

Storage Software e Cloud

Luviè Ruggero



Cloud Computing - NIST* Definition (*National Institute of Standards and Technology)

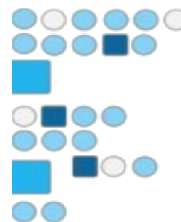
Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.



Cloud Storage

Virtualizzato

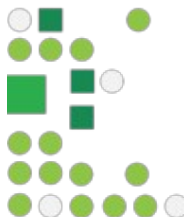
Risorse Storage sono virtualizzate da diversi arrays, vendors, datacenters – consolidate ed accedute da qualsiasi luogo.



Migliore utilizzo degli investimenti

Standardizzato

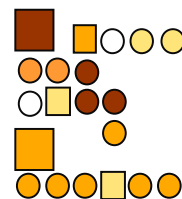
Servizi Storage scelti da uno “storage service catalog”



Migliore produttività

Automatizzato

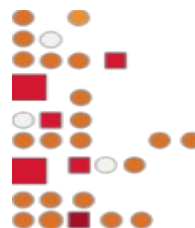
Storage provisioning e' self-service – L' amministratore usa la automazione per allocare capacità dal catalogo.



Maggiore velocità

Pay per use

gli utilizzatori sono coscienti dell'impatto dei propri consumi e livelli di servizio

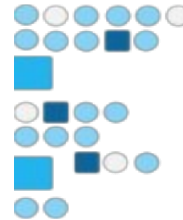


Migliore allocazione costi

Cloud Storage

Virtualizzato

Risorse Storage sono virtualizzate da diversi arrays, vendors, datacenters – consolidate ed accedute da qualsiasi luogo.



Server e Storage Hypervisors

Server hypervisors...

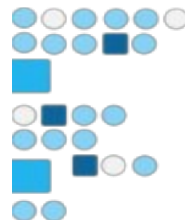
- Virtualizzano i servers fisici per migliorare la produttività
- Abilitano lo spostamento delle macchine virtuali in modalità trasparente
- Migliora la efficienza grazie ad una interfaccia gestionale comune ed indipendente da Op.Sys ed hardware utilizzato



Cloud Storage

Virtualizzato

Risorse Storage sono virtualizzate da diversi arrays, vendors, datacenters – consolidate ed accedute da qualsiasi luogo.



Server e Storage Hypervisors

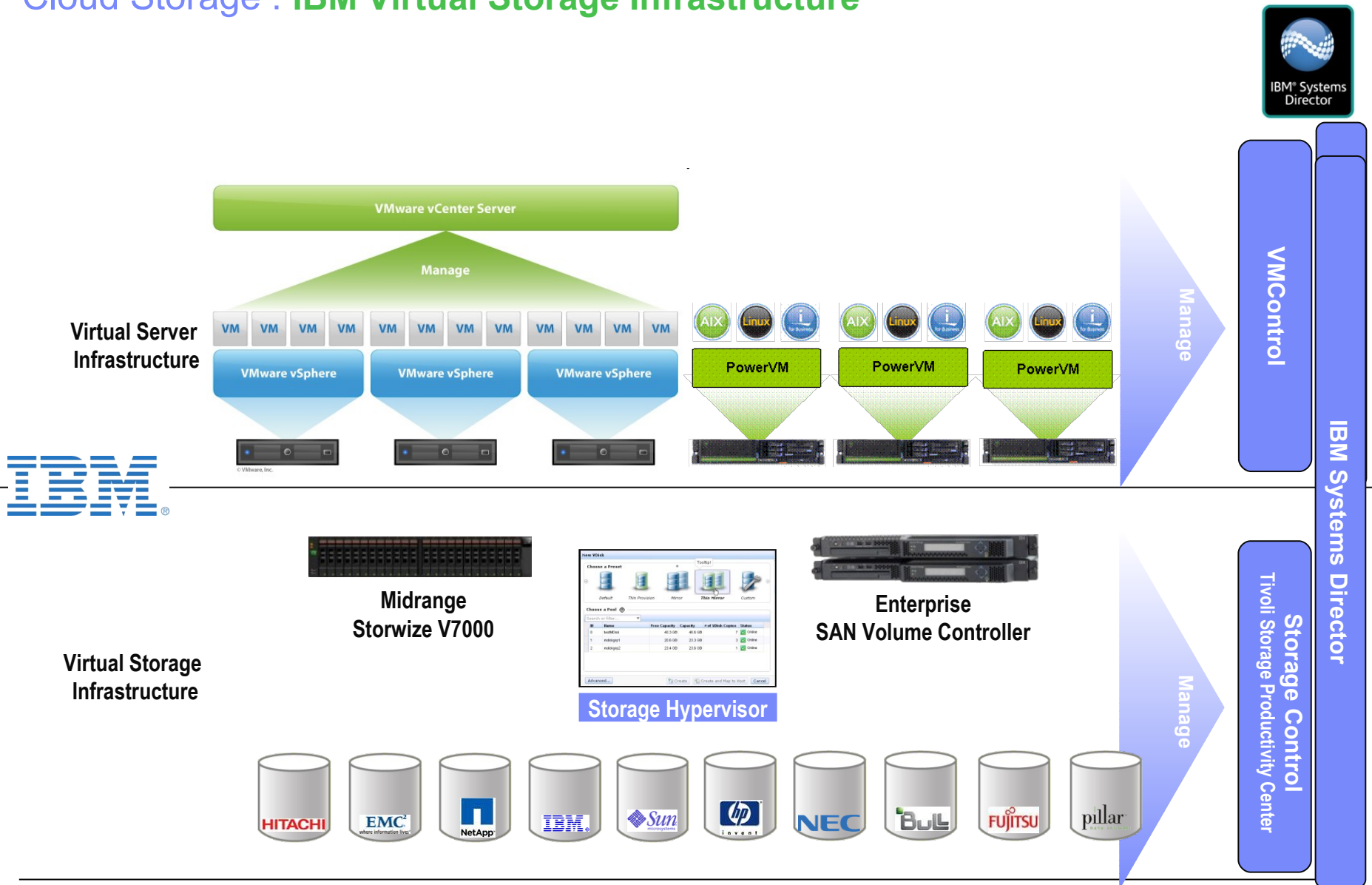
Storage hypervisors...

