Experiencing MIS

Fifth Canadian Edition

Chapter 6

The Cloud

Q6-1: Why Should I Care About Networks?

- Computers are more useful to people when they are connected to networks
- When connected to the Internet, you are part of a functioning network of networks containing millions of computers and other devices
- Networks allow you to send and receive email, browse web pages stored across the globe, download audio and video files, and even talk to friends using the telephone

Networks and Collaboration (1 of 2)

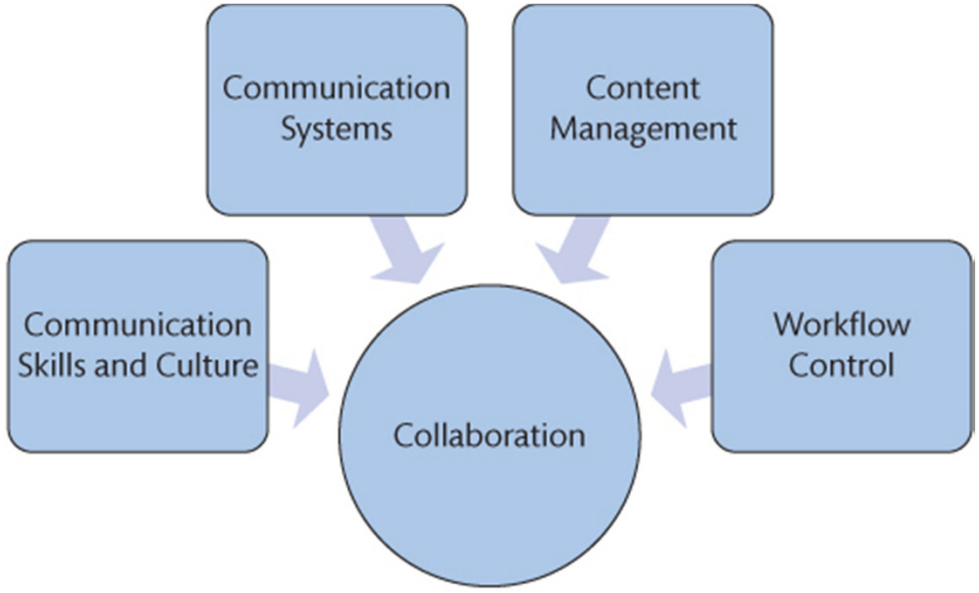
- **Collaboration**: when two or more people work together to achieve a common goal, result, or product
- Effective collaboration produces results greater than those that could be produced by any of the individuals working alone
- Collaboration involves coordination and communication and often makes use of computer networks

Networks and Collaboration (2 of 2)

- Effectiveness of a collaborative effort is driven by four critical factors:
  - Communication skills and culture
  - Communication systems
  - Content management
  - Workflow control

Figure 6-1
Critical Factors in Collaboration

- Communication skills and culture
- Communication systems
- Content management
- Workflow control



Communication Systems

- Group members may be travelling or unavailable
- To collaborate, companies use
  - Email
  - virtual private networks
  - Messaging
  - video conferencing

Network Externalities

- **Network externality**: the larger the number of people using a network, the more valuable that network becomes
- also called “network effect”
- When networks are first started, people often look for the critical mass
- When networks hit critical mass, they usually grow at a faster rate
- Network growth leads to congestion problems or the market may become saturated

Q6-2: What Is a Computer Network?

- **Computer network**
  - collection of computers that communicate with one another over transmission media
- **Transmission media**
  - physical media (copper cable, optical fibre)
  - wireless media (light or radio frequencies)

Computer Networks

Type	Characteristic
Local Area Network (LAN)	Computers connected at a single physical site
Wide Area Network (WAN)	Computers connected between two or more separated sites
The Internet and internets	Networks of networks

Q6-3: Why Is the Cloud the Future for Most Organizations?

