Swift, S3 or CDMI – Why choose?

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Today's Presenters

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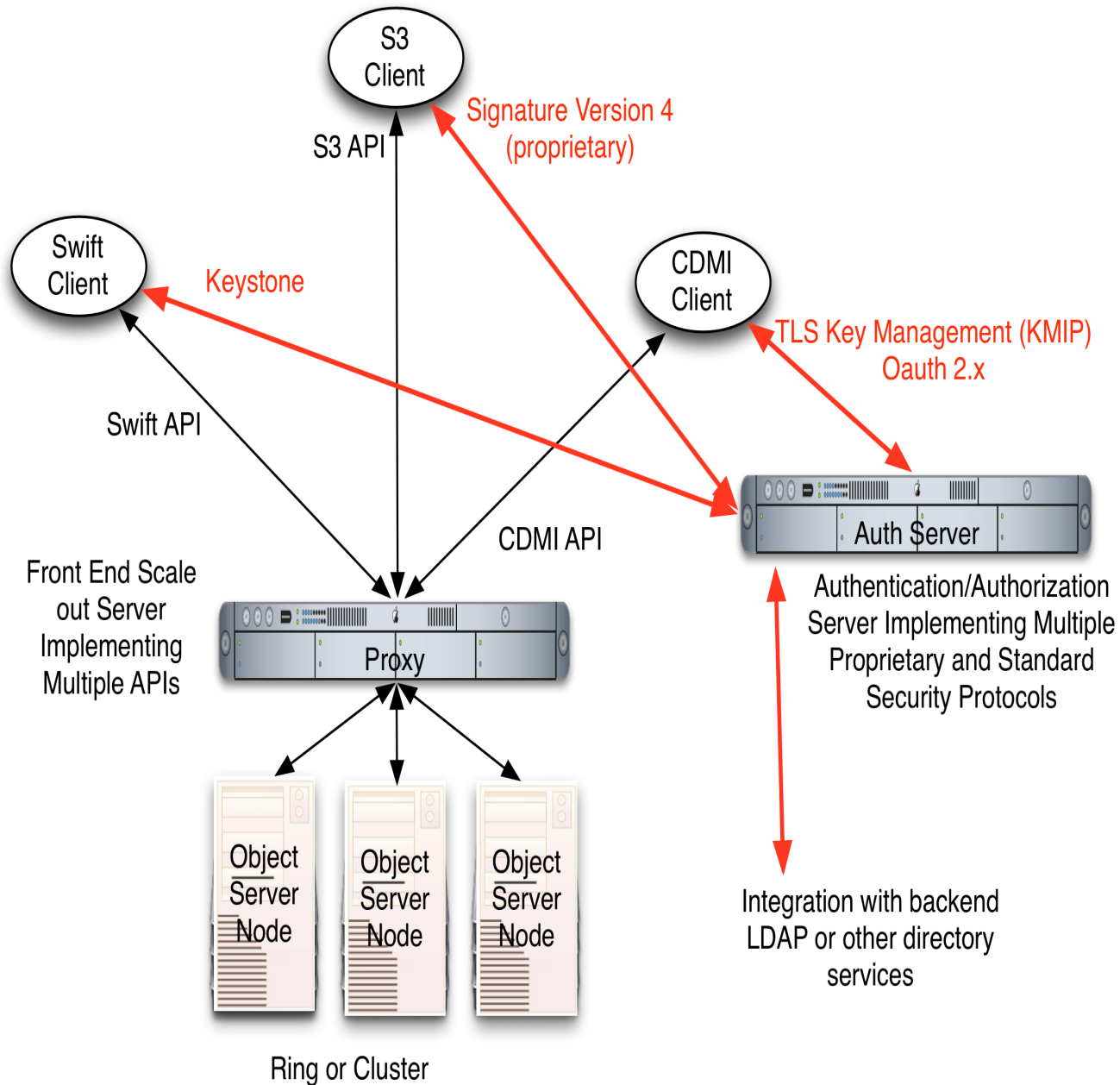**HP Helion Professional Services**

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What experience have you had?

