



NFS vs. CIFS (SMB)

Benchmarking the performance

Disclaimer:

These benchmark results are results from our lab environment. They have informational character only and are not transferable to a real environment (your network!).

We do not claim the integrity of a real benchmarking between NFS vs. CIFS (SMB), but we assure you that the benchmarks are the actual results from our environment.

Scenario:

To measure the transfer rate of the Network File System (NFS) and the Common Internet File System (CIFS), we use different benchmark tests. For NFS we use NFS v. 3. The Common Internet File System (CIFS) is the successor of the well known Server Message Blocks (SMB).

All tests use only one client. This means the results are not transferable to a real network with many clients connected to a server. The client mounts different shares on different servers (see Configuration).

The different benchmarks we use are:

Read File: Uses a program that reads a whole file from a share. We use this benchmark with different file sizes (5GB, 100MB, 10MB, 1MB)

Copy: Copies files or folders from the local drive to the server share and copies the files or folders back to the local drive. We use a file of 5GB size and 3 folders (size 1GB) with:

- A 10 * 100MB (big)
- B 100 * 10 MB (medium)
- C 1000 * 1MB (small)

All the files were created with /dev/urandom to omit compression of the file transfer. For all benchmarks we measure the time for completion and calculate the transfer rate.

Configuration:

Client:

Linux, 2 Quad Core CPU at 3.33 GHZ, 3GB RAM, Raid 1 S-ATA, 1GB NIC

Server 1:

Opensolaris, 1 Quad Core 3,00 GHz, 8GB, S-ATA RAID, 1GB NIC

Server 2:

Linux, 1 Dual Core CPU at 2.8GHz, 6 GB RAM, S-ATA, 1GB NIC
= slowest server

Server 3:

Windows 2008, 2 Quad Core 3,16GHz , 16 GB RAM, S-ATA RAID, 1GB NIC
=fastest server

To measure the transferrate for CIFS and NFS, we use different Benchmarks.
Each Benchmark was applied several times on each share.
The following table lists the reference (used in this documentation) and a description of the benchmark:

Reference	Description
Copy 5GB	copy one 5 GB file from/to share
Copy small	copy a folder with 1000 Files of 1 MB size from/to share
Copy medium	copy a folder with 100 Files of 10 MB size from/to share
Copy big	copy a folder with 10 Files of 100 MB size from/to share
read 5GB	use a program that reads a 5 GB file from a share
read small	use a program that reads a 1 MB file from a share
read medium	use a program that reads a 10 MB file from a share
read big	use a program that reads a 100 MB file from a share

The following table lists the file sizes :

Reference	Bytes of file	Bytes of folder	Number of files
5GB	5242880000		1 File
Small	1048576	1048576000	1000 Files of 1048576 bytes
Medium	10485760	1048576000	100 Files of 10485760 bytes
Big	104857600	1048576000	10 Files of 104857600 bytes

Read File

The read file benchmark reads files of different sizes on the server share. A program on the client measures the time it takes for the whole file to be read.

Read 5 GB file		
<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1		
106.138	49.397	395.175
105.840	49.536	396.287
106.409	49.271	394.168
107.248	48.886	391.085
106.408	49.271	394.172

Read 100 MB file		
<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1		
2.135	49.114	392.909
2.233	46.958	375.665
2.114	49.602	396.812
2.166	48.411	387.286
2.210	47.447	379.575

NFS on Server 1		
60.908	86.079	688.629
62.842	83.430	667.436
61.302	85.525	684.203
60.911	86.074	688.595
61.737	84.923	679.383

NFS on Server 1		
1.335	78.545	628.360
1.415	74.104	592.834
1.501	69.858	558.868
1.290	81.285	650.280
1.275	82.241	657.930

NFS on Server 2 (Sync)		
68.686	76.331	610.649
62.310	84.142	673.135
69.555	75.377	603.020
68.196	76.880	615.037
65.835	79.637	637.093

NFS on Server 2 (Sync)		
4.760	22.029	176.231
4.864	21.558	172.463
4.501	23.297	186.372
4.306	24.352	194.812
4.223	24.830	198.641

NFS on Server 2 (Async)		
60.880	86.118	688.946
62.981	83.245	665.963
62.335	84.108	672.865
62.696	83.624	668.991
62.908	83.342	666.736

NFS on Server 2 (Async)		
7.087	14.796	118.366
5.881	17.830	142.639
6.467	16.214	129.714
4.431	23.665	189.316
4.494	23.333	186.662

CIFS on Server 2		
140.791	37.239	297.910
136.836	38.315	306.521
134.756	38.906	311.252
141.079	37.163	297.302
134.756	38.906	311.252

CIFS on Server 2		
3.107	33.749	269.991
2.948	35.569	284.553
2.833	37.013	296.103
2.963	35.389	283.112
2.951	35.533	284.263

CIFS on Server 3		
108.657	48.252	386.013
109.293	47.971	383.767
107.840	48.617	388.938
108.832	48.174	385.393
108.523	48.311	386.490

CIFS on Server 3		
2.305	45.491	363.931
2.183	48.034	384.270
2.133	49.160	393.277
2.158	48.590	388.721
2.117	49.531	396.250

Read 10 MB file		
<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1		
0.249	42.111	336.892
0.224	46.811	374.491
0.301	34.836	278.691
0.240	43.691	349.525
0.306	34.267	274.138

Read 1 MB file		
<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1		
0.021	49.932	399.458
0.021	49.932	399.458
0.046	22.795	182.361
0.040	26.214	209.715
0.022	47.663	381.300

NFS on Server 1		
0.287	36.536	292.286
0.194	54.050	432.402
0.188	55.775	446.203
0.198	52.958	423.667
0.114	91.980	735.843
0.235	44.620	356.962

