



## Remote Administration: Extend your Team with Remote Experts

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series

- ▶ The True costs of Storage
- ▶ Segmenting the needs:
  - Reporting
  - Monitoring and Alerting
  - Provisioning
- ▶ Hitachi Data Systems “Service Operations Center” (SOC)
- ▶ Case Studies

# Taking a closer look at Managing costs

Worldwide IT Spending on Hardware, Power and Cooling, and Management/Administration

Spending  
(US\$Bill.)

\$300  
\$250  
\$200  
\$150  
\$100  
\$50  
\$0

- Power and cooling costs
- HW mgmt. and admin costs
- New Hardware spending

Installed Units  
(Mill.)

50  
45  
40  
35  
30  
25  
20  
15  
10  
5  
0

- Better Management: Reduce Operational Costs
- Better Utilization: Reduce Capital Costs

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

→ Operations Expenses, addressed by Professional Services

→ Capex costs reduced by Professional Services



- Administration
  - Provisioning
  - Reporting
  - Trending
  - Planning
  - Tiering
  - Tuning
  - Migrating
  - Securing
  - Destruction
  - ...
- Operational Cost (OPEX)**
- Capital Costs (CAPEX)**

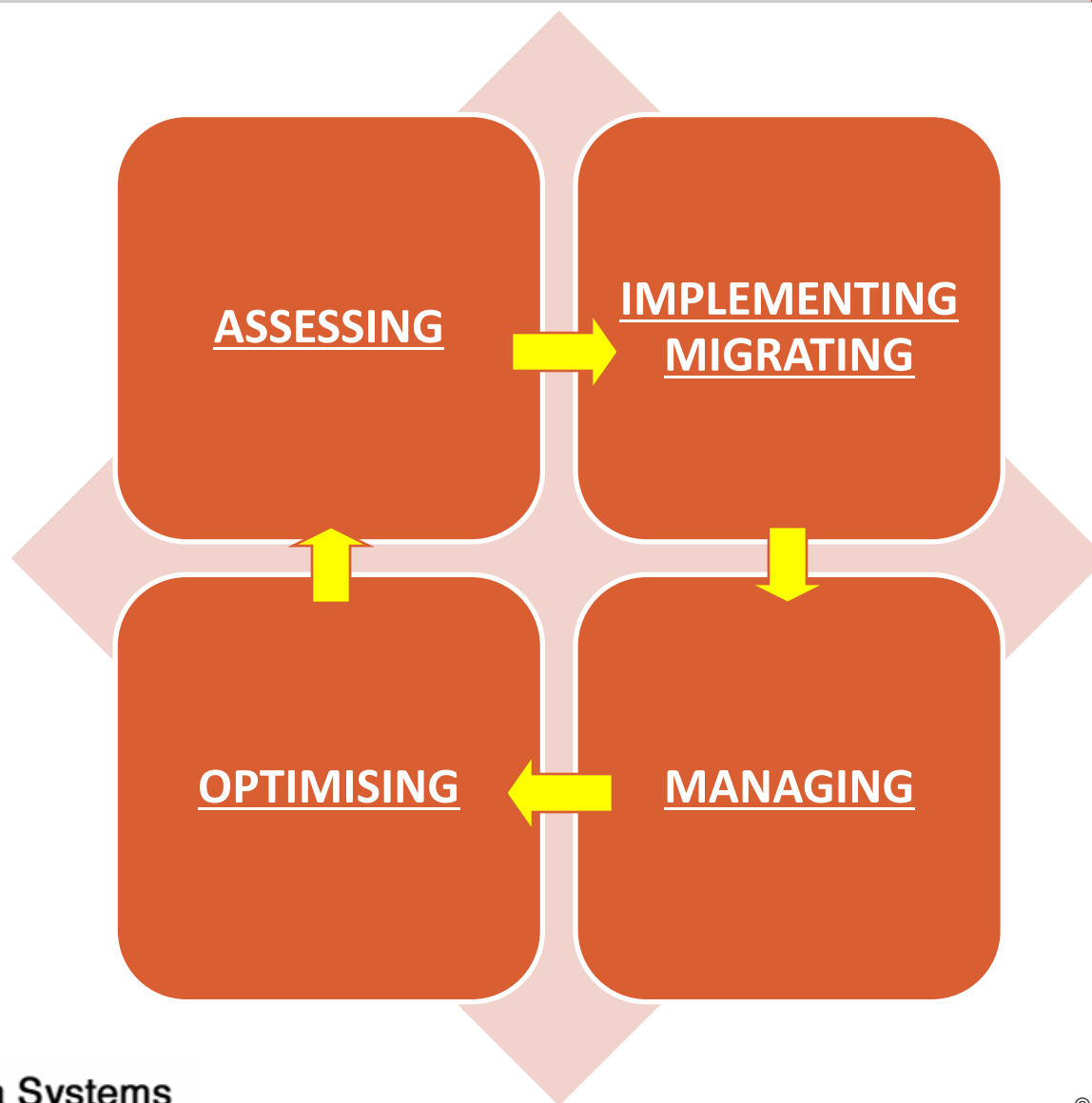
## “Invest in Storage Professional Services, Not More Hardware”

