SAN-Based Cache with Zero Deployment Downtime
"Data Caching Server (DCS)"

Wayne Lam, CEO
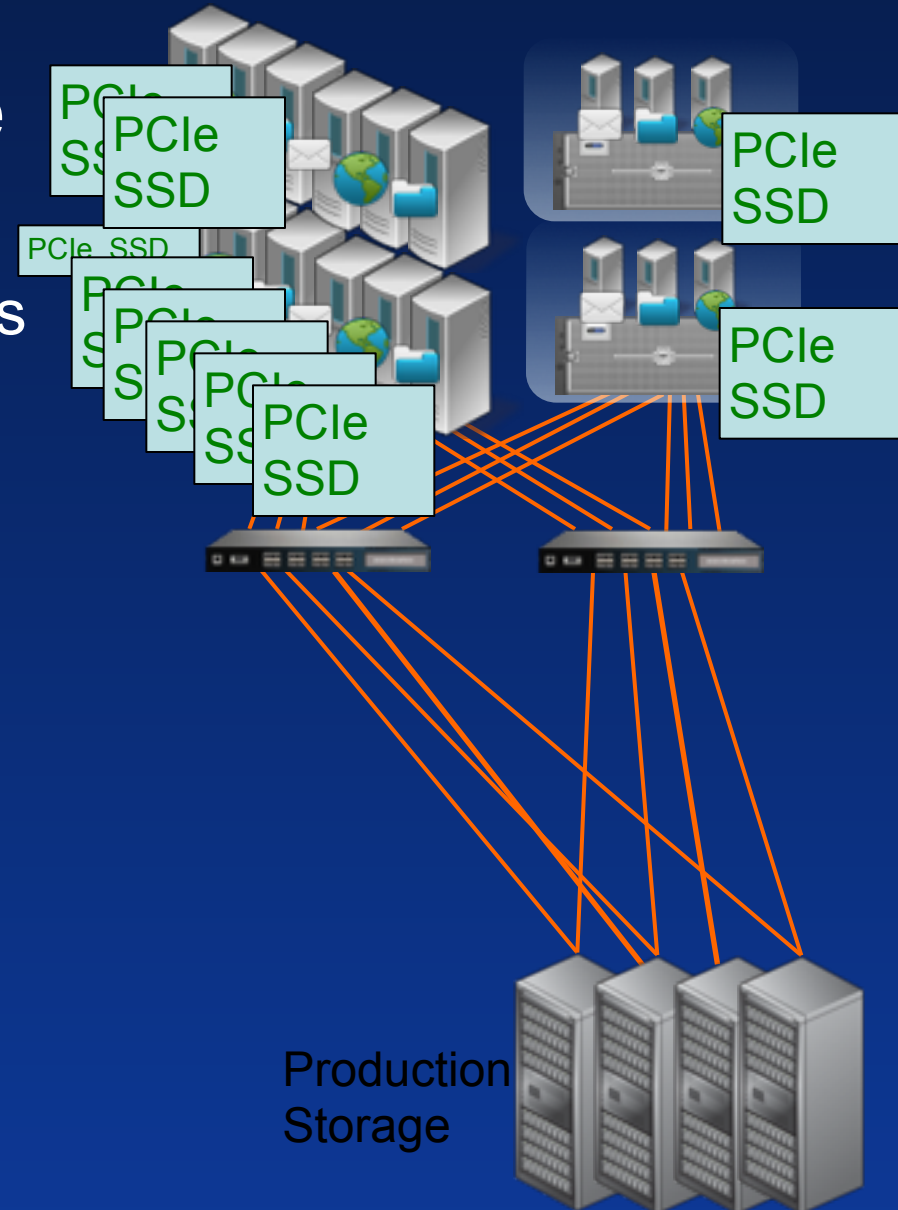
CDS Data Caching Server (DCS)

Plug-and-play SAN-based Cache requiring zero changes.

Deploys in minutes, anytime, no downtime.

Based on our patented technology (TDI) Transparent Datapath Intercept.

