COMPUTERWORLD SNIA

SNW

Driving Innovation Through the Information Infrastructure

SPRING 2011

Make Your Existing File Storage Infrastructure "Cloud-Ready"

Richard Gillett
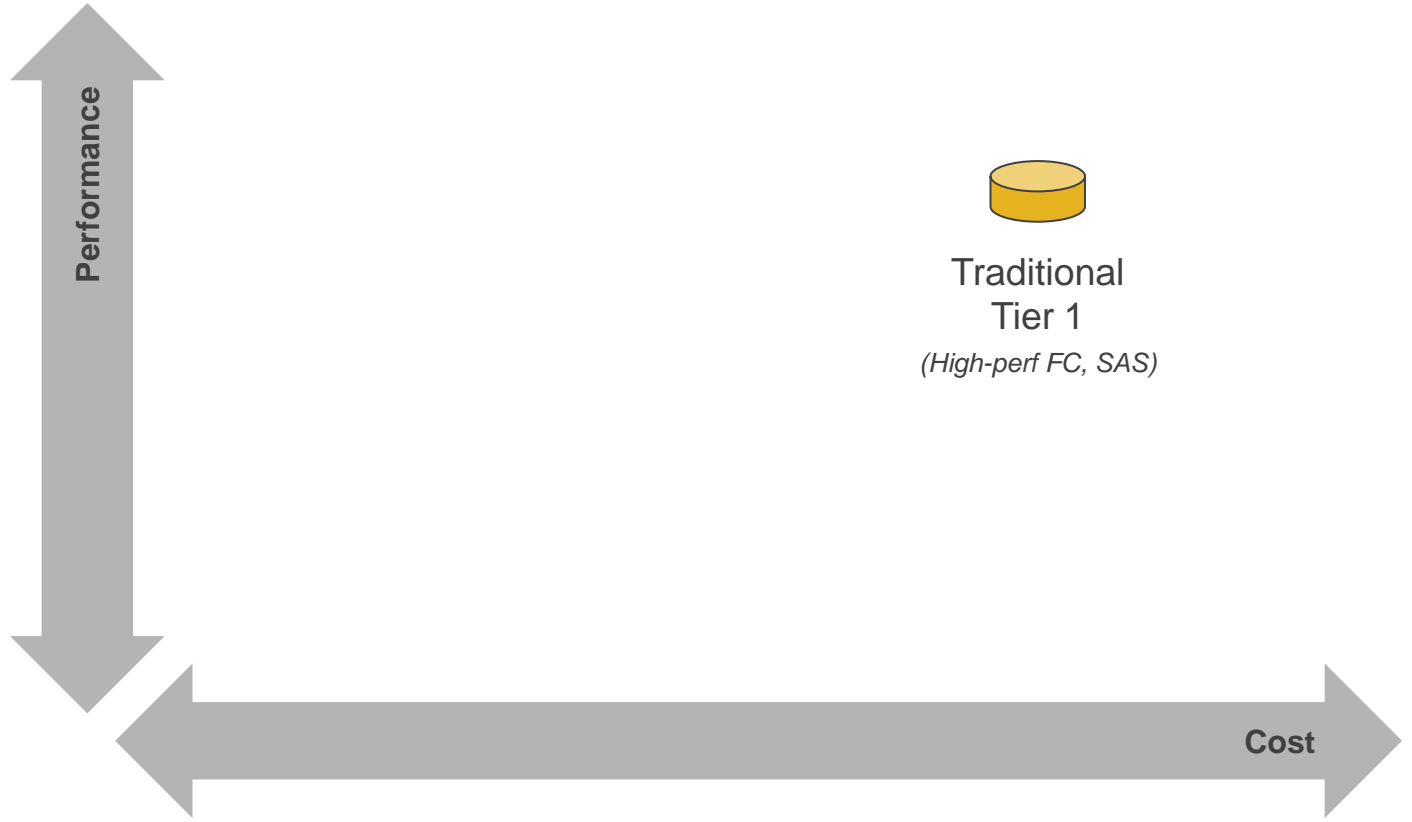
VP, Data Systems Architecture

F5 Networks

Agenda

- What is Cloud Storage?

- Technical Barriers to Using Cloud Storage

- Getting Ready for Cloud

  - Options for integration

- Advanced Applications

  - Integrated archive example
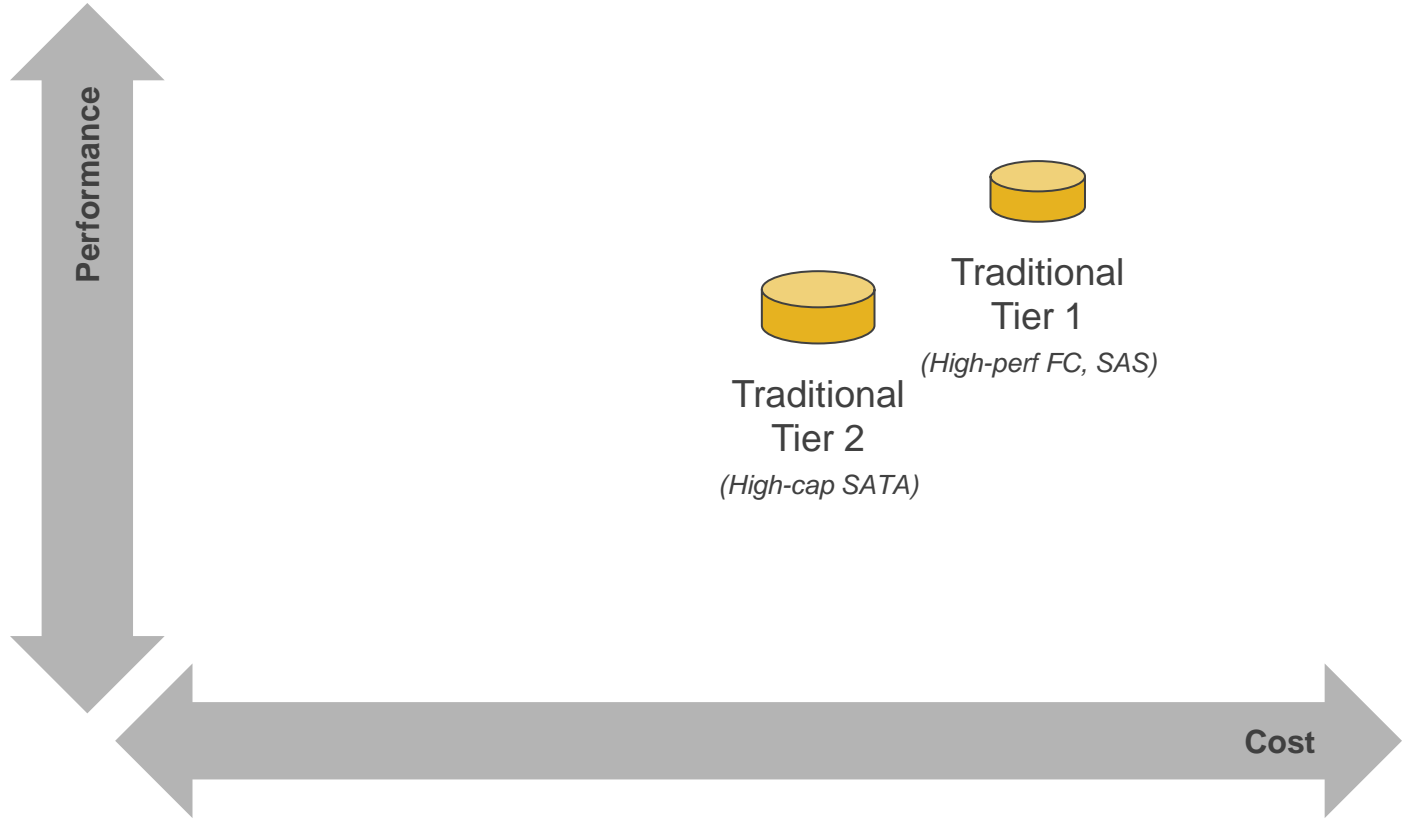
- Summary

Storage Continuum

Performance

Cost

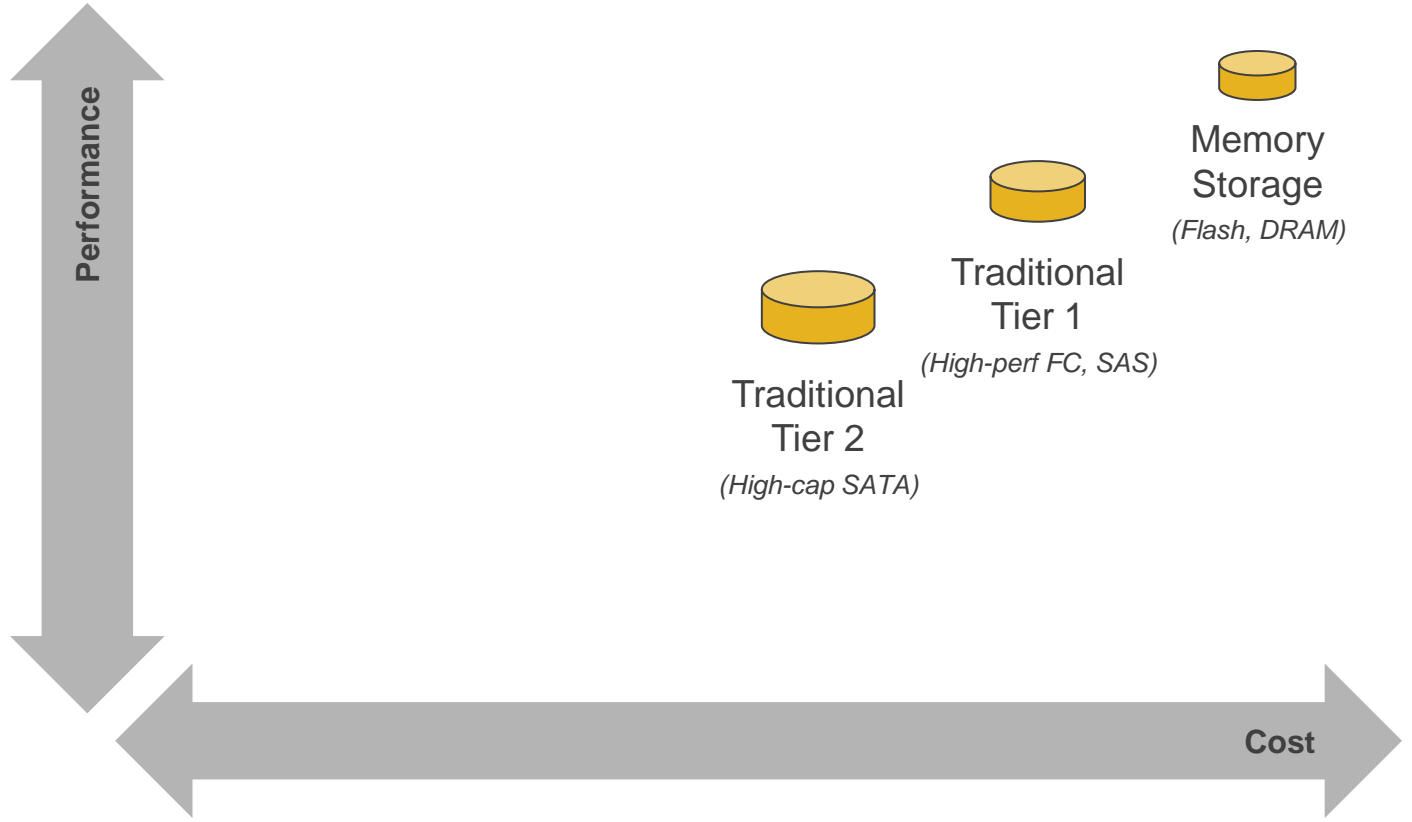Traditional
Tier 1
(High-perf FC, SAS)

