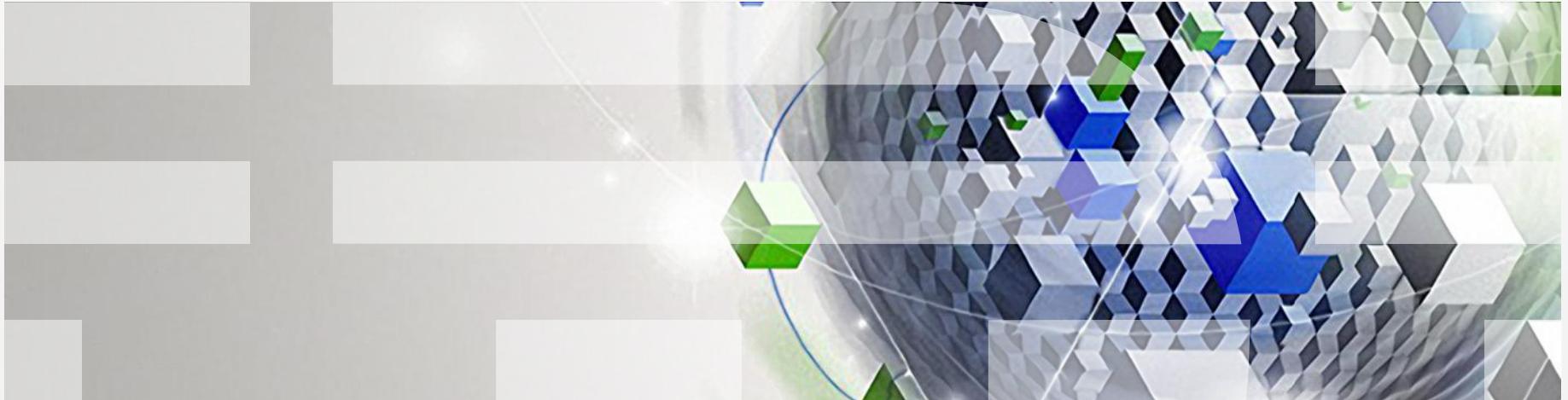
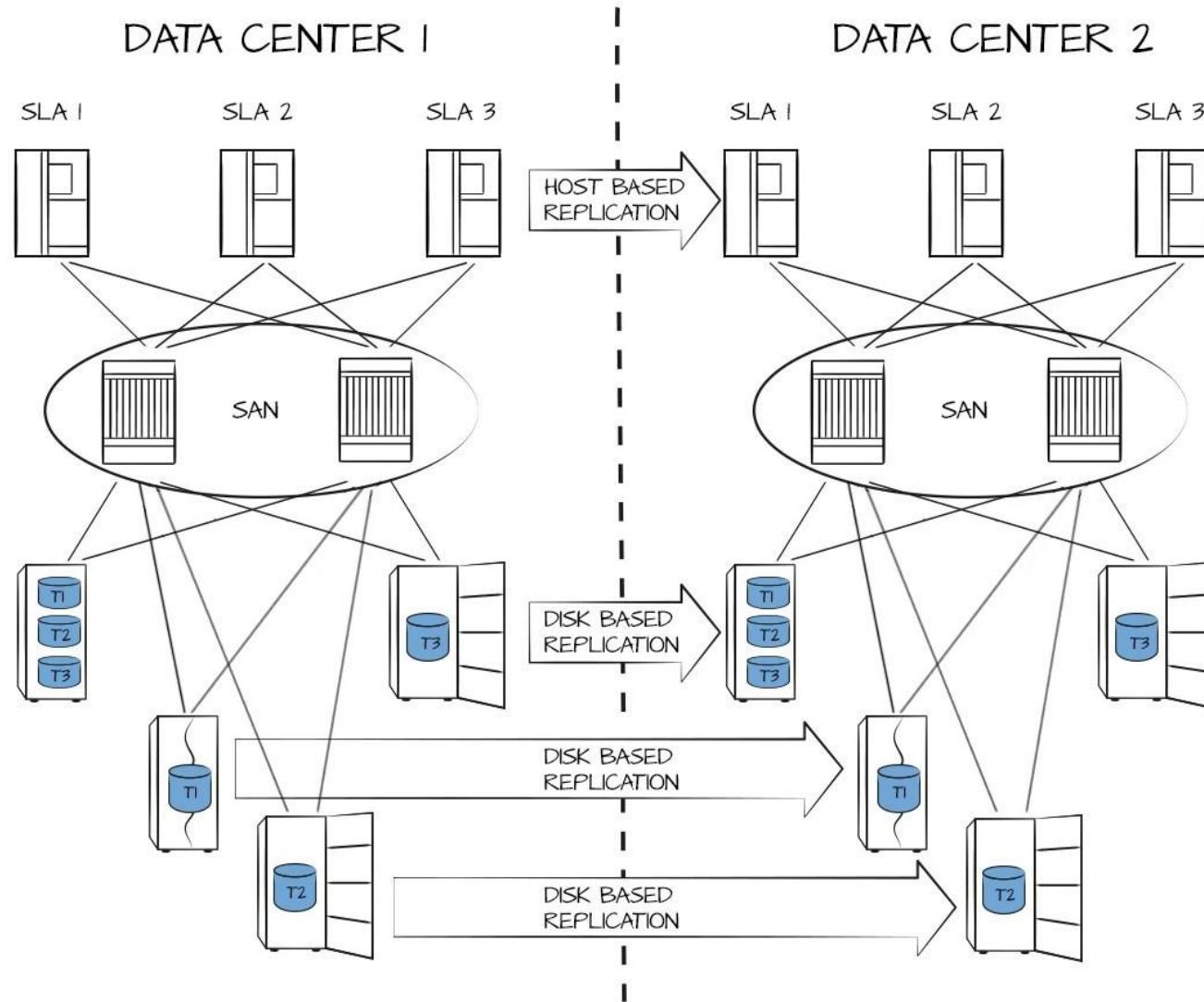


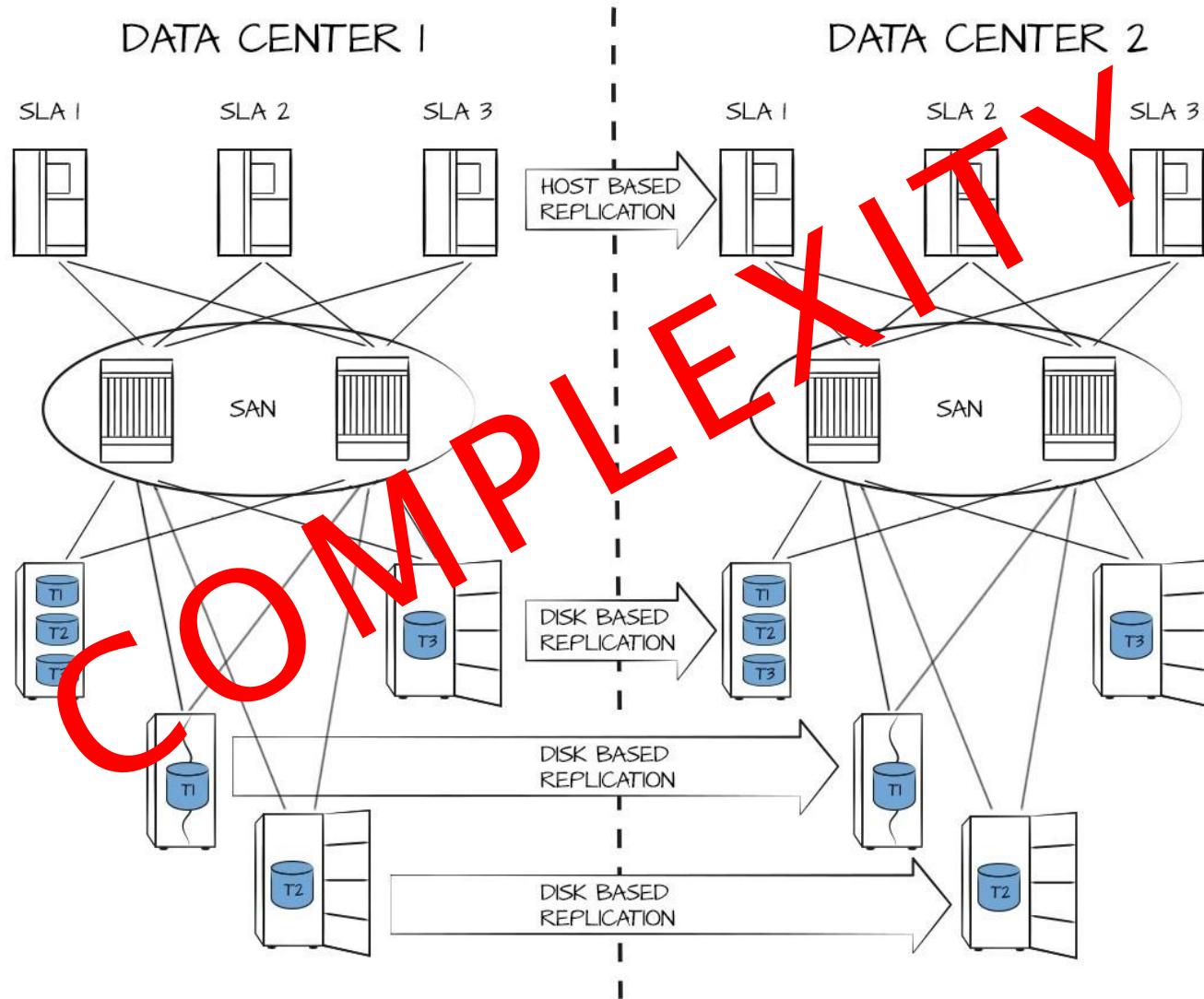
IBM Software Defined Storage - оптимизация на сторидж архитектура



