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**CS-590**

**Software Architecture**

**Lab -1**

**d. Write a one page essay where you explain clearly why software architecture is important**

Like a blueprint of a building, a bridge, or any other kind of structure, software architecture is used to organize and conceptualize a system. It includes a definition of which elements and components need to be in the system, which components need to interact with each other, and what type of environment the software needs to operate. Software architecture defines the structure and constraints that the software developers will need to work in. It includes the documentation, charts, diagrams, and anything used to facilitate communications with stakeholders.  To sum up Software architecture is all about the important stuff. Whether it is a small project with a single structure or heavily loaded software, the architecture clears future processes efficiently.

The following are the benefits of software architecture:

**1. Clear and Concise Communication**

The software architecture makes the entire process easy to comprehend and communicate with the stakeholders, developers, and everyone involved. With a clearly laid-out architecture, not only is the planning process better, but the decision-making process is quicker and more efficient. It helps in understanding several aspects such as the cost, quality and duration of the software development.

2. **Quality assurance**

While providing custom software development services, the company ensures that the quality is maintained to produce the best results. Aspects such as the ability to maintain, security, performance and interoperability are a part of the software architecture.

**3. Managing Change**

Changes to a software system are inevitable. The catalyst for change can come from the market, new requirements, changes to business processes, technology advances, and bug fixes, among other things.

**e. Explain what the difference is between software architecture and software design**

While software architecture defines the important stuff software design focus on how the software will be built.  It addresses problems like the functions of individual modules, the scope of classes, the purposes of different functions, and the like.

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| S.No. | SOFTWARE DESIGN | SOFTWARE ARCHITECTURE |
| 01. | Software design is about designing individual modules/components. | Software architecture is about the complete architecture of the overall system. |
| 02. | Software design defines the detailed properties. | Software architecture defines the fundamental properties. |
| 03. | In general it refers to the process of creating a specification of software artifact which will help to developers to implement the software. | In general it refers to the process of creating high level structure of a software system. |
| 04. | It helps to implement the software. | It helps to define the high level infrastructure of the software. |
| 05. | Software design avoids uncertainty. | Software architecture manages uncertainty. |
| 06. | Software design is more about on individual module/component. | Software architecture is more about the design of entire system. |
| 07. | It is considered as one initial phase of Software Development Cycle (SSDLC) and it gives detailed idea to developers to implement consistent software. | It is a plan which constrains software design to avoid known mistakes and it achieves one organizations business and technology strategy. |
| 08. | Some of software design patterns are creational, structural and behavioral. | Some of software architecture patterns are microservice, server less and event driven. |
| 09. | In one word the level of software design is implementation. | In one word the level of software architecture is structure. |
| 10. | How we are building is software design. | What we are building is software architecture. |

**f. Explain What makes software architecture so difficult?**

**Ans:**

Software architecture is hard because everything is a trade-off, and a software architect’s primary responsibility is making design decisions that consider those trade-offs.Architecture characteristics, often referred to as “the -ilities,” are orthogonal to the domain functionality. You cannot make an architectural decision without knowing which characteristics are important to the stakeholders.

g. Explain clearly the main differences of software architecture in a traditional waterfall project and software architecture in an agile project.

**Ans:**

**Software Architecture:** in waterfall it is done only once at the beginning of the project and it is handed to the analysis teams. But in agile it is repeated several times till the customer approves the product.

i. For each of the following qualities, give at least 1 technique that you know to increase this quality: 1. Performance

2. Availability

3. Resilience (against failure)

4. Reusability

5. Maintainability