Gartner RAS Core Research Note G00165133, Adam W. Couture, 27 February 2009

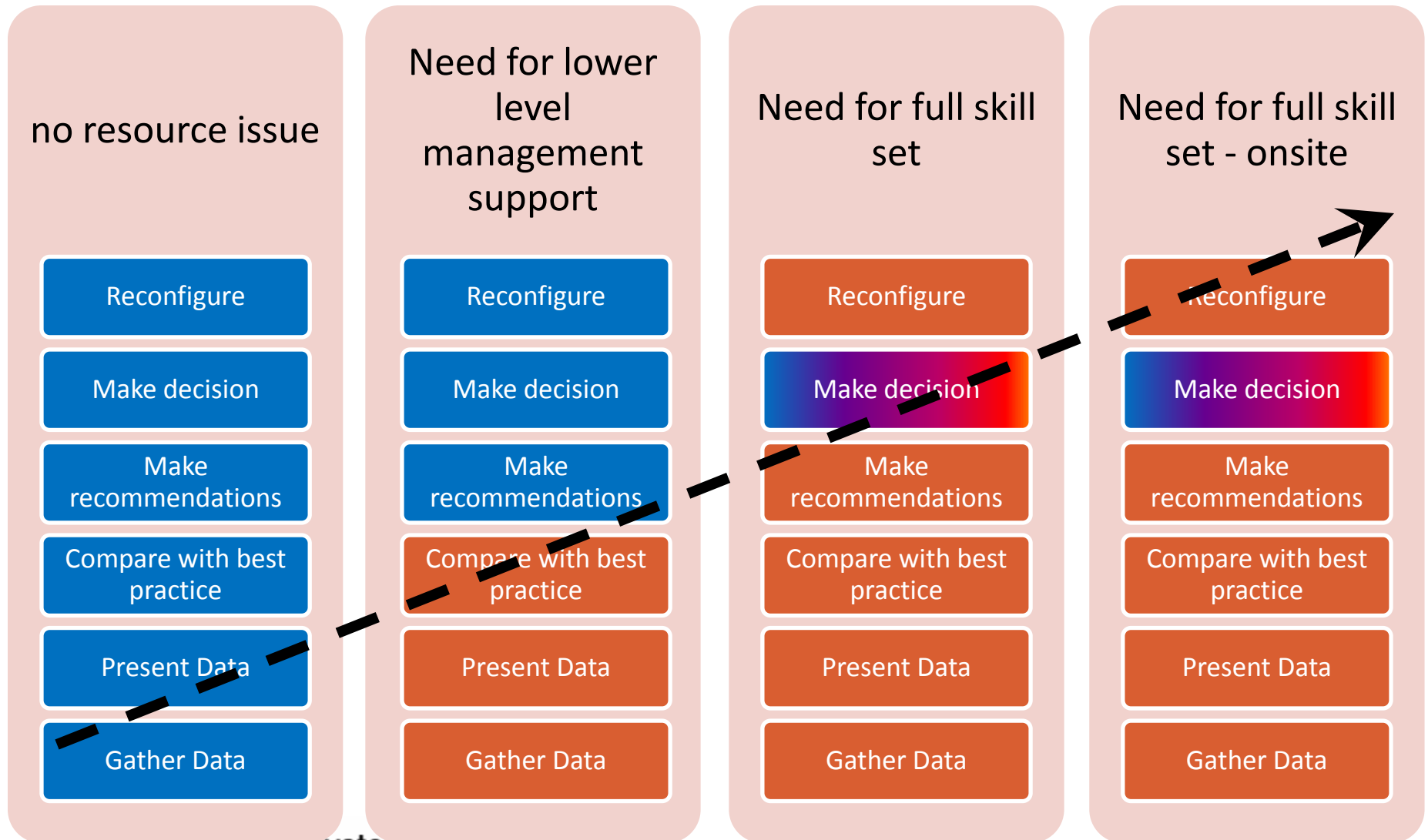
- ▶ “Based on end-user inquiry, Gartner has observed that most storage infrastructure is managed inefficiently.”
- ▶ “By improving storage utilization, IT departments can delay incremental storage acquisitions”
- ▶ “Unless your storage utilization rate is above 70%, immediately begin planning how you can stave off hardware purchases through better storage management”



# What Professional Services Addresses



# The levels of management Needs



- ▶ Provisioning
- ▶ Planning
- ▶ Data Classification/ Tiering
- ▶ Storage Tuning
- ▶ Migrating
- ▶ Replicating
- ▶ Securing
- ▶ Reporting
- ▶ Trending

## Centre of Excellence

- ▶ Staffed by experienced UNIX® and Microsoft® Windows® Storage Administrators
- ▶ Delivering Service Level Agreement led Storage requirements
- ▶ 24/7 continuous storage infrastructure monitoring and alerting
- ▶ Enhanced reporting capabilities (chargeback/utilised versus allocated)

## Hitachi Data Systems Knowledge Base

- ▶ Proven “best practice” processes and procedures for running Hitachi storage
- ▶ ITIL-based support (incident, problem and change)
- ▶ Full access to Hitachi Data Systems technical resources



▶ Remote Reporting

▶ Remote Monitoring & Alerting

▶ Remote Provisioning



# Remote Reporting Service

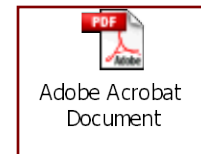
- ▶ provides the real time, end-to-end visibility
- ▶ isolates, identifies and diagnoses
- ▶ performance bottlenecks in the SAN

.....before they impact operations.



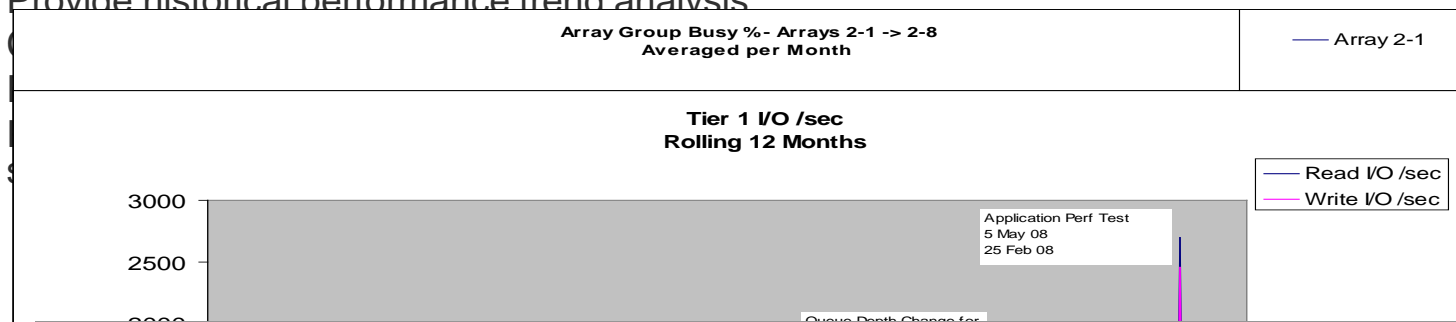
- ▶ **Trending** – Tuning Manager software monitors part or whole aspects of the customer's Hitachi environment, from host storage utilization to front- and back-end port contention, traffic analysis or simple load balancing.
- ▶ **Reporting** – Supplies customized reports, which advise customers on specific aspects of their environment such as performance bottlenecks or future storage management capacity requirements.
- ▶ **Proactive Maintenance** – Addresses host bus adapter firmware and microcode upgrades, compatibility checks, reclaiming of old storage and documentation audits.
- ▶ **ITIL Implementation** – Includes incident management and alerting, capacity, performance, change and release management and service improvement planning.

- ▶ Performance Reporting (using Hitachi Tuning Manager)
  - End to end SAN Performance Reporting to pinpoint potential bottlenecks, highlight historical trends, and provide forecasting for future requirements
  
- ▶ Capacity Reporting
  - SAN Capacity Reports detailing usage (allocated / unallocated) by Tier, trended to forecast future storage requirements
  
- ▶ Configuration Reporting (available now as part of Remote Provisioning)
  - SAN documentation creation and management (e.g. BCD) to enable configuration, audit, compatibility checks, code upgrades etc



Provides SOC with end to end visibility required to

- isolate and diagnose performance bottlenecks within the SAN
- Provide historical performance trend analysis



