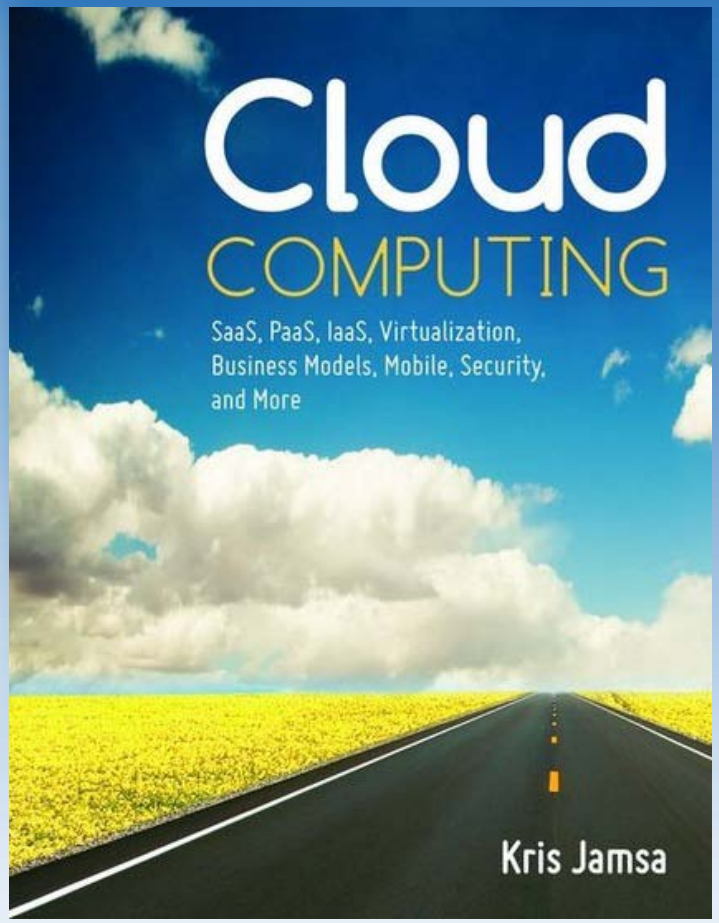


Cloud Computing

Chapter 4

Infrastructure as a Service (IaaS)

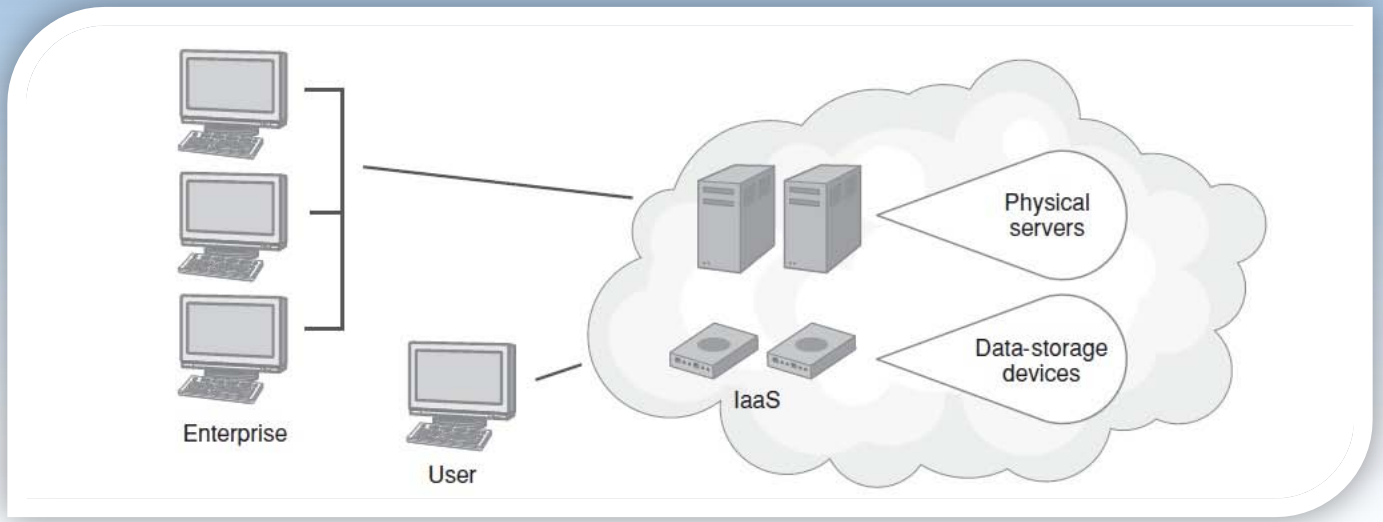
JONES & BARTLETT LEARNING
An Ascend Learning Company

Learning Objectives

- Define and describe IaaS and identify IaaS solution providers.
- Define and describe colocation.
- Define and describe system and storage redundancy.
- Define and describe cloud-based network-attached storage (NAS) devices and identify solution providers.
- Define and describe load balancing and identify cloud-based solution providers.
- Describe the pros and cons of IaaS solutions.

IaaS Defined

- An IaaS provider makes all of the computing hardware resources available, and the customers, in turn, are responsible for installing and managing the systems, which they can normally do, for the most part, over the Internet.