◆ When customers ask for support of a given API, can a vendor survive if they ignore these requests?

◆ A strategy many vendors are taking is to support multiple APIs with a single implementation.

  ◆ Besides the Swift API, many support the S3 defacto and CDMI standard APIs in their implementation.

◆ What is needed for these APIs to co-exist in an implementation?

◆ Basic operations are nearly identical between APIs, but what about semantics that have multiple different expressions such as metadata?

◆ Best practices and tips to implementing multiple protocols in your cloud storage solution

What does this look like?

Breakdown

◆Storage Operations

- •CRUD – All pretty much determined by HTTP standard (common code)

- •Headers are API unique however (handle in API specific modules)

◆Security Operations

- •Client communication with Auth Server (API unique)

- •Multiple separate services running in Auth Server

What resources are available

◆ Comparison of S3/Swift functions

- **https://wiki.openstack.org/wiki/Swift/ APIFeatureComparison**

  - Somewhat dated – needs updating

◆ Implementation of CDMI filter driver for Swift

- **https://github.com/osaddon/cdmi**

  - Stagnant for 2 years

  - Implementation of S3 filter driver for Swift

  - **https://github.com/fujita/swift3**

  - Also stagnant

Support

◆Latest version of CDMI - http://www.snia.org/sites/default/files/ CDMI_Spec_v1.1.1.pdf

•Baseline operations (mostly governed by RFC 2616) now documented in Clause 6 (pgs. 29-36)

•CDMI now uses content type to indicate CDMI-style operations (as opposed to X-CDMI-Specification-Version)

•Spec text that explicitly forbid (in 1.0) functionality required for S3/Swift integration has been removed from the spec.

•HTTP Basic/Digest authentication is no longer mandatory. CDMI implementations can now use S3 or Swift authentication exclusively, if desired.

Discovery of Security Protocol Implementations

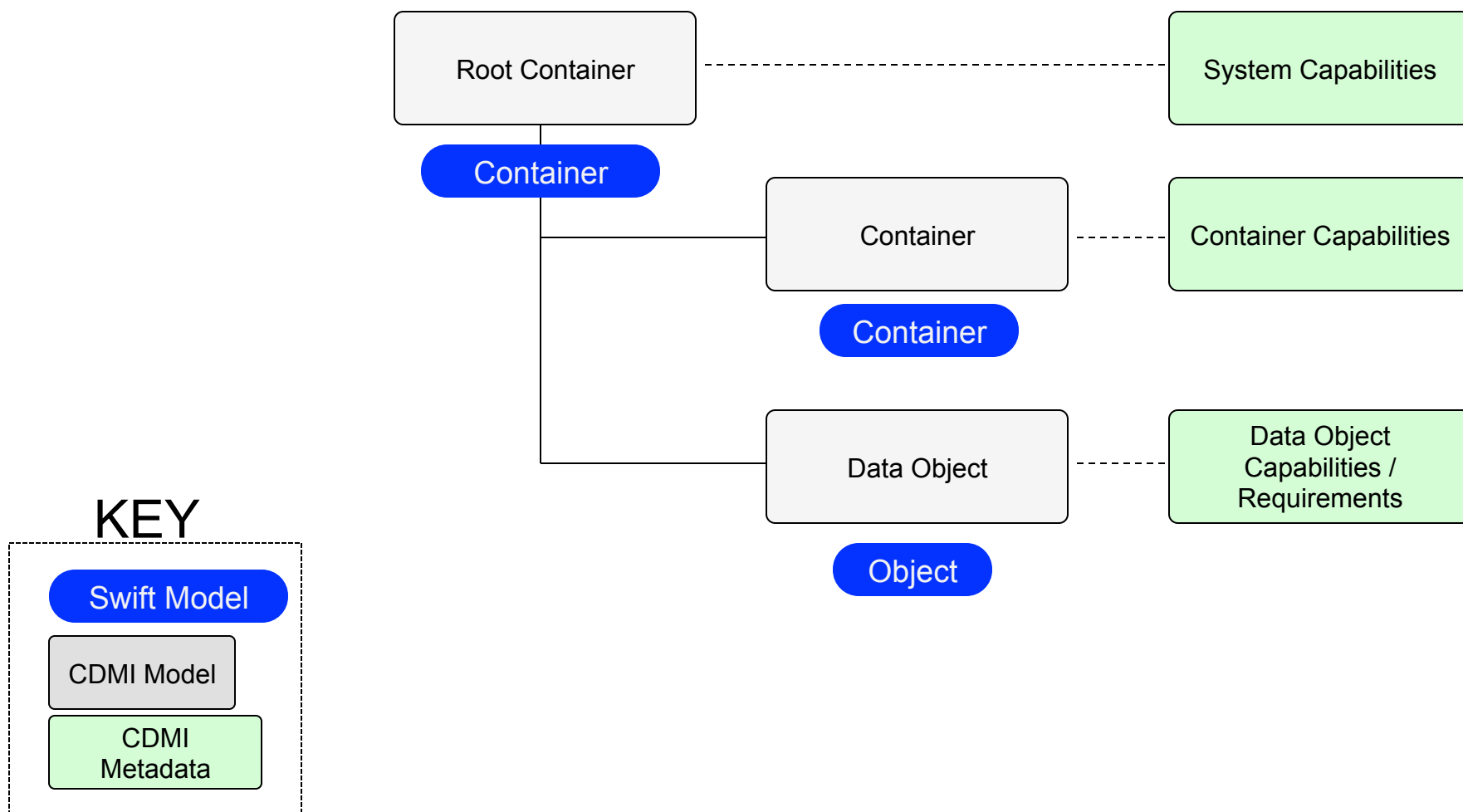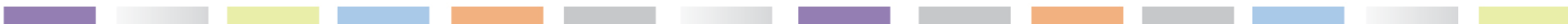◆CDMI 1.1 now includes a standard means of discovering what methods are available:

•cdmi_authentication_me thods (Data System Metadata) *12.1.3*

•If present, this capability contains a list of server-supported authentication methods that are supported by a domain. The following values for authentication method strings are defined:

• "anonymous"-Absence of authentication supported

• "basic"-HTTP basic authentication supported (RFC2617)

• "digest"-HTTP digest authentication supported (RFC2617)

• "krb5"-Kerberos authentication supported, using the Kerberos Domain specified in the CDMI domain (RFC 4559)

• "x509"-certificate-based authentication via TLS (RFC5246)

Extending the standard security types

◆The following values are examples of other widely used authentication methods that may be supported by a CDMI server:

- ◆"s3"-S3 API signed header authentication supported

- ◆"openstack"-OpenStack Identity API header authentication supported

- ◆Interoperability with these authentication methods are not defined by this international standard.

- ◆Servers may include other authentication methods not included in the above list. In these cases, it is up to the CDMI client and CDMI server (implementations themselves) to ensure interoperability.

- ◆When present, the cdmi_authentication_methods data system metadata shall be supported for all domains.
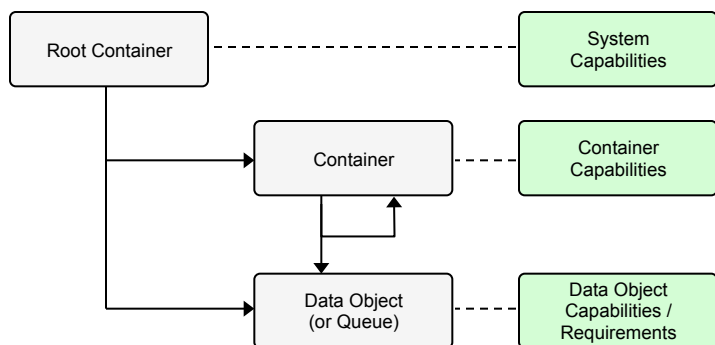
Swift and CDMI Models

