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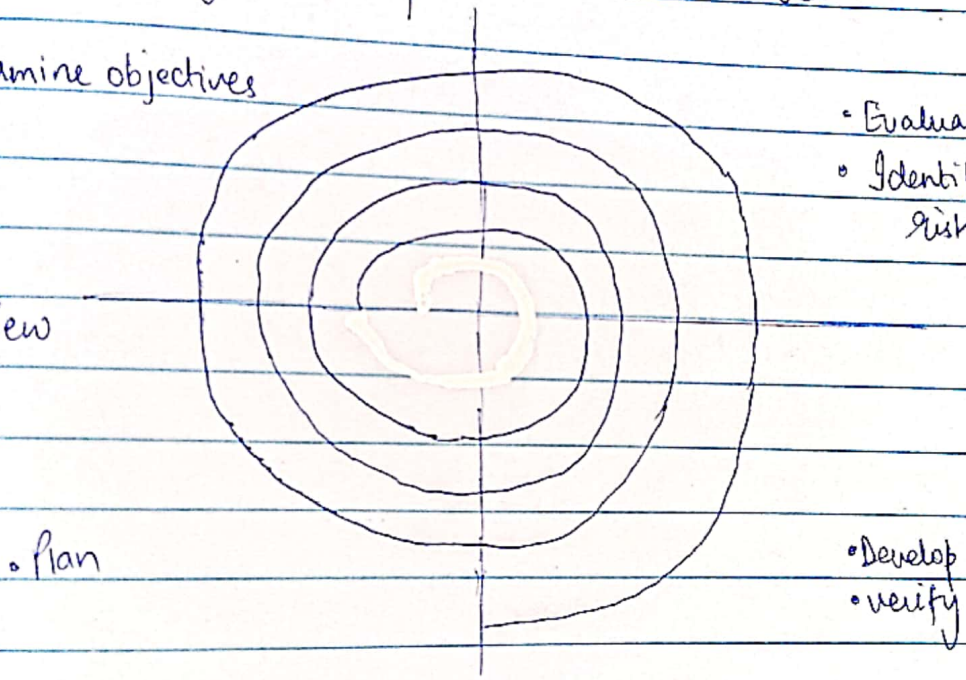
SOFTWARE ENGINEERING

SURPRISE TEST-1

1. (a) SPIRAL MODEL

Models dont usually deal with uncertainity which is inherent to software projects.

Barry Boehm recognized this and tried to incorporate the "project risk" factor into a life cycle model. Hence we got the spiral model in 1986.



* The radial dimension of the model represents cumulative cost
* Each path around the spiral is indicative of increased costs.
* The angular dimension represents the progress made in completing each cycle.
* Each loop of the spiral from X-axis clockwise through 360° represents one phase.

One phase is split roughly into four sectors of major activities

- Planning : Determination of objectives, alternatives & constraints.
- Risk Analysis : Analyze alternatives, and attempts to identify & resolve risks involved
- Development : Product development & testing product
- Assessment : Customer evaluation

ADVANTAGES

- Development is fast & features are added in systematic manner.
- Changes can be done at a later stage.
- Risk Management
- Customer feedback

DISADVANTAGES

- More documentation due to intermediate phases
- Costly model not suitable for small project
- The model requires risk assessment expertise

(b) SOFTWARE CHARACTERISTICS.

Six major components :

i) Functionality : Degree of performance of the Software against its intended purpose. Considers suitability, accuracy, compliance & security of software

(ii) Reliability : Ability of the software to provide desired functionality under given conditions.
Required functions : recoverability, fault tolerance and maturity.

(iii) Usability : Extent to which software can be used with ease. (Understandability, learnability & operability)

(iv) Efficiency : Ability of software to use system resource in most effective & efficient manner.

(v) Maintainability : Ease with which the modifications can be made in a software system to extend its functionality, improve its performance or correct errors.

(vi) Portability : Ease with which software developers can relaunch software from one platform to another without (or with minimum) changes.

AREAS OF APPLICATIONS OF SOFTWARE

1. System Software - Infrastructure softwares like compilers, operating systems, editors, drivers etc.

2. Real Time Software - These softwares are used to monitor, control & analyze real world events as they occur. Eg. Software for weather forecasting.

3. Embedded software - This type of software is placed in Rom of the product & control various functions of product The product could be an aircraft, automobile, security system, etc.

4. Business Software - Business software could be payroll, file monitoring system, employee management, account management. Eg Enterprise resource planning

5. Personal computer software - word processors, computer graphics, multimedia & animation tools, database management etc

6. Artificial Intelligence Software - Export systems, artificial neural networks, signal processing software

7. Engineering & scientific software - CAD / CAM package, SPSS, Matlab, Engineering Pro, circuit analysers etc

2. (a) FUNCTIONAL REQUIREMENTS

- Requirements that end user specifically demands as basic facilities that the system should offer.
- All of these functionalities need to be necessarily incorporated in the system as a part of the contract
- These are stated in the form of input given to the system, the operation performed & the output expected.

Example: Authentication of user when logging,

System shutdown in case of cyber attack.

NON-FUNCTIONAL REQUIREMENTS.

- Defines the quality attribute of a software system.
- Priority or extent varies
- Deals with issues like portability, security, reliability, scalability, flexibility, reusability, performance etc.

Example: Processing of each request must be done in 10 seconds.

STEPS IN REQUIREMENT ENGINEERING PROCESS

~~1. Develop Requirements~~

~~Gather, analyse & develop requirements from the concept of operations, Stakeholder needs, objectives.~~

~~2. Write & Document Requirements~~

1. Requirements Elicitation

Ways used to gain knowledge about project domain & requirements. Techniques used include interviews, brainstorming, task analysis, prototyping etc.

2. Requirement Specification

The models used at this stages include ER Diagram, data flow diagrams (DFDs), functional decomposition diagrams (FDDs) data dictionaries etc

3. Requirement verification & validation
Verification - set of tasks that ensure that the software correctly implements a specific function
Validation - Different set of tasks that ensure software that has been built is traceable to customer requirements

4. Requirements management
Analyzing, documenting, tracking, prioritizing & agreeing on the requirement.

(b) Major challenges that software engineering will face in next 10 years:

(i) Dev-Ops:
With the invention of Dev-ops there is need to shift development based decisions into the design phase.

(ii) Privacy & Security
These issues have to be kept in mind during the design phase. Due to internet software are becoming increasingly vulnerable.

(iii) Big Data.
With an exponential increase in data, software must get used to storing & utilizing vast amounts of data.

Universal web has transformed software systems:

- In place of monolithic development most of the applications are developed for web users.
- The updating & maintenance of web based software is easy. Changes made at one place will effect globally.
- Software is developed in parts. By using web it becomes easy to collect all parts to make a working application.