Data Centers Must Provide

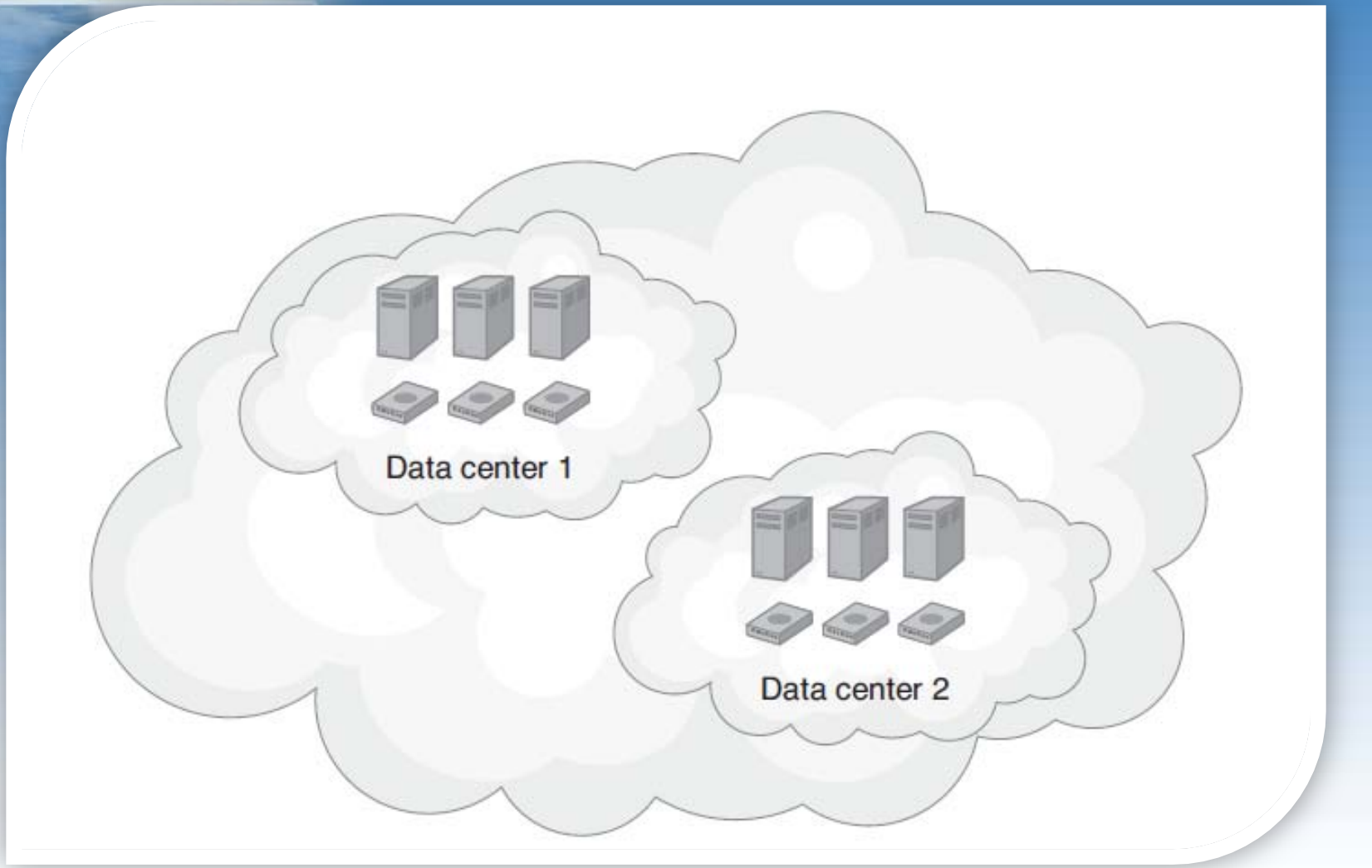
1. Access to high-speed and redundant Internet service
2. Sufficient air conditioning to eliminate the heat generated by servers and disk storage devices
3. Conditioned power with the potential for uninterrupted power supply in the short term and long term through the use of on-site diesel powered generators
4. Fire suppression systems
5. Administrative staffing to support hardware, networks, and operating systems

Bottom Line:
Data Centers are Expensive

Colocated Data Centers

- To reduce the risk of a single point of failure, companies often create a duplicate data center at a remote location.
- One of the data centers fail, the other can immediately take over operations.
- Unfortunately, the second data center will increase the company's costs—essentially doubling them—because there are duplicate servers, storage devices, network equipment, Internet access, and staffing.

