

# **Tivoli Storage Manager V3.7 Performance Update**

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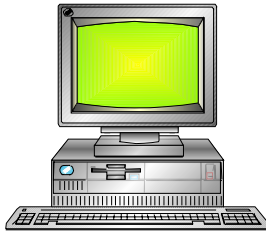
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# Performance Challenges/Objectives

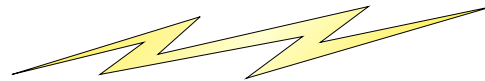
## ■ TSM Environment

### CLIENT



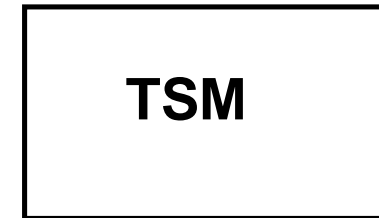
- Avg File Size
- Processor Speed
- Operating System
- Compression

### NETWORK



- Bandwidth
- Utilization
- Protocol
- Gateways
- Routers/bridges
- Tuning

### SERVER



- Processor Speed
- # of Client Sessions
- Other Applications
- Storage Devices

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# Performance Objectives for '99

## ■ Focus areas

- Backup/restore throughput of smaller objects
- Volume level backup/restore
- Rapid Recovery LANless restore
- Self tuning
- MVS
- Windows NT
- AS/400
- Domino 5.0/Lotus Notes

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# Embodiment of Focus Area

## ■ Tivoli Storage Manager V3.7

- Multi-Session Backup/Archive Client
- Logical Volume "Image" Backup/Restore
- Instant Archive/Rapid Recovery
- Windows NT Server Performance Enhancements
- MVS Performance Enhancements
- Self Tuning

## ■ Tivoli Data Protection for Lotus Notes Domino 5.0

## ■ Tivoli Storage Manager for AS/400 V3.1.2 Improvements

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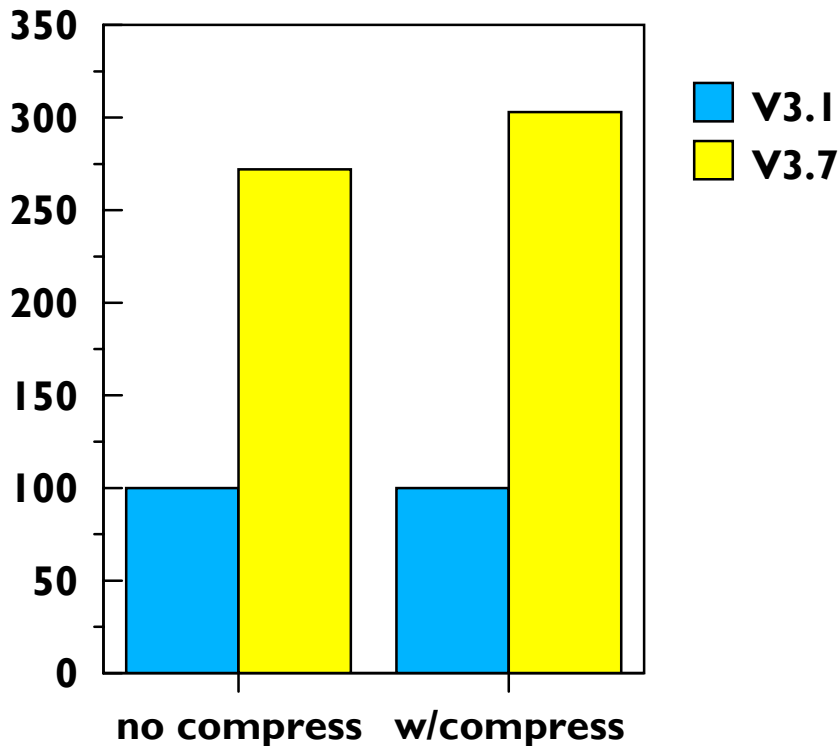
# V3.7 Multi-Session Backup/Archive Client

## • Description

Allows multiple sessions to be started between the client and server per single B/A client invocation.

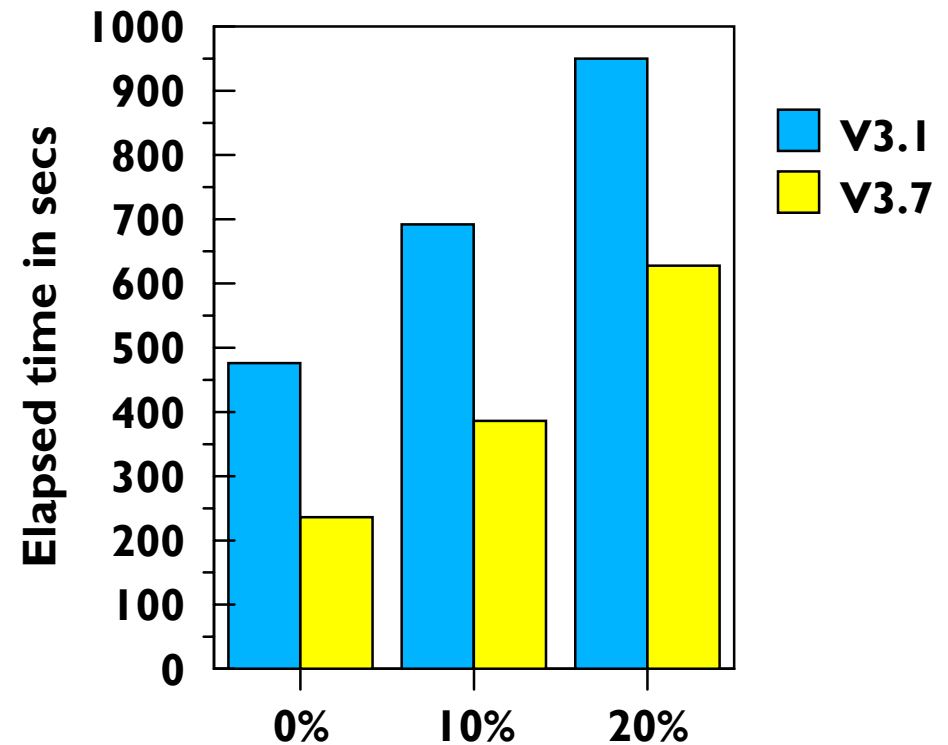
- AIX Server - RS/6000 4-way F50, Disk stgpool (4 vols JBOD) 9.1GB SSA
- NT Client - Netfinity 4-way (400Mhz xeon) RAID 5 (4+p) 18.2GB SSA
- Network - 100mbit FDDI

