Homework 2

CS 664-Computer Networks

1. Understand the question, stay on topic, and answer briefly. 25 points

a. What is HTTP, and what is its primary purpose in web communication? Compare and contrast the key features and improvements of HTTP/1, HTTP/2, and HTTP/3. Discuss how each protocol addresses performance, efficiency, security, and other aspects of web communication.

b. Explain the concept of a persistent HTTP connection (HTTP keep-alive) and its advantages. How does it differ from a non-persistent (traditional) HTTP connection? Provide examples of scenarios where each type of connection might be beneficial.

c. How does HTTP maintain statelessness in its communication? What are the advantages and disadvantages of statelessness in HTTP?

d. Explain the request-response model in HTTP. What are the key components of an HTTP request and an HTTP response?

2. Understand the question, stay on topic, and answer briefly. 25 points

a. What is a cookie in the context of web technology? How is it different from other methods of storing user data on the client side?

b. What is the difference between first-party cookies and third-party cookies? Provide examples of when each type is used and potential privacy concerns associated with third-party cookies.

c. What is web caching, and why is it essential in the context of web performance and user experience?

d. Explain the relationship between browser caching and conditional GET requests in web development. How do conditional GET requests improve caching efficiency?

3. Understand the question, stay on topic, and answer briefly. 25 points

a. What is DNS, and what is its primary function in computer networking and the internet?

b. Explain the hierarchical structure of the DNS naming system, including the roles of top-level domains (TLDs), second-level domains, and sub domains.

c. What are authoritative DNS servers, and how do they differ from recursive DNS servers? How do authoritative DNS servers help resolve domain names?

d. What is a TTL (Time-to-Live) value in DNS records, and why is it important? How does it affect caching and DNS propagation?

4. Understand the question, stay on topic, and answer briefly. 25 points

a. What are two technical challenges associated with streaming video that we discussed in class, and could you please explain them briefly?

b. What is the role of a buffer in streaming video playback? How does it contribute to a smooth and uninterrupted viewing experience?

c. What is Dynamic Adaptive Streaming over HTTP (DASH), and how does it work to deliver video content to viewers? How does it differ from traditional streaming methods?

d. Content distribution networks (CDNs) typically adopt one of two different server placement philosophies. Name and briefly describe them.