Свilen Станчев



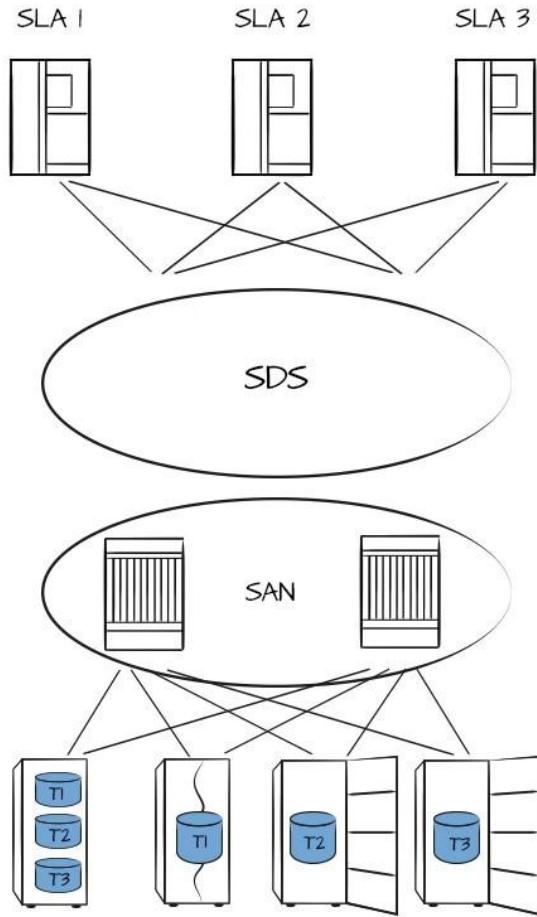
CLASSICAL DATACENTER WITH STORAGE IN SILOS...



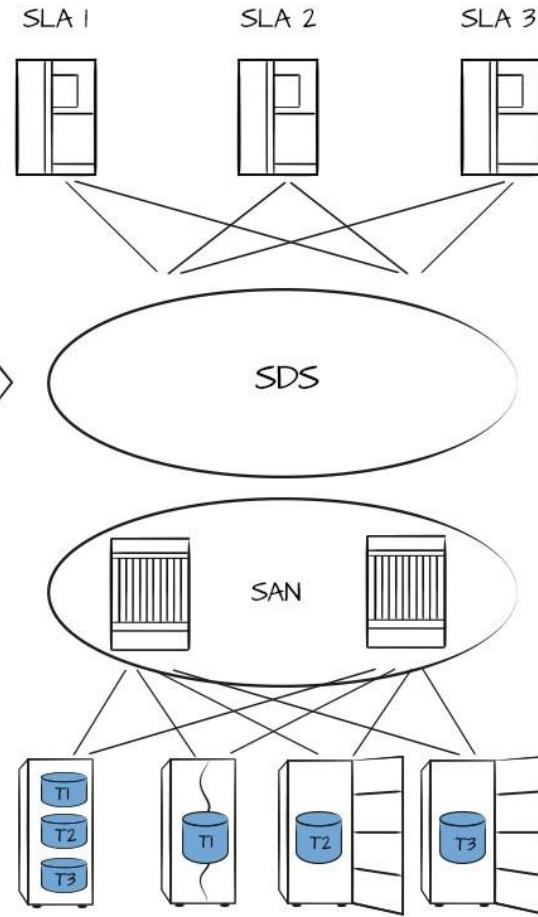
COMPLEX TO MANAGE...



DATA CENTER 1

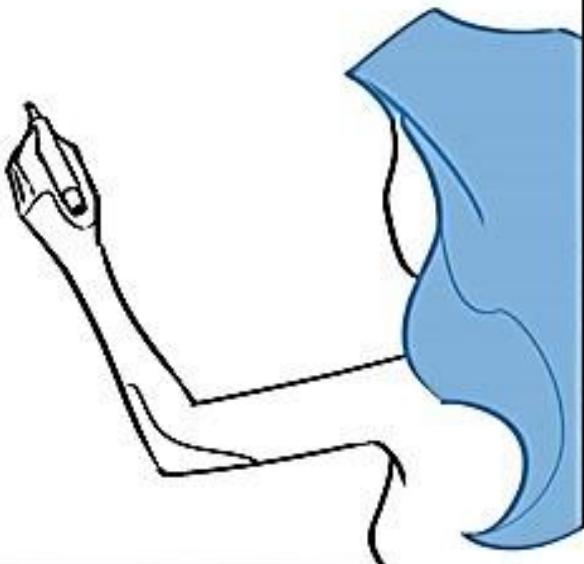


DATA CENTER 2

DISK BASED
REPLICATION

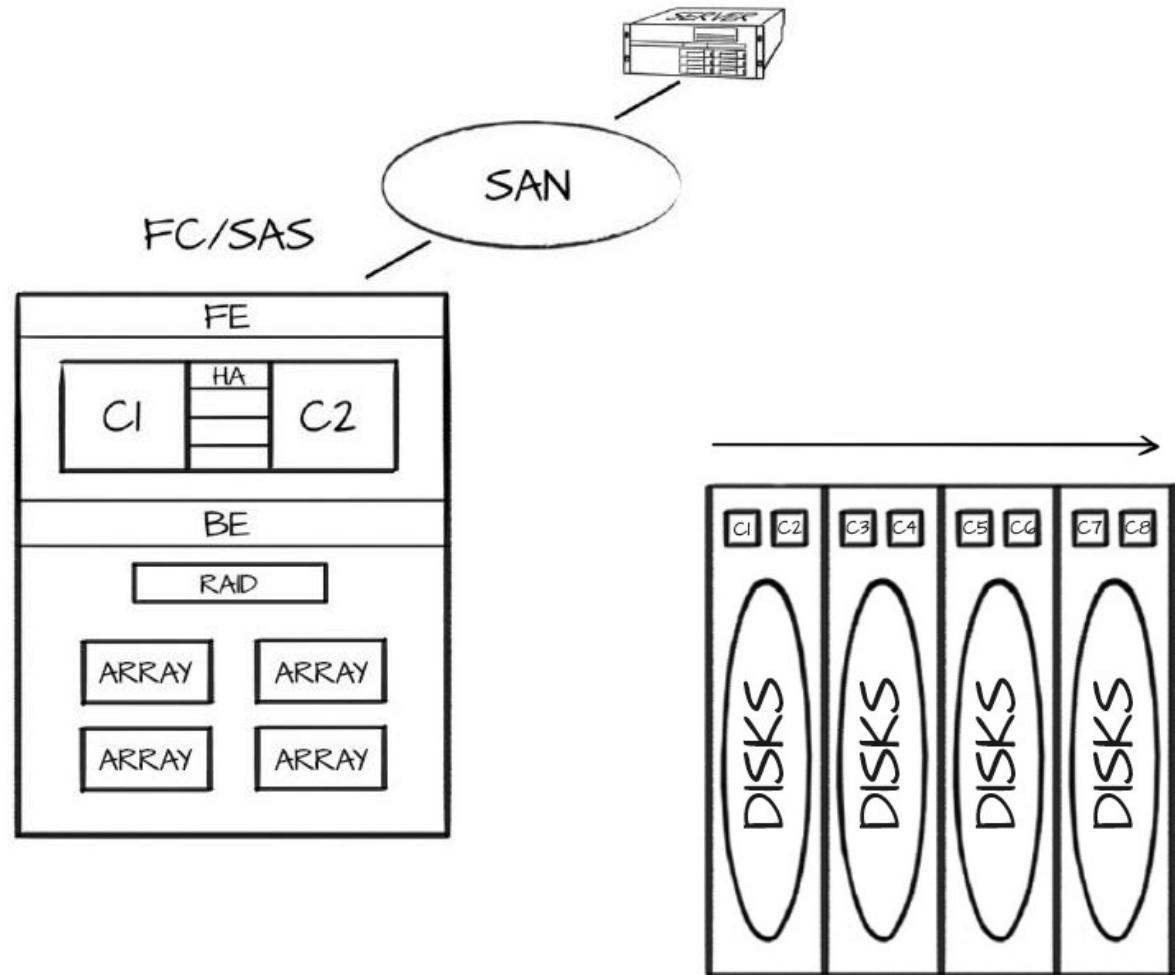
TO REMOVE THE COMPLEXITY, WE ADD SDS LAYER...

