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03SM22BI0006 - Computer Networks and Distributed Systems (CNDS)

E1 - Networks, Architectures, Services, and Protocols

1 Recap

In the exercise session, only a high-level summary of the lecture is provided. Please send us specific questions that you would like to see discussed in the exercise session.

Topics and questions can be submitted here:

`https://forms.gle/N4wDHbMYATbZsVzD8`

2 Computer Networks

1. Which of the following items are key components to form a network?

   [_] End-systems
   [_] Connections
   [_] Services
   [_] Intermediate systems
   [_] Links
   [_] Distribution systems

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2. Provide an example for *information*, *data* and *signal*.

3. How would you define a *computer network*?

4. For each of the following networks, indicate if the network can be classified as a *LAN*, *MAN*, *PAN* or *WAN*:

   [_____] A keyboard transmits keystrokes to a laptop using the Bluetooth protocol.

   [_____] The CSG uses a network provided by SWITCH to create a daily backup of servers located in BIN. The target server is located on the Irchel campus.

   [_____] Alice, Bob, Eve, Mallory, and Trent meet at BIN to play a multiplayer game. To connect their devices, Alice brought a small switch, to which everyone connects using an Ethernet cable.

   [_____] An undersea cable provides interconnection between data centers in New York and Amsterdam.

   [_____] Alice is printing a PDF over Wi-Fi.

5. Why are standards a critical thing for computer networking?

3 Architectures, Services, and Protocols

1. For each of the communication examples, provide if the partners are following a *Unicast* (U), *Broadcast* (B), *Multicast* (M), or *Anycast* (A) transmission.

   [___] The UZH wants to retrieve the semester fees from students. Therefore, the administration prepares a set of letters which are individually addressed to each student. The postal service then takes care of routing each letter to the appropriate recipient.

   [___] The UZH wants to attract new students for their computer science study program. Thus, they make use of a service provided by a local printing company. UZH submits a single flyer to the company with the instruction to send it to the group of citizens that are between the age of 18 and 21. The service then takes care of replicating and delivering the messages.

   [___] Alice enters the room and starts shouting at the people in the room.

   [___] A live TV streaming service offered by a company can serve 1000 Mbit/s of traffic. Each TV stream requires 10 Mbit/s of bandwidth. During prime time, the server is at full load.

   [___] A domain name server is responsible for resolving queries to domain.example.ch. To ensure low latency for everyone around the globe, redundant servers are provisioned in each continent. Thus, requests are resolved by the server closest to the user.

2. For each of the communication examples, provide if the transmission medium used by the partners is following a *Simplex* (S), *Duplex* (D), or *Half duplex* (H) transmission.

   [___] Alice is talking to Bob over a walkie-talkie.

   [___] Alice is talking to Bob on the phone.

   [___] Alice is in a remote location. Since there is no internet connectivity, she is watching TV using a satellite television service.

   [___] *Optional*: Alice is requesting a picture of a cat from a web server over HTTP. (Hint: Consider the message model between the client and the server on the HTTP protocol level.)

3. Describe connection-oriented and connectionless services and give an example for each.

4. Describe the acknowledged and unacknowledged service models and give an example for each.

5. Describe the major differences between the *OSI* and the *Internet* (TCP/IP) models.

6. Describe the key responsibilities and characteristics of each layer (*L1*-*L7*) in the *OSI* model

   L1:

   L2:

   L3:

   L4:

L5:

L6:

L7:

Submission Guidelines

Please use the OLAT system for submitting your exercise. For more information on the exercise class, please visit our web page.