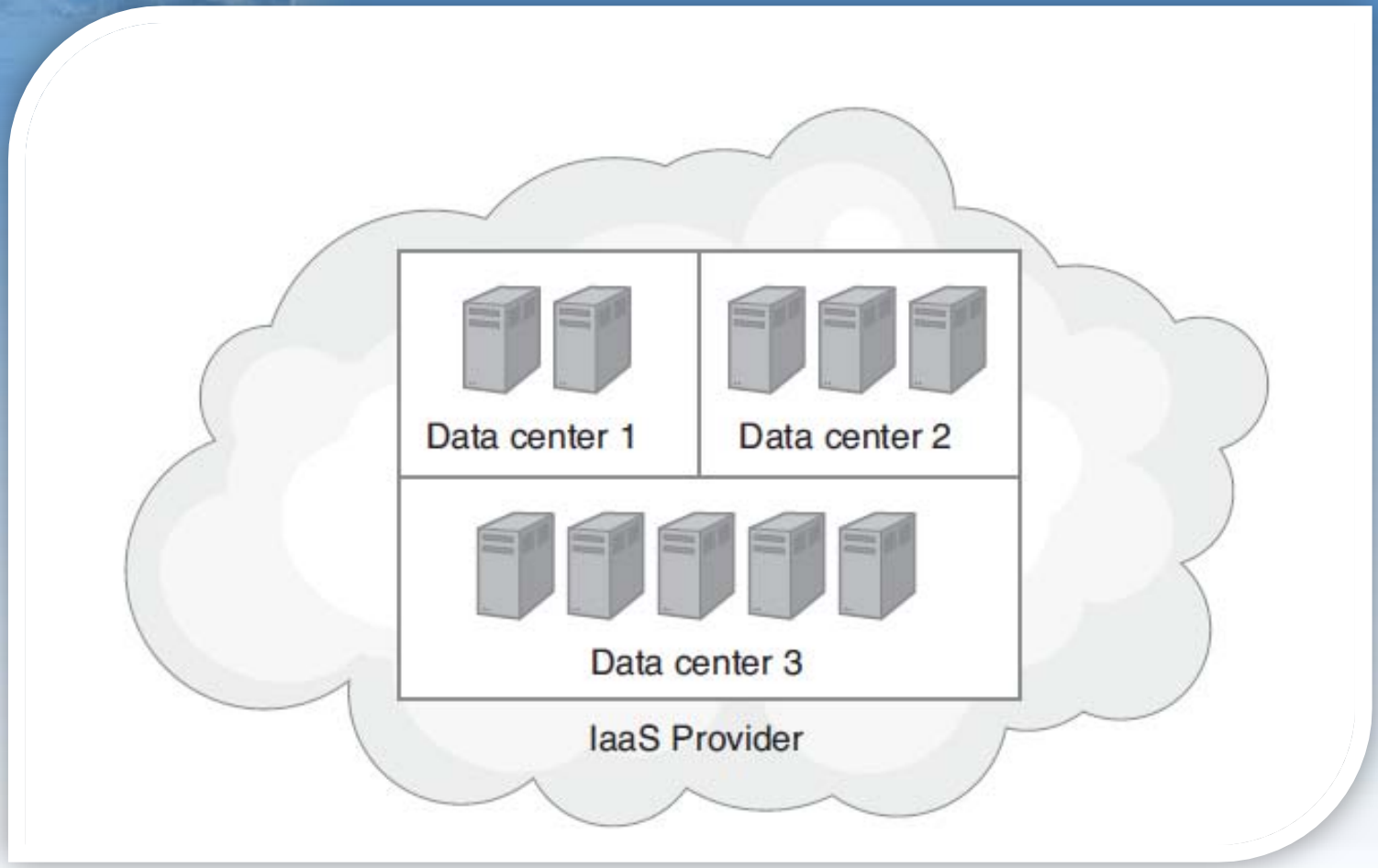
Colocated Data Center



What Colocated Systems Accomplish

- Makes the company less susceptible to fire, acts of God, and terrorism
- Improves performance through a distributed workload
- Makes the company less susceptible to downtime due to power loss from a blackout or brownout

