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EMC NetWorker Performance and Scalability with Oracle's SPARC T5-2 Server Architecture

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Executive Summary

This white paper describes the performance results obtained for the EMC® NetWorker® product's performance and scalability capabilities on Oracle's SPARC T5-2 server. NetWorker scales and performs better compared to previous SPARC platforms due to the enhanced resources and capability of the SPARC T5-2 server.

The objectives of this effort were to verify the following:

» How NetWorker takes advantage of the new capabilities of Oracle's SPARC T5 processor
» How the distributed segment processing (DSP) capability of Data Domain Boost® increases the backup throughput on a SPARC T5-2 server by eliminating duplicate data transmission to the EMC Data Domain® systems

The performance test results are as follows:

» NetWorker backup on a core [1/16 of a processor] of the SPARC T5-2 server performs the same as an x64 SUSE Linux Enterprise Server (SLES) system.
» NetWorker backup performance on the SPARC T5-2 server scales linearly with increased hardware threads.
» The SPARC T5-2 server performs at the rate of 1 TB per hour with just eight cores [half a processor] and 11 percent faster compared to x64 configurations.
» Lowering the hardware threads [<64 hardware threads or eight cores] can cause CPU saturation on the SPARC T5-2 server. It is recommended to have at least eight cores on the SPARC T5-2 server to get optimal performance.
» On average, each save stream with Client Direct = On takes approximately 50 to 75 MB of memory on the SPARC T5-2 server.
» The SPARC T5-2 server as a NetWorker storage node with Client Direct = Off takes approximately 30 to 150 MB of memory per stream.
» CPU and memory utilization on the SPARC T5-2 server increases with the increase in number of save sets.
» Large save sets (90/180 save sets) backup performance increases by 1.8 times when the cache is not cleared after a previous backup.
» Backup performance on the Oracle Solaris ZFS file system is 2.4x times better than a UFS file system.

Audience

This white paper is intended for EMC NetWorker backup administrators, Oracle Database administrators, storage administrators, and IT architects responsible for architecting, creating, managing, and using IT environments that focus on high-performance enterprise-level backup with EMC NetWorker, Oracle's SPARC T5-2 server, and Data Domain. This white paper assumes that readers are familiar with EMC NetWorker, the SPARC T5-2 server, and Data Domain systems.

Introduction

This white paper introduces readers to NetWorker, the SPARC T5-2 server, and Data Domain features and functionality relevant to NetWorker backup from the SPARC T5-2 server with Data Domain Boost. This paper discusses how NetWorker takes advantage of the new capabilities of the SPARC T5-2 server and Data Domain Boost 3.0 and how NetWorker scales and performs better compared to when previous SPARC or x64 platforms are used. This paper also highlights the best practices for optimal performance using EMC NetWorker on the SPARC T5-2 server platform.

Products and Feature Overview

EMC NetWorker Product Overview

The EMC NetWorker product is a storage management software suite that provides backup, recovery, and other services to systems with a wide variety of operating systems and data types. NetWorker works on many different operating systems and is interoperable. This provides the flexibility to design a storage management system that works best with your current computing environment.

The NetWorker environment provides the ability to protect an enterprise against data loss. As the enterprise grows, so does the complexity and importance of protecting data. NetWorker software provides the power and flexibility to meet these challenges.

The NetWorker software is a cross-platform, client/server application that provides the ability to remotely manage all NetWorker clients and servers from a web-enabled user interface.

The NetWorker product has these components:

- NetWorker Management Console (NMC) server
- Console user interface
- Datazone
- NetWorker server
- NetWorker client
- NetWorker storage node
- Deduplication storage systems
- Virtual environments

NMC Server

The NMC server manages all NetWorker servers and clients. The NMC server also provides reporting and monitoring capabilities for all NetWorker servers and clients in your environment.

Console User Interface

The NMC server uses a graphical interface that runs from any computer in your environment that has a supported web browser and the Java Runtime Environment (JRE). The NetWorker installation guide provides information on supported web browsers and supported versions of the JRE. Multiple users can access the NMC server concurrently from different browser sessions. A computer that hosts the web browser also can be a NetWorker client.

