

Positioning storage technologies with TSM

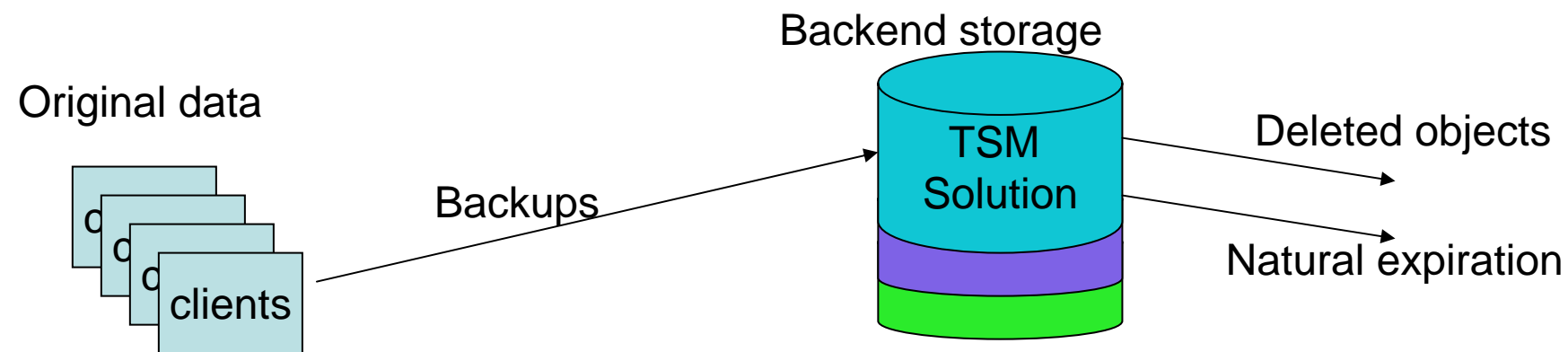
Joost Bleijenberg

The problems you face...

- Autonomic data growth of 130%¹⁾ or more
- Data classification to be cost effective
 - Not all your data has the same business value
 - Backup/Restore requirements might differ
- Reduction TSM maintenance window
 - Backup/restores the whole day
 - Less time for backup stg's and migrations
- Backup/Archive more and more tight in with operational applications
- Fast restore and archive retrieve features

1) Horizon research 2005

The problems you face...



Total storage=Delta backup daily X Versions or Retain+Initial Storage-Deleted

5-15%

Check your environment

Fixed

0-2%

Example:

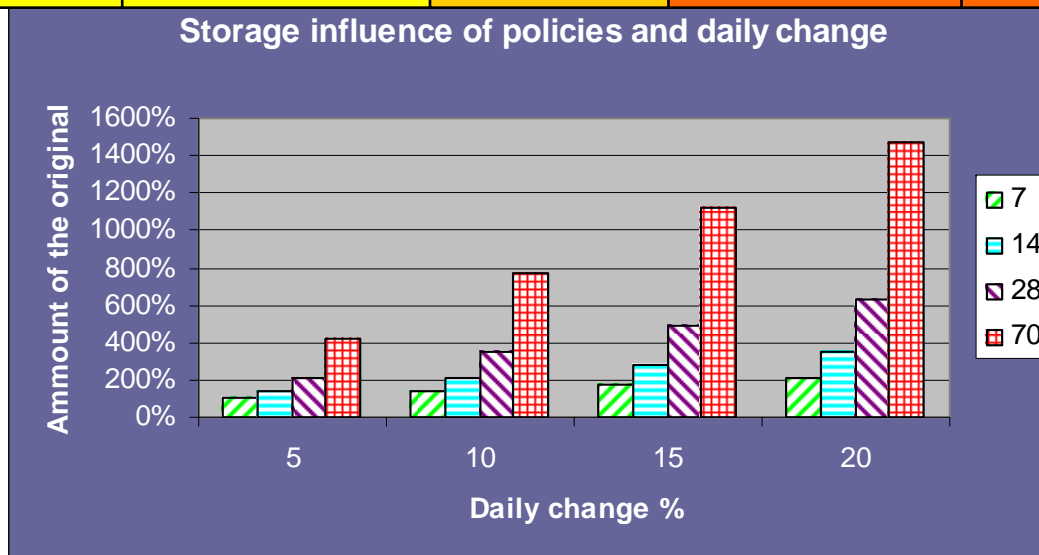
A 10MB file gets backuped for 14 days with a daily change of 13%

Total storage=13%*10MB*14+10MB-2%10MB

The problems you face...

