



## IBM SmartCloud Virtual Storage Center aka IBM Storage Hypervisor

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IBM Australia

# Pulse2012

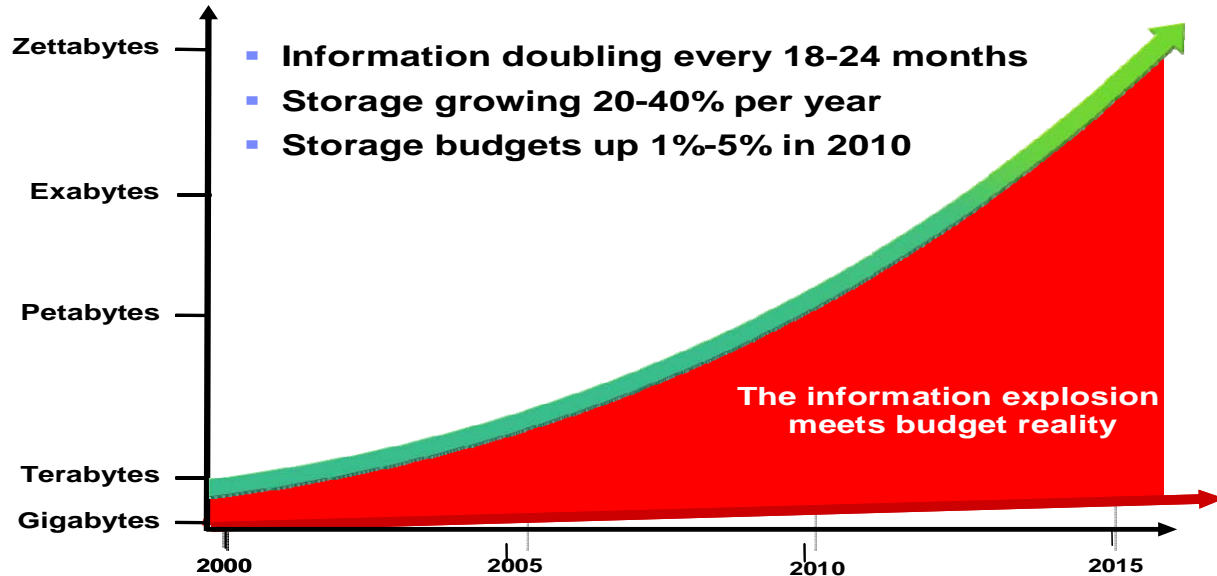
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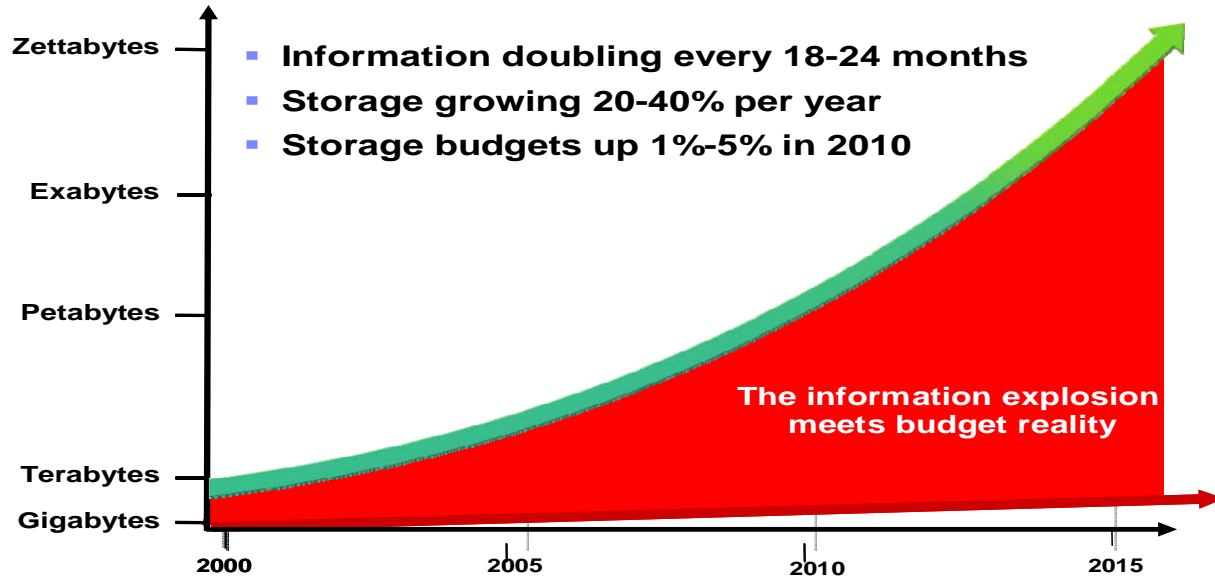
Sheraton on the Park Hotel, Sydney