Max increase in selective bkup throughput



Client data - 256MB wrkld

Incremental bkup improvement



% of changed filesys - 1.5GB total data, 10kb file

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# V3.7 Multi-Session Backup/Archive Client

## • Terminology

- **producers** - generate candidate files to be backed up or archived by consumers
- **consumer** - send files to server to be backed up or archived
- **threshold** - determines how often the client performance monitor is awakened
- **resourceutilization** - combination of producer, consumer and threshold values at the client

Producers, consumers can generate unique sessions to the Tivoli Storage Manager Server



# V3.7 Multi-Session Backup/Archive Client

## • Resourceutil values

- Values >2 allowed only when connecting to a 3.7 server
- Non-root UNIX limited to 1 session

	Max #of Sessions	Unique # of Producer sessions	Threshold (secs)
1	1	0	45
2	2	1	45
3	3	1	45
4	3	1	30
5	4	2	30
6	4	2	20
7	5	2	20
8	6	2	20
9	7	3	20
10	8	4	10
default	2	1	30

# V3.7 Multi-Session Backup/Archive Client

## • Performance considerations

- Number of factors that can prevent the multi-session client from improving performance
- Server
  - CPU cycles, memory, number of storage volumes
  - number of concurrent TSM processes and sessions
- Network
  - Bandwidth
  - If client has multiple network connections to server, only one interface will be used
- Client
  - CPU cycles, memory
  - Client storage subsystem - filesystems that are striped across multiple disks using software stripping or raid-5 are better equipped to handle an increase in random read requests than a single drive filesystem

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# V3.7 Multi-Session Backup/Archive Client

## • Performance considerations cont.

- Server ***reg/update node maxnummp*** option can be used to control the number of mount points that a multi-session client can consume
- Client with multiple sessions can produce multiple accounting records
- ***Query node*** command does not summarize the activity of a client if there are multiple sessions generated. Need to use sql or activity log to find out about the sessions
- Set server ***maxsessions*** large enough to support more sessions. The default is that two sessions are started with new Tivoli Storage Manager 3.7 client
- For the Netware client, use default ***resourceutilization***

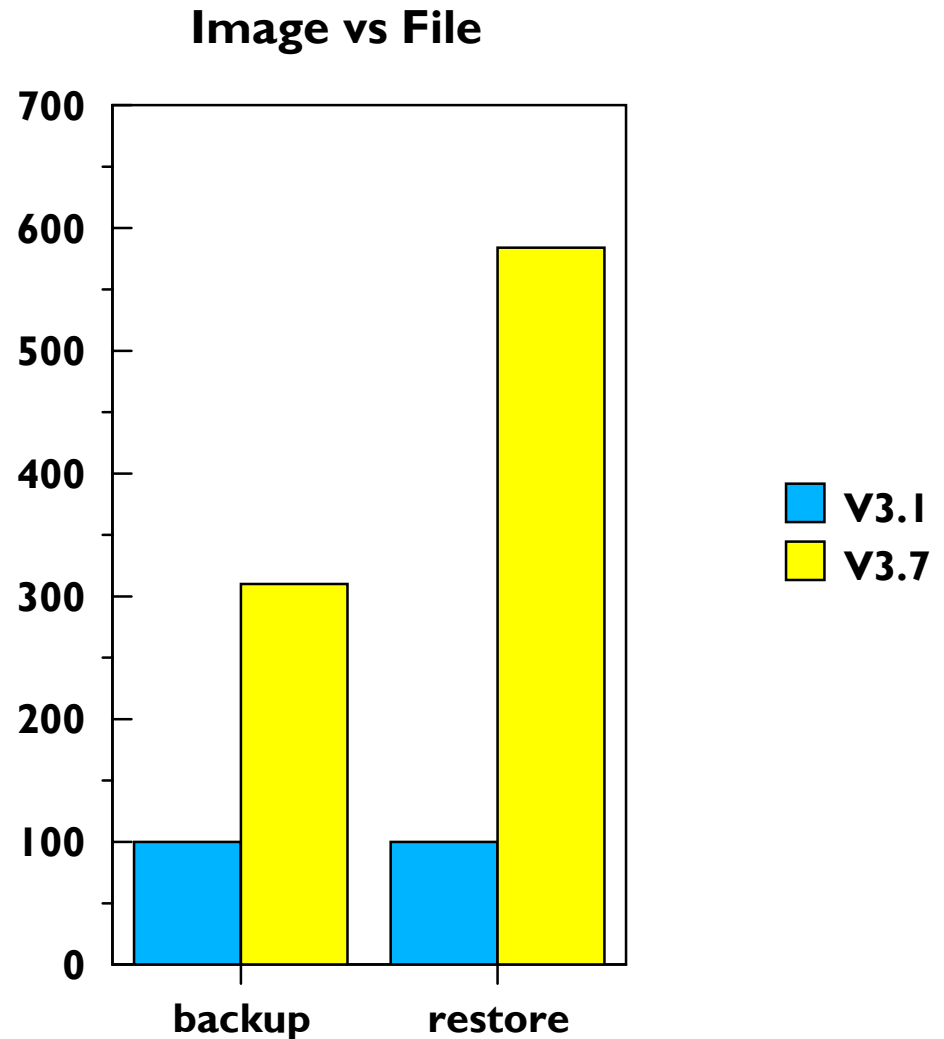
# V3.7 Logical Volume 'Image' Backup/Restore