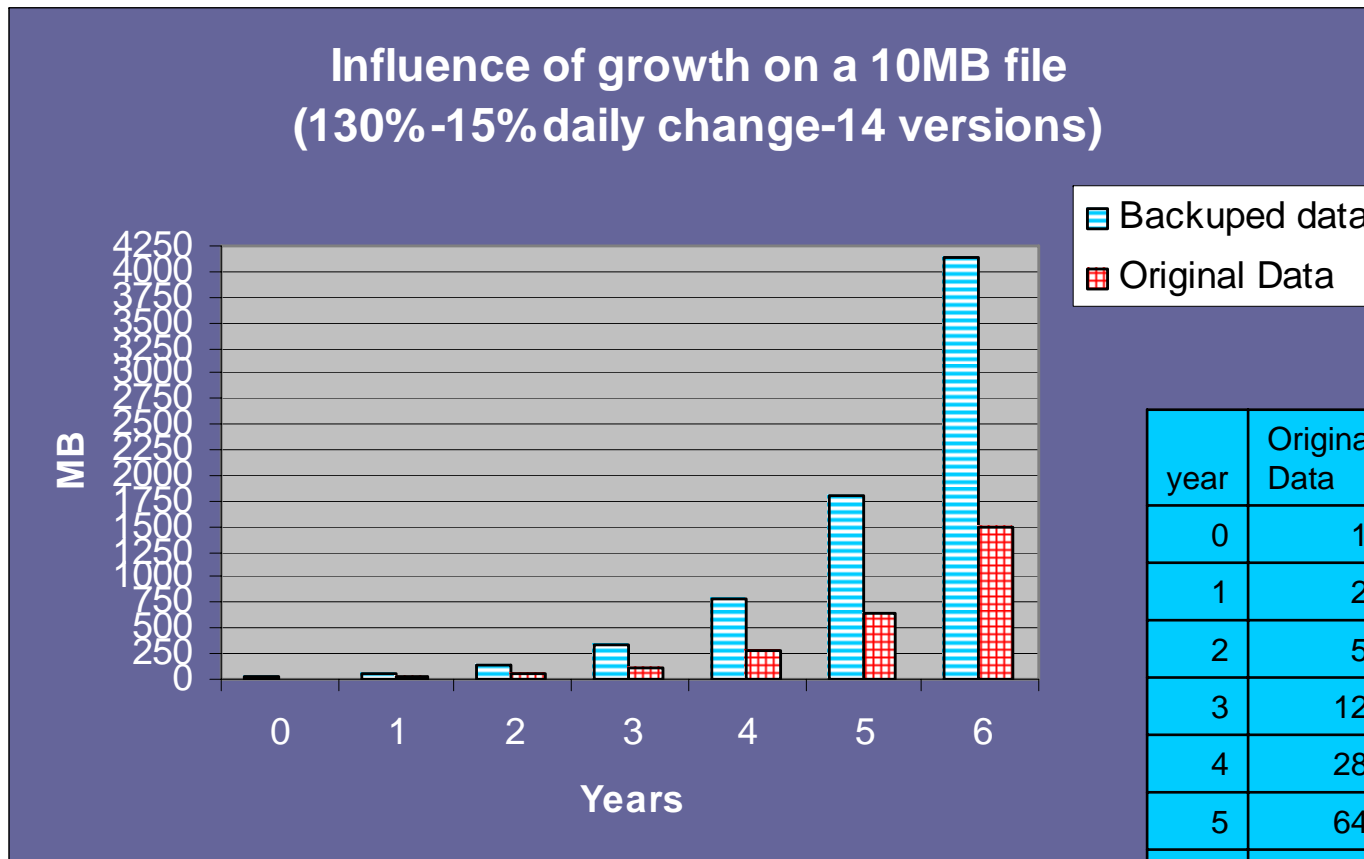
So what happened to your original data amount ?

Total storage compared to the original		%change per day			
		5	10	15	20
Policy	7	105%	140%	175%	210%
	14	140%	210%	280%	350%
	28	210%	350%	490%	630%
	70	420%	770%	1120%	1470%



The problems you face...

The impact of autonomic growth on a 10MB file....



year	Original Data	Backuped data	% Orig
0	10	28	280%
1	23	64	644%
2	53	148	1481%
3	122	341	3407%
4	280	784	7836%
5	644	1802	18022%
6	1480	4145	41450%

The problems you face...

What should be your watermarks?

- Autonomic growth
- Project growth
- Daily change figures (backup amount)
- Amount of nodes

Storage developments

- **EMC DiskLibrary DL700 series**
 - Virtual tape library emulates ATL,ADIC,STK and IBM libraries
 - Up to 340TB in a box (compressed)
 - 600MB/s compressed-1200MB/s uncompressed
- **IBM 3590 technology**
 - 40 uncompressed-80MB/s compressed/WORM
- **LTO3**
 - 80 uncompressed-160MB/s compressed
- **S-ATA**
 - Cheap by economies of scale

Storage developments

technology	Compression (in the box)	Worm	Cost [EUR/TB]	Fault tolerance	Cap. [GB]	Speed [MB/s]
Disk Library (DL740)	Yes (software)	No	2500 (compression 1:2)	Raid 3	-	600 (comp)/1200 MB native per box
LTO3	Yes (hardware)	No	2200 (400)	CRC	400-800	80-160(comp) per drive
3590	Yes (hardware)	Yes	4700 (450GB)	CRC	450-900	40-80(comp) per drive
S-ata	No (software depending on file system ex2 can)	No	3200 (no compression) A class (fast/ds) 1800 B class	Raid 5	-	>1200 per box

All prices are calculated based on a three tier solution with primary and secondary on same technology