IaaS Solutions May Support Many Different Companies

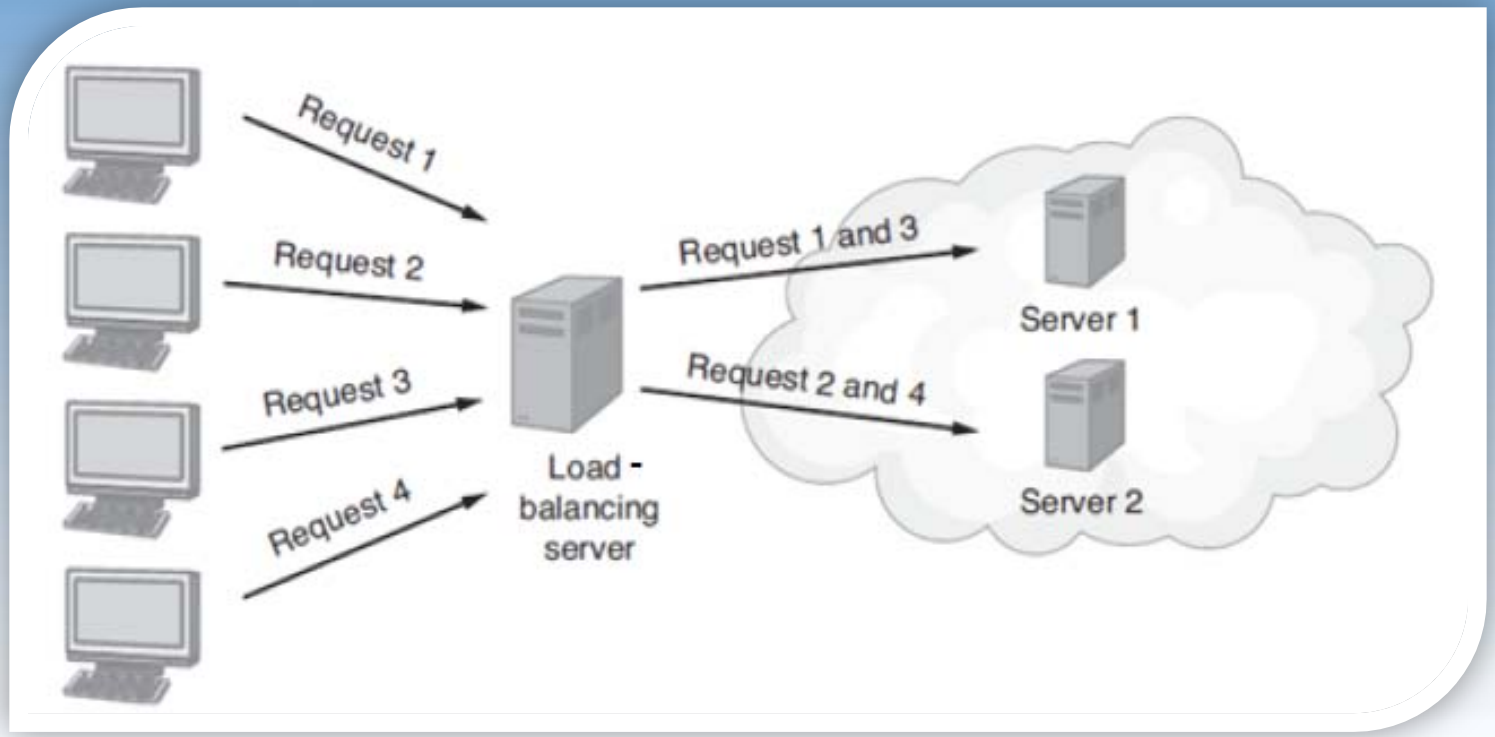


Load Balancing

- Google, Yahoo!, Amazon, and Microsoft experience millions of user hits per day.
- Across the web, sites experience a wide range of network traffic requirements.
- To handle such web requests, the sites use a technique known as **load balancing**, to share the requests across multiple servers.

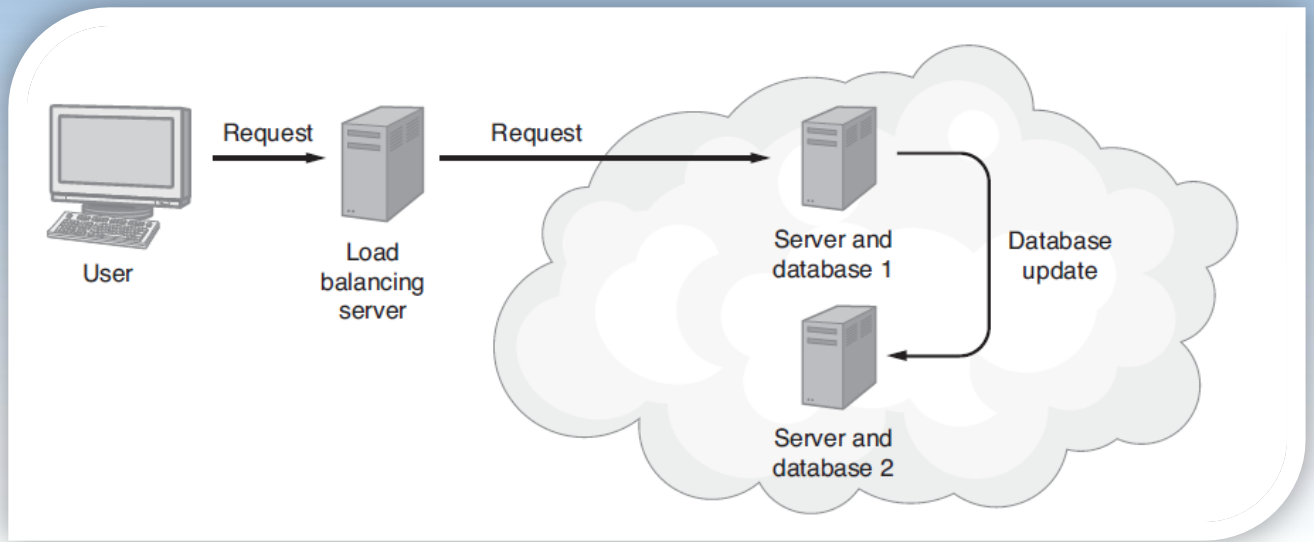
Load Balancing Continued

- Load balancing uses a server to route traffic to multiple servers which, in turn, share the workload.



