This is a brief report on my attempt to reproduce the results of the paper, "Queues Don't Matter When You Can JUMP Them!" The highlight of the research paper is the system QJUMP, a simple mechanism by which switches can rate limit traffic going across them with the prioritization of low latency packets. The intent of this paper is to show that a guaranteed maximum limit of latency can be achieved through this queue-jumping technique.

My attempt at re-creating QJUMP involved sending a mix of low latency packets (1 byte of data) and high throughput messages (64 kibibytes of data == 65536 bytes), with high throughput messages being sent at a target rate of 2:1, randomly selected. The host would then measure the latency of each message, with a printed message popping up for every minimum and maximum latency achieved.

The host could be run with standard queueing with no queue jumping enabled through the command-line flag of `--no-jump`. Otherwise, no command-line arguments meant the host would be run with queue jumping enabled (and the standard epoch-based procedure for sending queued packets).

I let the client run for an indefinite period of time, where it was constantly sending data over TCP to the host. The host then measured latencies as described above. I did this with both queue jumping and without and compared the numbers. After letting the system run for many minutes to try to achieve new minimums and maximums as many times as possible, I found that the minimum latency achieved was incredibly similar with queue jumping (843 ns) to without queue jumping (1001 ns).

The maximum latency achieved, however, was far better with queue jumping enabled (4,833,826 ns) than without (7,446,831 ns). This makes sense given the maximum latency constraint described in the paper, but this result does not have a lot of statistical power behind it as the experiment was extremely scaled-down.

Here is some example output:

[natan@royal-16] (47)$ ./qjump_host	[natan@royal-16] (48)$ ./qjump_host --no-jump
Socket creation succeeded	Socket creation succeeded
Binding succeeded	Binding succeeded
Listening succeeded	Listening succeeded
Connection accepted from 0.0.0.0:0	Connection accepted from 0.0.0.0:0
New minimum latency in nanoseconds: 125569.000000	New minimum latency in nanoseconds: 98812.000000
New maximum latency in nanoseconds: 125569.000000	New maximum latency in nanoseconds: 98812.000000
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.	.
New maximum latency in nanoseconds: 710248.000000	New maximum latency in nanoseconds: 4174695.000000
New maximum latency in nanoseconds: 803274.000000	New maximum latency in nanoseconds: 4232102.000000
New maximum latency in nanoseconds: 948359.000000	New maximum latency in nanoseconds: 4357067.000000
New maximum latency in nanoseconds: 952571.000000	New maximum latency in nanoseconds: 4404319.000000
New maximum latency in nanoseconds: 1012665.000000	New maximum latency in nanoseconds: 4411070.000000
New maximum latency in nanoseconds: 1017042.000000	New maximum latency in nanoseconds: 4464288.000000
New maximum latency in nanoseconds: 1043548.000000	New maximum latency in nanoseconds: 4469049.000000
New maximum latency in nanoseconds: 1154481.000000	New maximum latency in nanoseconds: 4495323.000000
New maximum latency in nanoseconds: 1214116.000000	New maximum latency in nanoseconds: 4520450.000000
New maximum latency in nanoseconds: 1347658.000000	New maximum latency in nanoseconds: 4600258.000000
New maximum latency in nanoseconds: 1396943.000000	New maximum latency in nanoseconds: 4767413.000000
New maximum latency in nanoseconds: 1508038.000000	New maximum latency in nanoseconds: 4774327.000000
New maximum latency in nanoseconds: 3897207.000000	New maximum latency in nanoseconds: 4779335.000000
New maximum latency in nanoseconds: 3976307.000000	New maximum latency in nanoseconds: 4864204.000000
New maximum latency in nanoseconds: 4234105.000000	New maximum latency in nanoseconds: 4893343.000000
New maximum latency in nanoseconds: 4300360.000000	New maximum latency in nanoseconds: 4901171.000000
New maximum latency in nanoseconds: 4335529.000000	New maximum latency in nanoseconds: 4931323.000000
New maximum latency in nanoseconds: 4340637.000000	New maximum latency in nanoseconds: 4936997.000000
New maximum latency in nanoseconds: 4379276.000000	New maximum latency in nanoseconds: 4988788.000000
New maximum latency in nanoseconds: 4384272.000000	New maximum latency in nanoseconds: 5016587.000000
New maximum latency in nanoseconds: 4389558.000000	New maximum latency in nanoseconds: 5110666.000000
New maximum latency in nanoseconds: 4394695.000000	New maximum latency in nanoseconds: 5137132.000000
New maximum latency in nanoseconds: 4401192.000000	New maximum latency in nanoseconds: 5142039.000000
New maximum latency in nanoseconds: 4461383.000000	New maximum latency in nanoseconds: 5169594.000000
New maximum latency in nanoseconds: 4787072.000000	New maximum latency in nanoseconds: 5174639.000000
New maximum latency in nanoseconds: 4810859.000000	New maximum latency in nanoseconds: 5506130.000000
New maximum latency in nanoseconds: 4833826.000000	New minimum latency in nanoseconds: 77816.000000
New maximum latency in nanoseconds: 6712852.000000	New minimum latency in nanoseconds: 64323.000000
New minimum latency in nanoseconds: 78687.000000	New minimum latency in nanoseconds: 46504.000000
New minimum latency in nanoseconds: 65735.000000	New minimum latency in nanoseconds: 17639.000000
New minimum latency in nanoseconds: 60803.000000	**New maximum latency in nanoseconds: 7446831.000000**
New minimum latency in nanoseconds: 950.000000	New minimum latency in nanoseconds: 1203.000000
New minimum latency in nanoseconds: 935.000000	New minimum latency in nanoseconds: 1058.000000
New minimum latency in nanoseconds: 843.000000	**New minimum latency in nanoseconds: 1001.000000**