Disk-Tape-Tape



Tapepool
primary

Tapepool
copy

Pro	Con
Static media (once written is safe)	Collocation needed to keep the tape utilization high
Real off-site is possible	Limited mount points
Hardware compression	Sequential write is only possible for limited clients
	Multi session restore not possible due to volume lock
	Size of volumes is fixed

Disk-Tape-Tape

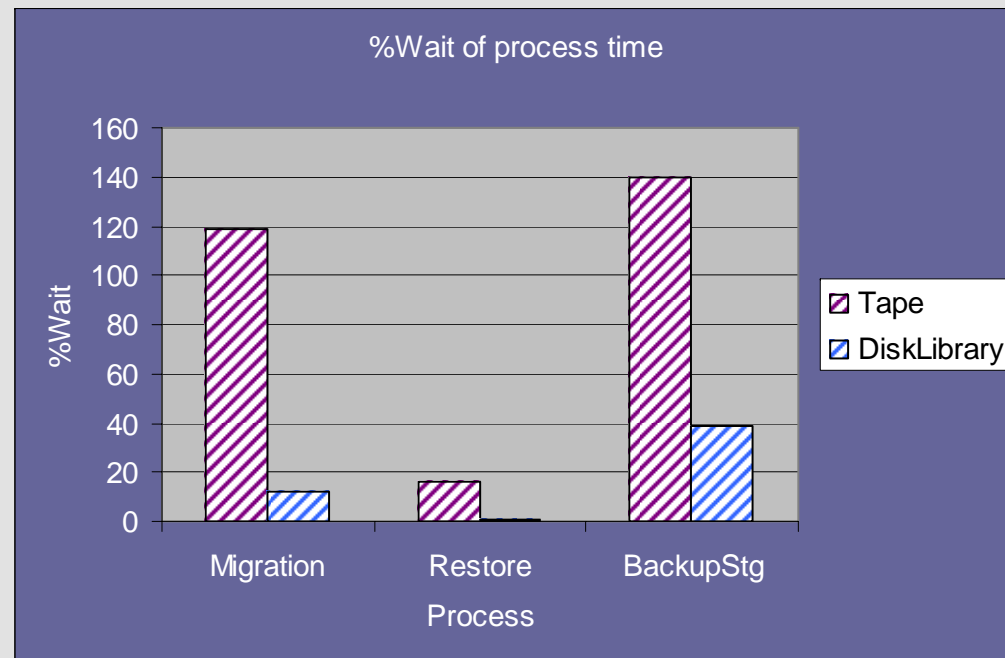
When you consider Tape:

- For better utilization collocation groups need to be made meaning management
- Very efficient and cost effective when using non collocated copy tapepool.
- Keep drive allocation in mind with sizing the environment. Free mount points could limit parallel housekeeping.
- Due to hardware compression large files (aggregates) will have great throughput.

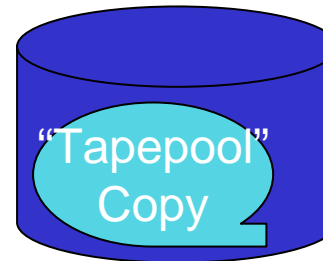
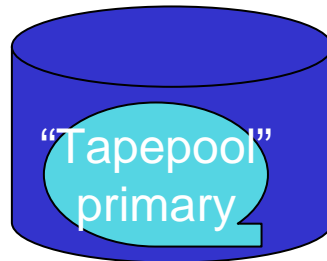
Disk-Tape-Tape

When you consider Tape:

- When using *collocation* lots of tape mounts occur and the ratio data transfer against mount time is likely to be out of proportion. Migration could have 120%(LTO2) of media wait time over the process time.
- So enormous impact for aggregated throughput of you tape drives.



Disk-DiskLibrary-DiskLibrary



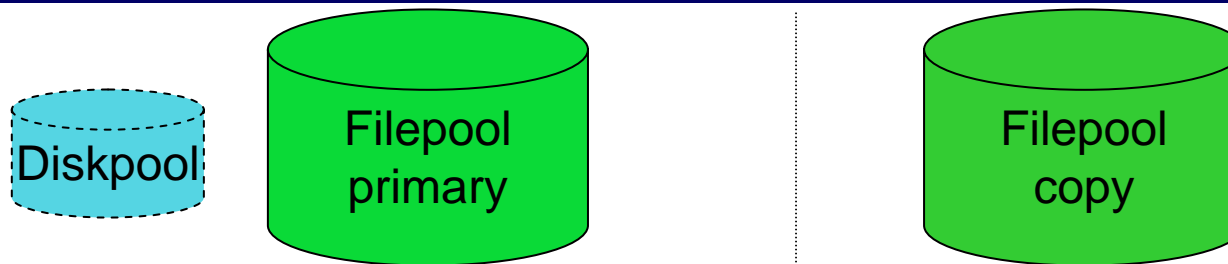
Pro	Con
No collocation needed	Compression reduces throughput
Multi session	"New" technology so fast evolving models will come
Sequential write possible	Certifying
Flexibility, easy create vtl, more drives and volumes	No real off-site storage
Emulation native tape/library	not WORM compliant
Depending on situation design without diskpool	Maximum capacity is 100TB compressed per box
No mount time/time to position	Dedicated for backup
More drives make housekeeping easier	

Disk-DiskLibrary-DiskLibrary

When you consider DiskLibraries:

- Diskpool could be skipped from the design if throughput is sufficient, however it could still be used as a fall back in case the primary disklibrary fails.
- The amount of drives to assign.
- The size of the volumes.
- Compression (box setting).

