COMP90007 Lecture 3 Tutorial Questions

Solutions

2018 – SM 2

Week 2 Tutorial

1. An alternative to a LAN is simply a big timesharing system with terminals for all users. Give two advantages of a client-server system using a LAN.

Answer: The LAN can be grown incrementally. If the LAN is just a long cable, it cannot be brought down by a single failure (if the servers are replicated). It is probably cheaper and could provides more computing power.

Week 2 Tutorial

- 2. Which of the OSI layers handles each of the following:
  - a) Dividing the transmitted bit stream into frames.
  - b) Determining which route through the subnet to use.

Answer:
a) Data link layer,
b) Network layer.

Week 2 Tutorial

- 3. A collection of five routers is to be connected to a point-to-point subnet. Between each pair of routers, the designers may put a high speed line, a medium speed line, a low speed line, or no line. If it takes 100 ms of computer time to generate and inspect each topology, how long will it take to inspect all of them?

Answer: Call the routers A, B, C, D, and E. There are ten potential lines: AB, AC, AD, AE, BC, BD, BE, CD, CE and DE. Each of these has four possibilities (three speeds or no line), so the total number of topologies is 4^10 = 1, 048, 576. At 100 ms each, it takes 104, 857.6 sec, or slightly more than 29 hours to inspect them all.

Week 2 Tutorial

- 4. What are two reasons for using layered protocols?

Answer: Among other reasons for using layered protocols, using them leads to breaking up the design problem into smaller, more managable pieces, and layering means that the protocols can be changed without affecting higher to lower ones.

Week 2 Tutorial

- 5. The Internet is roughly doubling in size every 18 months. Although no one really knows for sure, one estimate put the number of hosts on it at 600 million in 2009. Use these data to compute the expected number of Internet hosts in the year 2018. Do you believe this? Explain why or why not.

Answer: Doubling every 18 months means a factor of four gain in 3 years. In 9 years, the gain is then 4^3 or 64, leading to 38.4 billion hosts. That sounds like a lot, but if every television, cellphone, camera, car, and appliance in the world is online, maybe it is plausible. It would require the average person to have dozens of hosts by then given that the estimate is much greater than the expected world population.

Week 2 Tutorial

- 6. List two advantages and two disadvantages of having international standards for network protocols.

Answer: One advantage is that if everyone uses the standard, everyone can talk to everyone. Another is the widespread use of any standard will give its economies of scale, as with VLSI chips. A disadvantage is that the political compromises necessary to achieve standardisation frequently lead to poor standards. Another disadvantage is that once a standard has been widely adopted, it is difficult to change, even if new and better techniques or methods are dicovered. Also, by the time it has been accepted, it may be obsolete.

Week 2 Tutorial

- 7. client-server system uses a satellite network, with the satellite at a height of 40, 000 km. What is the best case delay in response to a request?

Answer: The request has to go up and down, and the response has to go up and down. The total path length traversed is thus 160, 000 km. The speed of light in air and vacuum is 300, 000 km/sec, so the propagation delay alone is 160, 000/300, 000 sec or about 533 msec.