Root Container ---------- System Capabilities
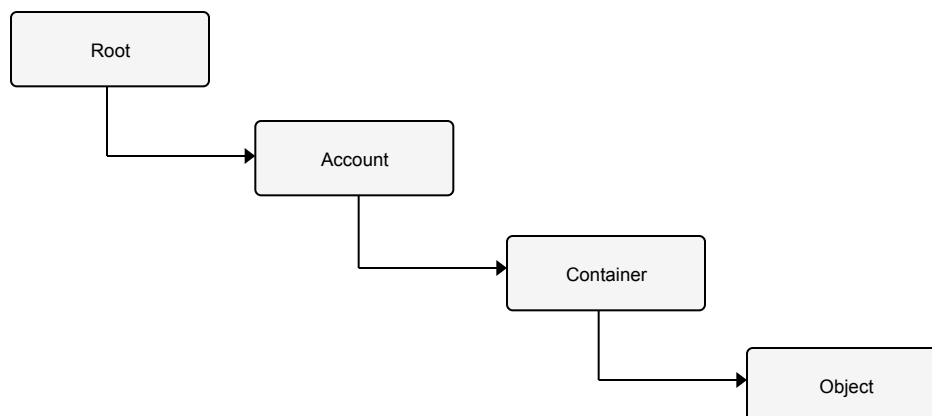
Container

Container ---------- Container Capabilities

Container

Data Object ---------- Data Object Capabilities / Requirements

Object

KEY
- Swift Model
- CDMI Model
- CDMI Metadata

Swift and CDMI Models

CDMI Object Model

```
Root Container ------------- System Capabilities
     |
     v
  Container ------------- Container Capabilities
     |  ^
     v  |
Data Object ------------- Data Object
(or Queue)                Capabilities /
                          Requirements
```

Swift Object Model

```
Root
  |
  v
Account
    |
    v
 Container
     |
     v
   Object
```

File System Model

```
Root Directory
     |
     v
 Directory
    |  ^
    v  |
   File
```

S3 Object Model

```
Root
  |
  v
Bucket ------- Account
   |
   v
 Object
```

Swift and CDMI Models

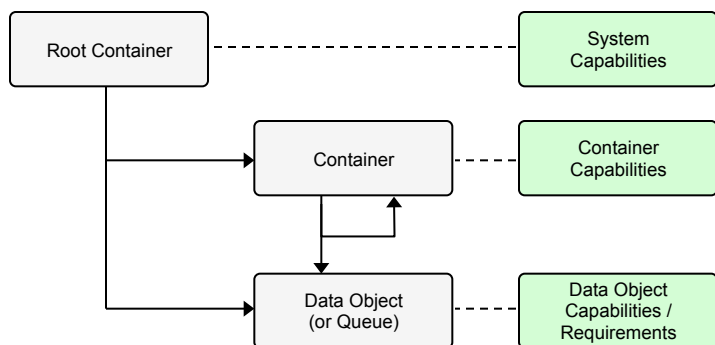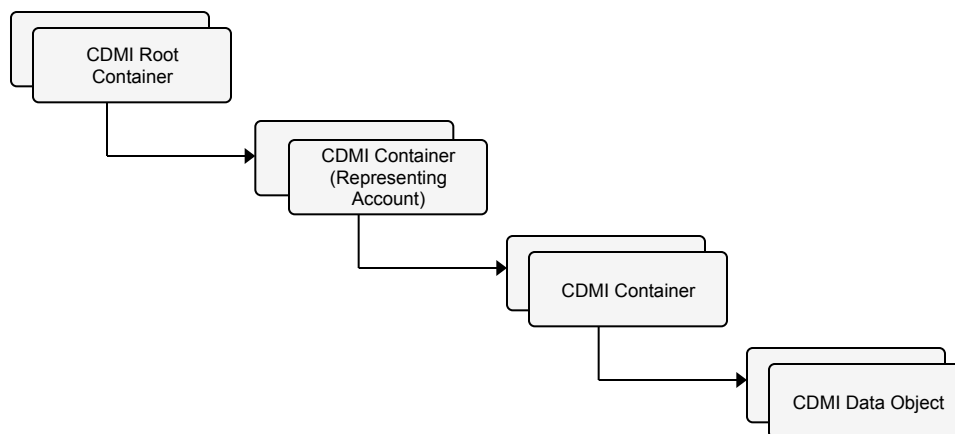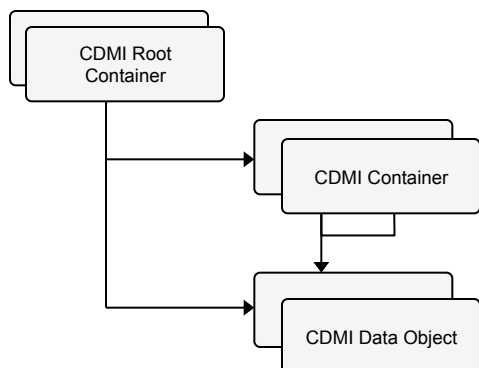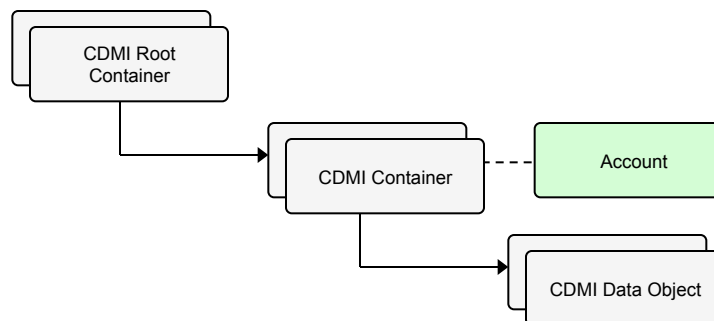## CDMI Object Model