Storage Continuum

Performance

Cost

Traditional
Tier 1
(High-perf FC, SAS)

Traditional
Tier 2
(High-cap SATA)

Storage Continuum

Performance

Memory
Storage
(Flash, DRAM)

Traditional
Tier 1
(High-perf FC, SAS)

Traditional
Tier 2
(High-cap SATA)

Cost

Storage Continuum

Performance

Memory
Storage
(Flash, DRAM)

Traditional
Tier 1
(High-perf FC, SAS)

Traditional
Tier 2
(High-cap SATA)

Optimized
Storage
(Deduped SATA)

Cost

Storage Continuum

Performance ↕

Memory Storage
(Flash, DRAM)

Traditional Tier 1
(High-perf FC, SAS)

Traditional Tier 2
(High-cap SATA)

Optimized Storage
(Deduped SATA)

Cloud Storage
(Public, hybrid, private)

Cost →

Big Picture Opportunity

Performance

Active & Changing

Memory
Storage
(Flash, DRAM)

Traditional
Tier 1
(High-perf FC, SAS)

Traditional
Tier 2
(High-cap SATA)

Optimized
Storage
(Deduped SATA)

Cloud Storage
(Public, hybrid, private)

Cost

Big Picture Opportunity

Active & Changing

Memory Storage
(Flash, DRAM)

Traditional Tier 1
(High-perf FC, SAS)

Inactive & Unchanging

Traditional Tier 2
(High-cap SATA)

Optimized Storage
(Deduped SATA)

Cloud Storage
(Public, hybrid, private)

Performance

Cost

Big Picture Opportunity

Single Namespace

Performance

Active & Changing

Memory
Storage
(Flash, DRAM)

Inactive & Unchanging

Traditional
Tier 1
(High-perf FC, SAS)

Traditional
Tier 2
(High-cap SATA)

Optimized
Storage
(Deduped SATA)

Cloud Storage
(Public, hybrid, private)

Cost

Comparing Performance

- General guidelines:

Type of Storage	Aggregate Bandwidth	Single Operation Latency
Local Tier 0 (SSD)	> 1000 MB/s	< 500 µs
Local Tier 1 (SAS)	500 MB/s	0.5 to 5 ms
Local Tier 2 (SATA)	100 MB/s	.5 to 15 ms
Cloud	.1-10 MB/s	10 ms to >10s

Strong Interest In Cloud

Would you consider private cloud as an alternative to traditional NAS Storage?
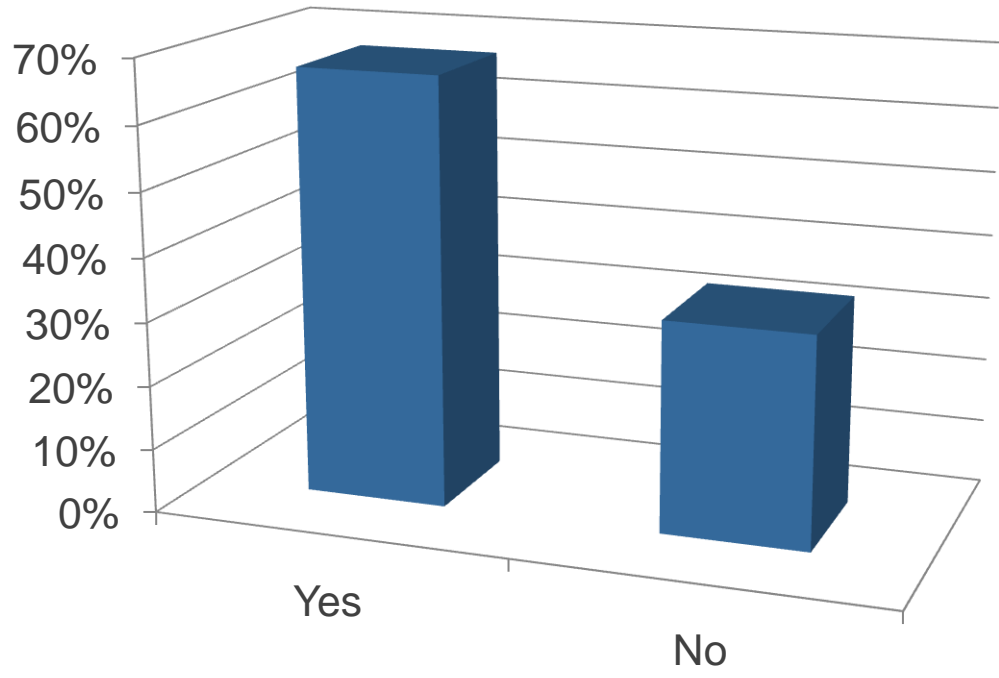
Source: F5 Networks, July 2010

What Is Cloud Storage ?

- No consistent definition
- For our purposes today, cloud storage is:
  - Remotely accessed
    - Accessed via a WAN
  - Optimized for long-term retention
    - Typically implemented as some form of object store
  - Not "natively" presented as a file system
    - Typically a web-based API
  - Might be "rented" (bought as a service) or "owned" (deployed conventionally)
    - More on the next slide

Simple Cost Comparison

Characteristic	Own Tier-1	Own Tier-2	Rent Cloud
Purchase price ($/GB)	$10	$2	-
Rental cost ($/GB-Month)	-	-	$0.15
HW/SW Maintenance (% of price over 36 months)	15% per year	15% per year	-
Power and cooling costs ($/GB over 36 months)	$1.8	$0.2	-
Effective Cost Per GB Over 36 Months 100% utilization; 0% access	**$16.30**	**$3.10**	**$5.40**
Effective Cost Per GB Over 36 Months 50% utilization; 0% access	**$32.60**	**$6.20**	**$5.40**

Own or Rent – A Simple Model

- Profile for renting storage
    - Low storage utilization today
    - Modest total capacity
    - Temporary peaks in storage demand
- Profile for owning storage
    - High storage utilization today
    - High total capacity
    - Willing to deploy cloud-like technology in place of traditional NAS
    - Storage capacity demand continually grows

CHALLENGES

Goals and Constraints

Users

IT
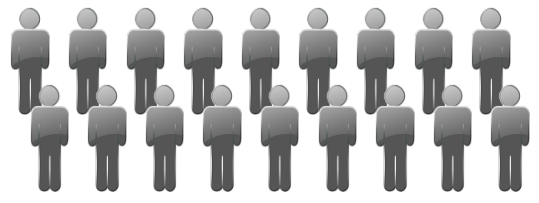
What users care about:

- No change to how they access files
- Having a single location for accessing files
- Maintaining a reasonable level of performance

What IT cares about:

- Managing growth
- Improving utilization
- Reducing costs
- Reducing overall complexity
- Ensuring data security
- Maintaining data availability
- Meeting regulatory compliance requirements

Challenges and Solutions

Challenges
Maintain transparent access to files
Move appropriate files to and from cloud
Remote storage latency
Data security
Different "storage model"

Challenges and Solutions

Challenges	Solutions
Maintain transparent access to files	• Data redirection *within* the file server • File virtualization *above* the file server
Move appropriate files to and from cloud	• Automatic classification + policy + migration • Manual
Remote storage latency	• Only store "inactive" data in cloud • Locally cache all file metadata • Locally cache all file data
Data security	• 100% data and metadata encryption before leaving customer site
Different "storage model"	• File system gateway to cloud API

INTEGRATION

File Server Redirection
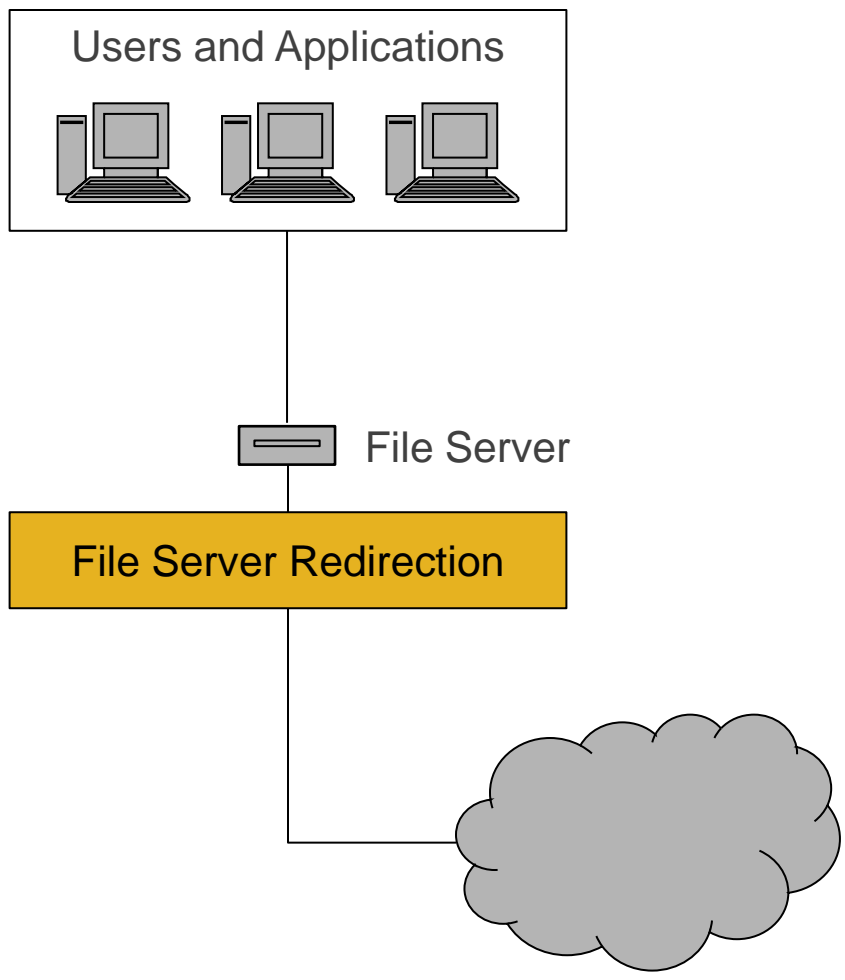
File Virtualization

