

Lesson 1:

Introduction to IT

Business and Careers

Objectives

By the end of this lesson, you will be able to:

- ✦ 1.1.1: Distinguish between individual job roles within the IT industry and the IT profession as a whole.
- ✦ 1.1.2: Identify responsibilities, tasks and skills of a Web site designer for both traditional and mobile Web sites.
- ✦ 1.1.3: Distinguish between a Web architect and a Web application developer.
- ✦ 1.1.4: Identify responsibilities, tasks and skills of a Web site analyst.
- ✦ 1.1.5: Identify responsibilities, tasks and skills of a Web site manager.
- ✦ 1.1.6: Identify responsibilities, tasks and skills of a database administrator.
- ✦ 1.1.7: Identify responsibilities, tasks and skills of a server administrator, including e-mail/groupware administrator, Web server administrator, cloud-based server administrator.
- ✦ 1.1.8: Identify responsibilities, tasks and skills of a network engineer.
- ✦ 1.1.9: Distinguish between a security manager and a security analyst/consultant.
- ✦ 1.1.10: Identify responsibilities, tasks and skills of a PC and mobile device repair technician.
- ✦ 1.1.11: Identify responsibilities, tasks and skills of a help desk technician.
- ✦ 1.1.12: Identify responsibilities, tasks and skills of a Web marketing professional.
- ✦ 1.1.13: Identify responsibilities, tasks and skills of a mobile Web application developer.
- ✦ 1.1.14: Interpret a common business organization chart, including identifying duties of a Chief Executive Officer (CEO) versus a Chief Operations Officer (COO).
- ✦ 1.2.2: Explain Internet history, define current protocols (e.g., IPv4, IPv6, related protocols), and identify timelines and models for technology adoption curves (e.g., Moore's Law, Geoffrey Moore's technology adoption life cycle, Kuhn's concept of paradigm shifts).

- ↻ 1.15.6: Explain common models for information flow and reporting between IT and upper management, as well as IT and other areas of the organization, including identifying project approval steps, SWOT analysis, data modeling vs. business ontology.
- ↻ 1.15.15: Identify the importance of quality management and assurance, including ISO 9000 standards.
- ↻ 1.20.1: Identify and explore career opportunities in the IT industry that relate to personal career goals.
- ↻ 1.20.2: Conduct job searches.
- ↻ 1.20.3: Use Internet technology to obtain employment, including employment sites and networking sites such as LinkedIn.
- ↻ 1.20.4: Create a résumé and place it in an appropriate file format (e.g., ASCII, HTML, RTF, PDF).
- ↻ 1.20.5: Determine the relevance and necessity of education as job roles, responsibilities and technologies change.
- ↻ 1.21.1: Communicate technical issues and concerns to an end user.
- ↻ 1.21.2: Demonstrate the value of IT-related expenses to management and stakeholders.

Pre-Assessment Questions

1. In which job role does an individual determine the visibility of Web sites across multiple clients and search engines?
 - a. Web site analyst
 - b. Network engineer
 - c. SEO analyst
 - d. Server administrator

2. In computer science and Web technology, what is ontology?
 - a. The return-on-investment (ROI) impact of IT decisions on an organization's bottom line
 - b. The tendency for organizational and market changes to occur in a revolutionary manner
 - c. The process of determining the requirements that a database must fulfill in order to function properly for an organization
 - d. The study of how a particular part of a company, called a domain, is organized

3. Why is it important for people who want jobs in the IT industry to have good communication skills?

Information Technology (IT)

Information Technology (IT)

The management and processing of information using computers and computer networks.

Information Technology (IT) refers to all aspects of managing and processing information using computers and computer networks. Because computers are vital to information management in all organizations and companies, most organizations have dedicated computer personnel referred to as IT departments. IT departments generally deal with computer, telecommunications, network and other related technologies and services to provide employees with the resources necessary to reach their organizations' goals.

Information Technology is one of the fastest-growing career fields in the world today. IT skills are essential in all industries and are necessary in many different job roles.



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Visit CIW Online at <http://education.Certification-Partners.com/CIW> to watch a movie clip about this topic.

Lesson 1: Introduction to IT Business and Careers

OBJECTIVE

1.1.1: Individual IT job roles

IT Job Roles

The following sections will identify the various job roles in the IT industry, including the responsibilities, tasks and skills they encompass. As you will see, many of the responsibilities and skills overlap, so distinctions between job roles are not always precise.

NOTE:

Project management concepts and techniques will be presented extensively in a later lesson.



Many of the job roles listed in this section are integral components of most organizations. However, many are outsourced to contractors in the United States or sent offshore to be performed by qualified personnel in developing countries. By incorporating business and project management skills into your skill set, you will make yourself more marketable for employment in the U.S. IT industry.

Adopting a holistic perspective

Competent professionals working in any job role understand how their work affects others. Therefore, an IT professional must have a working knowledge of various IT concepts and practices relevant to the company. A holistic perspective — the ability to place a particular technology or practice in context with the entire company — is vital.

A holistic perspective in relation to IT involves understanding the needs of the business, as well as the various technologies required to design and deliver specific products. These products may be software designed by the company, services provided by the company or marketing pieces such as HTML-based e-mail and Web sites.

As you learn about the IT profession, take the time to consider how all of the job roles discussed here must work closely with each other in order to create effective business solutions.

End users

Even if you do not plan to become an IT professional, you still need to know how to use the various technologies found in the workplace. A deep knowledge of these technologies will help you excel as an employee. Knowing how IT works will help you use tools and applications more securely, as well.

As you learn about various technologies and job roles, ask yourself how you can learn more about the technologies used in your company. Develop a sense of curiosity about them. As you confront a technology that is new to you, ask yourself a few questions:

- Where can I learn more about this technology?
- Who can help me learn more about this technology?
- How can I use this technology in a new, creative way?

Google

The *de facto* standard for search engine sites (www.google.com).

Facebook

The premier social networking site on the Web (www.facebook.com). It enables individuals to communicate individually and connect as groups using various communications tools.

Twitter

A social networking and blogging site that allows individuals to communicate via short messages (www.twitter.com).

Companies and Web sites such as **Google**, **Facebook** and **Twitter** all began with employees who took existing technologies and found ways to use them creatively. As a result, these individuals were able to create solutions and billion-dollar companies that benefit people every day.

For example, the creators of Google took the already-existing practice of using search engines and applied methods to rank and qualify search results based on sophisticated criteria. Facebook's creators applied social networking concepts and group-based communications and added games, chat and other features to create a compelling Web site. Twitter's creators simply combined social networking and short, text-based communications to create what has fast become a universal way to inform people about your latest activities. Many companies use social networking to communicate with their customers. Figure 1-1 shows an example of a company reaching out to customers through a variety of social media outlets. You will learn more about social networking in a later lesson.



Figure 1-1: Communicating with customers using social media

OBJECTIVE

1.1.2: Web site designer job role

Web site designer

An individual who is responsible for the organization and appearance of a Web site.

Web site designers

Web site designers create the "look and feel" that visitors will see when they access a site on the World Wide Web. Web site designers determine the most effective site layouts, color schemes, navigational links and fonts to maintain visitor interest in the site. Site designers primarily establish the organization, mood and tone of the site relative to its content, with input from various parties. These parties include members of the marketing, sales and IT departments. In short, Web site designers are responsible for developing the user interface and aesthetics of a Web site, given input from those who know the company's audience and the company's technological abilities.

Web site designers must understand Web development technology and be proficient in Web languages such as Hypertext Markup Language (HTML), CSS and JavaScript; graphics applications such as Adobe Flash, Microsoft Silverlight, HTML5, Adobe Photoshop, Adobe Fireworks and the GNU Image Manipulation Program (GIMP); and Web site development applications such as Adobe Dreamweaver and Microsoft Expression Web. They must also possess good communication, organizational and visual design skills. Web site designers work closely with other departments within organizations and

with potential site viewers to determine the information and format that the site will present online.

smartphone

A mobile phone with advanced computing ability and Internet connectivity. Smartphones combine a mobile phone, camera, video recorder, global positioning system, touch screen, Web browser and wireless high-speed Internet connectivity into one device.

tablet

A powerful mobile computer similar to a smartphone, but with a larger touchscreen. Tablet computers typically do not have phone service, but are capable of high-speed Internet connections.

Web designers may be responsible for developing sites that work in mobile device browsers as well as in traditional PC browsers. Many large companies design two separate sites: one traditional and one mobile. The mobile sites are usually stripped-down versions of the traditional sites. Mobile sites typically have few or no images, less interactivity and less appeal. With the advent of newer mobile devices, however, developers can now create one site used by both traditional browsers and mobile devices. The reason is that newer devices such as **smartphones** and **tablets** are capable of handling rich content and interactivity due to their larger screens and powerful processors.

One example of a specific Web site designer job role is user interface designer. User interface designers ensure that a Web page meets the expectations of the end user, as well as the expectations of the business. User interface designers also help ensure that a Web page meets cultural expectations; is accessible by people with disabilities; and works in various browsers, including those found on smartphones.

Figures 1-2 and 1-3 show two different designs for the same Web site. Figure 1-2 shows a Web page with rudimentary formatting applied. A Web site designer may look at this page, determine that the page will not effectively grab the attention of potential viewers, and change the formatting and color scheme to make the page more interesting, thereby increasing viewer awareness of and participation in the Web site.

NOTE:

Visit a traditional Web site, such as eBay.com. Then visit the mobile version of that site at m.eBay.com. Note the differences and similarities between the two sites. In the age of smartphones and tablets, are stripped-down mobile sites still necessary? Can one site serve both audiences?

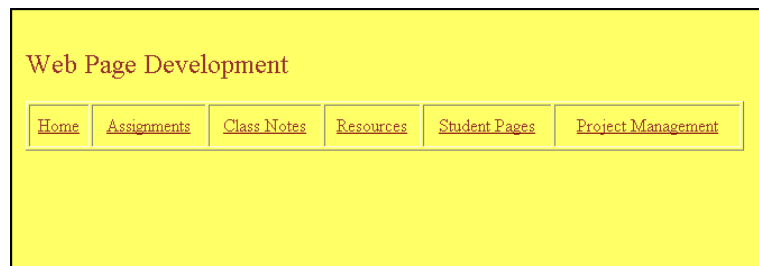


Figure 1-2: Web site design — plain Web page

Figure 1-3 shows the same Web page with additional formatting applied. Notice that this Web page is more interesting and easier to read than the preceding Web page.