- Cost of network storage and data transfer decreased
- Companies looked at moving computing infrastructure to the cloud
- Save costs
- Increase accessibility
- Likely that all organizations will move to “the cloud”

What Is the Cloud?

- **Elastic** leasing,
- of **pooled** computer resources,
- **Over the Internet**

Elastic Leasing

- Automatically adjusts for unpredictable demand
- Limits financial risks

Pooled Resources

- Pooled resources
  - Same physical hardware
  - Virtualization
- Economies of scale
  - Average cost decreases as size of operation increases
  - Major cloud vendors operate enormous Web farms

Over the Internet (1 of 2)

- computer industry agreed on a standard of requesting and receiving services over the Internet
- To reduce long, slow process of per-company decisions, methods
- **service-oriented architecture (SOA)**
  - Method of designing programs to be flexibly combined
  - Programs define
    - services they perform
    - data they expect
    - Results they produce

Over the Internet (2 of 2)

- **Web service standards**
- Method of designing programs to be flexibly combined
- Used by programs to define
  - services they perform
  - data they expect
  - Results they produce
  - How they will communicate
- **Web services:** SOA-designed programs that comply with web service standards

Why Is the Cloud Preferred to In-House Hosting? (1 of 2)

Cloud-based

- **Positive**
- Small capital requirements
- Quick development
- Flexibility/adaptability to changing demand
- Known cost structure
- Security
- No obsolescence
- Economies of scale

In-House

- **Positive**
- Control of data location
- In-depth visibility of security
- Disaster preparedness

Why Is the Cloud Preferred to In-House Hosting? (2 of 2)

Cloud-based

- **Negative**
- Dependence on vendor
- Loss of control over data location
- Little visibility into security, disaster preparedness

In-House

- **Negative**
- High cost
- Development effort
- Staff and training
- Management
- Inability to accommodate changing demand
- obsolescence

Why Cloud Now?

- Cheap processors, essentially free data communication and data storage
- Virtualization technology
- Internet-based standards enable flexible, standardized processing capabilities

When Does the Cloud Not Make Sense?

- When industry practice requires physical control or possession of the data
- Ex: Financial institution legally required to maintain physical control over its data

Q6-4: How Do Organizations Use the Cloud?

