



Education

# Cloud Storage Clients

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## ➤ Cloud Storage Clients

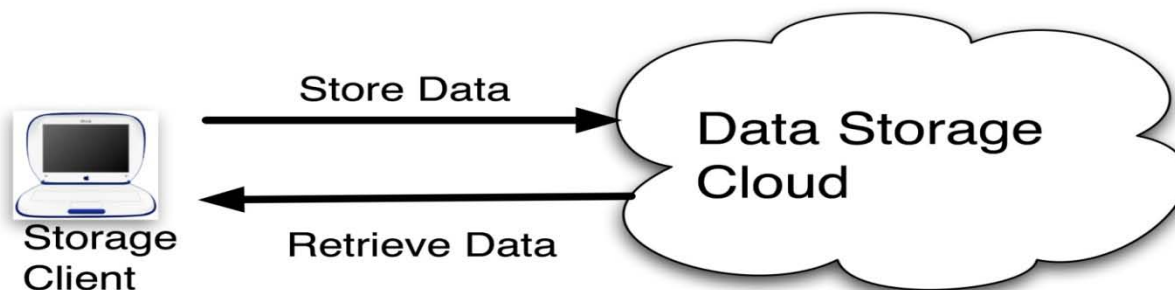
- ◆ Cloud Storage is a broad term being applied to many technologies, services, and products.
  - There are a dizzying array of technical terms used when discussing cloud storage (ex: CDMI, RESTful, APIs, NFS, CIFS, Objects, NOSQL, Key-Value Stores, Big Data, ...).
  - There are numerous services for cloud storage each offering their own proprietary interfaces (Amazon S3, Google, Rackspace Files, ...).
  - There will also be many Cloud Storage products/technologies deployed inside of Enterprises.
- ◆ Complicating things further, as we become ever more mobile, we are moving to multiple devices all of which do not have traditional file systems (ex: smartphones, tablets). Thus the way in which we store and interact with our data changes quite dramatically.

- Understand what it means to be a "client" of Cloud Storage and how users will interact with their data in this new paradigm.
- Understand the current landscape of proprietary and standard's based Cloud Storage options. (For both Public and Private Cloud Storage)
- Example demo of one or two cloud storage clients (time permitting)

