1. **What are architectural drivers? List and describe each. Of the architectural drivers which tend to have the greatest influence on design and system structure?**

**Architecture drivers** are requirements that will shape the software architecture. They include: High-level Functional Requirement, Constraints, Quality Attributes Requirement.

* **High-level functional requirements** descride what a system must do. “High-level” means the requirements that don’t refine in detail, still raw and generality. Some example of high-level functional requirement:
* **Constraints** are pre-made design decisions that the architect must observe to design a software. They are made before the system design begin. There are two kinds of contraints:
  + **Technical constaints** have a direct influence and immediately on the design. They are obvious and clearly. For example: programming language (such as: Java, C#, C++, Ruby), network (Wireless, ethernet), protocol (such as: TCP, OSI), algorithm (such as: dijkstra, heuristic, brute-force search), operating system (such as: Window, Linux, Mac OS),… must be used in system.
  + **Business constraints** have indirect influence on the design. But they seldom have obvious architecture design influence. For example: Cost, schedule or company policies,…
* **Quality attributes requirement** – properties that the system must have in addition to functionally. For example: security, perfornance, availability, usability, flexibility, modifiability, so forth.

Quality Attribute requirement is the **greatest influence on design and system structure** because it’s hard to write down or test. To make quality attributes well, we must define at the architectural design commence because architecture allocate to elements and assign them. For example: The customer want their software must have modifiability such as: sometime winform, other time webform; therefore, the quality attributes must be identify from a beginning of architectural design to define a multiple tiers (such as: Presentation tier and Logical tier). When the presentation tier change, the logical tier is keeping.

1. **How to present quality attributes?**

Each quality attribute have a scenario because that is no sense if these quality attribute without scenario, it look like a vessel that doesn’t contain anything inside. Therefore, they must be present with six part below:

* Source of Stimulus: The entity (such as: a human, a computer system, or any other actuator) that generated the stimulus.
* Stimulus: The stimulus is a condition that impact on system.
* Environment: The condition that under when the stimulus occurred
* Artifact: The artifact that was stimulated by stimulus.
* Response: This is a results of the activity that was stimulated by stimulus.
* Response Measure: a measurement of respone when the stimulus occurred.

*Example:*

“A acceptance tester performs a acceptance test on a completed system that provides an interface for controlling its behavior and observing its output; 75% path coverage is achieved within two hours”

Source of Stimulus: Acceptance tester

Stimulus: performs a acceptance test

Environment: system

Artifact: at the completion of system

Response: system has interface for controlling behavior and output of the system is observable.

Response Measure: 75% path coverage is archieved with thin 2 hours.

1. **Show some possible business and technical constraints**

*Business constraints:*

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| Consideration | Business Constraints | Examples |
| Cost limitations | How much over what period of time can be spent on the system or product? | The budget provides for project is 50.000 USD |
| Schedule limitations | What are the delivery schedules? One delivery? Incremental? What functionality must be delivered at what point in time? | The delivery schedules is next six month. |
| Mandatory regulatory restrictions and demands | Are there any regulations imposed on the system, product, or organization designing and building the system, or the customer stakeholders’ organization? |  |
| Legal restrictions and demands | Are there any legal impositions placed on the system, product, or organization designing and building the system, or the customer stakeholders’ organization? | The information of person under the age of 21employed to work underground shall be supplied to an authorized member of the executive of the trade union on his request. Disclosure of medical information of persons employed to work underground is prohibited.  (From legal reference: Regulation 16F of Factories and Industrial Undertakings Regulations, Cap 59) |
| Market restrictions and demands | Does the target market impose any restrictions or demands on the system or product, especially if it could prevent entry into another market? | Not produced commercially in the EU |
| Organizational restrictions and demands | Do any of the organizations involved in the project have policies, processes, resources or lack thereof, or structural issues that could impose restrictions or demands on the design or construction of the system or product? | Our information centre is open 7 days a week from 9am - 4pm. |
| Logistical issues | Are there logistical issues such as deployment, transportation, supplier/supply chain, and similar that could impact the design of the system? | The product was transported by train |

*Technical constrains:*

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| --- | --- | --- |
| Consideration | Technical Constraints | Example |
| Computer operating system(s) | Are there any constraints to use a particular computer operating system? Are there any constraints to support multiple operating systems? | Window, Ubuntu, Linux, MS-Dos, Mac OS, Unix |
| Computer platform(s) | Are there any constraints to use a particular computer hardware platform? Are there any constraints to support multiple hardware platforms? | Personal computer, Mainframe, supercomputer,… |
| Computer languages(s) | Is there a constraint to use a particular computer language? | Java, C#, C++, Ruby, Ajax, Pascal, Visual Basic, Perl,… |
| Peripheral or network hardware | Are there any constraints that specify that particular peripheral devices or network hardware be used? Is there any custom hardware specified that must be used? | Hub, Switch, Router,… |
| Commercial hardware or software products | Is there a constraint that specific commercial hardware and software products be used? | Hardware: High security keying system, …  Software: Microsoft Project, Microsoft Office, … |
| Tools and methods | Are there any constraints that specify that certain tools (e.g., design tools, process tools, programming environments) or technical methods be used? | Microsoft Visual Studio, Netbean, Visual C++, SQL Server, Enterprise Architect |
| Protocols, interfaces, standards | Are there any constraints that specify that certain protocols, interfaces, or standards be used or adhered to during development? | TCP, OSI,… |
| Legacy hardware and software | Are there any constraints that indicate that the new system/product must utilize or interact with any legacy hardware or software systems or elements? | Interact with printer, scanner, microsoft excel,… |