- HIGH PERFORMANCE
- HIGH AVAILABILITY - 'FIVE NINES'
- HIGHEST SCALABILITY IN ONE BOX
- EVERY SOLUTION GETS TESTED BEFORE SHIPMENT
- DEDICATED RAID CPU
- INCLUDED 24X7 MAINTENANCE
- LICENSING MODELS
- SCALABLE ADVANCED FUNCTIONS
- MAINFRAME ATTACH
- ACTIVE/ACTIVE LUN ACCESS



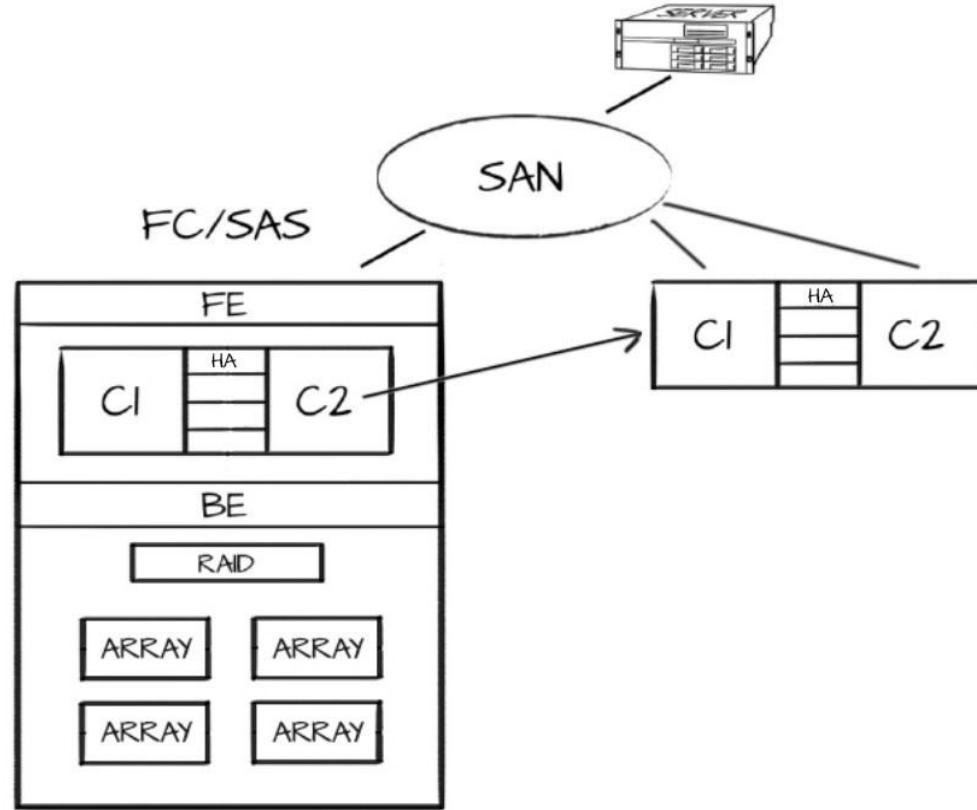


HIGH PERFORMANCE



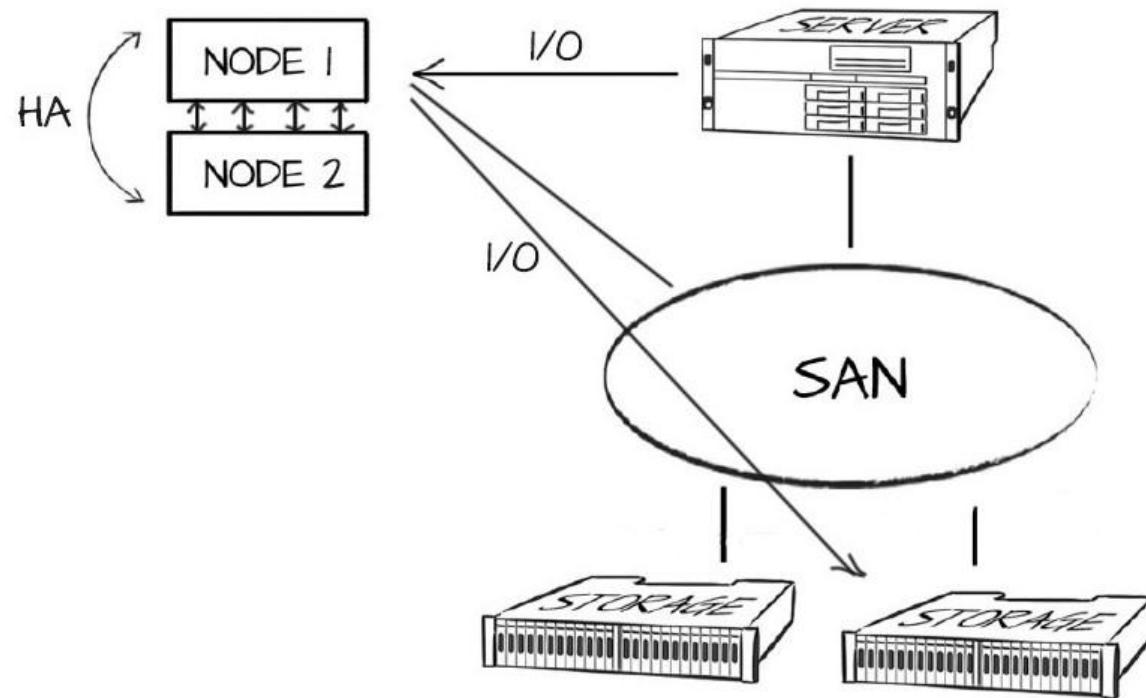
CLASSICAL HIGH END DESIGN

IBM confidential



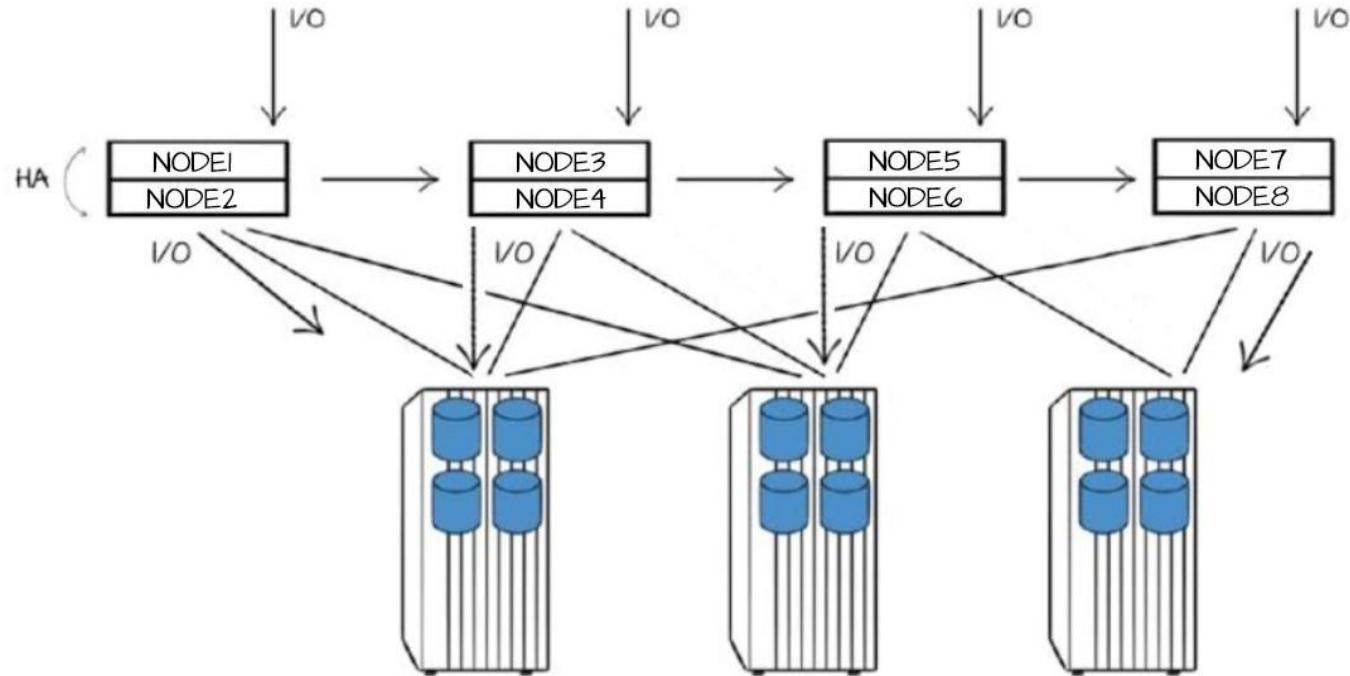
VIRTUALIZATION APPROACH

IBM confidential



VIRTUALIZATION - I/O PATH

IBM confidential