# You have faced the problem...



# You have faced the problem...



## ...and heard the “Cloud” buzz

- “...major economies of scale and greater control of growing data volumes.”

# Cloud is changing how we think about Private IT

- Clients want to use Cloud concepts to improve Private IT  
“Cloud Enable” their environment (Private Storage Cloud)
- What distinguishes a Private Storage Cloud from Traditional IT?

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# What's a Storage hypervisor?

- **Server hypervisor** has a well understood value connotation
  - Pooled physical resources are consumed by virtual machines resulting in high asset utilization
  - Virtual machines are mobile giving CIO's their choice of physical server device
  - A common set of value capabilities and centralized management are provided for virtual machines regardless of what physical server they are sitting on
  - ...cost savings and flexibility!

## **On Intel systems**

server virtualization platform (VMware vSphere or Red Hat EV) and  
server virtualization management (VMWare vCenter or Red Hat EV Manager)

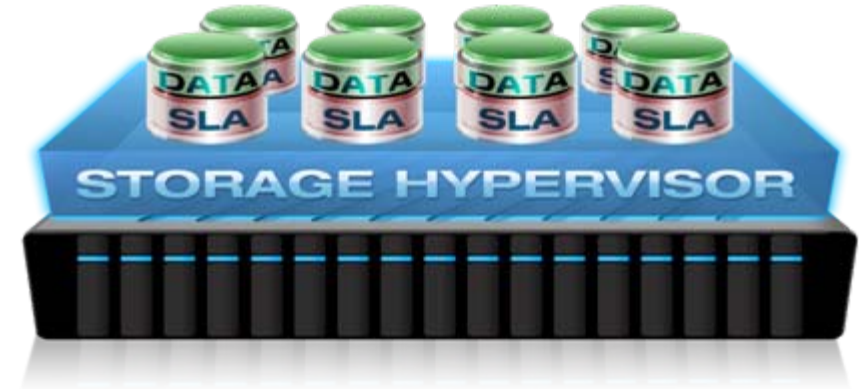
## **On Power systems**

server virtualization platform (IBM PowerVM) and  
server virtualization management (IBM Director VMControl)

- **Storage hypervisor** is a rapidly emerging way of describing the same value points in a storage context

# Pooled Physical Resources

- Dramatically improve utilization of your physical storage assets
- How? Pooled physical resources from virtually any disk array vendor or tier





# Common Capabilities

- Deliver tier-1 service **regardless of hardware choice**
- **How?** Common capabilities **delivered by the storage hypervisor**
  - I/O caching, thin provisioning, automated tiering, application-integrated snapshot and mirroring, mobility-driven disruption avoidance

SLA (Service Level Agreement) is encapsulated with the data in a virtual volume.



The desired service is delivered by the Storage hypervisor independent of the underlying hardware platform.