Two Options

Users and Applications

File Server

File Server Redirection

Users and Applications

File Virtualization

NAS

Gateway
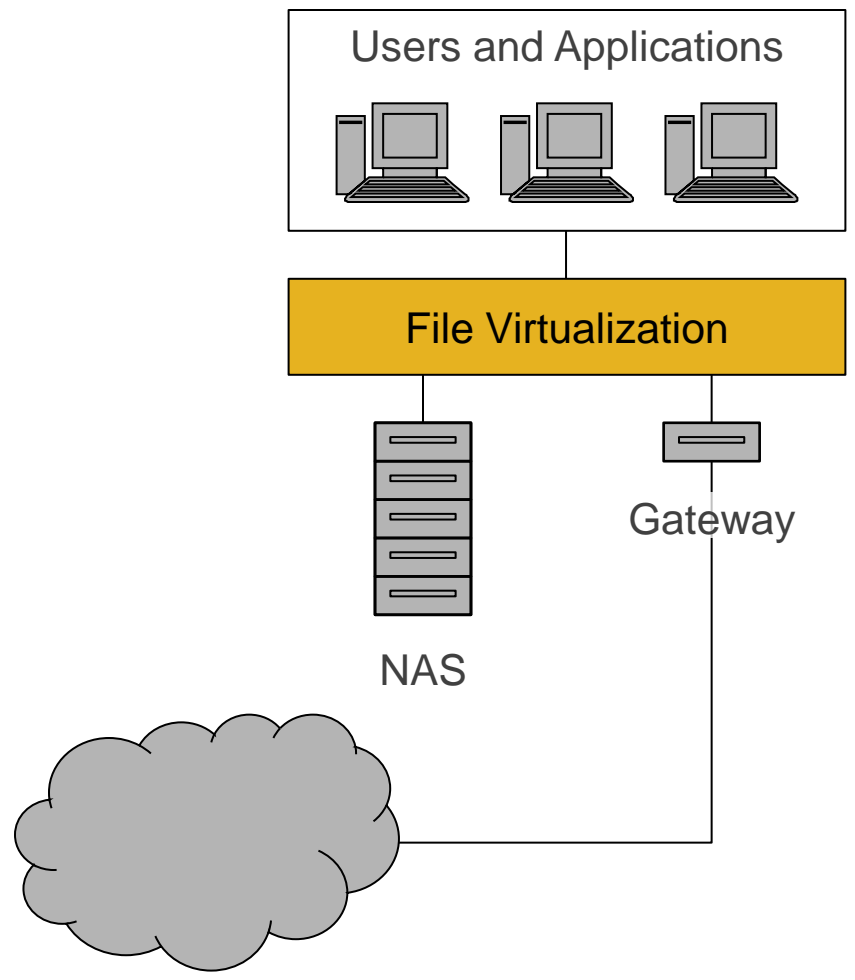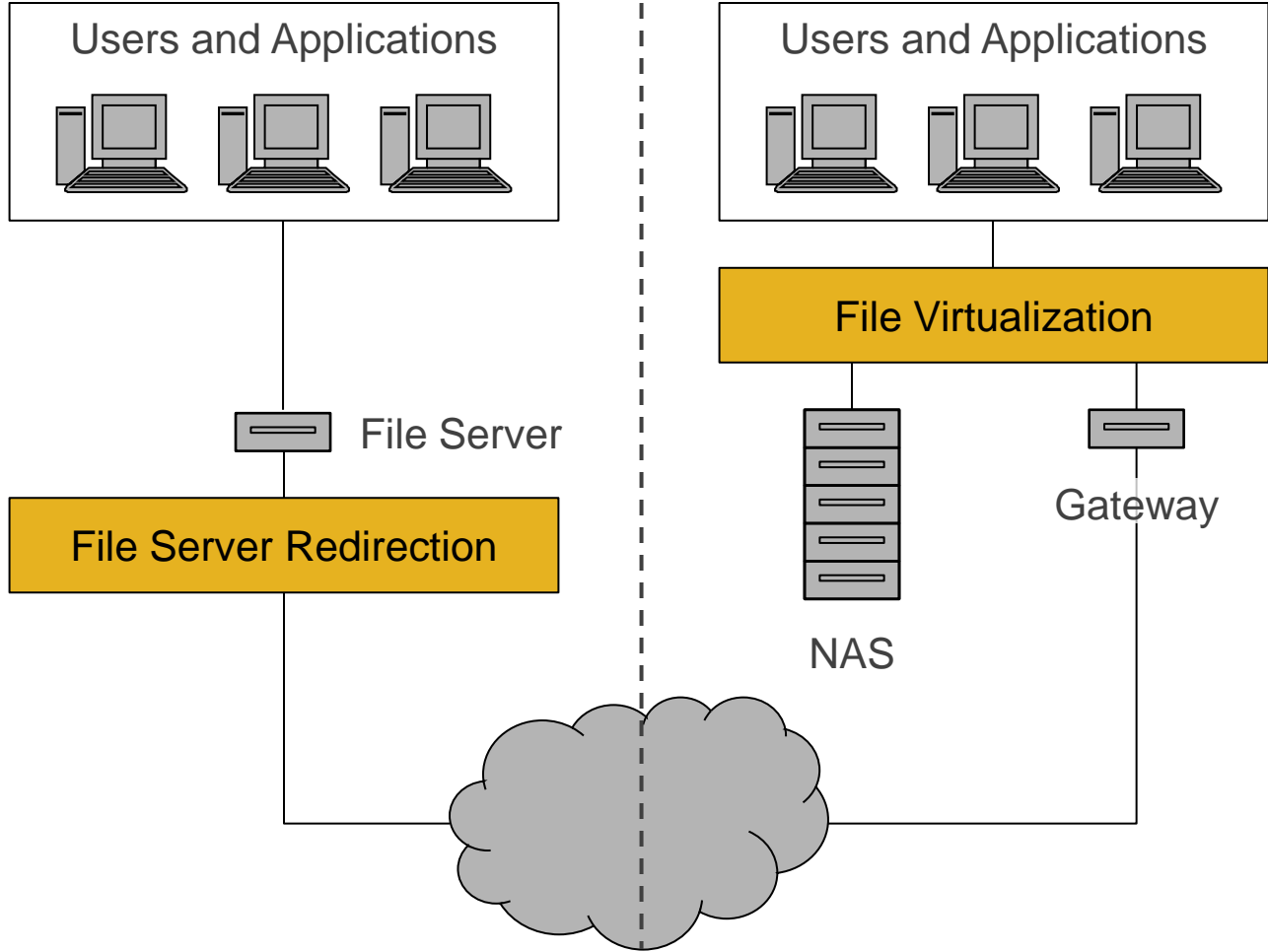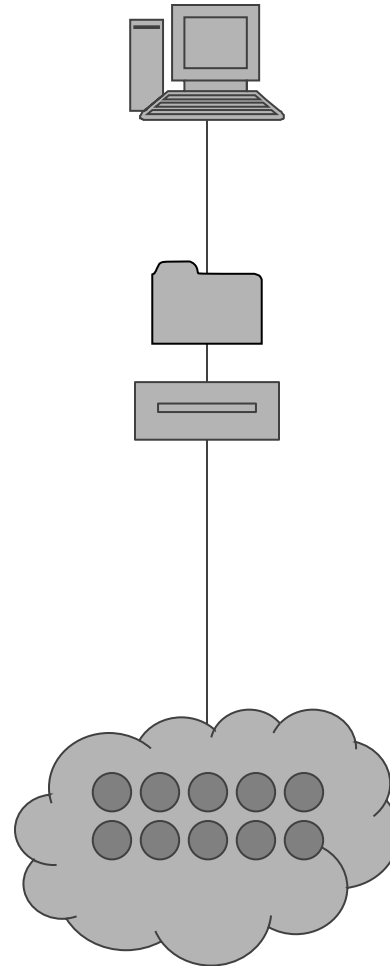
File Server Redirection

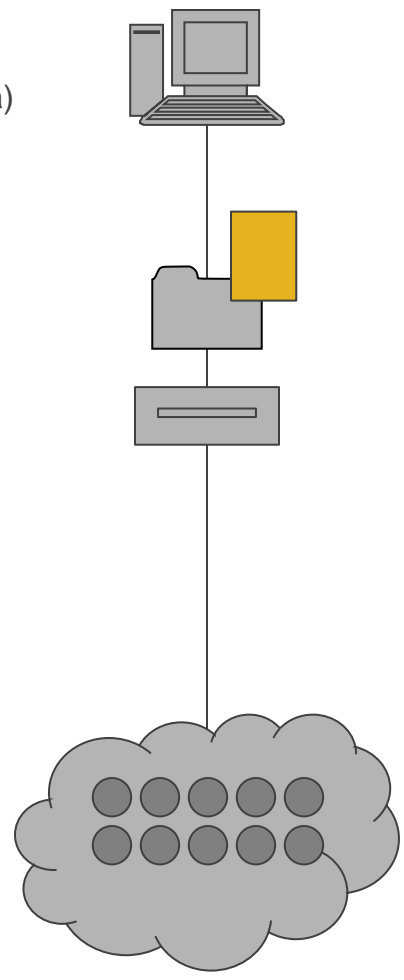# File Server Redirection
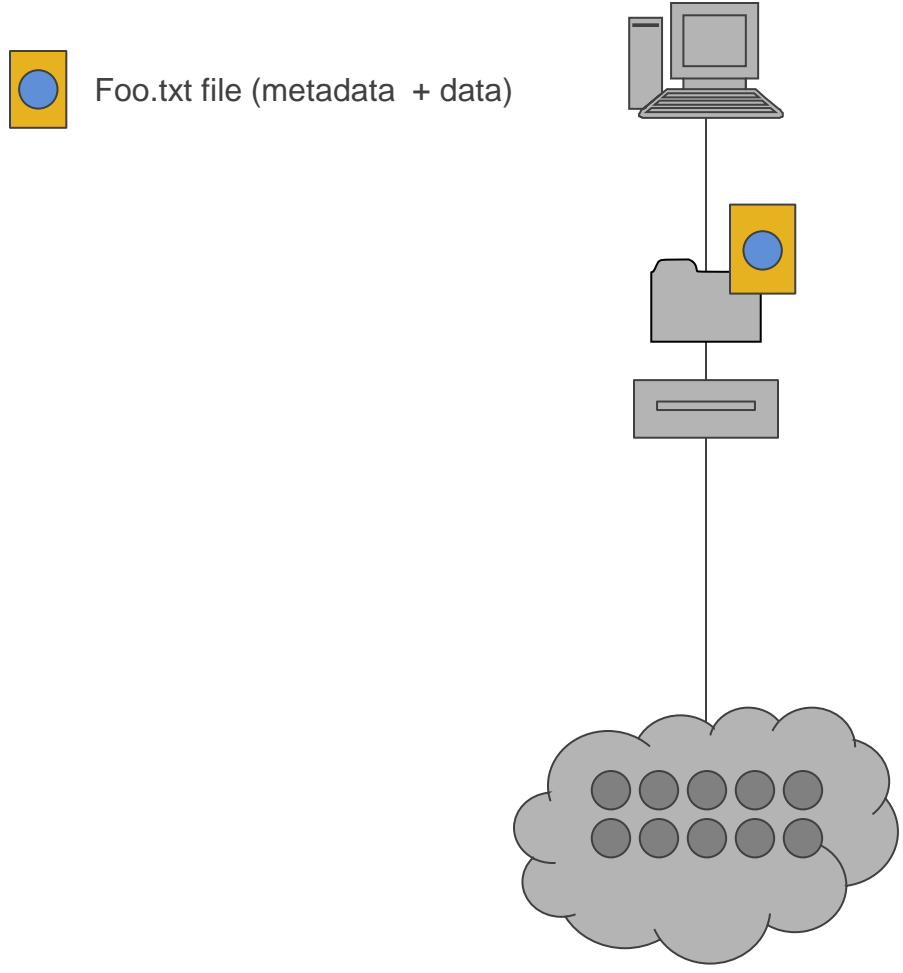
Foo.txt file (metadata + data)