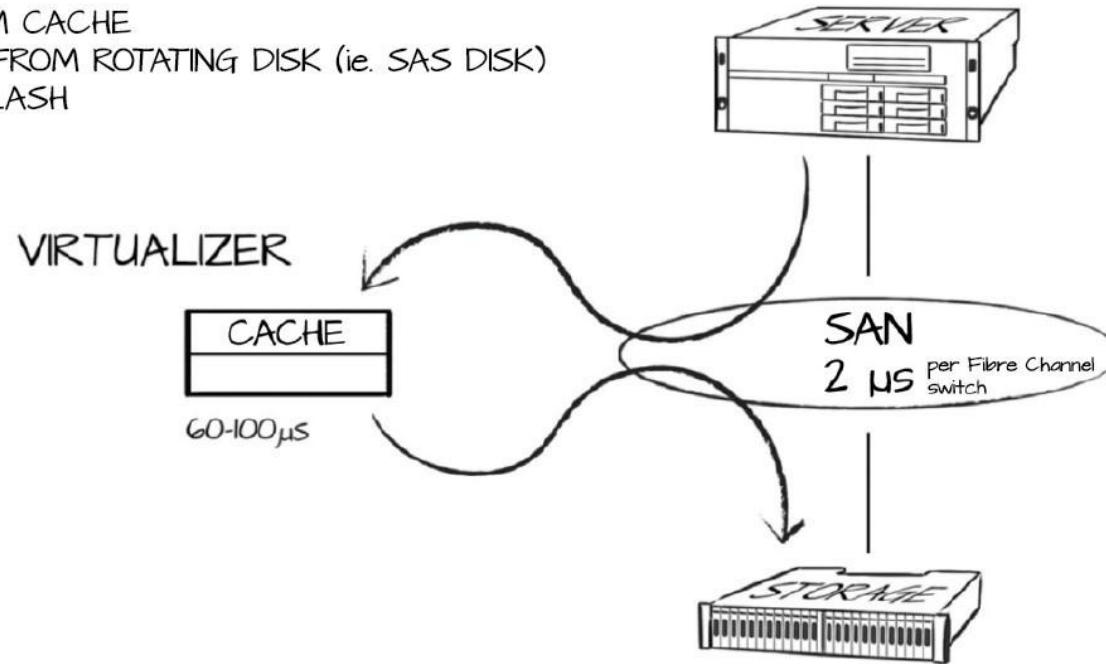
HISTORY:

DEVELOPMENT STARTS: 1999
FIRST PRODUCT: 2003

VIRTUALIZATION – SCALABILITY



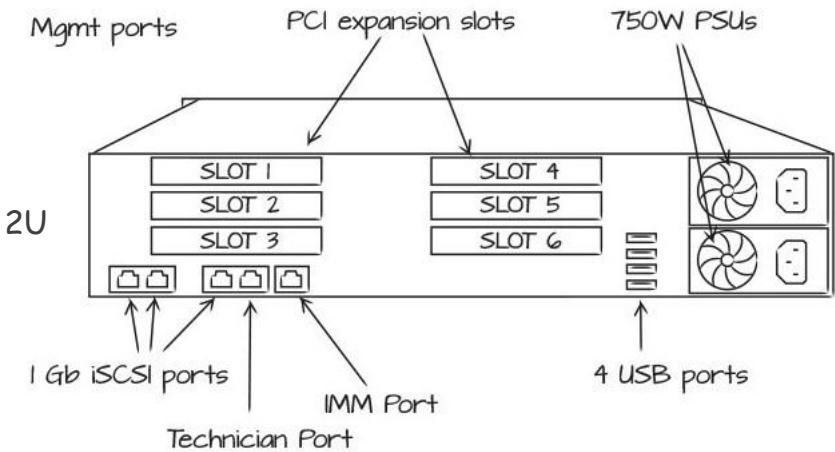
< 1 ms - FROM CACHE
3 ms < 5 ms - FROM ROTATING DISK (ie. SAS DISK)
100-200 μ s - FLASH



VIRTUALIZATION – LATENCY



REAR VIEW



	SVC CG8	SVC DH8
Cache Read MB/s	6,050	17,000
Cache Write MB/s	3500	7,000
Cache Read IOPs	800,000	1,150,000
Cache Write IOPs	300,000	500,000
Disk Read MB/s	5,380	14,000
Disk Write MB/s	2,800	4,000
Disk Read IOPs	365,000	700,000
Disk Write IOPs	115,000	200,000
70/30 Mixed IOPs	200,000	395,000