Host-side Cache

- The best place to cache in terms of performance
  - local PCIe bus speed delivers best IOPS and MB/s
- Can cache all downstream storage
- Challenges:
  - Down time required
  - Hardware compatibility
  - Limited cluster support

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

PCIe SSD

Production Storage

Storage-side Cache

- Shared by all hosts
  - Cluster friendly
- No work at the host
- No work at the FC switch

- Not shareable by all storage
- Available only for some storage

Production Storage
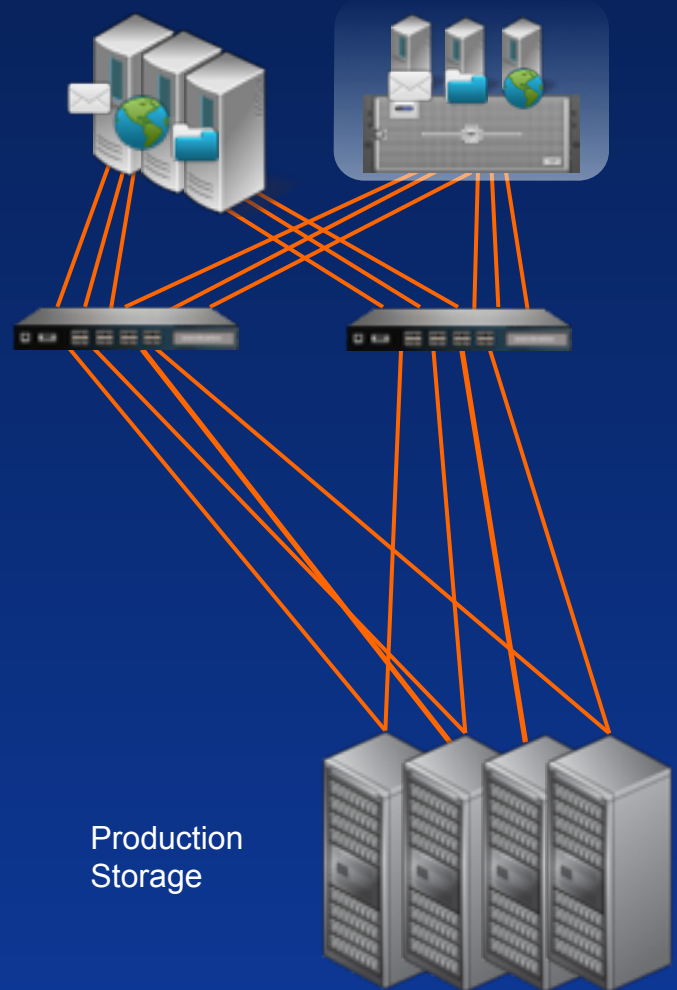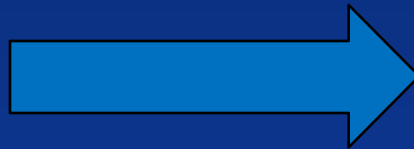
DCS: SAN based Cache

- Best of both world!
- Shared by all hosts and storage
- Requires no changes at the hosts, switch, or storage
- Plug-and-Cache!
- Open architecture
  - Extensible
  - Serviceable
  - Manageable
- What about the Complexity and Risks of In-band Appliances?

