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

For the picture in Errata.pdf, the cost to travel between Joe and Sandy is 248. I would connect point a to point d, this will reduce latency since going up in the hierarchy will reduce latency and this solves the problem and makes the connection possible. 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. 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

The routers that are in between the network nodes can be the end points of the service. The ways one can measure the service is RMA, which stands for

reliability, maintainability and availability.

5 Question 1.5

An application requirement can translate into a delay as a queuing delay or a processing delay. The metrics for the services that I use are capacity and delay. The Capacity shows what bandwidth is possible in the network theoretically. The delay is used to measure how long do signals take to travel in the network and are measured as end-to-end or round-trip delay measurements.

6 Question 1.6

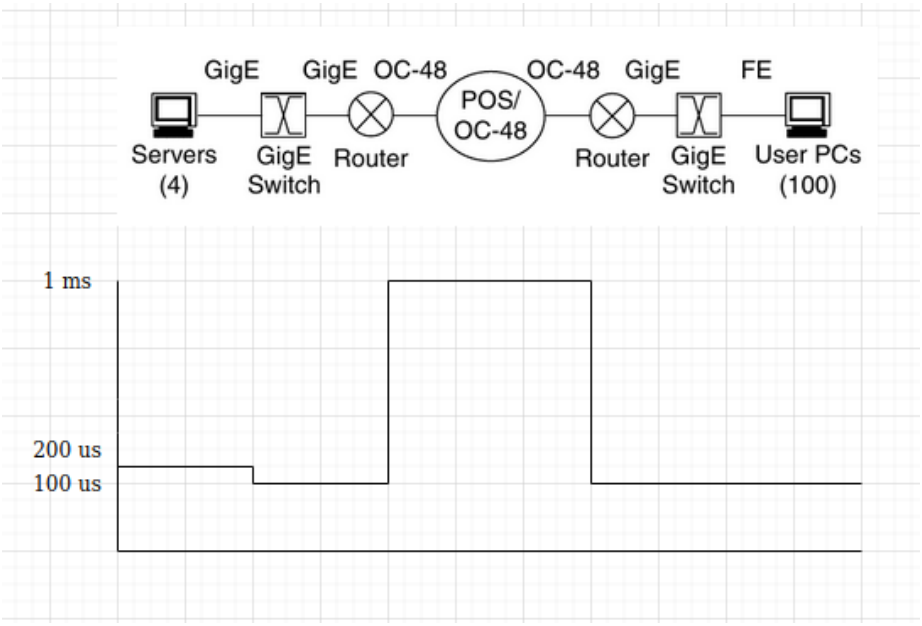


Figure 1: Before firewall

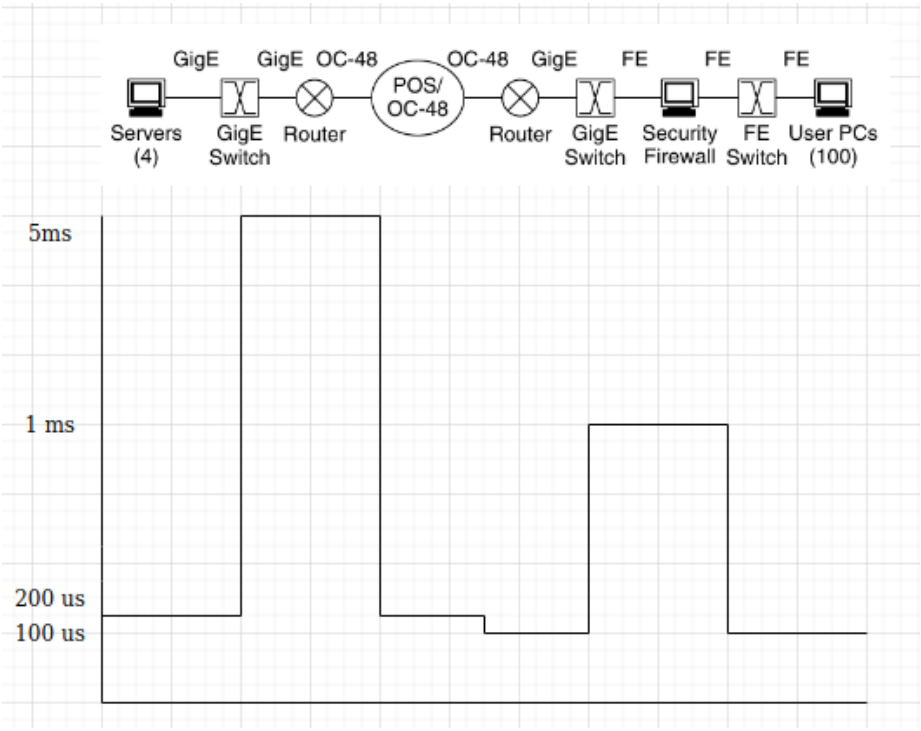


Figure 2: After firewall

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. Here I got a comment that VOD might not be over IP, on Wikipedia it says VOD is over the internet which is what I knew so I will not change this bullet point.
- User access to servers in a corporation - Guaranteed because in a private network you can allocate bandwidth for users and you can guarantee access using QoS technology. Not necessarily guaranteed but it can be achieved.