Fornisce una piattaforma per la virtualizzazione dello storage (IBM SAN Volume Controller) e per la sua gestione (IBM Tivoli Storage Productivity Center)

Fornisce una interfaccia gestionale comune ed una data mobility non-distruttiva fra tiers storage eterogenei



Cloud Storage : IBM Virtual Storage Infrastructure



Cloud Storage : IBM Virtual Storage Infrastructure

Caratteristiche virtual storage

(think VMware vSphere)

Common device driver

iSCSI o FC host attach

Common capabilities

I/O caching

Thin provisioning

Easy Tier: tiering automatico su Solid-state Disks

Snapshot (FlashCopy)

Mirroring (Sincrono ed Asincrono)

Data mobility

Migrazione trasparente dei dati fra arrays e tiers diversi

Snapshot e mirroring fra arrays e tiers diversi

Gestione virtual storage

(think VMware vCenter)

Manageability

Gestione integrata dell'intero ambiente

SAN

(Tivoli Storage Productivity Center)

Replication

FlashCopy integrata con applicazioni

(Oracle, DB2, SAP, Exchange, SQL Server)

Automazione DR

(Storage failover/fail back con TPC for Replication)

(Site switching con Tivoli System Automation)

High Availability

Stretch Cluster HA

Cloud Storage : IBM Virtual Storage Infrastructure

Insight

Visibilità sulla infrastruttura storage per migliorare il servizio fornito

Rappresentazione grafica, analisi della configurazione storage e reportistica di dettaglio su performance , assets zoning etc

Best Practices

Gestione ambiente storage tramite policy-driven recommendations

Guida basata su Best Practices per la configurazione, il provisioning dello storage e la pianificazione della SAN

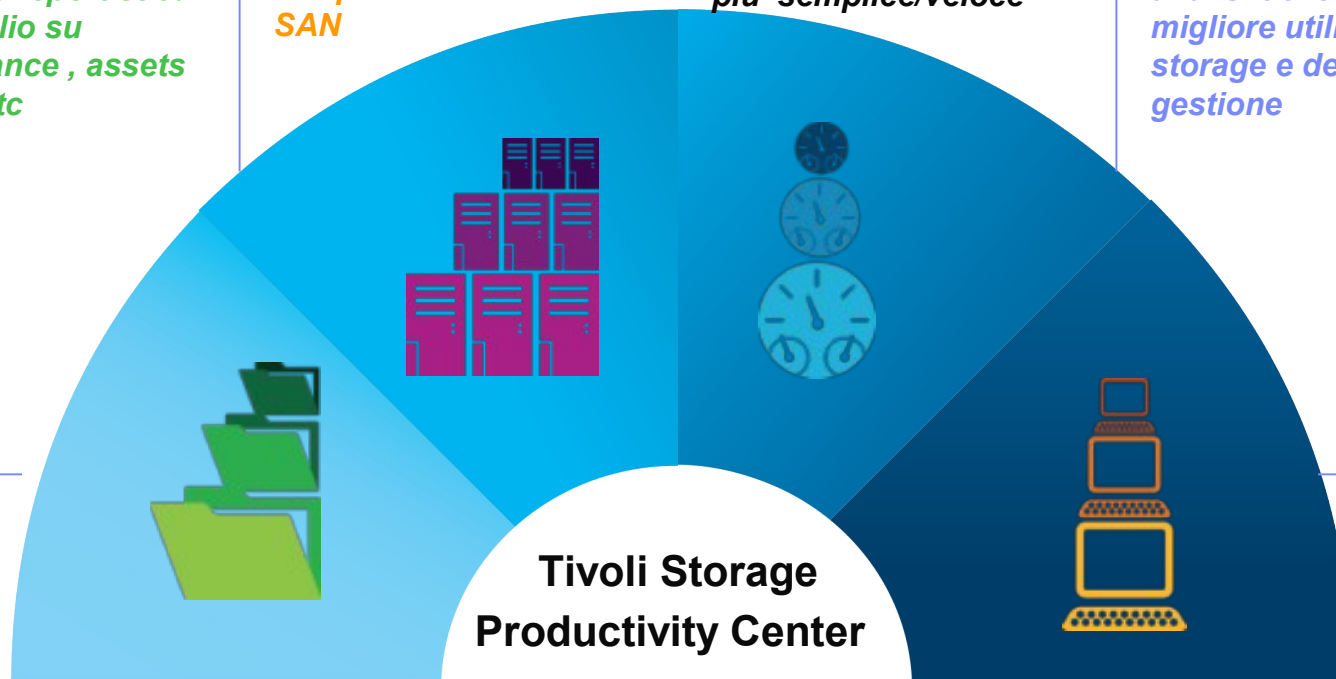
Performances

Raccolta e documentazione di storage service level agreements . Heat maps, threshold management, fault alerting per una problem determination piu' semplice/veloce

Optimization

Ottimizzazione delle risorse per un migliore utilizzo degli investimenti in storage

Migrazione dei dati sulla base di una analisi dei contenuti , migliore utilizzo dello storage e della sua gestione



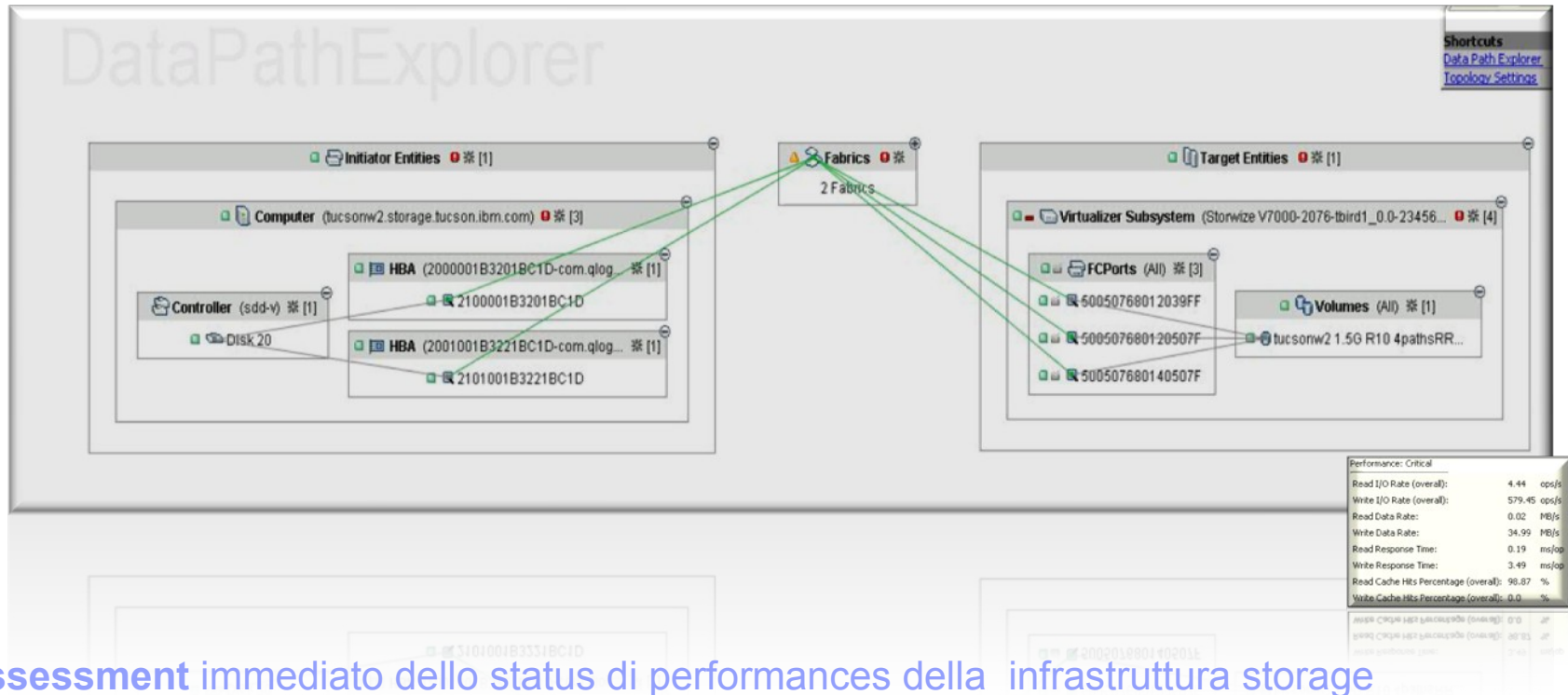
Cloud Storage : IBM Virtual Storage Infrastructure