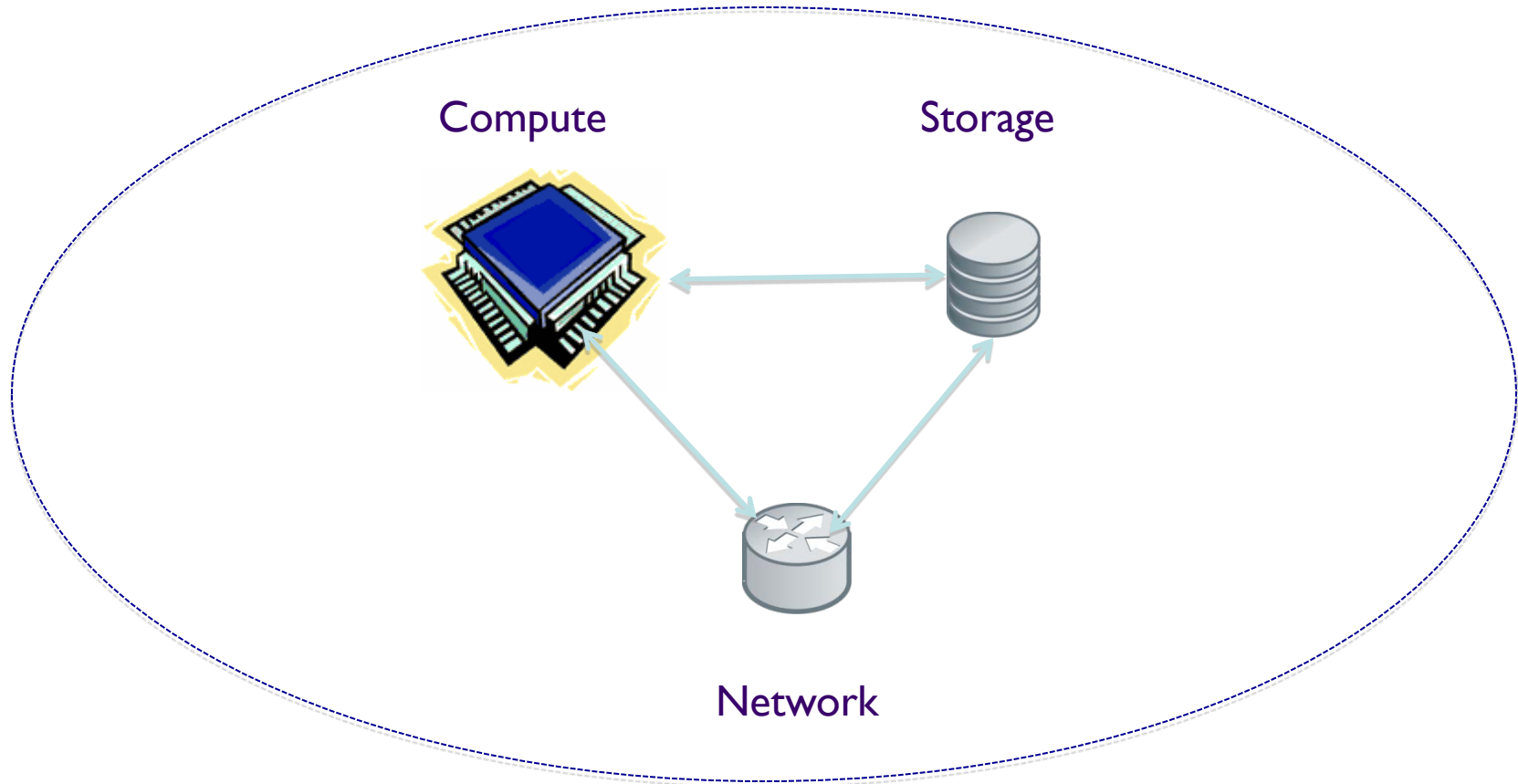
- 1) SNIA base definition
- 2) Additions to base definition
- 3) Cloud Storage client concepts
- Remember: Always at least two points of view (usually more):
  - ◆ Cloud as a primary business model v.
  - ◆ Cloud as a technology
- Note: The Speaker acknowledges that there are multiple, even conflicting, definitions of Cloud. This tutorial is created from the point of view of a technology first. The audience should be aware that some information available today is not created from that point of view.

# What is Cloud Storage? (SNIA)

- The use of the term **cloud** in describing these new models arose from **architecture** drawings that typically used a cloud as the dominant networking icon.
- The cloud conceptually represented any to any connectivity in a network, but also an **abstraction** of concerns such the actual connectivity and the services running in the network that accomplish that connectivity with little manual intervention.