File Server Redirection

Foo.txt file (metadata + data)

Foo.txt (metadata & pointer to data)

Foo.txt data

File Server Redirection

Foo.txt file (metadata + data)

Foo.txt (metadata & pointer to data)

Foo.txt data

File Server Redirection

Foo.txt file (metadata + data)

Foo.txt   (metadata &
              pointer to data)

Foo.txt data

File Virtualization


Tier 0   Tier 1   Cloud

File Virtualization

Foo.txt file (virtual)

File Virtualization

Tier 0

Tier 1

Cloud

File Virtualization

Foo.txt file (virtual)

Foo.txt file (physical)

File Virtualization

Tier 0

Tier 1

Cloud

File Virtualization

Foo.txt file (virtual)

Foo.txt file (physical)

File Virtualization

Tier 0

Tier 1

Cloud

File Virtualization

Foo.txt file (virtual)

Foo.txt file (physical)

File Virtualization

Tier 0

Tier 1

Cloud

File Virtualization

Foo.txt file (virtual)

Foo.txt file (metadata + data)

Foo.txt (metadata & pointer to data)

Foo.txt data

File Virtualization

Tier 0

Tier 1

Cloud

File Virtualization

Foo.txt file (virtual)

Foo.txt file (metadata + data)

Foo.txt (metadata & pointer to data)