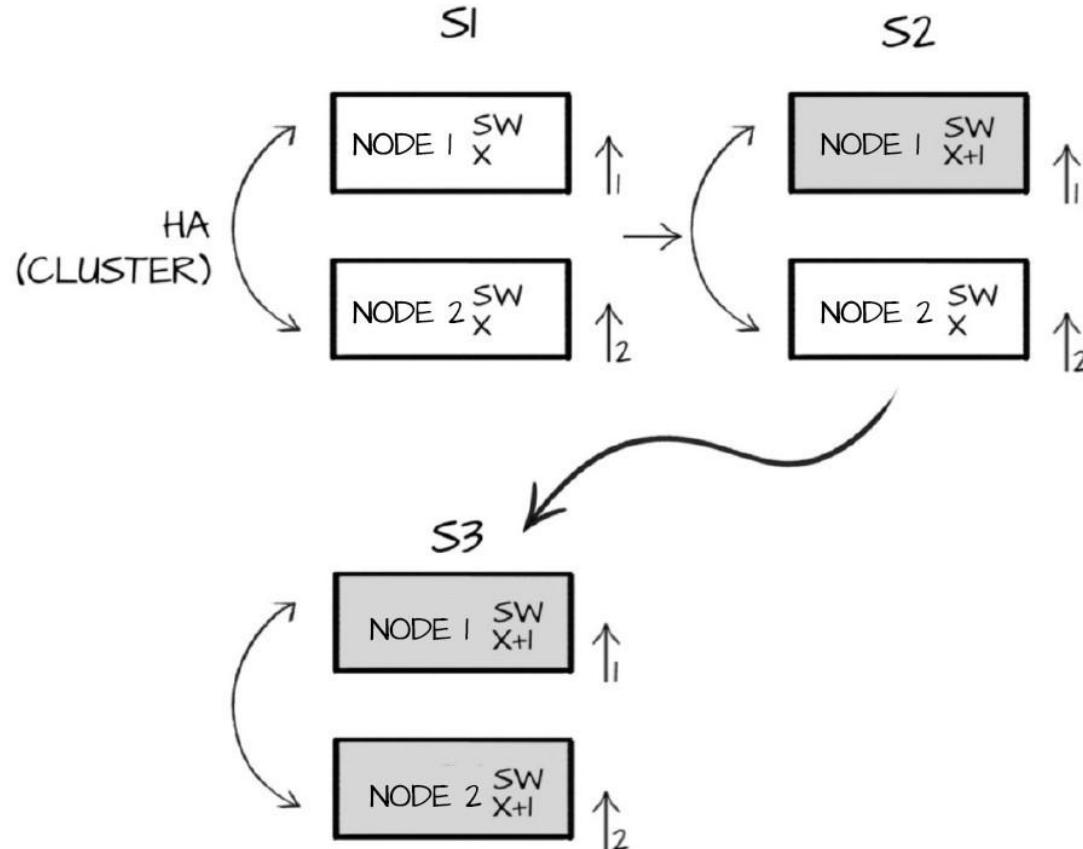
VIRTUALIZATION – PERFORMANCE (BIG NODE)

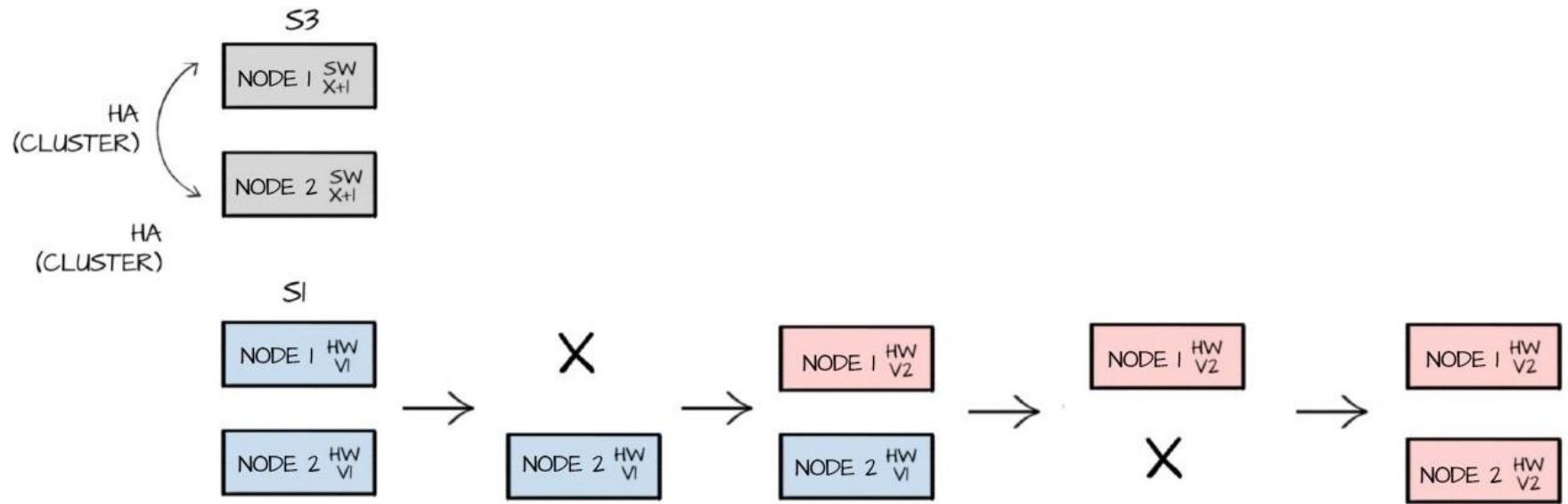


ONLINE INFRASTRUCTURE LIFECYCLE MANAGEMENT



LCM





VIRTUALIZATION - HARDWARE UPGRADE



SUPPORT FOR VARIOUS BACKEND SYSTEMS & TECHNOLOGIES



Compellent
523

IBM DS
DS3000,
DS4000
DS5000,
DS6000
DS8000

IBM
XIV
Gen 3

IBM
N series
Storwize
V7K
V9K
V3700

Hitachi
Lightning
Thunder
TgnStore
AMS,
WMS,
USP,
USP-V,
VSP

EMC
CLARiON
CX4,
Symmetrix,
DMX,
VMAX,
VNX,
VNKe

Sun
StorageTek
StorEdge

HP
MA, EMA
MSA, EVA,
XP, P9500,
3Par

NEC
iStorage

Bull
Storeway
1500,
2000,
3000

NetApp
FAS
XioTech
Enterprise

Fujitsu
Eternus
DX80 S2,
DX90 S2,
DX410 S2,
DX440 S2
Violin
DX440 S2
TMS
RamSAN
440

NexSAN
SATABeast

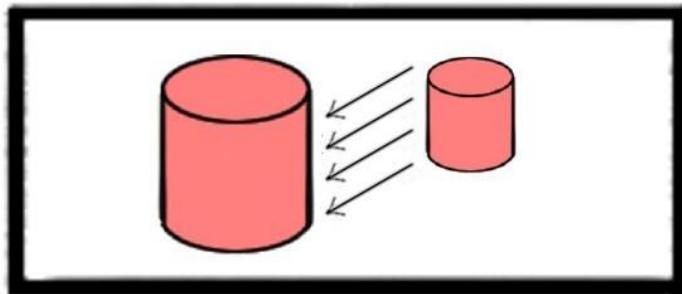
Multivendor Support +260 Storage models



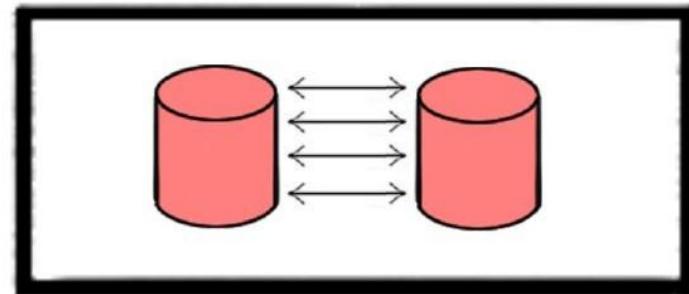
SCALABLE ADVANCED FUNCTIONS



SNAPSHOT

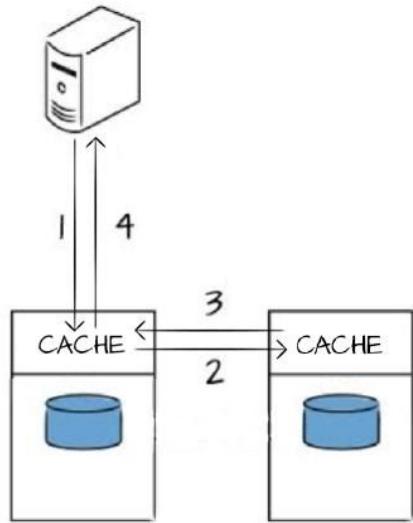


CLONE



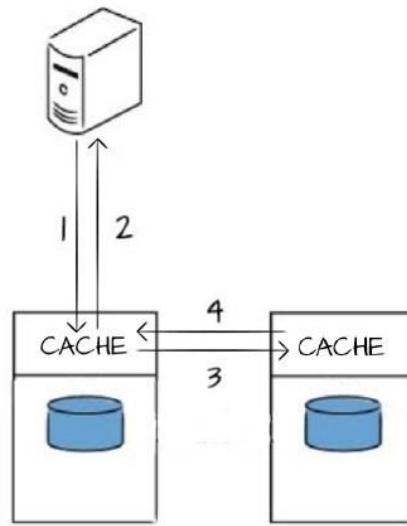


SYNC



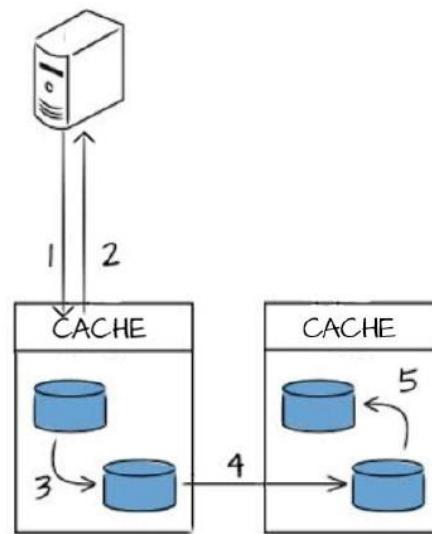
1. Write IO
2. Write to secondary
3. Write hit acknowledge
4. Write acknowledge