Datazone

A datazone is a single NetWorker server and its client computers. Datazones can be added as backup requirements increase.

NetWorker Server

NetWorker servers provide services to back up and recover data on NetWorker client computers in a datazone.

NetWorker Client

A NetWorker client computer is any computer in a datazone with data that must be backed up. The NetWorker NMC server, NetWorker servers, and NetWorker storage nodes are also NetWorker clients.

NetWorker Storage Node

A NetWorker storage node can be used to improve performance by offloading from the NetWorker server much of the data movement involved in a backup or recovery operation.

Deduplication Storage Systems

The NetWorker software supports backup data deduplication on EMC Avamar® storage nodes and on Data Domain® storage systems.

Virtual Environments

NetWorker clients can be created for virtual machines for either traditional backup or VMware Consolidated Backup (VCB). Additionally, the NetWorker software can automatically discover virtual environments and changes to those environments on either a scheduled or on-demand basis, and it provides a graphical view of those environments.

Oracle's SPARC T5-2 Server

The SPARC T5-2 server is an ideal platform for workloads that demand the highest levels of performance without draining strapped IT budgets. The SPARC T5-2 server represents the best combination of cost, performance, scalability, reliability, and security in its class.

Utilizing a modular design architecture, SPARC T5-2 servers are powered by SPARC T5 processors—delivering exceptional single-threaded and multithreaded performance. With 16 cores and 16 memory slots per SPARC T5 processor, SPARC T5-2 servers provide extreme compute density with a maximum of up to 8 chips (128 cores) and 4 TB of system memory all within a rack enclosure.

Built-in virtualization capabilities provided by Oracle VM Server for SPARC allow the consolidation of many servers onto one machine, reducing a data center's physical footprint and lowering power and cooling costs. The advanced SPARC T5 processor includes integrated on-chip cryptographic support that provides wire-speed encryption capabilities for secure data center operation—without paying a performance penalty or having to acquire additional hardware. All of the servers in Oracle's SPARC processor–based family run the Oracle Solaris operating system—the best UNIX system for Oracle and independent software vendor (ISV) application deployments. They share the same virtualization capabilities through Oracle VM Server for SPARC and leverage the same systems management framework through Oracle Enterprise Manager Ops Center. This leads to unprecedented simplicity in the deployment of all enterprise workloads, enabling reduced business risk, delivering management cost savings, and unlocking the flexibility to grow your business to any scale, while maximizing reliability and uptime.

SPARC T5-2 Server Architecture

Processor

- Sixteen-core 3.6 GHz SPARC T5 processor
- Up to 128 threads per processor for a maximum of 256 threads per system
- Sixteen floating-point units per SPARC T5 processor
- Sixteen cryptography units per SPARC T5 processor
- On-chip encryption instruction accelerators with direct non-privileged support for 16 industry-standard cryptographic algorithms plus random number generation in each of the 16 cores: AES, Camellia, CRC32c, DES, 3DES, DH, DSA, ECC, Kasumi, MD5, RSA, SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512

Cache per Processor

- Shared 8 MB, 8 banked, Level 3 cache
- 128 KB Level 2 unified cache per core

Main Memory

Three memory configurations supported with a two-processor system:

- 256 GB (using 32 x 8 GB 1,066 MHz DDR3 dual inline memory modules [DIMMs])
- 512 GB (using 32 x 16 GB 1,066 MHz DDR3 DIMMs)
- 1 TB (using 32 x 32 GB 1,066 MHz DDR3 DIMMs)

System Architecture

- SPARC V9 architecture
- ECC (Error-correcting code) protected

Key RAS Features

- Hot-pluggable disk drives
- Redundant, hot-swappable power supplies and fans
- Environmental monitoring
- Extended ECC, error correction, and parity checking memory
- Easy component replacement
- Two integrated disk controllers with RAID 0, 1, and 1E/10
- Electronic prognostics
- Fault Management Architecture including Predictive Self Healing (Oracle Solaris features)

SPARC T5-2 Server Software

Operating System

Oracle recommends Oracle Solaris 11 (latest release) for enhanced performance and functionality.

Please refer to the latest data sheet for a complete list of supported operating systems.