# Mobility

- Balance workload, manage lease termination, improve datacenter performance
- **How? Mobility of virtual volumes between any physical disk arrays**
  - Move on the fly, snapshot or mirror between arrays...
  - ...In a single physical datacenter or across two physical datacenters up to 300km apart



# Centralised Management

- Optimize your people **for the challenges of day-to-day operations**
- **How?** Centralised management
  - Visualization, health, capacity, performance
  - Storage services catalog, automated provisioning, pay-per-use



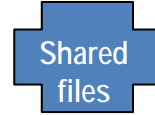
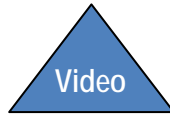
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# Cloud Enable Traditional IT

Storage services are standardized

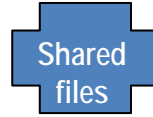
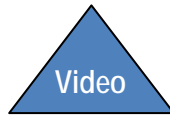
## 1. Create the catalog of available storage services (15 to 20)



# Cloud Enable Traditional IT

Storage services are standardized

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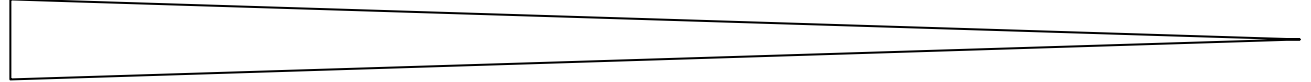


## 2. For each catalog entry, define the appropriate service levels

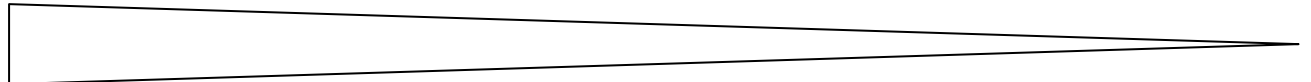
Highest

Lowest

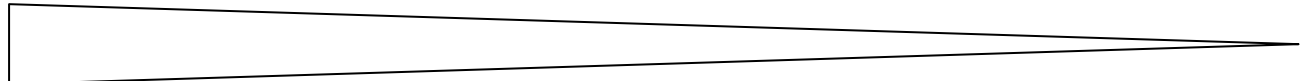
Capacity Efficiency



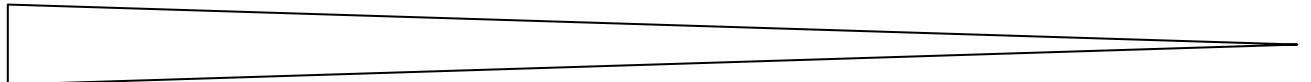
I/O Performance



Data Access Resilience



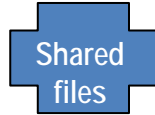
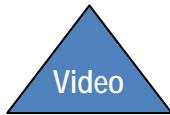
Disaster Protection



