CE443-Computer Network

TA session

PA 1 – NAT

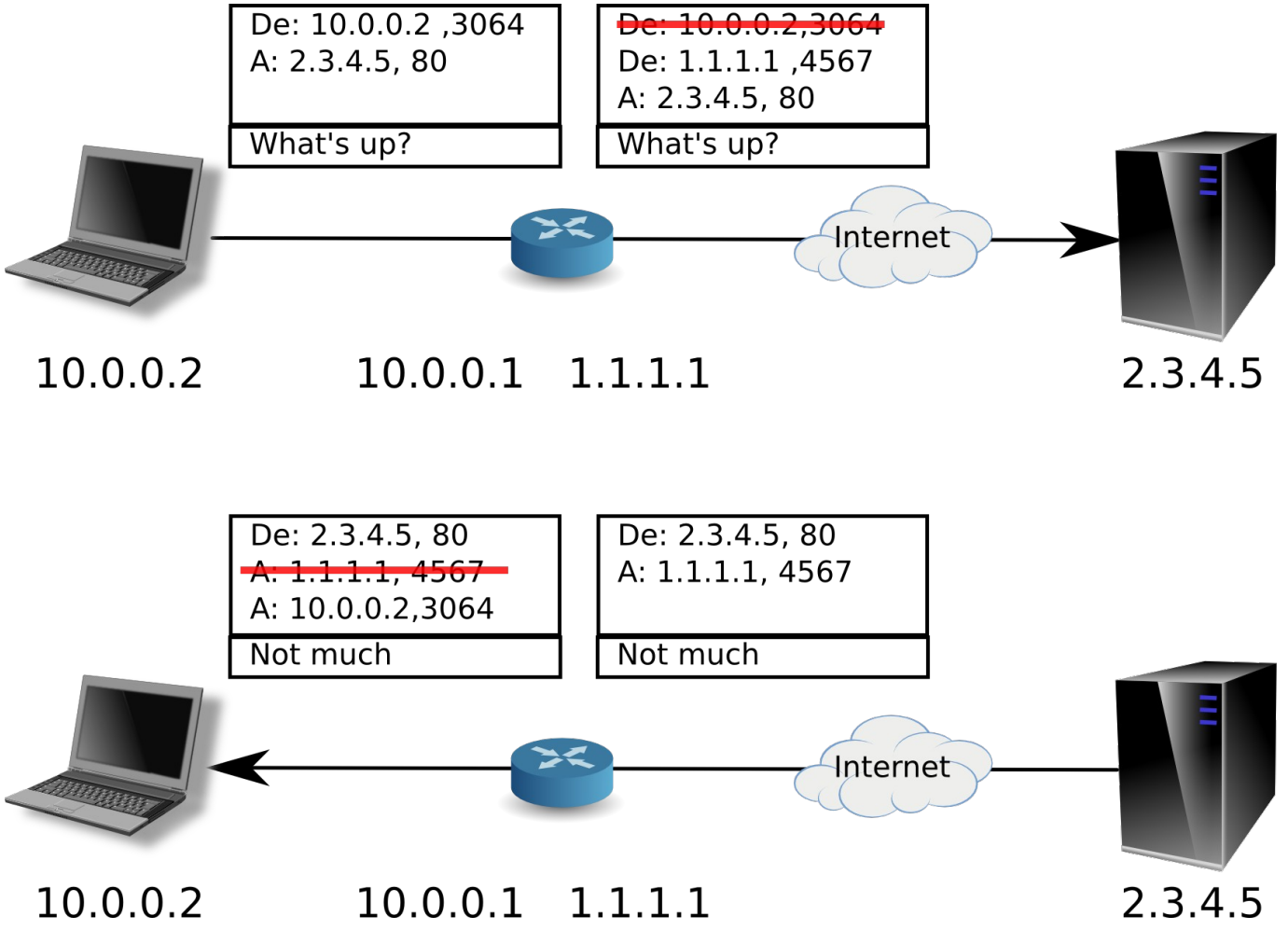
Today Topic

Programming Assignment 1

- Introduction to NAT
- NAT Types and UDP Hole Punching
- Simple Topology
- Assignment details
- How to start

Introduction to NAT

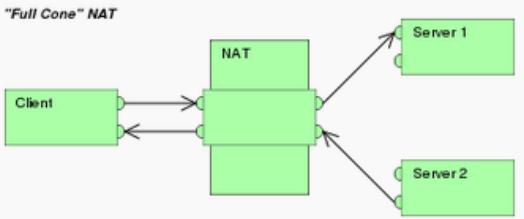
Network Address Translation



NAT Types

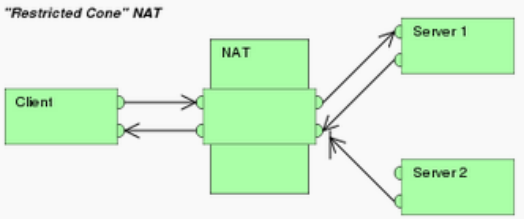
Full-cone NAT, also known as *one-to-one NAT*

- Once an internal address (iAddr:iPort) is mapped to an external address (eAddr:ePort), any packets from iAddr:iPort are sent through eAddr:ePort.
- *Any external host* can send packets to iAddr:iPort by sending packets to eAddr:ePort.



