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**Iqra National University Peshawar Pakistan**

**Department of Computer Science**

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| Subject: | **Software Design** | Issue Date: | **13/April/2020** |
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**Note: Attempt all Questions..**

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| **Q.1** |  |  |  |
|  |  | Is the Software Design needed in the Software Development Projects? If yes then explain how it is important?  **Ans 1 a** : Software design is the process by which an [agent](https://en.wikipedia.org/wiki/Agency_(philosophy)) creates a specification of a [software artifact](https://en.wikipedia.org/wiki/Artifact_(software_development)), intended to accomplish [goals](https://en.wikipedia.org/wiki/Goal), using a set of primitive components and subject to [constraints](https://en.wikipedia.org/wiki/Constraint_(mathematics)). Software design may refer to either "all the activity involved in conceptualizing, framing, implementing, commissioning, and ultimately modifying complex systems" or "the activity following [requirements](https://en.wikipedia.org/wiki/Software_requirements) specification and before [programming](https://en.wikipedia.org/wiki/Computer_programming), as in a stylized software engineering process.  Software designn usually involves problem solving and planning a [software](https://en.wikipedia.org/wiki/Software) solution. This includes both a low-level component and [algorithm design](https://en.wikipedia.org/wiki/Algorithm_design) and a high-level, [architecture](https://en.wikipedia.org/wiki/Software_architecture) design.  Software Development Project. A software development project is a complex undertaking by two or more persons within the boundaries of time, budget, and staff resources that produces new or enhanced computer code that adds significant business value to a new or existing business process  Software design is a preeminent component of software project development. During the design phase, the actual conceptualizing of the solution is created, that is the detailed software architecture meeting specific project requirements is created. |  |
|  |  | **Q1 b** : As one of the most complex man-made artifacts (objects), computer software is very difficult to design. Explain what are the main challenges in software design?  **Ans** **1** **b** : The basic issues in software design  2.1 Concurrency. ...   * 2.2 Control and Handling of Events. ... * 2.3 Data Persistence. ... * 2.4 Distribution of Components. ... * 2.5 Error and Exception Handling and Fault Tolerance. ... * 2.6 Interaction and Presentation. ... * 2.7 Security.   Some of the major challenges include requirements volatility, design process, quality issues (e.g., performance, usability, security, etc.), distributed software development DSD, efficient allocation of human resources to development tasks, limited budgets, unreasonable expectations and schedules, fast-changing technology |  |
|  |  | Software Complexity Software is more complex, for the effort and the expense required to construct it, than most artifacts produced by human endeavor. ... per line of code to construct a one-million line program (specify, design, implement)   It is difficult to visualize the size of a software program because software has compex modules to be design. |  |
| **Q.2** |  | The literature on design methods began to appear in the 1950s and 60s. Since then, design methodology has become an independent discipline of scientific study.  **2a** : What are the essential characteristics of design?  **Ans no 2a** : A good design should posseses the following characteristics:   * Function. A product can be sold if it meets the needs of the consumer and as such the product must be designed to meet such needs. . * Some characteristics of a good design are :- * Reliability. . * Maintainability. . * Producibility. . * Simplification. . * Product standardization and variety reduction. ... * Quality. . * Minimum cost.   Six characteristics of good software design—simplicity, coupling, cohesion, information hiding, performance, and security—are described. This is followed by a description of abstraction as the art of software design.  There are some Software characteristics SC like reliability, usability, efficiency, maintainability, portability, functionality.   * Different Types Of Software Design Levels SDL:- * 1- Architectural Design:- This is the first level of the designing. Architectural design is the greatest summarize edition of the system. ... * 2- High-level Design:- This is the second level of the designing. ... * 3- Detailed Design:- This is the third level of the designing.   …………………………………………………………………………  **Q2b** . What activities of Software Design Process are used by designers?  **Ans no 2 b**: The design process activities are the followings:   * Architectural design. The sub-systems of system and their relationships are identified based on the main functional requirements of software. * Abstract specification. . * Interface design. . * Component design. . * Data structure design. . * Algorithm design.   Computer software designers use principles of science and mathematics to develop applications for multiple purposes. They might make games, operating systems and software programs. They figure out what a program should do based on user needs, then create and test it to ensure its functionality.  ……………………… ……………………………… |  |
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| **Q.3** |  | Study and explain Models other than McCall’ Model of attributes. Does the software Design affect these Models?  **Ans no 3** : Software Models are a standardised way of measuring a software product. ... Boehm Model - This model describes how easily and reliably a software product can be used. This model actually elaborates the aspects of McCall model in detail. It begins with the characteristics that resorts to higher level requirements  Al-qutaish (2010) studied five hierarchical quality models, which are the McCall model, the Boehm model, the Dromey model, the FURPS model (Grady, 1992), and the ISO 9126 model. He compared the structure as well as the coverage of quality attributes in these models.  Al-qutaish (2010) studied five hierarchical quality models, which are the McCall model, the Boehm model, the Dromey model, the FURPS model (Grady, 1992)  **FURPS** is an acronym representing a model for classifying software quality attributes (functional and non-functional requirements): Functionality - Capability (Size & Generality of Feature Set), Reusability (Compatibility, Interoperability, Portability), Security (Safety & Exploitability)  **The ISO/IEC 9126** standard describes a software quality model which categorizes software quality into six characteristics (factors) which are sub-divided into sub-characteristics (criteria). The characteristics are manifested externally when the software is used as a consequence of internal software attributes.  Which one is not a software quality model? Explanation: ISO 9000 is software certification. Explanation: A set of attributes that bear on the relationship between the level of performance of the software and the amount of resources used, under stated conditions.  **McCall's Factor Model**  This model classifies all software requirements into 11 software quality factors. The 11 factors are grouped into three categories – product operation, product revision, and product transition factors. Product operation factors − Correctness, Reliability, Efficiency, Integrity, Usability.  McCall's model is to bridge the gap between users and developers by focusing on a number of software quality factors that indicate the views of both users and developers. ... The product operation category consists of a set of quality attributes that includes correctness, reliability, usability, integrity, and efficiency.  The quality model is the cornerstone of a product quality evaluation system. The quality model determines which quality characteristics will be taken into account when evaluating the properties of a software product  Software quality must be maintained during the whole  process of software development.  Design effects quality of software for two reasons.  Design is the first stage to get quality requirements.  Errors made at this stage can be costly, even impossible, to be  corrected.  Design decisions effect the quality of the final product.  Design tasks divided into interrelated subtasks:  Architectural design,  Interface design  Detail design including algorithm and data structure design. |  |

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