Unit 2

Software Engineering

Assignment II

- What are the key challenges that software Engineering Face during software development? Explain.

ans Lack of resources, time constraints and increasing complexity of software are some of the most common challenges in software engineering, threatening the overall equilibrium of the work environment. Here is a list of critical challenges software engineers face.

1 Requirement volatility.
This is one of the most prevalent software engineering problems. The project requirements are unpredictable and often ~~shift~~ need to be clarified to the team members when they might shift. It often happens when the team introduces new features or if stakeholders are consultants are involved in the project

2 Limited budget and resources.
This is one of the most common problems and challenges in software engineering. At times the client or the manager does not present a realistic timeline and thus creates constrains in both time and budget. Limited budget and resources can lead to project delay for an uncomfortable time frame.

3 Lack of communication and collaboration
the team manager acts as a messenger between the stakeholders and the team. If the team manager fils to produces the deliverables to the client, it is a primarily because of the lack of communication between the team and the manager.

4 Poor software qualitey and maintenance.
Quality assurance is a critical aspect of software engineering. Inadequate testing practices can lead to unreliable software and unsatisfied user. Employing manual and automated testing techniques, including unit testing, integration testing and regression testing can help identify and fix issues early in development. Besides it can be easily overcome by employing competent engineering with adequate technical knowledge.

5 Integration and compatibility issues
In most software projects, software reuse plays a vital roal. This happens when people work on a project informally and search for a code similar to the ~~require~~ required code. Hence, similar codes create a compatibility issues and give rise to pertinent software engineering problems. This problem could be mitigated by increasing the project budget and providing appropriate products to compile and make potent software.

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- What is software model ? List the types of software model.

ans Software process model, sometimes can also be referred as SDLC. Every model can have particular approach of providing information about the process but individual model is not perfect for all kinds of applications. A software process model is a simplified representation of a software process. Each process model represents a process from a particular perspective, and thus provides only partial information about the process.

These generic models are not definitive descriptions of software processes. Rather they are abstractions of the process that can be used to explain different approaches to software development. It is a process frame works that may be extended and adapted to create more specific software engineering process

Types of software models are

a Waterfall Model
b Incremental Development Model
c Reuse-oriented / Component Base Software Engineering
d Prototyping Model
e Spiral Model
f Rapid Software Development
 - Agile Methods
 - Extreme Programming
 - Rapid Application Development

- Explain agile methods and software prototyping.

The Agile methology is a project management approach that involves breaking the project into phases and emphasizes continuous collaboration and improvement. Team follow a cycle of planning, execution an d evaluation. Agile approaches to software development consider design an d implementation to be the central activities in the software process. The approach communicates one to one with clients. It provides realistic approach of software development. It delivers early partial working solution.

A prototype is an initial version of a software system that is used to demonstrate concepts, try out design options, and find out more about the problem as it possible solution. Rapid, iterative development of the prototype is essential so that costs are controlled and system stakeholders can experiment with the prototype early in the software process. System prototypes allow users to see how well the system support their work. They may get new ides of ~~requirement~~ strength and weakness of the software.

- What are the skills necessary to handle software project?

Skills necessary to handle software projects are given below!

1 Agile mindset

A project manager needs to hava a project mind set, which means embracing change, uncertainty, collaboration and Feedback. Software project managers need to understand the principles and practices of agile and how to apply them to their projects. They also need to foster a culture of trust, transparency, and empowerment among their teams and stakeholders

2 Technical competence.

Another essential skill for software project manager is to have a good grasp of the software development process, tools, techniques, and standards. Technical ~~Comple~~ competence helps software project managers to communicate effectively with developers, testers, and other techical roles, as well as to assess the feasibility, risks and trade-ofs of different solutions

3 ~~Business acumen~~-Management

Project Managers needs effective management skills. Even if they haven't had previous experience managing a team they're responsible for guiding their team throughout ~~team team~~ the lifecycle of a project

4 Communication

From project kick-off to stakeholder meetings, project managers are constantly communicating. ~~As such~~, ~~pro~~ Project managers must have excellent communication skills in order to successfully lead projects to completion.

5 Leadership.

When managing a team or project, it's crucial to have strong leadership skills. By effectively coaching, guiding and motavating your co-workers, you can help move a project ~~forward~~ and delwer a positive outcome

- What are the types of software requirements? Explain functional, non functional, domain and user requirements

ans A comprehensive set of requirements is crucial for any software project. Software requirements are a way to identify and clarify the why, what and how of ~~an~~ business's application.

According to IEEE standard 729, a requirement is defined as follows:

- A condition or capability needed by a user to solve a problem or achive an objective.
- A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification or other formally imposed document
- A documented representation of a condition or capability as in 1 and 2.

Functional requirements.

These are the requirements that the end user specifically demands as basic facilities that the system should offer. It can be a calculation, data manipulation, business process, user interaction or any other specific functionality which defines what function a system is likely to perform. All these functionality need to be necessarily incoporated into the system as a part of the contract.

non functional requirements

These are basically the quality constraints that the system must satisfy according to the project contact. Non functional requirements, non related to the system functionality rather define how the system should perform. ~~The priority or extent to wh~~ they busically deal with issues like; protability, Security, Maintainability, Reliability, Scalability, Performance, Reusability, flexibility.

Domain requirements.

Domain requirements are the requirements which are characteristic of a particular category or domain of projects. Domain requirements can be functional or non functional. Domain requirements engineering is a continuous process of proactively defining the requirements for all foreseeable applications to be developed in the software product line.