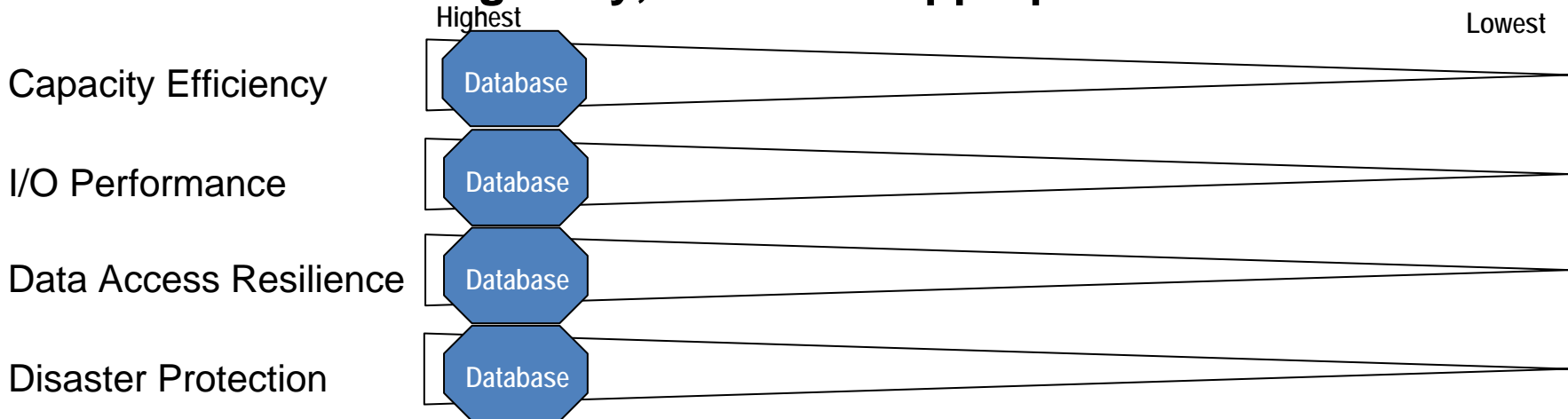
# Cloud Enable Traditional IT

Storage services are standardized

## 1. Create the catalog of available storage services (15 to 20)



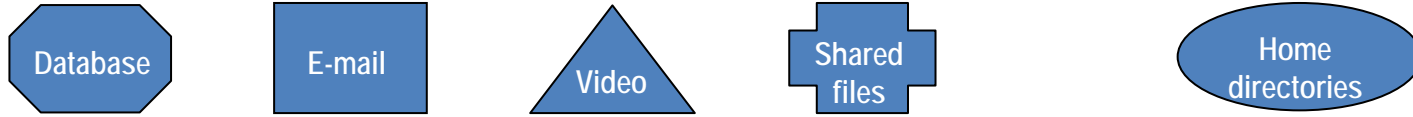
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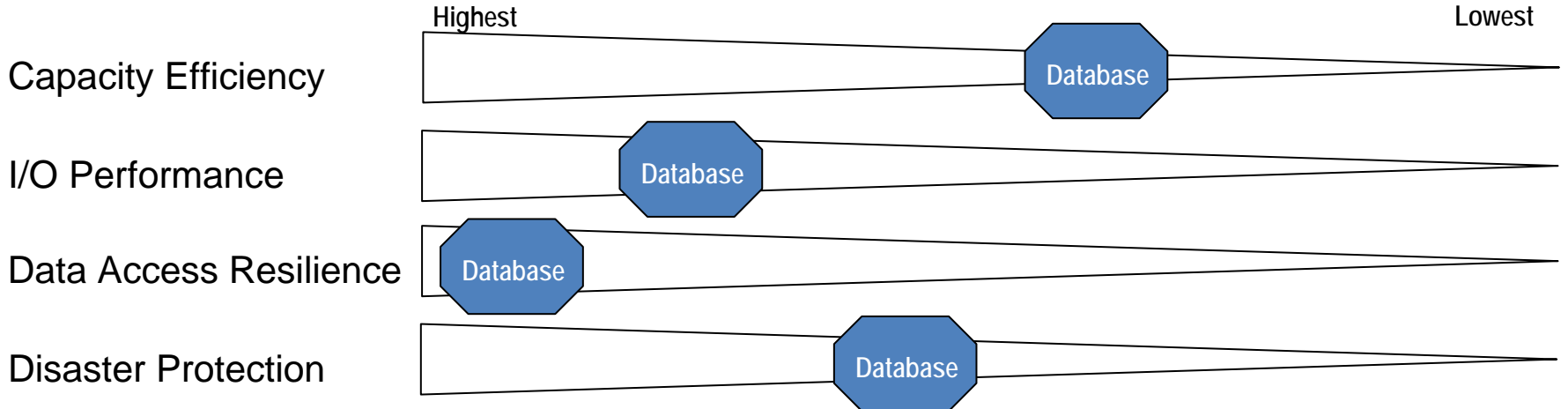
# Cloud Enable Traditional IT

Storage services are standardized

## 1. Create the catalog of available storage services (15 to 20)



## 2. For each catalog entry, define the appropriate service levels





Create Provisioning Profile

**Welcome to the Provisioning Profile Wizard**

The wizard will guide you through the creation of a Provisioning Profile. Provisioning Profiles are used by the SAN Planner by features that require a model for volume, multipathing and zoning requirements.

Create a new entry in the Storage Service Catalog

**Name and Description**

Enter a name for the new profile. A description is optional.

**Profile Name:**  
Database

**Profile Description:**  
Cloud storage for Database

**Creation Method**

Choose how you would like to create the new profile.