NFS on Server 1		
0.013	80.660	645.278
0.013	80.660	645.278
0.031	33.825	270.600
0.030	34.953	279.620
0.013	80.660	645.278
0.014	74.898	599.186

NFS on Server 2 (Sync)		
0.631	16.618	132.941
0.483	21.710	173.677
1.085	9.664	77.314
0.592	17.712	141.699
0.781	13.426	107.409

NFS on Server 2 (Sync)		
0.085	12.336	98.690
0.013	80.660	645.278
0.057	18.396	147.169
0.056	18.725	149.797
0.014	74.898	599.186

NFS on Server 2 (Async)		
0.487	21.531	172.251
0.387	27.095	216.760
0.608	17.246	137.971
0.442	23.723	189.788
0.435	24.105	192.842

NFS on Server 2 (Async)		
0.013	80.660	645.278
0.013	80.660	645.278
0.040	26.214	209.715
0.039	26.887	215.093
0.048	21.845	174.763

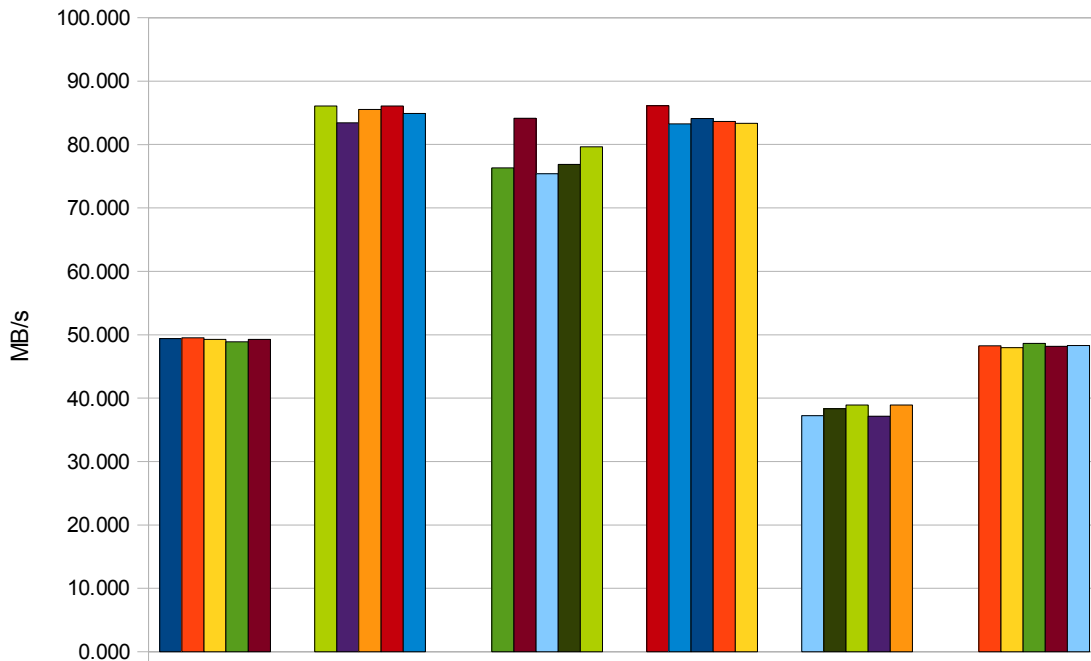
CIFS on Server 2		
0.311	33.716	269.730
0.321	32.666	261.327
0.297	35.306	282.445
0.334	31.394	251.156
0.378	27.740	221.921

CIFS on Server 2		
0.046	22.795	182.361
0.028	37.449	299.593
0.043	24.385	195.084
0.038	27.594	220.753
0.028	37.449	299.593

CIFS on Server 3		
0.214	48.999	391.991
0.220	47.663	381.300
0.217	48.321	386.572
0.217	48.321	386.572
0.218	48.100	384.799

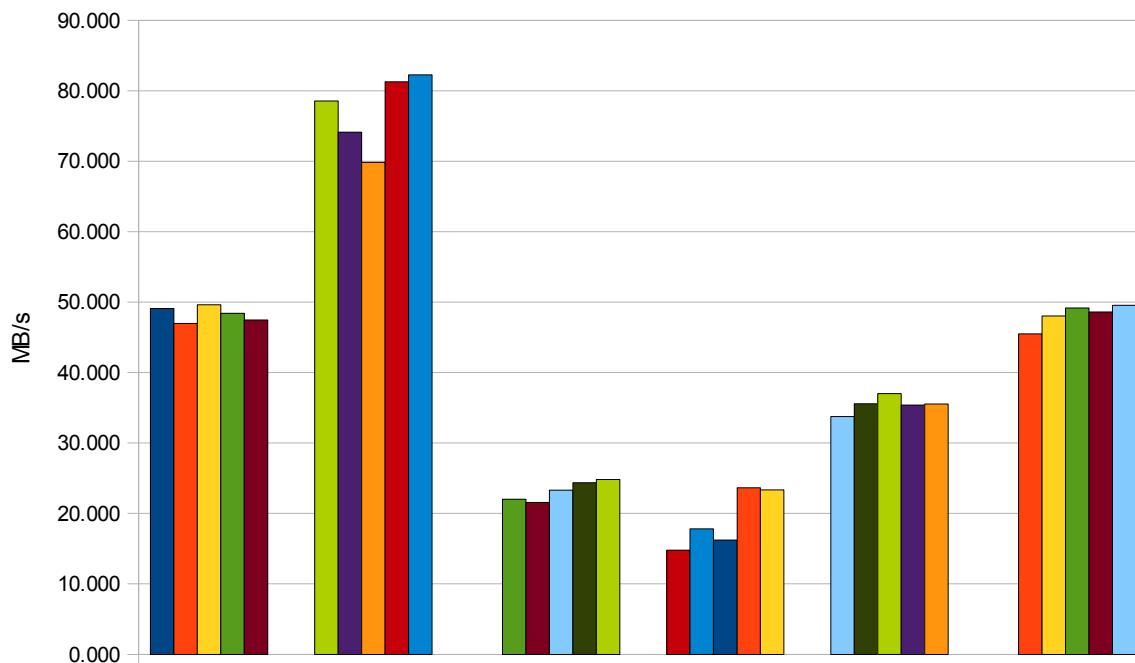
CIFS on Server 3		
0.023	45.590	364.722
0.023	45.590	364.722
0.022	47.663	381.300
0.023	45.590	364.722
0.022	47.663	381.300