User requirements:

These requirements describe what the end user wants from the software system. User requirements are usually expressed in natural language and are typically gathered through interview, serveys or feedback

What is wasterfall model? Describe the activities of waterfall model also mention its drawbacks.

ans The first published model of the software development process was derived from more general system engineering process. This takes the fundamental process activities of specification, development, validation and evolution and represents them as separate process phases such as requirement specification, software design, implementation, testing and so on.

Activities of waterfall model is described below.

1 Requirements analysis and definition
the system's services, constraints, and goals are established by consultation with system users. They are the defined in detail and serve as a system specification.

2 System and software design
The systems design process allocates the requirements to either hardware or software systems by establishi an overall system architecture. Software design involve identifying and describing the fundamental software System abstractions and their relationships.

3 Implementation and unit testing.
During this stage the software design is realized as set of programs or program units. Unit testing involves verifying that each unit meets its Specification.

4 Integration and system testing.

The individual program units or programs are integrated and tested as a complete system to ensure that the software requirements has been met. After testing, the software system is delivered to the customer

5 Operation and maintenance.

Normally, this is the longest life cycle phase. The system is installed and put into practical use. Maintenance involves correcting errors which were not discovered in earlier stages of the life cycle. improving the implementation of system units and enhancing the system

Disadvantages.

- Error can be fixed only during the phase.
- Non desirable ~~p~~ for complex project.
- Documentation occupies a lot of time for developers and testers.
- Client feedback cannot be included during ~~the~~ development phase.
- One the model is structure, it is practically impossible to change
- This model cannot accept changes in requirements during development

- What is CASE? Explain the importance of CASE tools in Software Development life cycle.

ans CASE tools are set of software application program, which are used to automate SDLC activities. CASE tools are used by software project managers, analysts and engineers to develop software system.

~~Se~~

As the special emphasis is placed on the redesign as well as testing, the servicing cost of a product over its expected lifetime is considaably reduced. The overall quality of the product is improved as an organized approach is an dertaken during the process of development. Chances to meet real world requirements are more likely and easier with a computer-aided software engineering approach. It provides better documentation, improves accuracy, It also provide intangible benefites. It reduces lifetime maintenance. It is an opportunity for non programmers. It increases speed of processing. It is easy to programe Software using CASE tools.

- What is Programming language? Explain different software development tools.

ans The computer system is simply a machine and hence it cannot perform many work; therefore, in order to make it functional different languages are developed which is known as programming languages or simply computer languages.

Different software development tools are:

1 Git Hub

GitHub is a software development platform that allows users to host and share materials used in software development. It's online and community-based allowing developers from anywhere in the world to upload coding projects.

2 IntelliJIDEA

A popular integrated development environment (IDE) for Java Development, with support for a wide range of programming language and frameworks. Fetures include code completion refactoring and debugging tools.

3 Eclipse

Another popular IDE, with a focus on Java development but Support for a range of other languages as well features include code completion, refactoring and debugging tools.

4 Visual Studio

A comprehensive IDE from Microsoft, with support for a wide range of programming language and platform. Features include code completion, refactoring, debugging and integration with other Microsoft tools.

o Explain spiral and prototyping model

ans Prototyping model

A prototype is an initial version of a software system that is ased to demonstrate concepts, try out design option, and find out more about the problem and its possible solutions. This model is used when the customer do not know the exact project requirements beforehand. In this model, a prototype of the end product is first developed, tested and refined as per customer feedback repeatedly till a final acceptable prototype is achived which forms the basis for development the final product.

Spiral model

The Spiral model is a SDLC model that provides a Systematic and iterative approach to software development. The software process is represented as a Spiral, rather than a sequence of activities with some backtracking from one activity to another. Each loop in the spiral represents a phase of the software process. ~~Thus~~, The ~~inner most~~ phases of spiral model can be Objectives determination and identify alternative solutions, Identify and resolve Risks, Develop next version of product, Review and plan for the next phase.

- Difference between software engineering and computer science-

Software engineering works to understand tools and process using their carefully cultivated knowledge to design, create and maintain computer software. Meanwhile, computer science takes those tools and processes one step further ;and drive innovations with their programming algorithm and security skills.

Software Engineering	Computer Science.
1) ~~Soft~~It applies all the standards and principles of engineering to design, develop, maintain, test and evaluate computer Software which is also known as life cycle of Software Development	1) It is basically formed with the collection of computer Engineering, Computer Science, Information system, Information Technology and Software Engineering.
2) It involves the study and application of software only	2) It involve the study and application of software and hardware
3) Focus on designing, development and maintaining software system	3) Focus on designing, development, and maintaining computer hardware and software system.
4) It is a structural process of checking, verifying, finding the errors and bugs according to the need of software and then provide a solution to remove bugs	4) It is not a structural process as everything to be done in in a process and requires proper study before executing.

- Compare agile Software development with prototyping model

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	Agile	Prototyping
i)	It is an incremental delivery process where each incremental delivered part is developed through an iteration after each time box	In this ,we will collect the requirements from the customer and prepare a prototype.
ii)	Agile is a flexible and fast methodology.	ii) It is a slow processing methodology
x iii)	The project requirement must be clear	This process can be used if the requirement of the project is not clear
iv	Agile focus on software development	iv) Rapid prototyping focuses on design practices
v)		v)