

HUS-VM AND VSP 5 WAY BALANCING

HDS ACCOUNT TEAM
10/10/2013

VIRTUALIZATION GLOBAL TECHNOLOGY VALUE
INNOVATE FLEXIBILITY DISCOVER CONNECTED
SUCCESS PARTNER SCALE CONVERGED SOCIAL

1. Five Way Balancing Overview
2. Pros / Cons on Five Way Balancing
3. Use cases and Live examples
4. Q & A

- It's the way how to design your array to be deployed and Balancing is done at 5 different levels
 - By Capacity (TB per port)
 - By LDEV/Lun Count (per port)
 - By Host Count (per port)
 - By Port IOPS / xfer rate (per port)
 - By VSD (per VSD)
- 3 Way Balancing
- + addl 2 Way Balancing
- How it works:
 - Simple planning and round robin assignment of Capacity , LDEV and Host – new arrays
 - Script to report current and proposed 3 way balance for existing arrays

- If the array has 200 TB in total usable and if you planned to use 10 Pair of front end ports or max of 20 pairs

then
- How it works:
 - Simply divide the 200TB / 10 or 200TB / 20 to get the max capacity per pair of port.
 - In real world you might have different scenarios / requirement – (ex host needs 6 TB)
 - Objective is to get close to this as much as you can and distribute the capacity equally from day one.
 - Plan ahead and this is more disciplined approach

- If the array has 3000 LDEV in total and if you planned to use 10 Pair of front end ports or max of 20 pairs

then
- How it works:
 - Simply divide the $3000 / 10$ or $3000 / 20$ to get the max Lun count per pair of port.
 - In real world you might have different scenarios / requirement (ex – one host need 10 TB)
 - Objective is to get close to this as much as you can and distribute the Lun Count equally from day one.
 - Plan ahead and more disciplined approach

- If the array has 100 hosts in total and if you planned to use 10 Pair of front end ports or max of 20 pairs

then

- How it works:
 - Simply divide the $100 / 10$ or $100 / 20$ to get the max Lun count per pair of port.
 - In real world you might have different scenarios / requirement (ex – host with 4 / 8 hba's)
 - Objective is to get close to this as much as you can and distribute the Host count equally from day one.
 - Plan ahead and more disciplined approach

- Problem
 - Ports are not balanced by Capacity
 - One pair having 40 TB mapped
 - another pair is mapped with just with 10 TB
 - Does Capacity means IOPS?
- Main Benefits:
 - Capacity = IOPS is “YES” and “NO” answer
 - If “YES” you are balancing the workload
 - If “NO” again it is no harm in balancing the Capacity
 - The Array is Optimized with equal capacity balancing
 - Minimize issues during migrations/provisioning

BY CAPACITY – LIVE EXAMPLES

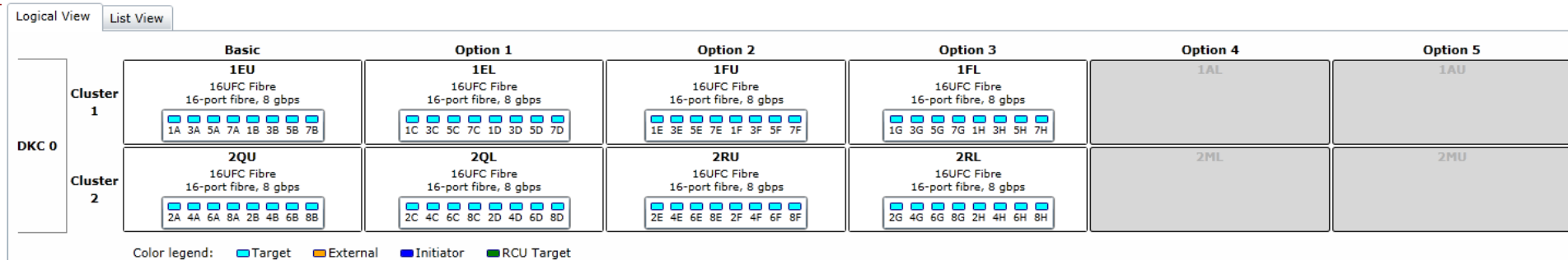
Citigroup Technology, Inc.



