

What You Need to Know on Cloud Storage

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Session Agenda

Part 1

- What is Cloud Storage?
- Introduction to HTTP
- Introduction to REST
- Break
- Part 2
 - Introduction to CDMI



The use of the term "cloud" arose from network architecture drawings that abstracted away details that didn't matter so that could be ignored.



The first known "Cloud" diagram was used in 1977 to abstract away the internal structure of ARPANET.



- Thus, "Cloud Storage" is the abstraction of the complexity of storage to the point where you can largely ignore it's implementation, location and operation.
- Some key differentiators:
 - Typically operated as a service (internally or externally)
 - Single access point (an HTTP URL is typical)
 - Self-service, self-provisioning and billed on usage



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- Examples of uses of Cloud Storage have grown to encompass virtually all storage applications, but are especially common for:
 - Internet-based media storage (photos, videos, etc.)
 - Web document repositories
 - Backup
 - Sync and share
 - Third platform applications



What does a typical cloud storage experience look like?

- □ 1. Select provider
- 2. Sign up (provide credit card)
- **3**. Create endpoint using provider web interface
- 4. Test using Cloud Storage API to store and retrieve
- **5.** Integrate Cloud API with application
- 6. Application uses Cloud API for store and retrieve
- 7. Pay based on usage

■ This can be done in less than a day (or even an hour)!





compared to traditional IT storage procurement and provisioning

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■ How does this map to the standard storage model?





- Some important concepts
 - Metadata Information about the data stored.
 - Examples of metadata include:
 - The date a photo was taken on
 - The author of a document
 - The number of times a file was accessed
 - Who is allowed to access a document
 - Policies Directives controlling how storage is managed







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Introduction to HTTP

- □ HTTP is the protocol that underpins the web
- HTTP runs over TCP/IP, and is based around three main concepts:
 - Verbs Commands that tell a server what to do
 - Headers Key/Value pairs used to provide control and metadata signaling
 - Bodies The contents of the operation
- In HTTP, every operation (verb) is performed against a "resource", which exists at a named location (URL).
 - Operations involve a "representation" of a given resource.
 - For example, a stored image may be retrieved as a JPEG or PNG (two representations of the same resource)



Introduction to HTTP

DEMONSTRATION OF BASIC HTTP CONCEPTS



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Introduction to REST

REpresentation State Transfer

- Started with a dissertation by Roy Fielding outlining the principles
- Addressability
 - Every object (resource) is addressable through a unique identifier
- Uniform, Constrained Interface
 - Use 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

Introduction to REST

- Why are RESTful APIs widely used?
 - Simplicity!
 - Safety no side effects and operation idempotency.
 - Commonly available and built-in infrastructures in many programming languages and for many platforms
 - Low learning curve leads to developer adoption
 - Developer adoption creates eco-system around API
 - Eco-system eases adoption by vendors and customers
 - Well suited for scale-out implementations



SDC 2015 Cloud Storage Primer

BREAK



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- CDMI (Cloud Data Management Interface) is a RESTful API for accessing and managing cloud storage.
- The major cloud storage APIs are:
 - Amazon S3
 - CDMI
 - Microsoft Azure
 - Swift API (part of OpenStack)
- CDMI is widely implemented
 - >30 server implementations
 - CDMI gateways, OpenStack support

- 2009: SNIA Cloud Technical Working Group founded to explore API standardization
- 2011: CDMI 1.0 ratified as a US Technical Architecture
 - CDMI 1.0.1 errata released in late 2011
 - CDMI 1.0.2 errata released in mid 2012
- **2012: CDMI 1.0.2 becomes ISO/IEC 17826:2012**
- 2013: CDMI 1.1 under active development
 - 18 Extensions submitted
- **2016: CDMI 1.1.1 becomes ISO/IEC 17826:2016**
 - 13 Extensions submitted, 5 incorporated







Why does CDMI Matter?

- Simple and easy to implement
 - Start with HTTP and add functionality, few mandatory parts
- Advanced functionality not found in other APIs
 - Provides a foundation for next generation cloud services, such as federation
- Open industry standard
 - Not controlled by any one vendor, protection against patents
- Well defined formal standard
 - Enables interoperability, testing, and cross-vendor support
- Widespread government support and adoption



- **CDMI** Standardizes:
 - CRUD operations (Create/Read/Update/Delete)
 - Data, Container, Queue and Domain objects
 - Identity and access control model
 - Metadata (including client and vendor extensibility)
 - Query and Notifications
 - Versioning
 - Serialization and Deserialization
 - Interoperability with other NAS and cloud protocols



- The CDMI standard can be downloaded from SNIA's web site:
 - http://www.snia.org/cdmi
- Extensions are defined to extend CDMI
 - http://www.snia.org/tech_activities/publicreview/cdmi
- We will be referring to the CDMI specification for the remainder of this session, so if you have your laptop with you, you'll want to download the CDMI 1.1.1 technical position document to follow along.



Introduction to HTTP

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Thank you!

Questions

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