Read 5 GB file



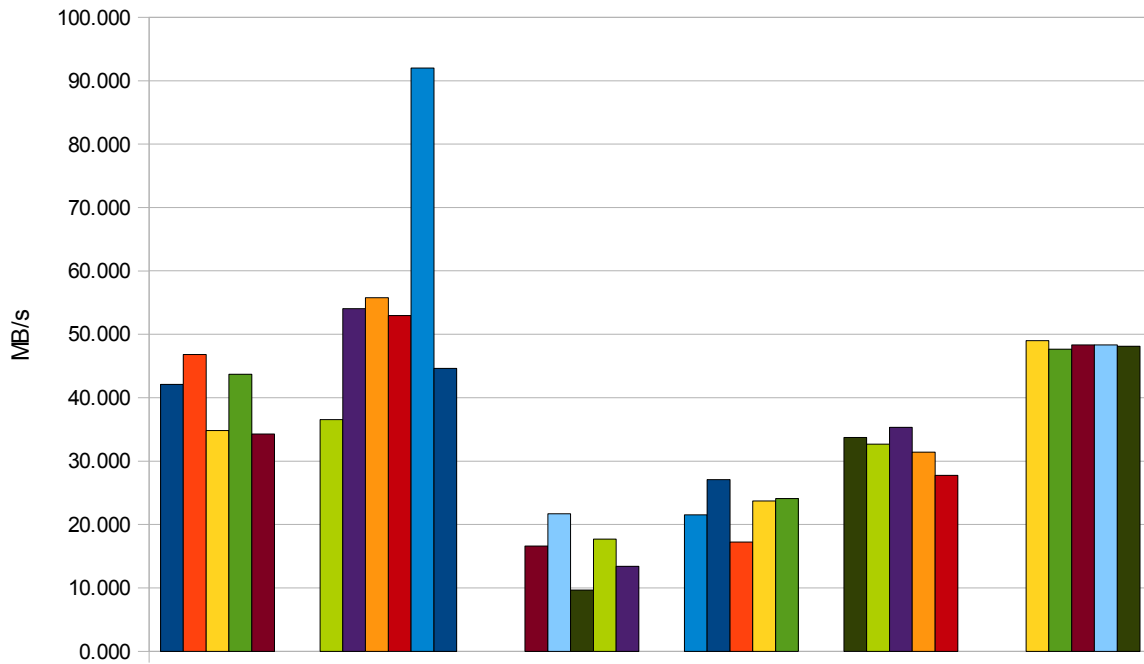
CIFS	NFS	NFS sync	NFS async	CIFS	CIFS
Server 1		Server 2		Server 3	

Read 100 MB file



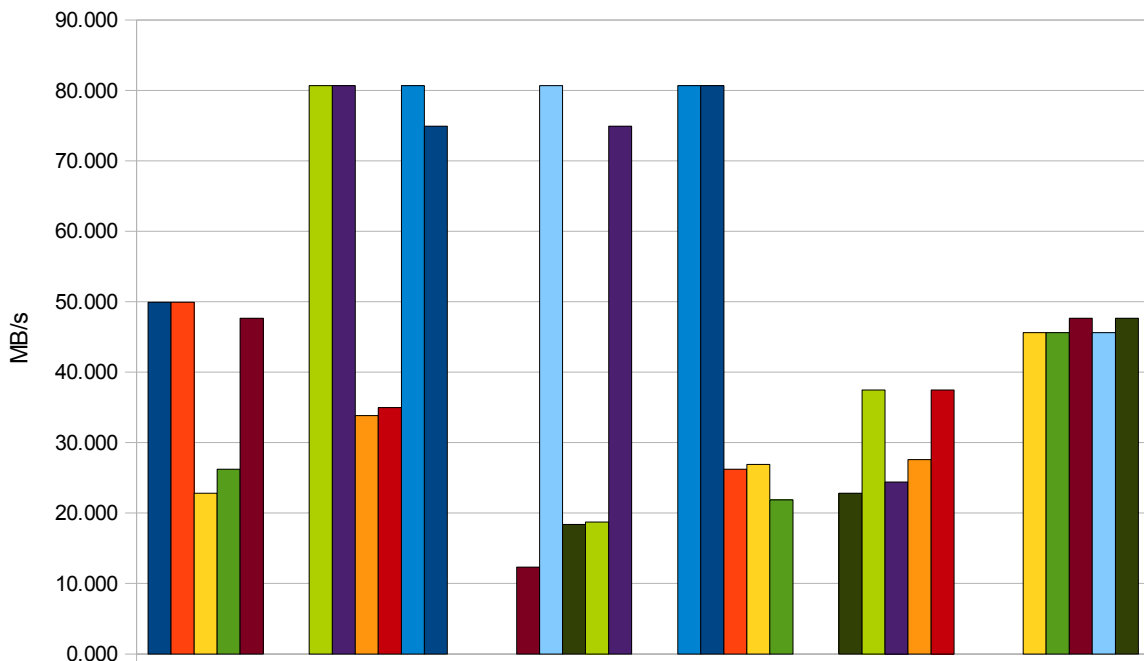
CIFS	NFS	NFS sync	NFS async	CIFS	CIFS
Server 1		Server 2		Server 3	

Read 10 MB file



CIFS	NFS	NFS sync	NFS async	CIFS	CIFS
Server 1		Server 2			Server 3

Read 1 MB file



CIFS	NFS	NFS sync	NFS async	CIFS	CIFS
Server 1		Server 2			Server 3

Copy 5 GB

This benchmark copies a 5 GB file.