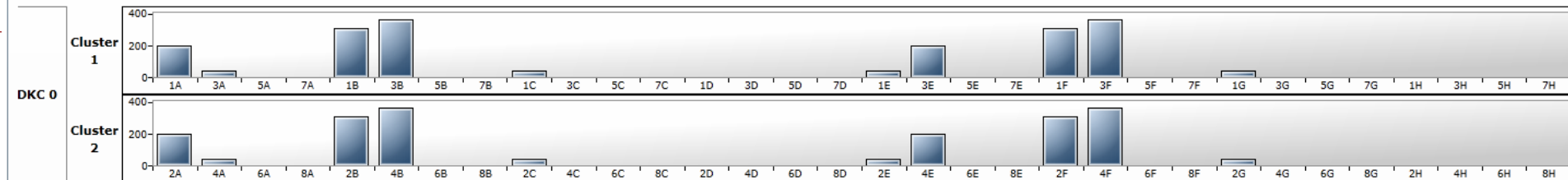
VSP-65592

Aggregate
VSP
Information

Port Details



LUN Distribution



- ☐ Total Capacity → 218 TB usable
- ☐ Ports in Use → 20 (10 pairs)
- ☐ Port 1A/2A mapped → 39 TB
- ☐ Port 1B/2B mapped → 10 TB
- ☐ Do you like to see the array configured or used this way?
- ☐ Do you like to see how all the other arrays configured?
- ☐ Do you think it as a Problem? or asking for problem in future?
- ☐ Do you think the above configuration is optimized or best use of resources?

- Problem
 - Ports are not balanced by LDEV/Lun Count
 - example Port 1A/2A mapped 750 LDEV/Luns
 - another pair is mapped with just 200 LDEV/Luns
 - Does LDEV count is a problem?
- Main Benefits:
 - LDEV Count = IOPS = QDepth is YES and NO
 - If “YES” you are balancing the workload
 - If “NO” no harm in balancing the LDEV’s by Port
 - The Array is Optimized with equal Ldev count balancing
 - Minimize issues during migrations/provisioning

BY LDEV/LUN COUNT – LIVE EXAMPLES

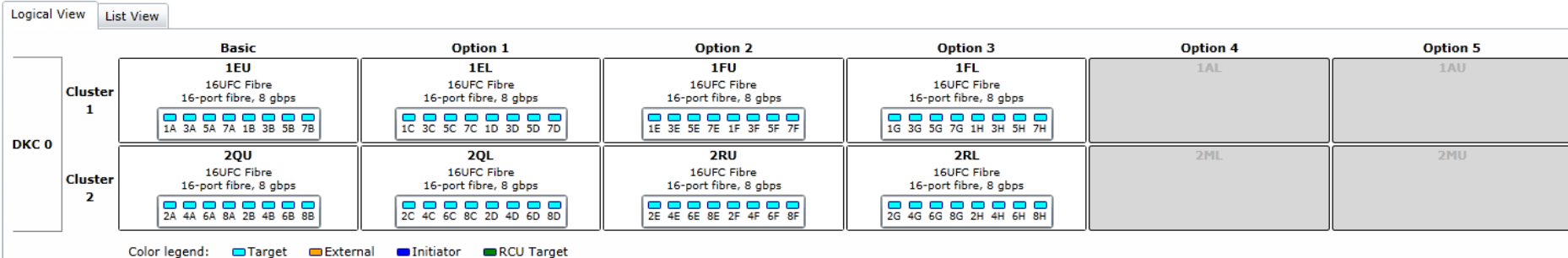
Citigroup Technology, Inc.



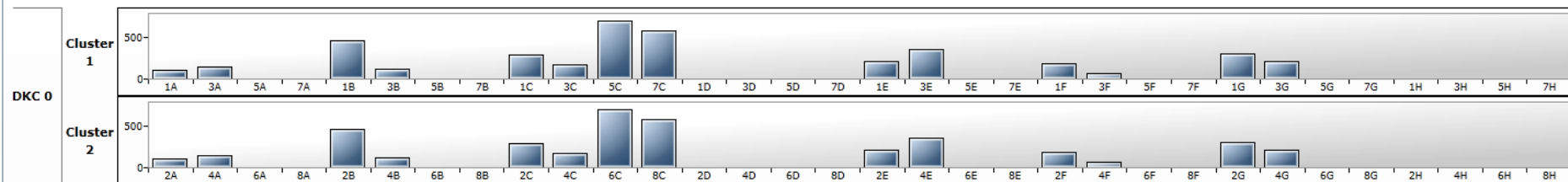
VSP-53562

Aggregate
VSP
Information

Port Details



LUN Distribution



- ☐ Total Ports → 64 (32 pairs)
 - ☐ Ports in Use → 28 (14 pairs)
 - ☐ Idle or Ports not in use → 36 (16 pairs)
 - ☐ Do you like to see the array configured or used this way?
 - ☐ Do you like to see how all the array configured?
 - ☐ Do you think it as a Problem?
 - ☐ Do you think the above configuration is optimized or best use of resources?
- Port 5C /6C → 700
Port 1A/2A → <100 Luns

- Problem
 - Ports are not balanced by Host Count
 - example port 1A/2A mapped with 72 servers
 - another port is just mapped with 20 servers / Host groups
- Main Benefits:
 - Host Count = IOPS = FANIN:FANOUT ratio
 - If “YES” you are balancing the workload
 - If “NO” no harm in balancing the Host Count by Port
 - The Array is Optimized with equal number of Host across Front End Ports
 - Minimize issues during migrations/provisioning

