MEMORY IN THE CLOUD

THE CLOUD STORAGE SERVICE

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Agenda

1. What is Cloud Computing ?
2. Memory on the Cloud : DAAS or Cloud Storage
3. Principal vendors of Cloud Storage
4. Conclusions + Demo

What is Cloud Computing

Cloud Computing

The delivery of computing and storage capacity, as a service to a heterogeneous community of end-recipients

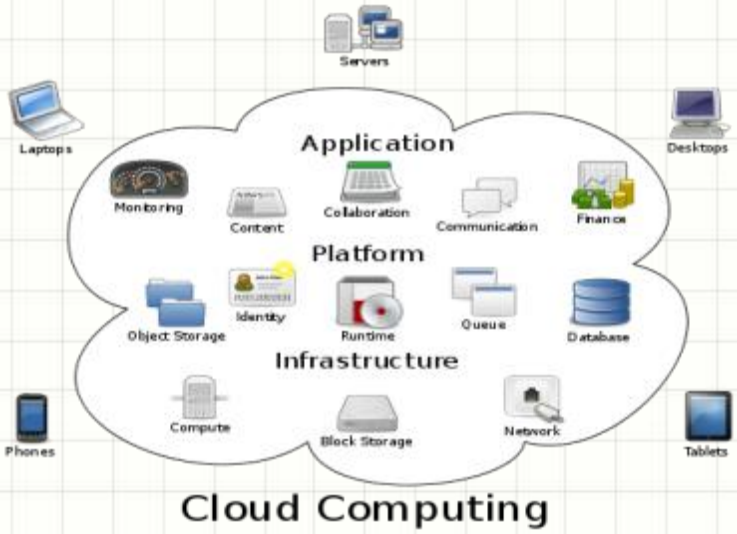
KEY WORDS

- Internet
- Store
- Compute
- Data

Cloud is not Grid computing

GRID COMPUTING

- Less request
- Big quantity of computation



- More request
- Less quantity of computation

General Benefits

- Flesibility
- Easy to use
- Back UP
- Strong Security
- Data redundancy
- Cost

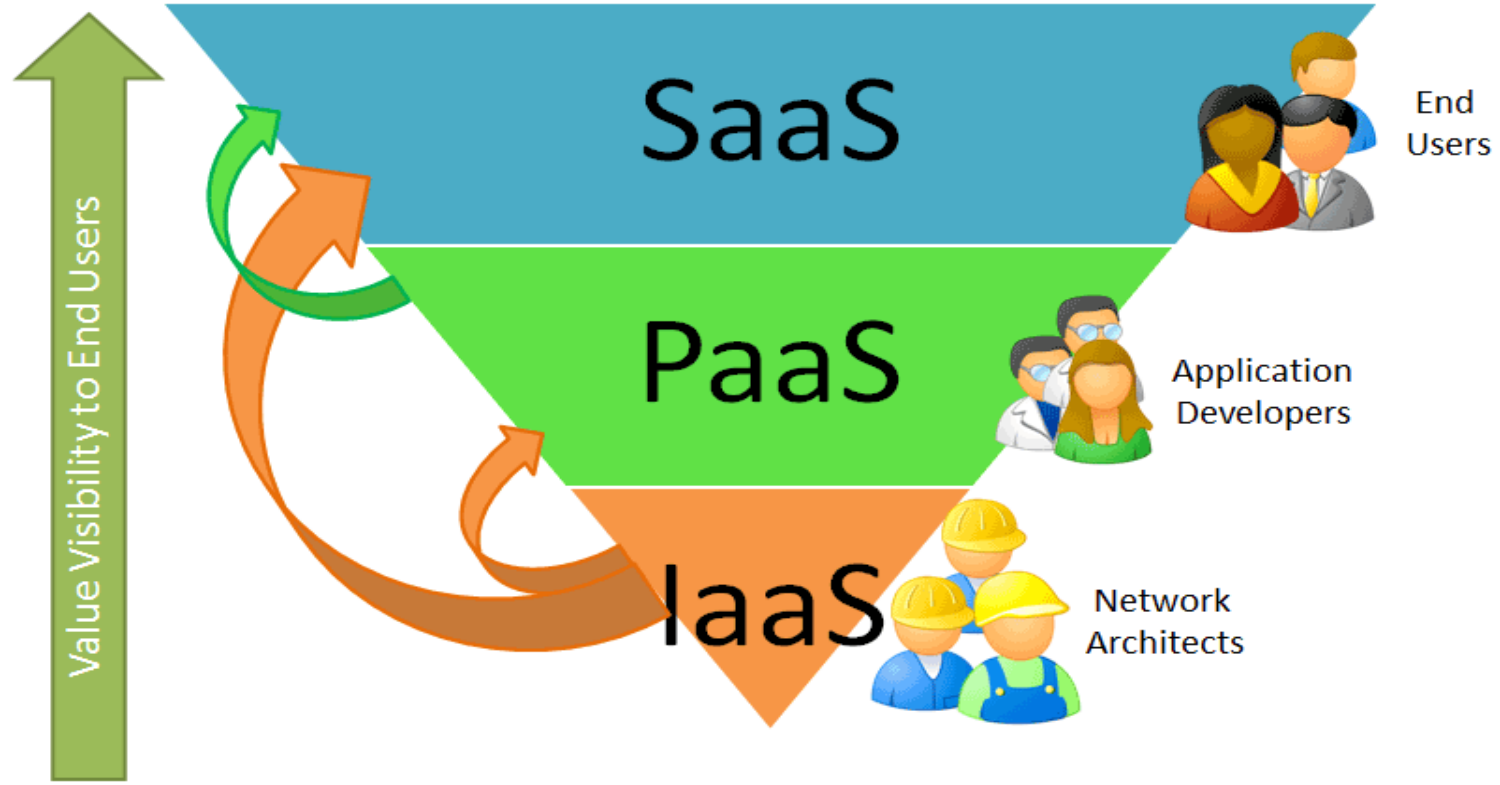
Drowback

- Prepare to pay once you outgrow free versions
- Limited features determined by your provider
- Security is only as strong as your password
- Must trust the company