ASYNC



1. Write IO
2. Write acknowledge
3. Write to secondary
(non synchronously)
4. Write acknowledge

ASYNC FOR LOW BANDWIDTH



1. Write IO
2. Write acknowledge
3. FlashCopy
4. Write to secondary
(non synchronously)
5. FlashCopy

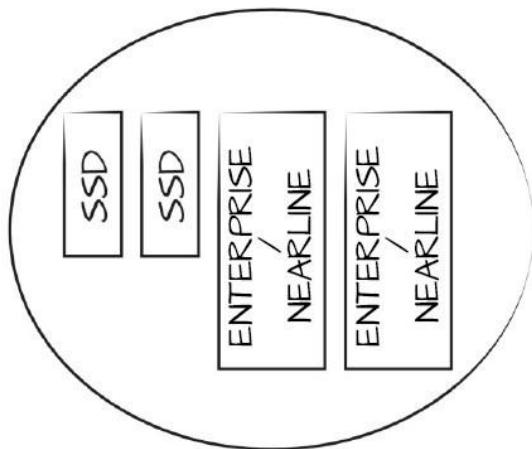


REPLICATION

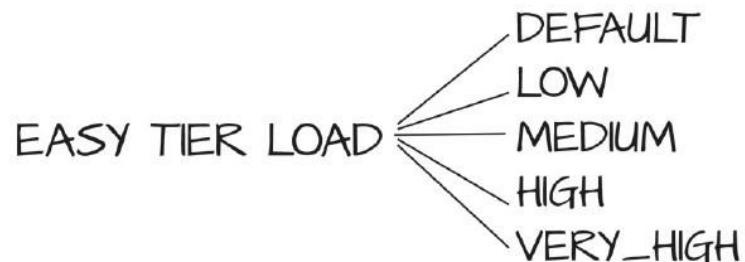
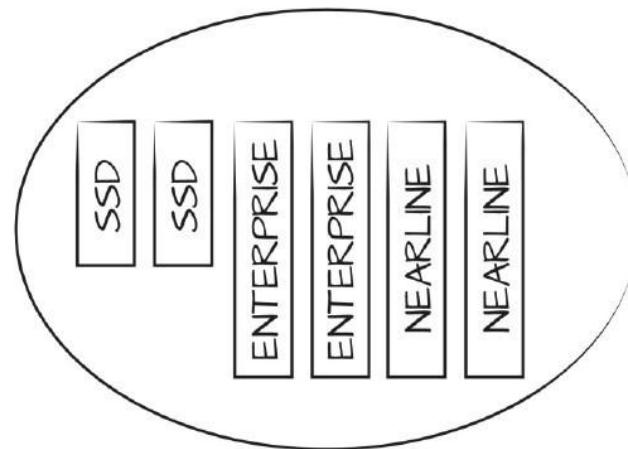
- SYNCHRONOUS REPLICATION
 - ASYNCHRONOUS REPLICATION
 - ASYNCHRONOUS REPLICATION FOR LOW BANDWITH
-
- FC REPPLICATION PROTOCOL
 - IP REPPLICATION PROTOCOL