Disk-Disk-Disk



Pro	Con
No collocation needed	Large file systems on the OS TB's.
Multi session	How long does fs check take if corruption occurs
Sequential write possible	Compression not always possible
No mount/time to position time	Susceptible to user failure
Flexibility, easy create vtl, more drives and volumes	No real off-site storage
Multipurpose device, ordinary storage	LanFree difficult to implement (uses NFS shares)
Depending on situation design without diskpool	

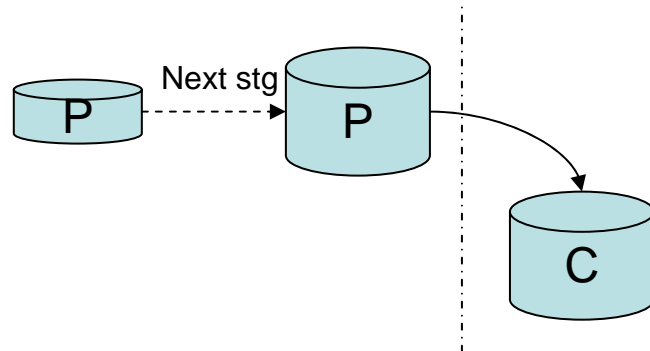
Disk-Disk-Disk

When you consider FilePools:

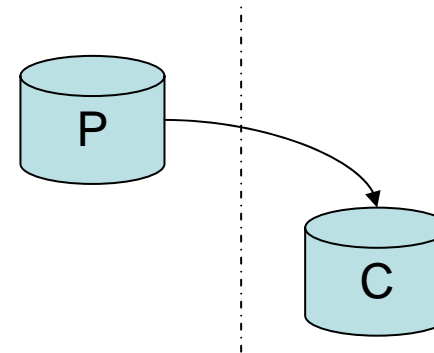
- Diskpool for availability purposes (leave it when your FilePool is mirrored or Raid5)
- Predefine file volumes, with failing filesystems TSM will retry to define volumes.
- Think about the size of the volumes to prevent volume locking.
- Define multiple filesystems