Main characteristics

- Application programming interface (API)
- Device and location independence
- Virtualization technology
- Multitenancy
- Performance
- Mantainance

Structure of Cloud Computing



Cloud Computing : IAAS

- It’s the architectural and infrastructural part of the cloud
- Physical machine or VM, raw block storage, laod balancer network
- Realize companies infrastructure
- Pay for use

- Amazon CloudFormation (EC2), RackSpace,Google Compute Engine, RightScale

Cloud Computing : PAAS

- Platform with operating system and program language environment, database, web server
- Develop and Run software

- Google App Engine

Cloud Computing : SAAS

- Use of software on the cloud
- Develop and Run software
- User not manage the infrastructure where the software run
- No installation

- Google Apps, salesforce.com

Cloud Computing : types

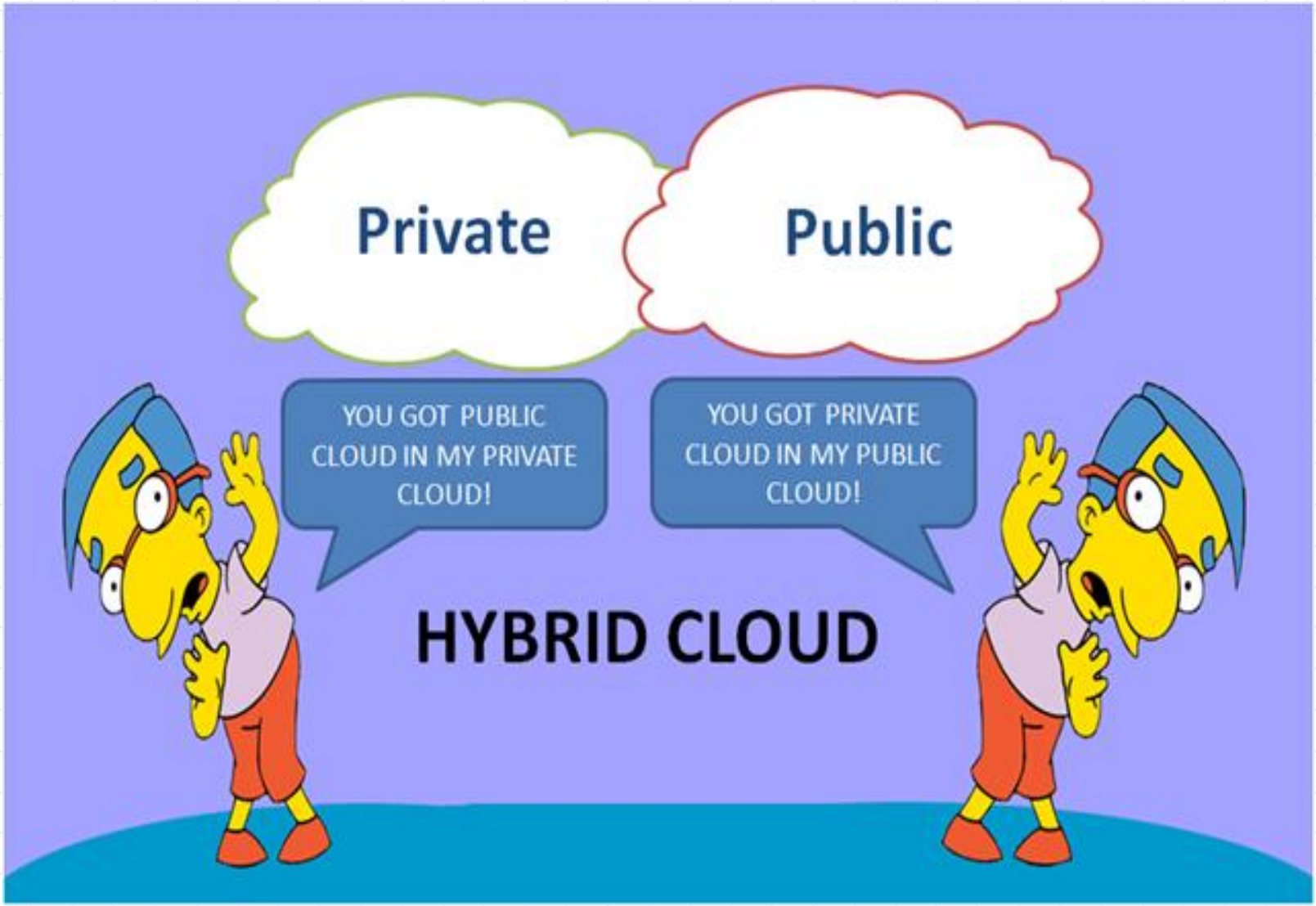
Public Cloud

- Hosted at a Service Provider Site
- Supports multiple customers
- Often utilizes shared infrastructure
- Supports connectivity over the internet
- Suited for information that is not sensitive
- Can be cheaper than private cloud

Private Cloud

- Hosted at an Enterprise or a Service Provider site
- Supports one customer
- Does not utilize shared infrastructure
- Connectivity over private network/ fiber or the internet
- Suited for information that is needs a high level of security

Cloud Computing : types



Cloud Storage

DAAS (Cloud Storage)

- Data Storage As A Service (DAAS)

Is a service that extend the memorization capacity of an user via internet without excessive cost or with very low costs

- Cost related to GB required and how long the space is used (month , year)

What's new ?

