Computer Networks

Spring 2016

Take-Home Midterm Exam

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# Part 1 Multiple Choice

## Question 1.1

B. When the sender sends some data to the receiver, the data is stored in the receiver’s buffer waiting for the receiver to read it. If the receiver reads in a low speed, the buffer may overflow. Flow-control service is used to match the sender’s sending rate and receiver’s receiving rate.

## Question 1.2

F. The data generated by other applications and hosts will wait at the routers’ buffer. During the transmission, this period of time belongs to queuing time.

## Question 1.3

B. HTTP is a stateless protocol. To track the users’ behavior, cookie establish a user session layer on HTTP, which make use of the header field of HTTP request and response and store the data on the client host.

## Question 1.4

D. To start a TCP connection, it will take at least 2 RTTs. The persistent/ non-persistent connection will affect the RTT cost by handshakes and with/without pipelining will affect the transfer time of the files, they can’t affect the starting 2 RTTs.

## Question 1.5

B. An authoritative name server is provided by the organization. When a client desires an IP address of a host name, after querying the local DNS server, the root DNS server and the TLD DNS server, the query will be sent to the authoritative DNS server of the organization that the host name belongs to, so it will provide the definitive IP address for any host name within its organizational domain.

## Question 1.6

A. Port is an abstract software defining on the Transport Layer for de-multiplexing data. The data will be firstly distributed to its protocol software, so there won’t be any conflicts.

## Question 1.7

A. The slow start mechanism and flow control mechanism are implemented in the host, the client just needs to response the request. The error control mechanism is set in the protocol. The handshakes just send some SYNC, ack and seq number to confirm that the connection is established successfully.

## Question 1.8

A. In virtual circuit network, the amount information that needs to be stored in the routers is quite large, including adding an entry in the forwarding table when a connection is established and removing it when the connection is released. This will cost so much that it will have bad effect on Internet backbone.

# Part 2 Question & Answer

## Question 2.1

1. ­

## Question 2.2

1. They will be primarily concerned with intra-autonomous system routing. In an Autonomous System, the engineers within an organization need to run and manage the local network. What they need to do is providing the routing algorithm inside the local network and connect the local network to outside. So they should be primarily concerned with intra-autonomous system routing.
2. It’s more relevant to inter-autonomous system routing. Comparing with the summary of the Autonomous Systems on the Internet, the summary of the hosts inside an AS is much smaller, so the forwarding table is small too.
3. OSPF.

Advantages: It’s safe. It can generate multiple same-cost paths. It provides integrated support for unicast and multicast routing and support for hierarchy within a single routing domain.

Disadvantages: It’s kind of complex. The routing load balancing capacity is weak.

1. BGP.

Advantages: BGP has redundant backup and the ability to eliminate loops. BGP has strong expansibility.

Disadvantages: BGP needs the support from the router, so it will cost much.

## Question 2.3

1. The RTT (round-trip time) indicates the time from the bus left a village to it reaches the village again, which is 12 hours.
2. The total handshake time cost is one RTT plus a transmission time, which is .
3. Assuming the window size as , the utilize rate is .So the utilize rate should be .
4. To fully utilize the Village A’s capacity, the following inequality needs satisfying:, so we get

## Question 2.4

## Question 2.5

1. The algorithm:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Steps | *N’* | *D*(B), *p*(B) | *D*(C), *p*(C) | *D*(D), *p*(D) | *D*(E), *p*(E) |
| 0 | A | 1, A | 3, A | 1, A |  |
| 1 | AB |  | 3, A | 1, A | 2, B |
| 2 | ABD |  | 2, D |  | 2, B |
| 3 | ABDC |  |  |  | 2, B |
| 4 | ABDCE |  |  |  |  |

The shortest path:

|  |  |
| --- | --- |
| Destination | Path |
| B | A→B |
| C | A→D→C |
| D | A→D |
| E | A→B→E |

1. The forwarding table:

|  |  |
| --- | --- |
| Destination | Next |
| B | (A, B) |
| C | (A, D) |
| D | (A, D) |
| E | (A, B) |