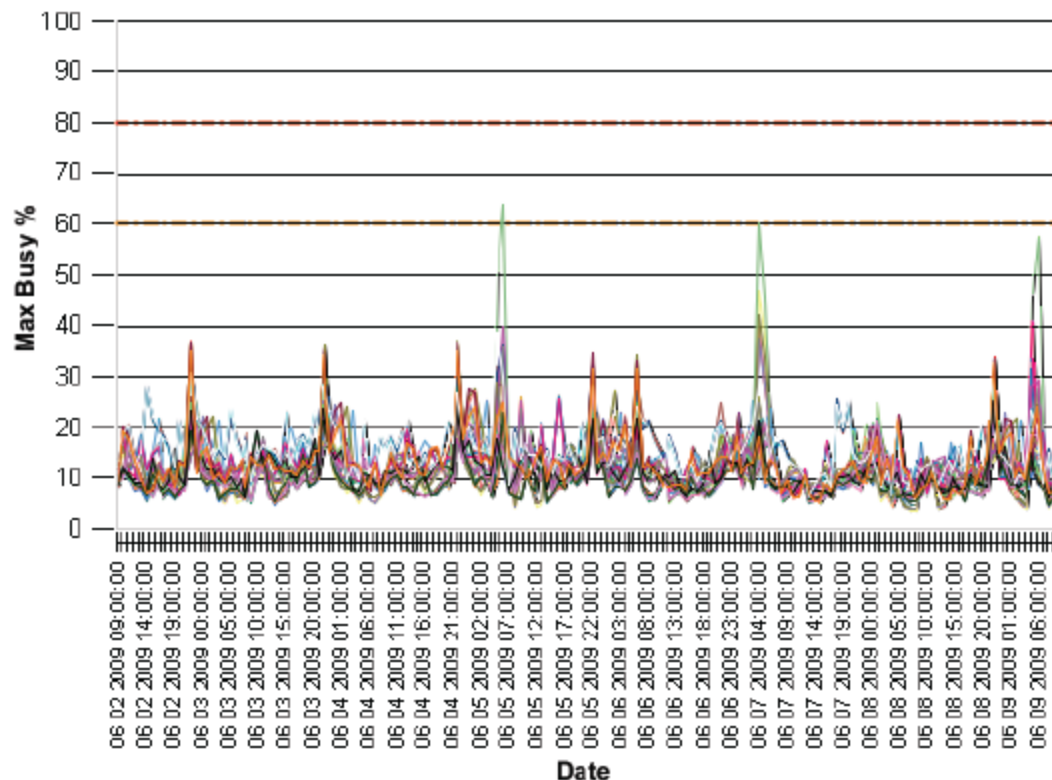
### RAG Status and Recommendations

Report	Description	RAG Status	Comments	Recommendations
1. Subsys	<u>Read and Write IO Rates</u> - measured in IOPS averaged per day	●	No issues	None
2. Port	<u>Port IO Rates</u> - Front-end SAN Host ports	●	No Load Balancing in place!	Implement Load Balancing on SAN Hosts and spread load across Front-e
	- Back-end Virtualised Storage ports	●	No issues	None
3. Port Max	<u>Max Port IO Rates</u> - Front-end SAN Host ports	●	No Load Balancing in place!	Implement Load Balancing on SAN Hosts and spread load across Front-e
	- Back-end Virtualised Storage ports	●	No issues	None
4. CHP	<u>CHP Busy Rates</u> - Busy rates for Client Host Processors	●	Proc 0 (Port CL1-E)	Implement Load Balancing on SAN Hosts and spread load across Front-e
5. CWP	<u>Cache Write Pend Rate</u> - CWP rate for Tier 1	●	No issues	None
6. CLPR	<u>Cache Write Pend Rates Per CLPR</u> - CWP rates split by Cache Logical Partition	●	No issues	Please ensure HDS are made aware of any planned perf testing
7. DKP	<u>DKP Busy Rates</u> - Back-end Disk Processor Busy Rates	●	No issues	None

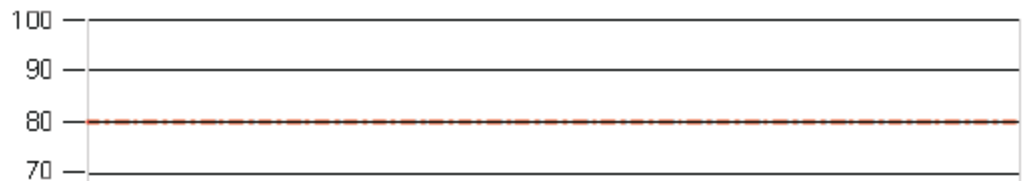


### 3.7 DKA Processor Max Busy Rates

#### USP DKA-1 Processors Max Busy %



#### USP DKA-2 Processors Max Busy %



#### Bookmarks

- 1 Introduction
- 1.1 Background
- 1.2 Intended Audience
  - 1.2.1 Customer
  - 1.2.1 HDS
  - 1.2 Customer's Prime Contact
- 1.4 Project Scope
- 1.5 Assumptions, Exclusions, Constraints and Dependencies
  - 1.5.1 Exclusions
- 2 Management Summary
  - 2.1 Subsystem Xfer and IOPS
  - 2.1 Ports and Channel Adapters (CHA)
  - 2.3 Cache
  - 2.4 Disk Adapters (DKA)
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Array Performance Check: Custom  
HDS SOC: +44 (0) 1753 618

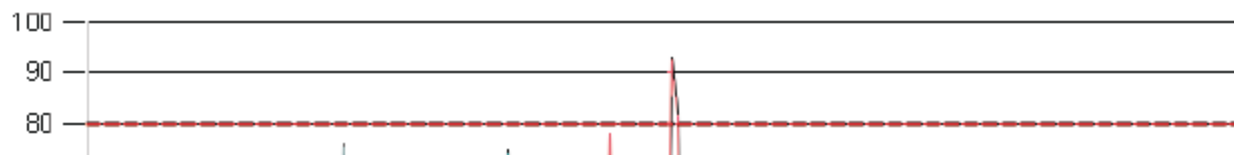
### 3.8 Array Groups

#### 3.8.1 Busy Array Group Details (Max busy > 80%)

Array Group	Average MaxBusy %	Max MaxBusy %
7-14	15.707195266272187	99.7
5-7	8.658857988165687	99.6
9-14	22.037485207100598	99.4
7-9	11.687047337278104	98.9
3-9	21.28692899408283	97.0
6-5	26.188065088757398	96.0
9-1	4.4694615384615375	95.6
5-11	21.014307692307703	95.5
3-2	4.753491124260356	93.8
1-2	6.101745562130178	92.7
4-1	5.7915088757396465	92.6
7-15	16.30545562130177	91.7
7-1	6.684863905325447	90.1
3-1	6.905692307692305	83.4