First we copy the file from the client's hard drive to the server share,
then we copy the file from the server share back to the local drive.

To server share			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
1	58	44.431	355.449
2	3	42.625	341.000
1	59	44.058	352.463
1	43	50.902	407.214
1	55	45.590	364.722

To local drive			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
2	1	43.330	346.637
2	3	42.625	341.000
1	59	44.058	352.463
2	2	42.974	343.795
2	5	41.943	335.544

NFS on Server 1			
3	9	27.740	221.921
3	11	27.450	219.597
3	0	29.127	233.017
3	13	27.165	217.321
3	9	27.740	221.921

NFS on Server 1			
1	33	56.375	451.000
1	30	58.254	466.034
1	36	54.613	436.907
1	34	55.775	446.203
1	31	57.614	460.913

NFS on Server 2 (Sync)			
2	54	30.131	241.052
2	54	30.131	241.052
2	58	29.454	235.635
2	54	30.131	241.052
2	56	29.789	238.313

NFS on Server 2 (Sync)			
4	14	20.641	165.130
4	9	21.056	168.446
4	11	20.888	167.104
4	6	21.313	170.500
4	14	20.641	165.130

NFS on Server 2 (Async)			
2	6	41.610	332.881
2	6	41.610	332.881
2	6	41.610	332.881
2	8	40.960	327.680
2	5	41.943	335.544

NFS on Server 2 (Async)			
4	51	18.017	144.134
4	26	19.710	157.681
4	37	18.927	151.419
4	27	19.636	157.090
4	35	19.065	152.520

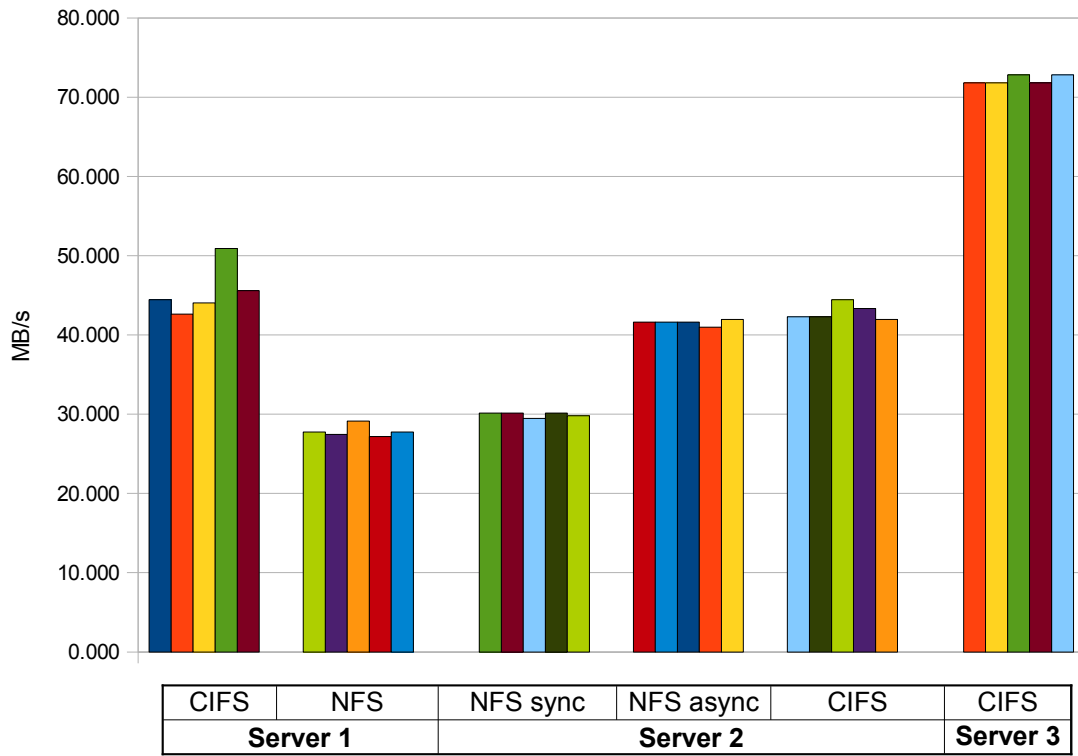
CIFS on Server 2			
2	4	42.281	338.250
2	4	42.281	338.250
1	58	44.431	355.449
2	1	43.330	346.637
2	5	41.943	335.544

CIFS on Server 2			
2	48	31.208	249.661
2	43	32.165	257.319
2	49	31.023	248.184
2	50	30.840	246.724
2	40	32.768	262.144