BY HOST COUNT – LIVE EXAMPLES

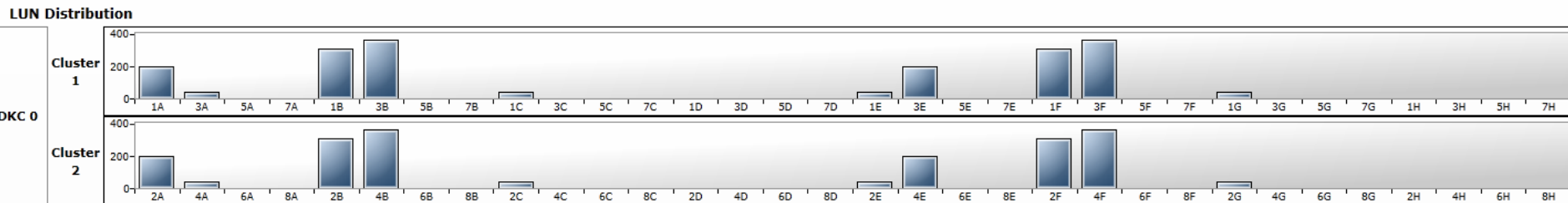
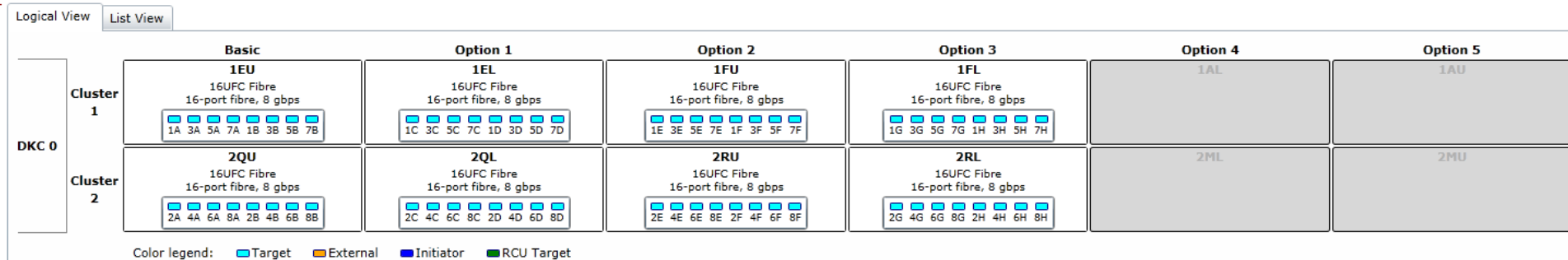
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VSP-65592