The screenshot displays the IBM TotalStorage Productivity Center interface. The main window shows a 'Topology Viewer' with a hierarchical view of storage components. On the left, there are 'Disks (Extent Pool 1) [8]' and 'Disks (n/a) [8]'. In the center, there are 'Pools (n/a) [1]' and 'Pools (raid5) [1]'. On the right, there are 'Volumes (Extent Pool 1) [26]' including APS1A00, APS2A00, DAL SVC, and TPM000. A 'Device [62]' container is also visible. The interface includes a 'Shortcuts' panel with links to 'Data Path Explorer' and 'Topology Settings', and a 'Mapped D...' section.

At the bottom, there is a table with the following columns: Switch, Subsystem, Disk, Pool, Volume, FCPort, Connection, Alert, Zone, Group, Label, Operational, Total Capaci..., Available Ca..., Primordial, RAID Level, Number Of ..., and Number of D... The table contains the following data:

Switch	Subsystem	Disk	Pool	Volume	FCPort	Connection	Alert	Zone	Group	Label	Operational	Total Capaci...	Available Ca...	Primordial	RAID Level	Number Of ...	Number of D...
			n/a														
			raid5	Extent Pool 1			ok					512.0	52.0	false	raid5	26	8

Cloud Storage : IBM Virtual Storage Infrastructure



End-to-end view con identificazione di eventuali componenti in errore o colli di bottiglia

Riduzione dei tempi per problem isolation e resolution

Cloud Storage : IBM Virtual Storage Infrastructure

Select to create the report

1 Select Resources dialog box

2 Date selection (From: 11 - March - 2008 10:30, To: 11 - March - 2008 16:30)

3 Summation Level: By Sample

4 Generate Report button

Edit Filter

Records must meet:

- All conditions
- At least one condition

Column	Operator	Value 1	Value 2	Edit
Volume	LIKE	RAID5*		Edit...
Total I/O Rate (overall) (ops/s)	BETWEEN	1700	1900	
Overall Response Time (ms/op)	BETWEEN	4.2	4.7	

Cloud Storage : IBM Virtual Storage Infrastructure

- Alerts generati sulla base di soglie critical/warning
 - Alerts soppressi se ripetuti entro un periodo di tempo
 - Alerts soppressi se non ripetuti entro un periodo di tempo
 - Tutti gli alert sono consolidati in ‘Constraint Violations’ reports

Lancia scripts
Sulla base di
trigger conditions

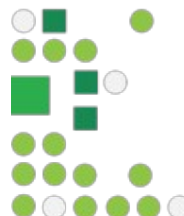
The screenshot displays the configuration interface for alert suppression and triggered actions. On the left, the 'Alert Suppression' section is visible, with a callout box pointing to the selected radio button: 'Trigger alerts for both critical and warning conditions'. Below this, there are options to suppress repeating alerts or suppress alerts unless the triggering condition has been violated continuously for a specified length of time (currently set to 45 minutes). On the right, the 'Triggered-Actions' section is shown, with a callout box pointing to the 'Run Script' option. A 'Specify Script' dialog box is open, showing the script name, where to run it (set to 'triggering computer'), and script parameters: \$1 = <computer>, \$2 = <manufacturer>/<serial-number>, \$3 = <current-grown-defects>, and \$4 = <old-grown-defects>.

Cloud Storage

Standardizzato



Servizi Storage scelti da uno
"storage service catalog"



Migliore produttività

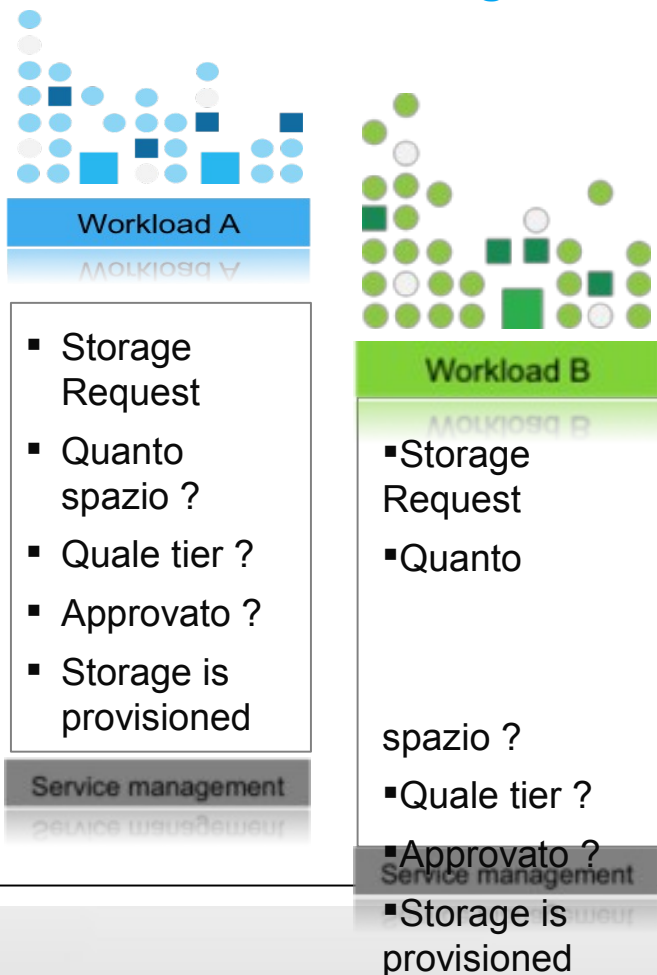
Storage Service Catalog: Le richieste per spazio storage sono dimensionate ed approvvigionate funzionalmente alla tipologia applicativa, alla tipologia dei dati ed ai requirement di business



