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System Configurations

The following table describes the systems and their configuration during the NetWare testing process.

Table 9 System Configurations

Configuration	**SS10 Model 30**	**SS2**	**IBM RS/6000 Model 550S**	**HP9000 Model 847S**	**Intel 486**
CPU	SuperSPARC	Cypress Ross	POWER	PA-RISC	i486
CLOCK	36 Mhz	40 Mhz	42.6 Mhz	48 Mhz	33 Mhz
MEMORY	64 MB	32 MB	64 MB	64 MB	8 MB
Ethernet	on board	on board	microchannel	LAN/9000	NE2000 16 bit
OS Version	SunOS 4.1.3fcs	SunOS 4.1.3fcs	AIX 3.2	HP-UX 8.02	MS DOS 5.0
NetWare Version	NetWare Sunlink 1.0fcs V3.11	NetWare Sunlink 1.0fcs V3.11	NetWare for AIX/6000 V3.11	NetWare for HP9000 8X7 V3.01B	NetWare V3.11
NFS Version	bundled	bundled	NFS for IBM	ARPA Services for HP9000	Novell NFS NLM V1.2

Table 8 Tuning recommendations based on memory & number of clients

Installed Memory	# of Clients	fs_shm_size	fs_cache_blocks	read_ahead_block_size
16 MB	< 50	800K	72	4096
32 MB	< 50	1100K	105	8192
> 32 MB	< 50	1300K	120	8192
16 MB	> 50	800K	72	2048
32 MB	> 50	1100K	120	4096
> 32 MB	> 50	1300K	120	8192

Note – The parameter titles are the ACTUAL names of the variables found in the file: /etc/NetWare/NWConfig. See below:

Code Example 2 /etc/NetWare/NWConfig:

```
-----------------------------------------------------------------
/* file system shared memory size and key */
fs_shm_size = 800*1024 /* default: 800K */
fs_shm_key = 3735890861 /* default: 3735890861 (0xDEAD2BAD) */
.
.
.
/* number of file system cache blocks */
fs_num_cache_blocks = 72 /* default: 72 */
.
.
.
/* NetWare has a simple read-ahead cache; used mostly on executable
file down loads. There is NO general purpose cache. The cache block
size token should be tuned to the UNIX filesystem block size that
NetWare is using (i.e. 1K * filesystems, 4K filesystems). */
read_ahead_cache = active /* default: active */
read_ahead_cache_block_size = 4096 /* default is 4096 */
------------------------------------------------------------------
```

PC Magazine has developed a V3.0 of this benchmark and we are currently in the process of obtaining a copy. This would allow us to rerun the tests. I understand that V3.0 more accurately represents a production network environment.

It would be fair to use the results of the two internal Novell tests to discredit any use of PC Magazine benchmarks prior to version 3.0.

Tuning recommendations

The final section of this report provides simple tuning tips that can help when running benchmarks on NWSL 1.0.

The most important performance gain was found by reducing the number of NCP Engines from the default of 10 to 1. This can be done by simply editing the file in /etc/NetWare/NWConfig file and changing the parameter shown below:

Code Example 1 /etc/NetWare/NWConfig:

```
-----------------------------------------------------------------
/* NetWare configuration/tunables file. */
/*“@(#)adm/etc/NWConfig.SRC 1.19 (Novell) 12/6/91” */
config_file_version = 1 /* Please don’t modify. */
/* General configuration. */
max_procs = 10 /* Maximum NCP engines */
max_connections = 50 /* Max connections to be supported */
max_volumes = 32 /* Max logical volumes to be supported */
shm_size = 512*1024 /* Shared memory segment size */
-----------------------------------------------------------------
```

change the parameter max_procs from the default of 10 to 1 and restart NetWare on the server. We recommend that you increase this parameter for each 20 clients using the server.

Other items that were found to increase performance was increasing the size of shared memory, cache blocks and read ahead block sizes used by NWSL. This can be done by modifying the following parameters shown in the table below based on the amount of memory installed on the system and the number of anticipated NetWare clients.

The Hard Disk Access Load (hdal) Defined

The Hard Disk Access Load test heavily loads the hard disk and disk-caching system. To do this, each station randomly accesses its own 100K data file using 1K records. Data written to the file is changed each time. The random reads typically access data outside the cache, which forces a disk read, as does any write.