- Create the profile without using an existing profile**  
You will be asked to specify the volume size and redundancy, multipathing and zoning requirements.
- Create the profile using an existing profile**  
Profile Name:  
[ ]

Back Next Finish Cancel Help



Create Provisioning Profile

### Volume Settings

Specify how the storage will be allocated and the storage performance characteristics

Select the type of new storage to provision

Provision Volumes

Provision Virtual Disks

Total Capacity:  GB

Number of Volumes/Virtual Disks:

RAID Level:

Volume/Virtual Disk Name Prefix:

Workload Profile:

Thin Provisioning Profile:

Solid State Disks:  Do not use Solid State Disks  Use Solid State Disks

Encryption Group:

Use unassigned volumes not involved in copy relationship

Planning will be based on the performance data collected in the last  days

Describe the service levels for

- Capacity efficiency
- I/O performance

- ✓ Introduction
- ➔ Select Planning Task
- Specify Plan Content
- Review User Selections
- Execute Plan

### Select Planning Task

Choose the type of plan to create. A plan can provision new storage, provision new storage along with accompanying replication protection, provide replication protection to existing storage, or provide multipathing or zoning reconfiguration.

Select the plan task type

- Provision storage only, including optional multipath and zone considerations
- Provision storage with replication, including optional multipath and zone considerations on the source resources
- Provision replication to existing storage
- Configure multipathing or zoning only

Specify that this catalog entry will also have service levels for

- Data access resilience
- Disaster protection

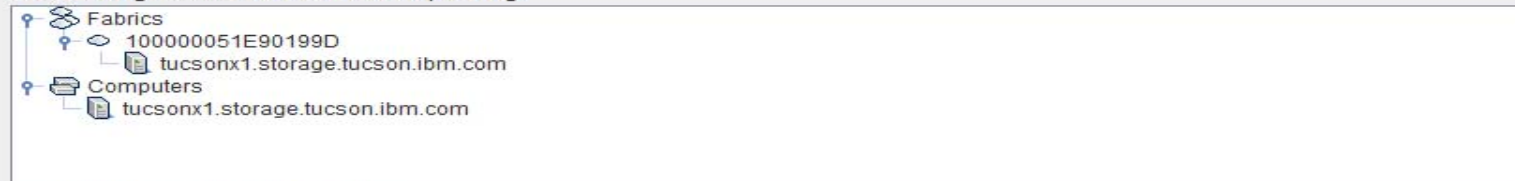


- ✓ Introduction
- ✓ Select Planning Task
- ✓ Specify Plan Content
  - ✓ Specify Capacity Plan
  - ✓ Specify Advanced Capacity Plan
  - ➔ Specify Path Plan
  - Specify Zone Plan
  - Choose Copy Session
- Review User Selections
- Execute Plan

### Specify Path Plan

If the selected hosts to be mapped to the new storage support multipath drivers, then this step allows you to define the multipath settings for mapping the hosts to the new storage.

The following resources are selected for planning.



Effective Provisioning Profile: None

Candidate SRG: Shared files

Multipath Option:

Load Balancing ▼

- Specify number of paths: <auto>
- Use fully redundant paths (requires at least 2 fabrics)

Describe the service level for

- Data access resilience

- ✓ Introduction
- ✓ Select Planning Task
- ✓ Specify Plan Content
  - ✓ Specify Capacity Plan
  - ✓ Specify Advanced Capacity Plan
  - ✓ Specify Path Plan
  - ✓ Specify Zone Plan
  - ✓ Choose Copy Session
  - ➔ Specify Session Properties
- Review User Selections
- Execute Plan

**Specify Session Properties**

Provide a name for the replication session and choose a session type. The list of session types can be filtered to simplify choosing the session type.