Figure 1-3: Web site design — more interesting Web page

In the following lab, you will review basic Web site design concepts. Suppose you are the Web site designer for your company. Your project manager has asked you to prepare several prototypes of the Summer Youth Blitz Web page for Habitat for Humanity. What formatting attributes or images would you use to increase the page's visual appeal?



Lab 1-1: Exploring basic Web site design concepts

NOTE:

Knowledge of HTML is not required to complete this lab. The HTML code you type is for demonstration only.

NOTE:

Any HTML5-compliant browser can be used for this course. The screen captures will demonstrate Firefox, Chrome, or IE9.

In this lab, you will modify an HTML page to make it more aesthetically pleasing and informative.

1. First, you will view the existing HTML page and consider ways to improve it. Open **Windows Explorer** and navigate to the **C:\CIW\Internet\Lab Files\Lesson01** folder.
2. Double-click the **Lab_1-1** folder, then double click **blitz.html**. This step opens your default browser and displays the Web page shown in Figure 1-4.

*Note: If you want to display file name extensions in Windows Explorer, select **Organize | Folder And Search Options**, then click the **View** tab. Deselect **Hide Extensions For Known File Types**, click the **Apply** button, then click **OK**.*

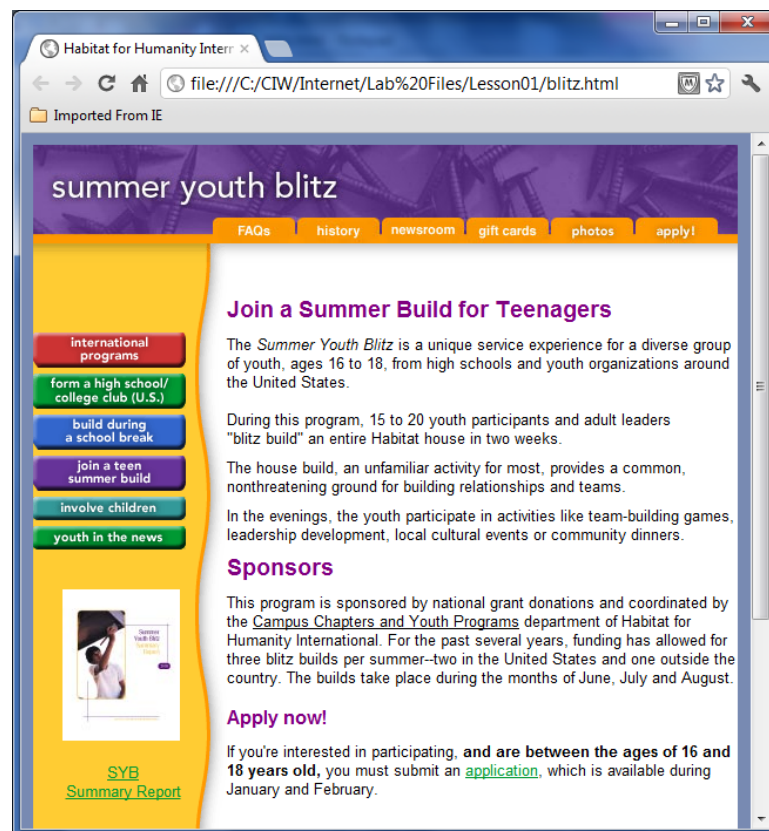


Figure 1-4: Viewing Web page for design qualities

Consider the following points about this Web page:

- The page provides a clear explanation of the Habitat for Humanity Summer Youth Blitz and offers a link to an application form.

- The page contains some graphical content, such as the side bar. The World Wide Web lends itself to graphical content. If you add the right image, you will better convey the page's message. An image can also increase the attractiveness of the page.
- What technologies are necessary to deliver this page? Consider the different parties that need to coordinate with each other in order for this to occur, including network engineers, server administrators, database administrators and designers.

Suppose that as a Web site designer, you have decided to add an image. Working with a graphic artist, you have created an image and want to insert this image into the page.

3. Next, you will change the HTML file so that it is more aesthetically pleasing. Close your browser window.
4. In Windows Explorer, double-click **syb.jpg** to display the image that you will add to enhance the existing Web page.
5. Close the image file.
6. In Windows Explorer, right-click **blitz.html**, then click **Properties**. The Properties dialog box will display.
7. Verify that the **Read-Only** check box is deselected, then click **OK**. This step ensures that you will be able to edit the HTML file.
8. In Windows Explorer, right-click **blitz.html**, then click **Open With | Notepad**. This step opens the Notepad application. You will see the HTML code display in the Notepad window.
9. Scroll down approximately half of the file until you see the gap immediately after the following line of code:

```
<article>
```

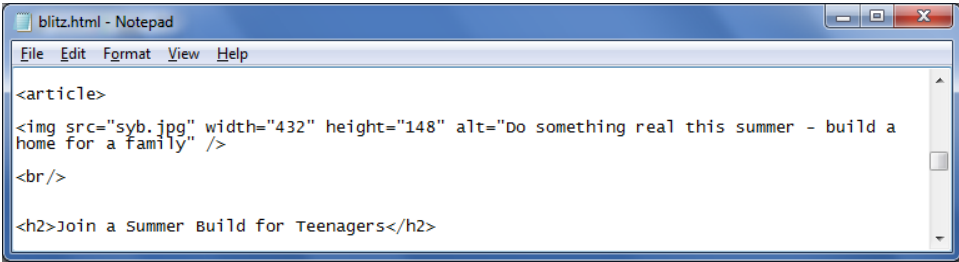
10. In the white space below the <article> element, type the following code:

```

```

Note: Ensure that the above code is typed exactly as written. You can also copy the code from the code_to_add_image.txt file in your lab folder.

The HTML code (including your newly inserted code) should match Figure 1-5.



```
blitz.html - Notepad
File Edit Format View Help
<article>

<br />
<h2>Join a Summer Build for Teenagers</h2>
```

Figure 1-5: Inserting HTML code

11. Press **CTRL+S** to save the changes, then close the **Notepad** window.

NOTE:
In Step 10, ensure that you type the HTML code exactly as written.

12. Open **blitz.html** in your Web browser. The modified Web page should appear as shown in Figure 1-6.



Figure 1-6: Improved Web page

13. Consider ways that adding this new image helps convey the message contained in this page's text. You have just helped enhance the design of this page.

14. Close the browser window.

In this lab, you considered Web site design issues and modified a page. You now have a better understanding of the Web site designer job role.

OBJECTIVE

1.1.3: Web architect vs. Web application developer

Web application developer

An individual who develops primarily server-side Web applications.

Web architect

An individual who creates the overview plan of a Web site's development.

Web application developers and Web architects

Web application developers use Web programming languages or products to develop Web sites, generally for Web server applications. Web application developers design, build and test the Web pages and hyperlinks that form the site. Web application developers must be proficient in programming and scripting languages such as Java, JavaScript, C++, Perl and others.

Web application developers may also lead project teams that design Web applications, so strong project management and analytical abilities are desirable skills for this job role.

Web architects are responsible for the overview plan of a Web site's development. They consult with management and Web site users to design and implement the plan for developing and maintaining an organization's Web site. They often manage Web site designers and Web application developers to design, develop, document and maintain an

organization's Web presence. Web architects must have solid project management, organizational and communication skills in order to provide technical leadership to an application development staff.

OBJECTIVE
1.1.13: Mobile Web application developer job role

mobile application developer

An individual who develops Web sites and/or applications for mobile devices.

Mobile application developers

Mobile application developers use many of the same skills and technologies as Web application developers to create applications for devices such as smartphones and tablets. These devices are capable of running powerful applications, graphics and multimedia. There are two ways to serve Web information to mobile devices: mobile Web sites and mobile apps.

- **Mobile Web sites** — Web sites designed specifically for mobile device browsers. Mobile Web sites are typically created with traditional Web development tools, but designed for smaller screens.
- **Mobile apps** — Applications created specifically for mobile operating systems, such as Google Android or Apple iOS. The apps are downloaded from a specific site, such as Google Play or Apple iTunes, onto the mobile device. Some apps feature content that mirrors the information found on traditional Web sites, such as the CNN news app or the Zillow real estate app. Other apps include games, office applications, photo editing software and social networking apps.

As technology progresses, Web application developers and mobile application developers will likely become the same job role. This is due to the convergence of traditional Web sites, mobile Web sites and mobile apps. Web developers will be able to use their design skills in all three environments.

OBJECTIVE
1.1.4: Web site analyst job role

Web site analyst

An individual who analyzes Web site statistics to determine the site's effectiveness.

Web site analysts

Web site analysts are responsible for analyzing Web site effectiveness from the viewpoints of both the organization and the end user. Analysts may design and conduct user surveys to obtain feedback about Web site features, then provide recommendations to improve the site's effectiveness. Analysts may also develop and monitor Web site tracking methods to determine the number of visitors, or "hits," a site receives.

Good analytical and communication skills are required for Web site analysts. Analysts gather and analyze statistical data, and often work with IT and marketing departments to recommend ways to increase a Web site's effectiveness. An analyst can also spend a considerable amount of time writing HTML, as well as creating graphics and writing client-side code such as JavaScript and VBScript.

Figure 1-7 shows an example of a Web site usage summary report generated by a Web site analyst. The report indicates that Web traffic remained relatively steady for several months, then declined dramatically in August. A Web site analyst would use these statistics, along with other research, to provide information to marketing and sales departments about their efforts. For example, if data shows that traffic increases with concentrated marketing efforts, then the Web site can be used to measure marketing success.

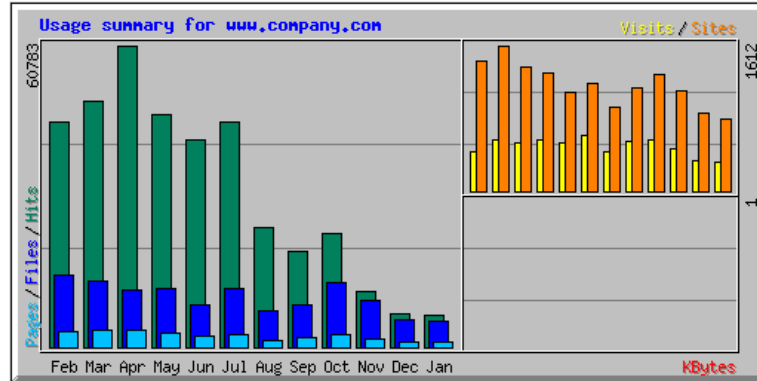


Figure 1-7: Web site usage report

A Web site analyst will probably be called to examine the data further to see whether decreased traffic has translated into decreased profitability for the company. Data analysis also has technical uses. For example, you can review usage statistics to help the IT department plan for increases in Web activity that accompany concentrated marketing efforts. It may become necessary to obtain a larger server or plan for more bandwidth if Web traffic is anticipated to increase dramatically.

dead link

A hyperlink that, when clicked, sends a Web site visitor to a page or resource that does not exist on the server.