Software Included

- Oracle Solaris 11, which includes Oracle VM Server for SPARC
- Oracle Solaris ZFS (default file system)

Virtualization

Built-in, no-cost Oracle VM Server for SPARC and Oracle Solaris Zones provide the flexibility and power of up to 128 virtual systems in a single SPARC T5 server.

EMC Data Domain Product Overview

EMC Data Domain systems are disk-based inline deduplication appliances and gateways that provide data protection and disaster recovery (DR) in the enterprise environment.

All systems run the EMC Data Domain Operating System (DD OS), which provides both a command-line interface (CLI) for performing all system operations and the EMC Data Domain System Manager (DD System Manager) graphical user interface (GUI) for configuration, management, and monitoring.

Systems consist of appliances that vary in storage capacity and data throughput. Systems are typically configured with expansion shelves that add storage space.

EMC Data Domain System Features

Data Integrity

The DD OS Data Invulnerability Architecture™ protects against data loss from hardware and software failures.

Data Compression

Using Global Compression, a Data Domain system eliminates redundant data from each backup image and stores only unique data. Duplicate data is stored only once. The storage of unique data is invisible to the backup software.

Restore Operations

From a Data Domain system, file restores create little or no contention with backup or other restore operations. Unlike tape drive backups, multiple processes can access a Data Domain system simultaneously. A Data Domain system provides the ability for your site to offer safe, user-driven, single-file restore operations.

EMC Data Domain Replicator

The EMC Data Domain Replicator sets up and manages the replication of backup data between two Data Domain systems. After replication is started, the source Data Domain system automatically sends any new backup data to the destination Data Domain system.

Multipath Configuration and Load Balancing

Multipath configuration and load balancing is supported on Data Domain systems that have at least two HBA ports. In a multipath configuration on a Data Domain system, each of two HBA ports on the system is connected to a separate port on the backup server. On a Data Domain gateway, each of two HBA ports is connected to a separate port on the array that the gateway uses as a backup destination.

System Access

The DD OS provides the following ways to access the system for configuration and management:

- CLI—A Data Domain system has a complete command set available to users in a command-line interface.
- DD System Manager—A browser-based graphical user interface is available through Ethernet connections.

EMC NetWorker with SPARC T5-2 Configuration and Test Strategy

Test Strategy

1. EMC NetWorker was installed as a NetWorker server and a NetWorker storage node on the SPARC T5-2 server. Tests were performed with the following options:
    a. Client Direct = Off—Client data is sent to the target device via the NetWorker storage node to the target device. The deduplication engine is on the NetWorker storage node—that is the SPARC T5-2 server.
    b. Client Direct = On—Client data is sent directly to the target device without using the NetWorker storage node. The deduplication engine is on each client. In this case, the SPARC T5-2 server is not playing any role in the data movement.
2. The test focus was the following:
    a. Find out the impact on NetWorker performance and scalability limits by enabling the CPUs on SPARC T5-2 hardware linearly.
    b. Discover how EMC NetWorker takes advantage of Oracle's SPARC T5 family of processors for improving the performance and scalability of NetWorker server operations and data movement
    c. Find how data movement from NetWorker clients to EMC Data Domain has improved using the SPARC T5-2 server
3. The above test was repeated with the target device on a VNX SAN storage system.
4. Client data was recreated on the SPARC T5 server. Data was backed up from the SPARC T5 server to Data Domain system and VNX SAN storage.
5. Tested restore throughput.
6. Compared SPARC T5 system performance with an x64 system. Used an x64 server and repeated some tests that were run on the SPARC T5 server.

Platform Coverage

- NetWorker server and NetWorker storage node: SPARC T5-2 server with Oracle Solaris 11.1
- NetWorker clients: 18 clients, all x64 with Linux operating systems; each with data size of 66 GB; VM client on UCS Cisco machine; each having 8 GB memory and 4 vCPU (2.93 GHz Intel Xeon X5670) processors assigned
- Data Domain: DD890 with DD OS 5.5
- VNX array for SAN backup testing
- Network speed of 10 GB
- Total backup size: ~1.2 TB
- x64 server: NetWorker server and NetWorker storage node: SUSE Linux Enterprise Server 11 SP3