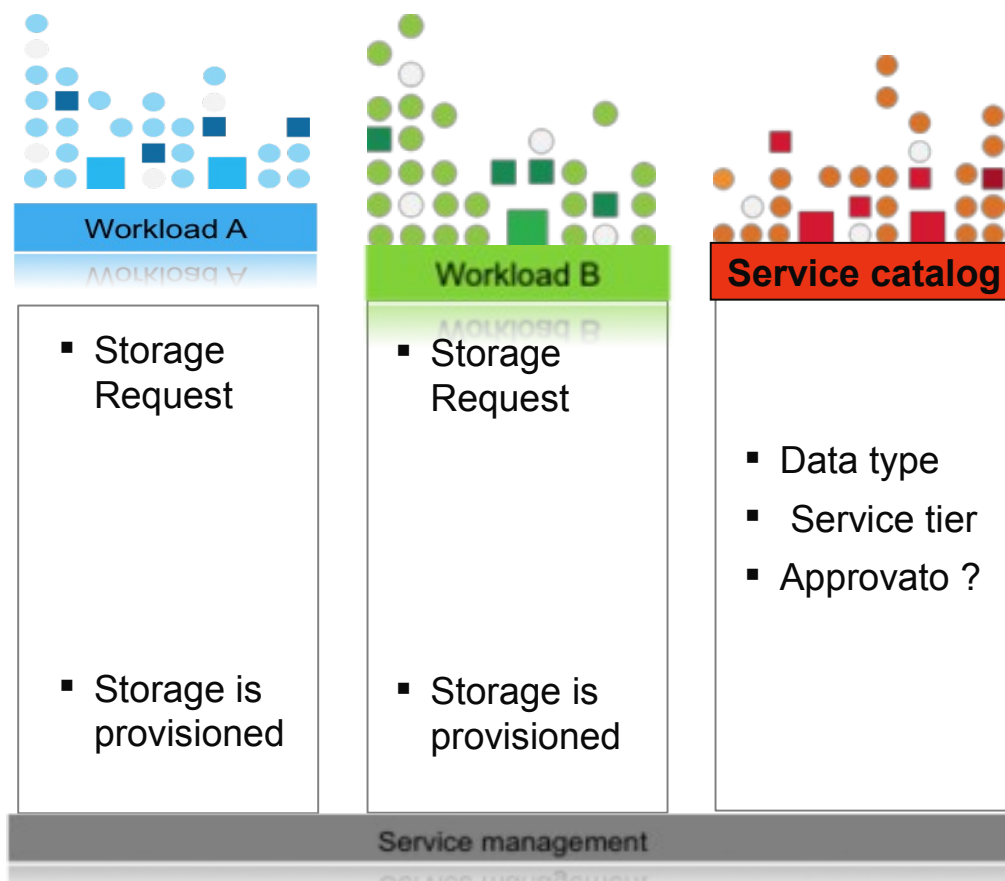
Cloud Storage: Service Catalog

Service Catalog cambia il modo in cui i servizi storage sono richiesti

Senza Service Catalog



Con Service Catalog

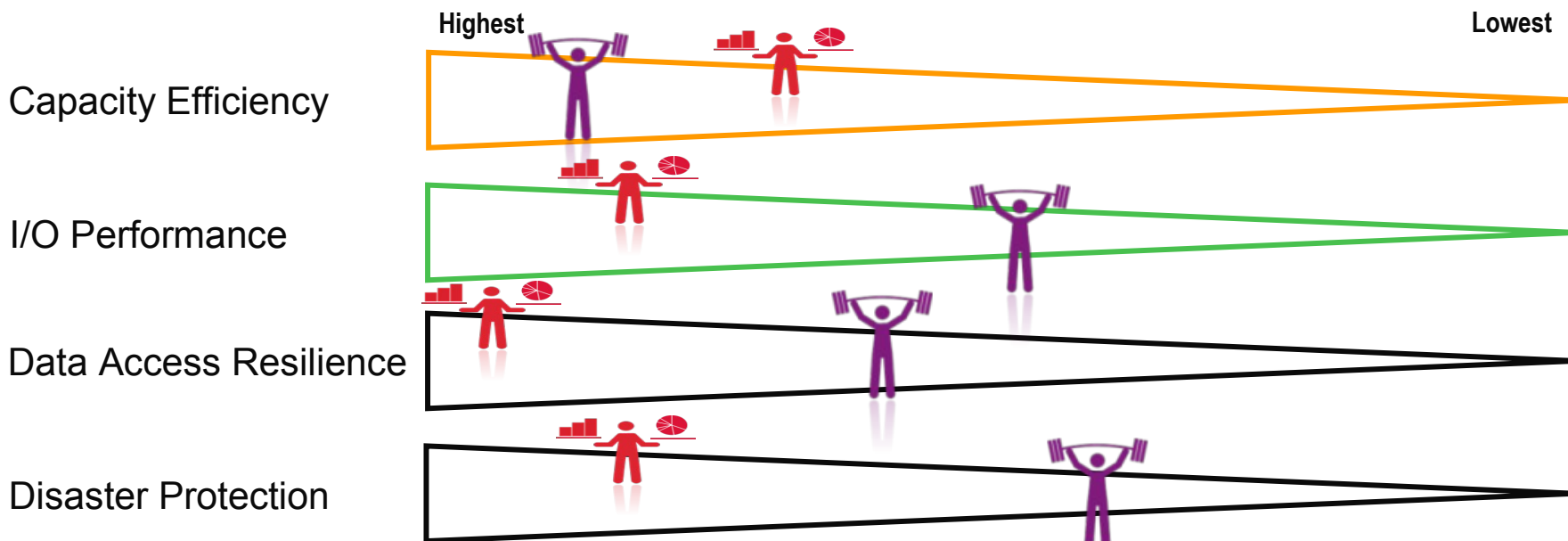


Cloud Storage : Service catalog

1. Creare il catalogo dei servizi storage (max 15 o 20)



2. Definire i livelli di servizio per ogni opzione a catalogo



Workload profile

Descrive le caratteristiche dello storage associato a ciascuna voce del service catalog

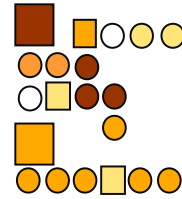
- Performance
- Dimensioni
- Availability

Utilizzato in fase di provisioning per identificare la risorsa appropriata alla richiesta ricevuta

Cloud Storage : Provisioning

Automatizzato ►

Storage provisioning e' self-service – L' amministratore usa la automazione per allocare capacità dal catalogo.



Maggiore velocità

Il provisioning dello spazio storage deve essere semplificato e deve mascherare le specificità degli array utilizzate.