## • Description

- Allows backup/restore of a filesystem at the logical volume level.
- Stores only the 'image' of a filesystem (no metadata).
- Designed for rapid recovery of an entire filesystem composed of small files.
- Individual files may not be retrieved from an image backup, only the whole filesystem

AIX Server - RS/6000 H70 - 4way  
JBOD 18.2GB disk stgpool  
AIX Client - RS/6000 43P  
Wrkld - 1GB total amount of data  
- 1.2GB filesys size 80% full  
- 10kb filesz  
- SSA 9GB

Network - 155 ATM



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# V3.7 Logical Volume "Image" Backup/Restore

## • Performance considerations

- Target workload, small avg filesz (<100KB), not recommended for filesystems w/large avg filesz
- Should be used for filesystems that are somewhat full (>60%.)
- If most data changes between image backups, image restores plus incremental restore may be slower
- The benefits of the image backup are lessened if incremental restore has to delete/restore most of the objects on the client

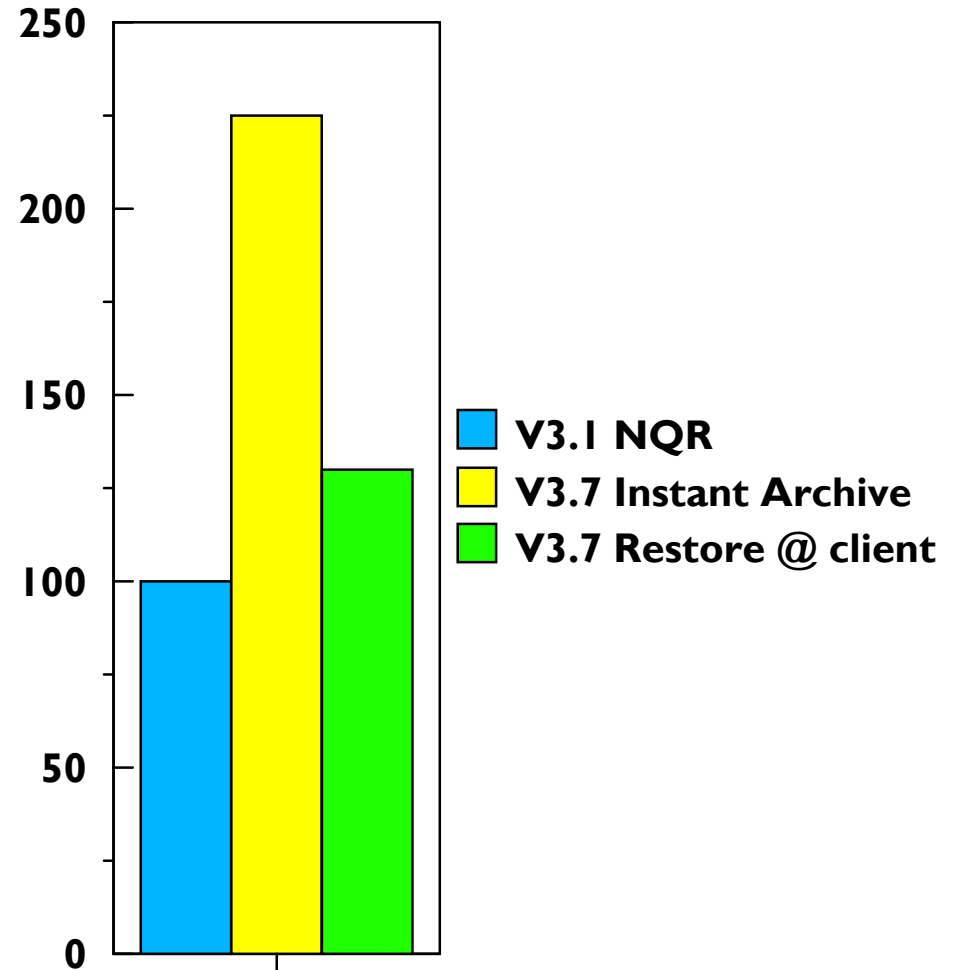
# V3.7 Instant Archive/Rapid Recovery

## • Description

- provides a way to perform a "snapshot" backup using client data already on the server
- client data will be consolidated onto a single set of media
- can be restored from:
  - the server
  - the client, when using device type in common with server

