Network Simulation Architecture

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CS/EE 143 Milestone 1

Tools

- Python 3.4.2
- SimPy process-based simulation framework
- Matplotlib
- GitHub source control
- GitHub built-in code review

Input

- JSON
- Dictionary format:

```
{
  "Hosts" : Number of hosts,
  "Routers" : Number of routers,
  "Links" : [ [Link Rate (Mbps), Link Delay (ms), Link Buffer (KB),
              ['H' or 'R', id], ['H' or 'R', id] ] ],
  "Flows" : [ [Data Amt (MB), Flow start (s), Src host id, Dest host id] ]
}
```

Output

- Real time performance curves
- Raw data files
- Measurements:
  - link rate
  - buffer occupancy
  - packet loss
  - packet delay
  - flow rate
  - window size

Environment

collect_reports():

    stop-the-world and collect data

while env.peek():

    env.step()

Sending Flow

id, W, capacity, RTT, hosts[]

send_packet()

```
while remaining_data > 0:
    trigger host.send_event()
```

recieve_ack()

```
while True:
    yield self.recieve_ack_event()
    retransmit, adjust ACK etc.
```

Receiving Flow

send_ack()

trigger host.send_event()

recieve_packet()

while True:

yield self.recieve_packet_reactive()

send ACK based on congestion algorithm

Host

id, sending_flows[], receiving_flows[]
events: send_event, receive_event

send()

```
while True:
    yield self.send_event()
```

receive()

```
while True:
    yield self.receive_event()
    trigger flow.receive_ack_event()
```

Link

id, weight, capacity, buffers (stores)

producer()
consumer()
update_link_weight()

Router

id, table, update_interval

receive_packet(packet)

if RoutingUpdatePacket:

    update the routing table

else:

    forward_packet(packet)

routing_update()

trigger update_link_weight()

BF

Packet

src, dest, size, ts, type, seqNum

Subclass:

- DataPacket
- ACKPacket
- RoutingUpdatePacket

Timeline & Division of Labor

Week 5 (Kexin):

Environment, I/O, Packets

Week 6 (Aman):

Host, Link,

basic Flow (no congestion control)

Week 7:

Router: start to implement dynamic routing

Week 8 (Xander):

Congestion control algorithm 1,

wrap up dynamic routing

Week 9:

congestion control algorithm 2

* additional goals

Week 10 (Aditya):

final presentation report