As a followup to a recent discussion in the AshMUG-Talk e-mail discussion list I decided to compare the real-world data transfer speeds to external hard disks with different interfaces: USB 2.0, Firewire 400 and Firewire 800.

Fortunately, my 20" iMac (2007) has all three interfaces, and I have an external hard drive, the La Cie Quadra, that also has all three interfaces. Therefore, I could test each interface with the same computer, the same hard drive, and the same test file (an 11.7 GB video file), to eliminate any differences due to differences in the hardware or data to be transferred.

Additionally, to eliminate other possible influences, my initial tests were with no applications except the Finder running, and all other external drives and devices disconnected.

The results were quite surprising. While Firewire 800 was faster than Firewire 400 which was faster than USB 2, the differences were *much* less than I expected. The relative data transfer speeds, taking USB 2 as 1, were:

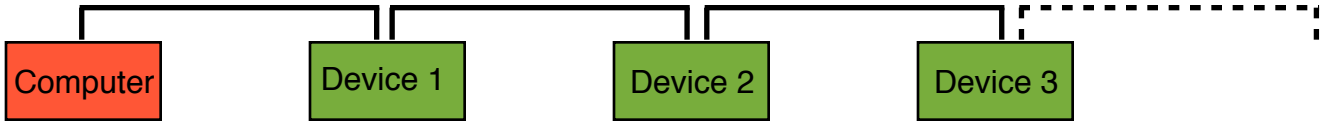
USB 2	Firewire 400	Firewire 800
1x	1.25x	1.39x

I had observed in the past that in my system of desktop computer plus several external hard drives, data transfers to the Firewire 400 hard drive seemed to be about 3 times faster than to either of the USB 2 drives. That meant that something else was affecting the results. Possibilities included differences in hard drives, the effects of having other hard drives and peripherals attached, and the Firewire Hub and USB 2 Hub through which several of these devices were connected. I systematically investigated these effects.

The important conclusions were:

- The only big effect was a deterioration of transfer speed by about a factor of 2 in the USB drives if they were connected through a Hub. (At least through the Cables to Go 7-port powered USB 2.0 Hub, and a "generic" 4-port powered USB 2 Hub)
- Connecting the Firewire 400 drives through a Firewire Hub had no effect. (Belkin 6-port powered Firewire 400 Hub).
- Daisy Chaining* Firewire 400 drives had no effect.
- Having other drives and peripherals connected had no effect (as long as they were not actively in use).
- Differences between USB drives were small. (But they all had similar specs.)

*Many Firewire devices have more than one Firewire port. You can "Daisy Chain" these devices (up to a theoretical maximum of 63) as below:



Finally, I decided to test USB 2 vs Firewire 800 on the same La Cie Quadra drive with my Mac Mini. The Mini has a slower processor than the iMac (2.0 vs. 2.4 GHz) but a faster internal bus (1 GB vs. 800 MHz).

I expected the results to be about the same. Surprise again. The Mini was faster than the desktop iMac by about 20% for USB and 50% for Firewire 800. Apparently the bus speed is more important than the processor speed.

All of the test data are given below, followed by the specs for the tested Hard Drives. It is interesting that my measured transfer rates in MB/s are fairly close to the claimed "Burst Data Transfer Rate" for Firewire 400 and USB 2, but my observed rate for Firewire 800 is at best about 60% of the claimed rate.

Test Transfer of 11.7 GB file from computer to external Hard Drive

Same external Hard Drive, Same File, Same Computer	**iMac [2.4 GHz Core 2 Duo, 800 mHz internal bus]**							
	Other Drives & Devices		**FW 800**	**FW 400**	**FW 400 (Hub)**	**FW 400 (Daisy Chained)**	**USB 2**	**USB 2 (Hub)**
LaCie Quadra 500GB	Disconnected	Time	4m 44s	5m 16s	5m 21s		6m 35s	15m 47s
		GB/Min	2.47	2.22	2.19		1.78	0.74
		MB/sec	41.2	37.0	36.4		29.6	12.4
LaCie Quadra 500GB	Connected	Time	4m 42s		5m 21s	5m 28s	6m 50s	15m 49s
		GB/Min	2.49		2.19	2.14	1.71	0.74
		MB/sec	41.5		36.4	35.7	28.5	12.3
Same File, Same Computer, Different Hard Drives	**iMac [2.4 GHz Core 2 Duo, 800 mHz internal bus]**							
Lacie FW 400 250GB	Connected	Time				5m 43s		
		GB/Min				2.05		
		MB/sec				34.1		
Lacie USB2 500GB	Connected	Time					10m 41s	18m 34s
		GB/Min					1.10	0.63
		MB/sec					18.3	10.5
Western Digital USB2 750GB	Connected	Time					6m 42s	15m 6s
		GB/Min					1.75	0.77
		MB/sec					29.1	12.9
Same File, Same Hard Drive, Different Computer	**Mac Mini (early 2009) [2.0 GHz Core 2 Duo, 1 GHz internal bus]**							
LaCie Quadra	Connected	Time	3m 9s				5m 26s	
		GB/Min	3.71				2.15	
		MB/sec	61.9				35.9	

Hard Drive Basic Specifications

La Cie Quadra 500 MB

Model: 301440U d2

Interface :
1 x eSATA 3Gbits port
2 x FireWire 800 ports (9-pin)
1 x FireWire 400 port (6-pin)
1 x Hi-Speed USB 2.0 port

Rotational Speed (rpm) :
7200 rpm

Cache :
16MB or greater

Burst Transfer Rate
eSATA: up to 105-115MB/s
FireWire 800: up to 75-85MB/s
FireWire 400: up to 35-40MB/s
Hi-Speed USB 2.0: up to 30-35MB/s

La Cie Firewire 400 250GB

Model: 300703U

Interface Type
IEEE 1394 (FireWire)

Cache Size
2.0 MB

Burst Data Transfer Rate
40.0 MBps

Spindle Speed
7200.0 rpm

La Cie USB 2 500GB

Model: 301285U

Interface:
USB 2.0

Burst transfer rate:
up to 30 to 34 MBps

Rotational speed:
7200 RPM

Cache size:
8 MB or greater

Western Digital USB 2 750 GB

Model: WDH1U7500N

Interface:
USB 2.0

Spindle Speed (RPM):
7200

Buffer Memory:
16MB

Burst Transfer Rate
Not Specified