Aggregate
VSP
Information

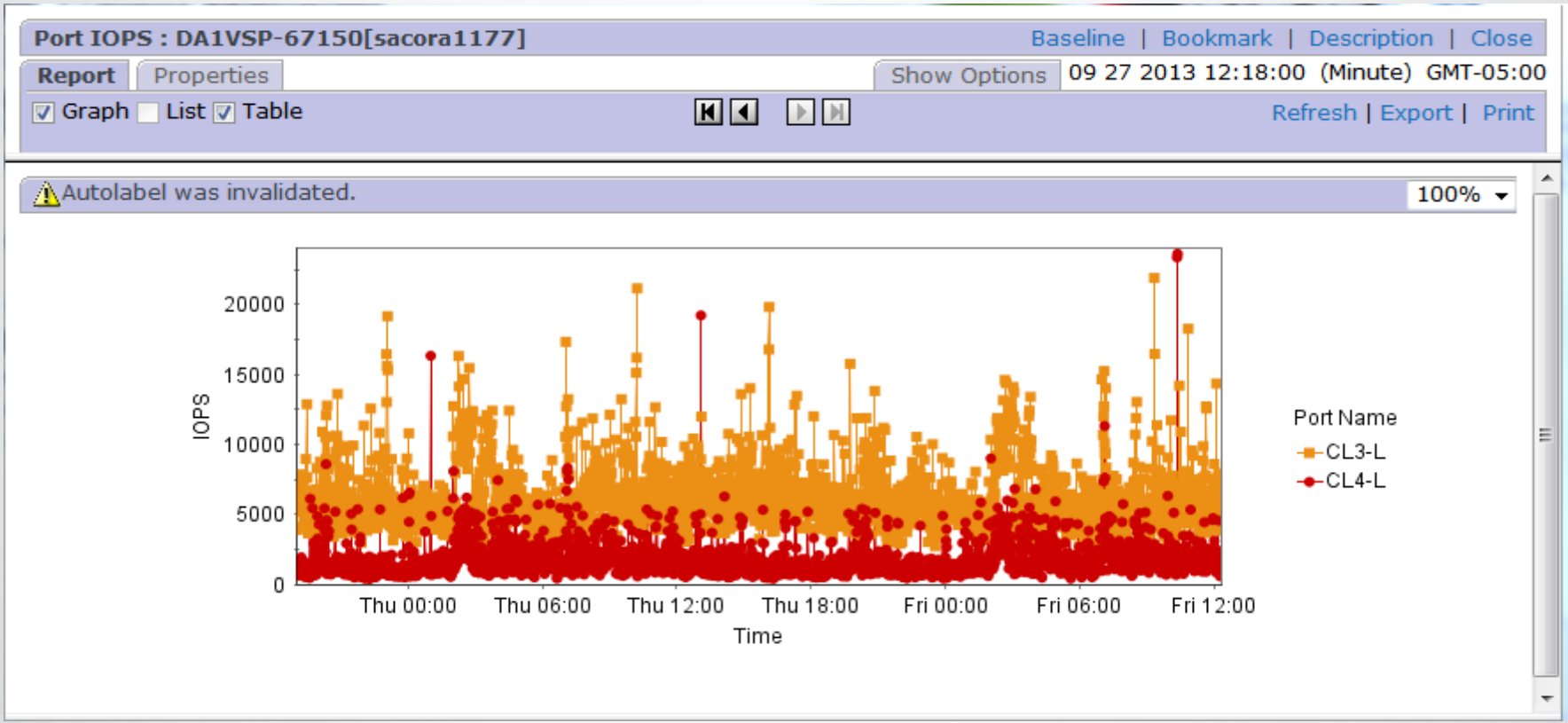
Port Details



- ☐ Ports in Use → 20 (10 pairs)
- ☐ Port 1A – 2 host groups , port 1B → 5 host groups , port 1C – 6 host groups
- ☐ Do you like to see the array configured or used this way?
- ☐ Do you like to see how all the array configured?
- ☐ Do you think it as a Problem?
- ☐ Do you think the above configuration is optimized or best use of resources?

- Problem
 - Ports are not balanced by IOPS
 - example port 1A/2A doing 10000 IOPS and 800 MB/s
 - another pair is just doing 3000 IOPS and 120 MB/s
- Main Benefits:
 - Host Count = IOPS = FANIN:FANOUT ratio
 - If “YES” you are balancing the workload
 - If “NO” no harm in balancing the Host Count by Port
 - The Array is Optimized with equal number of Host across Front End Ports
 - Minimize issues during migrations/provisioning

BY PORT IOPS/XFER RATE – LIVE EXAMPLES

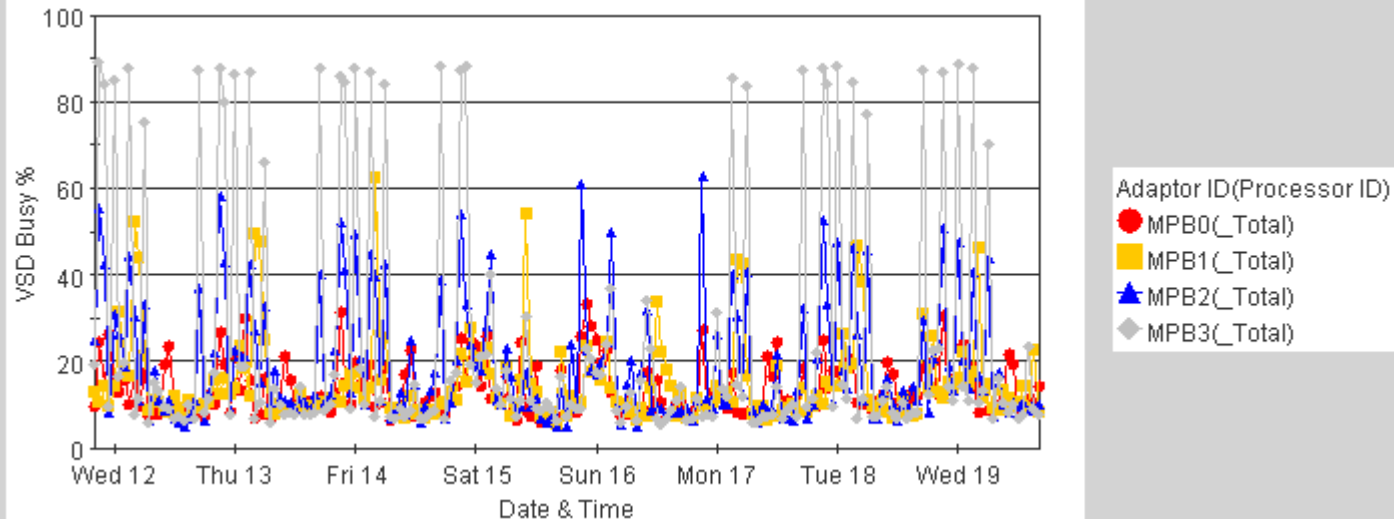


- CITI VSP-HUSVM Reports
 - 1. Cache
 - 2. Front End Port
 - FED Details (Tabular)
 - FED Port Details (Tabular)
 - Port IOPS
 - Port Transfer