(Address)-restricted-cone NAT

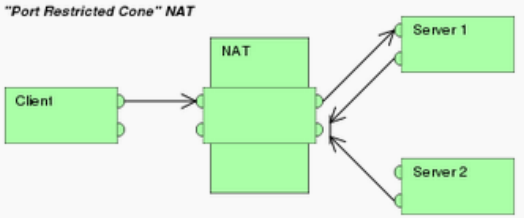
- Once an internal address (iAddr:iPort) is mapped to an external address (eAddr:ePort), any packets from iAddr:iPort are sent through eAddr:ePort.
- An external host (*hAddr:any*) can send packets to iAddr:iPort by sending packets to eAddr:ePort only if iAddr:iPort has previously sent a packet to hAddr:*any*. "Any" means the port number doesn't matter.



Port-restricted cone NAT

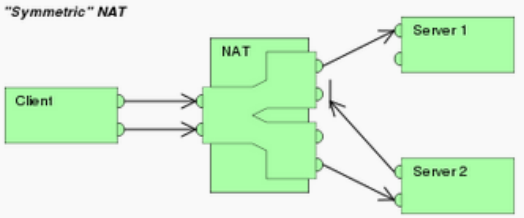
Like an address restricted cone NAT, but the restriction includes port numbers.

- Once an internal address (iAddr:iPort) is mapped to an external address (eAddr:ePort), any packets from iAddr:iPort are sent through eAddr:ePort.
- An external host (*hAddr:hPort*) can send packets to iAddr:iPort by sending packets to eAddr:ePort only if iAddr:iPort has previously sent a packet to hAddr:hPort.

