

Software engineering

هندسة البرمجيات

Definition :

Software is a program or set of programs containing instructions that provide the desired functionality.

Engineering is the process of designing and building something that serves a particular purpose and finds a cost-effective solution to problems.

Software Engineering is the process of requirements analysis designing, developing, testing, and maintaining software. Software engineering includes a variety of techniques, tools, and methodologies.

The main goal of Software Engineering is to develop software applications for improving quality, budget, and time efficiency.(produce **high-quality software on time also on budget**)

هندسة البرمجيات تنتج برامج عالية الجودة وفي حدود الميزانية كما تلبي احتياجات ومتطلبات المستخدمين وتسلم في الوقت المحدد.

Software Engineers :

Some of the key responsibilities of software engineer are:

- Requirement Analysis:
- Design and Development:
- Testing
- Code Review
- Maintenance
- Documentation

Software engineers require technical skills and soft skills :

Technical skills

- Coding and computer programming
- Software testing
- Object-oriented design (OOD)
- Software development

Soft skills

- Communication skills
- Team player
- Problem solving
- Attention to detail

Program vs Software Product :

Parameters	Program	Software Product
Definition	A program is a set of instructions that are given to a computer in order to achieve a specific task.	Software is when a program is made available for commercial business and is properly documented along with its licensing. Software Product = Program + Documentation + Licensing.
Stages Involved	Program is one of the stages involved in the development of the software.	Software Development usually follows a life cycle, which involves the feasibility study of the project, requirement gathering, development of a prototype, system design, coding, and testing.

Main Attributes of Software product :

Software product attributes are :

1. **Efficiency (Performance)** : It provides a measure of the resource requirement of a software product efficiently (How well the software uses resources such as CPU, memory, disk, and network).
2. **Dependability** : The degree to which a software system is trustworthy and can operate correctly, safely, and securely. The ability to work consistently and correctly under specified conditions. Includes fault tolerance, recoverability, and stability.
3. **Usability** : How easy the software is to use and learn.(Clear menus, readable text)
4. **Maintainability** It is the ability of the software to be modified, repaired, or enhanced easily with changing requirements (How easy it is to modify, fix, and update the software).

Software Development Life Cycle دورة حياة تطوير البرمجيات :

Software Development Life Cycle (SDLC), is a methodology that defines the entire procedure of software development step-by-step. The goal of the SDLC life cycle model is to deliver high-quality, maintainable software that meets the user's requirements.

SDLC stages are :

- 1) Requirement analysis تحليل المتطلبات
- 2) Planning التخطيط
- 3) Designing/system architecture التصميم/هندسة النظام
- 4) Coding/software developpement الترميز/تطوير البرمجيات
- 5) Testing/assurance quality الاختبار/ضمان الجودة
- 6) Deployment النشر
- 7) Operation and maintenance التشغيل والصيانة