2 WAY
STORAGE POOL



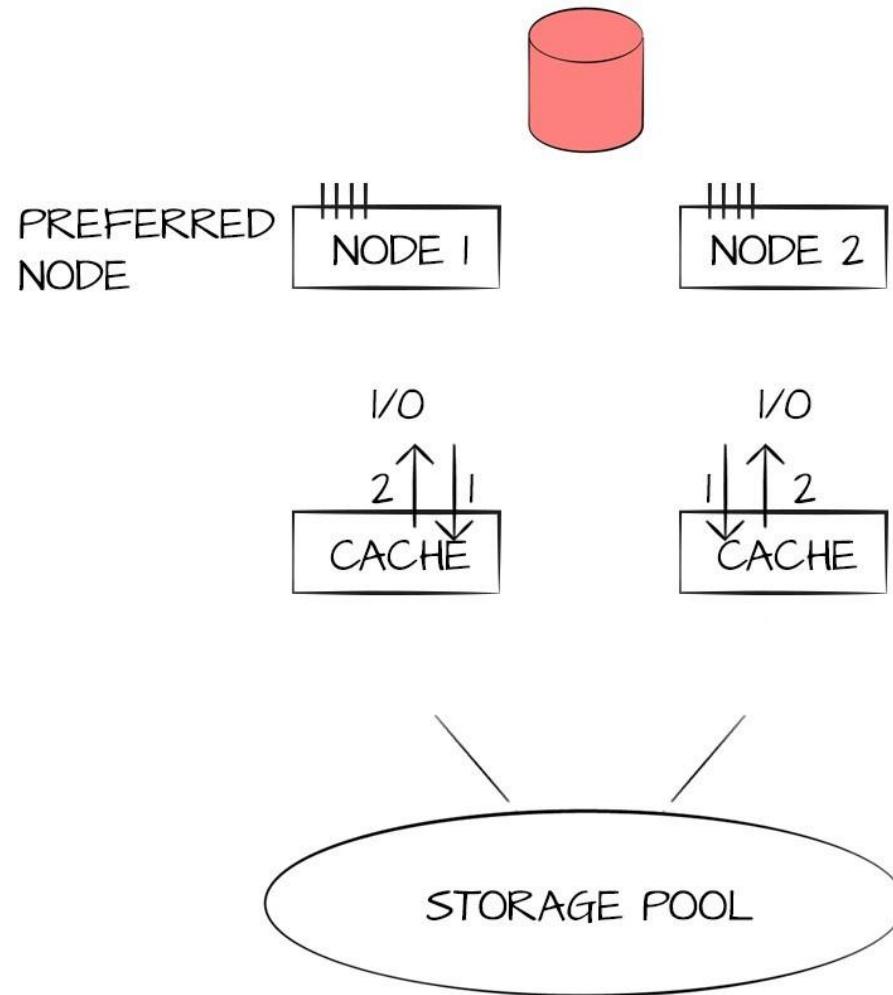
3 WAY
STORAGE POOL



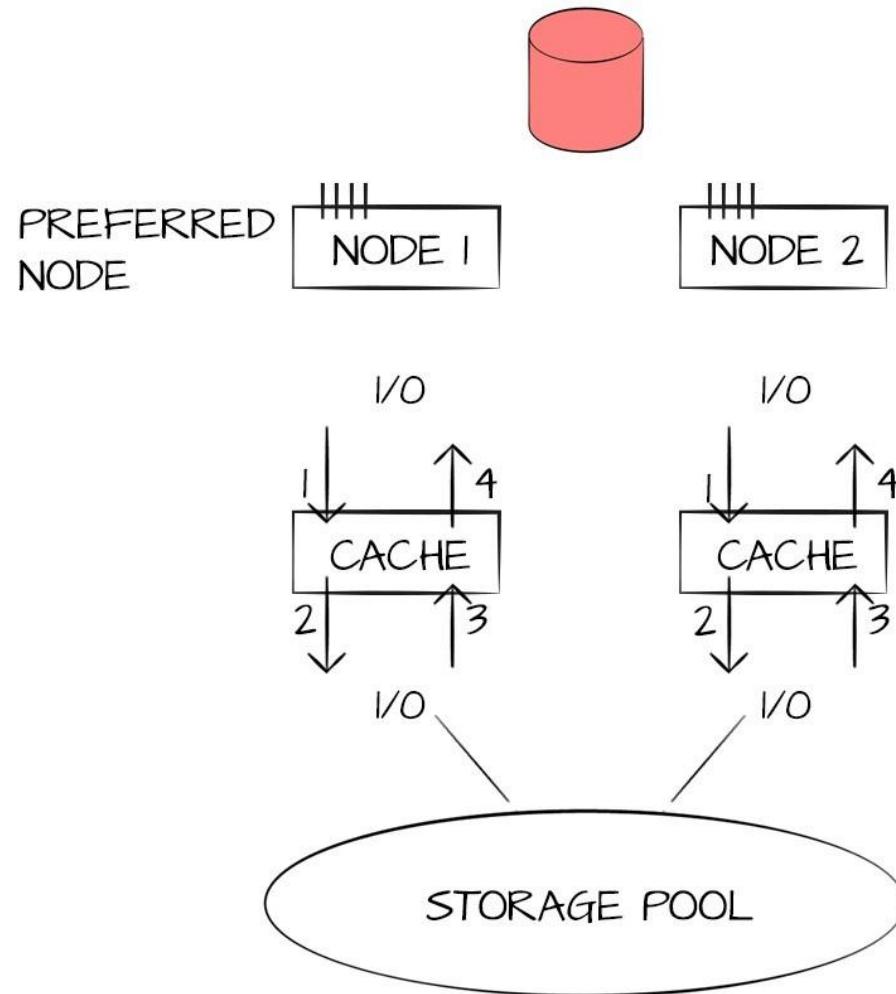
VIRTUALIZATION - ADVANCED FUNCTIONS - SUB VOLUME TIERING
MDISK LOAD PARAMETER



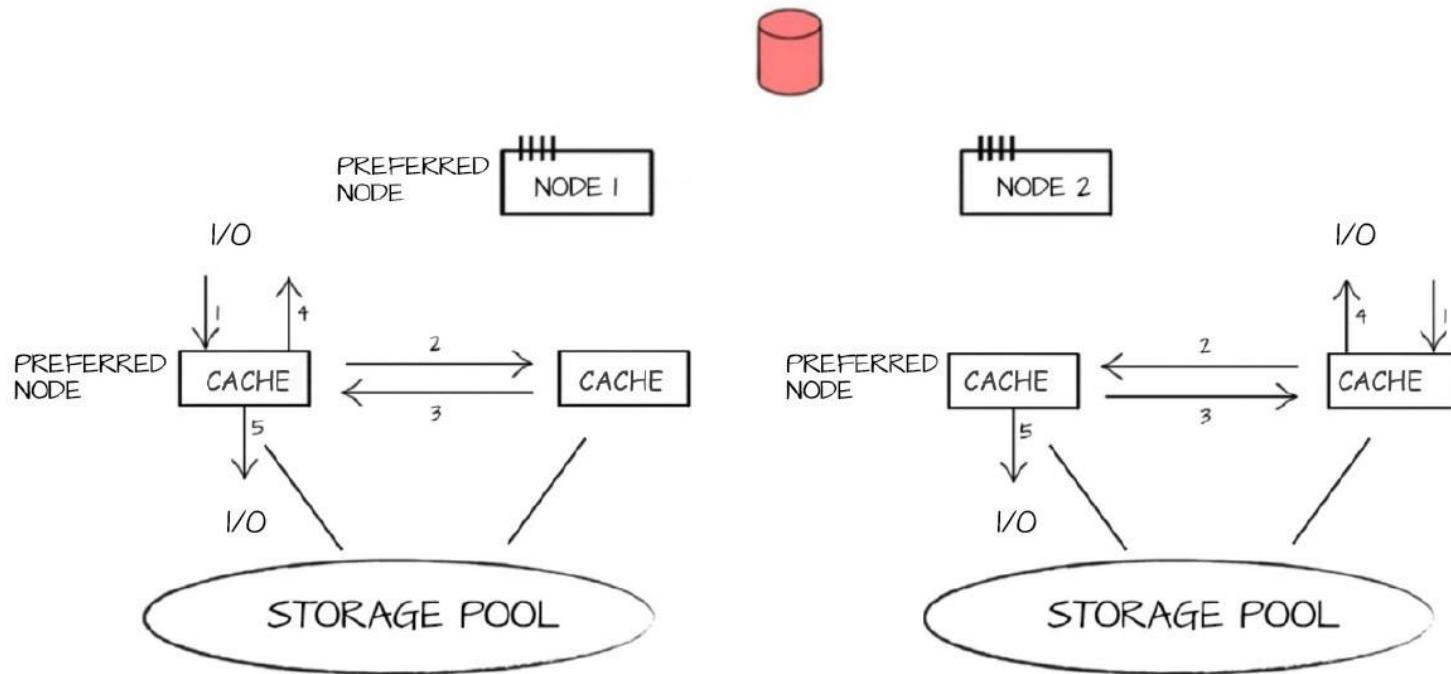
ACTIVE/ACTIVE LUN ACCESS



VIRTUALIZATION -ACTIVE/ACTIVE IO
READ CACHE HIT



VIRTUALIZATION -ACTIVE/ACTIVE IO
READ CACHE MISS



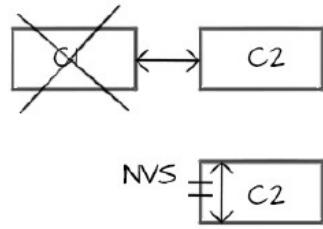
VIRTUALIZATION -ACTIVE/ACTIVE IO
WRITE (ALWAYS CACHE HIT)



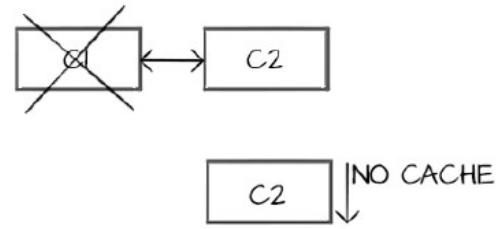
ADDITIONAL BENEFITS OF IBM's STORAGE VIRTUALIZATION