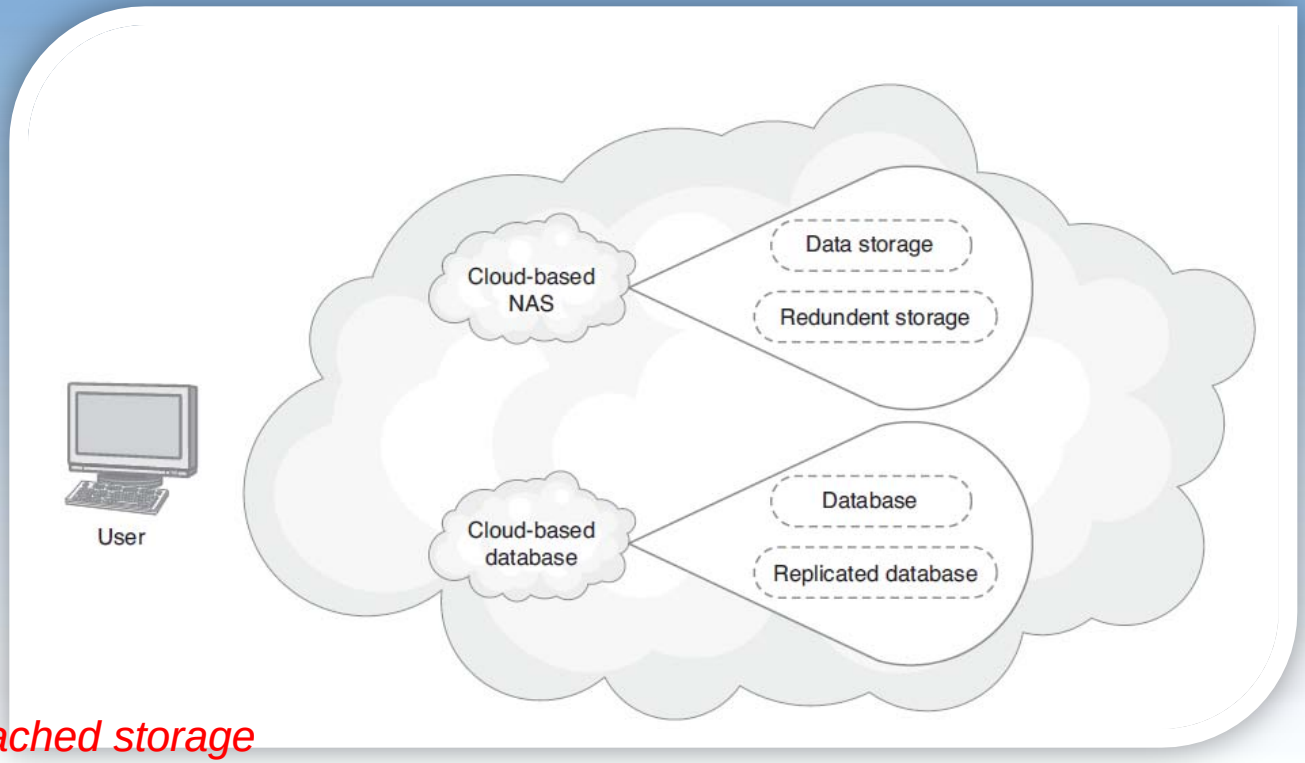
Load Balancing and Replicated Databases

- Load balanced systems, for data redundancy, often replicate databases on multiple servers.
- Each database, in turn, will send data updates to the other to maintain data synchronization between the servers.



Cloud-Based Data Replication

- Using cloud-based NAS devices and cloud-based databases, companies can replicate key data within the cloud.



NAS: network-attached storage

Real World: Rackspace IaaS

- Rackspace has emerged as one of the largest players in the IaaS market.
  - offers a set of solutions that include cloud hosting, managed hosting, and hybrid solutions that combine the cloud and managed services.
- Within minutes, from the Rackspace website an administrator can select a solution that deploys from 1 to 50 servers.
  - Larger configurations are available.

Rackspace Continued

- Rackspace
  - offers cloudbased solutions to hundreds of thousands of clients.
  - houses its data centers at very large facilities located around the world.
  - offers pay as you go scalability, with on-demand storage and load balancing.
- Beyond cloud hosting, Rackspace provides solutions for cloud-based e-mail, Exchange hosting, file sharing, backups, and collaboration.