Foo.txt data

File Virtualization

Tier 0

Tier 1

Cloud
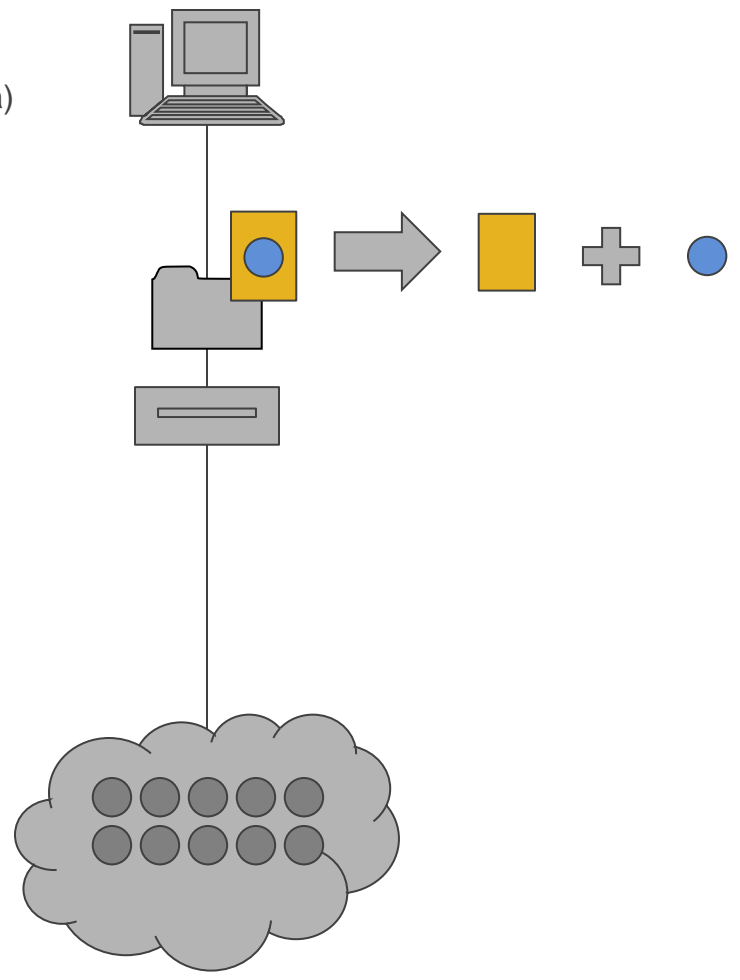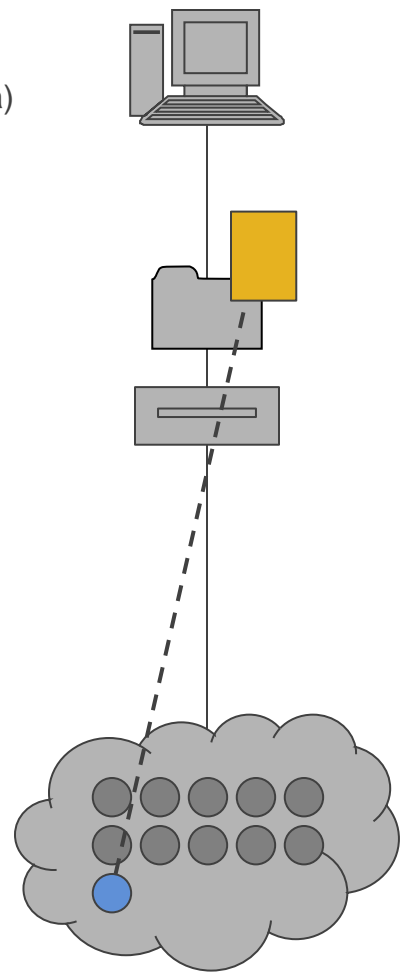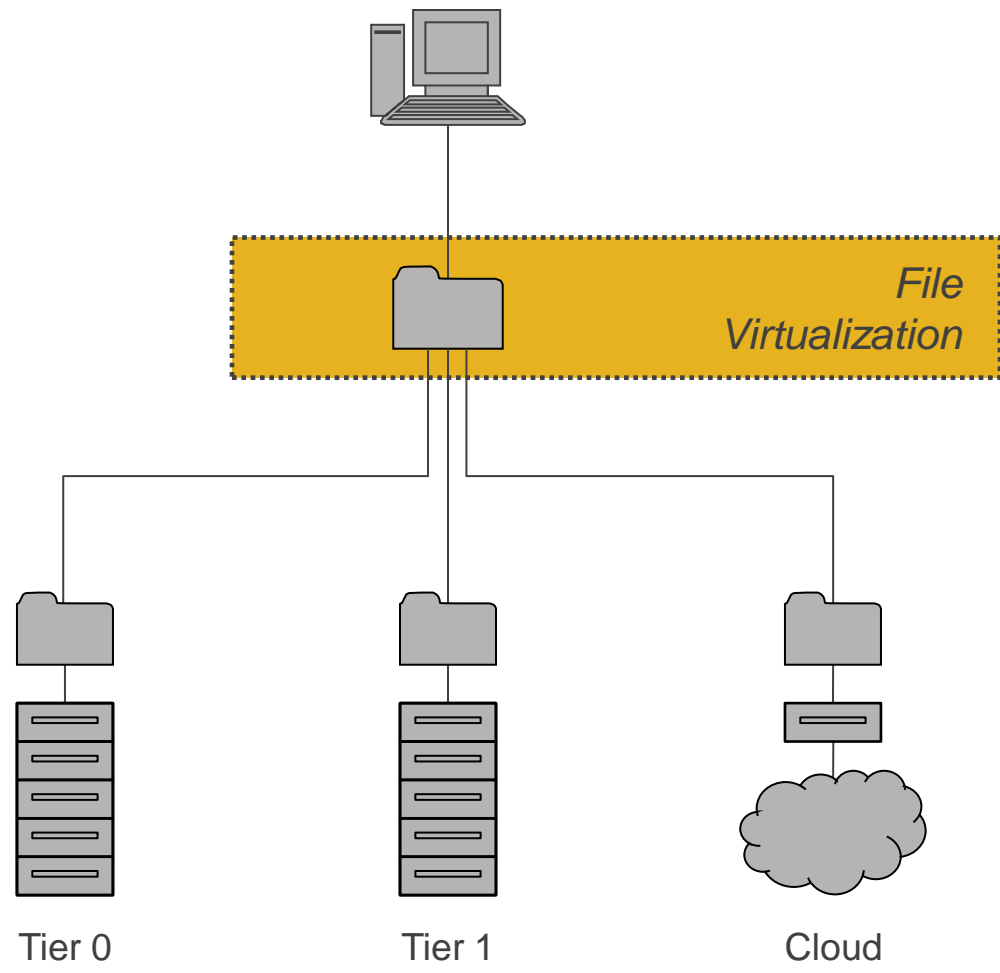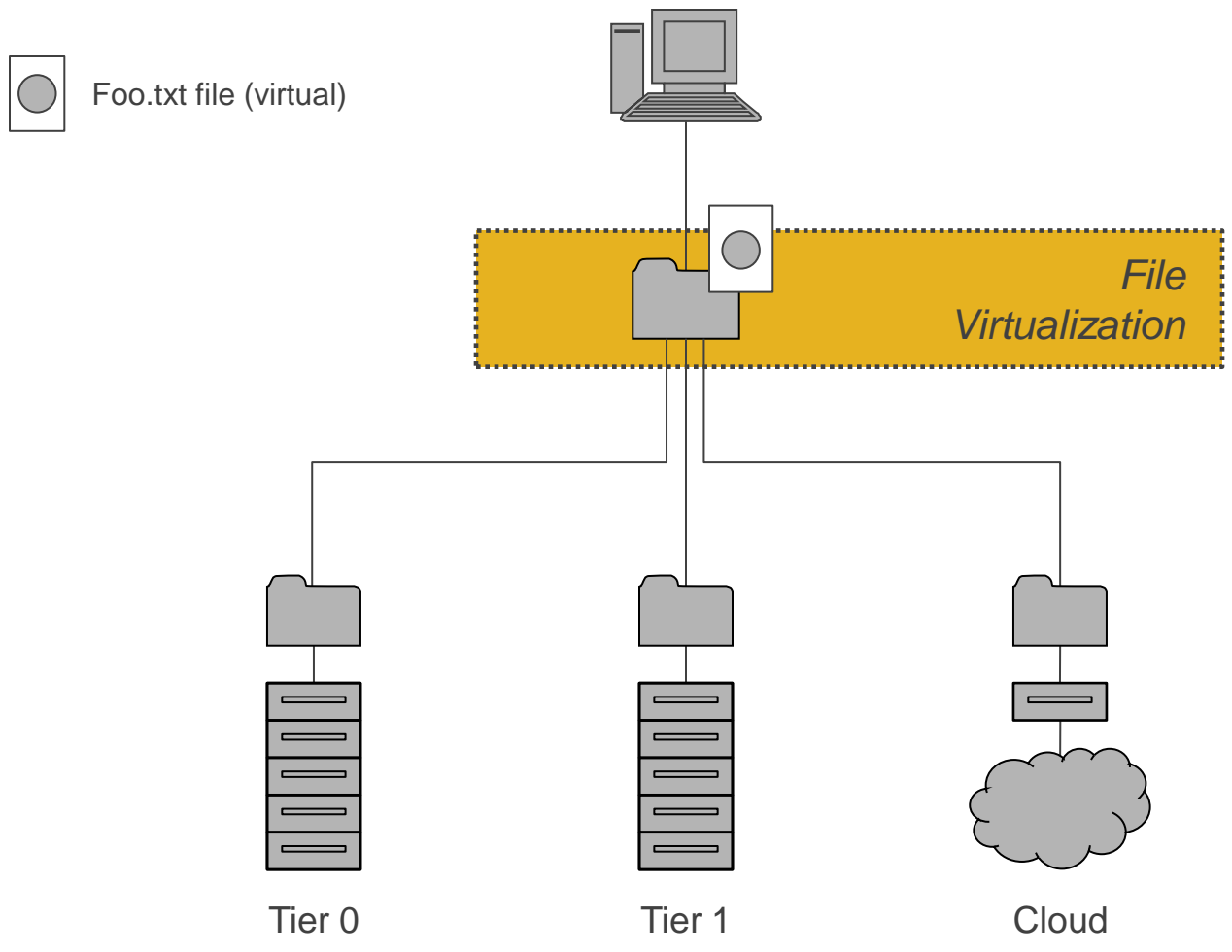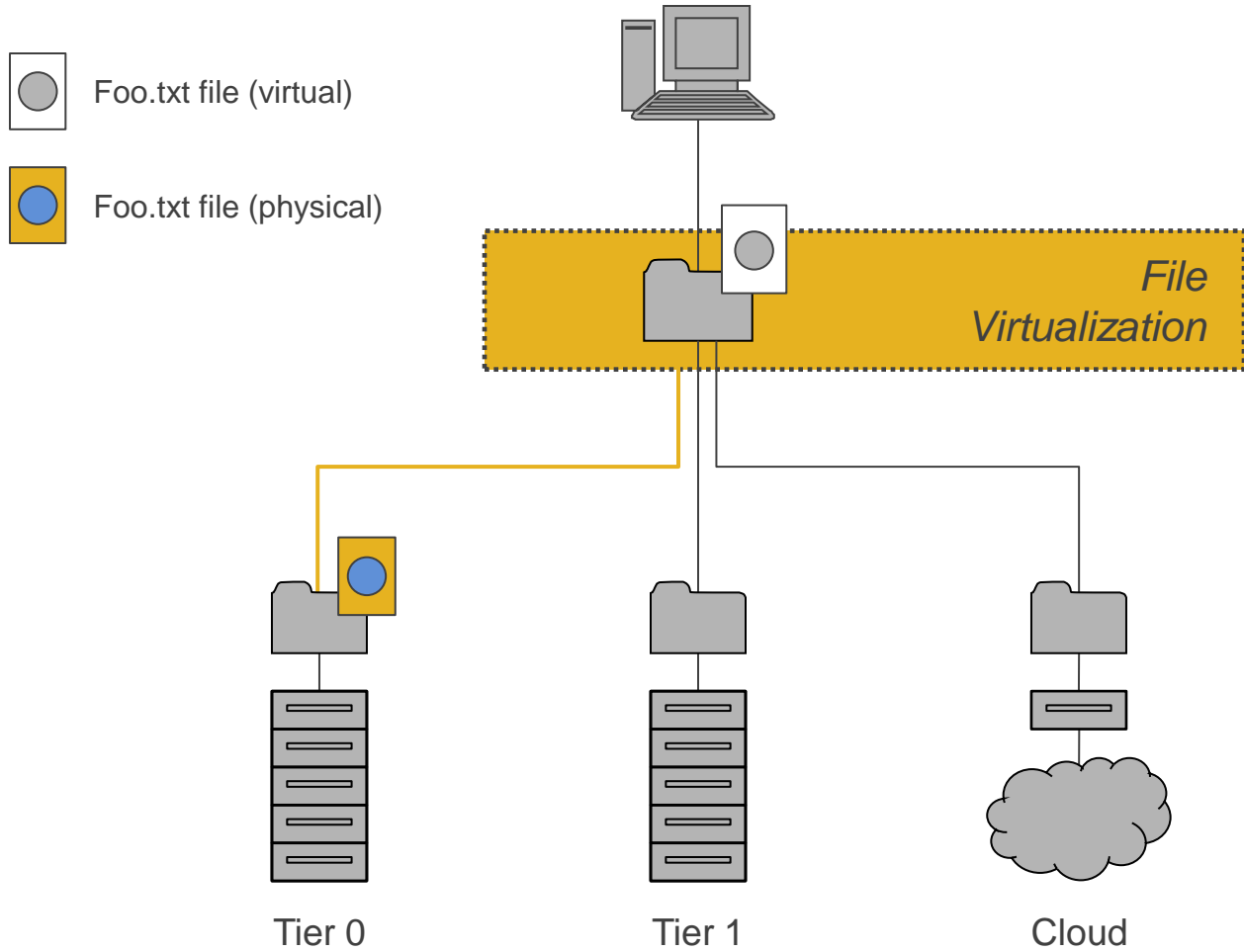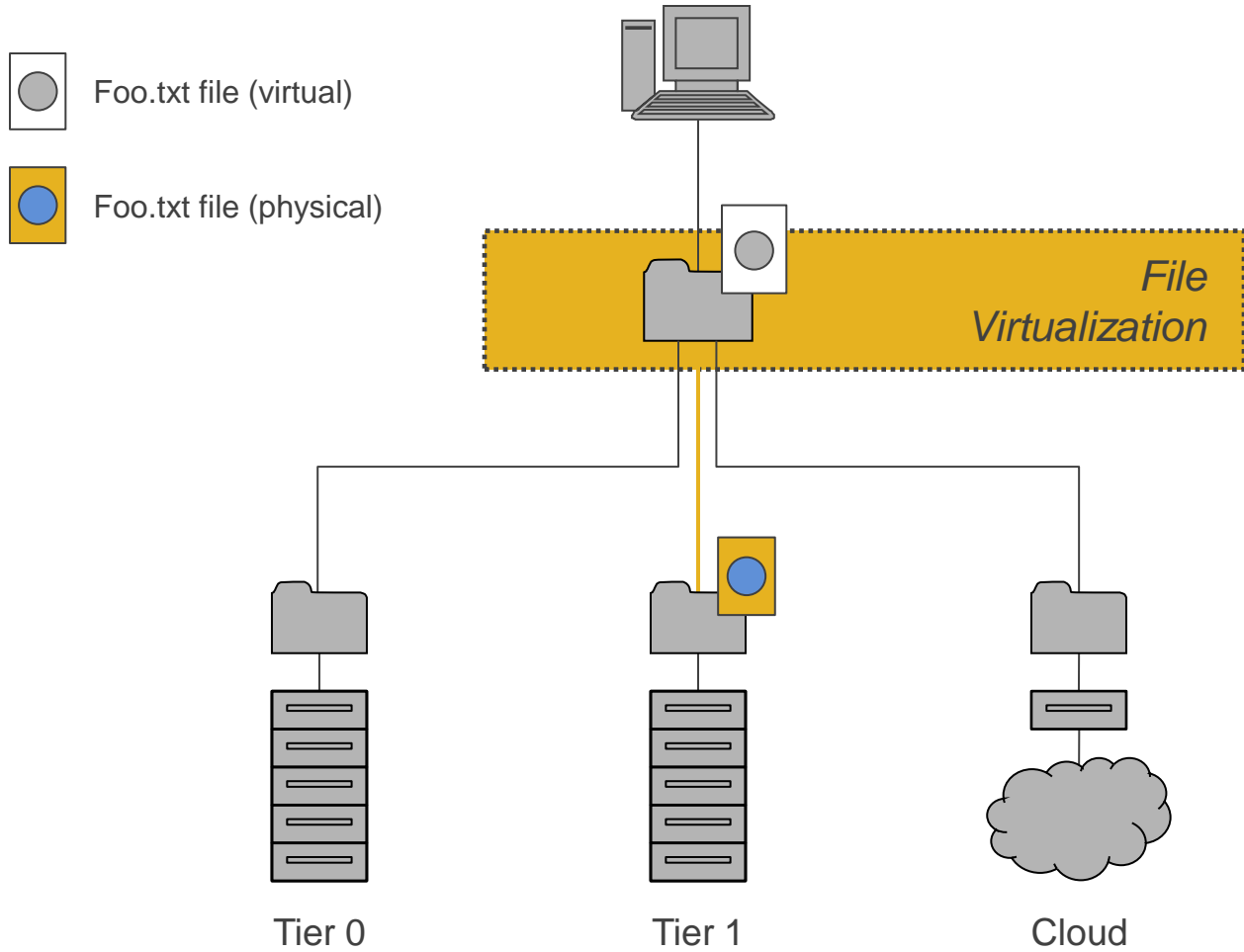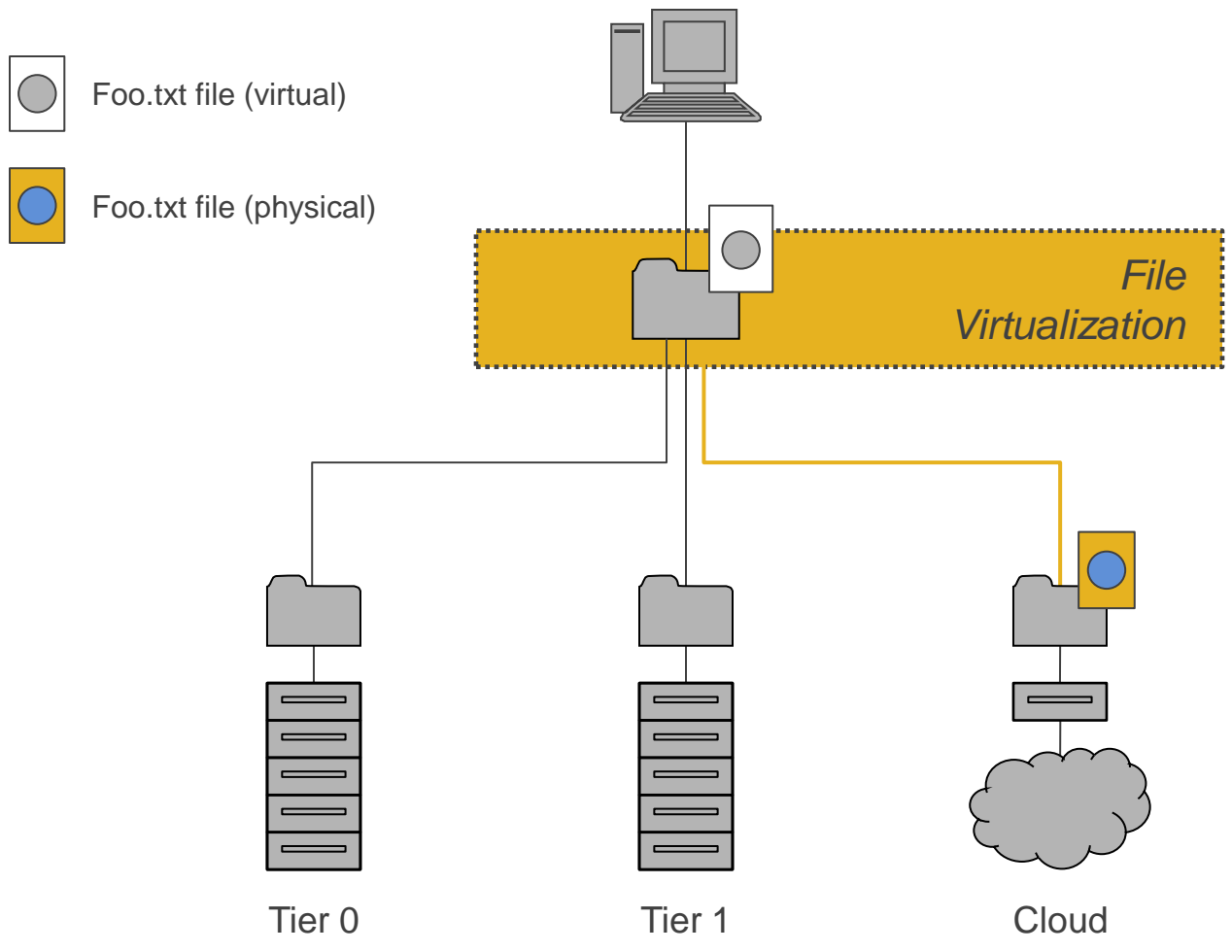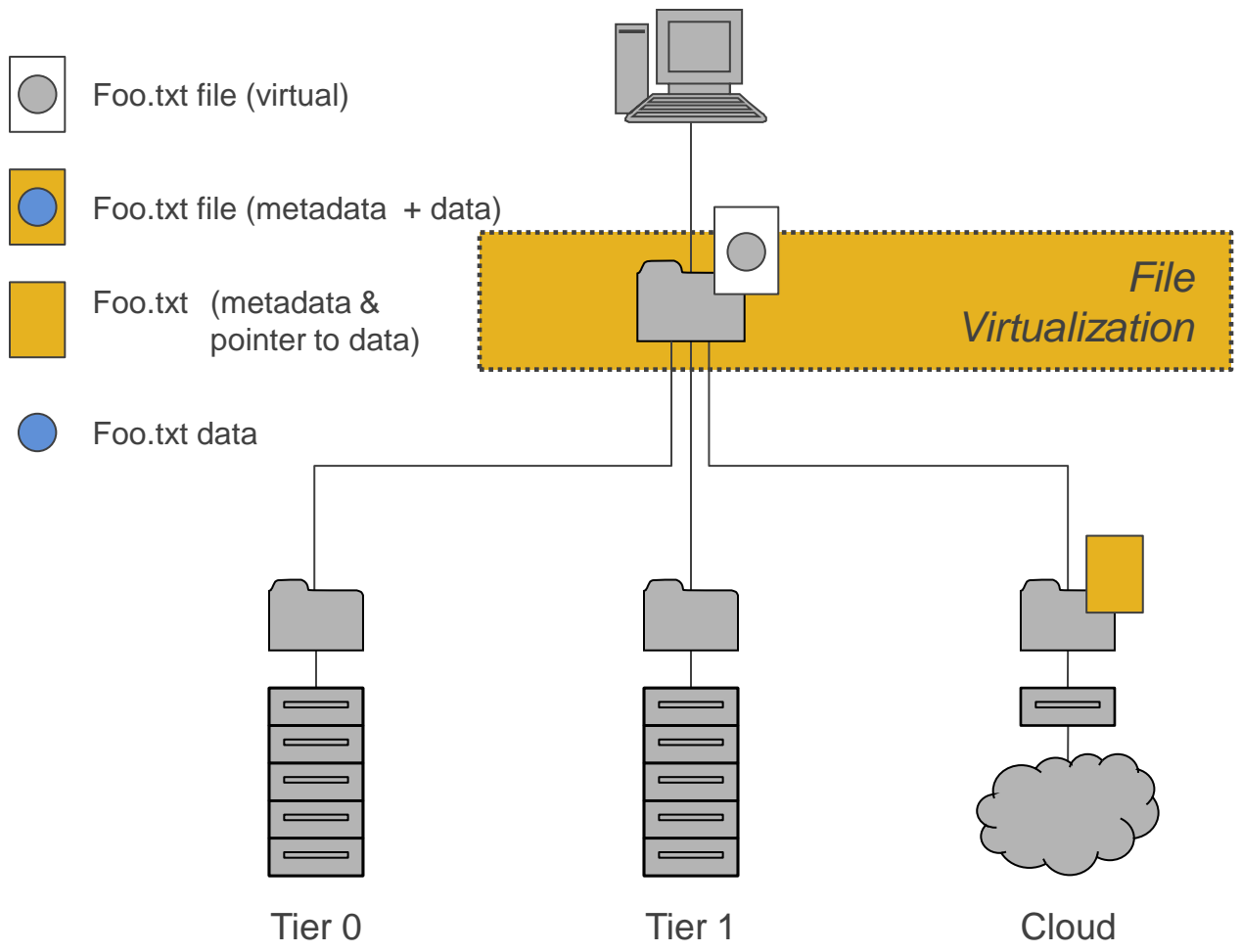
Comparison of Approaches