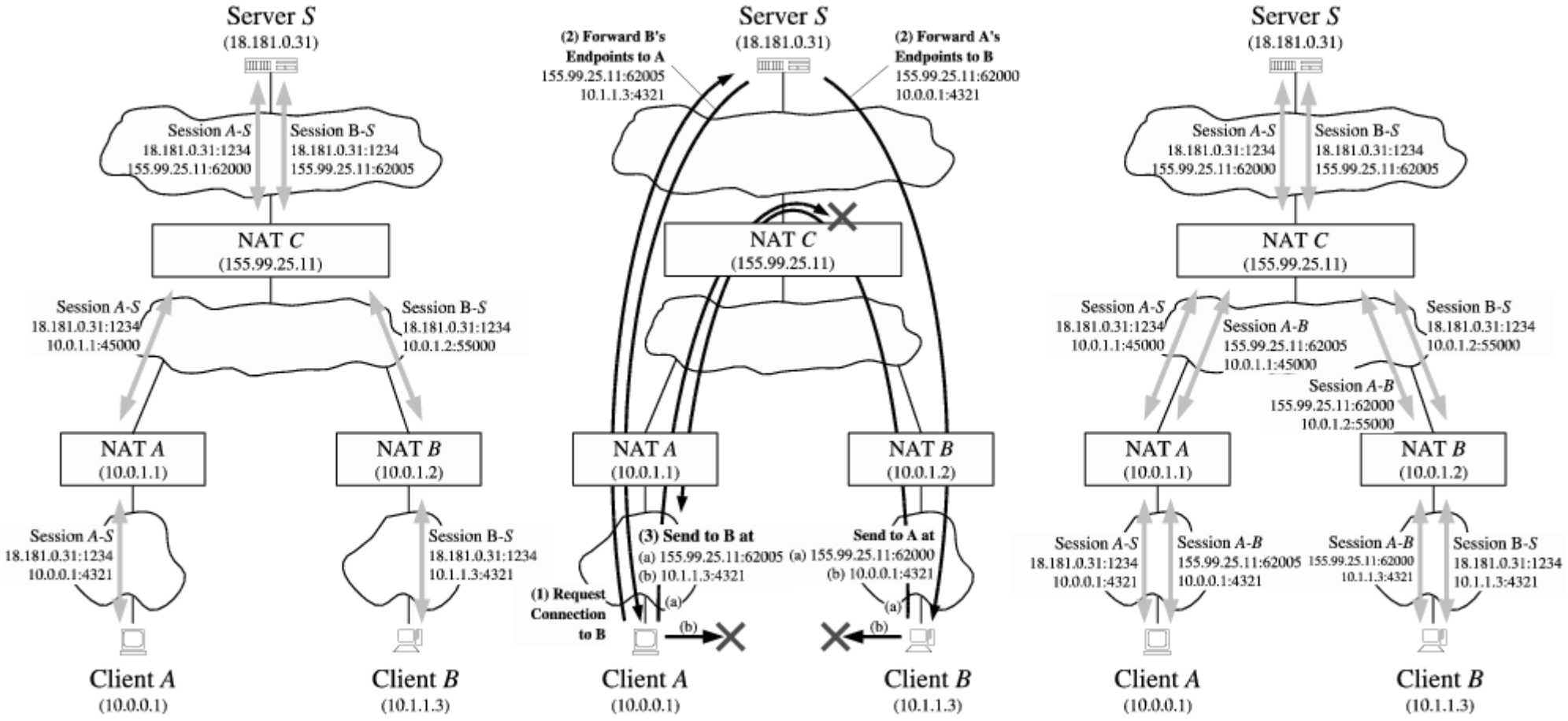


Symmetric NAT

- Each request from the same internal IP address and port to a specific destination IP address and port is mapped to a unique external source IP address and port; if the same internal host sends a packet even with the same source address and port but to a different destination, a different mapping is used.
- Only an external host that receives a packet from an internal host can send a packet back.

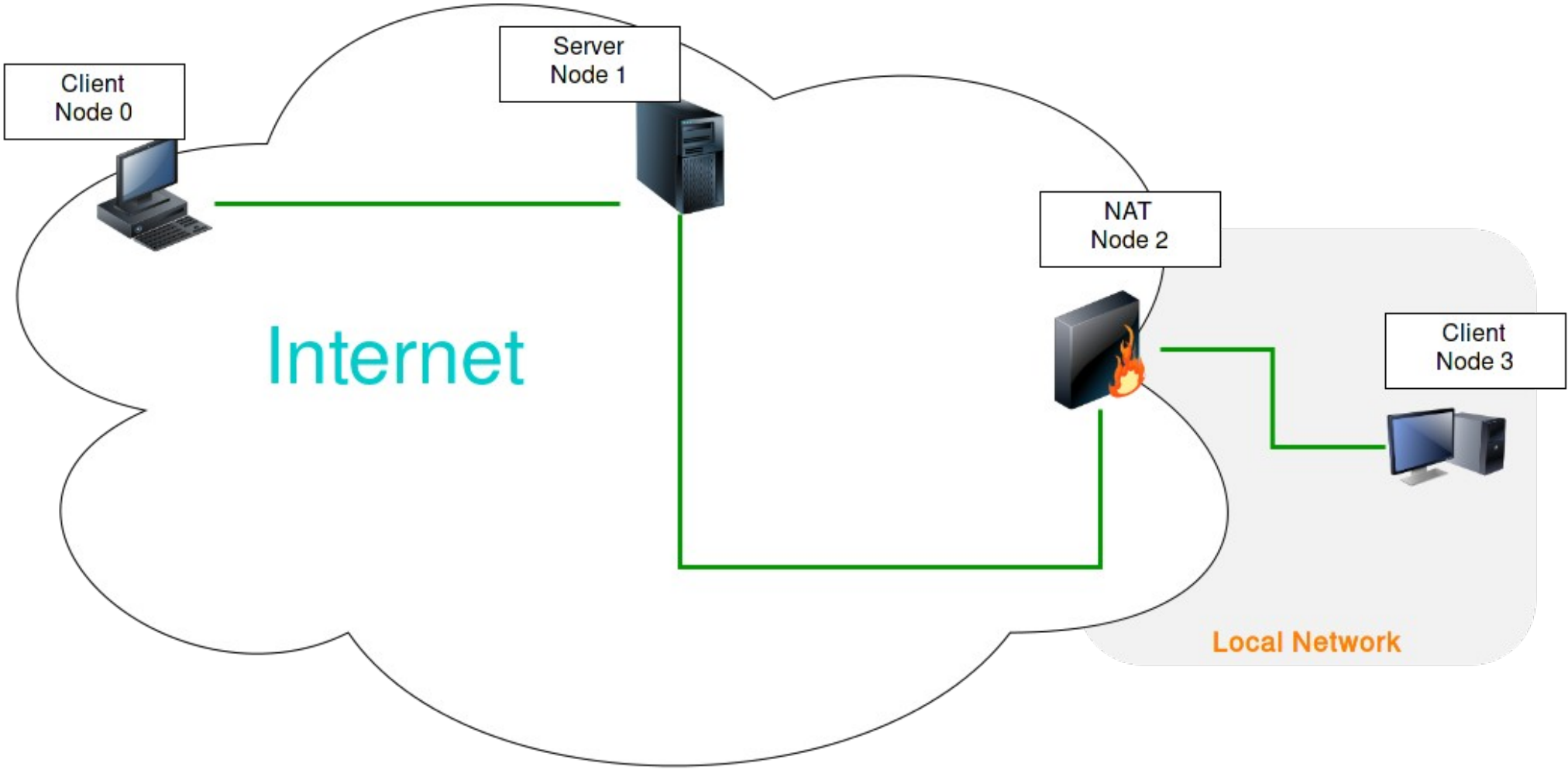


UDP Hole Punching



Simple Topolgy

map: Hole_Punching_Simple



Assignment Details

- Machine
  - Server
  - Client
  - NAT (optional)
- Programming Language
  - Java (recommended)
  - C++

How to Start