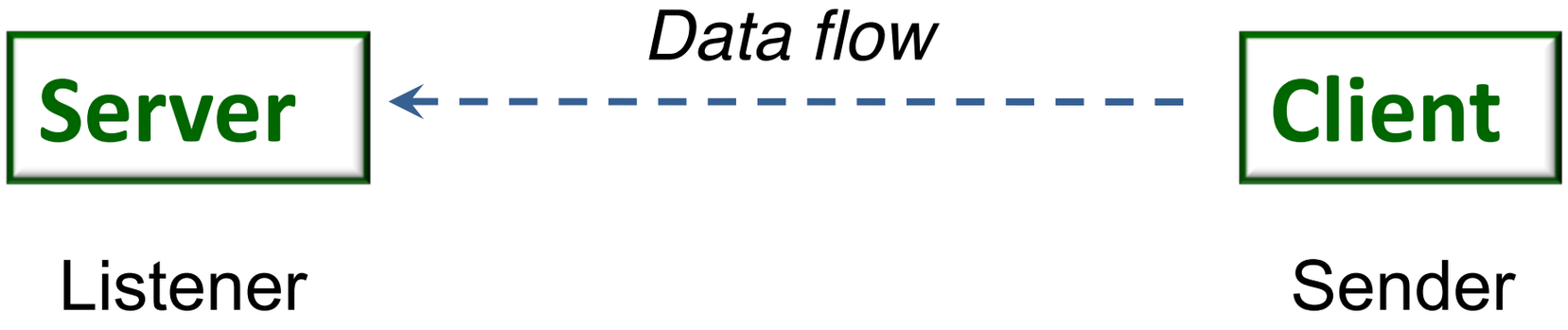
Measurement Tools

- iPerf / iPerf3 (http://iperf.fr)
  - Network testing tool to measure the network throughput between end hosts
- Ping ("Packet InterNet Groper")
  - Network testing tool to measure the packet round-trip time (RTT) between end hosts

iPerf / iPerf3

- Installation in Ubuntu
  - `sudo apt-get install iperf`
- Client-server model



iPerf / iPerf3

- TCP/UDP measurement
  - TCP: ***connection-oriented, reliable*** transportation protocol
  - UDP: ***connectionless, unreliable*** transportation protocol
- Tunable parameters
  - TCP window size, UDP buffer size and sending rate

iPerf TCP test

- -s: Run as the server; -c: Run as the client.
- -w: Set the window size (of TCP by default)

```
ubuntu@ip-172-31-35-167: ~ (ssh)
ubuntu@ip-172-31-35-167:~$ iperf -s -w 256K
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size:  416 KByte (WARNING: requested  256 KByte)
------------------------------------------------------------
[  4] local 172.31.35.167 port 5001 connected with 172.31.35.12 port 52186
[ ID] Interval       Transfer     Bandwidth
[  4]  0.0-10.0 sec  1.14 GBytes   977 Mbits/sec
```

Server ip: 172.31.35.167

```
ubuntu@ip-172-31-35-12: ~ (ssh)
ubuntu@ip-172-31-35-12:~$ iperf -c 172.31.35.167 -w 256K
------------------------------------------------------------
Client connecting to 172.31.35.167, TCP port 5001
TCP window size:  416 KByte (WARNING: requested  256 KByte)
------------------------------------------------------------
[  3] local 172.31.35.12 port 52186 connected with 172.31.35.167 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec  1.14 GBytes   977 Mbits/sec
ubuntu@ip-172-31-35-12:~$
```

On Client, put Server's ip after -c

iPerf TCP test

- By default, iPerf listens on TCP port 5001. This can be changed with “-p port_number”
- Double check the EC2 security group to ensure that the TCP port has been enabled

iPerf UDP test

- -u: use UDP rather than TCP
- -w: UDP buffer size
- -i: the interval time (in sec) between two periodic reports

ubuntu@ip-172-31-35-167: ~ (ssh)

```
ubuntu@ip-172-31-35-167:~$ iperf -s -u -w 128K -i 1
------------------------------------------------------------
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size:  256 KByte (WARNING: requested  128 KByte)
------------------------------------------------------------
[  3] local 172.31.35.167 port 5001 connected with 172.31.35.12 port 53468
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[  3]  0.0- 1.0 sec  49.8 MBytes   417 Mbits/sec   0.077 ms    6/35504 (0.017%)
[  3]  1.0- 2.0 sec  51.1 MBytes   428 Mbits/sec   0.111 ms  218/36644 (0.59%)
[  3]  2.0- 3.0 sec  52.1 MBytes   437 Mbits/sec   0.033 ms    0/37160 (0%)
[  3]  3.0- 4.0 sec  51.8 MBytes   434 Mbits/sec   0.030 ms   33/36980 (0.089%)
[  3]  4.0- 5.0 sec  51.3 MBytes   431 Mbits/sec   0.041 ms  608/37227 (1.6%)
[  3]  5.0- 6.0 sec  51.0 MBytes   428 Mbits/sec   0.050 ms  377/36775 (1%)
[  3]  6.0- 7.0 sec  51.0 MBytes   428 Mbits/sec   0.108 ms    0/36375 (0%)
[  3]  7.0- 8.0 sec  51.3 MBytes   430 Mbits/sec   0.064 ms  234/36822 (0.64%)
[  3]  8.0- 9.0 sec  51.9 MBytes   435 Mbits/sec   0.028 ms  614/37615 (1.6%)
[  3]  9.0-10.0 sec  51.2 MBytes   429 Mbits/sec   0.042 ms  199/36712 (0.54%)
[  3]  0.0-10.0 sec   513 MBytes   430 Mbits/sec   0.086 ms 2289/367990 (0.62%)
```

Server

iPerf UDP test

- -b: the UDP sending rate, in bits/sec

```
ubuntu@ip-172-31-35-12: ~ (ssh)
ubuntu@ip-172-31-35-12:~$ iperf -c 172.31.35.167 -u -b 1G -w 128K
------------------------------------------------------------
Client connecting to 172.31.35.167, UDP port 5001
Sending 1470 byte datagrams, IPG target: 10.95 us (kalman adjust)
UDP buffer size:  256 KByte (WARNING: requested  128 KByte)
------------------------------------------------------------
[  3] local 172.31.35.12 port 53468 connected with 172.31.35.167 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0-10.0 sec   516 MBytes   433 Mbits/sec
[  3] Sent 367990 datagrams
[  3] Server Report:
[  3]  0.0-10.0 sec   513 MBytes   430 Mbits/sec   0.000 ms 2289/367990 (0%)
ubuntu@ip-172-31-35-12:~$
```

Client

A more detailed tutorial is available at

https://aws.amazon.com/premiumsupport/knowledge-center/network-throughput-benchmark-linux-ec2/

Questions

- What network performance is experienced between instances of the same type? Different types? Different zones?
- Is network performance consistent over time (e.g., time of day, different pairs of instances, etc.)?

TCP/UDP Bandwidth

Small - Medium
Small - Large

…

Think what it will be like

Network Latency

Intra-region
Inter-region

…

Think what it will be like