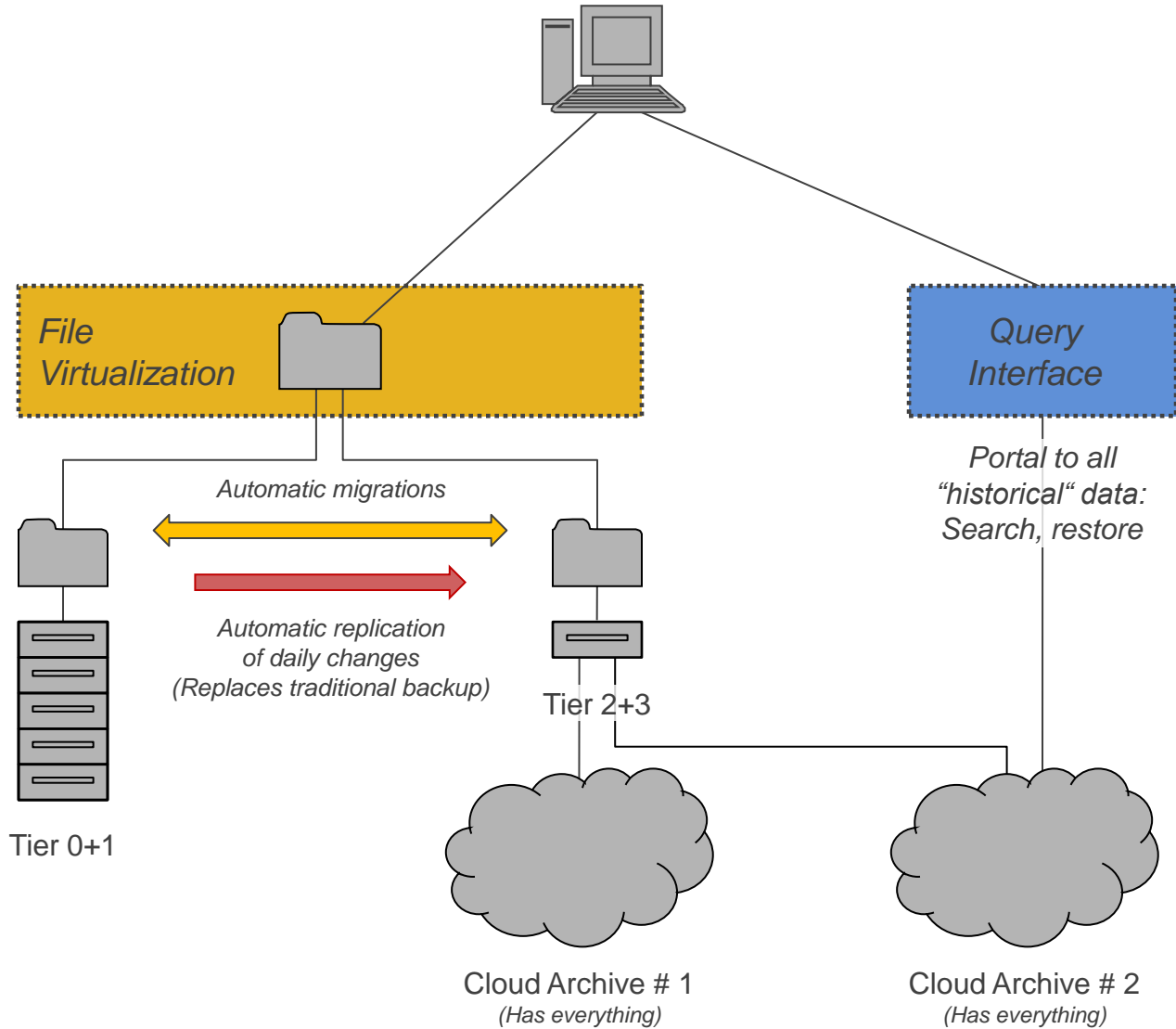| Aspect	File Server Redirection	File Virtualization
Availability of software-only options (VM)	Yes	Yes
Scale	Limited by single file server	Limited by file virtualization device
Choice of cloud technology	Limited by file server support	Any
Advanced cloud services	Limited by file server support	Any