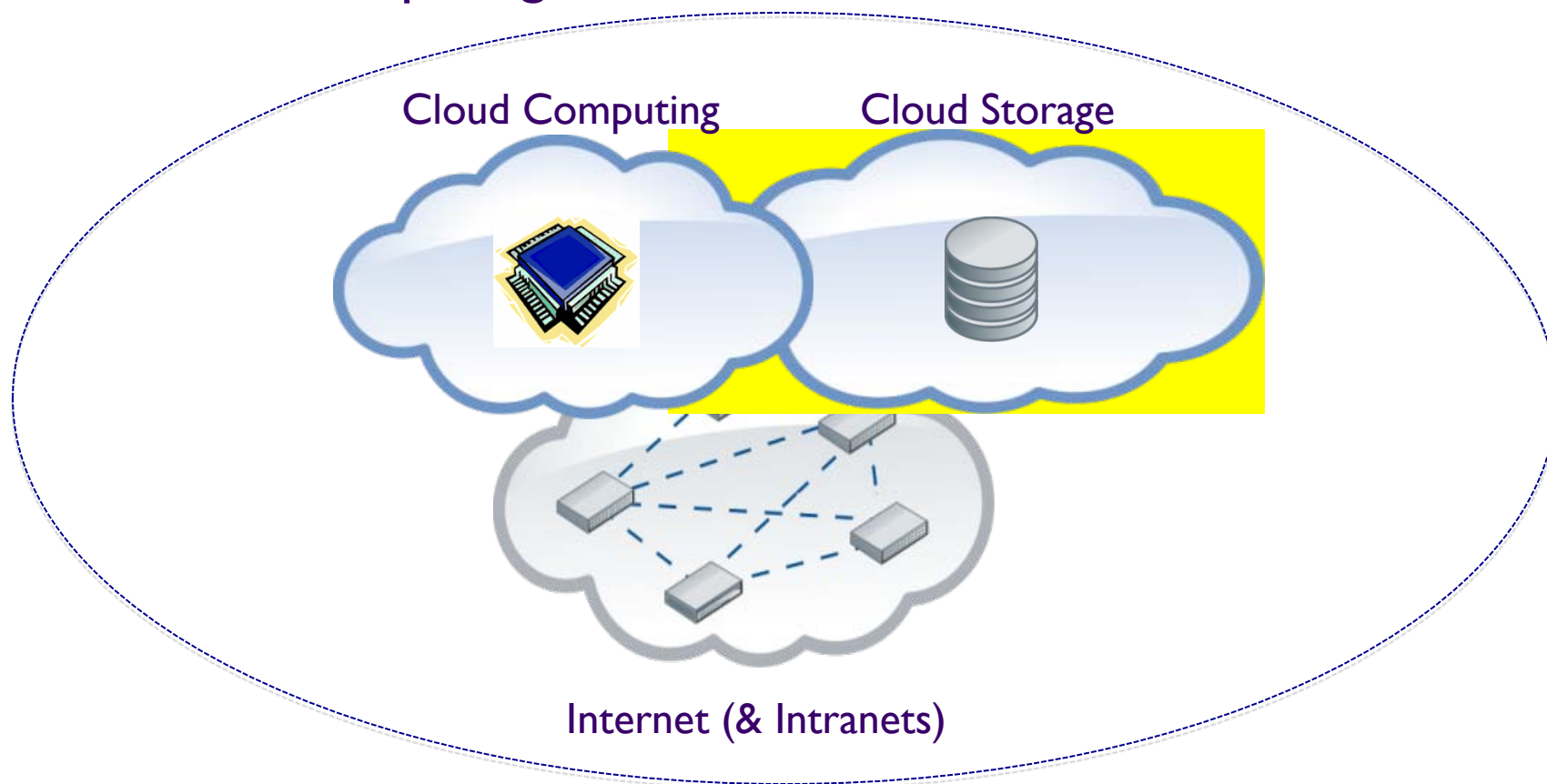
- This abstraction of complexity and promotion of simplicity is what primarily constitutes a cloud of resources, regardless of type.
  - ◆ An important part of the cloud model in general is the concept of a pool of resources that is drawn from upon demand in small increments (smaller than what you would typically purchase by buying equipment).
  - ◆ The recent innovation that has made this possible is virtualization.
- Thus cloud storage is simply the delivery of virtualized storage on demand. The formal term we proposed for this is Data Storage as a Service (DaaS).
- Data Storage as a Service
  - ◆ Delivery over a network of appropriately configured virtual storage and related data services, based on a request for a given service level.
  - ◆ Typically, DaaS hides limits to scalability, is either self-provisioned or provisionless and is billed based on consumption.