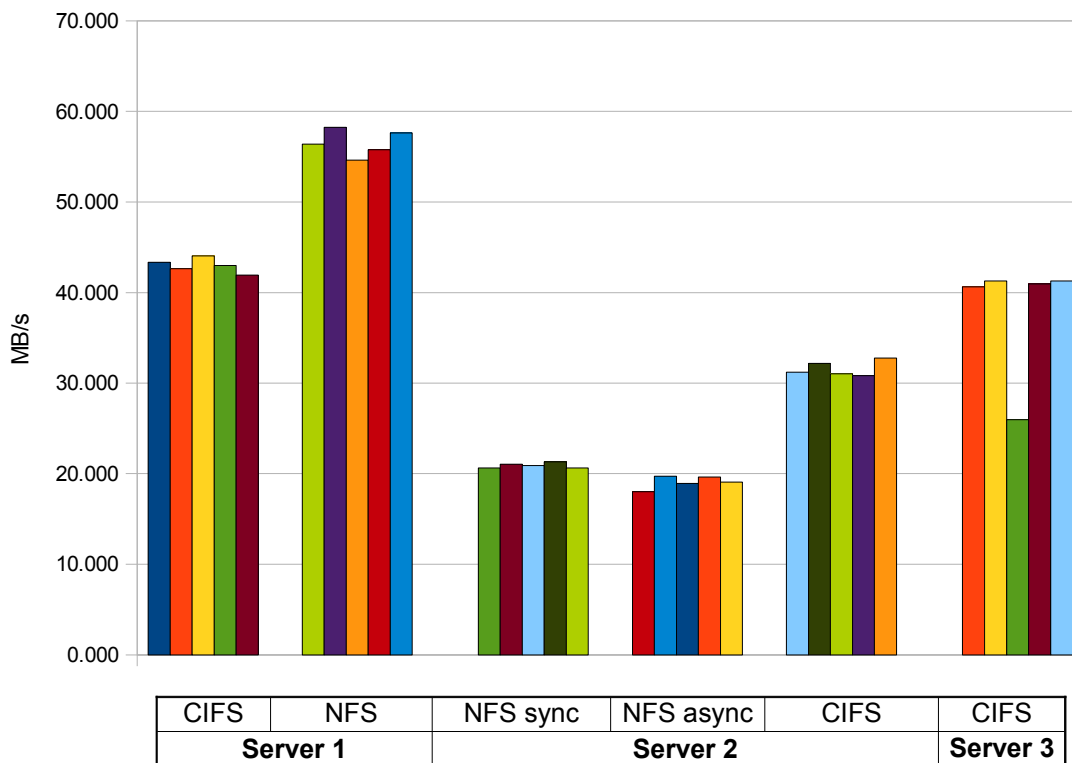
CIFS on Server 3			
1	13	71.820	574.562
1	13	71.820	574.562
1	12	72.818	582.542
1	13	71.820	574.562
1	12	72.818	582.542

CIFS on Server 3			
2	9	40.642	325.140
2	7	41.283	330.260
3	22	25.955	207.639
2	8	40.960	327.680
2	7	41.283	330.260

Copy 5 GB file to server share



Copy 5 GB file to local drive



Copy 1 GB Big Files

This benchmark copies a folder with 10 files (file size is 100 MB).

First we copy the folder from the client's hard drive to the server share, then we copy the folder from the server share back to the local drive.

To Server Share			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	19	55.188	441.506
0	19	55.188	441.506
0	19	55.188	441.506
0	26	40.330	322.639
0	19	55.188	441.506

To Local Drive			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	23	45.590	364.722
0	24	43.691	349.525
0	23	45.590	364.722
0	24	43.691	349.525
0	23	45.590	364.722

NFS on Server 1			
0	32	32.768	262.144
0	43	24.385	195.084
0	33	31.775	254.200
0	36	29.127	233.017
0	36	29.127	233.017

NFS on Server 1			
0	16	65.536	524.288
0	18	58.254	466.034
0	16	65.536	524.288
0	17	61.681	493.448
0	17	61.681	493.448

NFS on Server 2 (Sync)			
0	38	27.594	220.753
0	39	26.887	215.093
0	41	25.575	204.600
0	41	25.575	204.600
0	38	27.594	220.753

NFS on Server 2 (Sync)			
0	42	24.966	199.729
0	45	23.302	186.414
0	46	22.795	182.361
0	45	23.302	186.414
0	45	23.302	186.414

NFS on Server 2 (Async)			
0	47	22.310	178.481
0	48	21.845	174.763
0	36	29.127	233.017
0	40	26.214	209.715
0	44	23.831	190.650

NFS on Server 2 (Async)			
0	52	20.165	161.319
0	55	19.065	152.520
0	50	20.972	167.772
0	52	20.165	161.319
0	49	21.400	171.196

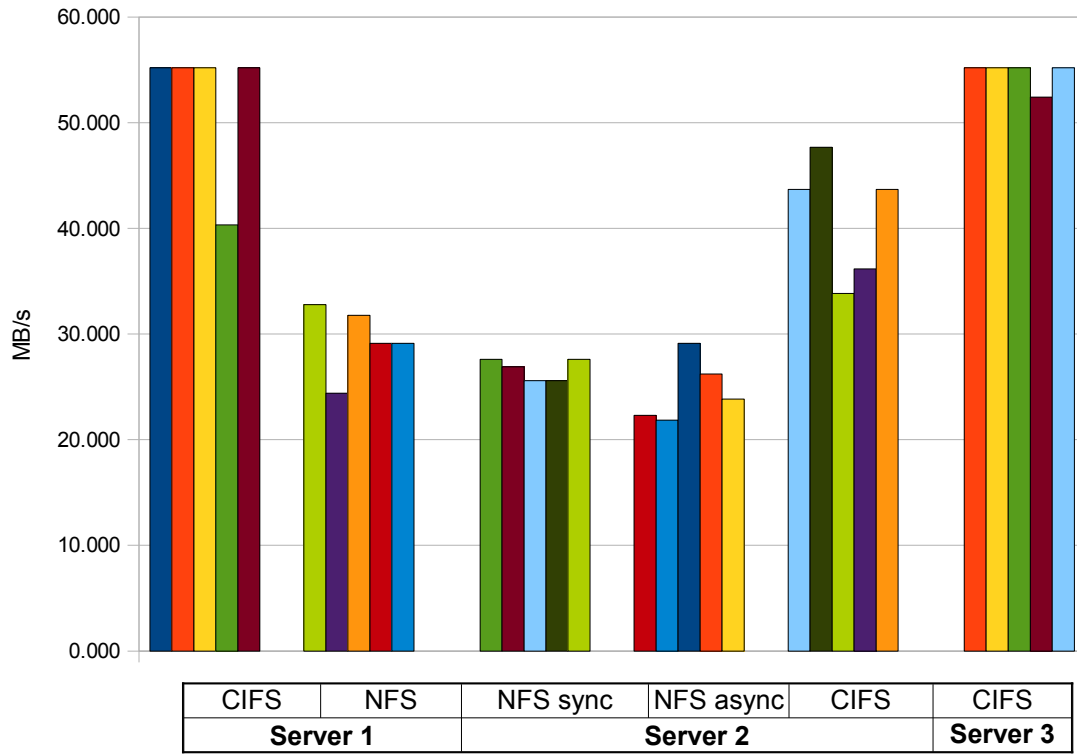
CIFS on Server 2			
0	24	43.691	349.525
0	22	47.663	381.300
0	31	33.825	270.600
0	29	36.158	289.262
0	24	43.691	349.525