The above is just an example to show the sample report

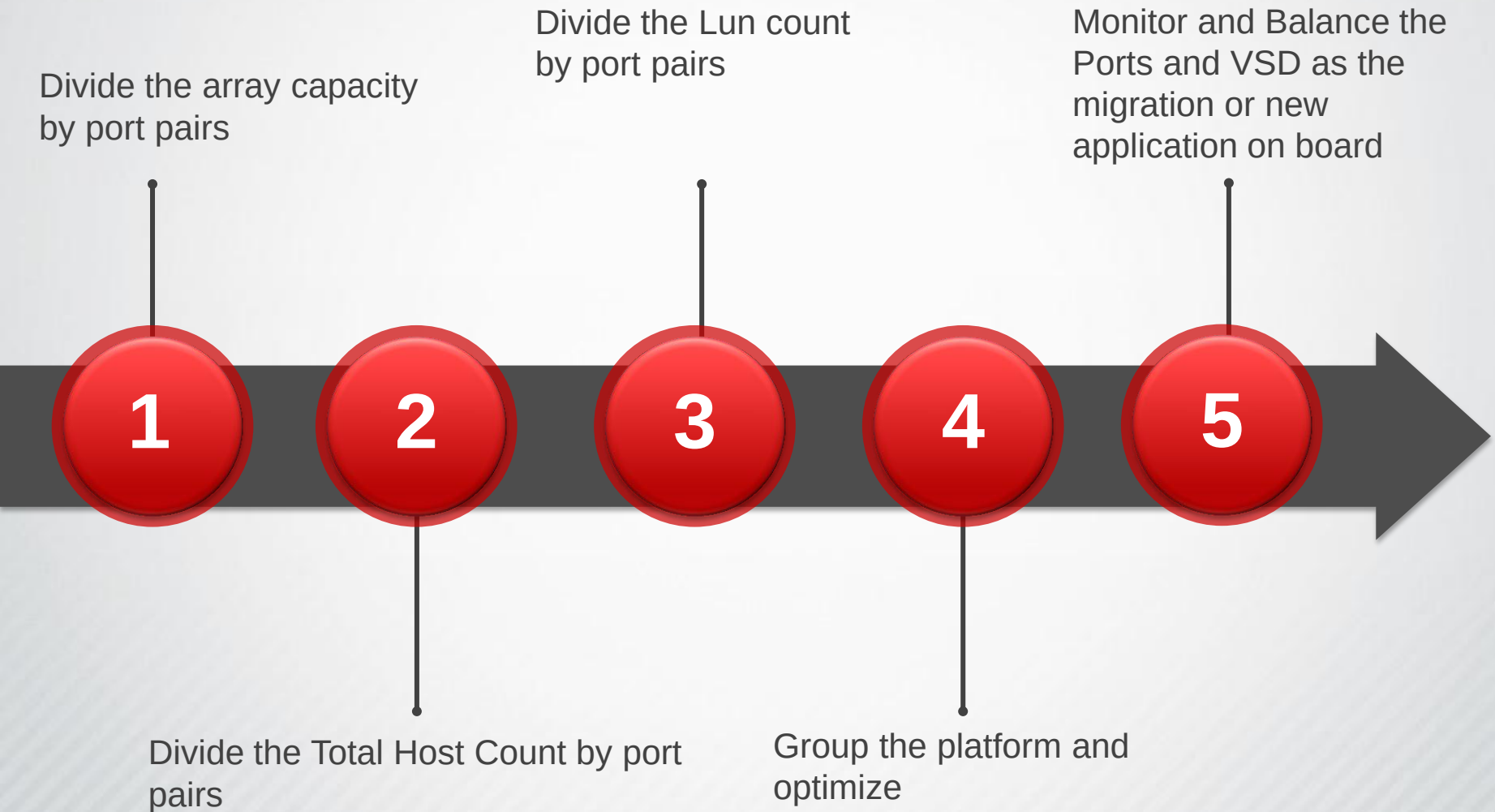
- Problem
 - VSD's are not balanced by workload
 - the above three balancing is by count and not necessarily the work load balance
 - just one VSD is running at 80% busy sustained
- Main Benefits:
 - VSD balancing = workload balancing
 - Proactive measures to avoid performance issues due to VSD
 - Proactive measures during VSD failover scenario or VSD failure
 - Minimize issues during migrations/provisioning