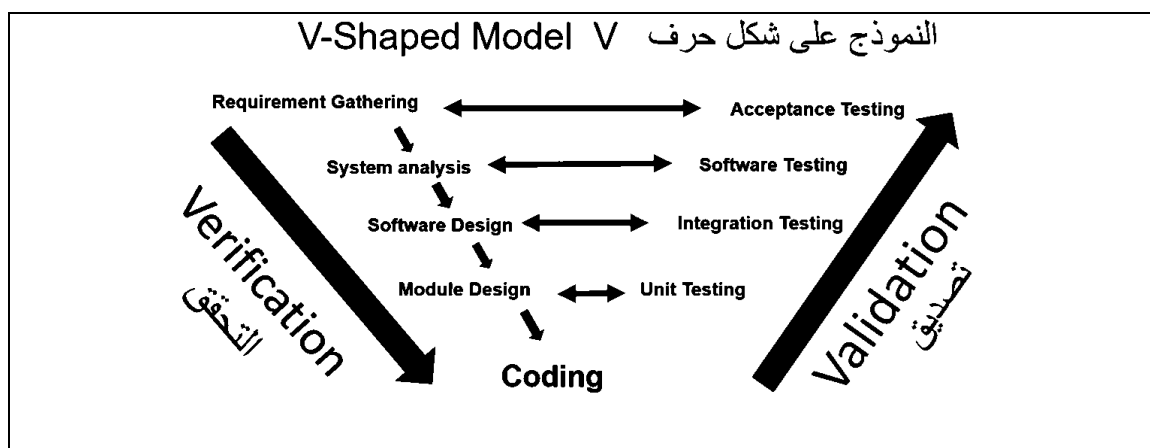
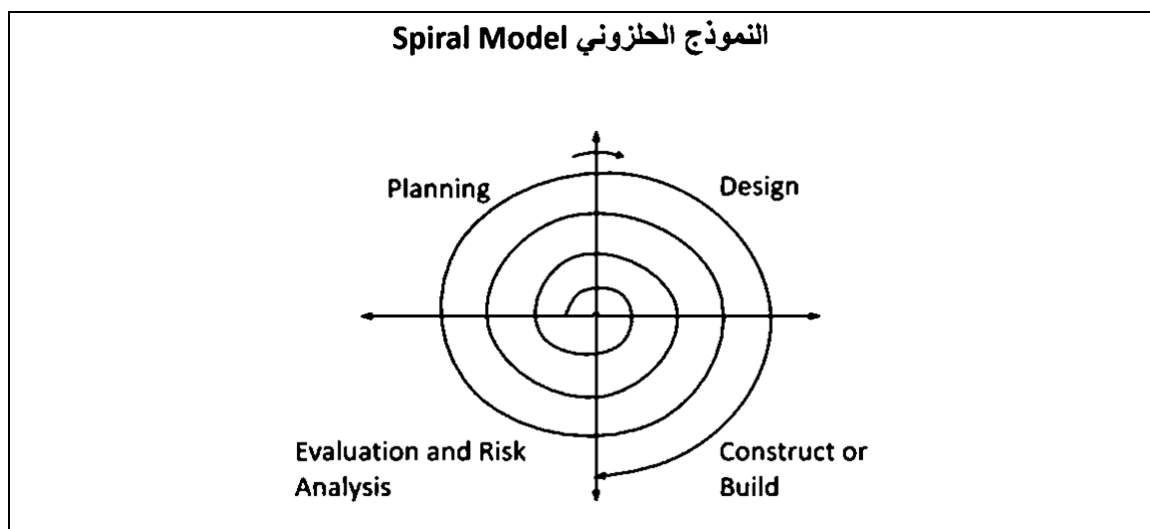
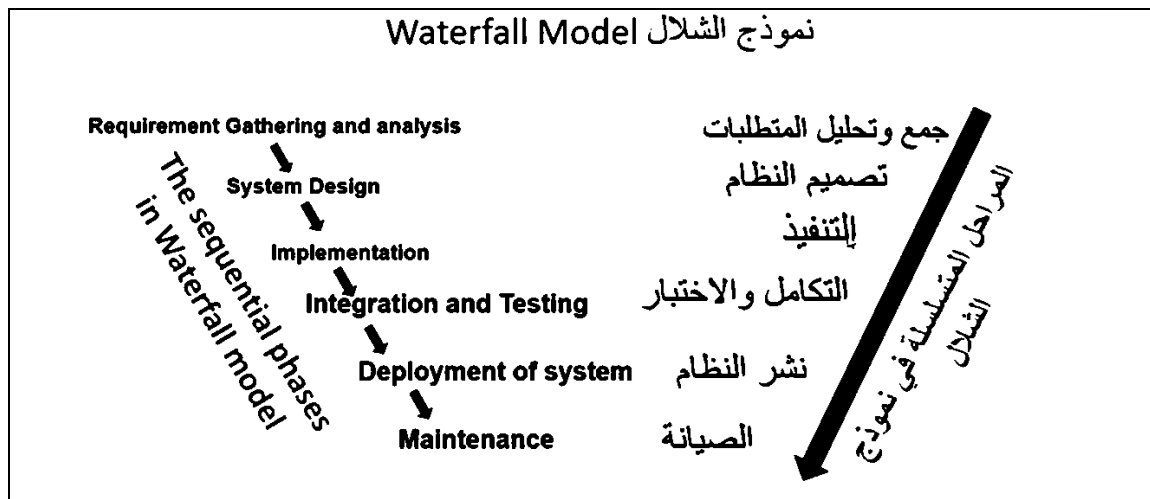
SDLC models :

SDLC Models are frameworks that guide the development process of software applications from initiation to deployment. Various SDLC models in software engineering exist, each with its approach to the phases of development.

Popular SDLC models are :

- 1) Waterfall model
- 2) Iterative model
- 3) V-model (Verification and Validation Models)
- 4) Spiral model
- 5) Agile model
- 6) Big bang model
- 7) RAD (Rapid application development) model
- 8) Incremental model
- 9) Prototyping model.

The choice of an SDLC model depends on factors such as project size, complexity, requirements volatility, and organizational preferences. It's essential to understand the characteristics and advantages of each model to make an informed decision based on specific project needs. Additionally, many organizations may adopt a hybrid approach, combining elements of different models to create a customized SDLC that suits their unique requirements.



Reference

- <https://www.geeksforgeeks.org/software-engineering/>
- <https://www.youtube.com/@prof.salehoqeililectures9355>