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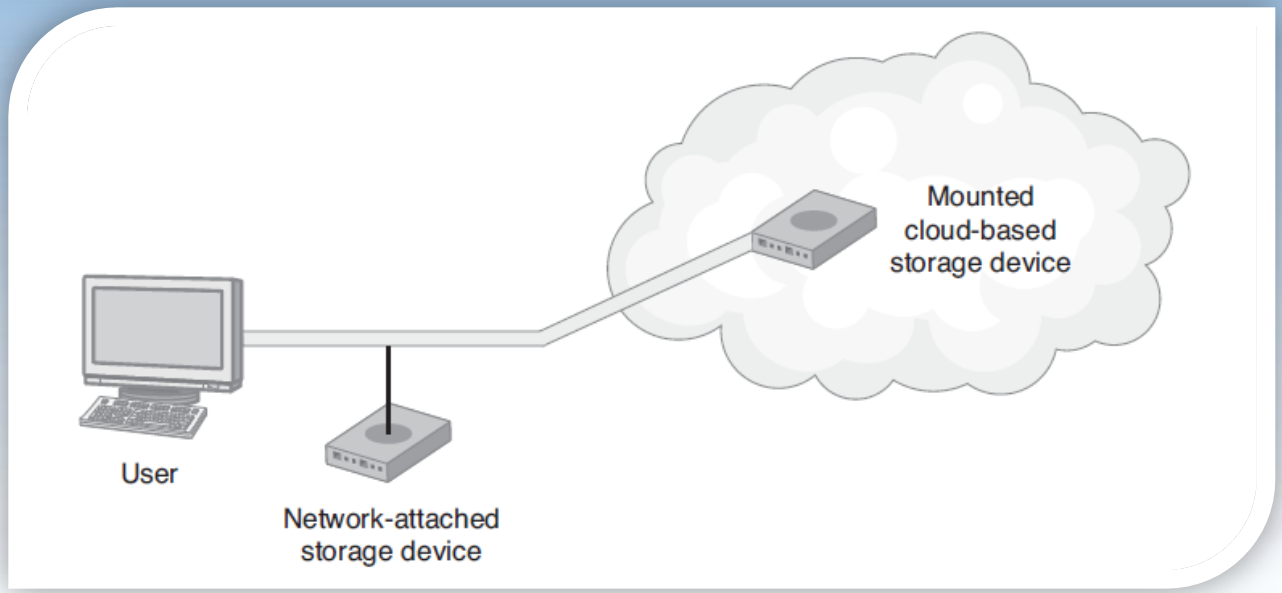
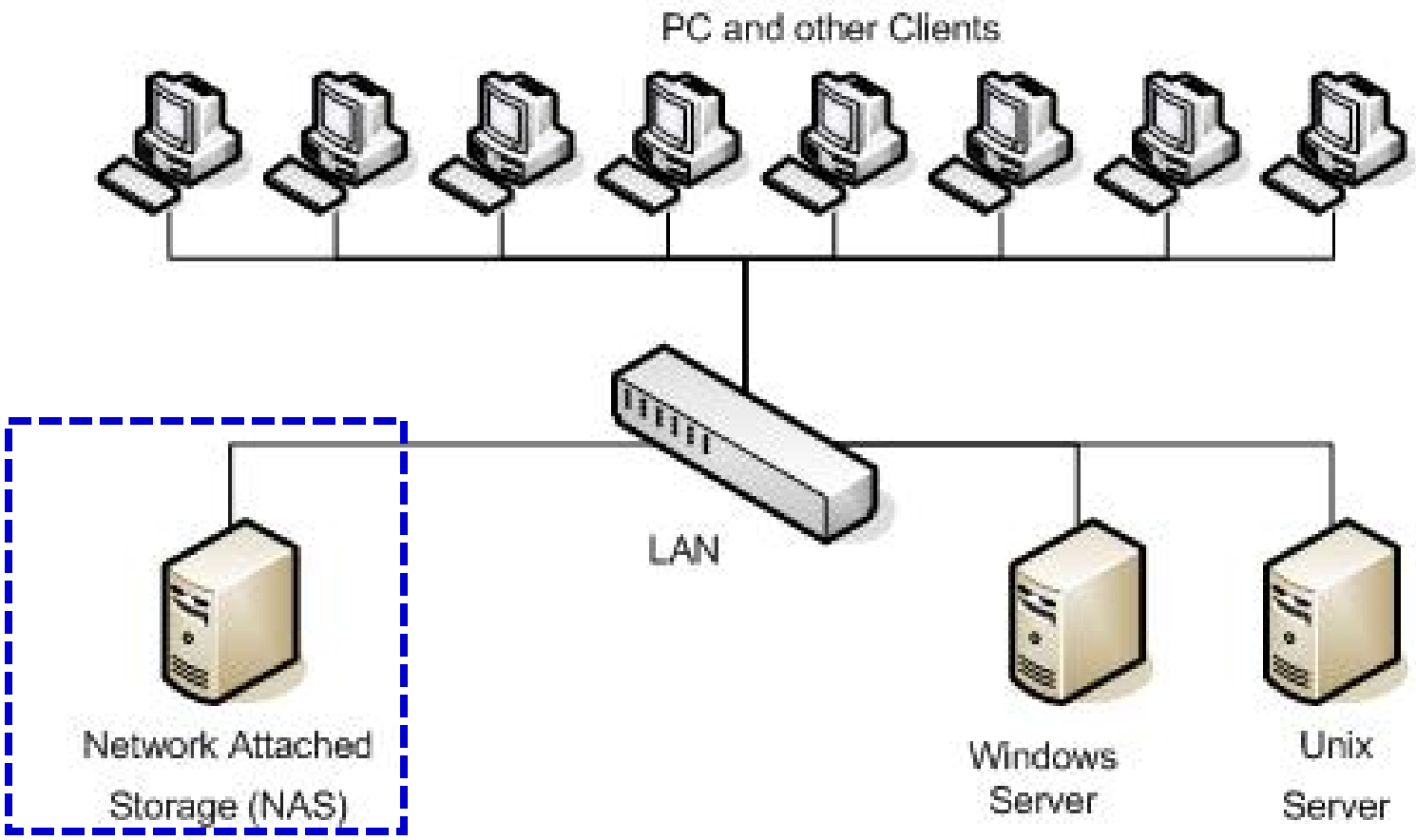
Network Attached Storage (NAS)

- Cloud-based NAS devices present cloud-based storage as mountable devices, which may be replicated in the cloud to meet a company's data redundancy needs.