BY VSD BALANCING – LIVE EXAMPLES



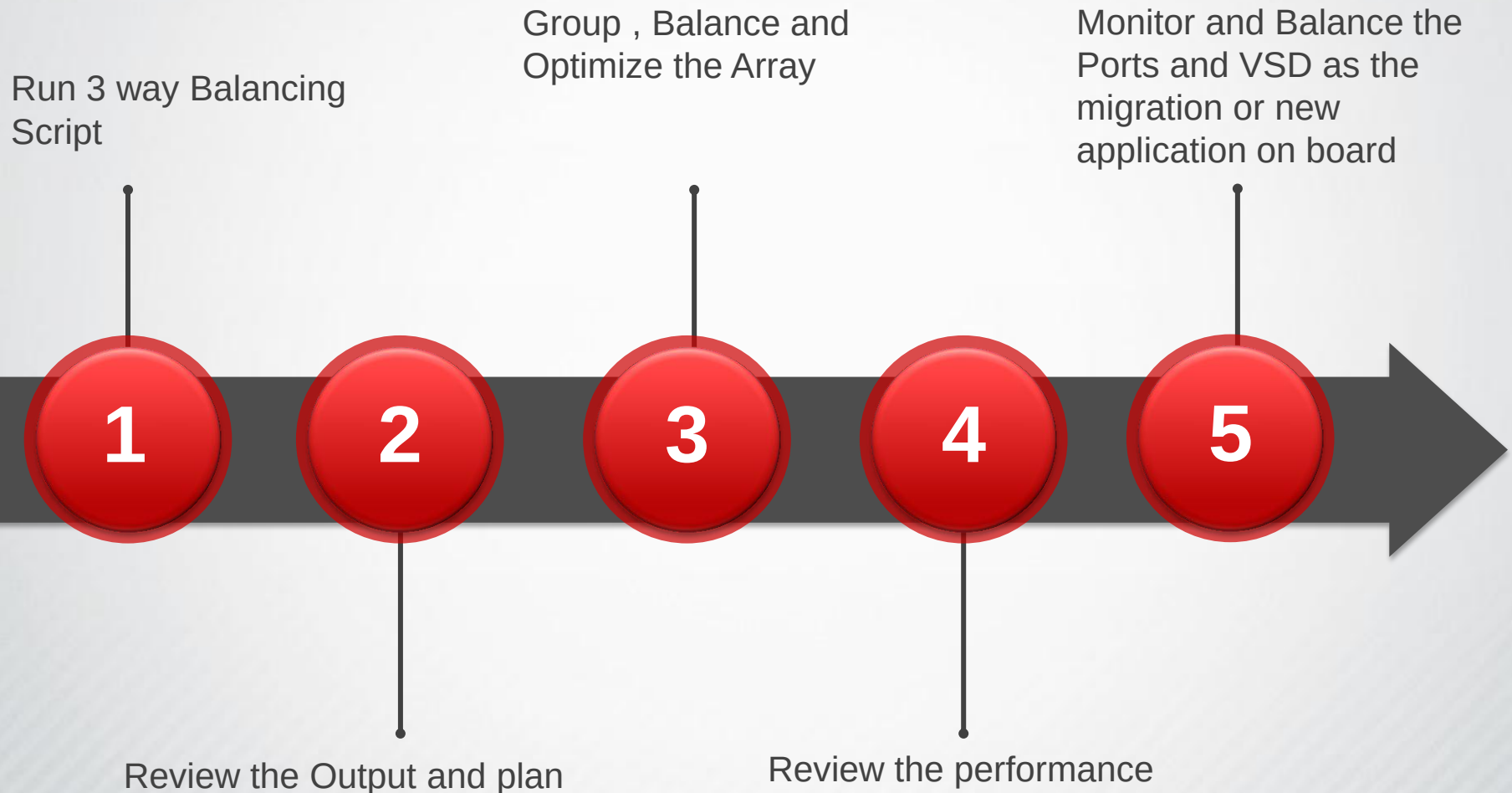
- ☐ Total VSDs → 4 (2 Pairs)
- ☐ MPB 3 is out of balance as seen above
- ☐ Do you like to see the array configured or used this way?
- ☐ Do you like to see how all the array configured?
- ☐ Do you think it as a Problem?
- ☐ Do you think the above configuration is optimized or best use of resources?

5 WAY WORK FLOW FOR NEW ARRAY



Hard if you are doing for first time. But will become like child's play moving forward.

WORK FLOW FOR EXISTING ARRAY



Hard if you are doing for first time. But will become like child's play moving forward.

- Background
 - Using Native Tuning Manager MC and Performance Reporter
 - Using TMEA Port IOPS/xfer Rate Report
- Main Benefits:
 - Proactive Monitoring and optimized use of resources
 - Storage expertise NOT needed
 - Array Optimized for best performance
 - Minimize issues during migrations/provisioning
 - Avoid Q Depth Issues

- Background
 - Using Native Tuning Manager MC and Performance Reporter
 - Using TMEA Top 20 LDEV per VSD report
- Main Benefits:
 - Proactive Monitoring and optimized use of resources
 - Storage expertise NOT needed
 - Array Optimized for best performance
 - Minimize issues during migrations/provisioning
 - Avoid the unforeseen performance issues