Test Setup and Configuration

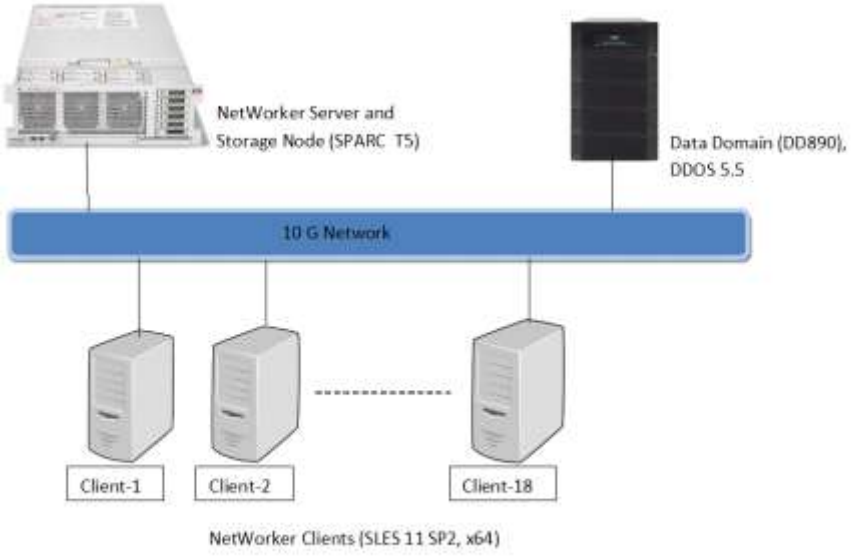

Figure 1. Test setup and configuration

NetWorker Configuration

- NetWorker server and NetWorker storage node configured on a SPARC T5-2 server
- All NetWorker clients configured in single Save Group
- Each client configured with 1, 5, and 10 save sets for Client Direct = On and Off; backup to match the DD890 limitation of max sessions
- Testing carried out with Client Direct = On and Off to determine the performance improvement on the NetWorker storage node
- Data Domain device reinitialized to support a deduplication scenario

Data Set

In-house scripts were used to create data on clients supporting deduplication use cases. Data from clients was copied to the SPARC T5-2 server for backup-from-server scenarios.

Test Cases

- The throughput of NetWorker with Data Domain and Oracle Solaris/SPARC T5-2 architecture was recorded while backing up with 8/16/256 hardware threads.
- The throughput of NetWorker was recorded while backing up with 8/16/256 hardware threads.

Data Analysis

- Backup throughput was measured by recording the Save Group completion time from NMC, and from the `mminfo` command output for each save set.
- Resource utilization on the server was monitored for memory, CPU, network, and I/O utilization for the server and for all NetWorker daemons.

Test Results

NetWorker backup performances for the different backup scenarios are given below.

Scenario 1

Back up from the NetWorker clients, with Client Direct = On, while backing up to a Data Domain device:

- This scenario is the backup of the data set on NetWorker clients.
- Client Direct attribute on NetWorker clients is set to On.
- Target device is on the Data Domain system.
- Deduplication happens on the NetWorker clients and there is no involvement of the SPARC T5-2 server storage node.

TABLE 1. BACKUP PERFORMANCE OF NETWORKER CLIENTS, WITH CLIENT DIRECT = ON WHILE BACKING UP TO A DATA DOMAIN DEVICE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
1 (1/16)	1,229 GB	18	1:15:20	278.43	0.85	7.30	2,238	2,326
1 (1/16)	1,229 GB	90	1:20:28	260.67	1.03	10.20	2,870	3,734
1 (1/16)	1,229 GB	180	1:21:04	258.74	2.12	84.70	3,753	5,541
2 (1/8)	1,229 GB	18	1:20:08	261.75	0.70	6.80	8,516	8,627
2 (1/8)	1,229 GB	90	1:33:04	225.38	0.70	10.20	9,195	10,118
2 (1/8)	1,229 GB	180	1:27:52	238.71	1.16	43.80	10,230	11,970
32 (2)	1,229 GB	18	1:17:46	269.72	0.00	0.00	8,054	8,135
32 (2)	1,229 GB	90	1:20:27	260.72	0.00	0.00	8,765	9,622
32 (2)	1,229 GB	180	1:21:56	256.00	0.00	0.00	9,718	11,445

Scenario 2

Back up from the NetWorker clients with Client Direct = Off while backing up to a Data Domain device:

- This scenario is the backup of the data set on NetWorker clients.
- Client Direct attribute on NetWorker clients is set to Off.
- Target device is on the Data Domain system.
- Deduplication happens on the NetWorker storage node and there is involvement of the SPARC T5-2 server storage node.