Finally, an analyst may be asked to make technical changes to the site. Such changes may include modifying HTML, updating server-side scripts to eliminate errors, and fine-tuning database connectivity. One common activity of a Web site analyst is to look for evidence of locations at which visitors become confused, or get sent to missing pages, called **dead links**. One possible indicator of a dead link is the "404 – Page Not Found" error, which you may see in a Web server log file. Regardless of the specific activities you undertake, if you are an effective Web site analyst, your Web site will operate more efficiently, from both a sales-and-marketing perspective and a technical perspective.

OBJECTIVE

1.1.5: Web site manager job role

Web site manager

An individual who manages a Web development team.

Web site managers

A **Web site manager** in a large organization generally manages the Web development team. A Web site manager in a small company could perform all the Web development job roles discussed previously. In short, Web site managers provide organizational leadership for Web site content and all related initiatives.

Web site managers are typically involved in standardizing the content, style, design and development procedures required to create and maintain an organization's Web site. Site managers also assess the costs and benefits of implementing these standards. Site managers may also evaluate alternative Web technologies and standards, and train Web designers and application developers.

Web site managers do not necessarily need to possess highly technical skills. However, they must demonstrate the ability to remain up-to-date in their knowledge and understanding of current Web technologies and processes. Site managers must also possess the ability to analyze, interpret and integrate a wide variety of data, evaluate Web resource utilization, forecast customer and organizational site needs, and anticipate and resolve ethical issues related to site content and design.

OBJECTIVE

1.1.6: Database administrator job role

Database administrators and database specialists

Databases store and manage information. Databases are used in all areas of an organization to store information related to employees, vendors, customers, inventory,

resources and so on. The power of databases lies in their ability to organize, sort and access information to meet specific user requirements.

database administrator

An individual who is responsible for the maintenance and security of an organization's database resources and data.

NOTE:

Databases will be presented in greater detail in a later lesson.

Database administrators are responsible for the maintenance and security of an organization's database resources and data. They are also responsible for researching and analyzing the latest database technologies and developments, and for providing recommendations to senior management about database use and information management procedures and standards.

Database administrators develop and implement database maintenance plans to check the integrity of the data, manage the physical resources necessary to store and manipulate the data, administer and enforce data usage standards, and audit database systems to maintain system performance. Database administrators also manage backup and recovery procedures to prevent data loss, and apply database software upgrades and repairs as needed.

Database administrators must be able to judge system effectiveness and efficiency, analyze information to propose solutions and solve problems, evaluate the impact of resource allocations, and communicate effectively with senior management when discussing the benefits and risks of proposed technology solutions.

Specializations

Database administrator is just one database-oriented job role. Other database specializations include:

- **Database designers** — Individuals who plan the logical and physical database structure. This type of specialist is important because a poorly designed database will cause serious performance and data-retrieval problems. These problems have become very common in the IT industry. Database designers also analyze a company's business requirements to make sure that the database fulfills these requirements.
- **Database engineers** — Specialists who build the physical architecture to create **scalable** database solutions. Database engineers make sure that different database servers can communicate with each other properly. They also know how to "distribute" databases, which means that multiple databases can act as one. These individuals also make sure that data is copied from one database to another properly, a process called **replication**.
- **Database analysts** — Individuals who study the data carefully. They also provide analysis data to enhance database performance and ensure that the company databases are fulfilling business goals.
- **Database security engineers** — Individuals tasked with ensuring that databases are being accessed only by properly authenticated users. Also includes those who understand how to recover data in case of a man-made or natural disaster.
- **Business intelligence analysts** — Individuals who are experts at mining databases for information, then creating functional specification documents based on this data to help a business create solutions for its customers. These individuals manage data miners.

scalable

The ability for a system to function well when its workload is increased or hardware is added to meet user need.

replication

The practice of copying data from one source, such as a database, to another.

OBJECTIVE

1.1.7: Server administrator job roles

server administrator

An individual who manages and maintains network servers.

Server administrators

Server administrators are responsible for designing, implementing, managing and maintaining network servers, and associated applications and peripheral devices. Server administrators may also implement policies and procedures for ensuring the security and integrity of the servers and network, and protect the network from viruses and other

intrusion threats, such as hacking. Other responsibilities include providing technical assistance and training to IT staff and system users, troubleshooting server and network problems, implementing cost-effective solutions, suggesting and implementing system improvements, and providing data backup services. A server administrator is shown in Figure 1-8.



Figure 1-8: Server administrator

Server administrators should be proficient in a variety of network operating systems and applications, such as Windows, UNIX/Linux, Microsoft Internet Information Services (IIS), Microsoft SQL Server and Microsoft Exchange. They should also be familiar with Web technologies such as HTML, Extensible Markup Language (XML) and File Transfer Protocol (FTP), and applications such as Adobe Dreamweaver.

cloud computing

Software, infrastructure and platform services that are hosted by a remote data center and provided to organizations or individuals over the Internet.

Server administrators must be familiar with **cloud computing**. Cloud computing is software services that are provided over the Internet, rather than at a company site. For instance, in the past, companies had to have a server room with Web, e-mail, file and database servers. These servers can now be located in the "cloud" (i.e., a remote data center that is accessed over the Internet). For example, the company Web site can be hosted by GoDaddy.com. E-mail can be provided by Google's Gmail service; file servers can be provided by Microsoft OneDrive; and database servers can be provided by Amazon Web Services (AWS). Each of these companies has a data center, or server farm, with hundreds or perhaps thousands of servers that share resources with one another. The ability to share resources keeps the costs relatively low for customers.

Server administrators are needed to configure and maintain these cloud servers. This can be done at the actual data center with rows of rack-mounted blade servers, or virtually at your company's headquarters. Even if a company moves its IT services to the cloud, someone has to configure, maintain and secure them.

In addition to possessing strong technical skills, server administrators must display strong communication skills so they can distill complex server and network issues into understandable concepts upon which senior management can make decisions and users can take action. Communication skills also include project management skills, as you will learn later in this lesson.

Server administrators can be classified into subcategories, such as Web server administrators or e-mail/groupware administrators. Web server administrators are responsible for servers that act as gateways between the organization and the Internet. E-mail/groupware administrators are responsible for network servers upon which e-mail clients and groupware (software that enables groups of people in a local area network [LAN] to organize their activities) are located. E-mail/groupware administrators install and maintain e-mail clients, develop and maintain security procedures to protect the integrity of electronic data transfers, and analyze and recommend improvements for e-mail utilization, capacity and performance.

OBJECTIVE

1.1.8: Network engineer job role

network engineer

An individual who manages and maintains a network infrastructure.

NOTE:

LANs, WANs, IPv4 and IPv6 will be presented later in this lesson.

Network engineers

Network engineers focus on the design, implementation, delivery and support of network components, policies and procedures used by an organization. Network engineers are responsible for configuring and testing network devices, and setting up and maintaining the network infrastructure. Network engineers also analyze, design and implement networking technologies to better meet the needs of the organization and the network users. Network engineers support and maintain network devices such as Web servers, e-mail servers, routers, connecting cables and so forth. Network engineers may also be responsible for system security, data backup, disaster recovery planning and virus protection.

Network engineers must be able to implement LANs and wide area networks (WANs), and be proficient in a variety of networking skills, such as routing and switching, network traffic analysis, and device configuration and testing. Network engineers must also be knowledgeable in a variety of network technologies and protocols, such as network communication media, Virtual Private Networks (VPNs), firewalls, Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6). Network engineers must also possess excellent communication skills to be able to present technical information in an understandable way to management, non-technical associates and customers.

Convergence technologies and Information Technology

Traditionally, telephone networks have been limited to sending voice data (e.g., telephone calls). Since the mid-1990s, however, telephone networks have increasingly transported network-based data. Any equipment used to carry voice/data and run by telephone companies is called a telephony network. Similarly, data networks have traditionally been limited to sending standard network data (such as files from a Windows client to a Windows server via TCP/IP). Increasingly, however, voice and data networks have been combined, or converged, creating convergent networks.

Convergent networks can help reduce cost to companies and organizations. Increasingly, Internet connections are used to carry voice communication. Network engineers are often asked to manage these networks.

Cloud computing

As you have learned, the cloud provides software services over the Internet. Network engineers are required to set up and maintain the cloud networks.

Cloud networks typically involve a data center, or several data centers, that can behave as one network. File storage services, such as Google Drive or Microsoft OneDrive, may span hundreds or thousands of servers on the network. Software such as Apache Hadoop allows these servers to work together and behave as one server that can be centrally administered.

OBJECTIVE

1.1.9: Security manager vs. security analyst/consultant

security manager

An individual who manages the security measures used to protect electronic data.

security analyst/consultant

An individual who examines an organization's security requirements and determines the necessary infrastructure.

search engine optimization (SEO)

The process of improving the volume and quality of traffic to a Web site by structuring content to improve search engine ranking. A specific activity of Internet marketing.

Security managers and security analysts/consultants

Security managers are responsible for managing the security measures used to protect electronic data. They maintain the software and procedures necessary to protect the confidentiality and integrity of information, and legitimate access to it. Security managers perform security risk assessments, prepare for disaster recovery, monitor security control systems to ensure that appropriate security clearances and information access levels are maintained, and work with other departments to maintain secure data and information flow. Security managers may also implement and document the organization's security policies and procedures, provide security training to management and employees, and monitor and recommend advancements in information security technologies.

Security managers have grown in importance as cloud computing has become more popular. Security is often the top concern of business leadership when moving to the cloud. For example, will proprietary information be safe in the cloud? Will the servers be safe from viruses, worms and other vulnerabilities?

Businesses typically assign several security managers to work with the cloud service provider in order to maintain security of the data, accounts, services and access permissions. Cloud activity must be monitored. For example, who has access to your company data? Network engineers and server administrators at the cloud service provider will typically have access to it, or at least have the ability to access it. Security managers must work with the provider to ensure the data remains safe.

Security analysts/consultants are responsible for examining an organization's security requirements and determining the hardware, communications and software capabilities needed to satisfy the requirements. Security analysts/consultants may lead project teams that perform risk assessment, information security program development and implementation, network security architecture review and design, product reviews, and security solution deployments.