(hdal) results analysis

The hdal test seemed the closest to simulating any form of user workload, but because the timed test is made up exclusively of reads, it also lacked "read world" considerations.

The Database Load Test (dbl) Defined

The Database Load test exercises the system's record-locking support and the way it handles a number of random simultaneous accesses to a common file. This test times how fast each loading station accesses a common database consisting of an index and a data file. Half the accesses are simple searches of the index file and an accompanying access to a record in the data file. One quarter of the accesses perform the same operation but also lock the data record and update its contents. The remaining accesses update the index file and a data record. The index file is locked during every update and the DOS 3.1 RLOCK statement prevents simultaneous index file updates.

(dbl) results analysis

The worst of the three was the dbl test. This benchmark was designed to test the btrieve performance of a given server. The problem is the actual test which was run as a benchmark had no btrieve operations. It was the same test used for benchmarking the nsl and hdal loads.

Conclusion

Because the results of the two internal Novell tests show that Sun outperforms both HP and IBM. It would be fair to conclude that the PC Magazine LAN Benchmark V2.0 did not represent any kind of network load that would be seen in a production environment.

Table 7 PC Magazine LAN Benchmark (NETBENCH2) Results

Test	Intel 486/33	HP9000 Model 847	RS/6000 Model 550	SS10 Model 30	SS2
nsl 1	57	66	78	76	65
nsl 25	81	305	327	417	503
hdal 1	50	69	64	64	57
hdal 25	215	351	327	435	579
dbl 1	48	66	67	85	77
dbl 25	53	70	86	85	82

Note – The complete results matrix can be found on newstop under: newstop:/sun/tech-mktg/nwsl/pcmagtest.wkz

Analysis of the PC Magazine LAN Benchmark results

The results of this benchmark seem to show that the HP9000 Model 847 and the IBM RS/6000 Model 550 outperform both a SPARCstation 10 and a SPARCstation 2. But, when you study the loads that are placed on the server and the makeup of the timed test, it is hard to relate this test to a real world network load.

Network Speed Load (nsl) Defined

The Network Speed Under Load test puts a heavy load on the network interface (cards, media, and so forth) while placing a minimal load on the hard disk by having each station continuously read and write its own 1-byte data file, changing the data each time. For systems with disk caching, the load on the hard disk is even smaller, since cached systems typically perform a disk write but do not require a physical disk read.

(nsl) results analysis

The nsl load does not simulate any real world environment that I am aware of. I don’t know of any application that reads and writes a 1 byte file continuously. This test only loaded up the ethernet cable so that collisions became the limited factor.

LAN Test Overview

The PC Magazine LAN benchmark test provides a way to impose a consistent load on a LAN and to time specific procedures. The tests generate repeatable results, which can then be compared with other similarly configured LANs with the same number of workstations.

The PC Labs LAN benchmark tests are written in C and are independent of commercial software. Sun ran the tests on a test- bed of 25 PC Clones ranging from 8-MHz IBM PC ATs to 486/25Mhz systems. For our test-bed to better simulate the conditions on a medium-size network of 20 or more workstations, PC Magazine designed these loading tests so that a single station represents five to ten times the load of a user performing an interactive task (for example, updating records) on a network. Thus the 25 Systems was representative of between 125 and 250 users.

By themselves, the elapsed times reported in these tests are not meaningful. They are valuable only when used to compare the performances of two or more systems running under near-identical conditions. The times are in seconds.

Load Overview

The Network Speed Under Load (nsl) and the Hard Disk Access Load (hdal) benchmark tests measure the time needed to perform a standardized task on the network. While the actual work loads used for these two tests (described below) are different, we used the same procedure for both. To obtain the elapsed times shown here, we ran a benchmark program performing a sequential create, a sequential read, a sequential write, a random read, and a random write of a large file. The record sizes used in these activities systematically rotate between 16K, 4K, and 512 bytes. The numbers shown in the three-dimensional chart are the total time necessary for all of these operations. We ran the test on all our PCs to load the network while timing just one of them. We then reduced the number of workstations five at a time to show the effect of loading on the network.