8 Question 1.8

For the first scenario a threshold should be used, if the limit of 100 ms is exceeded a notification is sent to the administrator and if the round-trip delay is under 100 ms no action needs to be taken. For the second scenario two thresholds should be used, if the capacity is under 512 kb the first threshold everything is good, if the user capacity is in between 512 Kb and 1.5 Mb then that is the yellow zone and if the capacity is above 1.5 Mb, the upper limit threshold then we are entering non conformance.

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) - informational
- e) - feature
- f) - core
- g) - core

11 Question 2.3

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

12 Question 2.4

The network device that is an endpoint is found in the 3rd layer. Also the requirements become more technical because you must measure delay, RMA and capacity.

13 Question 2.5

- a) - real-time and also mission critical, the data is important and must be monitored without delay and priceless
- 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 - online banking or a fin-tech product

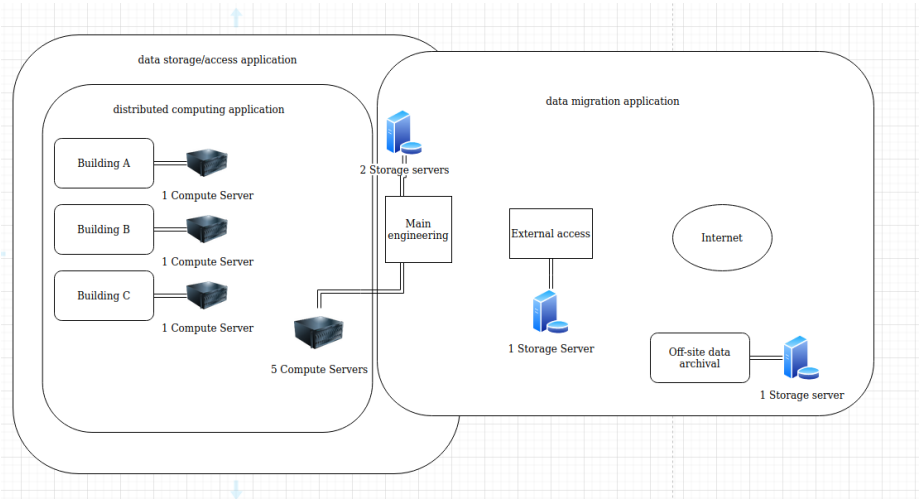
15 Question 2.7

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, these are interactive burst. On a campus you use Active Directory, mail servers, web servers such as Apache web server these are rate critical. 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. DNS and ATMs are found on campuses, these are mission critical.