DRAM

PCIe SSD

DR

PCIe SSD

PCIe SSD

PCIe SSD

Exte... Enclosures

Production Storage
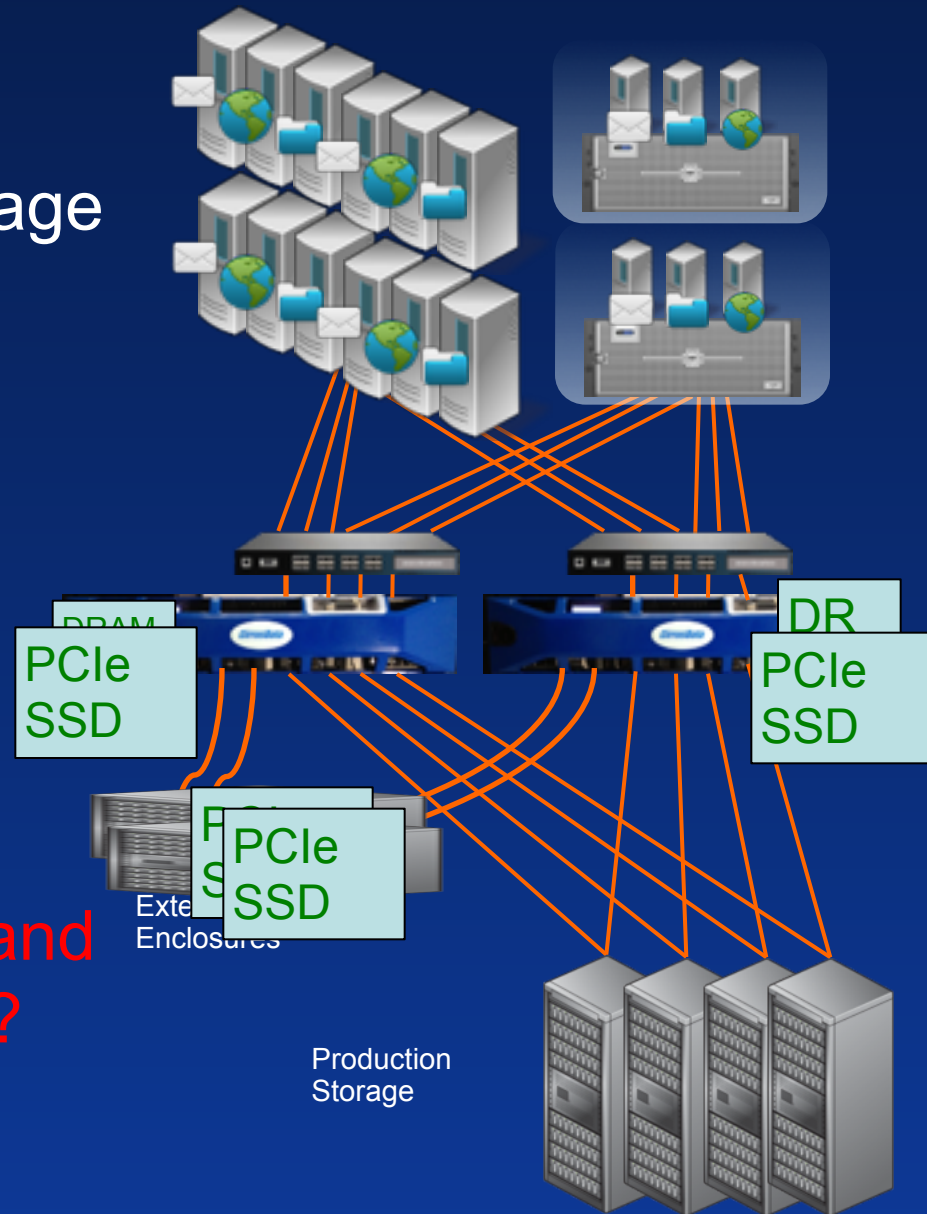
DCS: Transparent Data Intercept

- Patented Transparent Data Intercept (TDI) allows for Zero Change, plug-and-play deployment of DCS in the SAN
- Paths are inserted one at a time, 5 seconds per path.
- DCS auto-detects everything.
- Eliminates all the work and risk associated with In-band.