AIX Server - RS/6000 H50  
AIX Client - RS/6000 S70  
Wrkld - 1GB total amount of data  
- mixed filesz  
Network - Gbit Ethernet

Generate Backupset to flat file (9GB SSA disk)



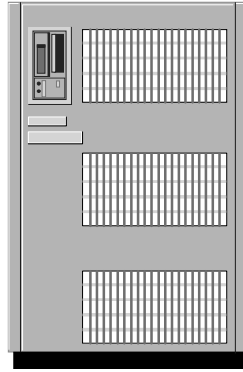
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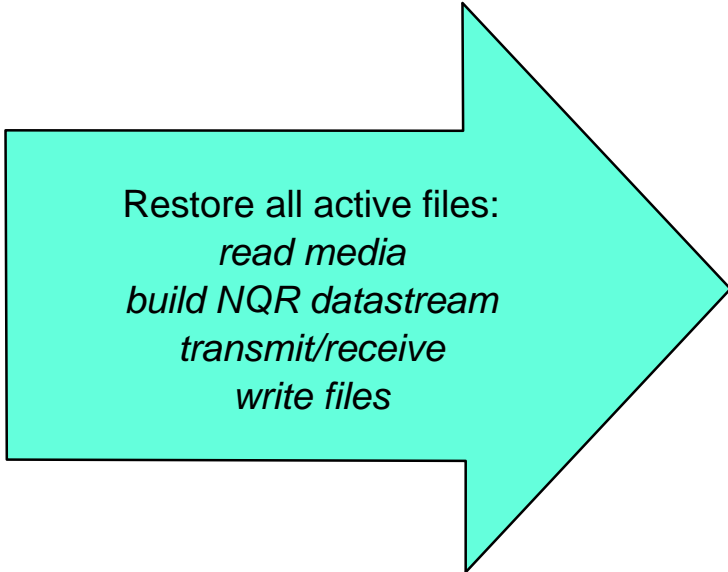
# V3.7 Instant Archive/Rapid Recovery

- Eliminates database scan for files during the restore
- Eliminates many tape mounts and locates during the restore
- Higher throughput during restore at client because network is eliminated
- Makes a large-scale restore possible in the mobile market

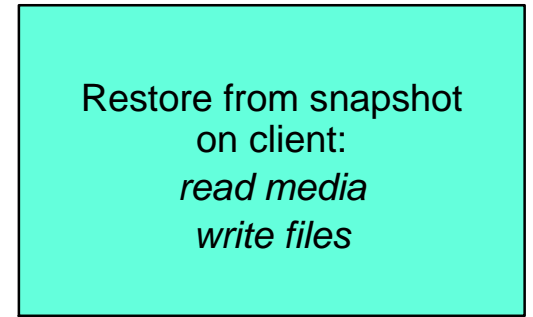
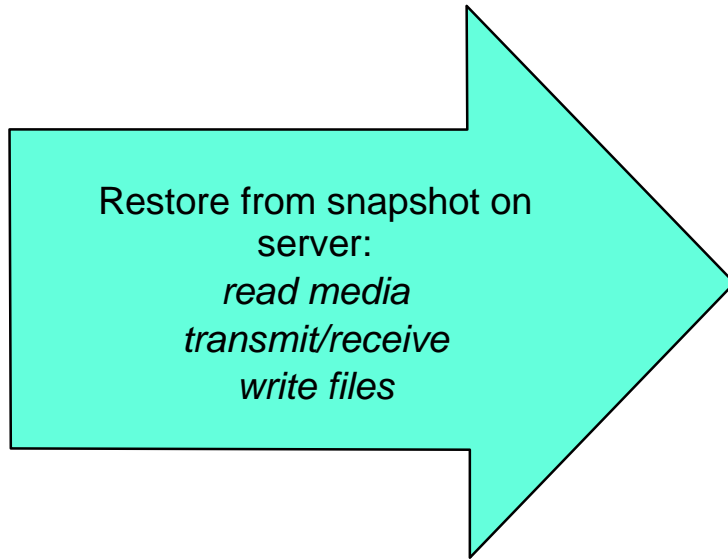
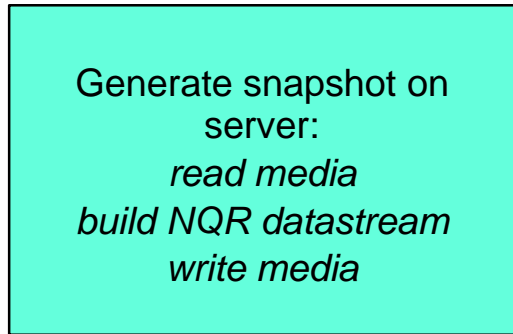
# V3.7 Instant Archive/Rapid Recovery



TSM Server



TSM Client



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# V3.7 Instant Archive/Rapid Recovery

- **Generate Backupset at Server**

- command syntax

`generate backupset nodename filespace name devclass=xxxxxx scr=yes`

- **Restore Backupset to Client from the Server**

- command syntax

`dsmc res backupset -rep=all -subdir=yes -quiet -loc=server vbsetname "/fs/*"`

- **Restore Backupset from file on client**

- command syntax

`dsmc res backupset -rep=all -subdir=yes -quiet -loc=file filename_for_vbset "/fs/*"`