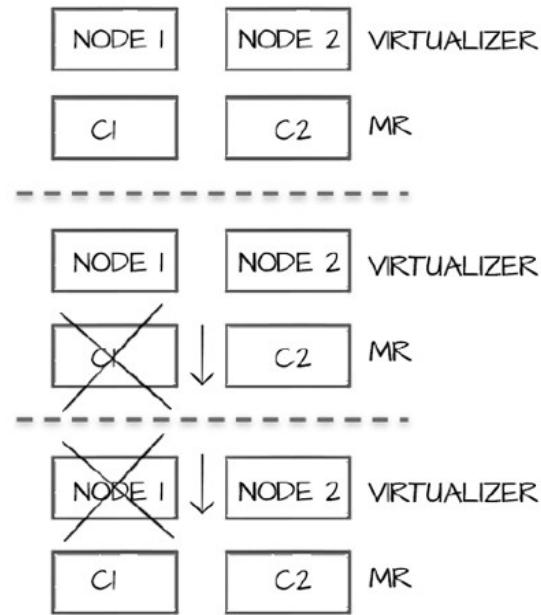
HE



MR



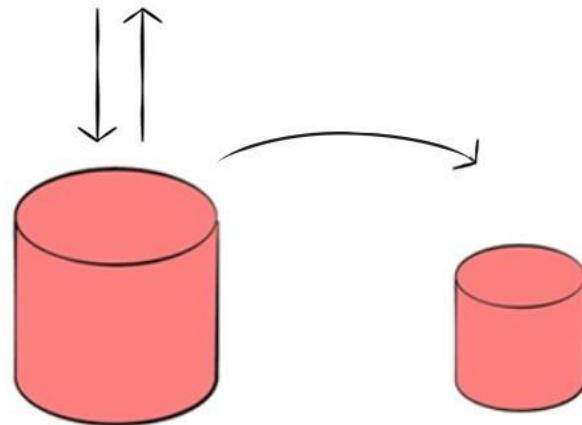
VIRTUALIZER + MR



VIRTUALIZATION - DUAL LAYER CACHE

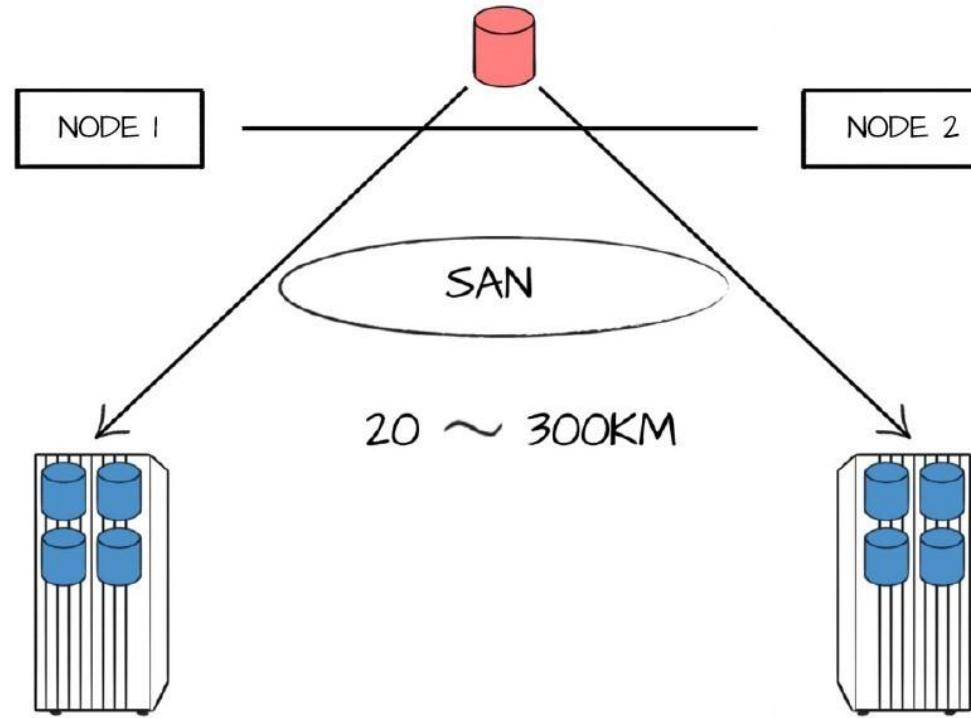


COMPRESSION - ONLINE



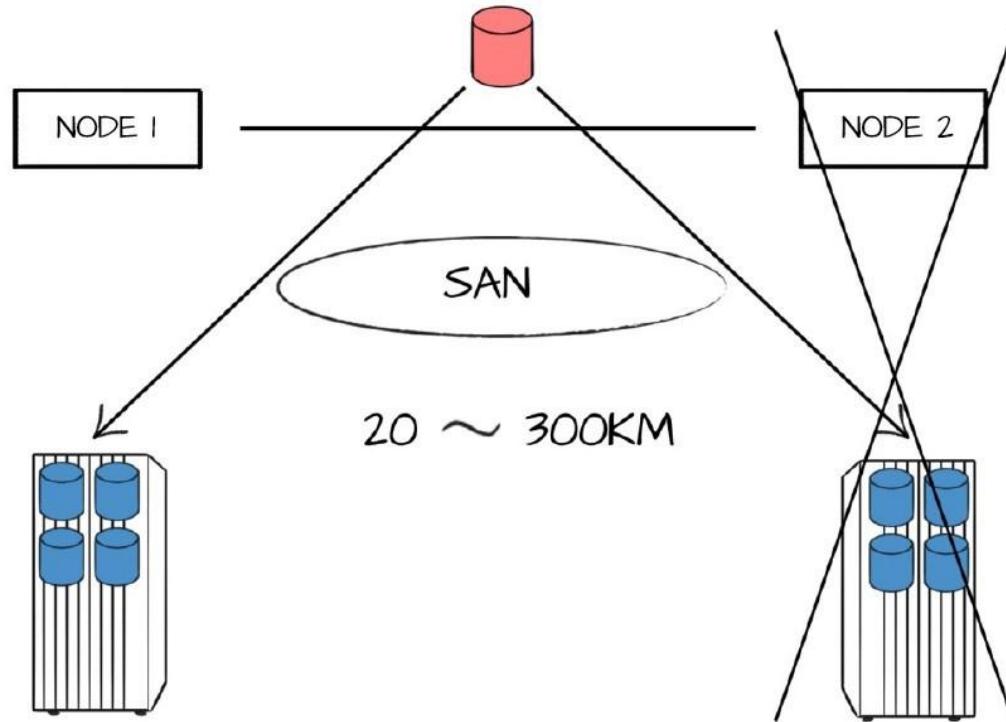
VIRTUALIZATION - COMPRESSION

IBM confidential



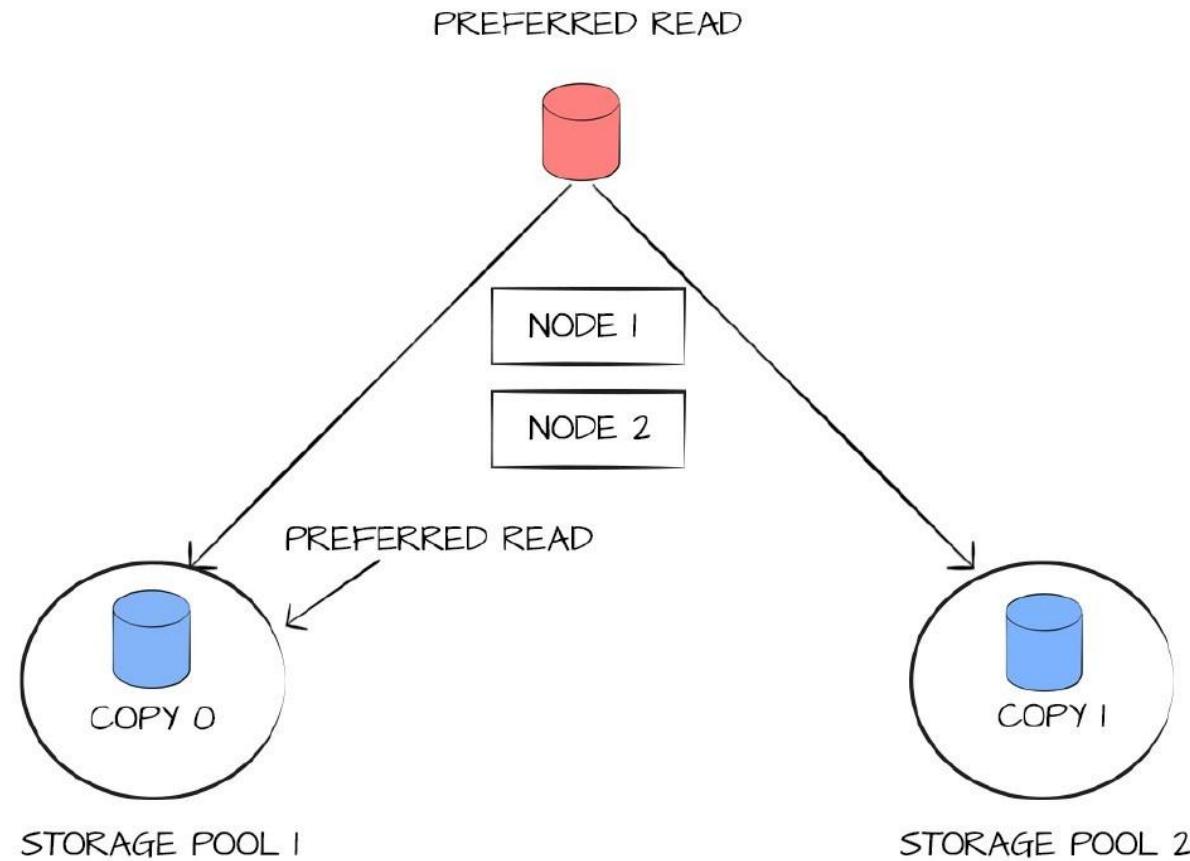
VIRTUALIZATION - STRETCHED CLUSTER

IBM confidential



VIRTUALIZATION - STRETCHED CLUSTER

IBM confidential



VIRTUALIZATION - PREFERRED READ

IBM confidential



THANK YOU !