Computer Networks Final (101/1)

只寫答案而沒有解釋說明，扣一半分數

1. (a) List TCP seven characteristics (7%)
   (b) Suppose Host A sends two TCP segments back to back to Host B over a TCP connection. The first segment has sequence number 10; the second has sequence number 100. Suppose that the first segment is lost but the second segment arrives at B. In the acknowledgement that Host B sends to Host A, what will be the acknowledgement number? How much data is in the first segment? Explain why. (6%)
   (c) Explain how TCP Fast Retransmit works. (6%)
   (d) How TCP does its flow control? (6%)
   (e) Why is there a UDP? (8%)

Ans:

(a) (7%)

- point-to-point: one sender, one receiver
- reliable, in-order byte steam:
- pipelined: TCP congestion and flow control set window size
- send & receive buffers
- full duplex data: bi-directional data flow in same connection
- connection-oriented: handshaking (exchange of control msgs) init's sender, receiver state before data exchange
- flow controlled: sender will not overwhelm receiver

(b) a) ack number = 10 (2%) (因為第一個 segment 遺失，即使收到第二個 segment，送回的 ACK=10，因為要通知 host A 重送第一個 segment) （1%）b) 90 bytes (2%) (100-10=90，第二個 segment 的 sequence number 減去第一個 segment 的 sequence number) (1%)

(c) Explain how TCP Fast Retransmit works. (6%)

(e) If sender receives 3 ACKs for the same data, (3%) it supposes that segment after ACKed data was lost: resend segment before timer expires (3%) (6% total)

(d) How TCP does its flow control? (6%)

(f) Rcvr advertises spare room by including value of **RcvWindow** in segments (3%)
Sender limits unACKed data to **RcvWindow** for guaranteeing receive buffer doesn't overflow (3%)

(e) Why is there a UDP? (8%)

- no connection establishment (which can add delay) (2%)
- simple: no connection state at sender, receiver
- small segment header
- no congestion control: UDP can blast away as fast as desired

2. List and compare two pipelined transport protocols. (9%)

Ans:

Go-back-N (5%)

(1) ACK-only: always send ACK for correctly-received pkt with highest *in-order* seq # (1%)
(2) out-of-order pkt:

- discard (don't buffer) -> no receiver buffering! (1%)
- Re-ACK pkt with highest in-order seq # (1%)

(3) timeout(n): retransmit pkt n and all higher seq # pkts in window (1%)
(4) deliver in-order segments to upper layer. (1%)

Selective Repeat (4%)

(1) receiver *individually* acknowledges all correctly received pkts (1%)
(2) buffers out-of order pkts (1%)
(3) sender only resends pkts for which ACK not received when timeout (1%)
(4) deliver total in-order pkts to upper layer (1%)

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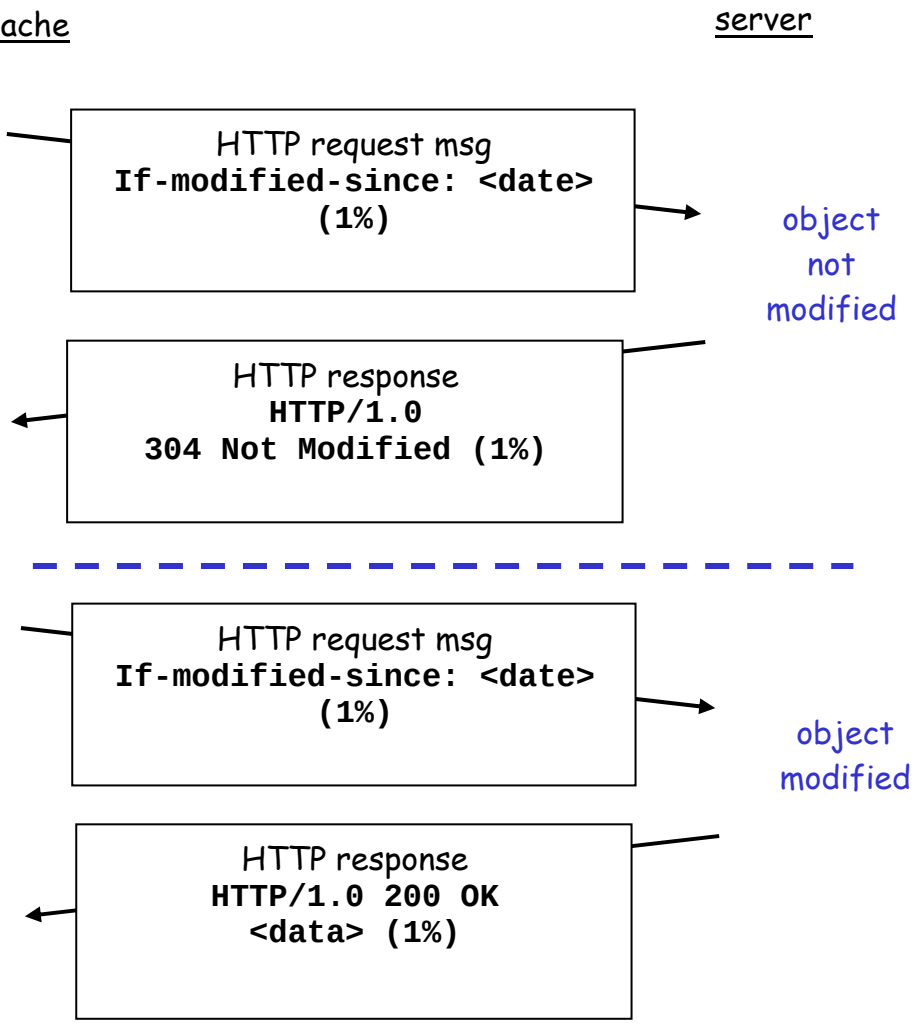
3. Explain flows and purposes of HTTP conditional GET. (要寫出用處，畫出運作過程) (6%)