Dove complementare la componente storage con la componente Fabric e multipathing

Deve potere utilizzare dei workload profile per allocare lo spazio storage funzionalmente alla classe di servizio richiesta

Cloud Storage : Provisioning

Provisioning completo basato sulle performance (solo storage IBM) e/o Spazio disponibile

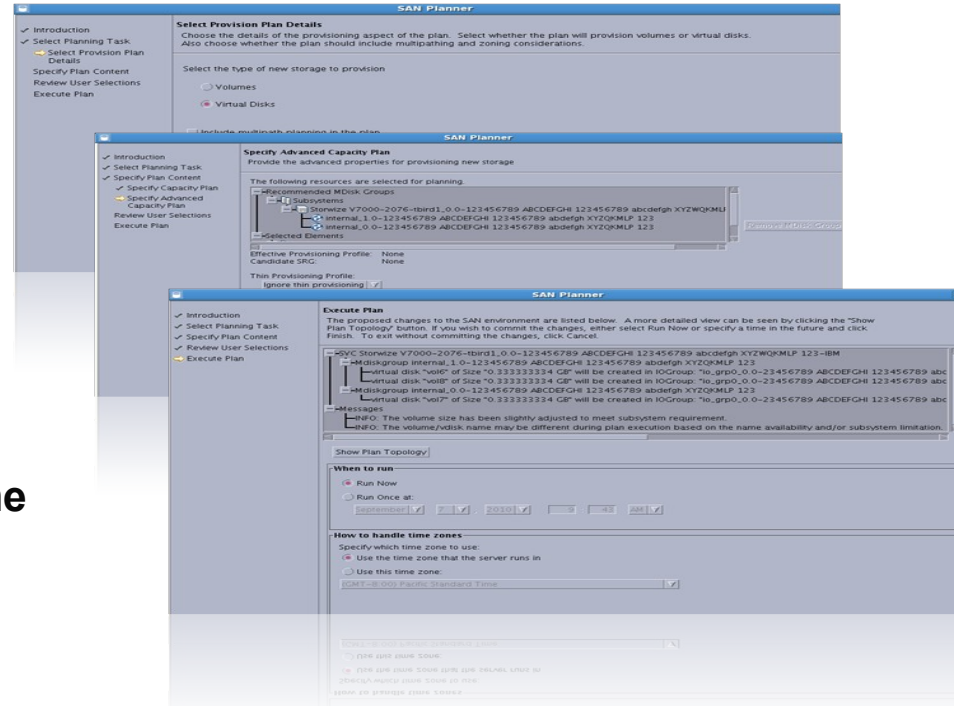
Operator Control sugli steps da includere

Include la possibilità di configurazione di copy services

Configurazione di FlashCopy e volume mirroring

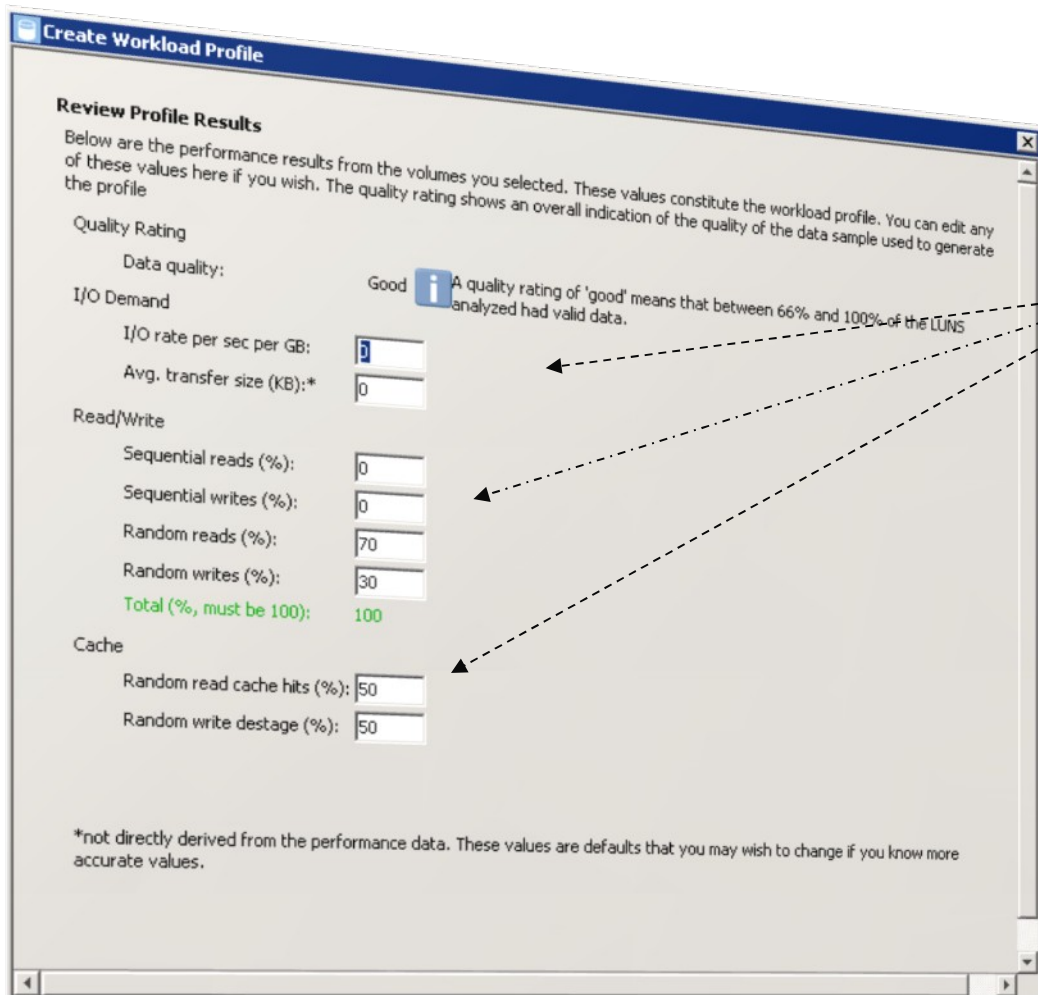
Esecuzione del piano Ad-hoc o schedulata

Approvazione richiesta per tutti gli step del workflow generato



Cloud Storage : Provisioning

TPC SAN Planners utilizzano workload e provisioning profile



Workload profile
 definisce le caratteristiche
 di performance richiesti per
 i volumi che saranno creati

Puo' utilizzare dei valori
 di riferimento utilizzando
 informazioni sui volumi esistenti

Cloud Storage : Provisioning

TPC SAN Planners utilizzano workload e provisioning profile

Provisioning profile
definisce le caratteristiche
fisiche (size, raid etc)
richieste per i nuovi volumi

Indica in workload profile
da utilizzare

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: 100 GB

Number of Volumes/Virtual Disks: 1

RAID Level: <system selected>

Volume/Virtual Disk Name Prefix:

Workload Profile: Workload_test

Thin Provisioning Profile: Ignore thin provisioning

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

Encryption Group: <none selected>

Use unassigned volumes not involved in copy relationship

Planning will be based on the performance data collected in the last 7 days

Back Next Finish Cancel Help

Cloud Storage : Provisioning

TPC SAN Planners utilizzano workload e provisioning profile

The screenshot displays the IBM Tivoli Storage Productivity Center (TPC) SAN Planner interface. On the left is a navigation tree with categories like Administrative Services, Data Manager, Disk Manager, and SAN Planner. The main area shows a sequence of four overlapping windows representing the provisioning steps:

- 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 protection to existing storage.
- Select Provision Plan Details:** Choose the details of the provisioning aspect of the plan. Select whether the plan will provision volumes or virtual disks. Also choose whether the plan should include multipathing and zoning considerations.
- Specify Plan Content:** Choose the input resources to be used for planning. Input resources may be storage subsystems, volumes, hosts, or a storage resource group (SRG). If you plan to use an SRG, you can specify the SRG here or you can select a candidate SRG from the Candidate SRG list below. A candidate SRG provides the best practice of separating your application data from your pool of unused resources.
- 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: Shared Files Session
 - Choose a session type from the list below
 - Filter by Copy Technology: No filtering
 - Location: Same Region
 - Use practice volume
 - Session types list: 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.