#### 3.8.2 Array Group Busy Charts

USP Array Groups 1\* Max Busy %



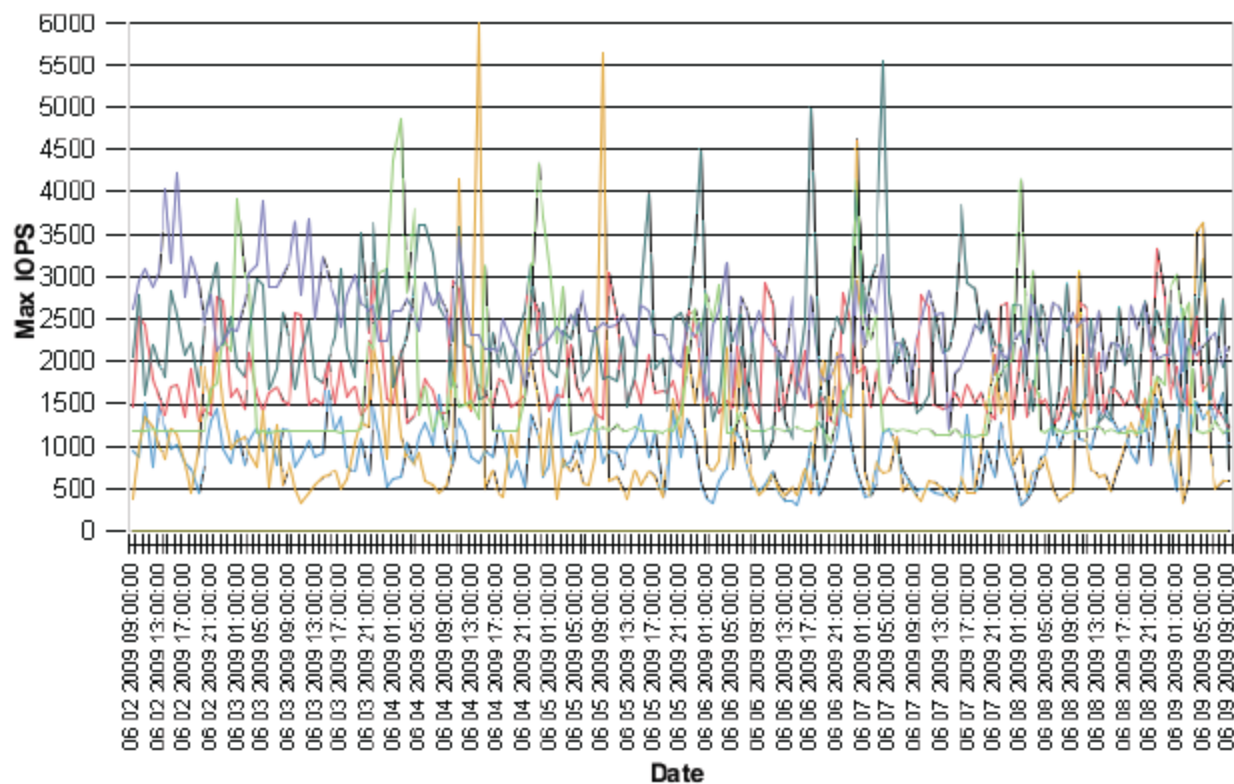
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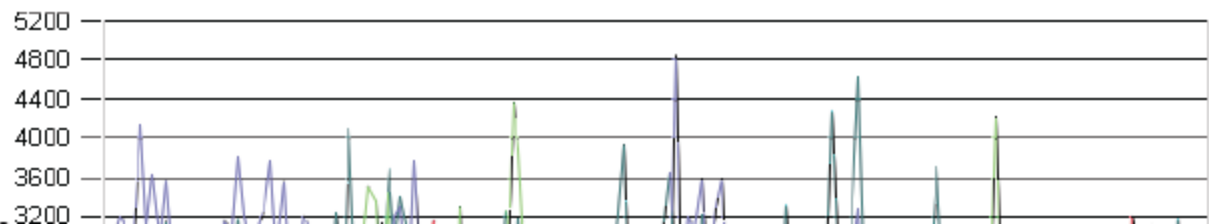


Array Performance Check: Custom  
HDS SOC: +44 (0) 1753 618

USP Ports CL3+ Max IOPS



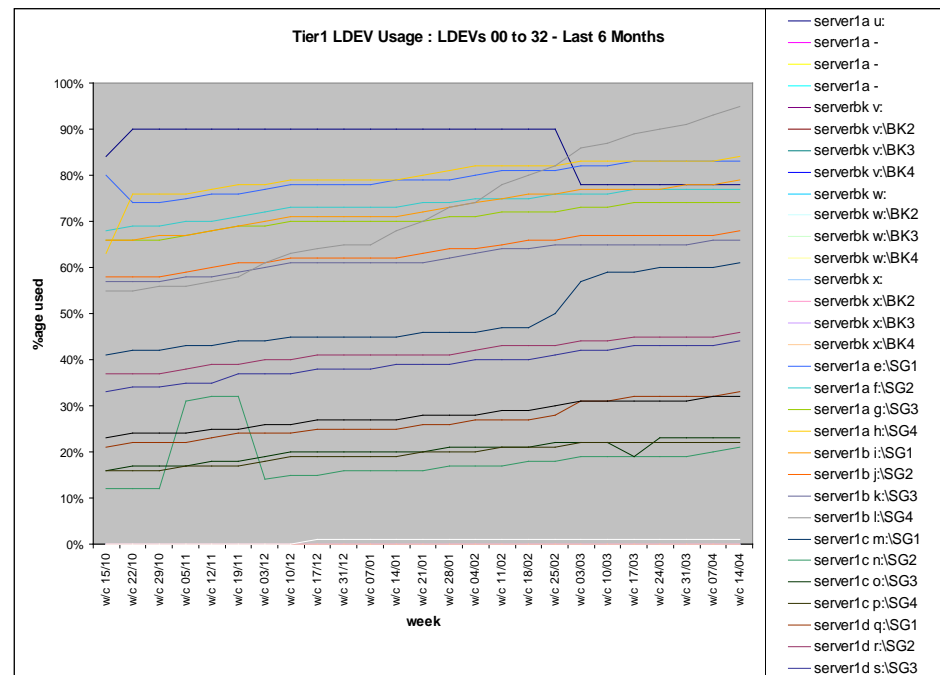
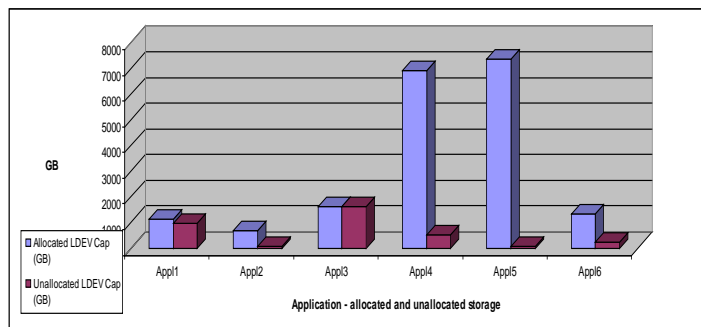
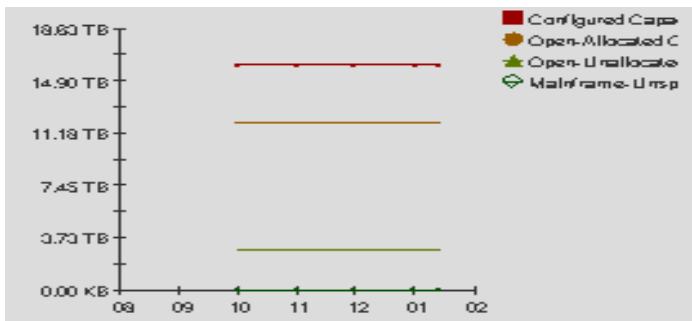
USP Ports CL4+ Max IOPS