DRAM

PCIe SSD

DRAM

PCIe SSD

PCIe SSD

PCIe SSD

External Enclosures

Production Storage
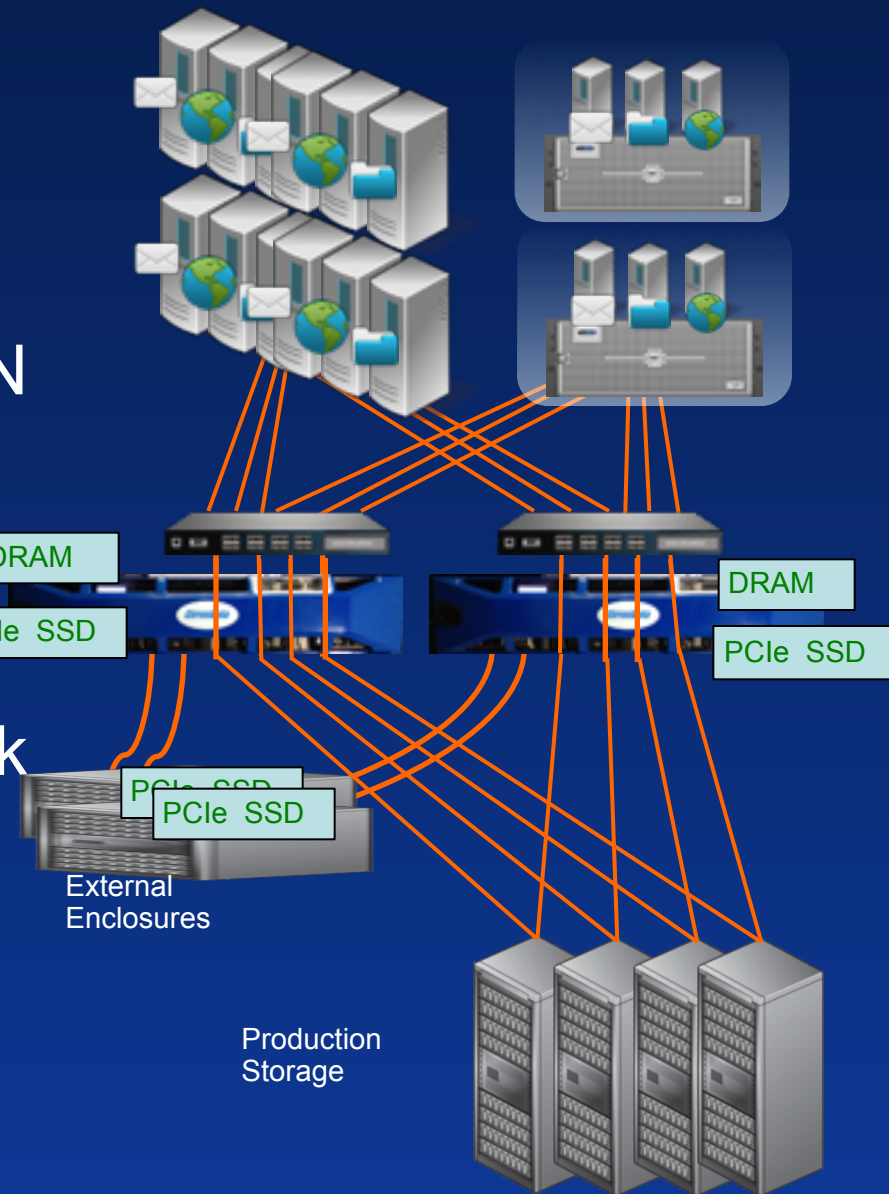
Appliance based on TDI

- CDS DCS appliance is built on patented Transparent Data Intercept (TDI) technology

  - **Zero downtime** data path insertion: just plug it in!

  - **Zero reconfiguration** of hosts, FC Switch zones, and Storage

  - **Plug and Play integration** to live production environment

  - **Auto Discovery:** Hosts, Storage Targets, Disks, FC Switches, and the entire SAN topology.

  - **I/O Tracking:** All I/O activities and performance data are tracked, with reports made available for analysis.
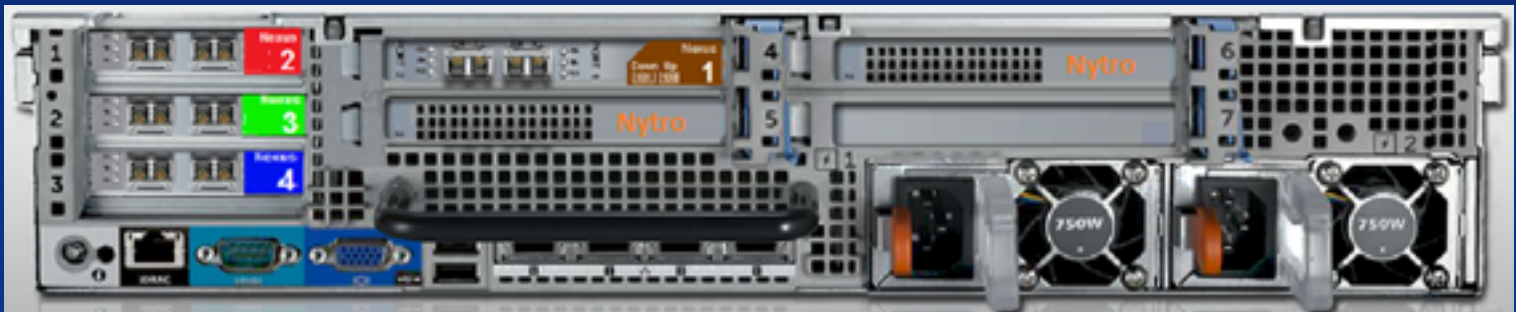
DCS-4000 with: 512GB DRAM, 8 8Gbps FC Ports, 4xGbe Ethernet Ports, 2x3.2TB LSI Nytro WarpDrive. Up to 3GB/s and 2M IOPS .