ADVANCED APPLICATIONS

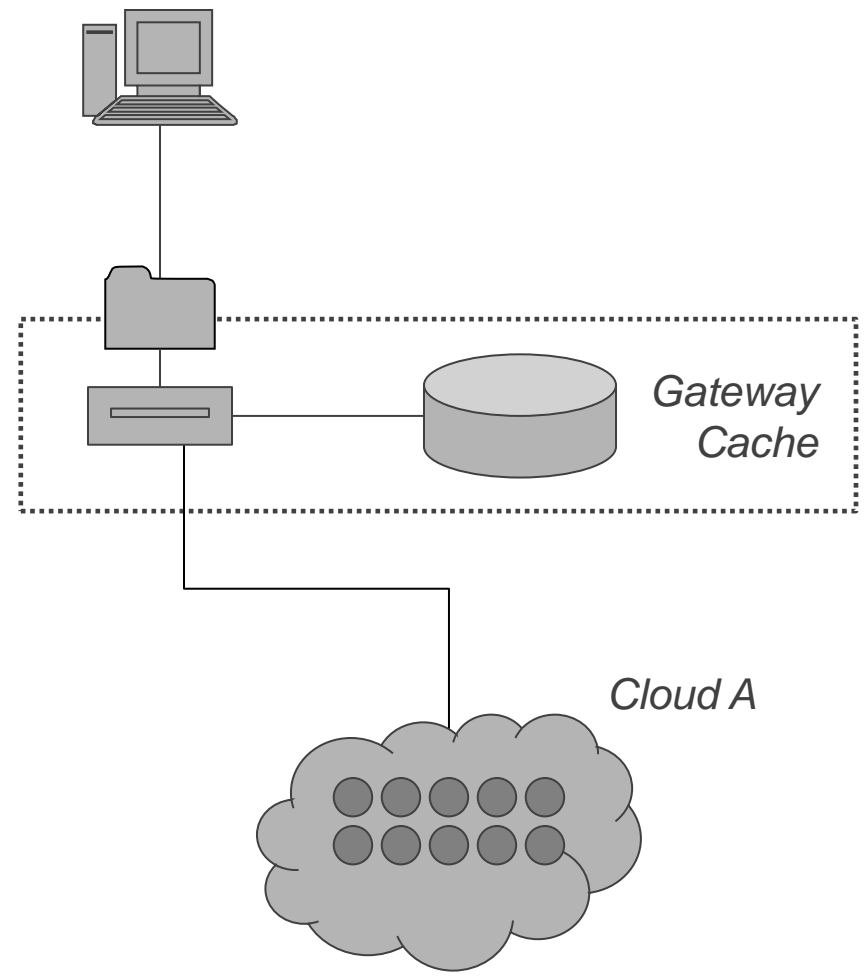# Integrated (Cloud-Based) Archive

- What is it?
  - A unified approach to data management that integrates and optimizes tiering, backup and recovery, discovery, and compliance

- Simple example:
  - In an integrated archive, a single copy of data* in the cloud archive can be used simultaneously as the data storage for multiple applications:
    - Tier 2
    - Backup and recovery
    - Compliance

Assume this "copy" is redundantly stored by the Integrated Archive
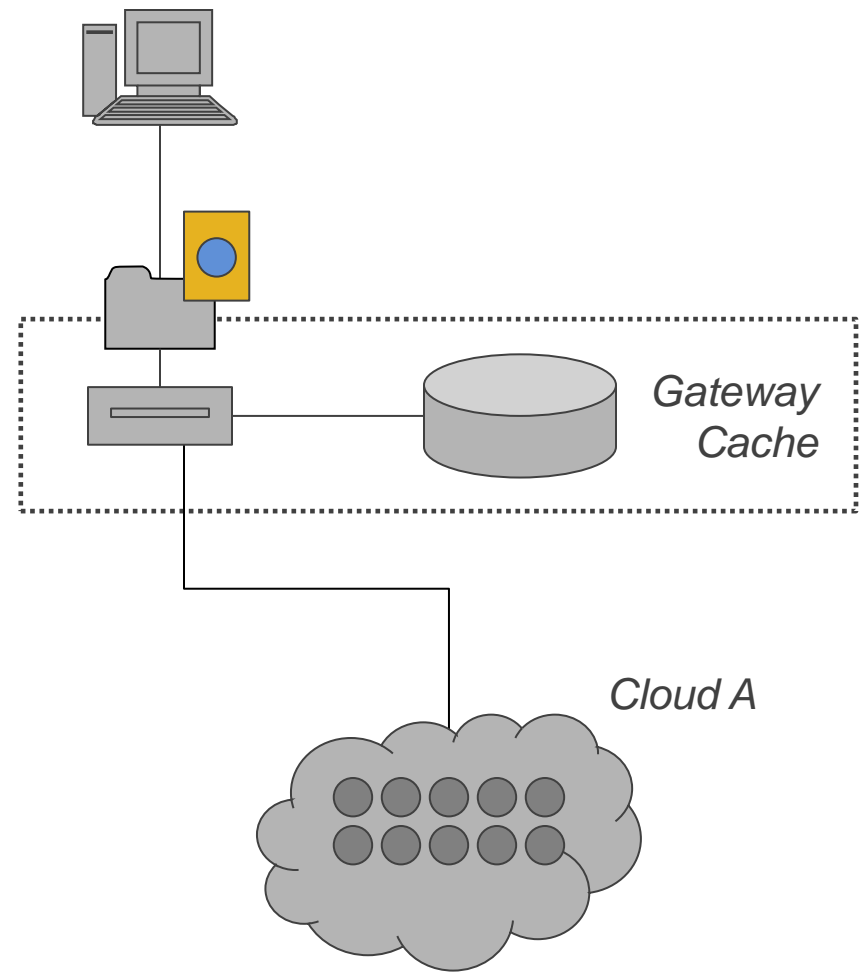
Integrated Archive

File Virtualization

Query Interface

Automatic migrations

Automatic replication of daily changes (Replaces traditional backup)

Portal to all "historical" data: Search, restore

Tier 0+1

Tier 2+3

Cloud Archive # 1
(Has everything)

Cloud Archive # 2
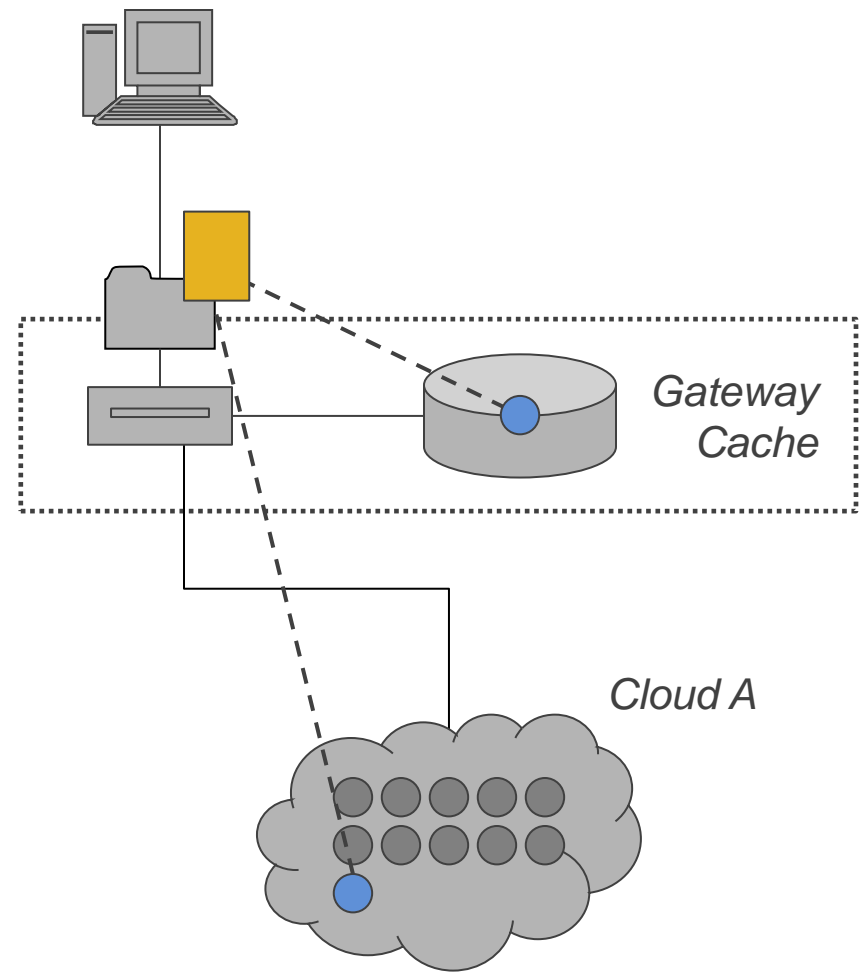*(Has everything)*

Integrated Archive In Action

Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1

Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1

Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1
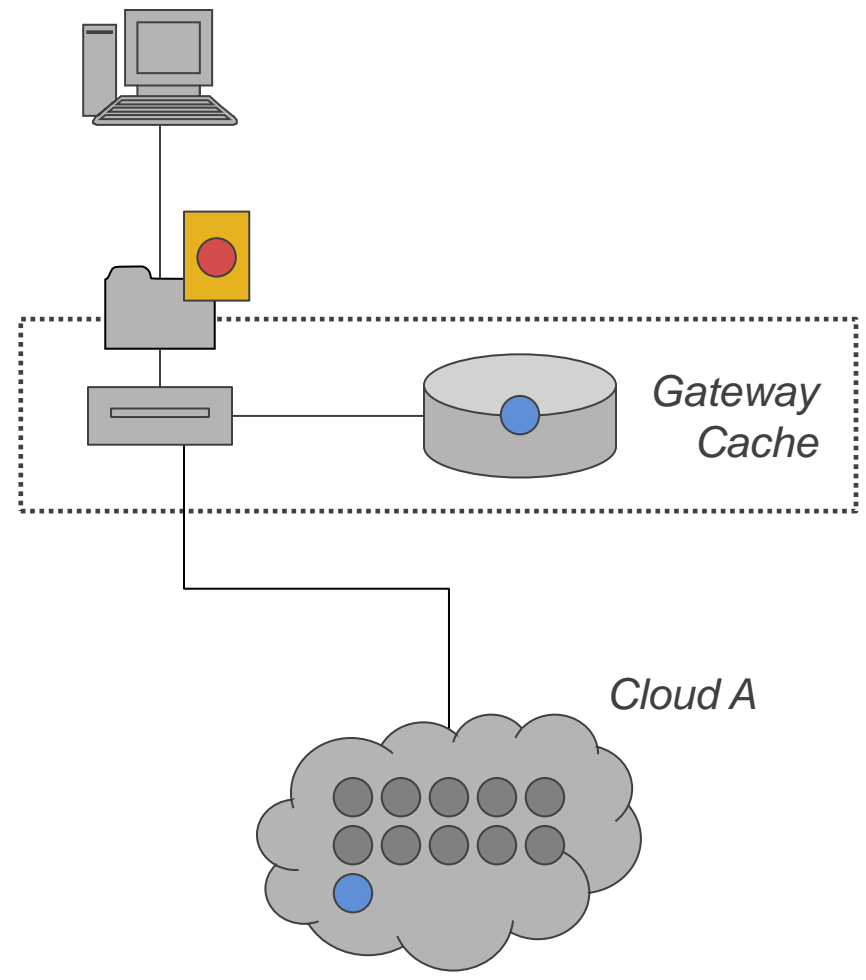
Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1