- **Online Backup**
- **Your Music in the cloud**
- **Sharing files**
- **Collaboration**
- **Synchronizing profiles (or devices) and mailboxes**
- **Use as External Hard Drives**
- **Access files from third party systems**

When is usefull

- When we serve our members tens of gigabytes of static files: files, photos, documents, videos or any other document
- Backup: Cloud storage is a great solution to store backups at a reduced cost
- Web applications: if we interface to storage directly from our application
- The Cloud storage involves a fully automated file replication
- We need a solution that allows us access to files even via CDN services, with a simple configuration
- We can synchronize our devices so to have ever with us our data

When not

- Cloud storage is not suitable for the storage of web pages and databases, we can not use it for these activities
- Not ideal in environments that require file access time low
- It can not replace a SAN for storage of virtual images of our VM
- It is not suitable as a component for a disaster recovery solution for the reasons listed: you can not access to files quickly, first of all.

Anatomy of a cloud storage

Cloud storage (or data storage as a service) is the abstraction of storage behind an interface where the storage can be administered on demand

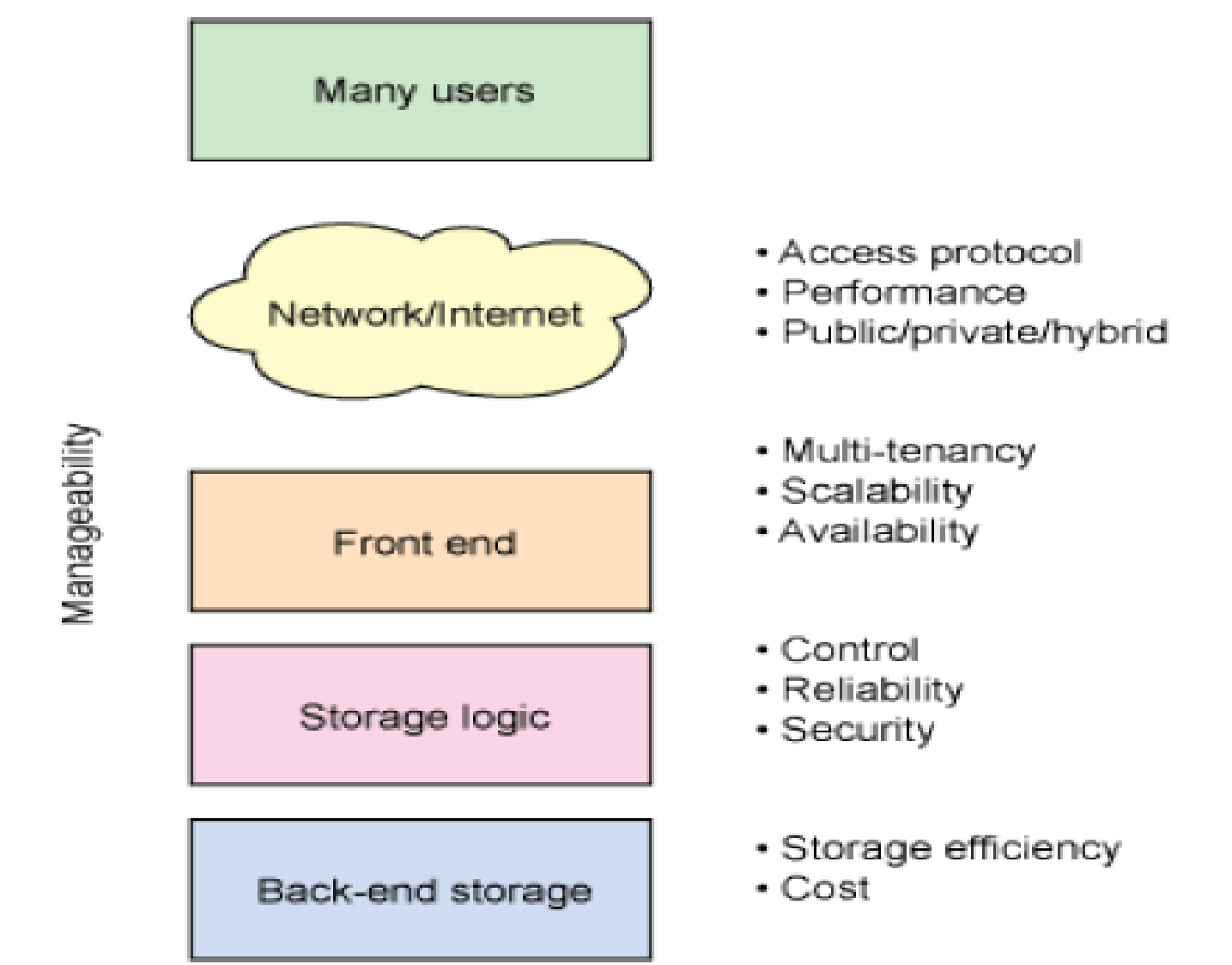
+

The interface abstracts the location of the storage such that it is irrelevant whether the storage is local or remote (or hybrid)