Bold represents best overall results

Italic represents best UNIX results

Note – The results above show that NWSL V1.0 on SPARC again beats IBM's NetWare for AIX in 9 of the 11 tests.

Note – The HP/9000 wins 6 of the 11 tests, but the underlying architecture of V3.01B is largely different and we expect that under V3.11 HP would suffer performance degradation due to the changes in implementation.

Caution – The Native NetWare numbers are included in the results as a warning not to sell NWSL 1.0 against Native NetWare using raw performance as a criteria.

Conclusion

We are again the clear winner over IBM at both extremes of the MASTER test. I would recommend using this data in any and all customer situations where IBM is a threat. These results tied with the KNOCK-off's against IBM should ensure a win!

A different strategy must be used against HP. Because they are using an old implementation of NetWare for UNIX and their product is OEM'd from third party. You can build a case on support and customer concern about the stability of the 3rd party vendor. If you match that with the long list of KNOCK-off's against HP and the inherent danger of the current implementation, you can make it difficult for them to beat you.

PC Magazine LAN Benchmark V2.0 (NETBENCH2)

The PC Magazine LAN benchmark program is used to evaluate LAN hardware and software.

Table 5 Novell Master Test Results Column 1 all systems (Bold is Highest)

Master TEST	**Intel 486**	**SS10 Model 30 & Prestoserve**	**SS10 Model 30**	**SS2**	**HP9000 Model 847S**	**RS/6000 Model 550**
Private file (128 Kb) sequential read	**1932.85**	796.03	798.67	910.97	823.20	508.00
Private file (128 Kb) random read test	**363.25**	226.83	225.73	268.13	254.60	345.17
Large block (16 Kb) transfer speed test	**17.95**	12.97	12.97	15.43	13.10	13.77
Create/Write/Close/Delete (16 Kb)	6.55	**7.40**	5.10	4.90	1.23	5.83
Record Lock/Unlock test	**443.30**	139.50	140.07	237.77	198.03	212.07
Directory Search (*.*) test	**596.40**	246.33	242.40	330.87	203.03	285.10
Random Directory search test	**337.53**	86.87	83.40	73.10	117.73	60.57

Bold represents best overall results

Italic represents best UNIX results

Column 10 Results

Table 6 Novell Master Test Results Column 10 all systems.

Master TEST	**Intel 486**	**SS10 Model 30 & Prestoserve**	**SS10 Model 30**	**SS2**	**HP9000 Model 847S**	**RS/6000 Model 550**
Open/Close File (multiple directories)	**878.10**	*67.00*	54.40	29.03	11.93	14.87
Open/Close File (single directory)	**1202.10**	*81.13*	70.37	46.23	10.15	53.78
Small shared file (4kb) random read	**4764.35**	672.83	690.13	565.60	*867.63*	631.90
Large shared file (4 Mb) random read	**4778.15**	491.50	493.20	346.30	*840.10*	625.17
Private file (128 Kb) sequential read	**30507.05**	6527.53	4771.33	*7919.60*	5998.63	6670.33
Private file (128 Kb) random read test	**1202.00**	490.37	467.07	380.07	*784.90*	595.83
Large block (16 Kb) transfer speed test	41.35	42.77	39.03	32.17	***44.43***	36.63
Create/Write/Close/Delete (16 Kb)	**13.37**	*10.93*	7.50	5.17	1.38	5.37
Record Lock/Unlock test	**1881.20**	404.43	227.40	309.13	*429.30*	270.33
Directory Search (*.*) test	**3478.20**	*453.40*	285.83	232.17	287.60	228.27
Random Directory search test	**1748.53**	145.03	103.53	73.40	*191.93*	42.33

Novell's MASTER Test

Novell's certification is extremely thorough in testing a servers ability to perform the tasks necessary to provide NetWare services. This particular test contains 11 different sections. Each section tests a different type of server function. The test was run on the Sun SS10-30, SS10-30/w Presto, SS2, IBM RS/6000 Model 550, and the HP/9000 Model 847. It should be noted that in all cases with the exception of the HP. NetWare for Unix V3.11 was used. HP is currently shipping NetWare for Unix V3.01B. The internal architecture is completely different and the results from the HP are not a direct comparison. We are waiting for HP to make available their V3.11 in late October to run the tests again.