# SAN Capacity Reporting

Provides SOC with Storage Array Capacity Information

- Raw, Usable, Allocated, Unallocated, Unformatted, External Storage Capacities
- Port, Cache, LUN Usage
- Breakdown by Storage Array and Tier
- Breakdown by SAN Host Utilisation
- Forecast and plan future storage system requirements



## 2.1 London 123 Report USPv

### ABC Capacity Report - ABC

Last Updated: **01/07/2009**

#### Tier Config

Disk Array	Storage Tier	RAID Level	RAID Config	Drive Type	Drive Size	No. Disks	No. Spare Disks
USPV (123) ABC	1	Raid1	2D+2	FC	146GB	72	N/A
	1	Raid5	7D+1	FC	146GB	134	4
	2	Raid5	7D+1	FC	300GB	392	4
	3	Raid6	6D+2	SATA	1000GB	48	2

#### Tier Usage (DP Pools)

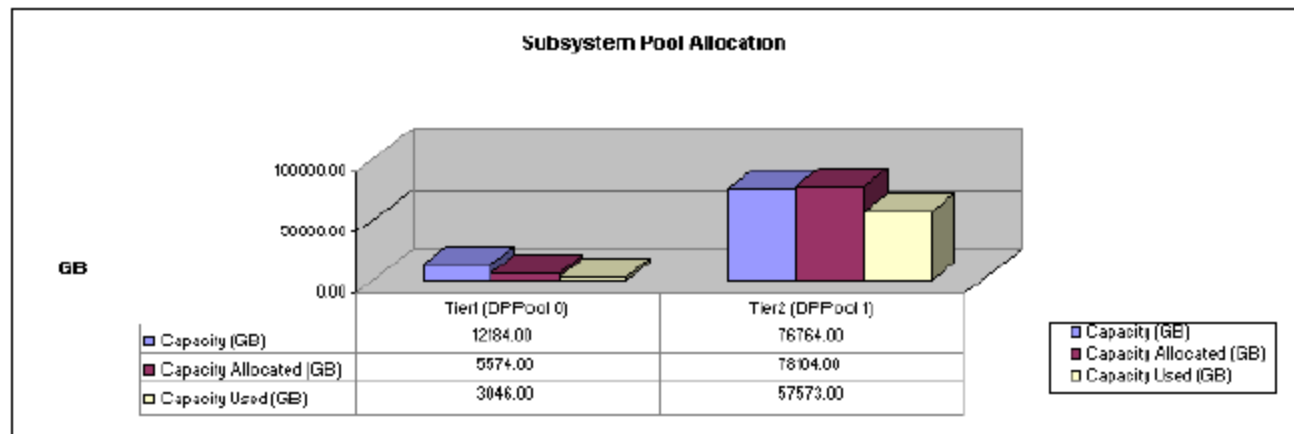
Disk Array	Tier / Pool	Capacity (GB)	Capacity Allocated (GB)	Free Capacity (GB)	Capacity Used (GB)	Used %	GB Overprovisioned	Overprovisioned #
USPV (123) ABC	Tier1 (DPPool 0)	12184.00	5574.00	9138.00	3046.00	25.00	0	0.00
	Tier2 (DPPool 1)	76764.00	78104.00	19191.00	57573.00	75.00	1340	175

#### Tier Usage (Non DP Pools)

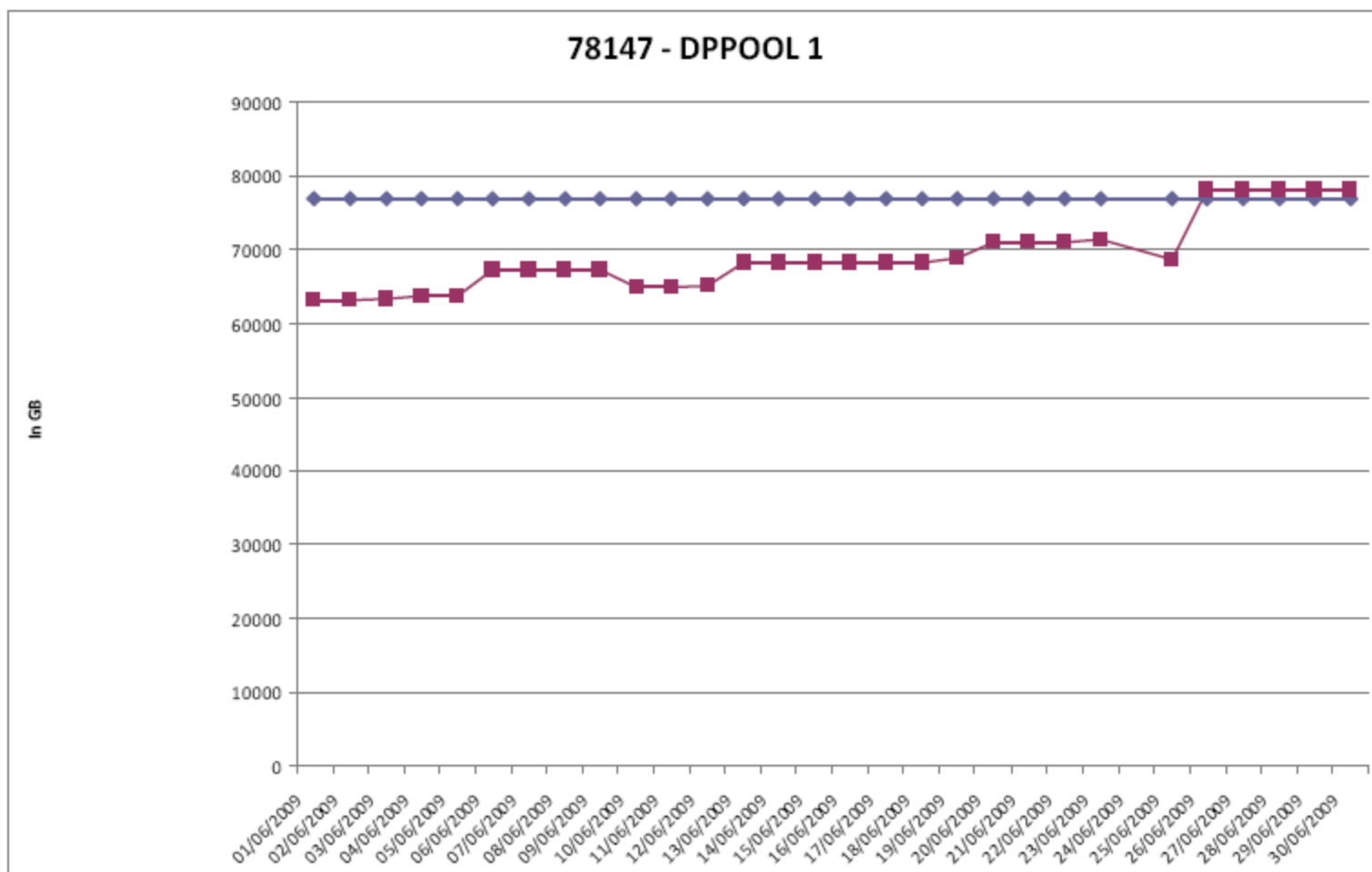
Disk Array	Tier	Capacity (GB)	Capacity Allocated (GB)	Capacity Carved, Not Allocated (GB)	Carved, Not Allocated (GB)	Used %
USPV (123) ABC	Tier1 - Raid1	4920.00	2400.00	0.00	2420.00	49.79
USPV (123) ABC	Tier3 - Raid6	33019.00	26578.00	62100	5819.00	80.49