Cloud Storage: architecture

Cloud storage architectures are primarily about delivery of storage on demand ina highly scalable and multi-tenant way

Cloud Storage Architecture



Cloud Storage Characteristics

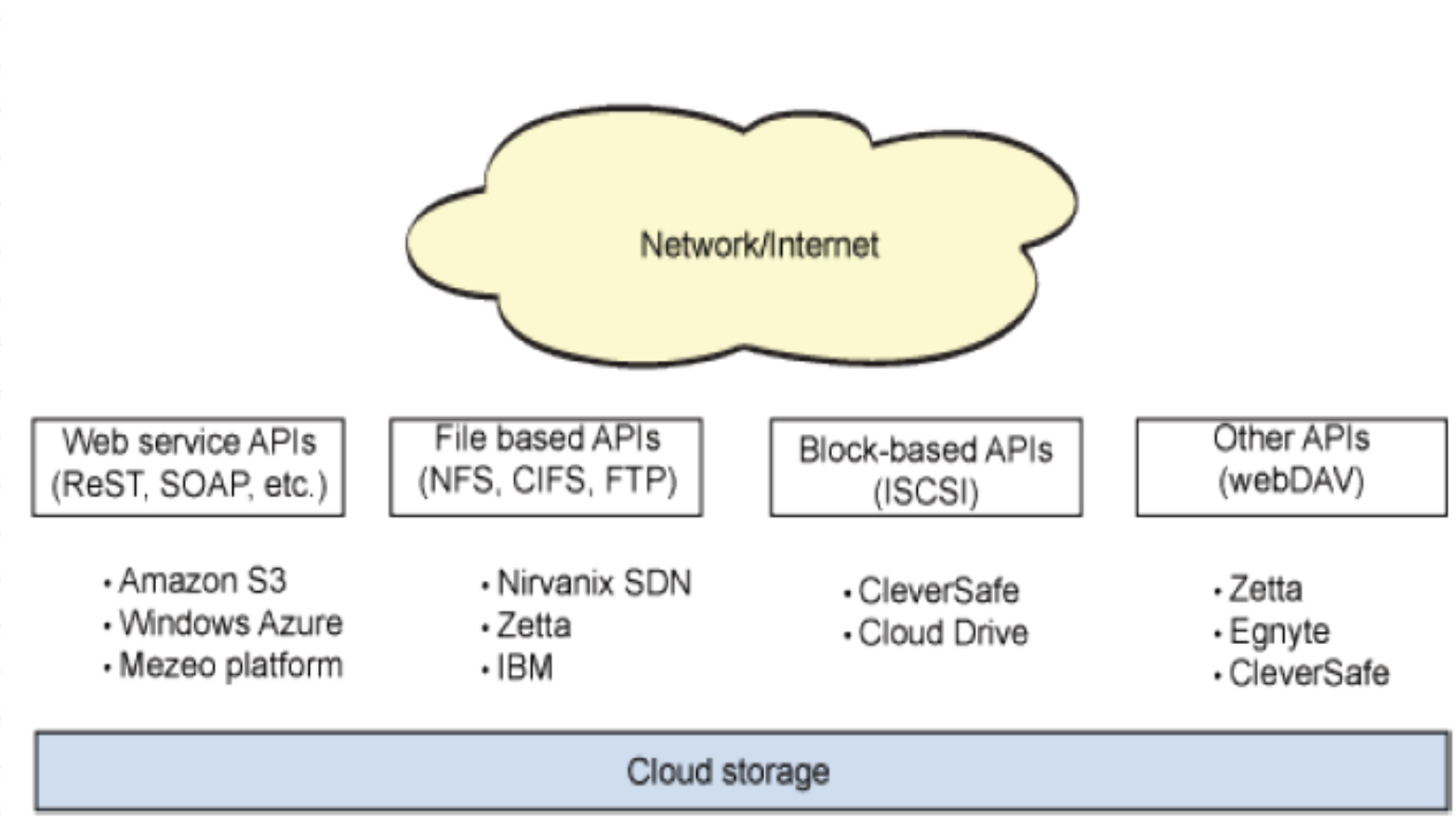
Characteristic	Description
Manageability	The ability to manage a system with minimal resources
Access method	Protocol through which cloud storage is exposed
Performance	Performance as measured by bandwidth and latency
Multi-tenancy	Support for multiple users (or tenants)
Scalability	Ability to scale to meet higher demands or load in a graceful manner
Data availability	Measure of a system's uptime
Control	Ability to control a system—in particular, to configure for cost, performance, or other characteristics
Storage efficiency	Measure of how efficiently the raw storage is used
Cost	Measure of the cost of the storage (commonly in dollars per gigabyte)

Cloud Storage characteristics : Manageability

- Cost:
  - Phisical Cost
  - Manageamnt Cost

The management cost is hidden but represents a long-term component of the overall cost.

