60 mins.

25 mcq — 25 marks

Open book.

Don't discard paper.

Start at 2:20, stop at 3:20pm.

answers are from lecture notes.

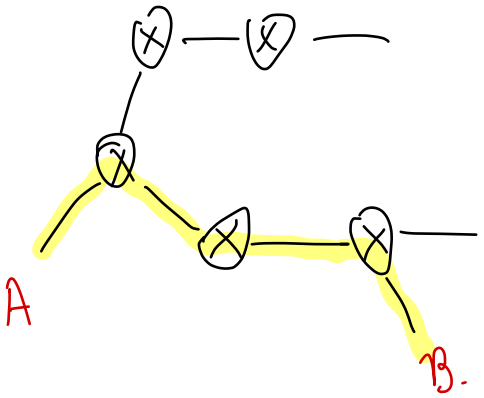
2 min per question.

practice paper explanations in forum.

lecture 7 is not in midterm.

only 1-6

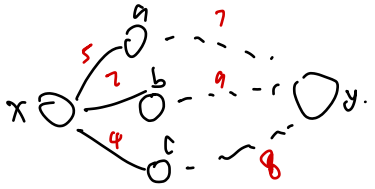
Routing Algo.



- packet goes thru multiple routers / networks.
- routing is complicated — involves economic concerns
- Simplified scenario:

  "dist vector" routing.

  → Bellman Ford = $\min_v \{c(x,v) + d_v(y)\}$.



Try all possible paths, compare & find min.

recursively

relate given problem to subproblem.

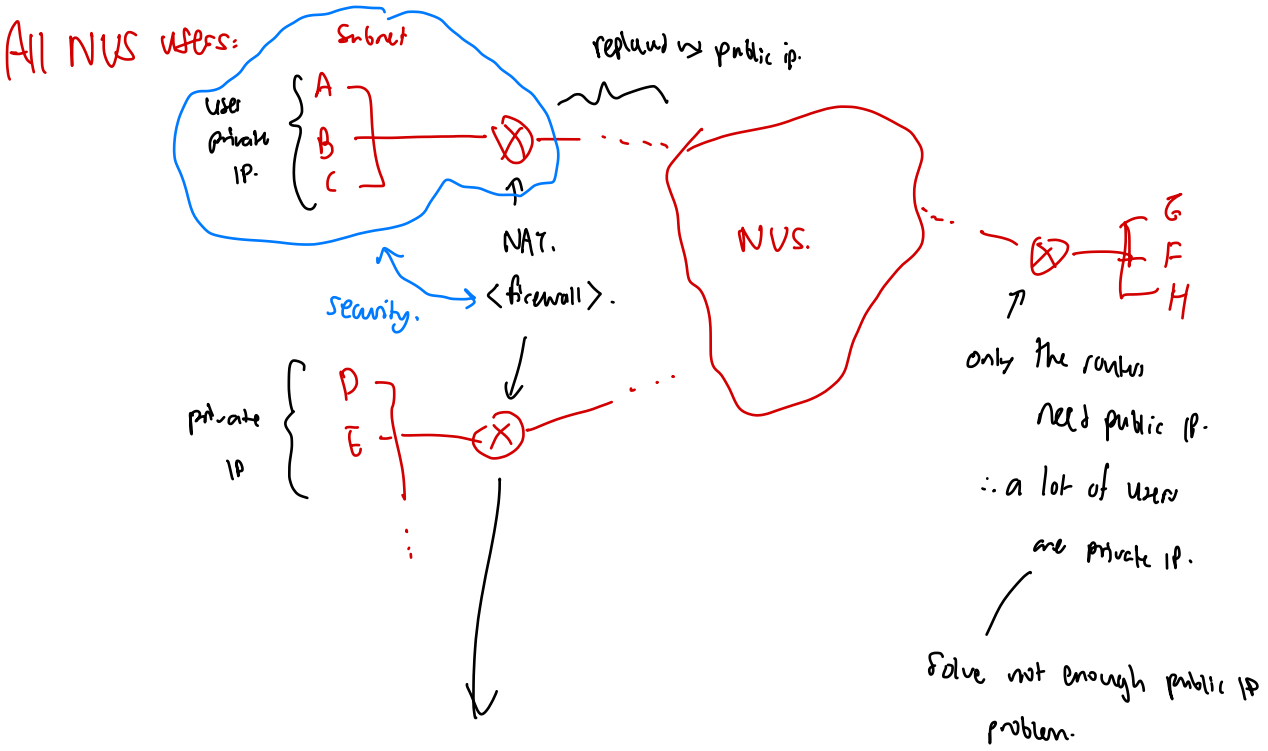
takes time for info to propagate hop by hop.

∴ slow algorithm if a lot of routers.

NAT

IP: 32 bits.

∴ 2^{32} ip addresses to use.



NAT translation table

WAN side	LAN side.
Outside public IP ⟷	Inside private IP.

IP is modified.

→ port number is changed so can distinguish which internal computer it is from.

↘ if they happen to use same port number.

router changes dest / source port address,

also TTL → ∴ need to change checksum (header)

since TTL is changed.

/

due to hop

- IP Datagram Fragmentation.

  - diff kinds of networks,

    /

    different MTU (Max Trans Unit)

    \

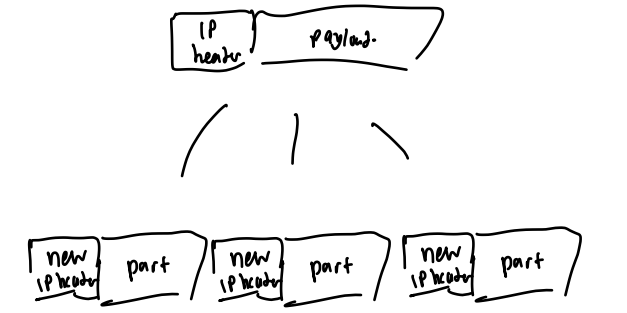
    allows packages of diff sizes.

    \

    too large datagrams are fragmented by routers.

    \

    destination do reassembly.



duplicate info from original header.

Flag. = 1 (got next segment)

offset is in 8-bytes

i.e. idx of payload

ICMP

ICMP header : Type + Code + Checksum + others

eg. 11 = TTL expired. (traceroute)

no. of hops.

Corrupted ⇒ router may or may not feedback to sender

⇒ if TTL expires, will send feedback.

TCP IP link → overhead for transmission.
⇒ unavoidable.
⇓
efficiency.
is bad for instant messaging.

1000 − 20 − 20 − 18 −

1000
1000 + 58

2000 − 20 = 1980

100 − 20 = 80

1980 ÷ 81 .

≈ 25.

initial startup ⇒ router only knows immed. neighbours.

0 2 4 3 6 8 7.