Cloud Storage : Provisioning

Il provisioning dello storage e' ridotto a poche operazioni

Ciclo completo di: Storage Volume, Host Assignment, SAN Zoning, Host multipath software, Volume replication

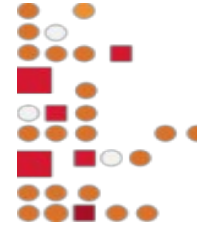
Basato su profiles che definiscono le caratteristiche di spazio e performance richieste

Le risorse piu' appropriate vengono automaticamente scelte ed utilizzate.

Cloud Storage

Pay per use ►

gli utilizzatori sono coscienti
dell'impatto dei propri
consumi e livelli di servizio



Migliore allocazione
costi

TPC raccoglie e storicizza dati relativi all'utilizzo storage

IBM TUAM (Tivoli Usage Account Management) accede ai dati di
utilizzo storage e crea la reportistica necessaria ad un eventuale chargeback

Cloud Storage : Pay per use

Tivoli. software

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

HR - Human Resources

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

Charge different rates for each service level

Charge based on allocated – or consumed space



Tivoli Storage Manager

- ✓ TSM Basic Edition
 - Backup/Recovery
 - Archive/Retrieve
- ✓ TSM Extended Edition (Basic plus..)
 - Tivoli Disaster Recovery Manager (DRM)
 - Backup via NDMP for NAS
 - Large Libraries (additional tape support
 - >4Drives, >48 slots)
- ✓ System Storage Archive Manager
 - Data Retention to meet regulatory requirements
- TSM for Fastback
 - Disk backup solution per ambienti Windows e Linux
 - Fast restore

Server Components

Application Protection

- ✓ TSM for Mail
- ✓ TSM for Databases
- ✓ TSM for Enterprise Resource Planning
- ✓ TSM for Microsoft SharePoint
- ✓ TSM for VE

Bare Machine Recovery

- ✓ TSM for System Backup and Recovery
- ✓ Tivoli Bare Machine Recovery

Advanced Replication

- ✓ FlashCopy Manager

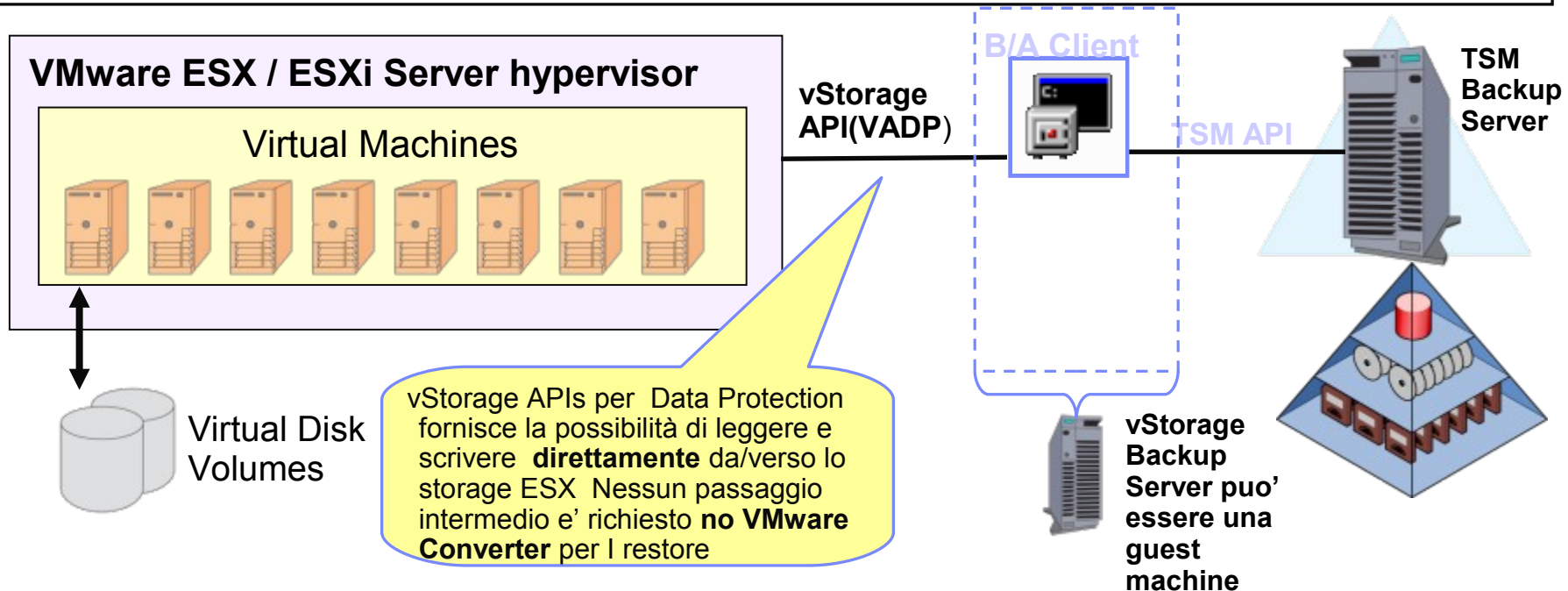
Space Mgmt, Archiving, CDP

- ✓ TSM for Space Management
- ✓ TSM HSM for Windows
- ✓ TSM for Storage Area Networks (SAN)
- ✓ Continuous Data Protection for Files

Client Components

Protect your virtual environment with TSM

Gestione Centralizzata – rimuove il requirement di un agente per VM guest.
 Veloce ed efficiente - utilizzando VMware's vStorage APIs for Data Protection e Changed Block Tracking (content aware backups)
 Discovery automatica e backup di nuove macchine virtuali
 Possibilità di scaricare il carico di lavoro del backup ad uno o piu' vStorage backup servers
 Non-disruptive snapshot a livello di immagine della guest machine
 Piu' opzioni di ripristino (dipendenti dal tipo di backup)
 Granular file level recoveries , Full virtual machine recoveries
 Integrato con le funzionalità di TSM