Foo.txt version 2

Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1

Foo.txt version 2

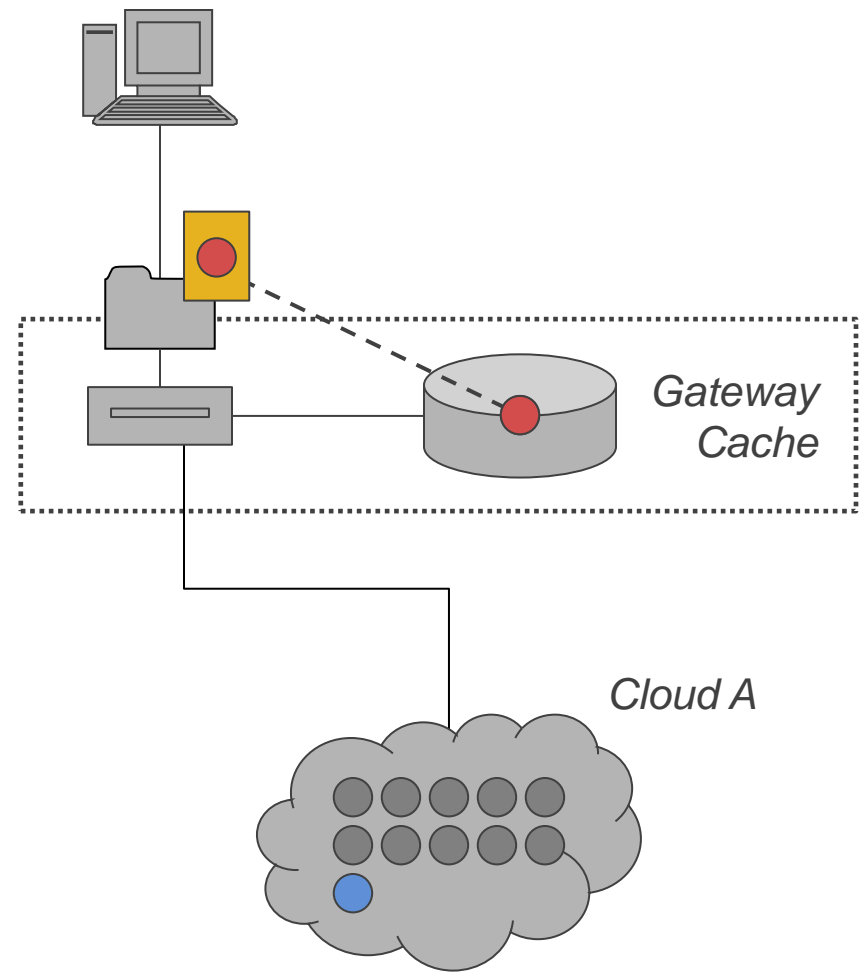*Gateway Cache*

Cloud A

Integrated Archive In Action

Foo.txt version 1
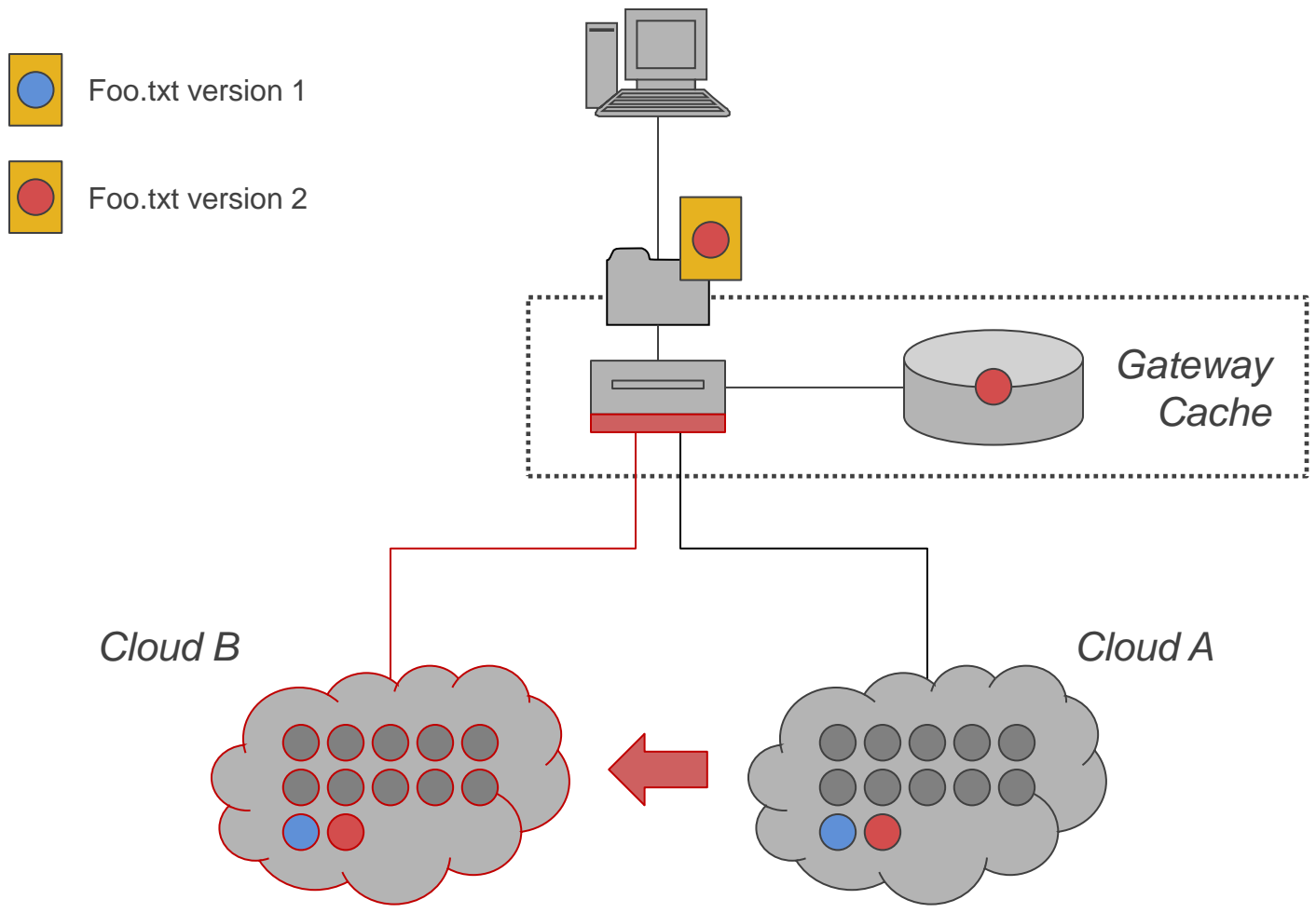
Foo.txt version 2

Gateway Cache

Cloud A

Integrated Archive In Action

Foo.txt version 1

Foo.txt version 2

Gateway Cache
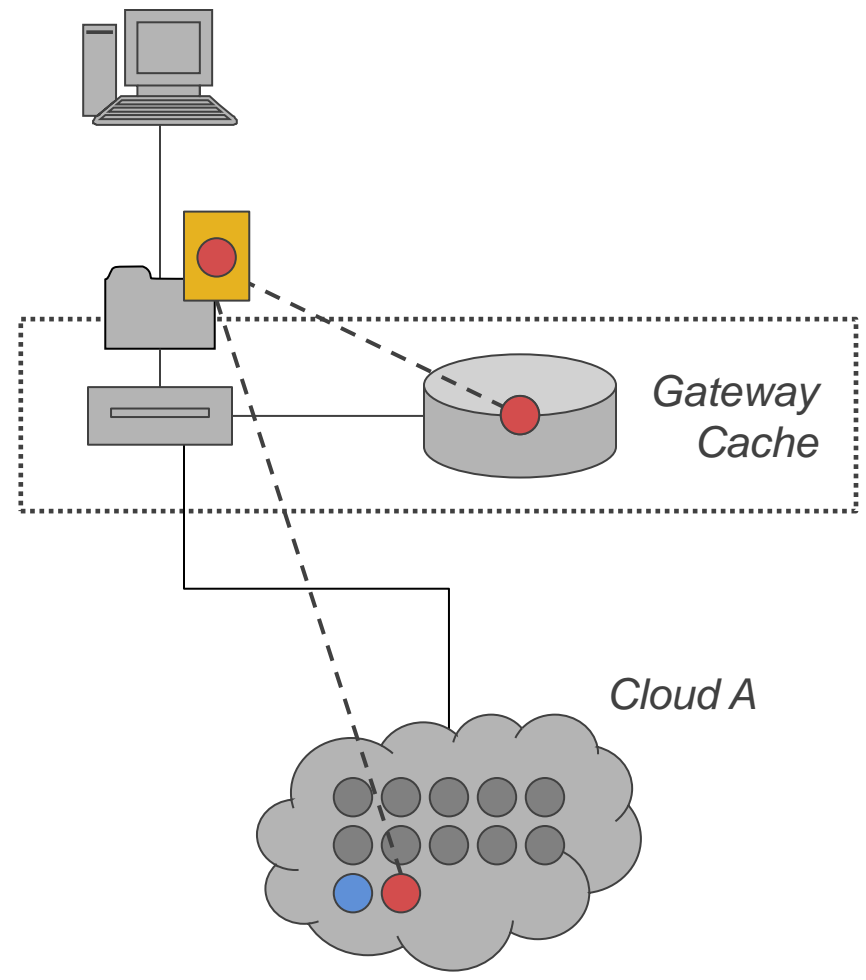
Cloud B

Cloud A

Summary

- Cloud storage technology is an attractive choice for long-term storage of files
    - Important to understand cloud technology
    - Independent of the options to deploy (rent/buy)
- There are two options to integrate cloud storage with existing file storage environments
    - Best option will depend on your environment and data storage requirements
- Cloud storage technology enables advanced data management
    - Example: Integrated Archive