TABLE 2. BACKUP PERFORMANCE OF NETWORKER CLIENTS, WITH CLIENT DIRECT = OFF WHILE BACKING UP TO A DATA DOMAIN DEVICE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
1 (1/16)	1,229 GB	18	3:54:16	89.53	81.17	91.50	3,696	3,796
1 (1/16)	1,229 GB	90	3:44:46	93.32	85.33	93.20	6,525	7,346
1 (1/16)	1,229 GB	180	3:47:56	92.02	83.26	92.70	10,319	11,992
2 (1/8)	1,229 GB	18	2:07:28	164.55	54.98	56.40	8,126	8,153
2 (1/8)	1,229 GB	90	2:01:04	173.25	76.66	90.40	8,892	9,657
2 (1/8)	1,229 GB	180	2:03:30	169.84	76.94	90.50	9,845	11,356
8 (1/2)	1,229 GB	18	1:24:02	249.60	9.96	13.30	8,069	8,174
8 (1/2)	1,229 GB	90	1:18:45	266.35	11.95	17.70	9,138	9,956
8 (1/2)	1,229 GB	180	1:22:37	253.88	11.52	17.10	10,139	11,790
32 (2)	1,229 GB	18	1:19:32	263.73	2.57	3.40	8,044	8,138
32 (2)	1,229 GB	90	1:22:04	255.58	2.70	4.60	8,669	9,626
32 (2)	1,229 GB	180	1:29:33	234.23	2.60	3.90	9,462	11,204

Scenario 3

Back up from the NetWorker clients while backing up to SAN storage:

- This scenario is the backup of the data set on the NetWorker clients.
- Client Direct attribute on NetWorker clients is set to On.
- Target device is on SAN storage.

TABLE 3. BACKUP PERFORMANCE OF NETWORKER CLIENTS WHILE BACKING UP TO SAN STORAGE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
1 (1/16)	1,229 GB	18	1:23:51	250.15	33.34	48.30	2,148	2,254
1 (1/16)	1,229 GB	90	1:40:49	208.05	30.81	57.70	8,409	9,553
1 (1/16)	1,229 GB	180	1:19:42	263.17	40.67	72.30	3,800	5,471
2 (1/8)	1,229 GB	18	1:27:48	238.89	12.78	18.80	3,069	3,189
2 (1/8)	1,229 GB	90	1:24:16	248.91	14.28	29.00	3,779	4,594
2 (1/8)	1,229 GB	180	1:23:31	251.15	15.97	40.20	4,799	6,401
32 (2)	1,229 GB	18	1:27:10	240.63	0.94	1.20	2,309	2,423
32 (2)	1,229 GB	90	1:23:59	249.75	1.10	1.40	3,065	3,938
32 (2)	1,229 GB	180	1:21:05	258.68	0.97	1.20	4,011	5,686

Scenario 4

Back up from the NetWorker server while backing up to a Data Domain device:

- This scenario is the backup of the data set on the NetWorker server.
- The target device is on the Data Domain system.
- Deduplication occurs on the NetWorker server and there is involvement of the SPARC T5-2 server storage node.