Basic building blocks of a modern computing environment, 3 legs



## Computing Environment “Cloud-ification”



Cloud as an architecture & abstraction

# “Traditional” Storage: Client/Server Model

## Today’s Persistent Storage Paradigm...

### ➤ NAS: File-based

- ◆ CIFS
- ◆ NFS

### ➤ SAN: Block-based

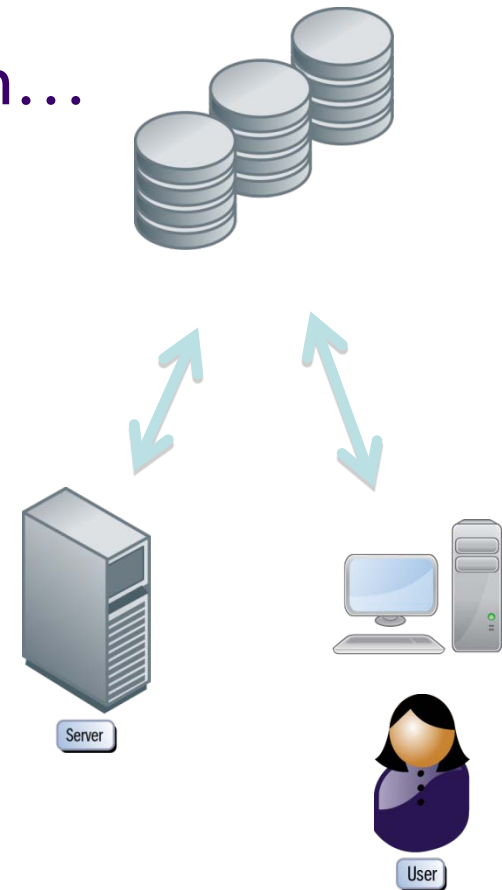
- ◆ FibreChannel
- ◆ iSCSI

### ➤ Relational Database

- ◆ SQL

### ➤ Notes:

- ◆ Servers are very monolithic, even when clustering
- ◆ Applicable to non-storage client server as well



## ➤ Factors

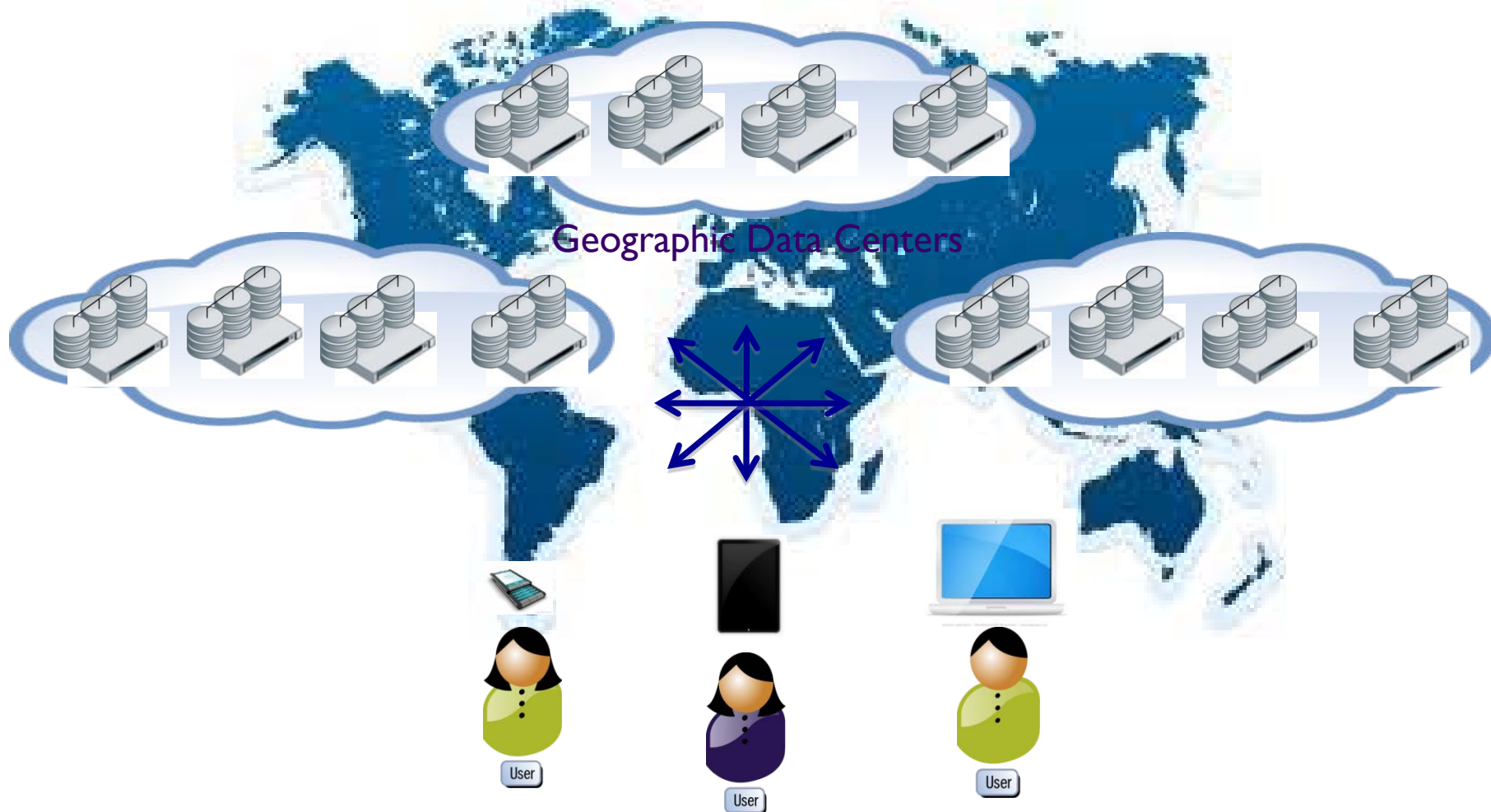
- ◆ Mobile Workforce
- ◆ Standardized x86 Hardware
- ◆ Very High Capacity Disk Drives
- ◆ The Web
- ◆ Data Explosion
- ◆ Moore's Law