Session Name:

Choose a session type from the list below

Filter by Copy Technology:

Location:

Use practice volume

FlashCopy  
Virtual Disk Mirroring  
Metro Mirror Failover/Failback  
Metro Mirror Failover/Failback with Practice  
Metro Mirror Single Direction  
Global Mirror Failover/Failback  
Global Mirror Failover/Failback with Practice  
Global Mirror Single Direction



Copy Synchronization Rate:  %

Describe the service level for

- Disaster protection

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# Cloud Enable Traditional IT

## Storage provisioning is self service

The screenshot displays the IBM Tivoli Storage Productivity Center interface. The title bar reads "IBM Tivoli Storage Productivity Center: tb096-ui.storage.tucson.ibm.com -- Edit Plan". The menu bar includes "File", "View", "Connection", "Preferences", "Window", and "Help". Below the menu bar is a toolbar with icons for navigation and actions. The left sidebar contains a "Navigation Tree" with categories like "Administrative Services", "IBM Tivoli Storage Productivity Center", "Data Manager", "SAN Planner", and "Monitoring". The "SAN Planner" category is expanded, showing "root.Database" selected. The main area is titled "Edit Plan" and contains a "Plan Preview" window. A callout box points to the "root.Database" item in the tree, stating "Select a service level from the Storage Service Catalog". Another callout box points to a "Volumes (Database)" container in the "Subsystems" view, stating "Note that this pool already has four volumes allocated". The "Volumes (Database)" container shows four volumes: db\_vdisk3, db\_vdisk2, db\_vdisk1, and db\_vdisk0, all connected to a "Pools (All)" container labeled "Database".

IBM Tivoli Storage Productivity Center: tb096-ui.storage.tucson.ibm.com -- Edit Plan

File View Connection Preferences Window Help

Element Management

Navigation Tree

- Administrative Services
- IBM Tivoli Storage Productivity Center
- Data Manager
- Data Manager for Databases
- Data Manager for Charge
- Disk Manager
- Storage Subsystems
- Storage Optimizer
- SAN Planner
  - root.Database
  - root.Shared files
  - root.Video
- Monitoring
- Alerting
- Profile Management
- Reporting
- Fabric Manager
- Tape Manager
- Element Manager
- Replication Manager

Edit Plan

The planner... more hosts, and optionally sets up multipath options and zoning for the new storage.

Creator: root Name: Database

Show Plan Topology

Plan Preview

Computers 0 Computers

Fabrics 0 Fabrics

Subsystems \* [1]

SVC-2145-tpcsvc62-IBM 0 \* [5]

FCPorts (All) 0 FCPorts

Volumes (Database) \* [4]

db\_vdisk3 db\_vdisk2

db\_vdisk1 db\_vdisk0

Pools (All) \* [1]

Database

Select a service level from the Storage Service Catalog

Note that this pool already has four volumes allocated



**Planner Selection**

Select the elements from topology

Available elements:

**Topology Viewer**

Overview L0:Computers L1:Computers-Normal

L1:Comput...

Shortcuts  
[Data Path Explorer](#)  
[Topology Settings](#)

Computers

Device 3 Volumes

Computers (Normal) [5]

cet-hacm... cet-hacm... tb096-ui...

tpcmv4-... tucsonx1...

Connectivity 3 Switches

Select the host to associate the new storage with

The screenshot shows a software interface for planning storage. At the top, there's a blue header 'Planner Selection' and a sub-header 'Select the elements from topology'. Below that, a section 'Available elements:' contains a 'Topology Viewer' with tabs for 'Overview', 'L0:Computers', and 'L1:Computers-Normal'. The 'L1:Computers-Normal' tab is active, showing a diagram of a storage topology. A central box labeled 'Computers (Normal) [5]' contains five server icons with labels: 'cet-hacm...', 'cet-hacm...', 'tb096-ui...', 'tpcmv4-...', and 'tucsonx1...'. To the right, a 'Device' box contains '3 Volumes', and below it, a 'Connectivity' box contains '3 Switches'. Lines connect the 'Device' box to the 'Computers' box and the 'Connectivity' box to the 'Computers' box. A blue callout box with a pointer highlights the 'tucsonx1...' host, with the text 'Select the host to associate the new storage with'.



