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Lab 1 – Measuring Bandwidth

The goal of this lab is to test and provide an empirical evaluation of the performance, specifically the effective bandwidth, of a network link.

To do this, I used the following command:

$ time cat largefile | head –c 1K | ssh rrishi@linux.scudc.scu.edu “cd ~/coen146/labs/lab1 && cat > tmplargefile”

This prints the contents of a large file (about 1GB), then pipes the first kilobyte into a ssh session, which puts the contents into another file. This is run from the same machine as the ssh host, so it is really going out to the network and then back into the machine. The time command records the real, user, and system times for that chain of commands.

Table 1 shows the real, user, and system times for transferring payloads for different sizes. The size was changed by changing head –c 1K to head –c 2K, head –c 4K, etc.

The bandwidth of a network is given by the number of bits that can be transmitted over the network in a certain period of time. We can determine the bandwidth of the network on this machine by calculating the slope of the line (user time). Bandwidth is measured in kilobits per second.

Therefore the bandwidth of this connection is 374 Mbps.

**Table 1 – Real, User, and System Times**

**for Transferring Various Size Payloads**

|  |  |  |  |
| --- | --- | --- | --- |
| size (KB) | real | user | sys |
| 0 | 0.201 | 0.016 | 0.017 |
| 1 | 0.169 | 0.019 | 0.019 |
| 2 | 2.499 | 0.021 | 0.015 |
| 4 | 0.165 | 0.027 | 0.008 |
| 8 | 2.152 | 0.018 | 0.021 |
| 16 | 0.160 | 0.026 | 0.011 |
| 32 | 0.162 | 0.025 | 0.012 |
| 64 | 0.157 | 0.017 | 0.017 |
| 128 | 0.162 | 0.022 | 0.012 |
| 256 | 0.170 | 0.028 | 0.016 |
| 512 | 0.180 | 0.028 | 0.018 |
| 1024 | 0.158 | 0.025 | 0.017 |
| 2048 | 0.209 | 0.037 | 0.022 |
| 4096 | 0.889 | 0.033 | 0.032 |
| 8192 | 0.330 | 0.053 | 0.043 |
| 16384 | 0.509 | 0.075 | 0.052 |
| 32768 | 2.090 | 0.110 | 0.079 |
| 65536 | 1.403 | 0.198 | 0.113 |
| 131072 | 7.043 | 0.377 | 0.219 |
| 262144 | 7.559 | 0.720 | 0.418 |
| 524288 | 11.114 | 1.456 | 0.952 |
| 1048576 | 20.600 | 2.823 | 1.569 |