CIFS on Server 2			
0	31	33.825	270.600
0	30	34.953	279.620
0	33	31.775	254.200
0	31	33.825	270.600
0	31	33.825	270.600

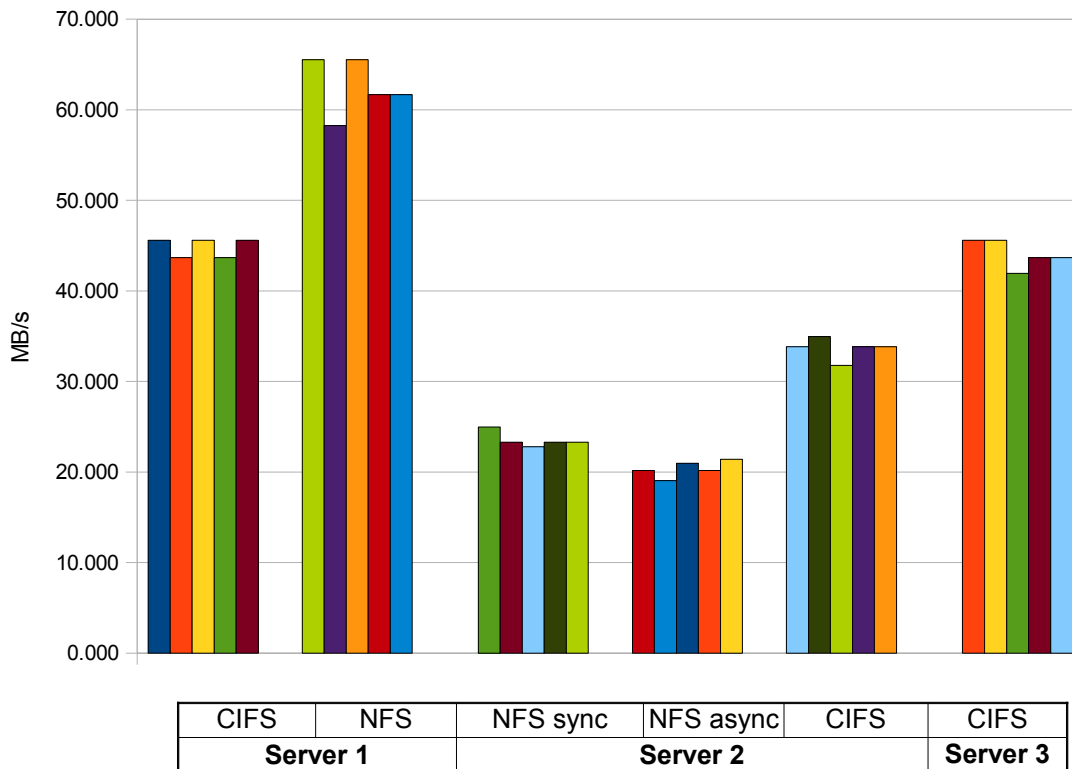
CIFS on Server 3			
0	19	55.188	441.506
0	19	55.188	441.506
0	19	55.188	441.506
0	20	52.429	419.430
0	19	55.188	441.506

CIFS on Server 3			
0	23	45.590	364.722
0	23	45.590	364.722
0	25	41.943	335.544
0	24	43.691	349.525
0	24	43.691	349.525

Copy big files to server share



Copy big files to local drive



Copy 1 GB Medium Files

This benchmark copies a folder with 100 files (file size is 10 MB).

First we copy the folder from the client's hard drive to the server share, then we copy the folder from the server share back to the local drive.

To Server Share			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	25	41.943	335.544
0	26	40.330	322.639
0	26	40.330	322.639
0	29	36.158	289.262
0	25	41.943	335.544

To Local Drive			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	28	37.449	299.593
0	29	36.158	289.262
0	26	40.330	322.639
0	26	40.330	322.639
0	29	36.158	289.262

NFS on Server 1			
0	42	24.966	199.729
0	47	22.310	178.481
0	48	21.845	174.763
0	52	20.165	161.319
0	50	20.972	167.772

NFS on Server 1			
0	24	43.691	349.525
0	25	41.943	335.544
0	24	43.691	349.525
0	23	45.590	364.722
0	25	41.943	335.544

NFS on Server 2 (Sync)			
0	41	25.575	204.600
0	43	24.385	195.084
0	41	25.575	204.600
0	39	26.887	215.093
0	46	22.795	182.361

NFS on Server 2 (Sync)			
0	57	18.396	147.169
0	58	18.079	144.631
0	51	20.560	164.483
0	53	19.784	158.276
1	3	16.644	133.153

NFS on Server 2 (Async)			
0	41	25.575	204.600
0	37	28.340	226.719
0	36	29.127	233.017
0	29	36.158	289.262
0	30	34.953	279.620