In addition to the technical skills related to information security, security analysts/consultants should have strong project management, consulting and communication skills. They will often manage security-related projects, write technical reports understandable to non-technical readers and communicate recommendations to senior management.

Security managers and analysts/consultants should possess knowledge of server operating systems (Windows, UNIX/Linux, etc.), firewall technology, virus-scanning software, security management software, security assessment software, intrusion-detection systems, VPNs, and so forth.

SEO analysts

Search engine optimization (SEO) is the process of improving the volume and quality of traffic to a Web site based on the relevance of the site to search terms entered into a search engine. Generally, the higher a site ranks (i.e., the earlier it appears in search engine results pages), the more searchers will visit that site, as shown in Figure 1-9.

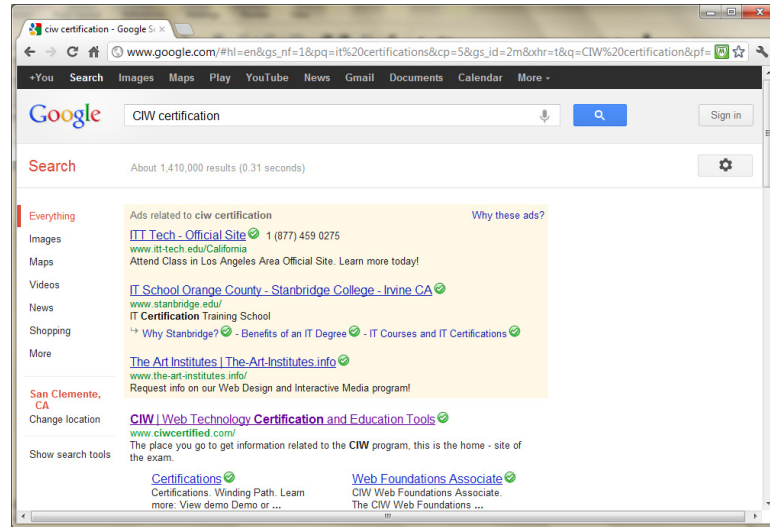


Figure 1-9: CIW certification search results

SEO analyst

An individual who determines the visibility of Web sites across multiple clients and search engines.

SEO analysts are responsible for performing keyword research to determine the visibility of Web sites across multiple clients and search engines. SEO analysts will often work with the marketing team to develop interactive marketing strategies to increase Web site visibility.

SEO analysts should have a basic knowledge of HTML, CSS, JavaScript and other programming languages; experience in keyword research; and familiarity with search engine ranking, traffic and analysis software. SEO analysts should also possess strong analysis and writing skills, as well as communication and teamwork skills. Analysts must be able to analyze and summarize data, and present analytical reports.

OBJECTIVE

1.1.12: Web marketing manager job role

Web marketing manager

An individual who develops and implements plans to exploit the Internet for marketing and sales opportunities.

Web marketing managers

Web marketing managers are responsible for developing and implementing plans to take advantage of the sales and marketing opportunities available through the Internet. They help define their companies' objectives for using electronic commerce (e-commerce) and decide which computer applications are needed to achieve them.

Internet marketing managers must possess knowledge of Internet-based applications and be able to analyze Web site traffic in order to develop recommendations to improve their companies' search engine optimization capabilities. Internet marketing managers must also possess business management and project management skills in order to develop budgets for projects, monitor project costs, provide status reports to management, and incorporate feedback from management. They must also possess strong analysis and writing skills, as well as communication and teamwork skills.

Blog managers

Blogging has become increasingly important to marketing a company, product or service. A well-run blog will discuss relevant topics. A blog manager has the following responsibilities:

- Publishing articles in a timely manner.
- Ensuring that content is relevant.
- Enforcing quality control, including proper tone, grammar and spelling.
- Maintaining the blogging site or account.

- Coordinating writers to ensure that entries are made consistently.
- Archiving and organizing blog, audio and video entries so that content can be searched and retrieved for later use.
- Managing talent, because many bloggers feel a sense of celebrity and think they need not keep to a schedule. A blog manager should understand how to work with these types of personalities.

PC and mobile device repair technicians

OBJECTIVE

1.1.10: PC and mobile device repair technician job role

PC repair technician

An individual who installs, modifies and repairs personal computer (PC) hardware components.

NOTE:

The A+ certification is recommended for those with an interest in PC repair, mobile device repair or help desk skills.

mobile device repair technician

An individual who troubleshoots and repairs mobile device hardware components.

Personal computer (PC) repair technicians install, modify and repair personal computer hardware components, such as PCs, disk drives, CD/DVD drives, tape devices, monitors, keyboards, data input devices and other peripheral equipment. PC repair technicians also install software, such as PC operating systems and application programs. PC technicians should be familiar with operating system and application program functionality in order to test and modify system functions to ensure proper performance.

PC technicians need to possess communication skills in order to provide technical assistance and training to end users, answer user inquiries regarding PC operations, diagnose hardware problems, and provide solutions. In addition, PC technicians must be able to use standard shop tools, such as soldering equipment, power tools and hand tools. PC technicians also need to be aware of standard safety procedures associated with the repair and maintenance of electronic equipment.

Mobile device repair technicians work with broken mobile devices such as smartphones and tablets. Most non-functional parts on a mobile device are simply replaced. The most common problem is a broken screen, or digitizer. Digitizers usually must be pried off and a new one must be glued on. Many pitfalls exist with mobile device repair because the components are small, crammed together and delicate. For example, screen replacement often damages the wireless antenna or home button functionality.

Additional mobile device repairs include replacing the liquid crystal display (LCD) component, battery, power button, speakers and connectors. Water damage is also a common occurrence. Mobile devices may require data backups, restorations and configuration setting changes.

Mobile device repair technicians require the same communication and troubleshooting skills as PC repair technicians. The tools are mostly the same, except mobile device technicians require tools for the smaller and glued-together components.

OBJECTIVE

1.1.11: Help desk technician job role

help desk technician

An individual who diagnoses and resolves users' technical hardware and software problems.

Help desk technicians

Help desk technicians diagnose and resolve users' technical hardware and software problems. Help desk technicians typically receive questions from users who are having problems using desktop, laptop, smartphone or tablet hardware or software, or who want to know how to use a specific software application. Technicians must use their knowledge of hardware, operating systems, applications and any relevant procedures to determine the sources of problems and provide solutions. Technicians may need to research problems with co-workers, programmers, IT staff, hardware vendors or software vendors in order to provide solutions. Technicians may also be involved in testing hardware and software to evaluate their ease of use, and to determine their applicability to the current work environment.

Help desk technicians must possess knowledge specific to the hardware, operating systems and software used by the organization. They must also possess strong

communication skills to effectively discuss, troubleshoot and solve user problems, usually by telephone. Help desk technicians may also be responsible for documenting their troubleshooting and problem-solving activities, escalating problems they cannot solve that require immediate resolution, and making recommendations to senior management to streamline or improve help desk functions.



CIW Online Resources – Online Exercise

Visit CIW Online at <http://education.Certification-Partners.com/CIW> to complete an interactive exercise that will reinforce what you have learned about this topic.

Exercise 1-1: IT Job Roles

Project management and IT responsibilities

The following additional skills are necessary to become a successful IT professional:

- The ability to plan projects, which includes estimating costs for software, hardware and labor, as well as working with management to obtain project approval
- Writing skills, so that plans can be distributed to all relevant individuals
- The ability to work with vendors to obtain cost and time estimates for the proper software and equipment

All IT workers must have some project management skills to excel at their positions and lead projects.

IT job skills in the future

In most organizations, the current IT career model approximates a pyramid with many entry-level positions at the bottom, and fewer positions available as you move up the hierarchy. Many IT managers believe that the future IT career model will be diamond-shaped: few entry-level jobs (because of offshore outsourcing of many IT positions), many mid-level positions, and few high-level positions.

In the diamond-shaped model, managers foresee a lack of experienced professionals to fill the mid-level positions. Smaller companies that do not outsource due to scale may be the source of mid-level IT jobs required in larger organizations. It is increasingly important that IT professionals possess general business knowledge, negotiating skills, intercultural skills and project management skills. Figure 1-10 shows IT professionals collaborating on a project.



Figure 1-10: IT professionals require interpersonal skills as well as technical skills

As an IT professional, you must be able to make informed decisions and fulfill commitments. If your company has outsourced some of its positions and you are working with foreign personnel, you may be able to avoid typical cross-cultural problems by doing the following:

- Learning common greetings or phrases in other languages
- Learning about common cultural misunderstandings so you can avoid them
- Developing good listening skills to better understand processes, issues and so forth that may be communicated to you in various ways
- Developing good communication skills to better disseminate information to those with whom you work



CIW Online Resources – Course Mastery

Visit CIW Online at <http://education.Certification-Partners.com/CIW> to take the Course Mastery review of this lesson or lesson segment.

IBA Lesson 1 - Part A

IT Industry Career Opportunities

OBJECTIVE
1.20.1: IT career goals

IT refers to all aspects of managing and processing information using traditional computers, mobile devices and computer networks. IT departments generally deal with employee computers and mobile devices, third-party service providers for cloud and telecommunication services, servers, networks, and other related technologies and services to provide employees with the resources necessary to reach their organizations' goals.

IT is one of the fastest-growing career fields in the world today. IT skills are essential in all industries and are necessary in many different job roles.

The following sections will explore methods you can employ to conduct effective job searches, create résumés, and take advantage of educational degree programs and certifications to provide you with the skills, training and competitive advantage you need when searching for the IT job of your choice.

OBJECTIVE
1.20.2: Job searches

Conducting job searches

You can employ many methods to explore career opportunities in the IT (or any) industry, such as:

- Participating in on-campus interviews (if you are a college/university student).
- Searching the newspaper classified ads for jobs.
- Visiting employment agencies and employment placement services.
- Attending job or career fairs.
- Volunteering for positions related to your career interests.
- Seeking part-time work through temporary employment agencies or internships.
- Networking (socially) and gathering employment information from friends, acquaintances, business associates and association members.

- Working with an executive search firm.
- Mailing cover letters and résumés to targeted organizations.
- Applying in person directly to targeted employers.
- Entering résumés electronically in database placement services or posting them on appropriate Web sites.
- Using Internet technology to conduct job searches.

The traditional methods of seeking employment (for example, classified ads, job and career fairs, and so forth) are perhaps the most common but least effective means of gaining employment, especially when these methods are not combined with other methods. A combination of some or all of these methods would be the most effective way to conduct a job search. However, using Internet technology may be the most effective means of gathering information about different job roles and responsibilities, and conducting a job search.