Cloud Storage characteristics : Access method



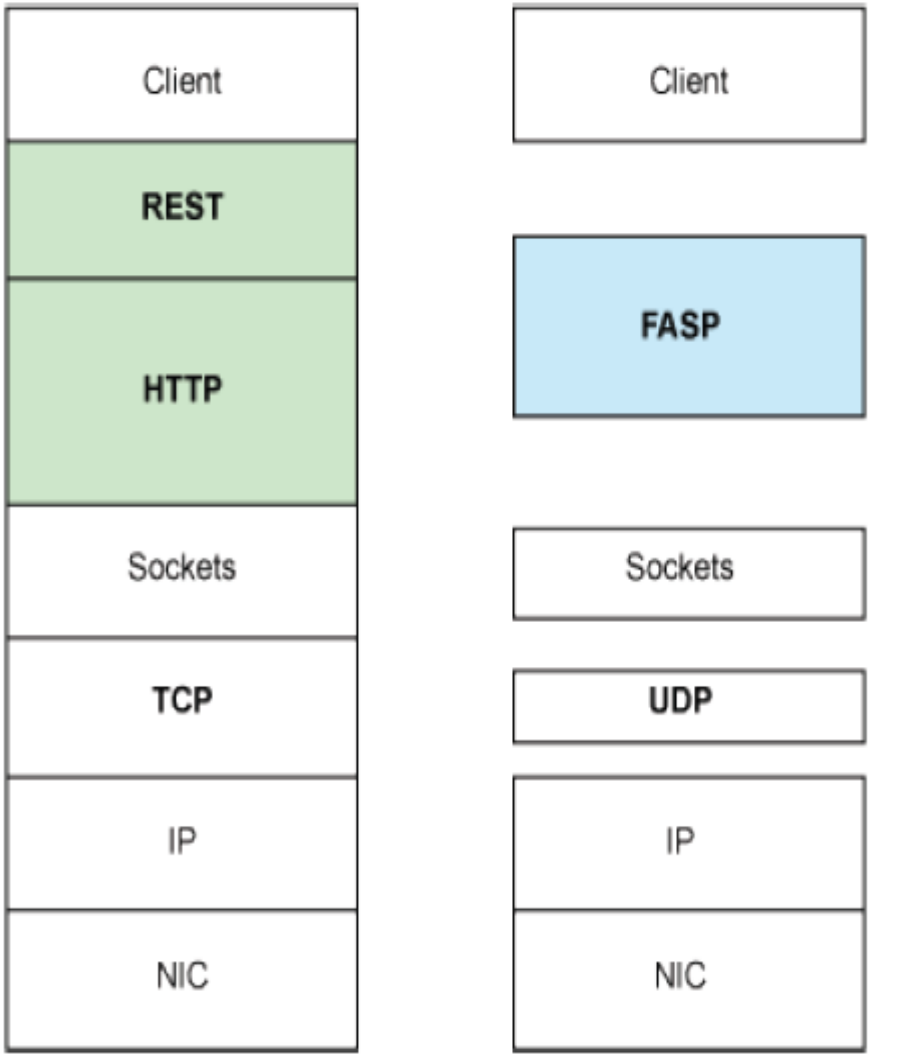
The REST API is a popular method for accessing cloud storage infrastructures

Cloud Storage characteristics : Performance 1

Many aspect to consider when we talk about performance

- Ability to move data between user and remote storage
- TCP and its problem…
- The solution of Amazon with Aspera (FASP)

Cloud Storage characteristics : Performance 2



The protocol FASP used by Amazon to tranfer Dara (www.asperasoft.com)

Cloud Storage characteristics : Multitenancy

This simply means that the storage is used by many users (or multiple "tenants"). Multi-tenancy applies to many layers of the cloud storage stack, from the application layer, where the storage namespace is segregated among users, to the storage layer, where physical storage can be segregated for particular users or classes of users.

Cloud Storage characteristics : Scalability

The ability to scale storage needs (both up and down) means improved cost for the user and increased complexity for the clouds storage provider.

- Functionality scaling
- Load scaling
- Geographic scalability
- Immagine scalabilità in inserimento

Cloud Storage characteristics : Availability 1

The cloud storage provider must be able to provide that data back to user upon request

- Difficult to provide in reliable and deterministic way

There are new and interesting schemas to provide Availability:

- IDA by company CleverSafe

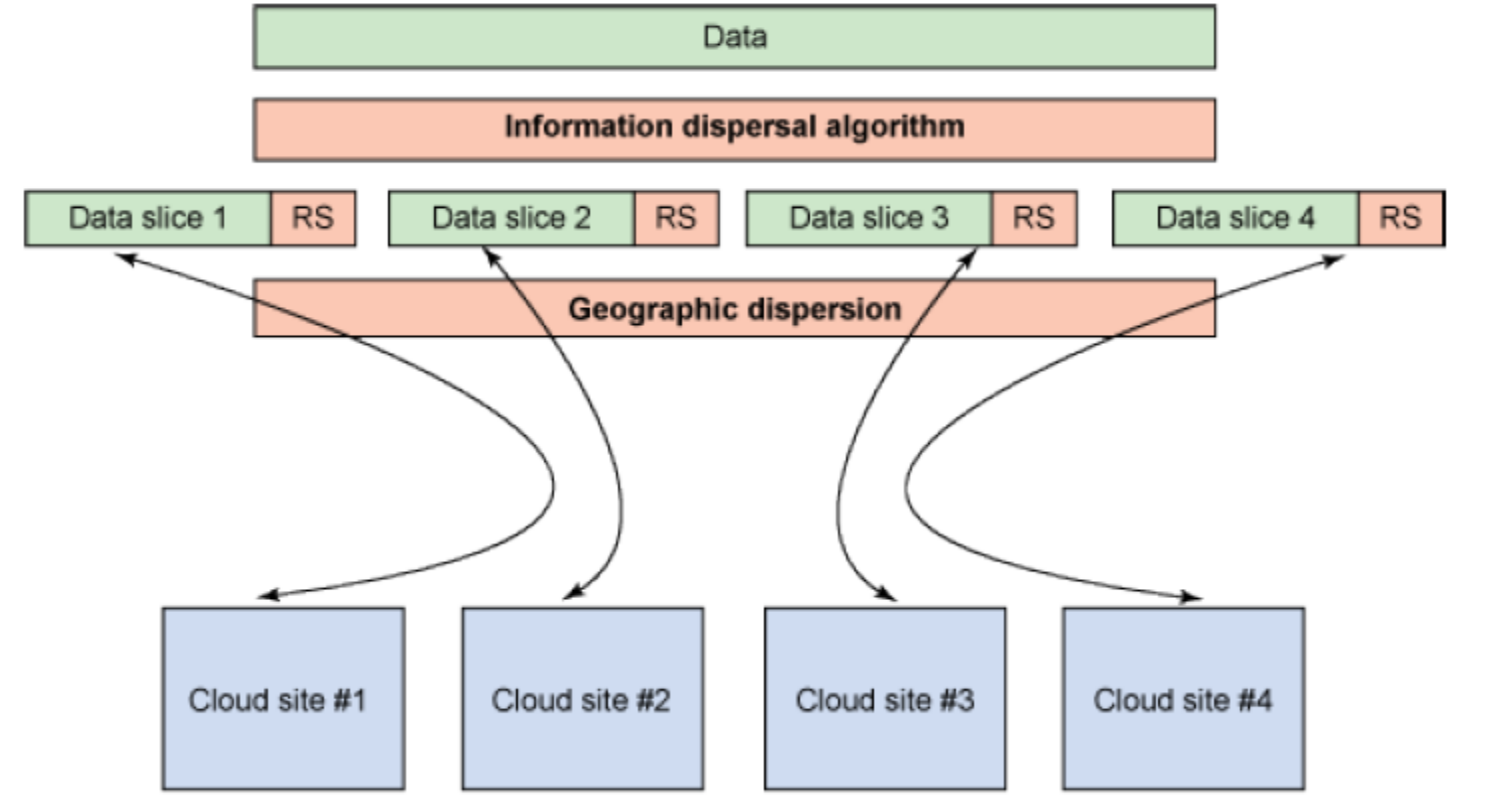
Cloud Storage characteristics : Availability 2

Information Dispersal Algorithm (IDA):

Is an algorithm that allows data to be sliced with Reed-Solomon codes for purposes of data reconstruction in the face of missing data

permits the reconstruction of data from a subset of the original data, with some amount of overhead for error codes and depending on the tolerated error

Cloud Storage characteristics : Availability 3



- For of slices (*p*) and a number of tolerated failures (*m*), the resulting overhead is *p*/(*p*-*m*). So, in the case of Figure 5, the overhead to the storage system for *p* = 4 and *m* = 1 is 33%.

Cloud Storage characteristics : Availability 4

- Problems:
  - processing intensive without hardware acceleration
- Replication (large amount of overhead)

Cloud Storage characteristics : Control

A customer's ability to control and manage how his or her data is stored and the costs associated with it is important.

Numerous cloud storage providers implement controls that give users greater control over their costs.

- Amazon implements Reduced Redundancy Storage (RRS) to provide users with a means of minimizing overall storage costs. Data is replicated within the Amazon S3infrastructure, but with RRS, the data is replicated fewer times with the possibility for data loss

Cloud Storage characteristics : Efficiency

Storage efficiency is an important characteristic of cloud storage infrastructures, particularly with their focus on overall cost.