# V3.7 Windows NT Server Performance Enhancements

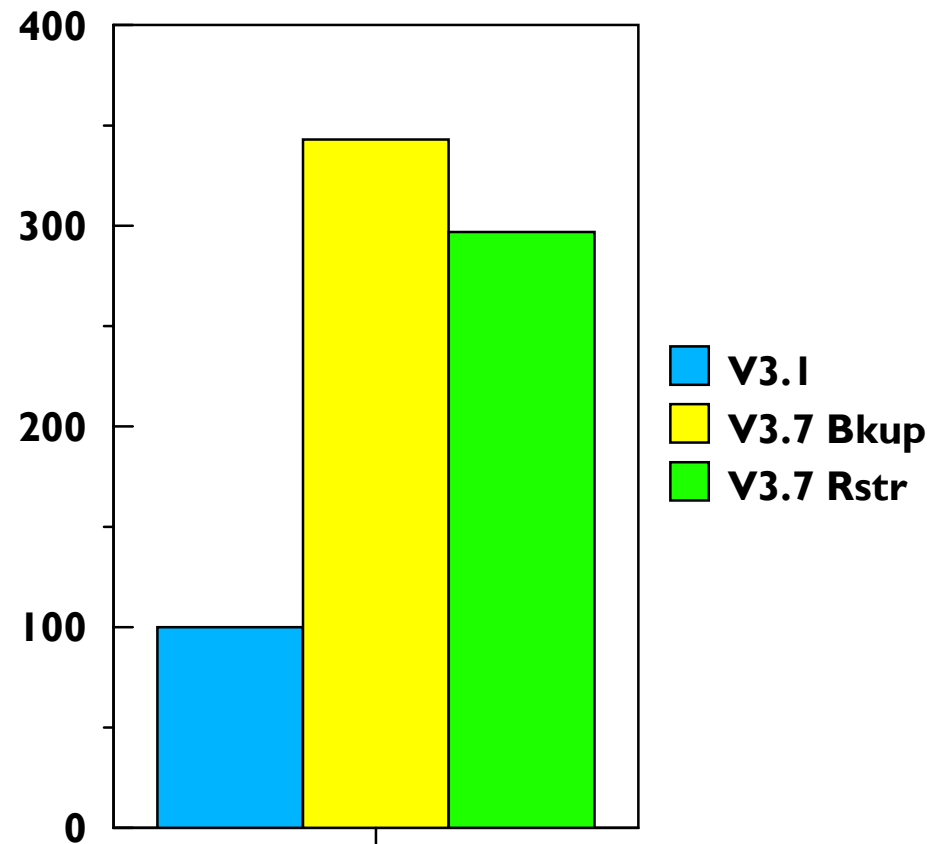
- **Description**

The Windows NT Tivoli Storage Manager Server enhancements require no tuning, just installation of product

**Selective Backup**, Windows NT server, WinNT LAN clients, Tcp/Ip, Disk stg pool

Netfinity 5500 2-way server, 300PL 450 MHz Pentium II clients, 3 100 Mb Ethernet LANs, 3.1.0.7 client, FAT filesystem

Multiple Client Bkup/Rstr comparison  
V3.1 vs V3.7 NT Server  
6 clients, 10kb wrkd



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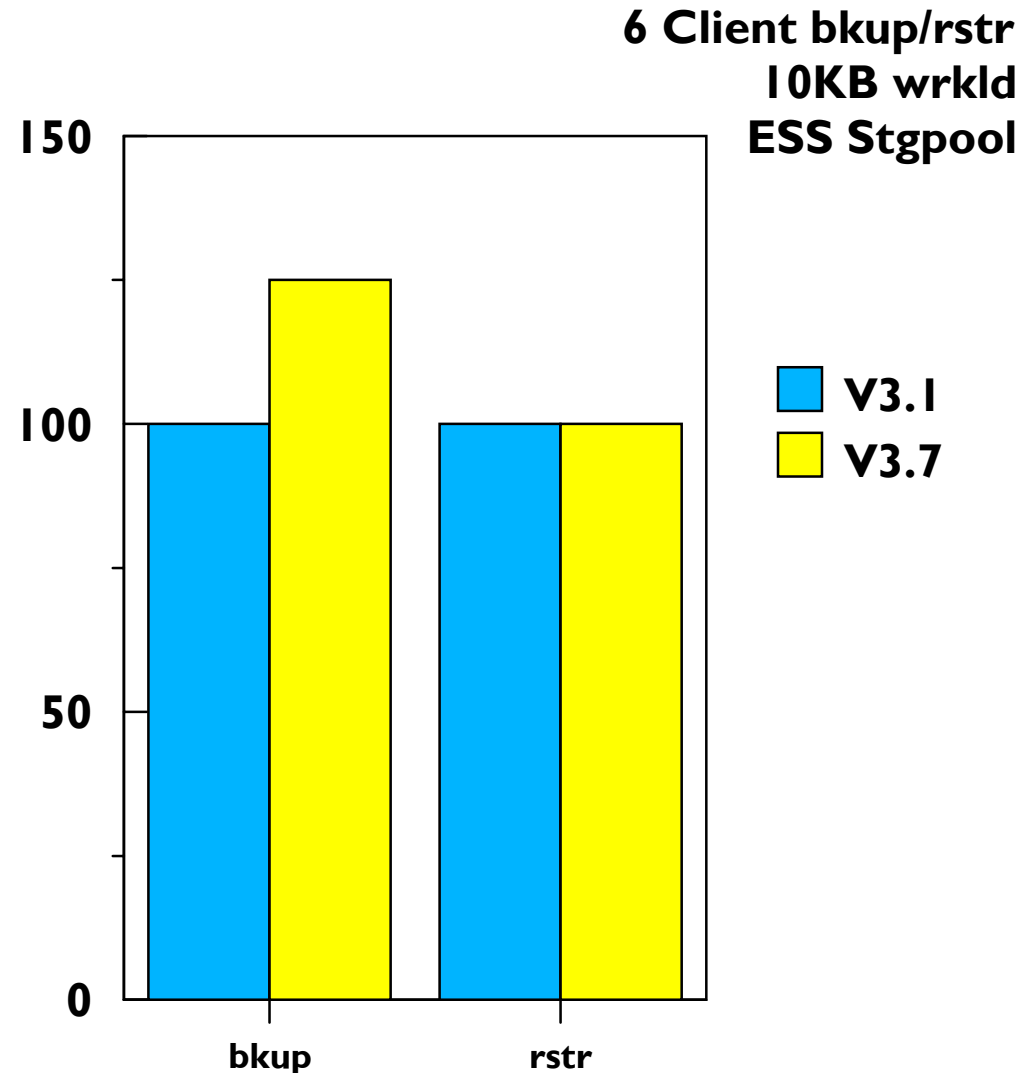
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# V3.7 MVS Performance Enhancements