Network-Attached Storage(NAS)

Typical Network Architecture Incorporating NAS Data Storage

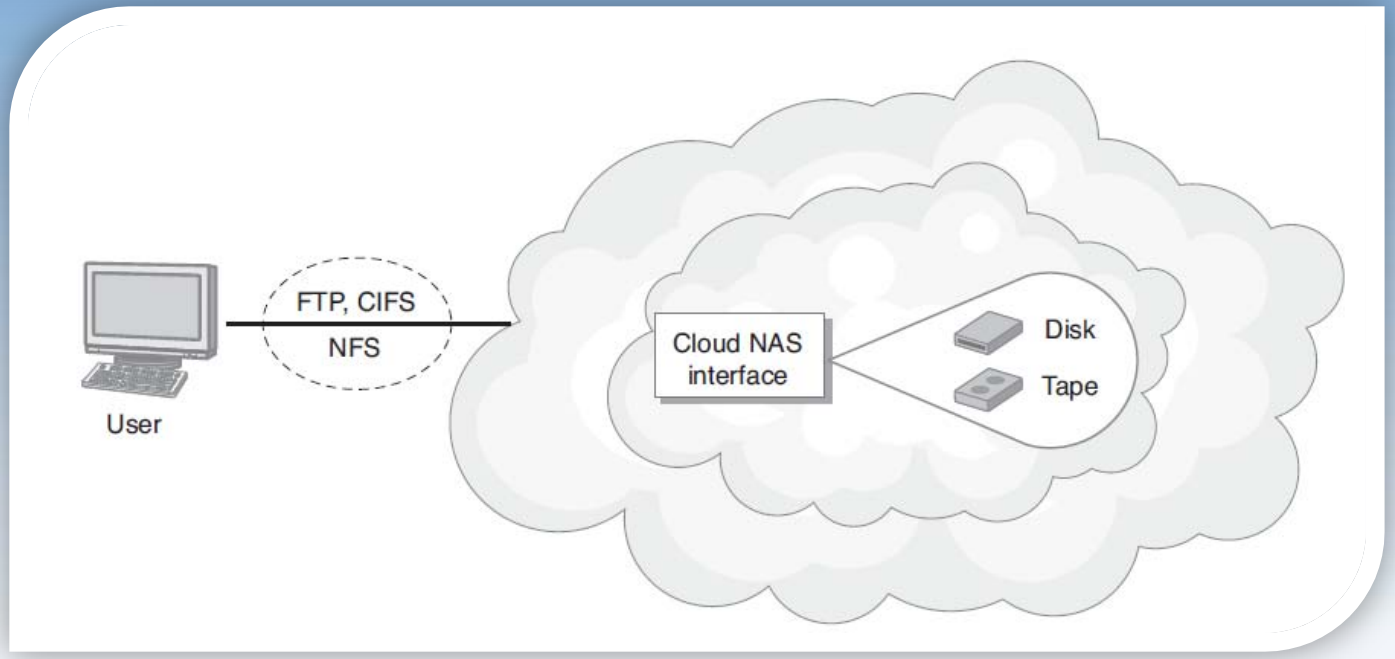


NAS

- Scalability: good
- Availability: as long as the LAN and NAS device work, generally good
- Performance: limited by speed of LAN, traffic conflicts, inefficient protocol
- Management: OK
- Connection: homogeneous vs. heterogeneous

Real World: Nirvanix IaaS

- The Nirvanix IaaS provides cloud-based NAS, which is accessible through the CloudNAS file system.



Nirvanix

nirvanix

Customer Login

How to Buy | Developer | Community | Contact

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PRODUCTS & SERVICES
- Public Cloud Storage
- Hybrid Cloud Storage
- Private Cloud Storage
- Cloud Storage Network™: Technical Overview
- Hybrid Cloud Storage: Technical Overview
- CloudNAS® / Web Services API
- Nirvanix Management Portal™
- Integrated Services
- Solutions Services
- terprise Support

Nirvanix

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Product Ma

JOB SUMMAR

The Product Mana bring to market new differentiated products and services that delive derstanding of the cloud storage market, customer needs ar d market share gain in key application areas that are heavily depend

Key responsibilitie ervice packaging, structure, and pricing; target markets definition e-off resolution in the product and service development proce ent requests; marketing content for customer and field collateral: with customers; customer and market research.