TSM for Virtual Environment

Nuovo TSM TDP for VMWare environment

Piu' opzioni di ripristino da una stessa image backups e supporto completo di vStorage API Change Block Tracking (CBT)

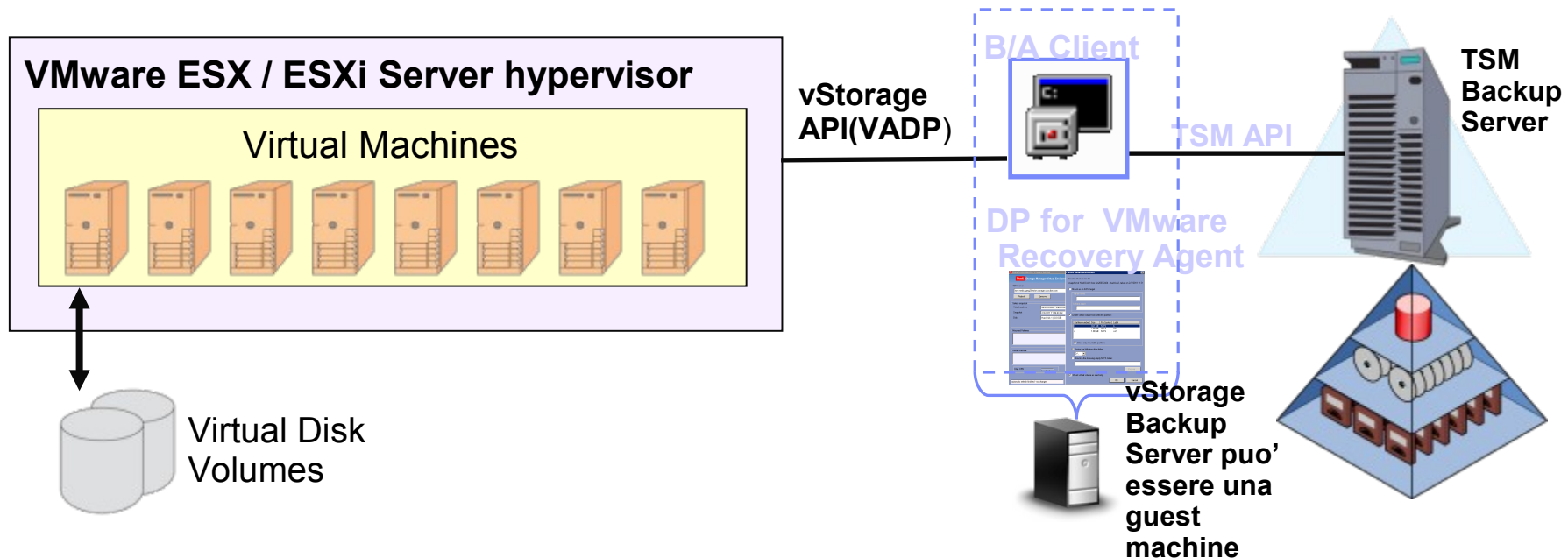
CBT Change block tracking consente di riconoscere i blocchi fisici modificati abilitando i backup di tipo incrementale

File/Volume/Disk/Full VM restores da un unico image backup (Windows e Linux guests)

Introduce la funzionalità di 'Instant restore' per consentire l'accesso ai dati mentre questi vengono ripristinati

Protect your virtual environment with TSM VE

- Gestione Centralizzata** – rimuove il requirement di un agente per VM guest
- Veloce ed efficiente**– **Incremental Block level backup** grazie a VMware's vStorage APIs for Data Protection e Changed Block Tracking
- Discovery automatica** e backup di nuove macchine virtuali
- Possibilità di scaricare il **carico di lavoro del backup** ad uno o piu' vStorage backup servers
- Non-disruptive snapshot** a livello di immagine della guest machine
- Piu' recovery options da uno stesso image-level backup**
 - Granular file level recoveries (**per Windows e Linux guests**)
 - Near instant volume recoveries**
 - Full virtual machine recoveries
- Integrato con le funzionalità di TSM**



TSM for Virtual Environment

Backup

BA client usa vStorage API Data

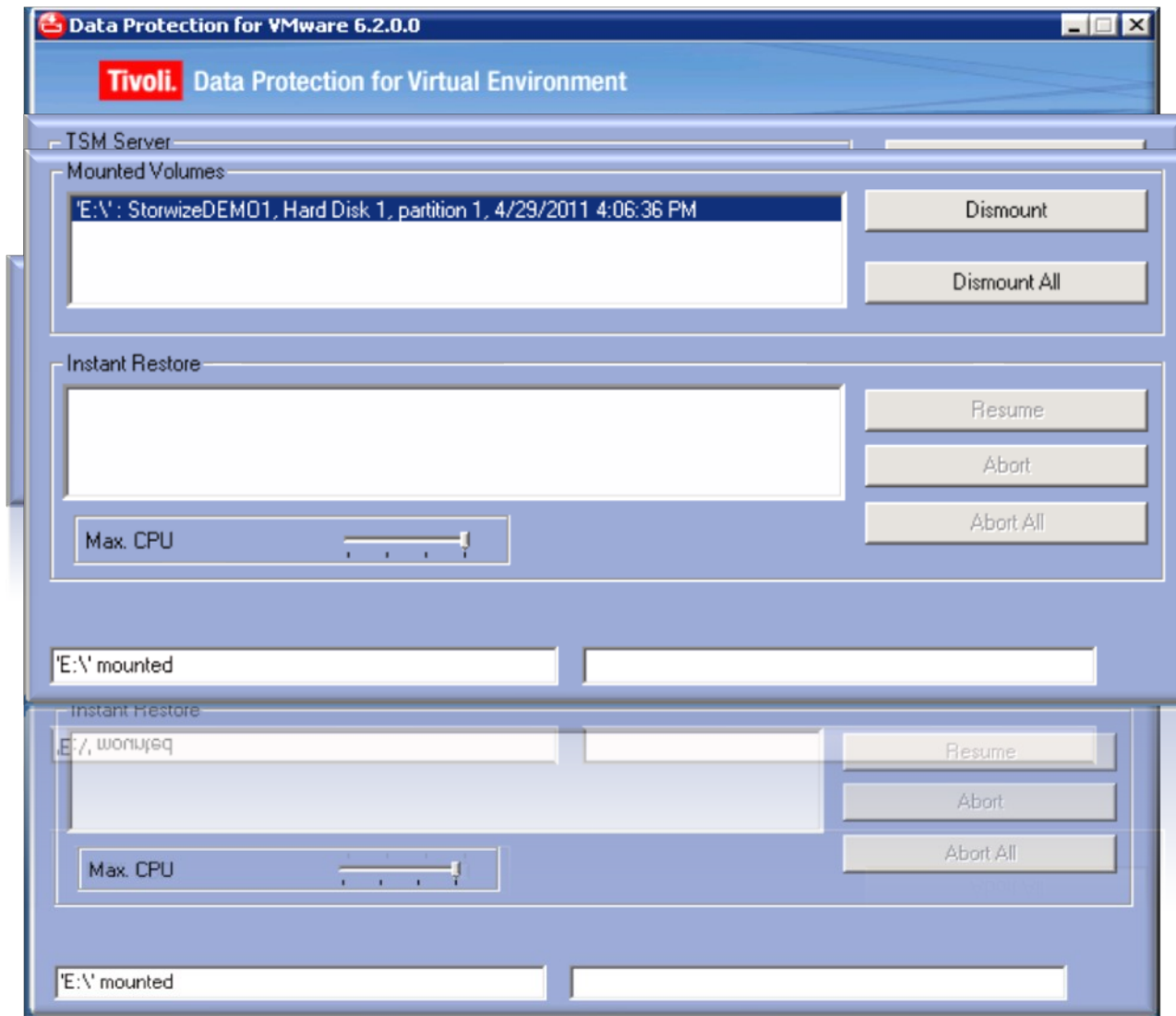
API contatta VMware (vCenter, ESX, etc)