Overlay for Swift Object Model

Overlay for File System Model

Overlay for S3 Object Model
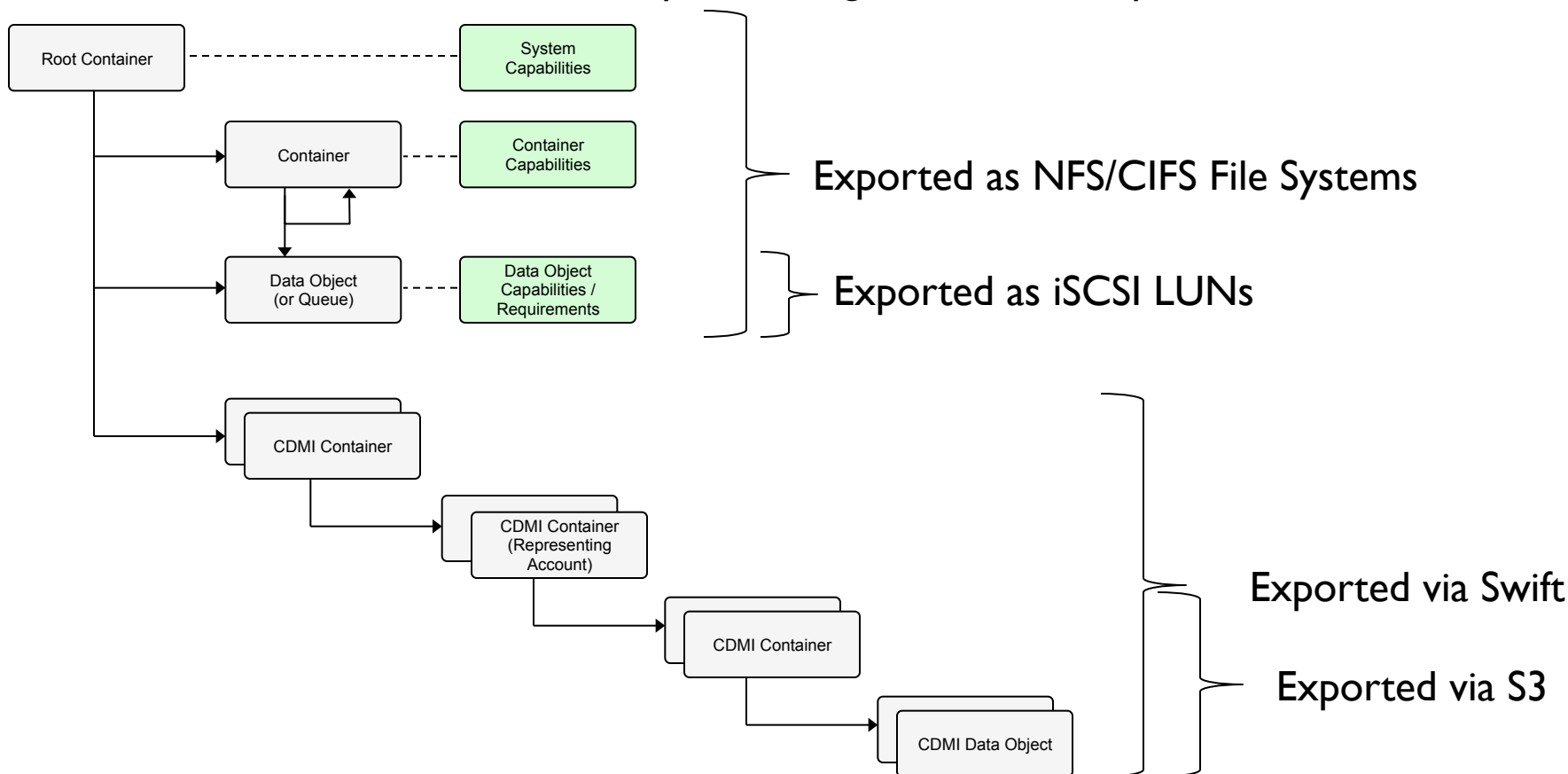
Swift and CDMI Models

