CECS 327 Assignment 2 - Architectures

20 points

Assignment Description. Answer the following questions from the Chapter 2 reading from your textbook.

Be through and complete with your answers. You may work on these questions with a partner (no

more than two working together), but both students must submit the document individually on Beachboard

Dropbox along with both students’ names on each submission.

1. What is a three-tiered client-server architecture?

* A three tiered client server uses three computer sets. It utilizes the user interface layer, application layer, and the database server. Three tiered architecture is scalable, and improved security but is complex compared to others.

2. What is the difference between a vertical distribution and a horizontal distribution?

* Vertical distribution is when a multi-tiered architecture uses multiple layers whereas a horizontal distribution deals with a single layer across multiple machines i.e. a single database.

3. If a client and a server are placed far apart, we may see network latency dominating overall performance.

How can we tackle this problem?

* One thing we could do is make it so that during the pauses in between packet send/receive requests we could utilize the asynchronous communication that was talked about in lecture. Clients can also use many sessions with the server and put the data together on the client end. Staggering the request can allow division of the code on the client’s end and run in parts.

4. Consider a chain of processes P1, P2, : : :, Pn implementing a multitiered client-server architecture.

Process Pi is client of process Pi + 1, and Pi will return a reply to Pi 􀀀 1 only after receiving a reply

from Pi+1. What are the main problems with this organization when taking a look at the request-reply

performance at process P1?

* The performance is going to be bad for large values of n. The problem with this is that each communication attempt between two layers is between two machines. If one of the machines in the chain performs badly then the performance will be immediately degraded.

5. In a structured overlay network, messages are routed according to the topology of the overlay. What

is an important disadvantage of this approach?

* Because of the topology the paths are logical paths that may become slow and take a great amount of time to reach their neighbors. Just because they are close logically does not mean that they are physically close and may take a long time to reach each other.

6. Consider an unstructured overlay network in which each node randomly chooses c neighbors. If P and

Q are both neighbors of R, what is the probability that they are also neighbors of each other?

* If each node randomly chooses c neighbors then the probability that P will choose Q as a neighbor or vice-versa is, P = 2c / (N−1). Here, N is nodes in the network.

7. Not every node in a peer-to-peer network should become superpeer. What are reasonable requirements

that a superpeer should meet?

* The superpeer needs to be able to handle all of the requests being thrown at it.
* The latency should always be low between the superpeer and the normal nodes.
* The number of nodes that each superpeer handles should be a fixed number.

8. Give an example of a self-managing system in which the analysis component is completely distributed

or even hidden.

* From the lecture, an unstructured peer-to-peer system that exchange information between nodes could make the topology. Analysis is done by dropping some links that won’t help make the intended topology.

9. Consider a BitTorrent system in which each node has an outgoing link with a bandwidth capacity Bout

and an incoming link with bandwidth capacity Bin. Some of these nodes (called seeds) voluntarily

offer files to be downloaded by others. What is the maximum download capacity of a BitTorrent client

if we assume that it can contact at most one seed at a time?

* If there are S seeders that are randomly selected from and N clients.
* The download max will be S x Bout /N
* The total download capacity will be S × Bout / N + Bout

10. Modern cars are stuffed with electronic devices. Give some examples of feedback control systems in

cars.

* The sensor that comes on every 5000 miles
* The airbag light
* Tire pressure sensors
* Cruise control switch
* Lane merging assist sensors

Deliverables. Submit the answers to the questions on Beachboard Dropbox by the indicated due date

and time. Acceptable file submission formats are: .txt, .rtf, .odt, .doc, .docx, or .pdf.