TSM storage setups

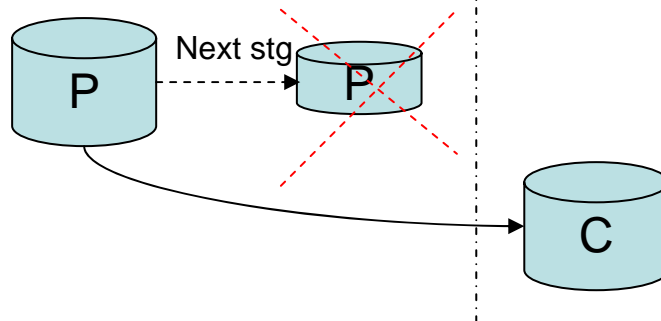
Three tier



Two tier

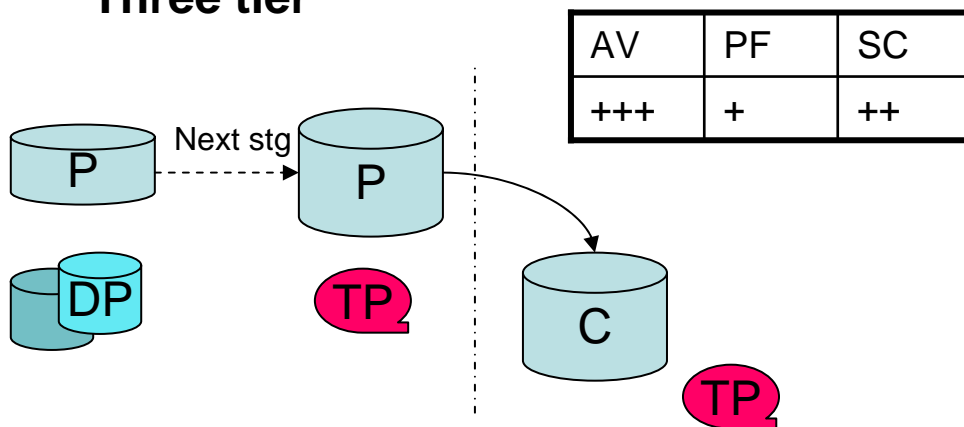


Three tier – with standby pool

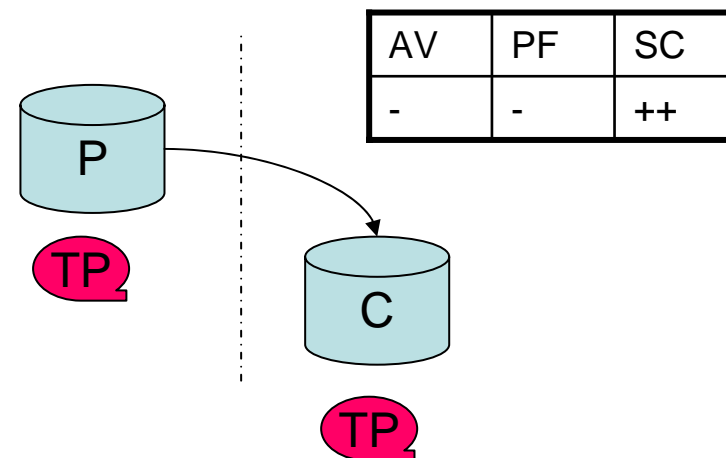


(D)-T-T

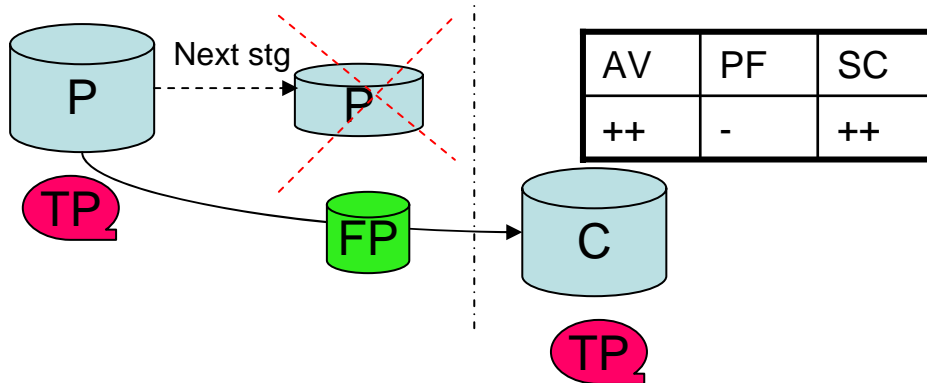
Three tier



Two tier



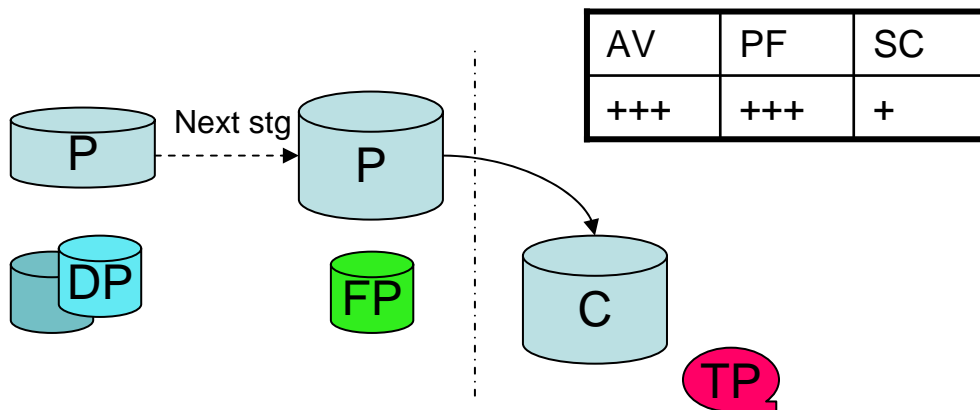
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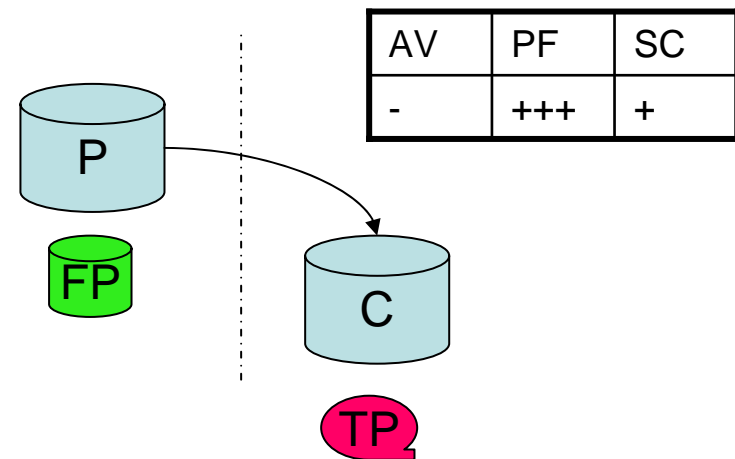
Av=availability
Pf=performance
Sc=scalability

(D)-D-T

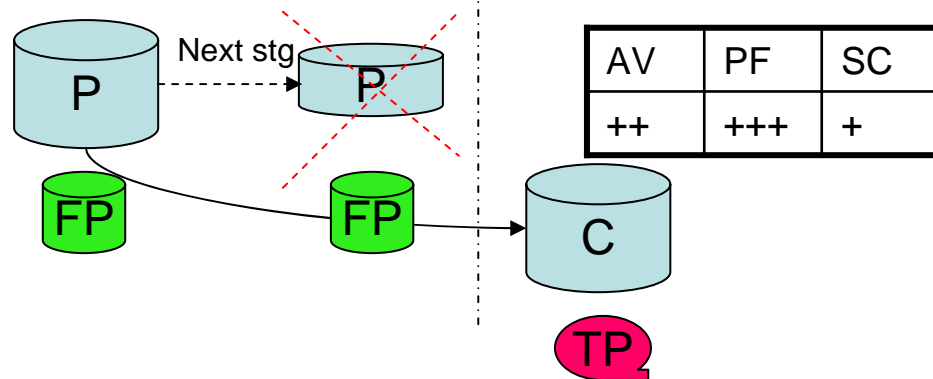
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Two tier