#### Total (DP and Non DP)

<b>Total</b>		121967.00	110256.00
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## 2.4 Dynamic Pool – DP1 Utilisation Trend

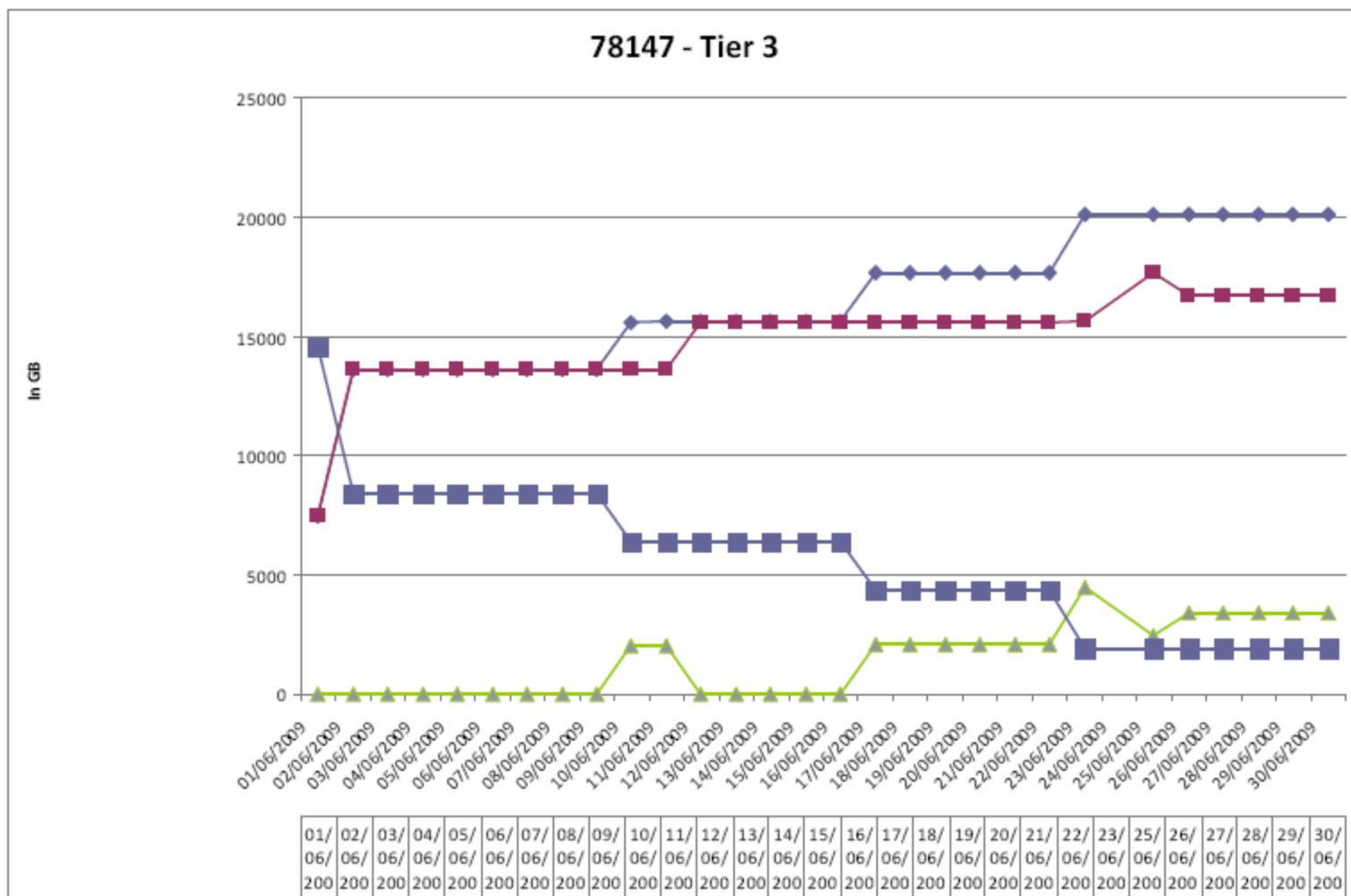


	01/06/2009	02/06/2009	03/06/2009	04/06/2009	05/06/2009	06/06/2009	07/06/2009	08/06/2009	09/06/2009	10/06/2009	11/06/2009	12/06/2009	13/06/2009	14/06/2009	15/06/2009	16/06/2009	17/06/2009	18/06/2009	19/06/2009	20/06/2009	21/06/2009	22/06/2009	23/06/2009	25/06/2009	26/06/2009	27/06/2009	28/06/2009	29/06/2009	30/06/2009	
TotalCapacity	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767	767
AllocCapacity	629	631	633	635	636	671	671	671	671	647	647	649	682	682	682	682	682	682	687	709	709	709	714	685	780	781	781	781	781	781



