Cloud Computing
Chapter 4
Infrastructure as a Service (IaaS)
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.
Collocated 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 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.
• 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 cloud-based 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.
Satisfy your users

with highly available and dependable SaaS hosting

OPEN CLOUD

Rackspace Cloud
Managed Virtualization
Managed Storage
Managed Colocation
RackConnect®

Managed Cloud

Managed Cloud

EMAIL HOSTING

Microsoft Exchange
Rackspace Email

CLOUD TOOLS MARKETPLACE

Create a free Rackspace Cloud account and explore what you can build!
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.
Product Manager - Nirvanix Cloud Storage Network

JOB SUMMARY

The Product Manager is responsible for bringing to market new differentiated products and services that deliver on Nirvanix's business growth strategy. You will be driven by a deep understanding of the cloud storage market, customer needs and competitive forces. You will be responsible for driving product strategy and market share gain in key application areas that will generate new revenue and profit streams.

Key responsibilities include:

- Markets definition
- Product development process
- Cloud Storage Network, CloudNAS®, Web Services API, and Field Collaborative Portal

The position will require interaction with internal and external customers. You will be responsible for the delivery of services packaging, structure, and pricing targets. You will lead the product go-to-market resolution in the product and service development process, and you will support customer, sales, and marketing teams in the resolution of customer requests. Marketing content for customer events, sales, and customer communications will be a key activity of the role.

ESSENTIAL JOB DUTIES

- Product management in the market
- Revenue growth and margin contribution, market share gains
- NPD 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
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.
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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.
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.
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?