NFS on Server 2 (Async)			
1	8	15.420	123.362
1	2	16.913	135.300
1	4	16.384	131.072
0	54	19.418	155.345
0	54	19.418	155.345

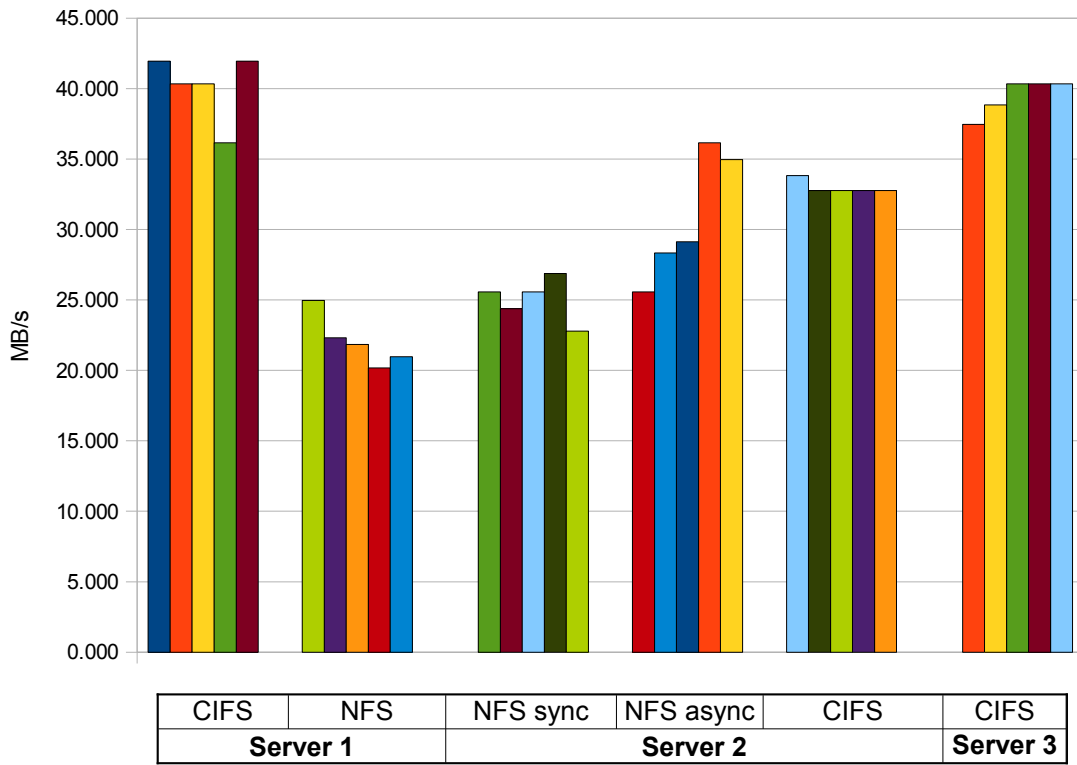
CIFS on Server 2			
0	31	33.825	270.600
0	32	32.768	262.144
0	32	32.768	262.144
0	32	32.768	262.144
0	32	32.768	262.144

CIFS on Server 2			
0	33	31.775	254.200
0	33	31.775	254.200
0	33	31.775	254.200
0	35	29.959	239.675
0	33	31.775	254.200

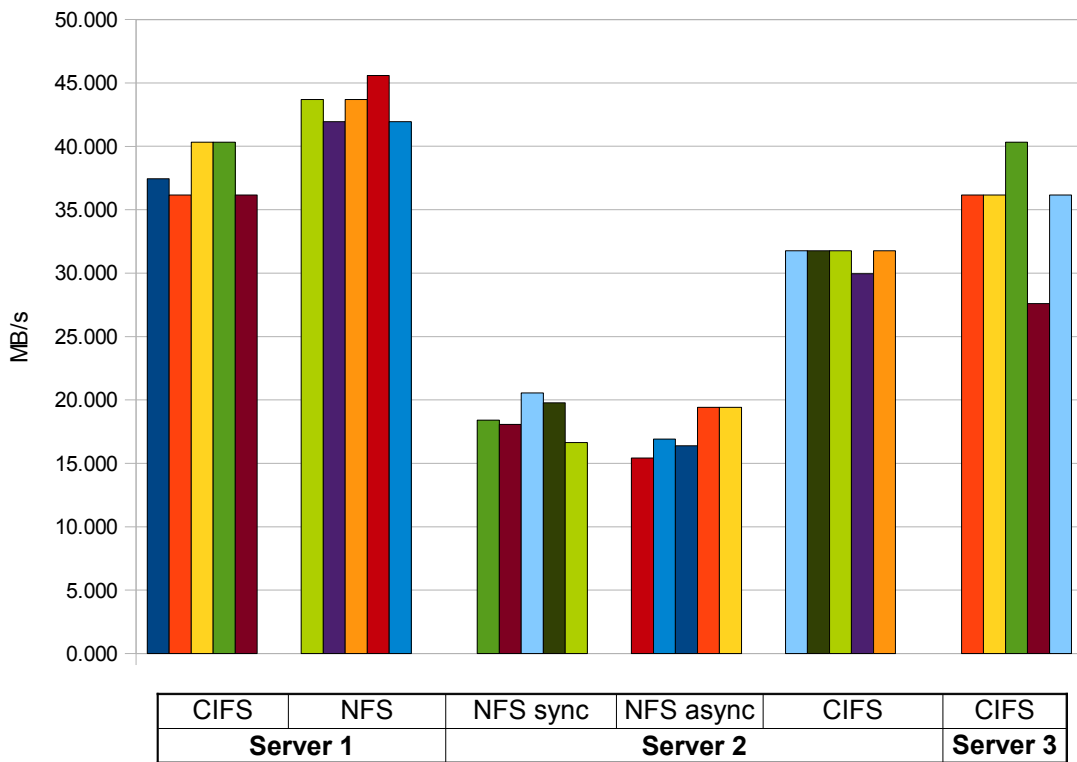
CIFS on Server 3			
0	28	37.449	299.593
0	27	38.836	310.689
0	26	40.330	322.639
0	26	40.330	322.639
0	26	40.330	322.639

CIFS on Server 3			
0	29	36.158	289.262
0	29	36.158	289.262
0	26	40.330	322.639
0	38	27.594	220.753
0	29	36.158	289.262

Copy medium files to server share



Copy medium files to local drive



COPY 1 GB Small Files

This benchmark copies a folder with 1,000 files (file size is 1 MB).
 First we copy the folder from the client's hard drive to the server share,
 then we copy the folder from the server share back to the local drive.