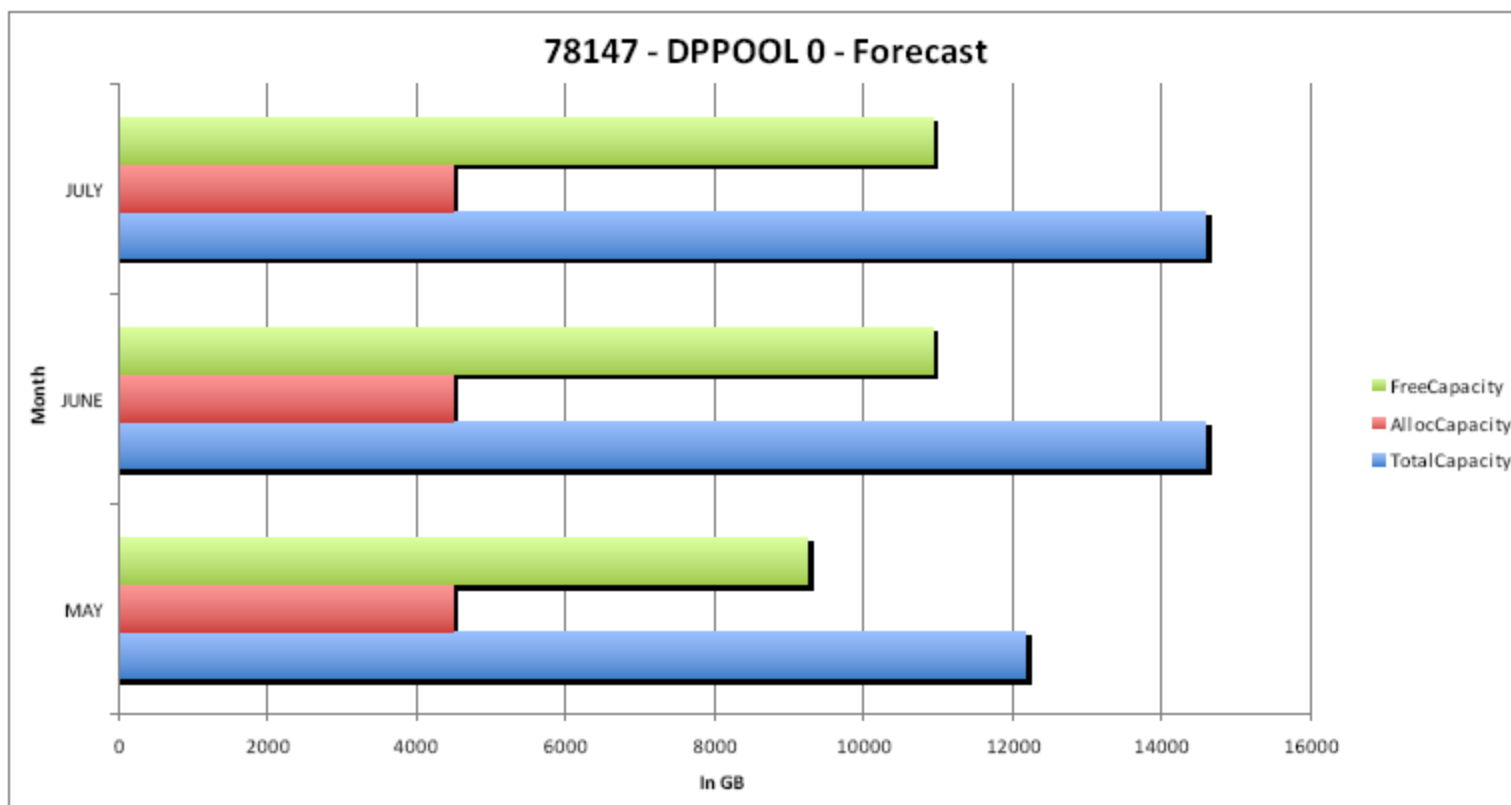
Capacity Report 010609: Customer  
HDS SOC: +44 (0) 1753 618666

## 2.5 Tier 3 Utilisation Trend



## 5 Storage Forecast – ABC

### 5.1 Dynamic Pool - DP0 Forecast



### 5.2 Dynamic Pool – DP1 Forecast



Provides SOC with End to End SAN Configuration Information to

- Create Build Configuration Documents (BCDs)
- Undertake full SAN Audits
- Perform Data Path Compatibility Checks for proposed SAN upgrades
- Carefully plan and control Storage Provisioning and SAN changes with iterations of BCDs
- Correlate and review configurations with any Performance issues or Capacity planning requirements

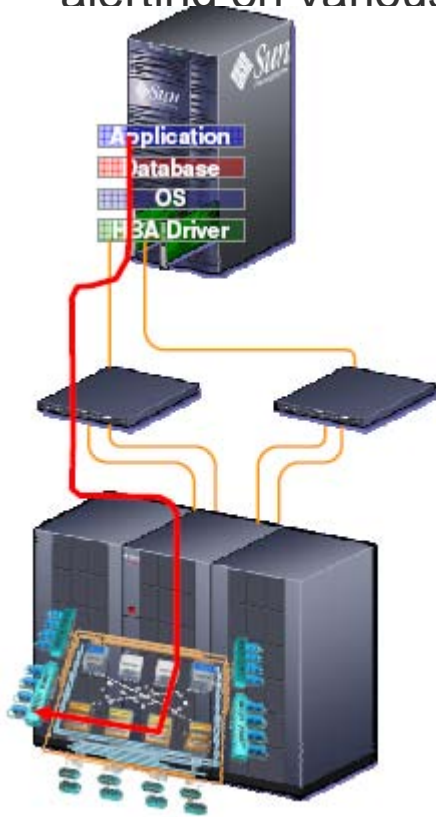
- ▶ ***Improves business agility***
  - Accelerates the identification of performance bottlenecks
  - Proactively monitors performance and provides alerts
  - Enables surveyed resource analysis by drilling down to problem areas quickly
- ▶ ***Enables operational excellence***
  - Improves IT processes via enhanced reporting and forecasting
  - Enables excellence by monitoring resources from the application to the storage system
  - Delivers automated alerts when utilization and/or performance reach critical thresholds
  - Maintains peak performance by identifying the source of bottlenecks
- ▶ ***Mitigates risk***
  - Enhances the customer's ability to meet service level agreements and eliminates storage capacity overruns
  - Prevents outages via advanced forecasting and multi-level alerts
- ▶ ***Reduces operational and capital costs***
  - Allows administrative resources to be more effective through enhanced forecasting and monitoring
  - Improves planning processes and allocation of storage resources
  - Enables more storage resources to be managed

- ▶ Remote Reporting
- ▶ Remote Monitoring & Alerting
- ▶ Remote Provisioning



# Remote Monitoring and Alerting – Performance Resources and Metrics

- Performance Monitoring and Alerting – real-time SAN performance monitoring and
- alerting on various system resources and metrics. These include:



- SAN Host (host agent required)

CPU, Memory, Workload, Server Activity

- Application (host agent required)