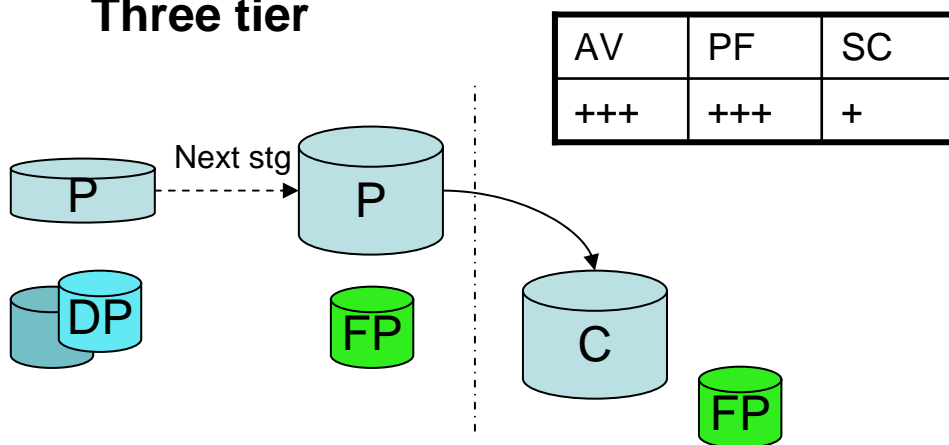
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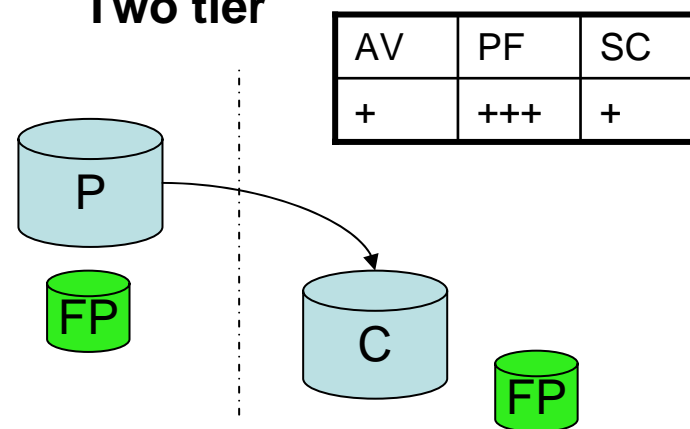
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(D)-D-D