Ans:

conditional GET (6%)

- Conditional GET: don't send object if cache has up-to-date cached version (1%) => reduce traffic loads (delays) on network links! (1%)
  cache: specify date of cached copy in HTTP request (1%)
  If-modified-since: <date> (1%)
  server: response contains no object if cached copy is up-to-date: (1%)
  HTTP/1.0 304 Not Modified (1%)



4. (a) What three services are provided by the domain name system? (3%)
   (b) Explain iterated query and recursive query (4%)
   (c) Authoritative DNS servers (2%)
   (d)Which tool allows the host running the tool to query any specified DNS server for a DNS record? (2%)
   (e) How to run the tool in (d) to execute "Please send me the host names of the authoritative DNS for mit.edu" operation? (4%)
   (f) How to run the tool in (d) to execute "Please send me the host names of `www.aiit.or.kr, but` we want to the query sent to the DNS server *bitsy.mit.edu* rather than to the default DNS server" operation? (4%)

Ans:

(a) DNS services (3%)

- hostname to IP address translation
- host aliasing (Canonical, alias names)

- mail server aliasing

(b) iterated query: (2%)
- contacted server replies with name of server to contact

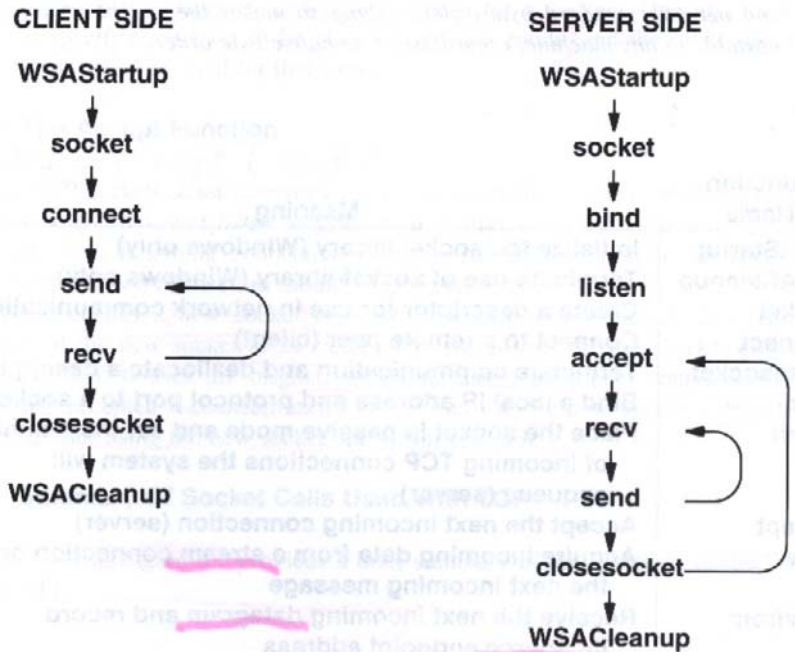
recursive query: (2%)
- contacted server forwards the DNS query to next server and waits for the reply

(c) authoritative DNS server (2%)
- organization's DNS servers, providing authoritative hostname to IP mappings for organization's servers

(d) *nslookup* (2%)
(e) nslookup –type=NS mit.edu (4%)
(f) nslookup www.aiit.or.kr bitsy.mit.edu (4%)