How the test works

Each test was run on 10 synchronized PC clients. The results from the test are given in groups each one representing units from 1 to 10.

The complete results will be available on newstop but the individual ranking in each category are listed below for columns 1 and 10. The numeric results are only valid when compared against systems tested using the same configuration. They have no absolute meaning. Bigger is better in all sections of the MASTER test.

Note – The complete set of results from the MASTER Test can be obtained on newstop:/sun/tech-mktg/nwsl/master.wks.

Column 1 results

Table 5 Novell Master Test Results Column 1 all systems (Bold is Highest)

Master TEST	Intel 486	SS10 Model 30 & Prestoserve	SS10 Model 30	SS2	HP9000 Model 847S	RS/6000 Model 550
Open/Close File (multiple directories)	**281.95**	56.17	52.57	36.03	12.43	28.13
Open/Close File (single directory)	**313.00**	67.77	66.67	47.90	10.70	66.20
Small shared file (4kb) random read	**713.95**	262.47	238.33	422.03	369.90	378.83
Large shared file (4 Mb) random read	**705.05**	233.93	232.83	326.33	341.13	375.13

Table 3 Novell's PERFORM3 Benchmark results with nfs for Maximum Kilobytes/second

SPARCstation 10 Model 30 Prestoserve	**Intel 486/33**	**SPARCstation 10 Model 30**	**IBM RS/6000 Model 550**	**HP9000 Model 847S**
574.89	458.80	324.73	281.27	248.94

Table 4 Novell's PERFORM3 Benchmark results with nfs for Average Kilobytes/second

Intel 486/33	**SPARCstation 10 Model 30/Presto**	**SPARCstation 10 Model 30**	**HP9000 Model 847S**	**IBM RS/6000 Model 550S**
366.78	301.43	185.80	181.24	176.54

Again the SS10 outperforms both the HP and IBM's under a mixed load even without the use of a Prestoserve Board. It is important to note that a Prestoserve increased performance and throughput of the SS10 beyond the Native NetWare server for Maximum Kilobytes/second throughput. We found that in this test the Prestoserve board provided a substantial increase in performance.

Note – A complete list of the results are on newstop under the directory: newstop:/sun/tech-mktg/nwsl/perform3.wkz

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Conclusion

It is safe to say that using the PERFORM3 benchmark from Novell that SunSelect's NWSL 1.0 outperforms IBM and HP with Novell clients and under a mixed load environment. Under certain types of load most evidently a mixed load, the use of a Prestoserve board provided an almost 80% increase in performance.

Table 2 Novell's PERFORM3 Benchmark results for Average Kilobytes/second

Intel 486/33	SPARCstation 10 Model 30	HP9000 Model 847S	IBM RS/6000 Model 550S
590.13	505.98	484.72	414.

Conclusion

The results show that using the Novell PERFORM3 benchmark, a Sun SPARCstation 10 outperforms both IBM and HP with respect to Maximum and Average Kilobytes/sec throughput. In table 1, both the Sun and HP were able to achieve a higher maximum throughput then a Native NetWare server.

Caution – The Native NetWare server had only a 16 bit ethernet adapter for the test. Though not tested it is conceivable with a 32 bit ethernet adapter the Native NetWare server could attain more than 652 Kilobytes/sec.

Novell's PERFORM3 & nhfsstone v2.0.3

The PERFORM3 benchmark was run again, this time with the addition of an NFS load. This was done in an attempt to simulate a mixed load environment.

How the test works

The exact same test which was run above was run again. But this time a Sun SPARCstation 2 mounted the exact same partition as the NetWare clients (to simulate shared data) and ran the nhfsstone v2.0.3 benchmark with a a load of 100 ops/sec using the standard legato mix. We decided to test both a SS10-30 with and without a prestoserve Sbus board. Larger numbers are better in this test. The results are presented in best to worst.

Novell's PERFORM3

Novell has a number of benchmarks that are used to determine a servers as well as a clients ability to process data. The PERFORM3 test is used to measure effective throughput of a server. The test results should be used only as a comparison between the machines tested as the client can have an effect on the performance. Because we used the exact same systems during our testing the numbers obtained can be used to show RELATIVE throughput.

