1dv702 Preliminary Assignment

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1 Question 1.1

A network and a computer architecture are similar as they describe the major components of each. For the network: network management, addressing and routing, security and for the computer: CPU, RAM, GPU, PSU etc., and also interactions between them such as the way they communicate, compatibility, bandwidth. Both of the architectures have physical components and functional components. Both are incredibly complex.

2 Question 1.2

The lower the cost, higher the bandwidth means that we want to have the lowest number between computers. If we add diversity we might be able to produce a path with a lower cost. For the picture in Errata.pdf the cost between Joe and Sandy is 248. If we add a link between a and b of cost 3 it would be better because it would produce a symmetrical map, a link between c and d is the same like a link between a and b.

3 Question 1.3

Wikipedia says that a content delivery network, or content distribution network (CDN), is a geographically distributed network of proxy servers and their data centers. The goal is to provide high availability and performance by distributing the service spatially relative to end users. A CDN strategy helps with performance because it provides diversity to a network using an algorithm of distribution, it is a real applied solution using the principle from Question 1.2.

4 Question 1.4

You, as a service provider must define the end to end performance between the device and the server. If you use a WAN provider you must add the latency from you own LAN network that you will use and the WAN network that you sub-contract and must research the limits. A service metric that one must use

for a POS service for example is a threshold measured in milliseconds and the limits for it.

5 Question 1.5

In between the application server and the user is the device and if we take the example of 100 ms it will mean that the latency between the server and the device will be lower. You can measure it the same way you would measure the latency between the application server and the user but the device would be the end point in this case.

6 Question 1.6

The way I interpreted this question is to just describe Figure 1.27 and Figure 1.28. Figure 1.27 was the original plan for the network, the bandwidth did not go lower than 1Gb at any point in the transmission path, however, a firewall was added in Figure 1.28 that limits the bandwidth on that segment to 100 Mb, this is very wrong and goes against the original plan. One should consider the speed when making changes in an existing network.

7 Question 1.7

- High-quality (phone company-grade) voice calls - guaranteed because voice is always guaranteed
- Voice over IP (VoIP) calls - best effort because IP is best effort
- File transfers via FTP - best effort because IP is best effort
- Audio file downloads - best effort because IP is best effort
- A commercial video-on-demand service - best effort because IP is best effort
- User access to servers in a corporation - guaranteed if done right

8 Question 1.8

For the first scenario a hard limit should be used, if the limit is exceeded a notification is sent to the administrator and if it increases packets might be dropped. For the second scenario a threshold should be used, since there is a need for a minimum and maximum value.

9 Question 2.1

The requirements analysis process is about identifying, collecting, and evaluating requirements for the network. One reason is to avoid mistakes, a second reason is to ensure quality and a third reason is to produce artifacts for subsequent employees to analyze the process of building and designing a network.

10 Question 2.2

- a) - coretechnical bug makes military lose money
- b) - feature
- c) - core
- d) - core
- e) - feature
- f) - informational
- g) - core

11 Question 2.3

- a) - device
- b) - application
- c) - user
- d) - network

12 Question 2.4

Hypothetically there is a company and it's users want a special e-commerce platform for selling goods, it is determined that to fulfill the contract we need a web server software that is proprietary and that web server requires a special proprietary redundant next-gen hardware that also requires an expensive router with optical 1000GB connections. The requirements get more technical because they get more specific, from wishes, to concrete, complex solutions.

13 Question 2.5

- a) - real-time because if data is lost it is lost forever
- b) - mission-critical because there is loss of money if the service goes down
- c) - rate-critical because the capacity is key here

14   Question 2.6

- government - the skatteverket web portal because taxes are holy and we can't lose them otherwise we would not be able to pay for vacations for the public sector

- military - communications with satellites, we need to get the images from the mass graves from China

- commercial - anything that can lose money really

15   Question 2.7

An example of a real-time app is an online game, if the latency is too high you desync and immersion is broken. Telnet is an interactive burst app because the delay is being caused by the network. Interactive Bulk applications are those where processing delays overwhelm any network delays such as FTP. An asynchronous communication service or application does not require a constant bit rate like a mail application.

16   Question 2.8

- Voice over IP (VoIP) - because the audio would be choppy if the packets are late

- Non-buffered (real-time) video or audio playback - because the video would stutter

- Teleconferencing - the same reason, immersion would be broken

17 Question 2.9 and 2.11
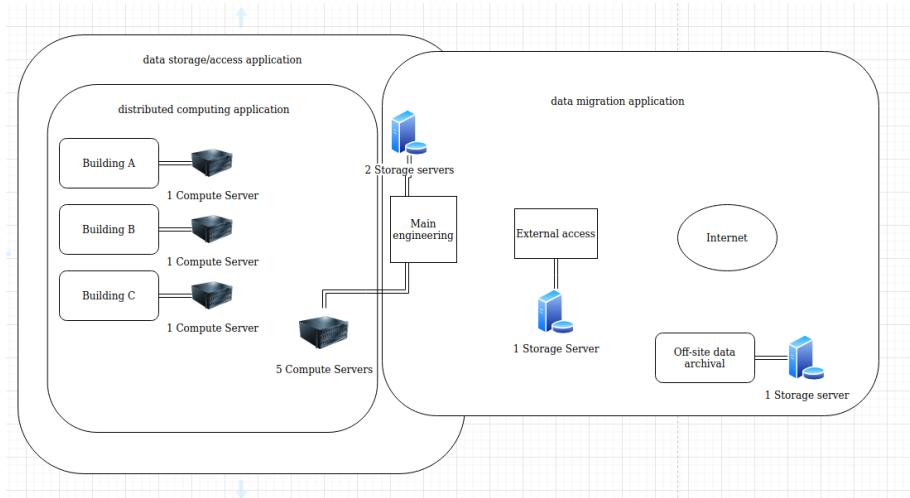
18 Question 2.10

- a) - specialized device
- b) - generic computing device
- c) - server
- d) - server
- e) - generic computing device

19 Question 2.12

In a campus you would use many types of apps. For example for video editing you usually use the network. The software used here can be Premiere pro, After effects, Lightworks, Davinci resolve. On a campus you use Active Directory, mail servers, web servers such as Apache web server. You can use Virtualized deployment with VMware over the cloud. There is also a need for custom compute apps for simulations. Another app that might be used is a regular backup app and file sharing apps.