# Section 1: Origins of Software Architecture

## Question 1

What four ‘things’ influence the design of an architecture as describe in the book in Chapter 1?

### Answer

**Section 1.1**

1. Architectures are influenced by the system stakeholders.
2. Architectures are influenced by the development organization.
3. Architectures are influenced by the architect’s background and experiences.
4. Architectures are influenced by the organization’s technical environment i.e. enterprise-wide standards concerning technology and process.

## Question 2

1. What is the definition of a System’s Stakeholder?
2. What is the name given to the specific stakeholder(s) that is the primary source of system features and requirements?
3. Provide an example of a problem domain and a stakeholder in that domain. Try not to use a domain described in class.

### Answer

1. A stakeholder is anyone who has an interest in seeing the successful delivery of the system.
2. The Subject Matter Expert (SME).
3. Grader: The answer should provide the name of a problem domain and a person or group of persons who are interested in a successful delivery. For example: Surgical Robots and either the doctor or patent.

## Question 3

What are the four phases of the Unified Process SDLC (Software Development Lifecycle)? (You will need to research this topic) Hint: The first phase is Inception.

During which of these phases is the system’s architecture decided upon?

### Answer

UP SDLC describes a development process to be followed by the development team to build a system from a project’s start to end. A process is defined with a number of activities that are performed by the development team during the project. UP divides these activities into four phases:

**Inception**: The overall goals (scope) of the project are established. An initial schedule and budget are created. Risks to success are identified. The decision of whether to proceed with the project is make.

**Elaboration**: Define the project’s budget and schedule. Define a majority of the system’s requirements. Design / decide upon the system’s architecture.

**Construction**: Essentially design and build the system according to the requirements. Unified Process describes an iterative process where manageable chunks (related features) are analyzed, designed, constructed, and tested in 3-4 week *iterations*. The system is built incrementally over a number of iterations until finished.

**Transition**: Final (integration or acceptance) testing is performed and defects are resolved. The completed system is delivered or put into production.

The system’s architecture is decided upon early in the project lifecycle. In UP terms, the architecture should be completed by the end of the elaboration phase.

## Question 4

Give three examples of how an organization’s previous investments or experiences can affect decisions concerning the design of a new product, service, or other development efforts.

### Answer

Some that come to mind are:

1. The organization will have an investment in specific hardware, operating system, or services. For example, they may have invested in Linux or Windows. They may have invested in Oracle or MS SQL Server DBMS.
2. The organization will be staffed with developers and other support personnel that are trained with specific technologies. For example, a staff that is experienced with Java, C++, or .NET languages and tools.
3. The staff’s expertise may extend to specific frameworks within a technology. For example, the use of JEE or Spring frameworks (these are Java-based frameworks used to assemble and deploy systems).
4. The organization may have invested in an internally developed framework which they want to reuse in new development.
5. The organization may wish to leverage an existing system, hoping to extend the existing system to meet future needs.

## Question 5

Describe the two categories (clusters) of recommendations provided by the book in Section 1 for designing an architecture.

### Answer

Section 1.3.

The categories are Process and Structural recommendations.

Process refers to the activities and ‘process’ an organization follows when developing the architecture for a new system or application. This is similar to the SDLC processes we studied in Software Engineering.

Structural refers to recommendations on how to design and ultimately construct the architecture. Structure refers to the system’s design, which patterns are used, and other software engineering best practices e.g. encapsulation and loose coupling.

## Question 6

What are the seven responsibilities the architect (role) has throughout the software development lifecycle?

### Answer

1. Contributes to building the project’s business case.
2. Contributes to capturing the system’s requirements.
3. Designs the system’s architecture.
4. Evaluates alternative architecture designs and selects the design that best meets the system’s unique quality attributes.
5. Communicates the architecture (design) to management and the development team.
6. Contributes to implementing the system.
7. Monitors development for conformance to the architecture.

## Question 7

Describe how an architect’s prior experience that can influence the decisions they make when designing the architecture of a new system. Hint: Similarity

### Answer

The most obvious will be the experiences the architect had with a particular technology in a previous project / architecture. If the project was successful, the architect may wish to utilize the same design in a new project, especially if the new project is similar to the previous successful project.

## Question 8

Each of the following is a requirement for an e-commerce site (for example amazon.com).

Identify each requirement as being functional or non-functional.

1. The customer must register and sign in before they can checkout. Functional
2. The site will provide 99.999 percent uptime. Non-functional
3. The site will present the user with a personalized home page containing items they examined on past sessions. Functional
4. The site will organize the customer’s browsing experience according to product categories. Functional
5. The site will respond to all requests within three seconds on average. Non-functional.

### Answer

Given in question.

## Question 9

Describe the differences between the views of a system held by architects vs. the view of a system held by developers.

### Answer

Grader: Answers should describe these views, not just list B&S vs N&D.

The architect has a broad and shallow view of the system. The architect takes a broad view that is concerned with understanding and accommodating all of the features required by the customer. However, because most architects are mere mortals they cannot internalize and understand the design and implementation of all these features.

The developer has a narrow and deep view of the system. Each of the several developers working on a project assumes responsibility for the design and implementation (delivering) of several of those features. Design and implementation requires a deep and detailed understanding of the features requirements, code design, etc. However, developers tend to ignore the design and implementation of those features they are not responsible for.

## Question 10

Describe at a high level the responsibilities and relationships between the Enterprise Architect and the Application Architect?

How are the designs produced by the application architect constrained by the enterprise architecture?

### Answer

The enterprise architect is concerned with the design of enterprise-wide IT infrastructure i.e. systems or services. These may be communication systems (networks) or databases that are used by all of the enterprise’s applications. The enterprise architect is also concerned with mandating the development practices and tools that are used to build the enterprise’s application.

The application architect is concerned with the design and delivery of applications that will execute within the enterprise’s IT infrastructure. The application architect gathers requirements and design an architecture for a single, specific application.

The application architect works with the tools and policies dictated by the enterprise architects. Their designs must use approved technologies such as technology stacks (Linux/Java vs Windows/.net), vendors (Oracle, MS, etc.), designs, infrastructure services provided by the enterprise, entities, and enterprise-specific business rules.