In our test environment we used 5 i386 PC's to benchmark NetWare for UNIX on the Sun SPARCstation 10, the HP/9000 Model 847 and the IBM RS/6000 Model 550 as well as a Intel 486/33 running Native NetWare V3.11. Each of the NetWare for UNIX servers had 64MB of RAM, a 1.3GB disk and a single ethernet adapter.

The test measured cumulative throughput of the 5 PC's with different file sizes. The parameters were as follows:

`File size: 4096 Kilobytes Step size: 256 bytes Test time: 12 sec's`

How the test works.

The test was run on the five synchronized machines each attempting to read a 4096 Kilobytes file for 12 sec's and then report the cumulative throughput achieved by all 5 PC's. The same test is run over and over decreasing the size of the file by 256 bytes each iteration. This continues until the file size reaches 256 bytes. The program then provides summary data which includes the Max Kbps achieved, the Avg Kbps for the test as well as the results for each of the file sizes tested. Larger numbers are better.

Table 1 Novell's PERFORM3 Benchmark results for Maximum Kilobytes/second

SPARCstation 10 Model 30	HP9000 Model 847S	Intel 486/33	IBM RS/6000 Model 550
652.00	639.39	631.19	510.20

fact, the utility is unable to restore the database from the most common form of corruption: an access file getting truncated do to a system crash during a directory update.

IBM RISC System/6000 Model 550S

- System: IBM RS/6000 Model 550S
- OS: AIX 3.2
- S/W: NetWare for AIX/6000 V3.11

1. Quick Installation documentation was weak and did not work. The documentation said that after install was complete you could start up NetWare services WITHOUT rebooting. We tried this and the server froze with no message as to what went wrong. It required a reboot for the NetWare services to start-up.

2. No License control. Easy for a Administrator to abuse their license contract with Novell. This could eat into critical VAR revenues on product sales.

3. Native Locks is broken. Novell ships the NetWare for UNIX code with a non-functional native locks. IBM did not fix this so IBM's NetWare for UNIX DOES NOT support locking between UNIX clients and NetWare Clients. This means if a PC NetWare client using lotus opens a spreadsheet and starts editing it, a Sun Client using NFS can also open the same spreadsheet and we have the classic data integrity issue; who's data is on the disk? SunSelect fixed the Novell Source code so that this locking functionality does work.

4. Does not detect corruption of inode file maintained for NetWare users. If the inode file is corrupted, the product continues to function while providing unpredictable results. NWSL checks the node file via nwfsck and if does not checksum the corrupted section of the inode file is rebuilt.

Performance Results (detail)

This section will review the results obtained from running three different benchmark test suites on the IBM, HP and Sun systems. The first part is a definition of each test and what it is designed to measure. The second part is a detail of the test results and the final section discusses the results and their relative importance to product sales.

5. HP’s version is out of date. It is based on NetWare for UNIX version 3.01B. They do not expect to release their V3.11 until October 1992. This is a free upgrade for products which are on HP software maintenance. Issues around V3.01B are detailed below:

    a. NetWare volume removal under V3.01B is extremely difficult.Instead of actually deleting the volume you change it’s reference in the NWConfig file to a special “Delete Volume” flag. After attempting to delete a number of volumes, the NWConfig file became quite cluttered and difficult to read. This can make an administrators job a nightmare. As in most production environments, disks are added groups are moved, servers are upgraded and the management of the NetWare Volumes can become a burden in making these realities a success.

    b. NetWare volume moves under V3.01B work as if you just mounted the volume under Portable NetWare for the first time. Because the volumes are referenced in the file using full host paths as apposed to a path relative to /, when you move a volume it must recreate the Novell specific database (INODE table) from scratch. This is not true of V3.11. V3.11 implements a much more advanced safer method of maintaining the Novell specific information for volumes (INODE table) being mounted under NetWare. Each volume only has one file, and this file can be recreated in the event that it is corrupted. To move a volume you simply use the unix mv command and change the references in the file. All the files and (INODE table) databases remain in tact. This can be a time issue if the (INODE table) database is very large. Because V3.01B must recreate it from scratch the volume is unusable until the table rebuild is complete.