DCS: Cache Resources

- Manages one or more Pools of:
  - PCIe SSD in-box
  - PCIe Attached SSD Enclosure
  - SAS-Attached SSD
  - RAID with 2.5"/3.5" SSD
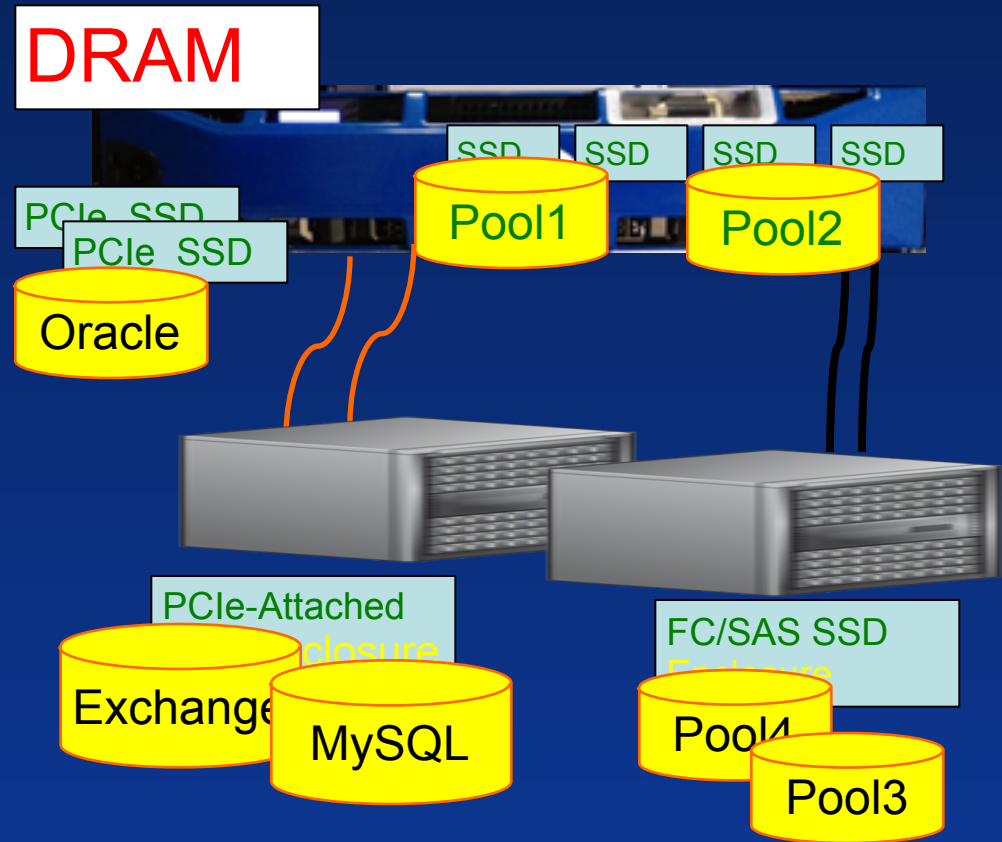- Built-in DRAM is also available as first-tier cache resource