The position will re

ESSENTIAL J

- Product performance in the market
- Revenue growth and margin contribution; market share gains
- MRD development and accuracy
- Manage the platform roadmap
- On schedule product releases
- Differentiated functionality delivered vs. competition
- Field Enablement & responsiveness to field escalations
- Internal & External Partner roadmap inputs

Nirvanix Company
- Management Team
- Careers
- Investors
- Contact

Nirvanix Next Steps
- Explore Products & Services
- How to Buy
- Talk to a Solutions Representative

Share

Advantages of IaaS

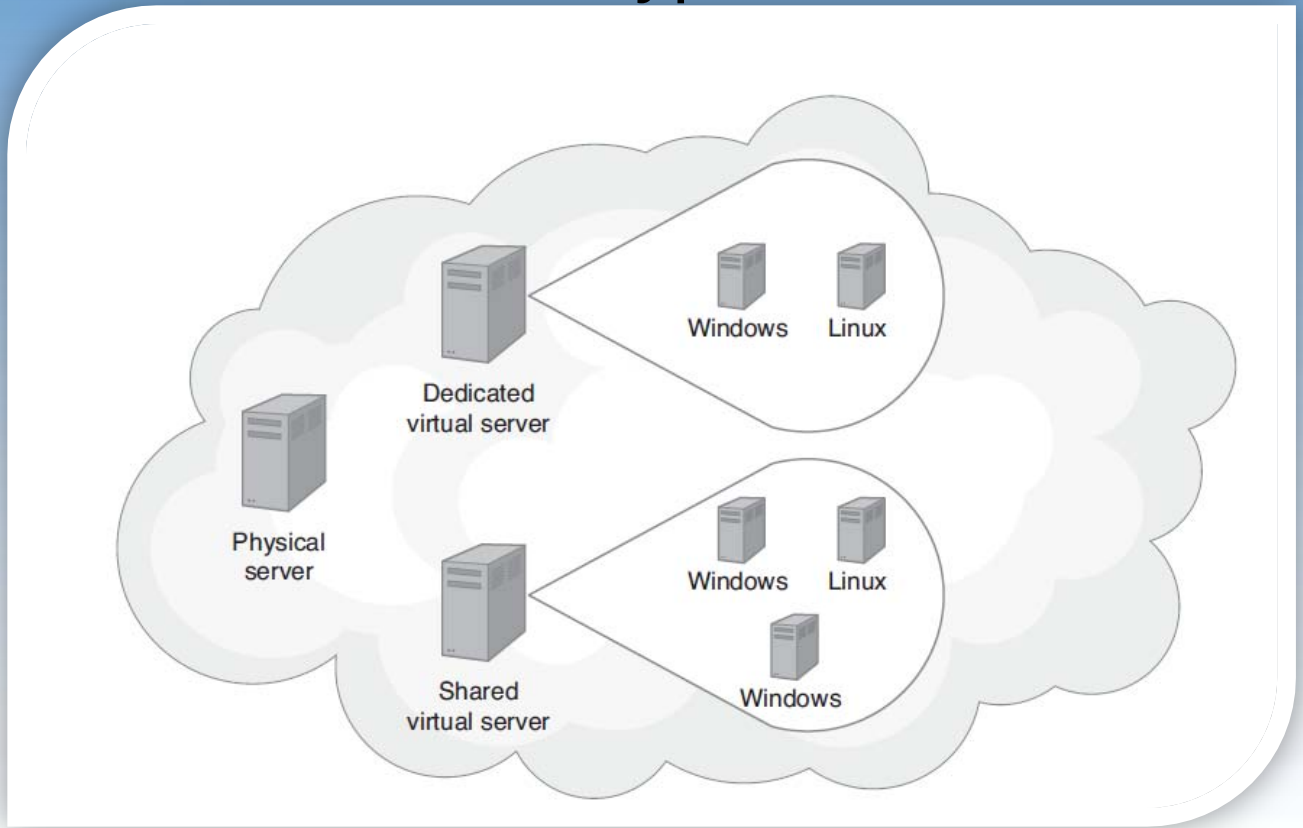
- Elimination of an expensive and staff-intensive data center
- Ease of hardware scalability
- Reduced hardware cost
- On-demand, pay as you go scalability
- Reduction of IT staff
- Suitability for ad hoc test environments
- Allows complete system administration and management

IaaS Server Types

- **Physical server**: Actual hardware is allocated for the customer's dedicated use.
- **Dedicated virtual server**: The customer is allocated a virtual server, which runs on a physical server that may or may not have other virtual servers.
- **Shared virtual server**: The customer can access a virtual server on a device that may be shared with other customers.

IaaS Server Types Continued

- Within an IaaS environment, customers can allocate various server types.



Key Terms

KEY TERMS

CloudNAS
Colocation
Common Internet File System (CIFS)
Load balancing
Network-attached storage (NAS)
Network File System (NFS)
Redundancy

Chapter Review

1. Define and describe IaaS.

2. Define and describe system redundancy. Discuss how you might use IaaS to implement a redundancy plan.

3. Define and describe load balancing. Discuss how you might use IaaS to implement load balancing.

Chapter Review Continued

4. Define and describe NAS. Assume you must implement a shared file system within the cloud. What company would you select? Why? What costs should your client expect to pay for cloud-based data on a gigabyte (GB) basis?

5. Define and describe colocation. Discuss how you might use IaaS to implement colocation.

6. Compare and contrast a cloud-based disk storage device (with a file system) with a cloud based database.

Chapter Review Continued

7. Compare and contrast physical, dedicated virtual, and shared virtual servers. Search the web for companies that provide each. What cost should a customer expect to pay for each?