Cloud services from cloud vendors, three types

Content Delivery Networks,

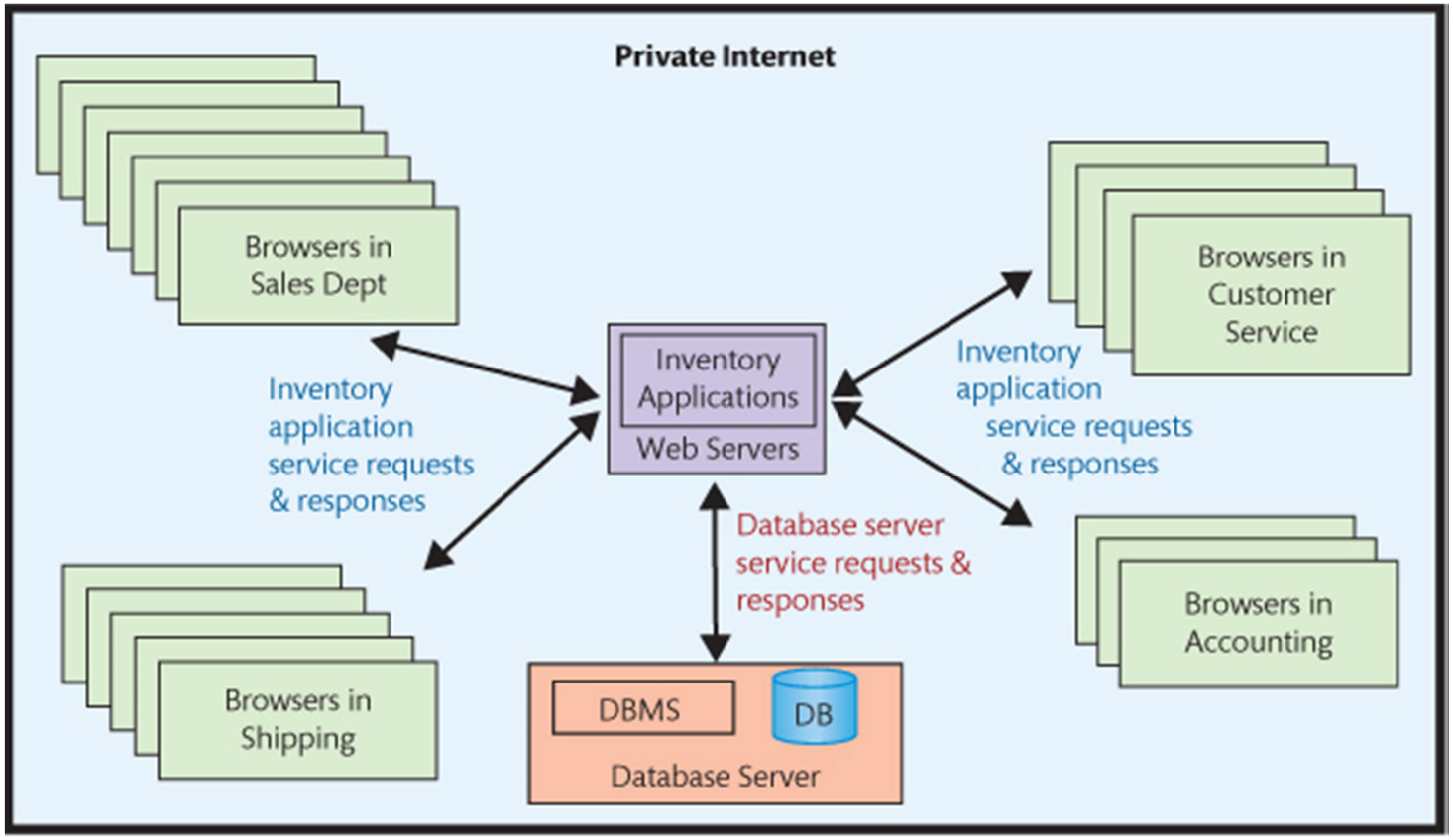
Cloud Services from Cloud Vendors

- Software as a services (SaaS)
  - Provides hardware, OS, and applications
  - Salesforce.com, Microsoft Office 365, Apple iCloud
- Platform as a service (PaaS)
  - Provides hosted computers, an OS, sometimes DBMS
  - Microsoft Windows Azure + choice of applications, Oracle On Demand + Oracle Database
- Infrastructure as a service (LaaS)
  - Cloud hosting of server computer or data storage
  - Rackspace, Amazon S3

Using Web Services Internally

- Build internal information using Web services
- Not strictly “cloud”, but does use cloud standards
- Company sets up a private Internet within the company
  - Writes applications for processing inventory, using Web services standards
  - Users access inventory w JavaScript sent to users’ browsers
  - Users include sales, shipping, etc.