TABLE 4. BACKUP PERFORMANCE OF THE NETWORKER SERVER WHILE BACKING UP TO A DATA DOMAIN DEVICE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
1 (1/16)	1,229 GB	18	3:18:39	105.59	99.51	100.00	4,492	4,545
1 (1/16)	1,229 GB	90	3:18:23	105.73	99.50	100.00	8,088	11,386
1 (1/16)	1,229 GB	180	3:20:19	104.71	98.88	100.00	12,941	19,823
2 (1/8)	1,229 GB	18	1:41:27	206.75	98.67	100.00	4,462	4,596
2 (1/8)	1,229 GB	90	1:41:46	206.11	99.31	100.00	8,159	11,384
2 (1/8)	1,229 GB	180	1:42:22	204.90	99.09	100.00	13,200	19,858
8 (1/2)	1,229 GB	18	1:07:16	311.82	14.49	18.80	9,845	9,924
8 (1/2)	1,229 GB	90	1:08:45	305.09	20.61	38.50	13,752	16,766
8 (1/2)	1,229 GB	180	1:08:19	307.03	56.13	71.80	14,097	19,557
32 (2)	1,229 GB	18	1:07:04	312.75	3.22	4.40	4,166	4,491
32 (2)	1,229 GB	90	1:06:36	314.94	6.05	9.00	8,276	11,210
32 (2)	1,229 GB	180	1:06:08	317.16	11.20	15.70	14,068	19,736

Scenario 5

Back up from the NetWorker server while backing up to SAN storage:

- This scenario is the backup of the data set on the NetWorker server.
- The target device is on SAN storage.

TABLE 5. BACKUP PERFORMANCE OF THE NETWORKER SERVER WHILE BACKING UP TO SAN STORAGE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
1 (1/16)	1,229 GB	18	1:09:38	301.22	34.69	48.50	3,211	3,366
1 (1/16)	1,229 GB	90	1:09:47	300.57	21.03	68.70	5,464	7,226
1 (1/16)	1,229 GB	180	1:09:44	300.79	23.43	83.10	7,886	11,617
2 (1/8)	1,229 GB	18	1:07:15	311.89	25.20	32.10	5,247	7,110
2 (1/8)	1,229 GB	90	1:08:33	305.98	29.38	36.70	8,311	10,016
2 (1/8)	1,229 GB	180	1:08:45	305.09	31.58	62.40	11,228	14,861
32 (2)	1,229 GB	18	1:10:51	296.05	1.72	2.60	2,847	3,034
32 (2)	1,229 GB	90	1:38:32	212.87	0.89	1.70	5,058	6,779
32 (2)	1,229 GB	180	1:50:18	190.16	0.69	1.50	8,372	11,776

Cache Impact on NetWorker Backup Performance

Back up from the NetWorker server while backing up to a Data Domain device with or without clearing the cache on the SPARC T5-2 server:

- This scenario is the backup of the data set on the NetWorker server with the target device on the Data Domain system.
- Running consecutive backups without clearing cache increases backup performance of 90 save sets by ~1.8 times.
- Running consecutive backups without clearing cache increases backup performance of 180 save sets by ~1.6 times.

TABLE 6. BACKUP PERFORMANCE OF THE NETWORKER SERVER WITH/WITHOUT CLEARING CACHE

# Cores (Processor)	Data Size	# Save Sets	Backup Time (h:mm:ss)	Throughput (MB/sec)	Avg. CPU (%)	Max. CPU (%)	Avg. Memory (MB)	Max. Memory (in MB)
3(3/16)	1,229 GB	90	2:02:55	170.64	26.94	98.20	8,189	11,473
3(3/16)	1,229 GB	18	1:13:29	285.44	73.86	76.90	4,589	4,640
3(3/16)	1,229 GB	90*	1:09:12	303.11	95.58	100.00	8,210	11,476
4 (1/4)	1,229 GB	180	1:48:24	193.50	22.50	76.60	12,860	20,082
4 (1/4)	1,229 GB	18	1:04:24	325.70	47.54	56.30	4,690	4,714
4 (1/4)	1,229 GB	180*	1:06:32	315.25	75.61	94.40	14,245	19,419

* Cache not cleared after prior backup operation

File System Impact on NetWorker Backup Performance

Back up from the NetWorker server while backing up data from UFS/ZFS file systems to a Data Domain device on a SPARC T5-2 server:

Running backups from the ZFS file system increases backup performance of by ~2.4 times.

TABLE 7. BACKUP PERFORMANCE OF THE NETWORKER SERVER WITH UFS AND ZFS FILE SYSTEMS

# Cores (Processor)	File System	# Save Sets	Throughput (MB/sec)
32 (2)	UFS	18	133.82
32 (2)	ZFS	18	312.75

SPARC T5-2 Server Performance Versus x64 Performance

Backup performance on a SPARC T5-2 server is similar or better in most of the cases, compared to backup performance on an x64 system.