- Data Reduction:
  - *Compression*
  - *De-duplication*

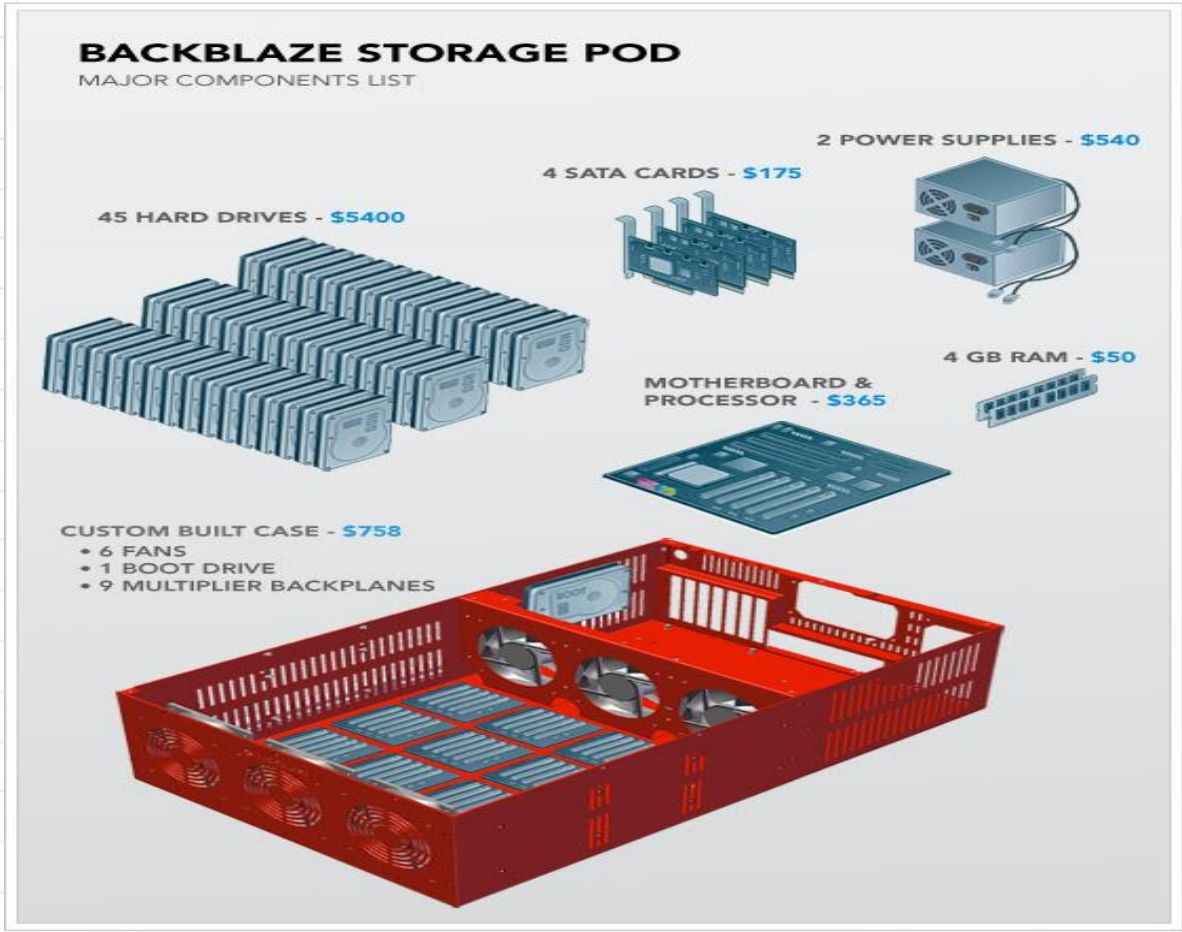
Cloud Storage characteristics : Cost 1

One of the most notable characteristics of cloud storage is the ability to reduce cost through its use

- Purchasing storage
- Powering
- Repairing
- Managing

Cloud Storage characteristics : Cost 2

An interesting case is the Company Blackblaze that set out to build inexpensive storage for a cloud storage offering



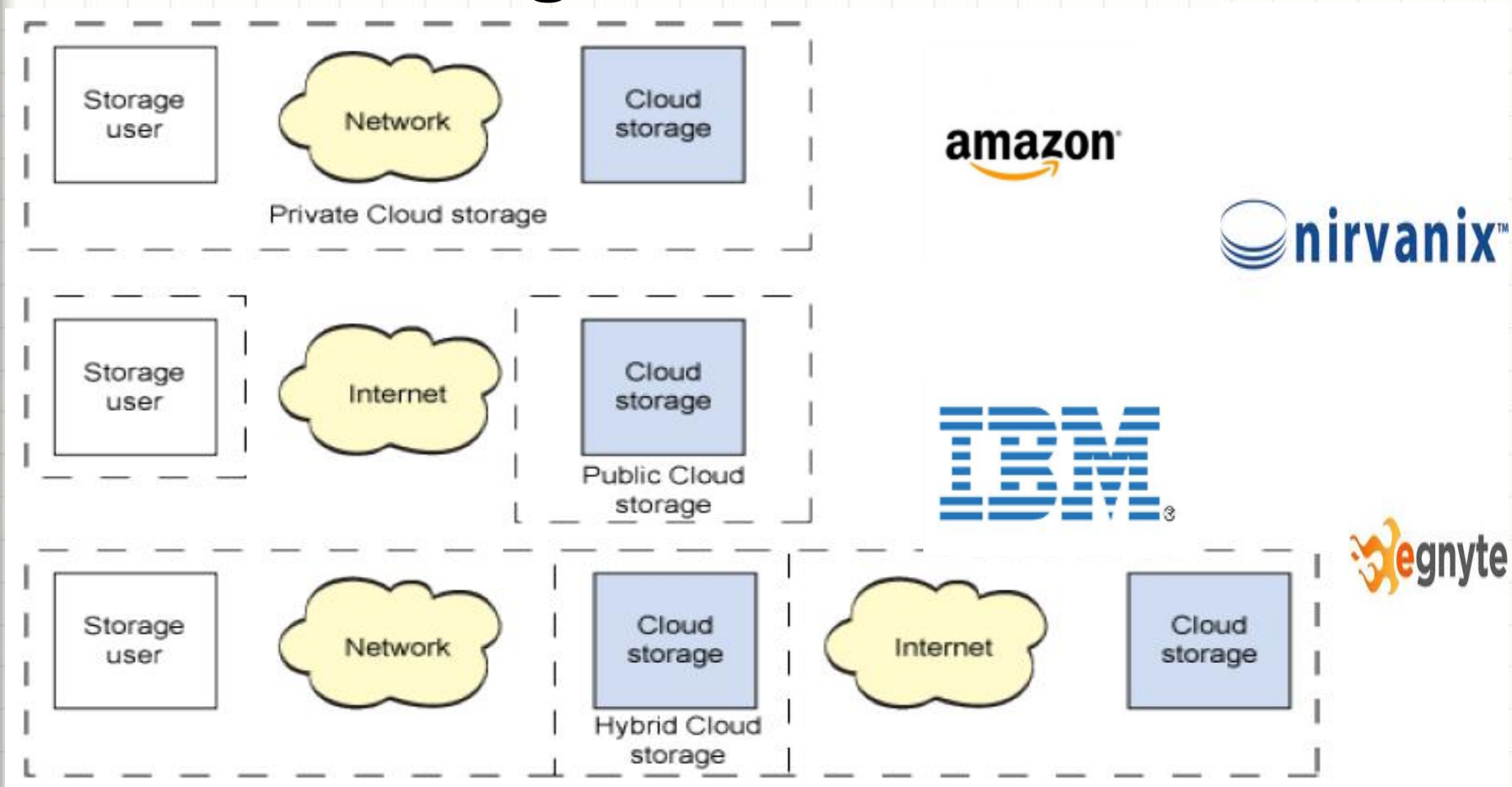
Cloud Storage Models 1

Cloud storage has evolved into three categories, one of which permits the merging of two categories for a cost-efficient and secure option.