OBJECTIVE
1.20.3: Internet
technology and
employment

Using the Internet to conduct job searches

You can use a variety of Internet search engines to search for information about career opportunities in the IT industry. By entering keywords to narrow your search to specific job types, you can retrieve available job listings that relate to your personal career goals. The following sites (and many others) provide information about careers and contain thousands of job listings:

- Dice (www.dice.com)
- Monster (www.monster.com)
- CareerBuilder (www.careerbuilder.com)
- Yahoo! Careers (<http://careers.yahoo.com>)
- Indeed (www.indeed.com)
- Guru.com (www.guru.com)
- Freelance Switch Job Listings (<http://jobs.freelanceswitch.com>)
- All Freelance Directory (www.allfreelance.com)
- Sologig (www.sologig.com)
- CollegeRecruiter.com (www.collegerecruiter.com)

Building a personal network

The Internet provides opportunities for you to network with business associates and other people who may be able to provide job leads. Sites such as LinkedIn (www.linkedin.com) allow you to build a professional profile online similar to a résumé, listing current and past job positions, skills, and education. You can then form links or connections to other people on the site with whom you have worked or associated. You and your connections become a network through which you can find other people you know or with whom you have professional skills or interests in common. Users can also write and post professional recommendations for each other. Other professional networking sites include Spoke (www.spoke.com), ZoomInfo (www.zoominfo.com) and Jigsaw (www.jigsaw.com).

As you evolve from being a Web consumer to being a Web producer of goods and services, consider the importance of using various sites to build your network.

In the following lab, you will search a major Web site devoted to job listings in numerous fields. Assume you are a recent college graduate with a bachelor's degree in computer science. After a summer of working as a computer repair technician in your uncle's computer service and repair shop, you decide that you want to pursue a career as a network engineer or systems administrator. You can use Internet technology to search for entry-level jobs that are suitable to your career goals.



Lab 1-2: Using Internet technology to conduct job searches

In this lab, you will use the Monster Web site to search for information about IT careers.

1. Open a **browser**.
2. **Browser:** Go to ***www.monster.com***. The Monster home page and search engine will appear, as shown in Figure 1-11.

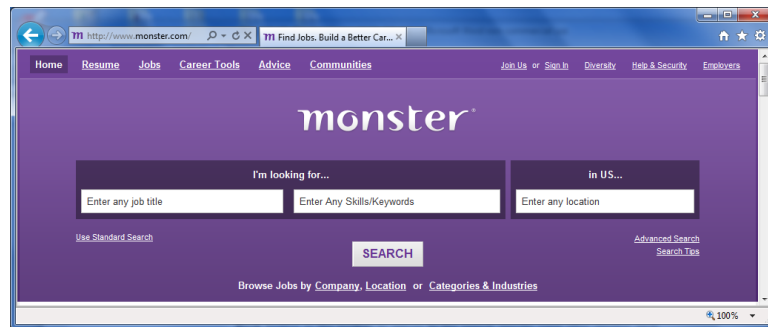


Figure 1-11: Monster home page

3. Click in the **Enter any job title** text box, type ***network engineer*** and click **Search**. This step accesses the Job Search Results page and retrieves all job listings containing the specified keywords in the job descriptions.
4. Click several hyperlinks and view the job descriptions and requirements. Click the **Back** button on the toolbar and return to the home page after viewing each hyperlink.
5. Search for the job title ***network administrator***. This step retrieves all job listings containing these new keywords.
6. Click several hyperlinks and view the job descriptions and requirements. Do you notice any major differences between the job roles and responsibilities of a network engineer versus those of a network administrator?
7. Enter keywords that describe a career in which you are interested, then click several hyperlinked results to obtain information about each position.
8. Close the browser.

As you can see, Internet search engines provide a wealth of information about every career path imaginable. Make sure you use appropriate keyword search techniques to help narrow your job search to specific locations and companies, if desired. You should always conduct your job searches using multiple search engines. Different search engines may yield different results for the same search string.

OBJECTIVE

1.20.4: Résumé file formats

Creating a résumé

You can use various file formats when you create your job skills and work history résumé. Your choice will depend on the way in which you want to deliver your résumé. You can create résumés for delivery in hard copy (print) or electronic format.

Formatting a résumé

Formatted résumés are typically created using a word-processing program such as Microsoft Word, OpenOffice Writer or Google Docs. You can create and print visually impressive résumés using a word-processing program; the full range of the software's formatting features are available to you. You would normally create formatted résumés if you intend to send printed copies to prospective employers by way of postal mail, fax, hand delivery or e-mail attachment. However, problems can occur when sending formatted résumés as e-mail attachments, as follows:

- Unless the recipient has the same program you used to create the résumé, he or she may not be able to view it electronically.
- The résumé's formatting may render inconsistently on different computers.
- Résumés sent as e-mail attachments are vulnerable to viruses, which may infect the recipient's computer.

Text format

Text résumés (also known as plaintext or ASCII résumés) are intended to be entered into keyword-searchable résumé databases and applicant-tracking systems used by most large employers. Text résumés contain little formatting and are not necessarily designed to be visually impressive. However, they are not vulnerable to viruses and can be read by many different programs on many different platforms. Text résumés can be used to post directly to job boards, or to paste into the body of an e-mail message.

To create a text résumé, you can use Windows Notepad or any word-processing program as long as you save the document as a plaintext file with the .txt file name extension.

Rich Text Format (RTF)

Rich Text Format (RTF) résumés combine the best qualities of formatted and text résumés. RTF résumés allow you to incorporate most formatting techniques to make your résumé visually appealing, but can also be read by numerous programs on many different platforms. RTF résumés are also far less vulnerable to viruses than formatted documents you create with a word-processing program.

An RTF résumé is the best choice if you intend to send your résumé as an e-mail attachment and you do not know the file type that your recipient prefers. However, you should also paste a plaintext version of your résumé in the body of the e-mail message as a precautionary measure in case the recipient cannot read the RTF version.

You can use Windows WordPad to create an RTF résumé, or you can use any word-processing program to create it as long as you save the document as an RTF file with the .rtf file name extension.

Portable Document Format (PDF)

Portable Document Format (PDF) résumés are compatible with all computer platforms and are not vulnerable to viruses. Most word processors allow you to save your document as a PDF file using the "save as" feature. PDF files use the .pdf file name extension.

NOTE:

Most basic formatting attributes are available for RTF documents. However, more complex formatting, such as tables or columns, is generally unavailable.

NOTE:
Adobe Reader software is available to download for free.

A PDF résumé (or a résumé converted into PDF) looks identical to and retains all the formatting of the original document. PDF documents retain their visual appeal and will render consistently on different computers. Recipients can use Adobe Reader software to open and read the PDF document. PDFs can also be opened in Google Docs.

HTML

HTML résumés are generally created to post as Web pages or, in some cases, to send as HTML-based e-mails. (However, consider that many people do not appreciate HTML-based e-mails and prefer text-only format with appropriate attachments.) HTML, or "Web-ready," résumés are useful if you have your own Web site or have access to Web space. Some Web sites offer free Web-space hosting and your ISP may include a Web-space hosting service. HTML documents use the .htm or .html file name extension.

HTML résumés retain all the formatting characteristics of a word-processing document, although the attributes may render inconsistently in different browsers. However, HTML résumés posted on the Web have several unique advantages over other résumé formats, as follows:

- Employers can access your résumé at any time.
- Employers may discover your résumé when they perform keyword searches.
- You can add links to your résumé that point employers to other documents, graphics and photographs that further illustrate your background and skills.

In the following lab, you will learn how to create a résumé and save it in plaintext format. Assume you have conducted an online job search and have found a job listing that interests you. To apply for this job, you must upload résumé information to the employer's human resources Web site. The Web site requires you to copy and paste material from your resume into an online application form. The résumé data is automatically entered into the company's applicant tracking system. In this case, what are the advantages of submitting a plaintext résumé?



Lab 1-3: Creating a plaintext résumé for online application forms

In this lab, you will create a résumé and save it as a plaintext document. The résumé information can be easily copied and pasted into an employer's online application form.

1. Open **Notepad**.
2. Enter several lines of text to create the start of a résumé, such as your name, contact information and basic skills. You can also use sample text from the **sample_resume_text.txt** file in your student lab files.
3. Select a line of text and select **Format | Font** to display the Font dialog box. Notice that the only formatting options available are font typeface, style, size and script.
4. Use the options in the Font dialog box to apply different text-formatting attributes to the lines of text. When you are finished, click **OK** to close the Font dialog box.
5. Select **File | Save As** to display the Save As dialog box.
6. Ensure that **Desktop** displays in the Search field.

7. Display the **Save As Type** drop-down list. Notice that the only option is to save the document as a text file with the .txt file name extension.
8. Specify a name for your file in the File Name text box, such as **My Resume**, and click the **Save** button to save the document to your Desktop. Your text document may resemble Figure 1-12.

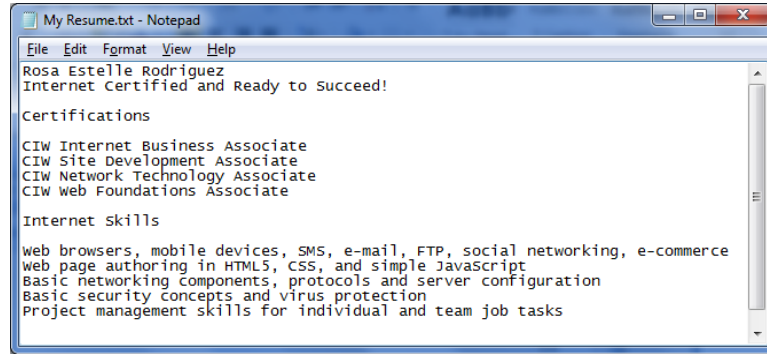


Figure 1-12: Creating plaintext résumé for online application forms

9. The résumé information can now be copied and pasted into an employer's online application form. Close the Notepad window.
10. Delete the file from your Desktop.

In the following lab, you will learn how to create a résumé and save it as a PDF file. Assume you have conducted a new online job search and have found several job listings that interest you. To apply for these jobs, you must upload or e-mail a PDF version of your résumé to the human resources department. What are the advantages of submitting résumés as PDF files?



Lab 1-4: Creating a PDF résumé in Google Docs

In this lab, you will create a résumé in Google Docs and save it as a PDF document. This lab requires a Google account. You will use this account for the remainder of the course. If you do not have one, please create an account at www.google.com. You are responsible for creating and maintaining your own account.