On a SPARC T5-2 server, the following performance is achieved:

- For NetWorker client backup, with Client Direct = On and backing up to a Data Domain device, maximum throughput is reached with only 16 CPU threads.
- For NetWorker client backup, with Client Direct = Off and backing up to a Data Domain device, maximum throughput is reached with only 64 CPU threads.
- For NetWorker client backup, backing up to a SAN storage device, maximum throughput is reached with only 16 CPU threads.
- For NetWorker server backup, backing up to a Data Domain device, maximum throughput is reached with only 64 CPU threads.
- For NetWorker server backup, backing up to a SAN storage device, maximum throughput is reached with only 16 CPU threads.

TABLE 8. BACKUP PERFORMANCE COMPARISON OF NETWORKER CLIENTS WITH CLIENT DIRECT = ON, WHILE BACKING UP TO DATA DOMAIN DEVICE

		SPARC T5-2			SLES x64		
Data Size	# Save Sets	# Processors	Time Taken	Throughput (MB/sec)	# CPUs	Time Taken	Throughput (MB/sec)
1,229 GB	18	1/8	1:20:08	261.75	8	1:26:07	243.56
1,229 GB	180	1/8	1:27:52	238.71	8	1:24:13	249.06

TABLE 9. BACKUP PERFORMANCE COMPARISON OF NETWORKER CLIENTS WITH CLIENT DIRECT = OFF, WHILE BACKING UP TO A DATA DOMAIN DEVICE

		SPARC T5-2			SLES x64		
Data Size	# Save Sets	# Processors	Time Taken	Throughput (MB/sec)	# CPUs	Time Taken	Throughput (MB/sec)
1,229 GB	18	1/2	1:24:02	249.60	8	1:30:14	232.45
1,229 GB	180	1/2	1:22:37	253.88	8	1:22:47	253.37

TABLE 10. BACKUP PERFORMANCE COMPARISON OF NETWORKER CLIENTS WHILE BACKING UP TO SAN STORAGE

		SPARC T5-2			SLES x64		
Data Size	# Save Sets	# Processors	Time Taken	Throughput (MB/sec)	# CPUs	Time Taken	Throughput (MB/sec)
1,229 GB	18	1/8	1:27:48	238.89	8	1:44:39	200.43
1,229 GB	180	1/8	1:23:31	251.15	8	1:38:49	212.26

TABLE 11. BACKUP PERFORMANCE COMPARISON OF THE NETWORKER SERVER WHILE BACKING UP TO A DATA DOMAIN DEVICE

		SPARC T5-2			SLES x64		
Data Size	# Save Sets	# Processors	Time Taken	Throughput (MB/sec)	# CPUs	Time Taken	Throughput (MB/sec)
1,229 GB	18	1/2	1:07:16	311.82	8	1:15:16	278.67
1,229 GB	180	1/2	1:08:19	307.03	8	1:23:36	250.90

TABLE 12. BACKUP PERFORMANCE COMPARISON OF THE NETWORKER SERVER WHILE BACKING UP TO SAN STORAGE

		SPARC T5-2			SLES x64		
Data Size	# Save Sets	# Processors	Time Taken	Throughput (MB/sec)	# CPUs	Time Taken	Throughput (MB/sec)
1,229 GB	18	1/8	1:07:15	311.89	8	1:47:49	194.54
1,229 GB	180	1/8	1:08:45	305.09	8	1:51:50	187.56

Conclusion

NetWorker scales and performs better on Oracle's SPARC T5-2 server compared to when previous SPARC platforms are used due to the SPARC T5-2 server's enhanced resources and capabilities. NetWorker backup on the SPARC T5-2 server performs the same as on the x64 SLES system.

NetWorker backup performance on the SPARC T5-2 server increases linearly with an increased number of CPUs. Cache memory plays an important role in backup performance and data set distribution on different file systems and increases the backup performance.

References

- *EMC® NetWorker® Version 8.2 Administration Guide*
- *EMC® Data Domain® Operating System Version 5.5 Administration Guide*
- SPARC T5-2 Server data sheet
- Oracle Solaris 11

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