Oracle, DB2, Exchange, SQL

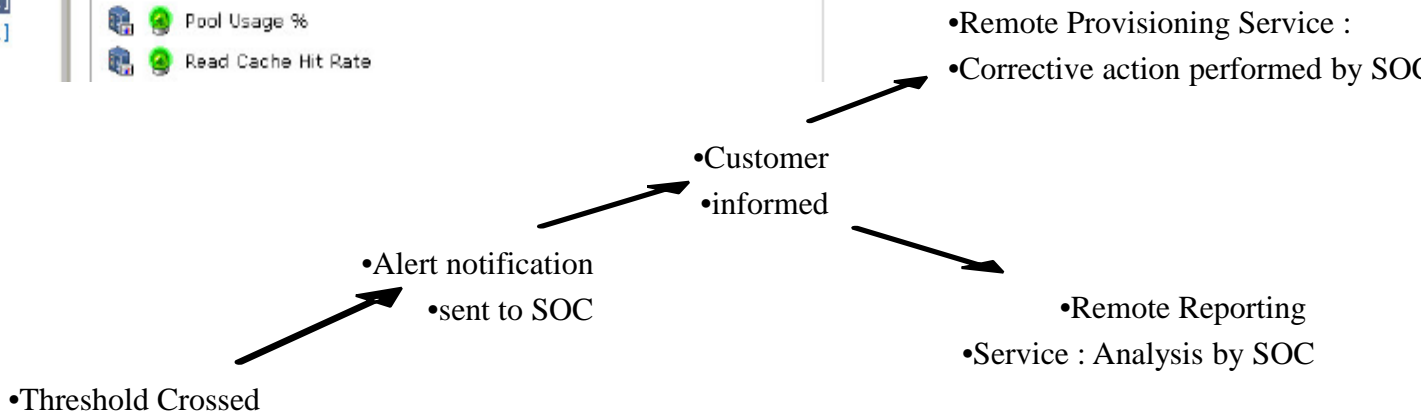
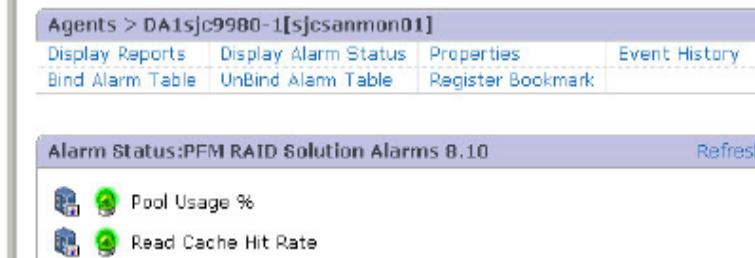
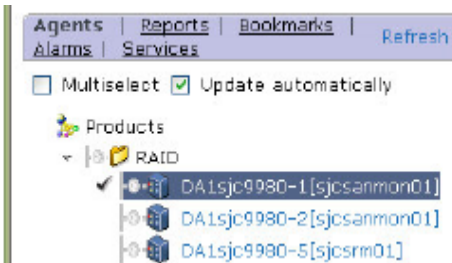
- SAN Switch (agent sits on HTnM server)

Port Usage, Transmitted/Received, Buffer Credit Count

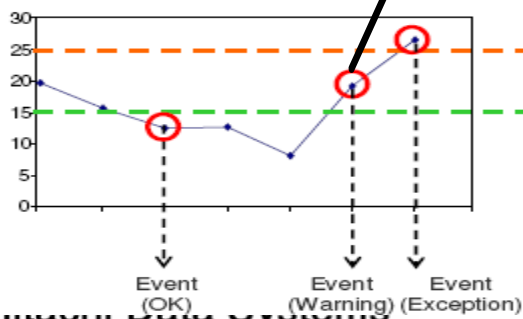
- SAN Storage (agent sits on HTnM server)

Port [Xfer/IO], CHA/DKA [Proc Busy], Cache [Usage, CWP], Array Group [Busy/Xfer/IO], LDEV [Hits/IO Count/Response Rates/Xfer]

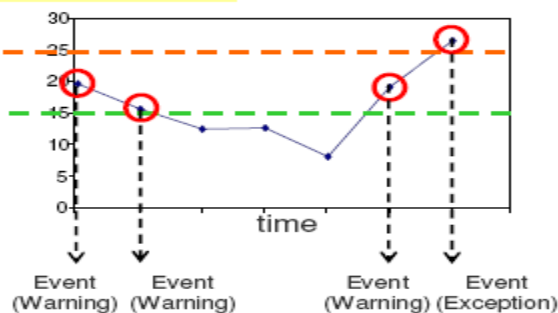
## HTnM configured to Monitor and Alert on Performance and Capacity Thresholds



State Alarm



Stateless Alarm



# Drilldown Dashboard



## Tuning Manager Alarm View to check Alarm Status

### Event History

Date and Time	Agent	Host	Status	Alarm Name	Alarm Table	Message
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	n/a	n/a	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	Stateless alarm	Windows	Alarm cleared
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	CPU usage	Windows	Alarm cleared
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU usage	Windows	CPU is at 13.507709% utilization
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	n/a	n/a	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	CPU usage	Windows	CPU is at 8.123996% utilization
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	n/a	n/a	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU usage	Windows	CPU is at 13.923104% utilization
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU usage	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	n/a	n/a	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU usage	Windows	CPU is at 8.897944% utilization
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	n/a	n/a	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows	State change
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU usage	Windows	CPU is at 14.248895% utilization
04 08 2008 02:47:04	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	n/a	n/a	State change

### Event Monitor

Date and Time	Agent	Host	Status	Report	Alarm Name	Alarm Table	Message
04 08 2008 00:57:00	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	n/a	n/a	n/a	State change
04 08 2008 00:57:00	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	Stateless alarm	Windows		
04 08 2008 00:57:00	TALUSSCC-RNAGAE	USSCC-RNAGAE	Warning	CPU Usage	Windows		CPU is at 11.118293% utilization
04 08 2008 00:57:00	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	n/a	n/a	n/a	State change
04 08 2008 00:57:00	TALUSSCC-RNAGAE	USSCC-RNAGAE	OK	CPU Usage	Windows		CPU is at 9.305601% utilization

### Alarm Status Screen

Agents | Reports | Bookmarks | Refresh  
Alarms | Services | Users

Display format: Products

Multiselect  Update automatically

- Products
  - RAID
  - DA1AMB00[USSCC-RNAGAE]
  - DA1USPVM[USSCC-RNAGAE]
- Windows
  - TALUSSCC-RNAGAE

Agents > TALUSSCC-RNAGAE

Display Reports | Display Alarm Status | Properties  
Bind Alarm Table | UnBind Alarm Table | Edit Agent Tree

Alarm Status: Windows

- Available Memory
- CPU Usage
- Disk Space

Health check status: Not Supported

Icon	Meaning
	Status is OK
	Status is Warning
	Status is Exception
	This alarm is stateless alarm
	This alarm is inactive

- ▶ Remote Reporting
- ▶ Remote Monitoring & Alerting
- ▶ Remote Provisioning



- ▶ The Remote Provisioning Service enables customers to pay for skilled expertise exactly when they need it.
- ▶ Available 24/7
- ▶ flexible contract to provide Remote Storage administration for an agreed number of hours per month (minimum 15)
- ▶ Provided by certified and trained Hitachi Data Systems personnel from the Service Operations Centre



# Remote Provisioning Service – Benefits

- ▶ Fills critical staff or skill set gaps when headcount or budget constraints exist
- ▶ Enhances operational efficiencies, mitigates risk, expedites return on storage assets
- ▶ Improves asset utilization and increases satisfaction by helping customers achieve established service levels
- ▶ Recommends ITIL best practice standards for change control (where customer does not already have these)
- ▶ Enables customers to realize the business benefits from their storage infrastructure

# Remote Management Services by Hitachi Data Systems

- ▶ *Improves business agility*
- ▶ *Enables operational excellence*
- ▶ *Mitigates risk*
- ▶ *Reduces operational and capital costs*

# Some Customers of the Service Operations Center

**HITACHI**  
Inspire the Next



News International



BONDDESKGROUP

CAPITA



Hitachi Data Systems



# Hitachi Data Systems



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series