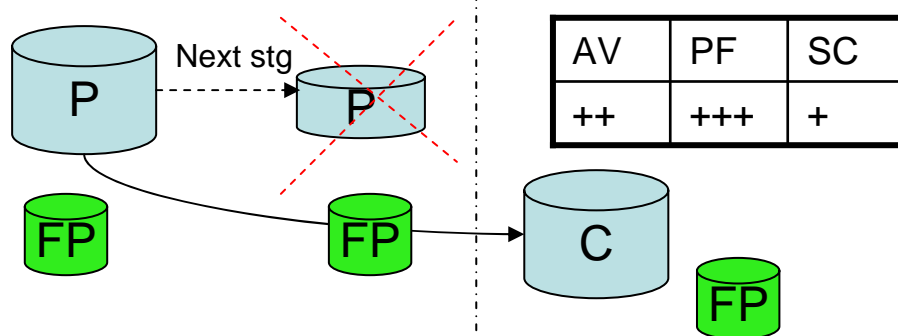
Three tier



Two tier



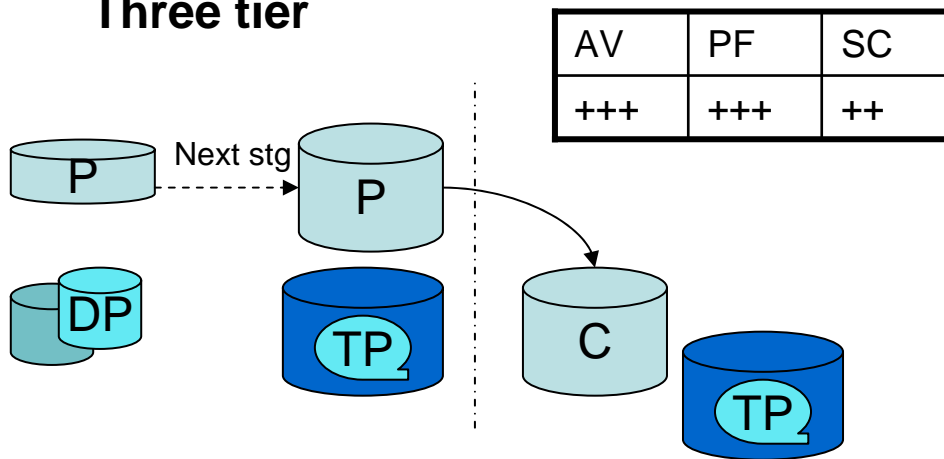
Three tier – with standby pool



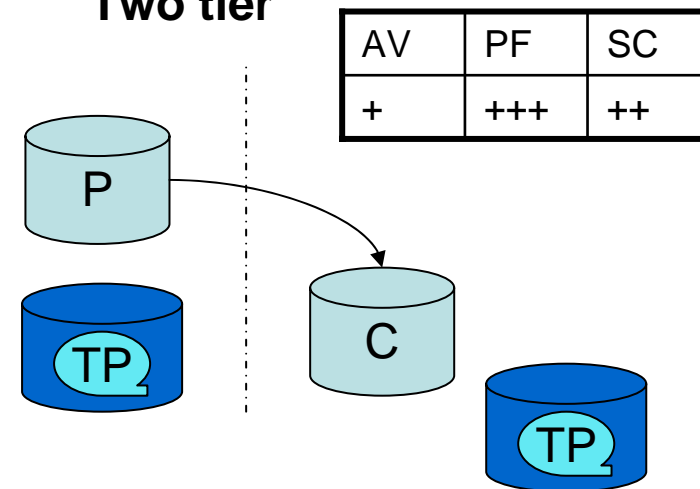
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(D)-DL-DL

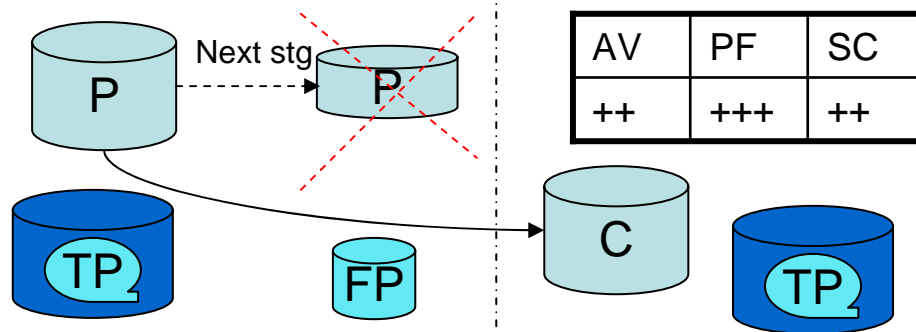
Three tier



Two tier



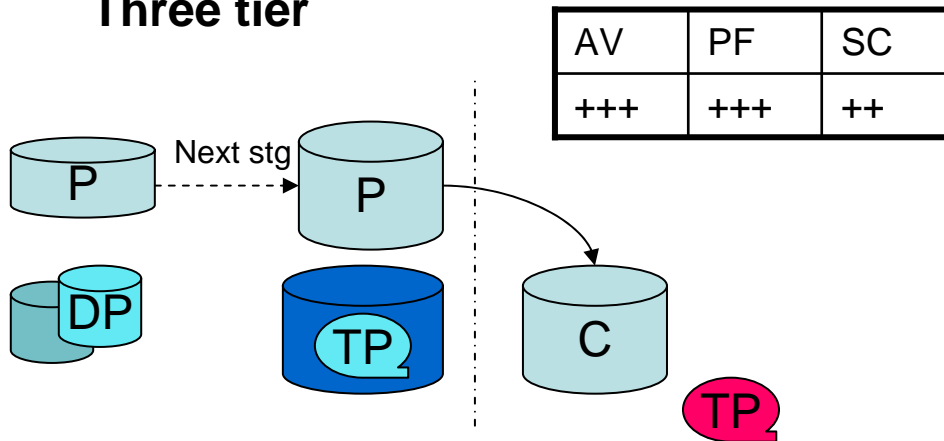
Three tier – with standby pool



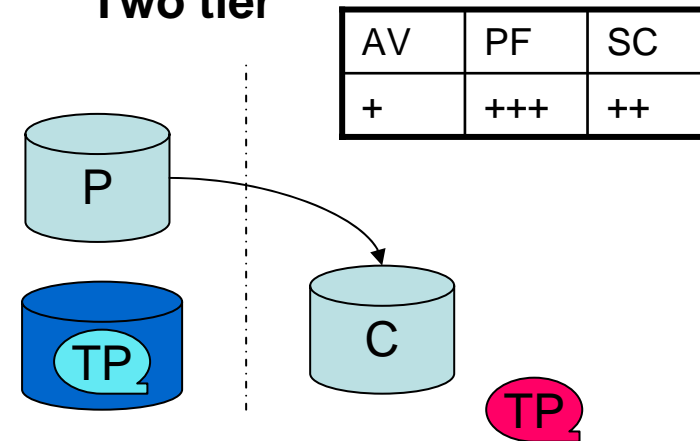
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(D)-DL-T

