

**DESIGN AND ANALYSIS OF COMPUTER NETWORKS:**

**ASSIGNMENT**

**REPUBLIC OF CAMEROON**

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**COMPUTER ENGINEERING**

**SOFTWARE ENGINEERING**

***Failing to plan is planning to fail.***

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**EXCERSISE 1.12**

**Questions 1:**

In Example 1.3, an analogy was drawn between a network’s architecture and design and a home’s architecture and design. Provide a similar analogy, using a computer’s architecture and design.

**ANSWER**

A computer’s architecture and design are similar to a network’s architecture and design.

First, the computer’s architecture are the functional components such as input and output unit, central processing unit, storage unit, bus cables **(addressing and routing),** random access memory **(performance)** and software **(privacy and performance)**. For the network’s architecture, we a have hardware and software, network topology **(network management)**, and communication protocols (**security, privacy and performance**) and transmission media **(addressing and routing).**

The computer’s design shows were the architectural designs are located. For example, where the fan is located, the registers, the processor, ports and slots, and the storage drives. For the network, where major devices such as routers and repeaters are located.

**QUESTION 5**

Service requirements flow from user to application to device to network, becoming more specific along the way. If you were given an application requirement for end-to-end delay (e.g., 100 ms) between an application server on one network and users on another network, for example, how might that translate into delay in the network and devices? What types of service metrics could you use to measure it?

**ANSWER**

Propagation delay, transmission delay, queuing delay and processing delay all contribute to the end-to-end delay.

* Propagation delay is the time it takes for one bit to travel from one end of the link (network), to the other.
* Transmission delay is the time needed to push all the packet bits on the transmission link.
* Queuing delay is the time a packet waits before it is processed in a buffer or switched.
* Processing delay is time taken to process the header of the packet.

If any of these times increase, the end-to-end delay will increase as well.

Some service metrics that could be used to measure it include; throughput, latency, packet loss, jitter, packet reordering and VoIP quality.

**QUESTION 7**

Which of the following applications require best-effort (unpredictable and unreliable), guaranteed (predictable and reliable, with accountability), or predictable service. Give reasons for your choices.

* High-quality (phone company-grade) voice calls
* Voice over IP (VoIP) calls
* File transfers via FTP
* Audio file downloads
* A commercial video-on-demand service
* User access to servers in a corporation

**ANSWER**

**Voice over IP (VoIP) calls:** It has higher call quality, flexibility (can carry many users per network), reliability and it is portable and scalable (users can be added to the network). (e.g, skype, zoom)  
  
**A commercial Video-on-Demand service:** It is convenient. That is, users can search through a video library and watch their choice of content at any time and place. Data can be shared too (e.g YouTube)   
  
**User access to servers in a corporation:** There is remote management, and centralized, real time data access.

**QUESTION 8**

Show how performance boundaries and thresholds could be used in the following scenarios. • An application has a service requirement for round-trip delay to be less than 100 ms. If delay is greater than 100 ms, notify the network administrator. • A user requires capacity of up to 512 Kb/s but may not exceed 1.5 Mb/s. You want to keep track of how much time the user’s capacity is between 512 Kb/s and 1.5 Mb