NOTE:

Google Drive was introduced in 2012. It is fully integrated with the Google Chrome OS but runs on any operating system.

1. Open a browser and go to **www.google.com**. Log in using your Google account.
2. **Google:** In the upper-right portion of the screen, click the **Apps** button (the square image composed of nine small squares), then click the **Drive** button. The Google Drive window will appear. Google Drive is a file storage service by Google in which you can store videos, photos, Google Docs, PDFs and so forth.
3. **Google Drive:** Click the **Create** button and select **Document**. An untitled document will appear in a separate Google Docs window.
4. **Google Docs:** Enter several lines of text to create the start of a résumé. You can also use sample text from the **sample_resume_text.txt** file in your student lab files.
5. Use the tools on the Format Bar to apply font, bold, italic, color and alignment attributes to selected text. Your résumé may appear similar to Figure 1-13.

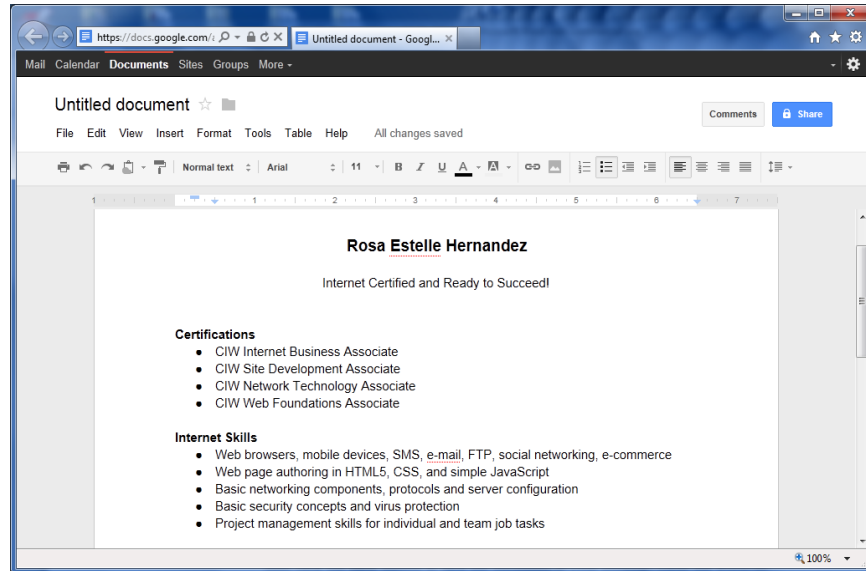


Figure 1-13: Creating résumé in Google Docs

6. Google Docs automatically saves your document as you type. Change the document name by selecting **File | Rename**. Name your document **SampleResume**.
7. To save your file as a PDF document, select **File | Download As | PDF Document (.pdf)**.
8. Select **Save As** to save the document to your Desktop.

Tech Note: A dialog box may appear asking if you want to open or save the document. Make sure you find the Save As feature. It may be accessible by clicking a drop-down menu next to the Save button. Save the document to your Desktop.

9. **Desktop:** Double click the PDF file you just saved to your Desktop. It should open automatically if Adobe Reader is installed on your computer (go to Step 11 if it is not installed). The formatting attributes you applied should appear in the document, similar to Figure 1-14. Exit Adobe Reader.

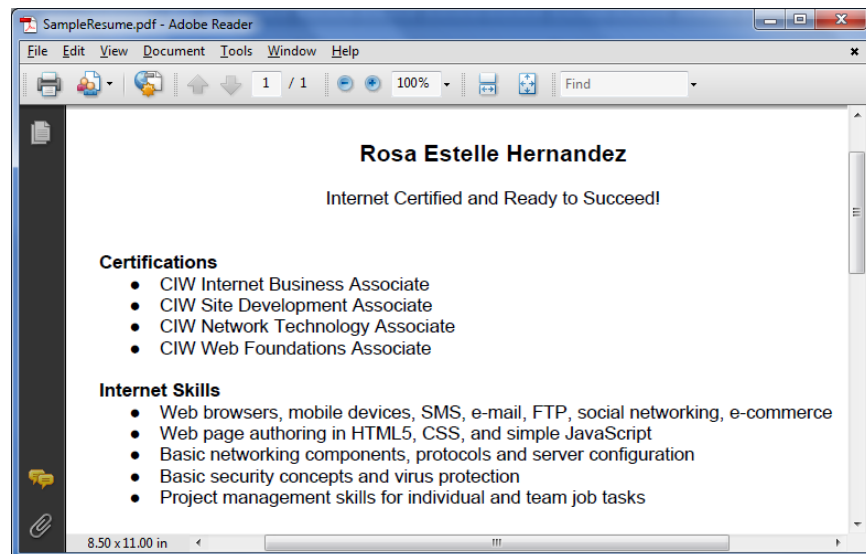


Figure 1-14: Creating PDF document with Google Docs

- 10. Google Docs:** If Adobe Reader is not installed, redisplay your browser and close the Google Docs window. You will return to the Google Drive home page.
- 11. Google Drive:** Click the **Upload** button (the button with the upward-pointing arrow, located next to the Create button). Select **Files** and locate the **SampleResume.pdf** file on your Desktop. Click **Open**. The PDF will appear in Google Drive.
- 12.** The résumé can now be uploaded or e-mailed to a potential employer in PDF format.
- 13. Google Drive:** Log out of your Google account and exit the browser.

OBJECTIVE

1.20.5: Education and technology job roles

Education and IT careers

As technology becomes more sophisticated and complex, employers will demand a high level of technical expertise. If you have a bachelor's or advanced degree in computer science, computer engineering, management information systems or an equivalent field, your prospects for employment in the IT industry should be favorable. However, employers are seeking professionals who can also demonstrate competence in interpersonal, business and project management skills because these skills are becoming more important in the workplace.

Because IT technologies change so rapidly, continual study is necessary to keep your skills current. Colleges, universities, employers, hardware and software vendors, and private training institutions offer continuing education so that you can remain up-to-date with current technological advances.

You can demonstrate a level of competence or expertise in specific IT fields by obtaining a technical or professional certification (for example, CIW, A+, Network+ or Security+). Certified individuals, particularly in the IT field, are widely sought, and professional certifications provide you with a competitive advantage when pursuing numerous jobs.

Technical Concepts and Training

As an IT professional, you will often be required to translate highly technical concepts into information that a non-technical audience can readily understand. This task will test your communication skills, which are very important. Your ability to enable a non-technical audience to understand complex concepts will apply particularly if you find yourself working with end users or management personnel, many of whom have only a basic knowledge of computers and computer networks.

OBJECTIVE

1.21.1:
Communicating with end users

Communicating technical issues to an end user

If you are a help desk technician, or are performing a similar job role, you must be able to understand the problems and concerns of end users as they work with computer systems they may not understand. Typically, when end users experience a technical problem, they may not know enough about what they are experiencing to be able to explain the problem accurately. You should be able to understand the information that end users provide and to understand the technical aspects of the problem. Your understanding of these aspects will allow you to provide an appropriate solution. A help desk technician is shown in Figure 1-15.

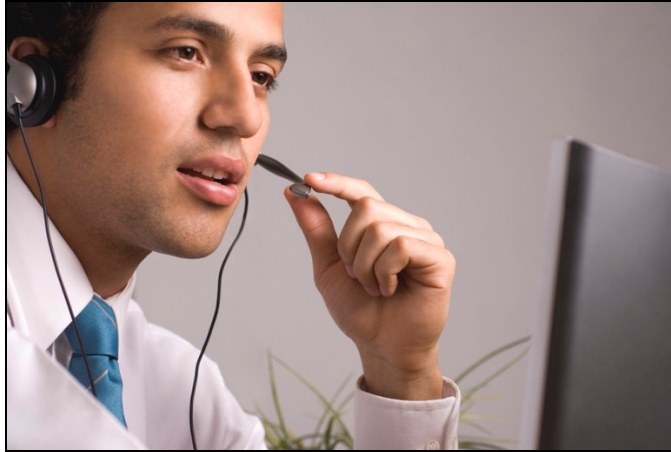


Figure 1-15: Help desk technician

NOTE:

Think of people you know who have very few or no skills with computers. How would you guide these people through a technical process?

OBJECTIVE

1.21.2:
Communicating
with management

You must also be able to communicate a technical response or concept in terms that end users can understand so that they can implement your solution. For example, a remote end user may call you to report that he cannot access the Internet on his computer. If the domain, IP address or subnet mask has changed, for example, you may need to instruct the user how to make the appropriate changes on his system.

Justifying IT-related expenses

As an IT professional, you must always keep in mind the Return-on-Investment (ROI) impact of IT decisions on an organization's bottom line. One of the critical questions to address before implementing a plan is to determine the benefit of purchasing hardware or software, or creating a particular product or service. Upper management will probably require you to justify the decision's benefits relative to its costs. You must be able to determine the risk and business value of each decision in order to justify purchases or plans. Frequently, you must balance these purchases or plans against other purchases and plans that you may need to abandon.

In most cases, the upper-level managers you may need to convince will not have the same level of technical expertise in computers and computer networks as you do. When presenting technically complex information to a non-technical audience, you must be able to put the information in terms that your managers can understand so that they can make informed decisions.

For example, suppose the IT department determines that system hardware upgrades are required to implement a company intranet. You will need to provide data that shows that the expected hardware costs, system down time and employee learning curve will yield measurable increases in productivity and sales, based on the increased ability to communicate and to secure information from outside attacks. Your understanding of networking technologies will help you communicate these concerns, and may help your company profit in the future.

OBJECTIVE

1.2.2: Internet
history, protocols
and technology
adoption models

Technology Adoption Models

Organizations and products evolve over time to address the needs of the marketplace by incorporating new techniques and processes that are sometimes considered revolutionary.

The following sections introduce three schools of thought that describe this tendency for organizational and market changes to occur as new technologies are adopted:

- Paradigm shifts
- Moore's Law
- Technology adoption life cycle

All three of these concepts bring about "shifts in thinking" about a particular subject or discipline. During such a shift, the accepted beliefs are questioned or discarded, and new ideas or worldviews take their place.

Paradigm shift

NOTE:

Kuhn's concept of "paradigm shift" is presented in his 1962 book, "The Structure of Scientific Revolution."

In 1962, Thomas Kuhn defined and popularized the concept of a "paradigm shift" in reference to the philosophy of science. A paradigm is a common belief in a theory and its principles. A paradigm shift is a change from one way of thinking to another; it is a revolutionary transformation that is driven by agents of change.