    c. Novell specific information database is prone to corruption in Portable NetWare V3.01B. Each Portable NetWare volume has a special directory called “access”. This directory contains a file for every directory in the volume. These files are named using hexadecimal numbers. These hex numbers are used as pointers to link the directories together. Every time a file is added to a directory, the entire access file for that directory is rewritten. This is not only extremely inefficient but if a system were to crash while this file is being rewritten the Novell specific attributes for all the files in that directory could be lost or be incomplete.

    d. Portable NetWare V3.01B has a very primitive recovery mechanism for lost or corrupted “access” files as described in #8. This utility is able to restore the filesystems after a crash only in very limited circumstances. In

Competitive Knock Off's

This section outlines a number of Knock-off's against both HP and IBM. These knock-off's are based on observed behavior of the particular products/release. Some of these may change with a newer release from the corresponding vendor.

HP9000 Model 847S mid-range server

- System: HP/9000 Model 847S (Mid-range PA-RISC based Server)
- OS: HP-UX 8.02
- Product: NetWare for UNIX HP/9000 Model 8X7 V3.01B

1. Installation Documentation is poorly organized. Too many books with difficult to understand titles. I had a very difficult time finding the section on installing the software It took me two days working with the VAR and HP to determine that a book was missing. Without this book I had no idea if my installation was successful.

2. Product ported by a 3rd party. Support is second tier. HP's support lines and licensing groups were not able to help me solve my licensing problems. The master VAR found the ONE person at HP who could help me. The product was ported for HP by Innovus Inc.

3. License is node locked, therefore if you have multiple NetWare for UNIX servers the number of users is limited to the number of licenses on a particular server, not the total number of users. NWSL uses SNL, so the total number of licenses are available to all NWSL servers on a network not just one particular server.

4. Native Locks is broken. Novell ships the NetWare for UNIX code with a non-functional native locks. HP did not fix this so HP's NetWare for UNIX DOES NOT support locking between UNIX clients and NetWare Clients. This means if a PC NetWare client using lotus opens a spreadsheet and starts editing it, a Sun Client using NFS can also open the same spreadsheet and we have the classic data integrity issue; who's data is on the disk? SunSelect fixed the Novell Source code so that this locking functionality does work.

Features Summary

As with all source code, including that provided by Novell some things just do not work. Most of these are trivial, but in one particular case a very critical functional attribute is broken in the NetWare for UNIX source distribution. That attribute is native locks. Native locks allow the operating system to pass a lock back and forth from UNIX to NetWare. If this does not work than a file supposedly locked by a NetWare users looks as though it is available to a UNIX user and data loss or file corruption can occur. IBM and HP did not fix native locks. Currently Sun is the only vendor of those tested who's native locks function correctly. This is a key competitive advantage.

Features and ease of use is another less critical, but important consideration where Sun beats both HP and IBM hands down.

Tuning Summary

The most important performance gain was found by reducing the number of NCP Engines from the default of 10 to 1. This can be done by simply editing the file in /etc/NetWare/NWConfig file and changing the parameter max_procs. Additional Tuning tips can be found in the complete white paper on newstop.

Installation Summary

Installation is has always been an issue with UNIX systems. Most Novell users are afraid of UNIX because it is "difficult to use". SunSelect's installation procedures and documentation address this head on. The customer should be convinced to install the package for any and all vendors being considered. This will help in proving that Sun provides a much more user-friendly installation process then both IBM and HP. This may not be the deciding factor but it gives the customer a feel for the time and effort Sun has placed on this port.

Special Thanks

I would also like to thank all those people at SunSelect who helped make this information possible. I would like to specially thank Gerry Hanam who spent long hours with me, helping me understand NWSL and providing me with the tuning recommendations.

Native vs. Unix

The most frequently asked question is: “What is the difference between NetWare for UNIX or Portable NetWare and NetWare running Native on an Intel microprocessor?” The simple answer is speed.

NetWare for UNIX was not envisioned to replace Native NetWare but rather become a complementary product. NetWare for UNIX does have features that are not available from Native NetWare or any Network Loadable Module (NLM). These include the ability to use the NetWare for UNIX server to run tty based applications, the ability to “map” volumes from the NetWare for UNIX server that do not physically reside on the server, and create a client/server environment that services PC’s, Workstations and Terminals all from the same machine. It is these features that would persuade a customer to consider using NetWare for UNIX in place of Native NetWare. If any one of these features is necessary the questions becomes: “Which NetWare for UNIX should I use?”