- ✓ Introduction
- ✓ Select Planning Task
- ✓ Specify Plan Content
  - ➔ Specify Capacity Plan
  - Specify Advanced Capacity Plan
  - Specify Path Plan
  - Specify Zone Plan
- Review User Selections
- Execute Plan

### Specify Capacity Plan

Provide the properties for provisioning new storage

The following resources are selected for planning.



Effective Provisioning Profile: **None**  
Candidate SRG: **Database**

Total Capacity:  GB  
Number of Virtual Disks:   
RAID Level (Back-end Storage):   
Virtual Disk Name Prefix:   
Workload Profile:

Specify how much capacity you want

The recommended provisioning will be based on the performance data collected between:

Start Date:  ,  End Date:  ,

Note: Any selected resources that do not have performance data in the specified time range will be ignored by the planner.

Use unassigned virtual disks (including unassigned virtual disks not known by the SAN planner to be in a copy relationship)

Back

Next

Finish

Cancel

Help

- ✓ Introduction
- ✓ Select Planning Task
- ✓ Specify Plan Content
- ✓ Review User Selections
- ➔ Execute Plan

**Execute Plan**

The proposed changes to the SAN environment are listed below. A more detailed view can be seen by clicking the "Show Plan Topology" button. If you wish to commit the changes, either select Run Now or specify a time in the future and click Finish. To exit without committing the changes, click Cancel.

- ↳ Mdiskgroup Database
  - ↳ A thin-provisioned virtual disk db\_vdisk4 of Size 2 GB will be created in IOGroup: io\_grp0 with Preferred Node: node1\_tpcs18 with initial
- ↳ Hosts
  - ↳ Host tucsonx1.storage.tucson.ibm.com
    - ↳ Subsystem Device Driver 1 Multipath mode = Load Balancing
      - ↳ Data Paths
        - ↳ New datapath will be defined as [initiator WWN= 2100001B3205D720(tucsonx1.storage.tucson.ibm.com), target WWN=500507680
        - ↳ New datapath will be defined as [initiator WWN= 2100001B3205D720(tucsonx1.storage.tucson.ibm.com), target WWN=500507680
- ↳ Zone Configuration Changes
  - ↳ Fabric 100000051E90199D

**Show Plan Topology****When to run** Run Now Run Once at:

August 11, 2011 1:44 PM

Start the automated provisioning

**How to handle time zones****Specify which time zone to use:** Use the time zone that the server runs in Use this time zone:

(GMT-8:00) Pacific Standard Time

Back

Next

Finish

Cancel

Help

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# Invoice by Account Level

## Invoice Number 1

**Date Range**

**Current Week**

**Start Date**

**August 7, 2011**

**End Date**

**August 13, 2011**

The Big Time Company  
 Corporate Headquarters  
 3013 Cork Street.  
 Roseville, CA 95667  
 United States of America

Charge different rates  
 for each service level

### **HR - Human Resources**

	<b>Units</b>	<b>Rate</b>	<b>Charge</b>
<b>Database</b>			
Disk Space Allocated (GB)	<u>250.00</u>	1.0500	262.50
Disk Space Consumed (GB)	<u>239.00</u>	0.0000	0.00
<b>Total For: Database</b>			<b>262.50</b>
<b>Email</b>			
Disk Space Allocated (GB)	<u>100.00</u>	0.0000	0.00
Disk Space Consumed (GB)	<u>97.00</u>	1.4000	135.80
<b>Total For: Email</b>			<b>135.80</b>
<b>Total For: HR - Human Resources</b>			<b>398.30</b>

Charge based on allocated  
 – or consumed space



# Cloud Enable Traditional IT

## Summary for block storage

What IBM products enable this Private Storage Cloud?

1. **Storage resources are virtualized**
2. **Storage services are standardized**
3. **Storage provisioning is self-service**
4. **Storage usage is paid per use**

IBM Storage hypervisor

- **System Storage SAN Volume Controller**
- **Tivoli Storage Productivity Center**
- **Tivoli Storage FlashCopy Manager**

→ Tivoli Usage and Accounting Manager

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