## • Description

- Open Edition Sockets Support (TCP/IP)
- Prefix VSAM Pages for Storage Pool, Data Base and Recovery Log I/O
- BSAM NCP > 1 Overlap BSAM I/O

MVS Server - ES9000 9672-RX6  
AIX Client - RS/6000 43P  
Wrkld - 10KB  
- 2 8GB SCSI disks  
- 240MB total data/client  
Network - 100MB Ethernet  
- GB Ethernet  
- 3COM 3900 Switch



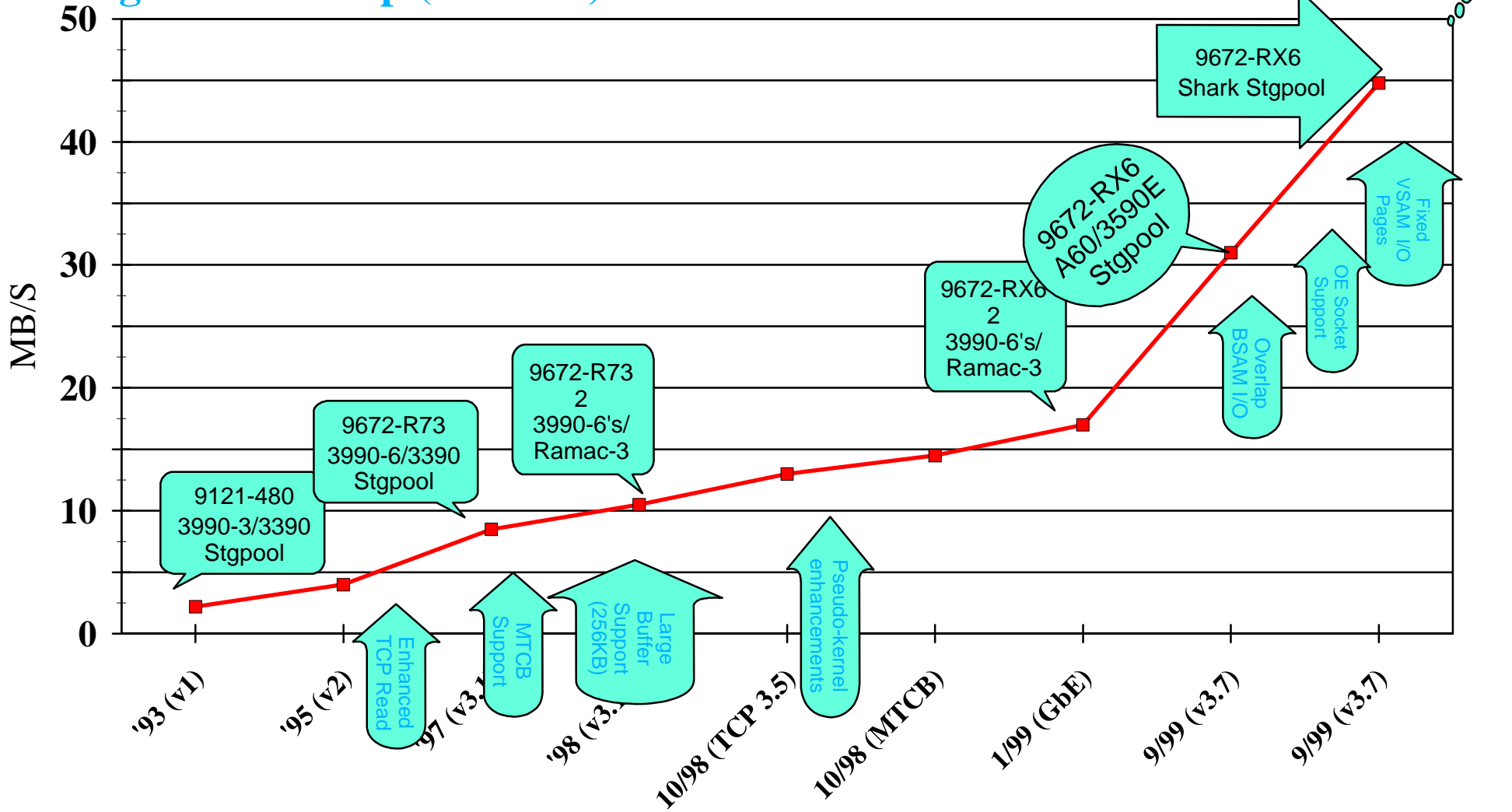
Increased bkup thruput w/30% savings in CPU