Report Summary

Performance Summary

All NetWare for UNIX implementations licensed from Novell come from one of two source distribution, and thus have the same basic features. A customer considering NetWare for UNIX is going to want to know which one performs best. There are a number of benchmarks that are used inside Novell for performance testing. Two of these Novell benchmarks were run on the Sun, IBM, HP and a Native NetWare server. The results of the PERFORM3 test show Sun outperforming both HP and IBM. The results of the Novell MASTER test show a SPARCstation 2 outperforming the IBM in 9 of the 11 tests. HP was able to obtain better numbers in 6 of the 11 tests, but HP’s version of NetWare is not the most current, and the changes made by Novell necessary to stabilize V3.11 created known performance penalties.

NetWare for UNIX from Sun outperforms IBM’s version on Novell’s own benchmarks. The HP version which is less stable wins only by a slight margin. The cost differential between the HP and Sun will make the decision an easy one for the customer if price/performance is the determining factor. Sun beats all vendors by a large margin when presenting the data using the price/performance model.

Native NetWare

Native NetWare is the NetWare offered by Novell which runs only on Intel based microprocessors. This version of NetWare like the others provides, among other things the basic file and print services. Novell over the years has enhanced Native NetWare to take advantage of new and more powerful Intel microprocessors. The most current version available from Novell is NetWare V3.11. This version was specifically designed to take advantage of the Protected Mode of the Intel 386 and 486 processors. All references to Native NetWare refer to the product available from Novell which runs on Intel based microprocessors only. It is possible to port NetWare native to a microprocessor other than Intel. Both HP and Sequent are currently working on such a project.

Note – Native NetWare is a combination of Intel Assembly Language and C. The lowest levels of source code are almost exclusively written in assembly language. The primary reason for this is performance. Novell has spent a great deal of time and money making the basic file and print services extremely fast.

NetWare for UNIX & Portable NetWare

Recently, Novell decided to take their NetWare operating system and make it portable. This allowed them to leverage other vendors microprocessor technology and operating systems while still focusing on the original Intel product. The majority of licensees have been UNIX vendors. Novell decided to target the UNIX marketplace and created a specific product named NetWare for UNIX. This new product is the second major release of the original Portable NetWare. This most recent release is NetWare for UNIX V3.11. This product is a much more enhanced and stable version than the original Portable NetWare, currently release V3.01B. The most noticeable difference is the older version has support for Macintosh. This support is scheduled for NetWare for UNIX V3.11 in the near future.

Note – NetWare for UNIX and Portable NetWare are entirely written in C. NetWare for UNIX and Portable NetWare uses the UNIX file system and operating system to provide the services that Native NetWare implements in low level assembly language. Because of this, Novell NetWare running Native will outperform NetWare on UNIX and Portable NetWare when providing the basic file and print services.

Novell NetWare

Overview

This paper is an overview of Novell's NetWare, NetWare for UNIX, their differences, performance, features, functionality, and tuning. It incorporates tests run on the Sun SPARCstation 10, SPARCstation 2, IBM RS/6000, HP9000, and Intel 486/33mhz.

Executive Summary

In almost all cases Native NetWare outperformed all versions of NetWare for UNIX. Novell's tests show Sun has superior performance, features and functionality over IBM. These same tests place Sun and HP almost equal, with HP having a slight performance lead. HP's Portable NetWare is based on an older source distribution, V3.01B. This source distribution has Macintosh client support, but at the cost of stability and recoverability. Sun SPARCstation 10 and NetWare Sunlink provide an unbeatable price/performance story against both IBM and HP. NetWare Sunlink should only be positioned against native NetWare on features and functionality.

What is NetWare

Novell NetWare is the most popular network operating system (NOS) for PC based networks. According to IDC, a computer industry research company, over 18 million PCs have been installed on local area networks as of 1990. NetWare was originally available only on Intel based PCs running DOS. As part of Novell's platform-independent NetWare marketing program, it has been ported to a number of different operating systems including UNIX and VMS. The original port of NetWare for Intel is frequently called Native NetWare.

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Competitive Analysis

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