5. (a) 請畫出 TCP socket 連線建立時 client and server 兩端呼叫函式的流程 (6%)
   (b) 本學期 winsock 作業題目的兩個功能是什麼？(4%) 規定用哪一個編譯器編譯？(2%)

只需要畫出 Client: socket -> connect; Server: socket->bind->listen->accept （一個名稱+順序 1%, 6% total）



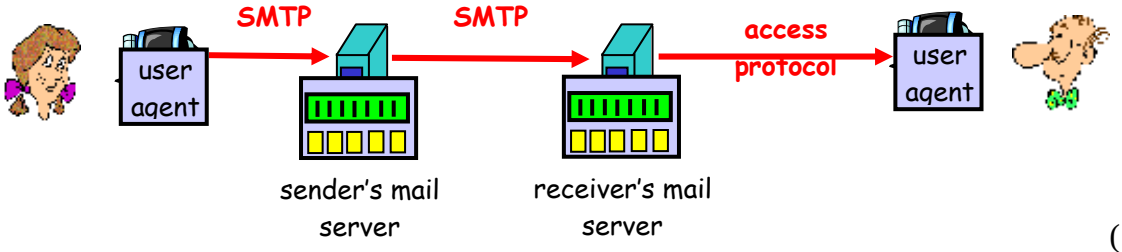
(b) BBS 發文章(2%)與讀文章 (2%); Dev C++ (2%) (6% total)

6. What are the major differences between SMTP and POP3? (4%) Draw a figure to show the mail-sending flow and all necessary modules among two end users. (7%) (11% total)

Ans:

POP: Mail access protocol: retrieval from server (說明 2%)

SMTP:
- direct transfer between mail servers to send email messages (說明 2%)



(1% each, 7% total)

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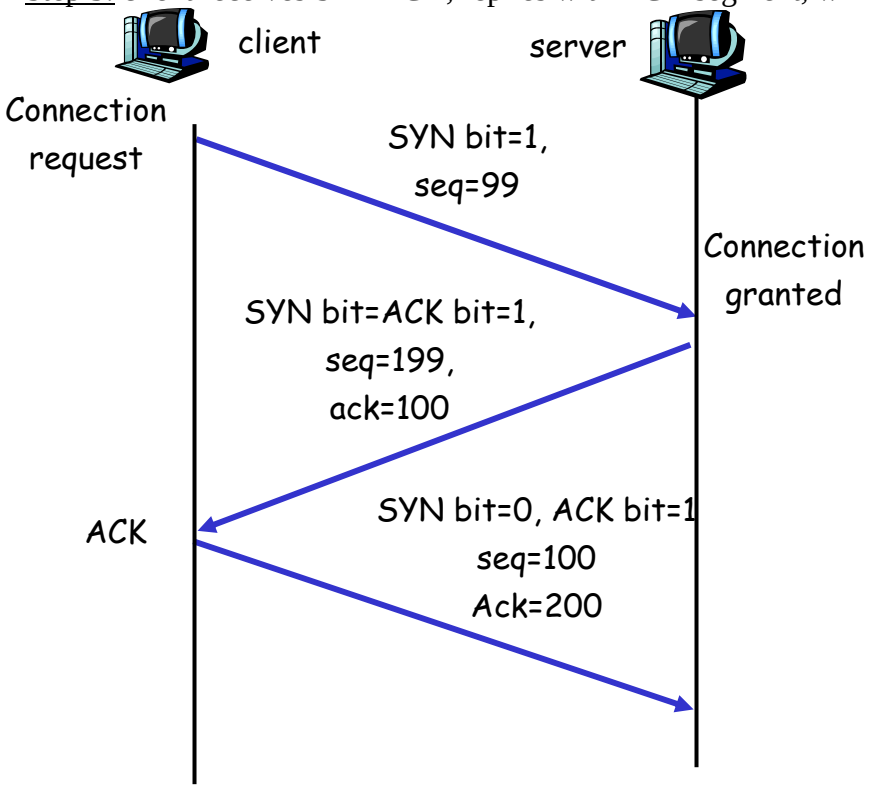
7. Draw the flow of the TCP three way handshake to explain its operations. Suppose the initial sequence numbers of the client and the server are 99 and 199, respectively. 必須在圖上分別清楚標示出 TCP 必要的 flag, sequence number, and ACK number. (10%)

Ans: Three way handshake:

Step 1: client host sends TCP SYN segment to server (搭配圖要正確 2%)
Step 2: server host receives SYN, replies with SYNACK segment (4%)
Step 3: client receives SYNACK, replies with ACK segment, which may contain data (4%)



上圖每個符號含內容 1 分，標示不全者，視狀況扣分，共 10 分