Phase

- In the Requirements phase, the system's services, constraints and goals are:
  - Established by consultation with the system users.
  - Defined in detail and approved by the customer.

- The specification document of the product is called Software Requirement Specifications (SRS) which constitutes a contract.

- Deliverables: SRS

Design Phase

- The aim of the design phase is to determine how the product will be made.
- Architectural Design
  - decomposes the product into modules.
  - Describes the functionality of each module.
  - Describes the interface to each module
    - Method Names
    - Inputs
    - Outputs
- Detailed Design
  - determines the internal structure of each module.
  - Algorithms are selected and data structures are chosen.
  - The internal data flows are determined.
- Deliverables: Architectural Design and Detailed Design.

Implementation Phase

- During the Implementation phase, the various component modules of the design are coded and tested. The major documentation associated with implementation is the source code itself, suitably commented.

- The job of testing the units or modules one by one independently is called unit testing. This is an integral part of implementation phase.

- Deliverables: source code.

Integration Phase

- The integration process involves building system combining the modules and determine whether the product as a whole functions correctly.

- After new modules are integrated then the software is tested to verify that the modules work together according to the specification, this is called integration testing.

- Deliverables: the software product.

System Testing Phase

- In this phase the software is testing as a complete system
- This testing verifies that:
  - Software implements all the features described in the SRS
  - All implemented features work correctly
  - The features are actually what the customer desired
    - The customer needs to be part of this testing

Deployment and Maintenance Phase

- Deployment
  - Installing Software and putting into practical use.
  - Organizing training sessions for users.
  - Writing user's manuals for the system.
    - The installation instructions,
    - Functional description of the software,
    - Reference guide with a list of error messages
    - Possible causes and describe how to recover from detected errors.
- Maintenance
  - Fixing bugs which were not discovered in earlier stages of the life cycle
  - Improving the implementation of system units
  - Enhancing the system's services as new requirements are discovered.