To Server Share			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	42	24.966	199.729
0	39	26.887	215.093
0	43	24.385	195.084
0	39	26.887	215.093
0	42	24.966	199.729

To Local Drive			
<i>Minutes</i>	<i>Seconds</i>	<i>MB/s</i>	<i>Mb/s</i>
CIFS on Server 1			
0	34	30.840	246.724
0	34	30.840	246.724
0	35	29.959	239.675
0	35	29.959	239.675
0	32	32.768	262.144

NFS on Server 1			
0	57	18.396	147.169
0	57	18.396	147.169
0	57	18.396	147.169
1	0	17.476	139.810
0	58	18.079	144.631

NFS on Server 1			
0	24	43.691	349.525
0	23	45.590	364.722
0	23	45.590	364.722
0	24	43.691	349.525
0	23	45.590	364.722

NFS on Server 2 (Sync)			
0	49	21.400	171.196
0	51	20.560	164.483
0	55	19.065	152.520
0	52	20.165	161.319
0	55	19.065	152.520

NFS on Server 2 (Sync)			
0	47	22.310	178.481
0	49	21.400	171.196
1	3	16.644	133.153
0	56	18.725	149.797
0	54	19.418	155.345

NFS on Server 2 (Async)			
0	48	21.845	174.763
0	41	25.575	204.600
0	43	24.385	195.084
0	43	24.385	195.084
0	42	24.966	199.729

NFS on Server 2 (Async)			
1	8	15.420	123.362
0	53	19.784	158.276
0	58	18.079	144.631
0	52	20.165	161.319
0	52	20.165	161.319

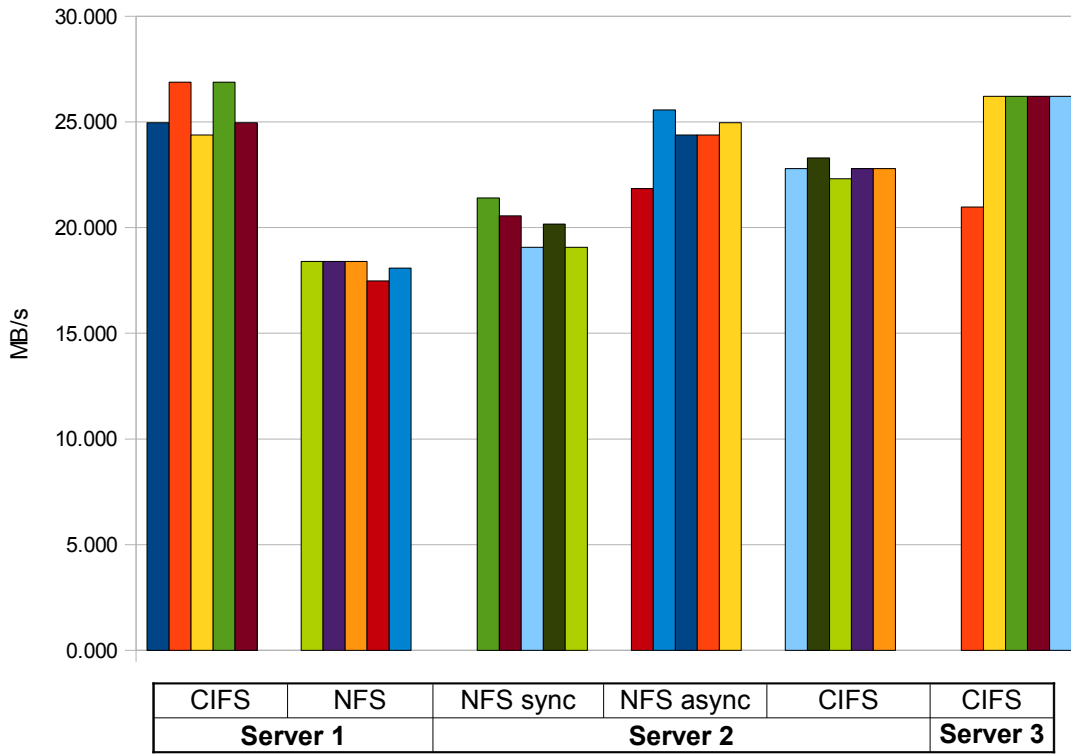
CIFS on Server 2			
0	46	22.795	182.361
0	45	23.302	186.414
0	47	22.310	178.481
0	46	22.795	182.361
0	46	22.795	182.361

CIFS on Server 2			
0	42	24.966	199.729
0	44	23.831	190.650
0	43	24.385	195.084
0	45	23.302	186.414
0	42	24.966	199.729

CIFS on Server 3			
0	50	20.972	167.772
0	40	26.214	209.715
0	40	26.214	209.715
0	40	26.214	209.715
0	40	26.214	209.715

CIFS on Server 3			
0	24	43.691	349.525
0	25	41.943	335.544
0	24	43.691	349.525
0	25	41.943	335.544
0	24	43.691	349.525

Copy small files to server share



Copy small files to local drive