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# Progress of MVS TSM Server

## Large File Backup (6 clients)



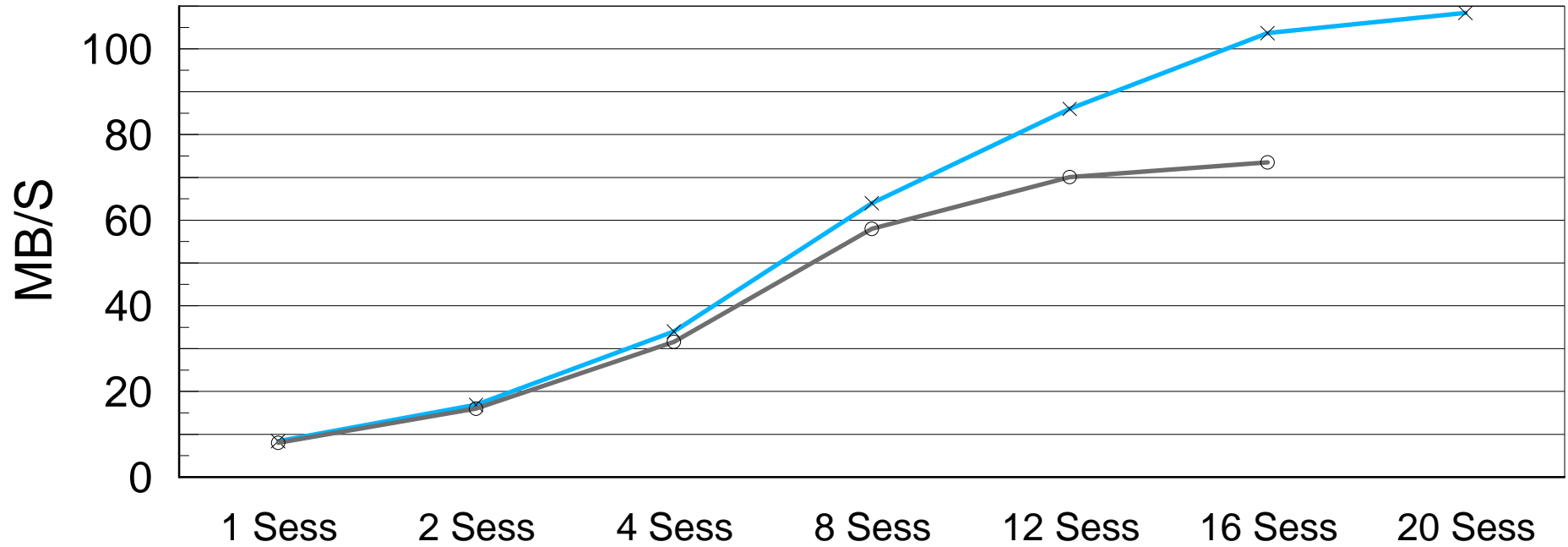
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# TSM V3R7 - Server MVS Client AIX(S70)

## Backup (SHARK Storage Pools), 256MB wkld



FIXIOBUF=16, MPTHREADING=YES, OE/BPX for S37, RU=0,Comp= NO

	1 □□□□	2 □□□□	4 □□□□	8 □□□□	12 □□□□	16 □□□□	20 □□□□
—x— □□□□□□ 1	8.4	16.9	34.0	64.0	86.0	103.7	108.4
—o— □/□ □□□□□□	8.0	16.0	31.6	58.0	70.1	73.5	

Server CPU(%) : 1.7 / 1.6      2.9 / 2.7      5.4 / 5.2      9.9 / 9.8      13.7 / 13.5      16.6 / 14.0      17.1 / na  
 Client CPU(%) :                      / 20.0                      / 50.0                      / 60.0                      / 92.0      70.0 / 96.0      80.0 / na

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# V3.7 Self Tuning

## • Description

**Tivoli Storage Manager uses an intelligent, adaptive algorithm to optimize performance for individual customer environments while minimizing administrative intervention.**

- **The batch size and the threshold for server migration and storage pool backup will be adjusted to obtain better performance without running out of log space.**
- **Server expiration processing will reset the database buffer pool, based on the cache hit ratio.**

# Tivoli Data Protection for Lotus Notes Domino 5.0

## • Description

New product that enables on-line backups, restores, and activation of Lotus Domino R5 Server databases and transaction logs.