DRAM

SSD   SSD   SSD   SSD

PCIe SSD

PCIe SSD

PCIe-Attached
SSD Enclosure

SAS/FC SSD
Enclosure
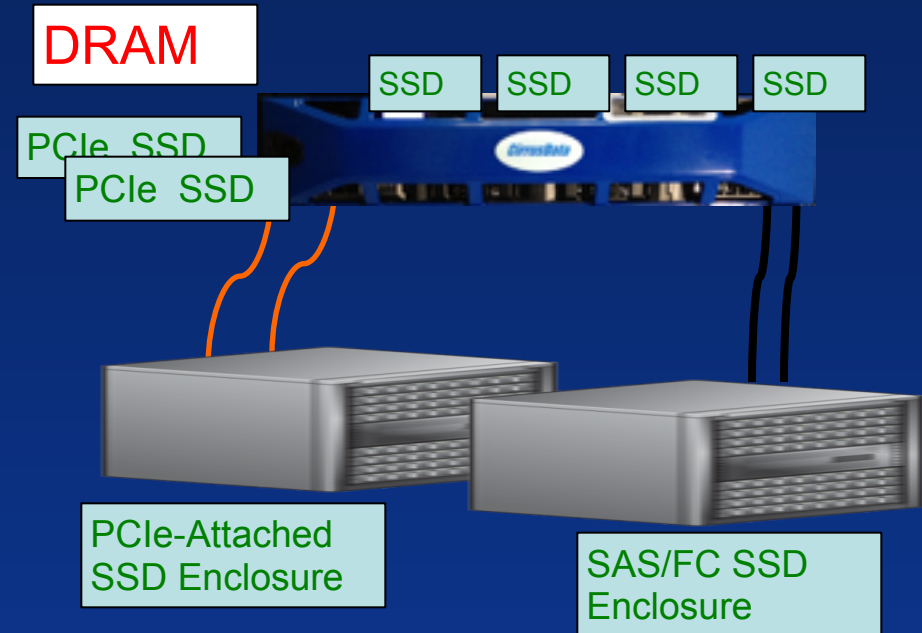
Pool-based Resource Management

Available Cache Resources are organized into Pools (Resource Groups)