Figure 6-9
Using Web Services Internally



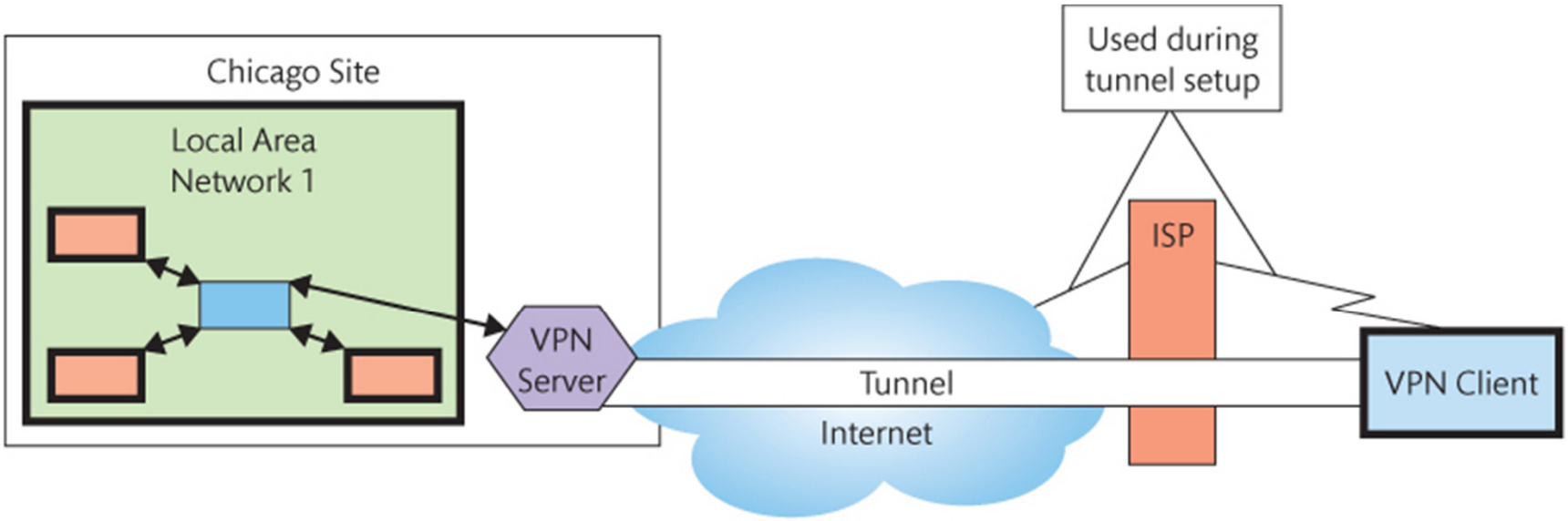
Q6-5: How Can Organizations Use Cloud Services Securely?

- Internet is a jungle of threats to data and computing infrastructure, companies need to be armed against the threats
- Combination of technologies often used now:
  - Virtual private network
  - Private cloud
  - Virtual private cloud

VPN

- uses public Internet to create appearance of a private connection on secure network
- Client (company, e.g.) establishes public connection to the Internet
- VPN software on the remove user's computer establishes a connection (**tunnel**) with the server
- Is a private pathway over a public or shared network

Figure 6-10
Remote Access Using VPN: Actual Connections



Using a Private Cloud

- Owned and operated by an organization for itself
- Company creates the private internet
- With applications using Web services standards
- Creates a farm of servers
- Manages the servers
- Provide security from within the infrastructure
- VPN set up for any remote users
- Difficult, and rare to do
  - Amazon, Microsoft, IBM, Oracle