- ❑ Simple Round Robin strategy
- ❑ Identify the bottlenecks easily
- ❑ avoid the VSP / HUS VM Q-Depth Issues in advance
- ❑ Performance is always optimized.
- ❑ very well disciplined approach
- ❑ VSDs can do more workload
- ❑ Have confidence when you provision
- ❑ Scripted solution for existing arrays

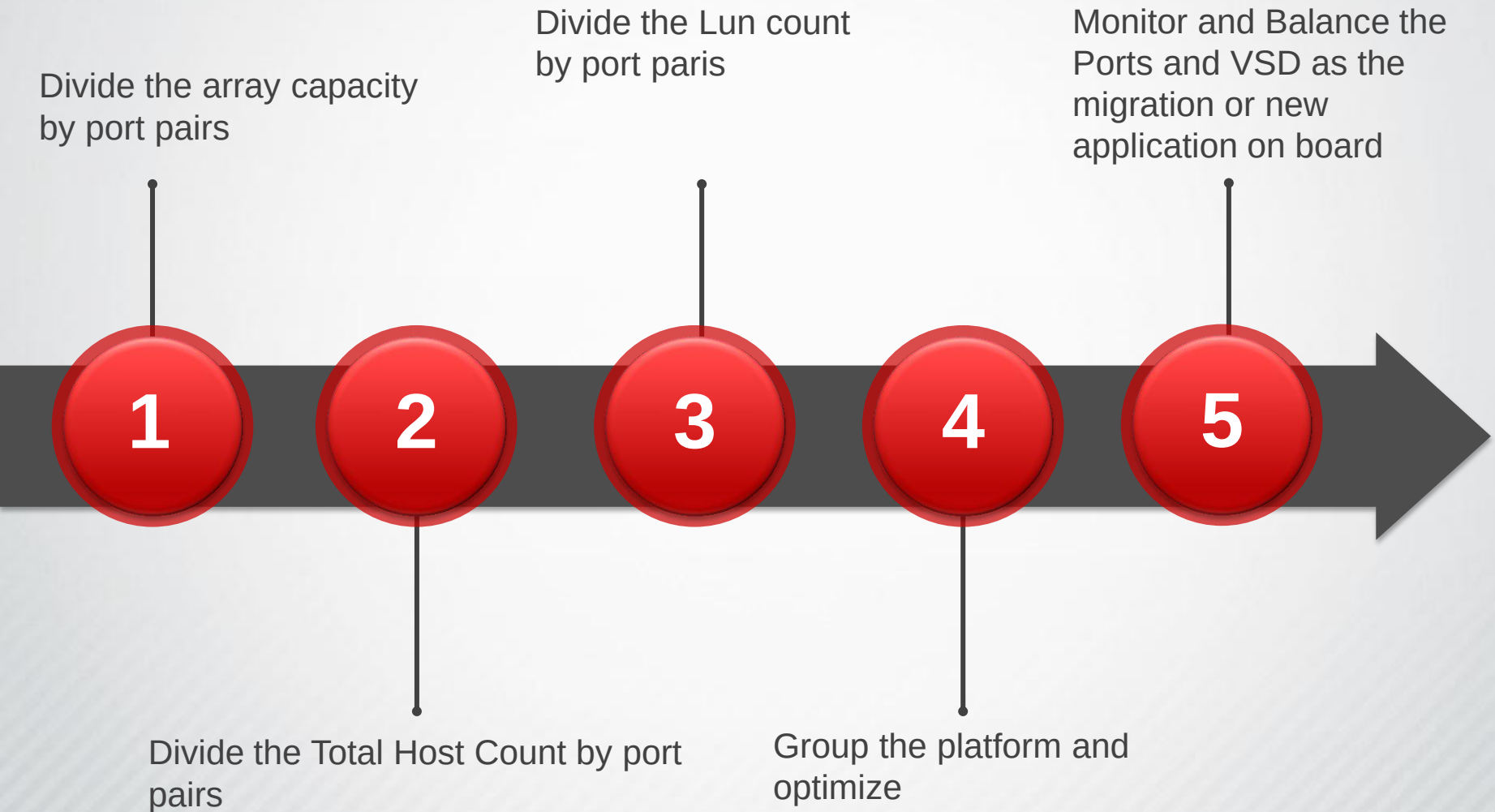
Get the most out of your arrays by doing 5 way balancing

My app performance is terrible, it's a storage problem !

- ☐ unlikely. Because of 5 way balancing
- ☐ easy to see the workload increase
- ☐ no Q-Depth issue
- ☐ This is all about planning
- ☐ know your array better than anyone else workload..