- By performance characteristics
- By hosts
- By storage
- By application

DRAM

SSD SSD SSD SSD

PCIe SSD
PCIe SSD

Pool1

Pool2

Oracle

PCIe-Attached
Enclosure

FC/SAS SSD
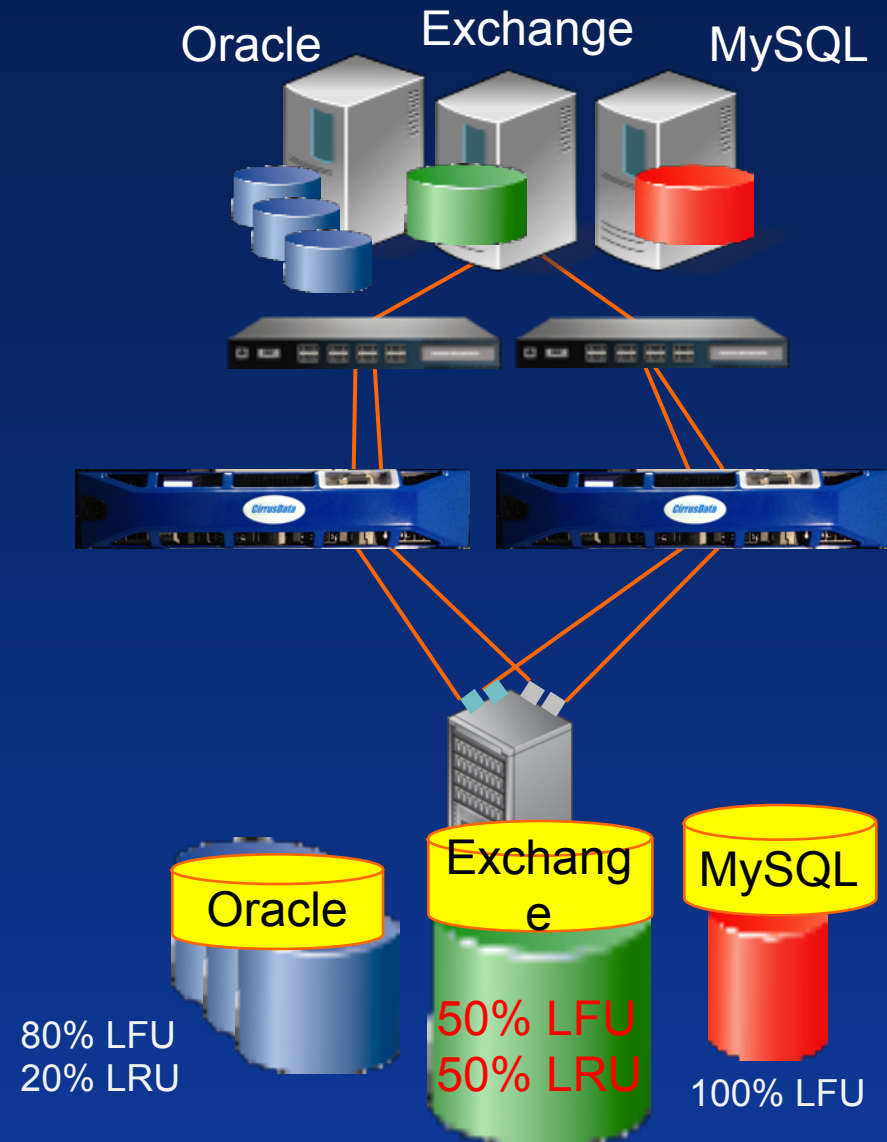Enclosure

Exchange

MySQL

Pool4

Pool3

DCS Cache Policy

- Create Cache Policies for one or multiple application LUNS
  - Sets of Application LUNs
  - Assigned to Resource Group (Pool)
  - LUNs in a pool share the Cache resources automatically.
  - Busy LUNs are given more cache automatically.
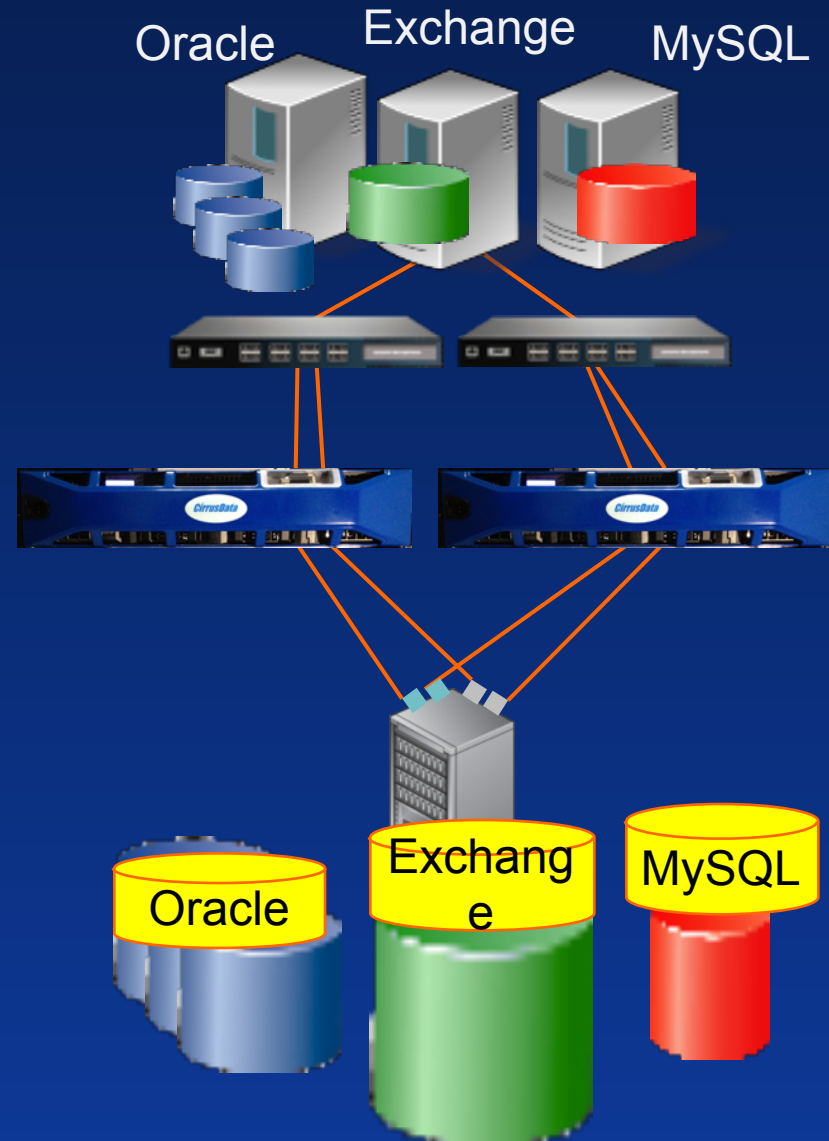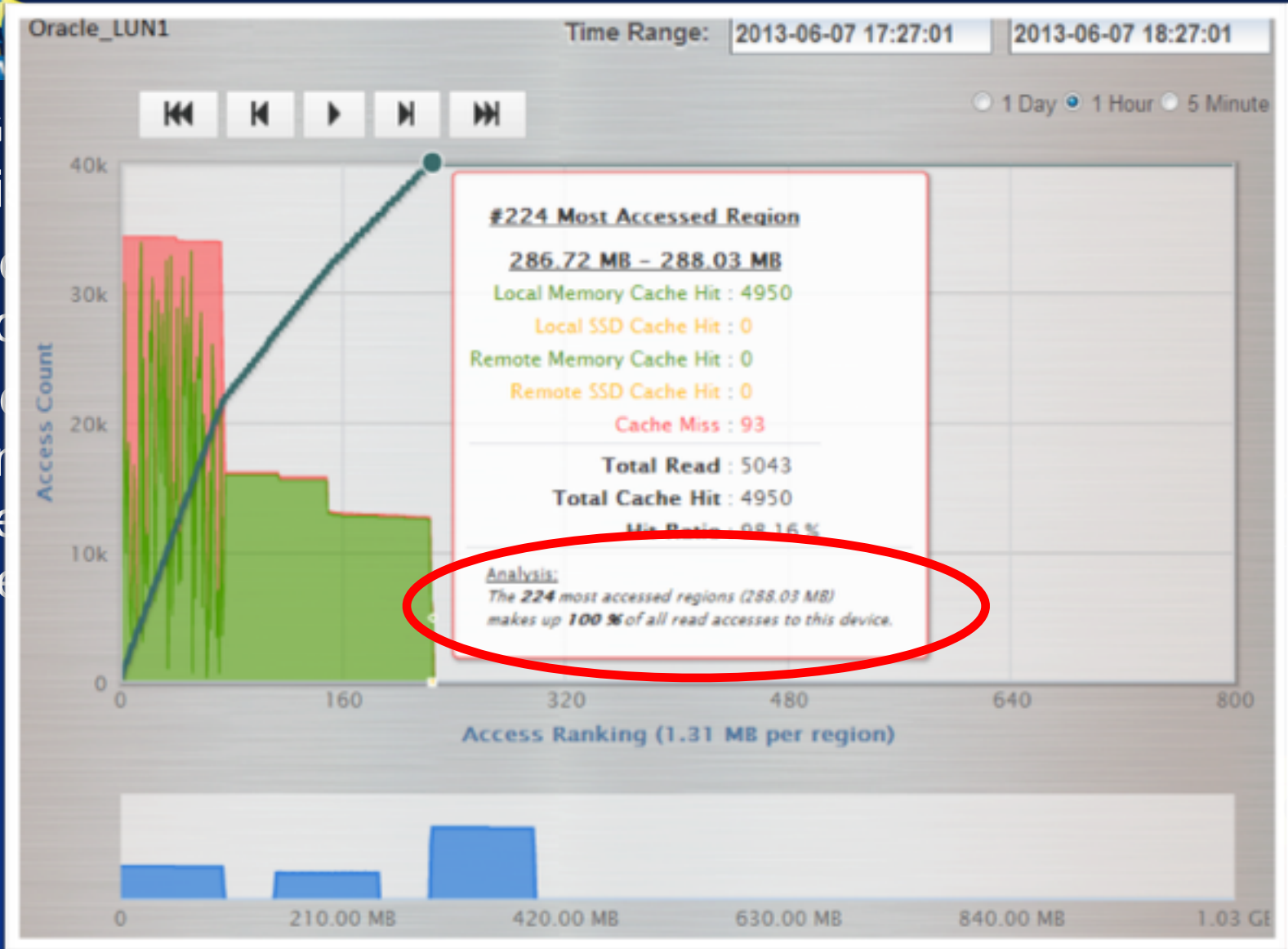
Built-in Analyzer Quantifies Cache Requirements

- Granular tracking of all disk access
- Sort by frequency of access
- Accurate estimation of amount of Cache Storage needed to hold x% of frequently hot blocks

Oracle   Exchange   MySQL

Oracle   Exchange   MySQL

80% LFU
20% LRU

50% LFU
50% LRU

100% LFU

Built-in Analyzer Quantifies Cache Requirements

- G... ...QL
  di...
- S...
  a...
- A...
  an...
  ne...
  fre...

DCS Use Cases

- Immediate remediation to storage performance problems
  - Just plug it in: the job will complete in 2 hours instead of 12
  - Remove and redeploy to solve another storage issue
  - Do this while application is still running! No downtime needed.
- Permanent Acceleration for legacy storage
  - Prolong life cycle of existing investment
- Storage Performance Analysis
  - Solve storage performance issues while collecting data point for permanent solution

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PCIe SSD

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PCIe SSD

External Enclosures

Production Storage