According to Kuhn, scientific advancement is not evolutionary, but rather is a "series of peaceful interludes punctuated by intellectually violent revolutions," and in those revolutions "one conceptual world view is replaced by another." When a paradigm shift occurs, an intellectual "battle" frequently takes place between those who adopt the new paradigm and those who cling to the old paradigm.

Because the term "paradigm shift" represents the idea of a major change in the former way of thinking or organizing, the term is now used in non-scientific contexts, such as in personal beliefs, complex systems, software/hardware development or business organizations.

Moore's Law

In 1965, Intel co-founder Gordon E. Moore postulated that the number of transistors per square inch on integrated circuits will double every two years. This prediction is known as Moore's Law. Moore's Law continues to hold true for almost every measure of the capabilities of digital electronic devices, including computer processing speed, memory capacity and so forth. As such, Moore's Law is often used as an analogy for advances in other technologies, such as software applications, the Internet and so forth.

Technology adoption life cycle

The technology adoption life cycle refers to a sociological model developed by Joe M. Bohlen, George M. Beal and Everett M. Rogers at Iowa State College. The model defines the demographic and psychological characteristics inherent in a population that describes the degree to which members of that population will adopt or accept a new product or innovation. The model divides the population into five groups of consumers, from earliest to latest:

- Innovators
- Early adopters
- Early majority
- Late majority
- Laggards

NOTE:

Moore's exploration of the diffusion of innovation theory is presented in his 1991 book "Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers."

Diffusion of innovation

Closely related to the technology adoption life cycle is the "diffusion of innovation" theory, which describes how, why and at what rate new ideas and technologies spread through cultures. In 1991, Geoffrey A. Moore explored the diffusion of innovation theory and its applicability to the marketing of high-tech products.

Moore argued that a "chasm" exists between the early adopters of the product (technology enthusiasts and visionaries) and the early majority (pragmatists). According to Moore, visionaries and pragmatists have very different expectations of the product, and different marketing techniques are required to successfully bridge the chasm between the two. These techniques address the two groups by tailoring to them the following:

- **Choosing a target market** — the market segment to which a product is marketed. The target market can be defined by age, gender, geography or any other combination of demographic factors.
- **Product positioning** — the process by which marketers try to create an image or identity of the product in the minds of their potential buyers so the buyers can determine its value relative to competing products.
- **Understanding the whole product concept** — the generic product needs to be augmented by training and support, manuals, accessories, and so forth that give customers a compelling reason to buy the product.
- **Marketing strategy** — the process by which marketers concentrate their finite resources to maximize sales opportunities for their products.
- **Choosing appropriate distribution channels** — the process of determining which intermediary organizations marketers can use to most effectively make the product available to consumers.
- **Pricing** — the process of determining the amount to charge for a product that helps achieve profitability for the organization, fits the realities of the marketplace, and supports the product's positioning.

According to Moore, the marketer should focus on one group of customers at a time, starting with the early adopters. Each group can then be used as a base for marketing to the next group. The most difficult step is making the transition between visionaries (early adopters) and pragmatists (early majority). If the marketer can build momentum for the product by successfully bridging this chasm, the product can become a success, if not a *de facto* standard.

Business Modeling

OBJECTIVE

1.1.14: Business organization modeling

ontology

The study of how a particular knowledge domain, or system, is organized. An ontology is the product of an ontological study.

When discussing computer science and Web technology, **ontology** is the study of how a particular part of a company, called a domain, is organized. The product of an ontological study, called an ontology, describes how individual elements of a domain relate to each other. This relation is usually represented in hierarchical terms. An ontology also describes how individual elements process information within the domain. The result of this description is usually a vocabulary for that domain.

The resulting description and vocabulary can help programmers and designers of complex systems tailor their systems to the needs of a business. If systems are properly designed using a useful ontological model, these systems will be able to use and reuse data more easily.

Purpose of an ontology

NOTE:

The term ontology has various meanings in other disciplines. For example, in philosophy, the term is used to denote an entire school of thought relative to the study of being.

An ontological study is a foundational step for programmers and designers of complex Information Technology systems. If properly conducted, an ontology allows software engineers and programmers to accurately map technology solutions to business needs. All parties will possess an objective understanding of how a domain processes information. An ontological study can also help ensure that data is formatted in a universal manner so that it can be reused from one complex system to another.

Table 1-1 describes ontology terms as they relate to a particular organization or business.

Table 1-1: Ontology terms

Ontology Term	Description
Domain	Represents an entire company or a division within a company.
Individual/object	The basic item within a domain. Also called an instance or an element. For example, a kayak manufacturing company would consider a kayak to be an object.
Class/set	A particular type of object. For example, a particular model of kayak would be an example of a particular class of individual object. Also called a concept in some ontologies.
Attribute	A unique characteristic pertaining to a class. A class can have multiple unique attributes. For example, a particular model of kayak will have various attributes, including: -Color. -Length. -Weight. -Displacement. -Type of construction materials.
Relation	Description of how one particular object or class is related to another, usually in a hierarchy. Helps create a taxonomy, which is a hierarchical relationship between objects or classes.
Schema	Hierarchical description and vocabulary concerning a particular domain.

Ontology and the business organization

A business ontology can be a description of the hierarchical organization structure of the business and how the various objects relate to each other. The business ontology model also illustrates the flow of information through the hierarchy. Figure 1-16 illustrates a typical business ontological model.

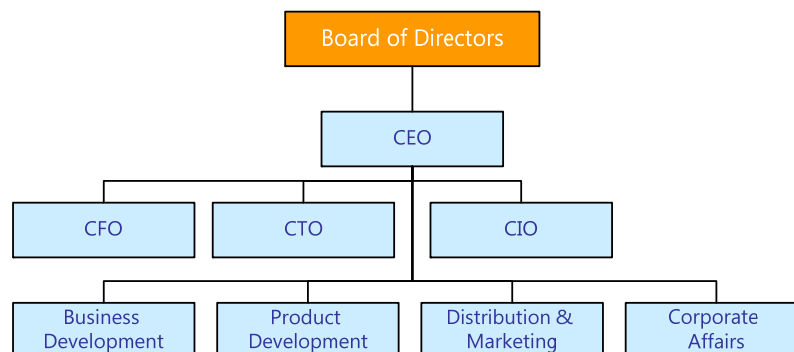


Figure 1-16: Typical business ontology model

The hierarchy illustrates the reporting structure of a typical large business that is publicly traded. The Chief Executive Officer is the highest-ranking officer to whom the other executive officers typically report. Table 1-2 describes each of the top-level objects (i.e., corporate officers) in the business ontology model.

Table 1-2: Business ontology model objects

Example Business Ontology Object	Description
Chief Executive Officer (CEO)	The highest-ranking corporate officer in charge of the total management of an organization, reporting to the board of directors.
Chief Information Officer (CIO)	In charge of the Information Technology (IT) and computer systems within the domain that support enterprise goals. Differs from a CTO in that a CIO is typically in charge of making sure technology fulfills business goals.
Chief Operations Officer (COO)	In charge of the operations management of the domain and is responsible for the design, development and operation of the systems that create and deliver the enterprise's products and services.
Chief Technology Officer (CTO)	In charge of making sure that IT resources are implemented and managed properly. The CTO role is usually different from the CIO role in that the CTO is responsible for how smoothly the technologies operate on a daily basis.
Chief Security Officer (CSO)	In charge of ensuring information security within an enterprise, and is responsible for the design, development and implementation of the systems that protect the organization's information from unauthorized access and use.
Chief Financial Officer (CFO)	In charge of managing the financial risks, planning, record-keeping and reporting of an enterprise.

Of course, not all companies and organizations follow this model exactly. However, all companies and organizations should create a model that ensures accountability among departments and reduces conflicts of interest. Conflicts of interest occur when the duties and responsibilities of corporate officers are vague or incomplete. One way to eliminate conflicts of interest is to implement a policy of segregation (or separation) of duties. Such a policy ensures that no individual is given responsibility for more than one related function.

Not included in the previous figure or table are the many levels below the chief executive level that an organization can have, depending on its size. Typically, the larger the organization, the deeper the hierarchy extends.

In a large organization, the top-level managers generally consist of the chief executives, and the vice presidents of various functions that report to the executives. Below the top-level managers are:

- **Middle-level managers** — directors and employees with managerial titles such as general manager, plant manager, regional manager, sales manager and so forth. Middle-level managers are responsible for carrying out the goals set by top management by directing the activities of particular departments or other business units.
- **First-level managers** — managers in the levels below middle managers who are generally known as first-line managers or supervisors. Typical titles include office manager, department manager, store manager, project manager and so forth. First-line managers are responsible for managing the employees who produce the products and offer the services.

Ontology and Information Technology (IT)

In business ontology, a domain and its data are described from the perspective of the business, without regard to how a particular application or system will process that data. An ontology does not study an individual application's understanding of data. Rather, it studies how the data is used by a business. In business ontology, the data is considered first, without any regard to how an application will process it.

To learn more about ontology as it relates to computer science, consider the following resources:

- [http://en.wikipedia.org/wiki/Ontology_\(computer_science\)](http://en.wikipedia.org/wiki/Ontology_(computer_science))
- <http://askville.amazon.com/computer-science-ontology/AnswerViewer.do?requestId=457310>
- <http://tomgruber.org/writing/ontology-definition-2007.htm>

Following are examples of when an ontology is helpful to specific Information Technology (IT) implementations:

- Creation of complex accounting systems
- Web 2.0 and semantic Web implementations
- Artificial intelligence

NOTE:
Web 2.0 technologies will be explored later in this course.

Semantic Web implementations are Web applications that have the ability to contextualize data as they process it. Applications that have the ability to apply context to data can make complex judgments about data, and as a result provide better solutions without human intervention.

Web Ontology Language (OWL)

Various languages exist for defining ontological relationships. The Web Ontology Language (OWL) is the most current. You can learn more about OWL at the W3C's OWL Web Ontology Language Overview site at www.w3.org/TR/owl2-overview/.

OBJECTIVE
1.15.6: Information flow and reporting models

Data Modeling

Data modeling involves determining the requirements that a database must fulfill in order to function properly for an organization. When creating a data model, you first create a conceptual model, which documents the data and information within an organization and how it is used. The actual implementation of the conceptual model is called a logical model.

When engaging in data modeling, you take the following steps:

- **Planning and analysis** — identifying business requirements
- **Conceptual design** — creating the model as a pure concept
- **Logical design** — encoding the concept into SQL programming
- **Physical design** — determining exactly where data will be stored
- **Implementation** — applying the design to an actual database application, such as MySQL or Oracle

Data modeling vs. ontology

A business ontological study is meant to help create various complex systems. Data modeling is meant for databases only. In data modeling, the most important consideration is the database's ability to process data.