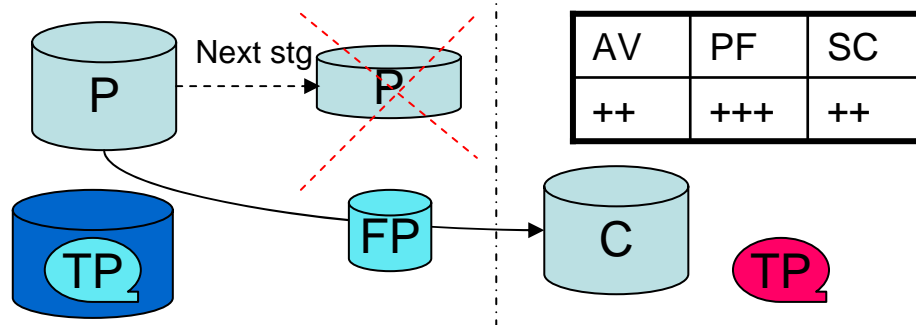
Three tier



Two tier



Three tier – with standby pool



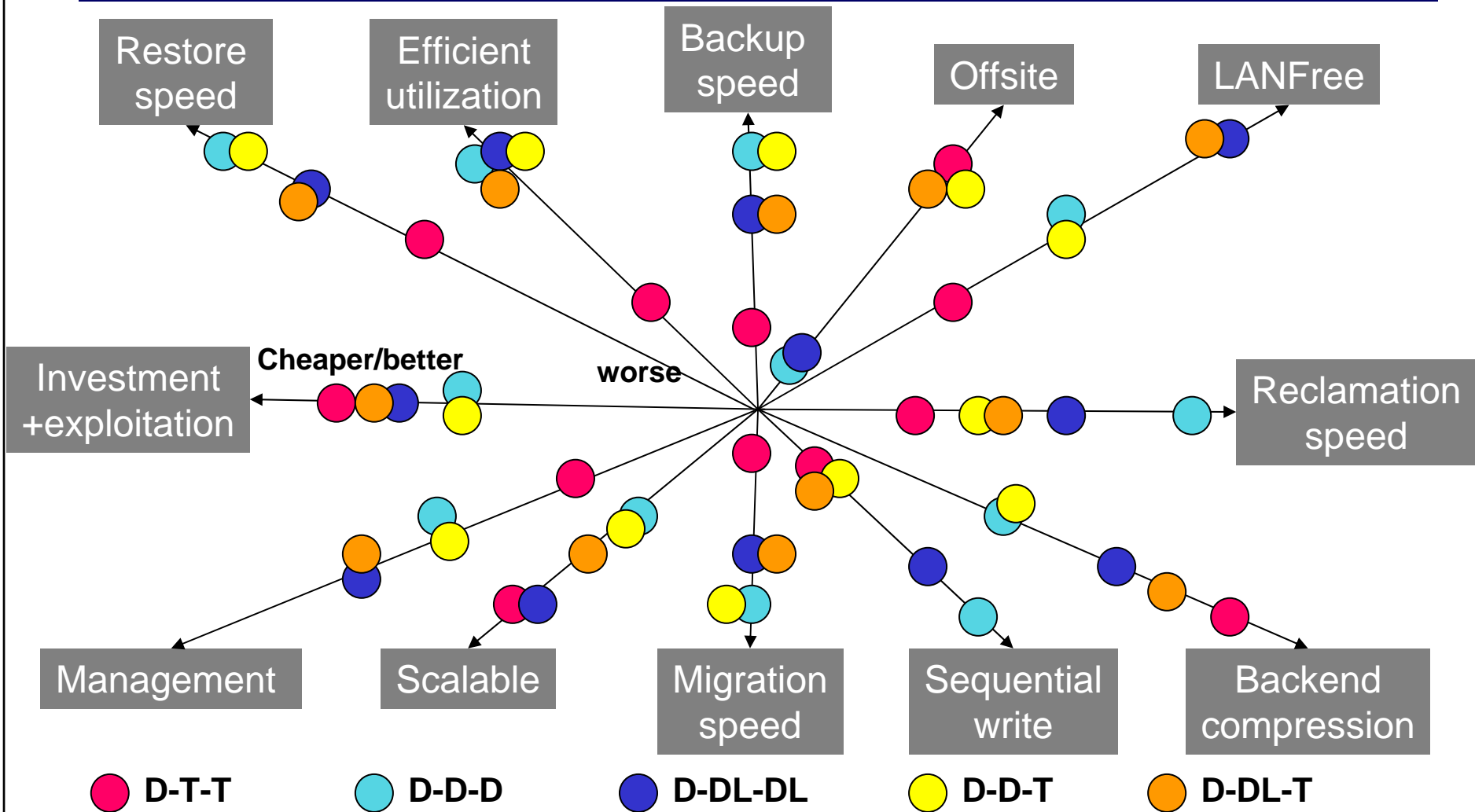
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Scalability&Performance

The limitation are:

- throughput of your solution
 - How much data can you handle in the backend in 24hrs?
 - Are restores fast enough?
- the total storage amount
 - Diskpool sizing (one day?)
 - Tape/file pool sizing
- housekeeping window
 - Expiration
 - Backup stg
 - Migration

TSM solution radar[©]



When you design

- Take a look at the current technology available
- Gather requirements
- Do proper financial analysis of both investment and exploitation costs over longer period.
- Design for scalability :
 - How easy can you expand, adapt to developments
- Design for flexibility :
 - New requirements like archive, fast restores, LANFree
- Know the figures of your environment and the target you design for scalability, performance and availability.
- Do tests yourself, do Proof of Concepts.
- Visit reference sites and ask for experience.

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Contact details

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