Figure 6-12
Private Cloud for Inventory and Other Applications

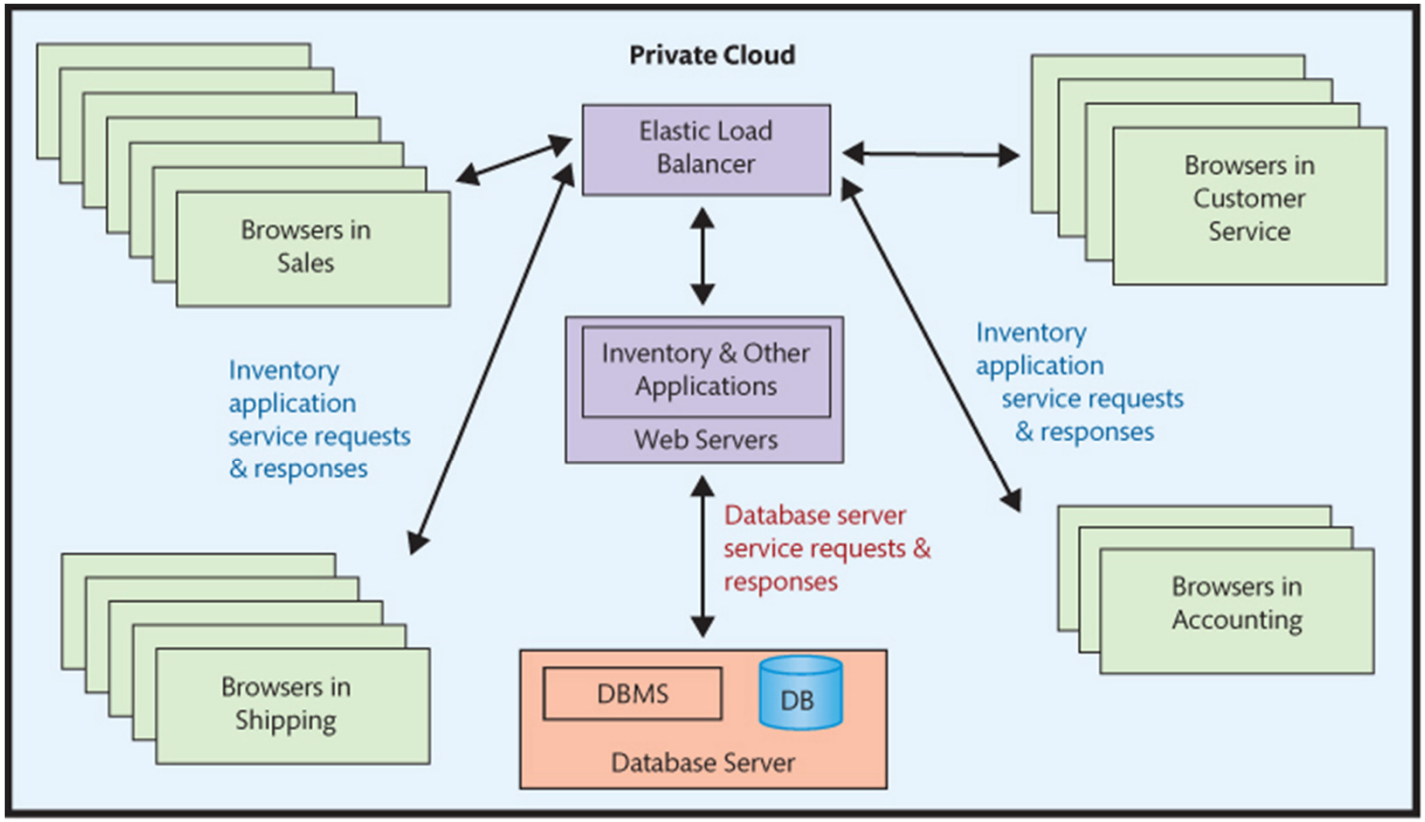
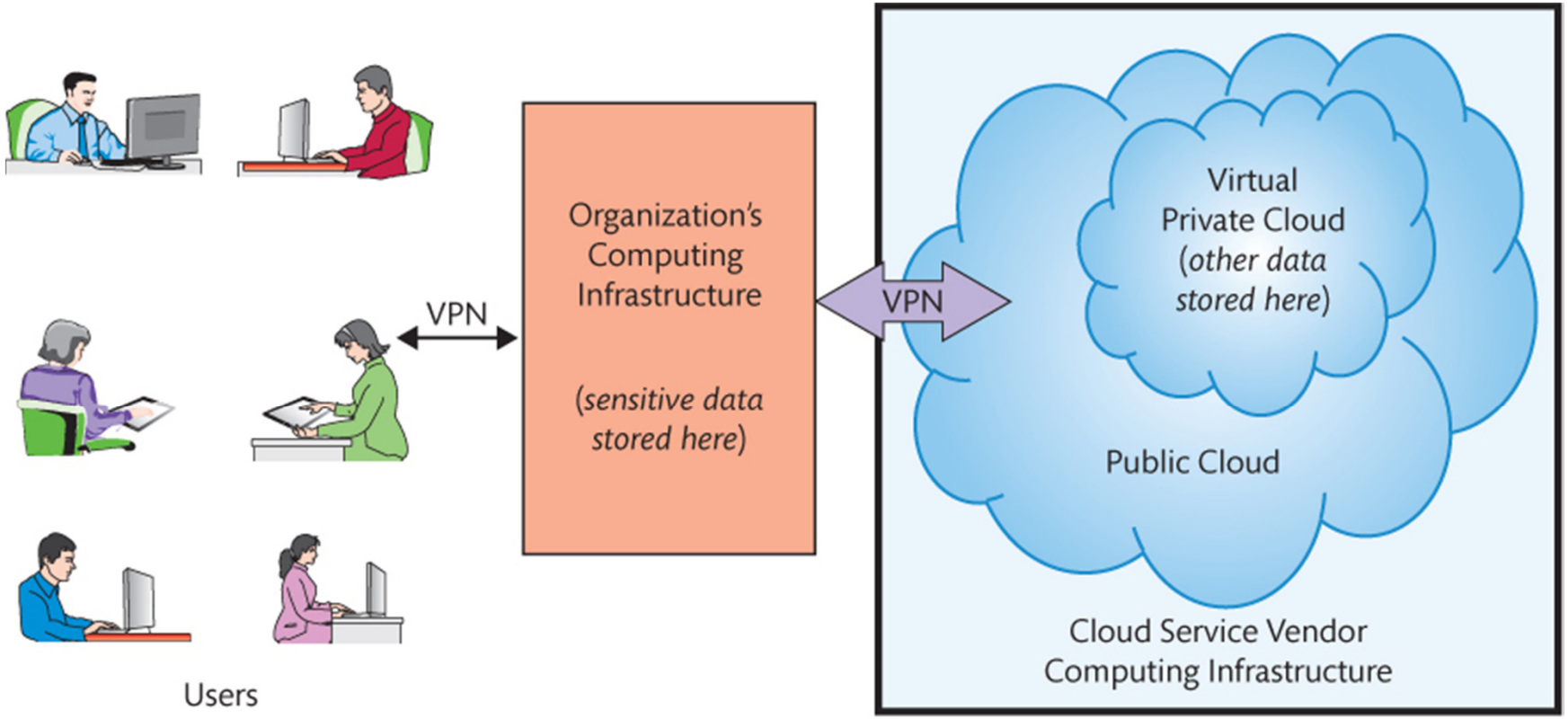