- Invoca vmtools su guest
- ESX crea lo snapshot

No staging disk su proxy (vs. VCB support)

- B/A client cattura le informazioni di configurazione
- B/A client legge i VMDK (full o inc) via VADP
- B/A client sposta i backup data verso TSM server tramite TSM API
 - Piu' oggetti , comprensivi di control info per ogni VMDK salvati su TSM server nello stesso filepace**
- B/A client rimuove lo snapshot

TSM for Virtual Environment



TSM for Virtual Environment

Select snapshot

Virtual machine: StorwizeDEM01 (Microsoft Windows Server 2008 R2) Mount

Snapshot: 4/29/2011 4:06:36 PM Restore

Disk: Hard Disk 1 (50.0 GB)

Sceita dello snapshot

Mount dello snapshot

Choose mount destination

Create virtual device for:
StorwizeDEM01, Hard Disk 1, 4/29/2011 4:06:36 PM

Mount as an iSCSI target

Target name:

Initiator name:

Create virtual volume from selected partition:

Partition number	Size	File System	Label
0	100 MB	NTFS	System Reserved
1	49.9 GB	NTFS	<No Label>

Show only mountable partitions
 Mount virtual volume as read only

Assign the following drive letter:
E:\

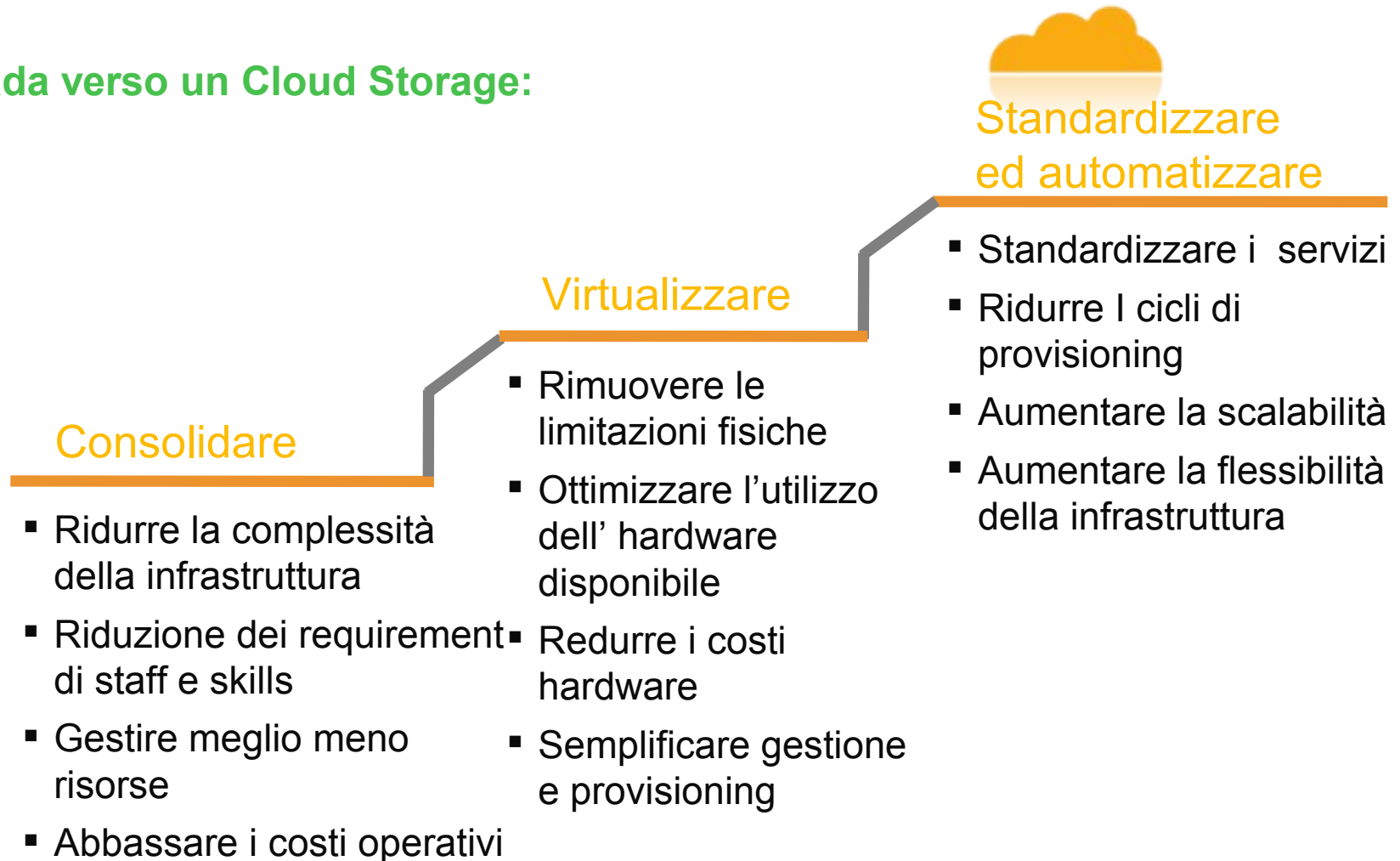
Mount in the following empty NTFS folder:

Browse...

OK Cancel

Cloud Storage

La strada verso un Cloud Storage:



Cloud Storage : Provisioning

IBM Storage products per uno Storage Cloud

Le risorse Storage sono virtualizzate

IBM storage hypervisor

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

Storage Services sono standardizzati

Storage provisioning e' automatizzato

Tivoli Storage Productivity Center

Storage e' paid per use

Tivoli Usage and Accounting Manager

Storage data sono sicuri

Tivoli Storage manager for Virtual Environment

Grazie della Vostra attenzione

Luviè Ruggero
IBM Client Technical Professional
rluvie@it.ibm.com