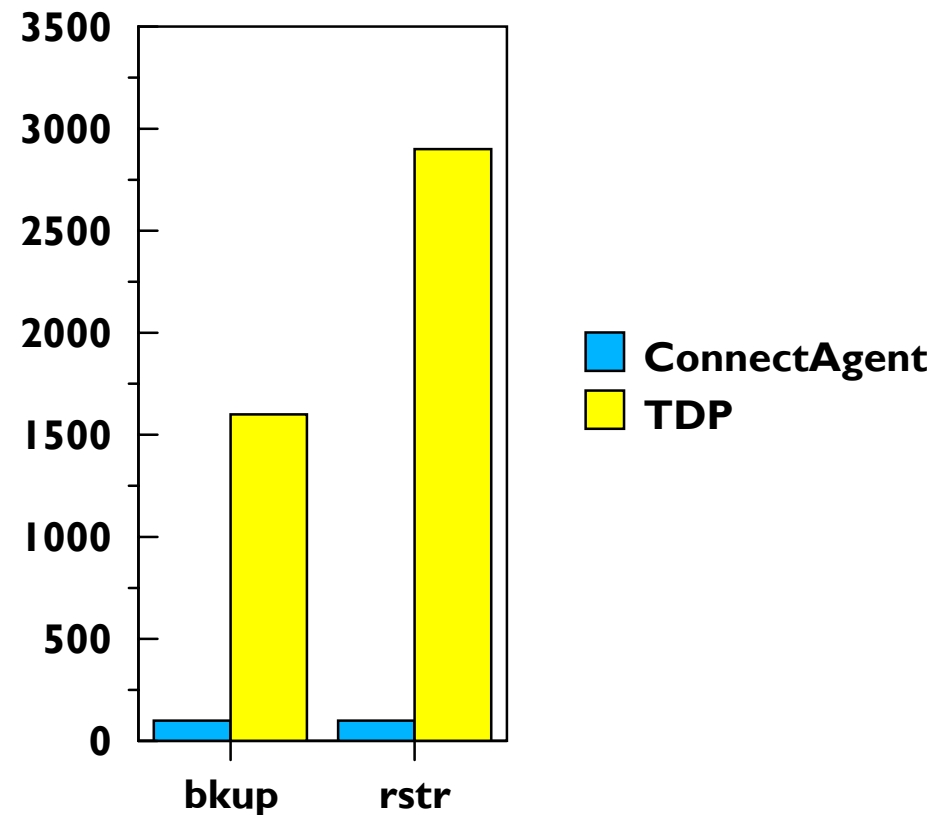
### Domino 5.0 Server environment:

AIX TSM Server - RS/6000 S70 - 4way  
NT Domino Server - Netfinity 7000 M10 - 4way  
Wrkld - 10 mail server databases  
- ranging in size from 7MB to 860MB  
- total size 2.5GB  
Network - Gb Ethernet

### ConnectAgent:

Fixtest 2.1.8.A

## TDP vs ConnectAgent Increase in throughput NT Domino Server



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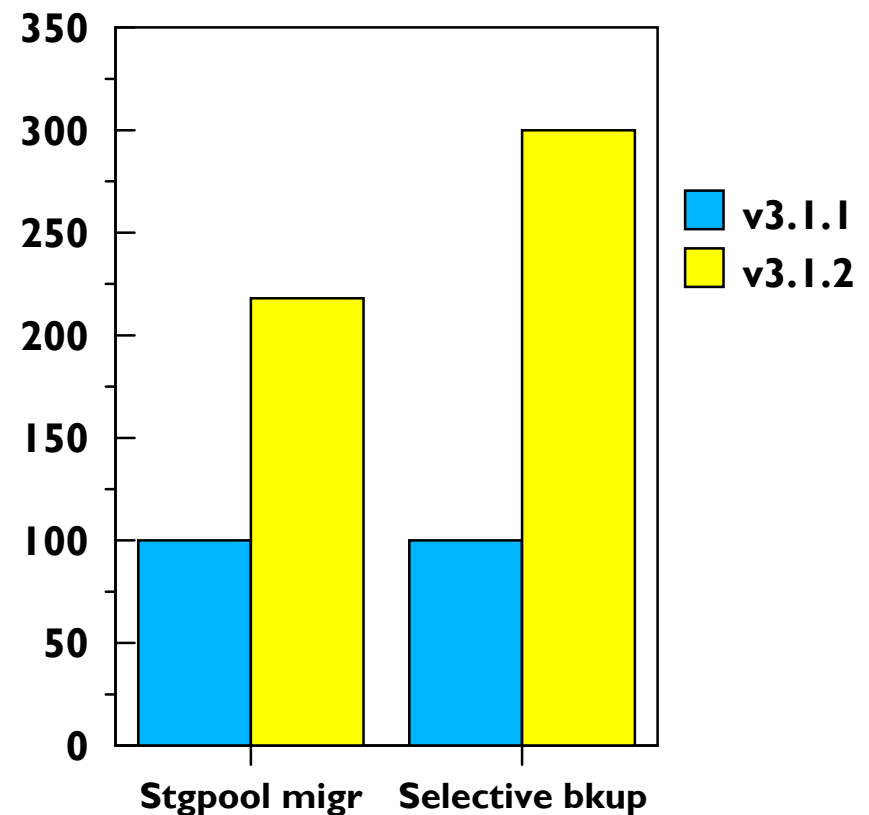
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# Tivoli Storage Manager for AS/400 V3.1.2 Improvements

## • Description

- Now using the AS/400 'Root' filesystem to enhance performance.
- The 'Root' filesystem takes full advantage of the AS/400 stream file support and hierarchical directory structure of the integrated filesystem.
- The Tivoli Storage Manager AS/400 server database, log and disk storage pool volumes can be located in the 'Root' filesystem.

**V3.1.1 vs V3.1.2**  
**Disk Stgpools (Lib vs IFS)**  
**Wrkld - large files (100KB+)**



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