CDMI Cross-namespace Management for Multiple Protocol

Root Container - - - - System Capabilities

Container - - - - Container Capabilities

Data Object (or Queue) - - - - Data Object Capabilities / Requirements

Exported as NFS/CIFS File Systems

Exported as iSCSI LUNs

CDMI Container

CDMI Container (Representing Account)

CDMI Container

CDMI Data Object

Exported via Swift

Exported via S3

* File-system-like hierarchies can be emulated on top of S3/Swift, but lack much of the operational expressiveness

CDMI Object Metadata

◆ 2 major classes – System and User

◆ SYSTEM Metadata

- Storage System: Timestamps, Traditional ACLs, Counts etc.
- Data System: requirements of the object – eg. Retention, Backup, Replication, Performance

◆ USER Metadata

- Application and data specific
- E.g. EXIF data on photos
- Location data of objects
- Relationship data
- SEARCHABLE!

CDMI Capability Metadata

- Describes the capability of a service participating in CDMI cloud environment
  - Performance
  - Retention capability
  - Location information
  - Storage features (Compression, Encryption, Hashes etc.)
- Shrink to fit development and consumption model
  - Advertising capability means that developers only need to implement the standard partially and only advertise what is implemented

CDMI and Swift

- CDMI works alongside Swift and S3 models, not replacing them

- Any of the APIs can be used to access the same data

- CDMI has been implemented for Swift as a filter which allows leverage of the Swift authentication filter

- If Swift and CDMI disagree, then CDMI "faults"

- Swift and CDMI use hierarchical containers but are slightly different in the implementation and language used
  - Swift Folder = CDMI Container

- CDMI Metadata can be stored in Swift metadata storage
  - This means the size limitation is implied for CDMI metadata currently

After This Webcast

- This webcast and a copy of the slides will be posted to the SNIA-CSI website and available on-demand
  - http://www.snia.org/forum/csi/knowledge/webcasts
- A full Q&A from this webcast, including answers to questions we couldn't get to today, will be posted to the SNIA Cloud blog
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Questions?

◆ Thank You

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