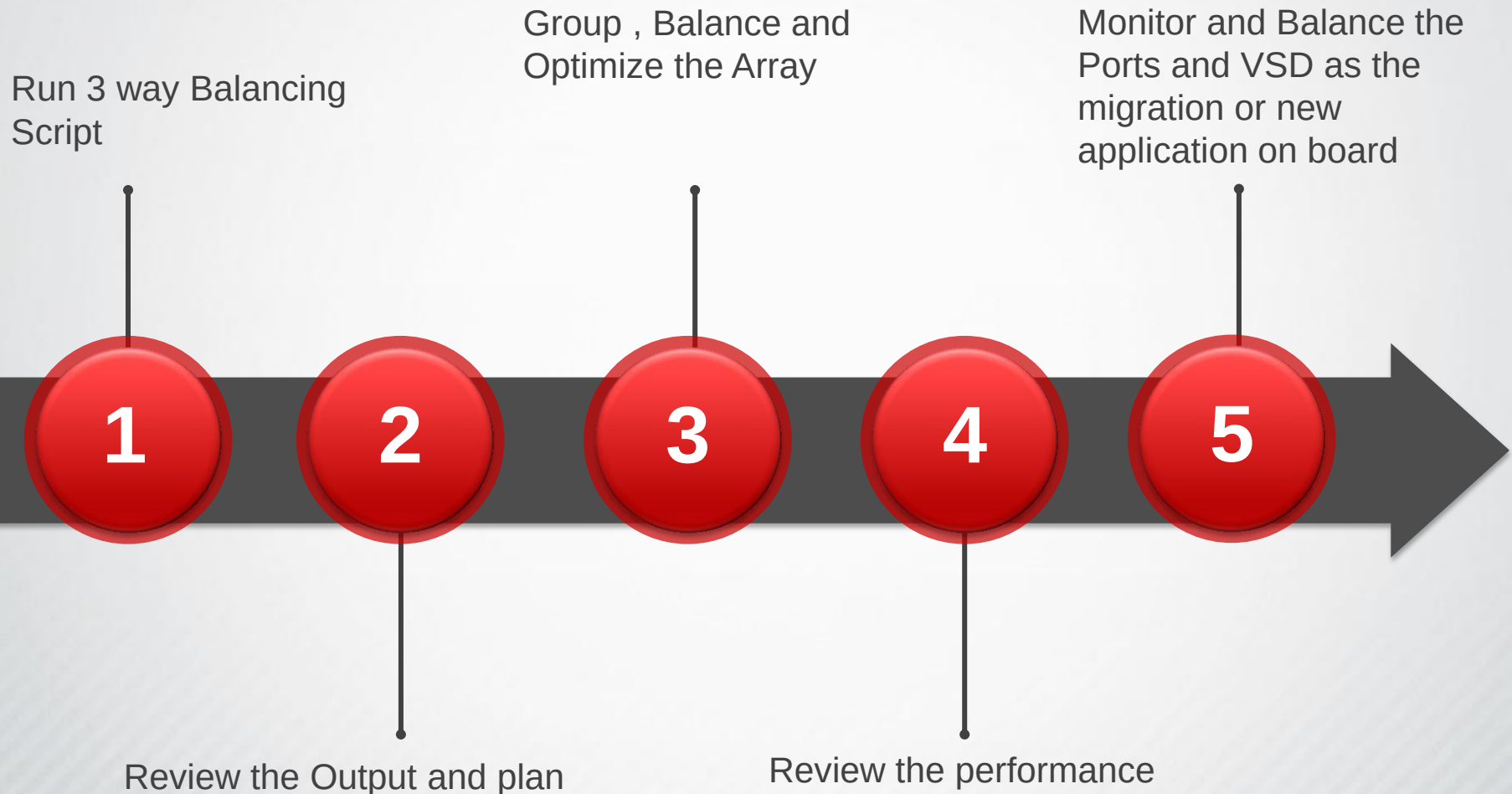
Be confident about your array and provisioning

WORK FLOW FOR NEW ARRAY



Hard if you are doing it for first time. But will become like child's play moving forward.

WORK FLOW FOR EXISTING ARRAY



Hard if you are doing it for first time. But will become like child's play moving forward.

SAMPLE MOCKUP OF SCRIPT OUTPUT

----- 3 Way Balancing Report – Current -----

Total Pool Capacity in TB = 240

Total Ports in the array = 64

Total DP-VOL Lun Count = 800

Total RCU Target = 4

Total Host Group count = 80

Total Host Target Ports in use = 3

Port	Capacity	Host Count	Lun Count	Port	Capacity	Host Count	Lun Count
1A				2A			
3A				4A			
5A				6A			
7A				8A			

----- 3 Way Balancing Report – Proposed for 32 ports in use -----

Total Capacity per port = $240 / 16 = 15$ TB

Total Luns per Port = $800 / 16 = 50$ Luns

Total Host groups per port = $80 / 16 = 5$ Hosts

----- 3 Way Balancing Report – Proposed for 48 ports in use -----

Total Capacity per port = $240 / 24 = 10$ TB

Total Luns per Port = $800 / 24 = 34$ Luns

Total Host groups per port = $80 / 16 = 3 \sim 4$ Hosts

THANK YOU