## ➤ Results – New Applications for Storage

- ◆ Many more server nodes: scale-out, not up
- ◆ More disconnected client devices: laptops, smartphones, tablets
- ◆ Everything online
- ◆ Everything kept forever
- ◆ Most data is fixed content & semi-structured

# Results: “Big Data”

## Cloud Storage




Cloud Storage Clients

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# Non-Traditional Data Stores

- APIs Everywhere: Application Programmer Interfaces
- Early Days: Proprietary
  - ◆ Examples: Amazon S3, Rackspace Cloud Files, Google GData, Iron Mountain, Twitter API, flickr API, Sun Cloud API, Facebook APIs, Bycast, Caringo SCSP
- NOSQL: Not Only SQL
  - ◆ A whole movement around non-relational databases
  - ◆ Store Types: Key Value, Column, Document, Graph
- Notes:
  - ◆ In most cases, non-traditional stores **complement** traditional data stores.
  - ◆ Internet based Cloud **Services** get the most press, but there are many other types. “Cloud Storage Services” are a subset of Cloud Storage (Think Intranets)
  - ◆ Some companies are applying traditional APIs to problem, which implies traditional clients (NFS, CIFS, SQL, ...)

# “Standards” Emerge

- RESTful Web Services (RESTful HTTP)
- Cloud Data Management Interface (CDMI)
- Java Script Object Notation (JSON)
  
- Notes:
  - ◆ These are just a few, but most relevant to Cloud Storage
  -  There is an entire tutorial on CDMI

- **Representation State Transfer**
  - ◆ Started with [Dissertation by Roy Fielding](#) outlining the principles
- **Addressability**
  - ◆ Every object (resource) is addressable through a unique identifier
- **Uniform, Constrained Interface**
  - ◆ Use only HTTP verbs and model other semantics in the data model
  - ◆ Allows for Familiarity (low learning curve), Interoperability and Scalability
- **Representation Oriented**
  - ◆ Complexity is in the representations
- **Communicate Statelessly**
  - ◆ No persistent client-server connections

## ➤ Characteristics

- ◆ Hybrid: Web + Local (App-like, also Rich Internet Application)
- ◆ RESTful HTTP
- ◆ Disconnected Operations
- ◆ Local Caching
- ◆ Data Synchronization
- ◆ Data as Objects with Metadata



## ➤ Just a Few Examples (there are many more):

- ◆ Mac & iPhone: Apple iDisk
- ◆ Windows: Microsoft Live Mesh / Windows Live Sync
- ◆ Linux: Ubuntu One
- ◆ Firefox + Gears (Google Docs\*)
- ◆ Rich Media apps, iPad Magazines/Newspapers
- ◆ Social Apps, Facebook, ...

## ➤ Notes:

- ◆ Other Servers can also be cloud storage clients, however that use case is not the main topic of this tutorial.
- ◆ Again, it's not always easy to separate compute from storage, hence overlap
- ◆ \* Temporarily disabled

- Many definitions of Cloud, Cloud Storage, Cloud Storage Clients. This tutorial takes a technology point of view that is much broader than just an Internet based service.
- Non-traditional Data Stores have emerged due to factors such as; mobilization, hardware standardization, data explosion and Internet ubiquity.
- Traditional & Non-Traditional data stores generally compliment each other.
- Non-traditional Data Stores are used optimally by non-traditional clients.
- Cloud Storage Clients are generally a hybrid mix of both local & web based applications.
- The most common Cloud Storage standards will be based on RESTful HTTP principles. (ex: CDMI)

- Please send any questions or comments on this presentation to SNIA: [trackcloudtechnologies@snia.org](mailto:trackcloudtechnologies@snia.org)

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