Figure 6-14
Using a Virtual Private Cloud



Q6-5: What Does the Cloud Mean for Your Future?

- Cloud services faster, more secure, easier to use, cheaper
- Fewer organizations set up own computing infrastructure
- More pooling of servers across organizations
- Overall size of the cloud gets bigger
- Individuals, small businesses, large organizations obtain elastic resources at very low cost
- Cloud fosters new categories of work

So What? "Net Neutrality Enabled"

- ISPs little control over amount, type, or origin of content
- 30% of U.S. Internet traffic during peak hours associated with people using Netflix
- Net neutrality
  - All users and content providers treated equally
  - No "fast" or "slow" lanes
  - ISPs not allowed to block or slow content associated with competitors
  - ISPs can't charge heavy Internet users additional fees or taxes

Q6-7: How Is Mobile Computing Changing the Way We Work and Live?

- Laptops becoming more common
- Smartphone becoming primary device for mobile computing
- **M-commerce**: Mobile commerce, applications that work on mobile devices, are on the rise (mobile banking, ticket purchases, pizza delivery)
- Computing power is with you – not only in an office building
- Hard to leave office behind

A Word of Caution

- Computer in your pocket can be useful, but data on it, if lost, can be devastating
- Reality of technology can sometimes be a fraction of what it promised
- Social media can amplify issues such as bullying
- Technology is not everywhere – rural areas not as evenly covered, creating barriers