We can have:

- ***Public Cloud Storage***
- ***Private Cloud Storage***
- ***Hybrid Cloud Storage***

Cloud Storage Models 2



Cloud Storage Providers

Cloud Storage providers

Analisys Parameter:

- *Features (File/folder sharing, link sharing, file versionig, incremental back-up….)*
- *Access (web browser, mobile website/app, desktop app, multisync…)*
- *Security (SSL/TLS encryption, password protect sharing…)*
- *Supported platform*

Cloud Storage providers

Types of cloud service:

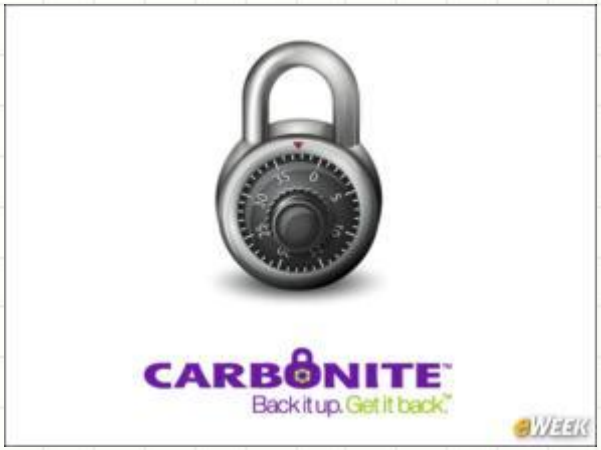
- BACKUP -> (*MOZY , CARBONITE*)
- REMOTE STORAGE -> (*BOX.NET , GOOGLE CLOUD DRIVE , AMAZON CLOUD DRIVE*)
- SYNC -> (*iCLOUD , UBUNTU ONE*)
- HYBRID -> (*SKY DRIVE + LIVE MESH , DROPBOX*)

Cloud Storage providers: Backup

Features:

- Back-up and restore an entire HD
- Local Client
- Drag&Drop
- Recent sync functionality
- Start with 50GB for $5.99/Month or 100GB for $9.99
- No file sharing capabilities
- File versioning,incremental back-up,
- Strong security (128-bit encryption and 448bit blowfish encryption)

Cloud Storage providers: Backup



Features:

- Fast and unlimited back-up with only $8,25/Year
- Service plan it’s only annual
- You can subscribe only one pc for data back-up
- Schedule back-up and automatic
- Not slowest on upload
- No file versioning or sharing capabilites

Cloud Storage providers: Remote storage

Features:

- The ideal for professional users
- File storage entirely web-based
- 5GB as a free user, $10 for 25GB
- Limits on uploaded file (25MB in case of the free service, 1GB in case of payment)
- A good solution for file sharing, not for back up options
- Web-based and not automatic back-up
- Simple to use, fast upload

Cloud Storage providers: Remote storage

Features:

- Full integrated with other google application
- CREATION AND COLLABORATION
- STORE EVERYTHING SAFELY AND ACCESS IT ANYWHERE
- SAERCH EVERYTHING
- 5GB free upgrade to 25GB for $2,50/month until to $49,99/month
- Use via web or desktop application

Cloud Storage providers:

Remote storage

Features:

amazon cloud drive

Storage Plan		Songs Holds up to:	Photos Holds up to:	HD Video Holds up to:
5 GB	FREE	1,000	2,000	20 minutes
20 GB	$20 / year	Unlimited	8,000	1.5 hours
50 GB	$50 / year	Unlimited	20,000	3.5 hours
100 GB	$100 / year	Unlimited	40,000	7 hours
200 GB	$200 / year	Unlimited	80,000	14 hours
500 GB	$500 / year	Unlimited	200,000	35 hours
1000 GB	$1000 / year	Unlimited	400,000	70 hours

Cloud Storage providers: Sync

Features:

iCloud Plans					
PAESE	**5GB**	**10GB (TOT.15)**	**20GB (tot.25)**	**50GB (tot.55)**	
Australia	FREE	21$	42$	105$	
Europe	FREE	16 €	32 €	80 €	
United-Kingdom	FREE	14£	28£	70£	
USA	FREE	20$	40$	100$	

Cloud Storage providers: Sync

Features:

- 5GB free upgradeable for $2,99/Month for each 20GB added
- Syncronization of all pc connected to the account using the client available for all OS
- One Music Store

Cloud Storage providers: Hybrid

Features:

- Only 2GB as a free upgradable to 16 inviting friends at the service
- SSL protocol for transfer file and AES to file ciphered on the storage
- Simplicity
- Great support service

Cloud Storage providers: Hybrid

Features:

- 25GB free (you just have an account on windows live)
- Limit on upload (only 300MB for each file)
- Access to other service:
  - Windows Live Photos
  - Office live App
- Loading is not very fast (30kb/s - 70kb/s)

Conclusion

Cloud storage is an interesting evolution in storage models that redefines the ways that we construct, access, and manage storage within an enterprise. Although cloud storage is predominantly a consumer technology today, it is quickly evolving toward enterprise quality. Hybrid models of clouds will enable enterprises to maintain their confidential data within a local data center, while relegating less confidential data to the cloud for cost savings and geographic protection.


THANKS
FOR
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