A business ontology is meant to describe how a business (i.e., domain) is organized and how it processes data. In a business ontology, the way an application processes data is not considered.

OBJECTIVE
1.15.15: Quality management and assurance

The Importance of Standards

Generally speaking, standards help govern the ease with which information can be exchanged and understood between people, businesses and systems. If people, businesses and systems do not adhere to the same standards, communication between them is more difficult. In the ever-changing world of technology, the adoption of standards is a critical component to the success of businesses, hardware and software development, and the World Wide Web. The following sections will introduce some of the main standards organizations that provide the necessary framework for business, network and Internet-related success.

If you have ever used a telephone or connected to the Internet, you have done so using standards created by the organizations discussed in the following sections.

International Organization for Standardization (ISO) 9000

The International Organization for Standardization (ISO) is a grouping of national standards bodies from 157 countries. ISO develops technical specifications for intellectual, scientific, technological and economic activities worldwide. ISO is not an acronym; the name is derived from the Greek *isos*, which means equal. You can learn more about ISO at www.iso.org.

ISO offers a family of business management system standards called ISO 9000. ISO 9000 details the steps recommended to produce high-quality products and services using a quality-management system that maximizes time, money and resources. ISO 9000 outlines a systematic approach to managing business processes so that they consistently deliver quality products.

World Wide Web Consortium (W3C)

NOTE:
Tim Berners-Lee invented the World Wide Web in 1989 while working at the European Organization for Nuclear Research (CERN). He has also served as the W3C Director since 1994.

The World Wide Web Consortium (W3C) is a vendor-neutral forum whose mission is to create Web standards and guidelines. Tim Berners-Lee and others created W3C as an industry consortium whose primary mission is to build consensus around Web technologies. In order for the Web to reach its full potential, the W3C mandates that the most fundamental Web technologies be compatible with one another, and that any hardware and software used to access the Web be able to work together. The W3C refers to this goal as "Web interoperability." The W3C also serves as an open forum for discussions about the Web. You can learn more about the W3C at www.w3.org.

Since it was founded in 1994, the W3C has published more than 110 Web standards, called W3C Recommendations. The W3C does not force manufacturers to follow the Recommendations, but encourages them to do so. Many of the standards define levels of conformance, which manufacturers must follow if they want to label their products W3C-compliant. Because the W3C does not force manufacturer compliance, the Recommendations may be implemented only partially. The Recommendations are under a royalty-free patent license, allowing anyone to implement them.

Internet Engineering Task Force (IETF)

The Internet Engineering Task Force (IETF) is an open international community of network designers, operators, vendors and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The IETF develops and promotes Internet standards for the TCP/IP and Internet protocol suites. The IETF works closely with the W3C and other standards organizations, such as ISO and the International Electrotechnical Commission (IEC). The actual technical work of the IETF is done in its working groups, which are organized by topic into several areas (e.g., routing, transport, security, etc.).

Requests for Comments (RFCs)

Requests for Comments (RFCs) are documents of interest to the Internet community published by the IETF. These documents describe methods, behaviors, research or innovations applicable to the workings of the Internet and Internet-connected systems. They include detailed information about standardized Internet protocols, such as IP and TCP, and those in various stages of development. They also include informational documents regarding protocol standards, assigned numbers (e.g., port numbers), host requirements (e.g., data link, network, transport and application OSI layers) and router requirements.

RFCs are identified by number. The higher the number, the more recent the RFC. There are thousands of RFCs. You can learn more about RFCs at www.rfc-editor.org/index.html.

Institute of Electrical and Electronics Engineers (IEEE)

The Institute of Electrical and Electronics Engineers (IEEE) creates standards relating to various technologies, including those used on the Internet. The IEEE also sponsors technical projects and many journals. IEEE standards include the following:

- Ethernet (802.3)
- Wireless Ethernet (802.11)

IEEE publications include the following:

- *Communications Magazine*
- *Information Theory*
- *Computer Graphics and Applications*
- *Power and Energy Magazine*
- *Wireless Communications*

You can learn more about the IEEE at www.ieee.org.

Telecommunications Industry Association (TIA)

The Telecommunications Industry Association (TIA) is responsible for creating various standards, including:

- **TIA/EIA-568-B** — cabling standards that include the RJ-45 jacks and plugs used throughout the world to connect computers. This standard also includes RJ-11 plugs and jacks, which are used in various countries for traditional telephony.

Request for Comments (RFC)

A document published by the IETF that details information about standardized Internet protocols and those in various development stages.

- **TIA/EIA-598** — fiber-optics standards that ensure quality high-speed networks across the world.

You can learn more about TIA at www.tiaonline.org.



CIW Online Resources – Online Exercise

Visit CIW Online at <http://education.Certification-Partners.com/CIW> to complete an interactive exercise that will reinforce what you have learned about this topic.

Exercise 1-2: Standards organizations



CIW Online Resources – Course Mastery

Visit CIW Online at <http://education.Certification-Partners.com/CIW> to take the Course Mastery review of this lesson or lesson segment.

IBA Lesson 1 - Part B

Case Study

That's a Hot Site

Suzanne has been newly hired by a scientific organization that conducts seismic research about "hot spots" worldwide. The organization was formed only recently; its Web site was hurriedly developed by an outside contractor and contains only rudimentary information about the organization. The organization's sponsors have asked Suzanne to make the Web site more informative and appealing to viewers.

Suzanne decides to upgrade the Web site by performing the following tasks:

- She adds introductory text and diagrams about the science of seismology and other geophysical processes to illustrate how scientists study earthquakes, volcanoes and the earth's mantle.
- She uploads and creates links to photographs of the most visually stunning hot spots around the world, such as those in Yellowstone National Park in the United States, the mid-Atlantic ridge, Iceland, Hawaii and so forth.
- She uploads and creates links to scientific papers and studies conducted by the resident team of seismologists.

* * *

As a class, discuss this case study and answer the following questions:

- Based on the tasks Suzanne performed thus far, what do you think is her job role at this company? What other job roles might she have?
- What other improvements can Suzanne make to the Web site to increase viewer interest and provide additional information? What job skills might those improvements require Suzanne to possess?

Lesson Summary



Application project

Consider the many IT job roles you learned about in this lesson. Which of these job roles particularly appeal to you? What skills do you already have that you can contribute to these job roles?

Visit a job search site such as *www.monster.com* or *http://careers.yahoo.com* or any other such site. Search for jobs in your area in the job role(s) of your choice. What skills are they looking for?

Begin creating a résumé document for yourself using a text or word-processing application. List your education, including this course, and any credentials you hold, such as diplomas, degrees and certifications. Include any relevant clubs or membership organizations to which you belong. And list all the skills and experience you have that you could contribute to the workplace. Remember that skills such as communication, writing, teamwork and project management are just as important as any technical skills.

Now review the requirements for jobs that interest you. Which skills do you already have? Which do you need to acquire? Will you learn some of the skills you need in school? In this course? In technical vocational training? On the job? Is there an internship you can apply for in your community? Consider approaching businesses and community colleges in your area.

Remember that everyone has to start somewhere. Often, an entry-level job that seems less interesting will provide valuable training and experience that will eventually help you land the higher-level jobs you really want. Building a skill set and a career takes time, usually many years. Do not expect to start on top, but be willing to set goals for yourself and work hard to achieve what you want.

Keep your résumé document handy so you can add to it each time you learn a skill, complete some training, earn a credential or accept a job.



Skills review

In this lesson, you learned about the responsibilities, tasks and skills required for various job roles in the Information Technology (IT) industry. You also learned about the most effective methods of conducting IT job searches, presenting résumés to hiring managers, and discussing technical issues with non-technical audiences. You studied technology adoption models, business models and data models. You also learned about the importance of standards to govern the ease with which information can be exchanged and understood.

Now that you have completed this lesson, you should be able to:

- ✓ 1.1.1: Distinguish between individual job roles within the IT industry and the IT profession as a whole.
- ✓ 1.1.2: Identify responsibilities, tasks and skills of a Web site designer for both traditional and mobile Web sites.
- ✓ 1.1.3: Distinguish between a Web architect and a Web application developer.
- ✓ 1.1.13: Identify responsibilities, tasks and skills of a mobile Web application developer.

- ✓ 1.1.4: Identify responsibilities, tasks and skills of a Web site analyst.
- ✓ 1.1.5: Identify responsibilities, tasks and skills of a Web site manager.
- ✓ 1.1.6: Identify responsibilities, tasks and skills of a database administrator.
- ✓ 1.1.7: Identify responsibilities, tasks and skills of a server administrator, including e-mail/groupware administrator, Web server administrator, cloud-based server administrator.
- ✓ 1.1.8: Identify responsibilities, tasks and skills of a network engineer.
- ✓ 1.1.9: Distinguish between a security manager and a security analyst/consultant.
- ✓ 1.1.10: Identify responsibilities, tasks and skills of a PC and mobile device repair technician.
- ✓ 1.1.11: Identify responsibilities, tasks and skills of a help desk technician.
- ✓ 1.1.12: Identify responsibilities, tasks and skills of a Web marketing professional.
- ✓ 1.1.14: Interpret a common business organization chart, including identifying duties of a Chief Executive Officer (CEO) versus a Chief Operations Officer (COO).
- ✓ 1.2.2: Explain Internet history, define current protocols (e.g., IPv4, IPv6, related protocols), and identify timelines and models for technology adoption curves (e.g., Moore's Law, Geoffrey Moore's technology adoption life cycle, Kuhn's concept of paradigm shifts).



CIW Practice Exams

Visit CIW Online at <http://education.Certification-Partners.com/CIW> to take the Practice Exams assessment covering the objectives in this lesson.

IBA Objective 1.01 Review

IBA Objective 1.02 Review

IBA Objective 1.15 Review

IBA Objective 1.20 Review

IBA Objective 1.21 Review

Note that some objectives may be only partially covered in this lesson.

Lesson 1 Review

1. What IT job role would most likely be responsible for managing and maintaining a network infrastructure?

2. There are many ways to conduct a search for a job in the IT industry. Which method is considered the most effective?

3. Why is continuing education important for people who want jobs in the IT industry?

4. To what do the concepts of a paradigm shift, Moore's Law and the technology adoption life cycle refer?

5. In relation to IT, what purpose does an ontology serve in a business?

6. What is data modeling, and what are the two types of models within a data model?

7. Why are standards important in the world of technology?
