NEW PERSPECTIVES

# Unit 8
## The ITC Industry

## Computer Concepts 2016

ENHANCED EDITION

## 8 Unit Contents

- Section A: ICT Industry Basics
- Section B: The Computer Industry
- Section C: The Telecom Industry
- Section D: Tech Careers
- Section E: ICT Laws and Ethics



## 8 Section A: ICT Industry Basics

- ICT Core Industries
- ICT Goods and Services
- Technology Life Cycles
- Disruptive Technology
- ICT and Productivity
- ICT and National Security



## 8 ITC Core Industries

- As the computer industry expanded beyond number crunching to data storage and decision support, the IT (Information Technology) industry evolved
- The **ITC industry** is a result of that evolution; a convergence between the IT industry and the telecommunications industry



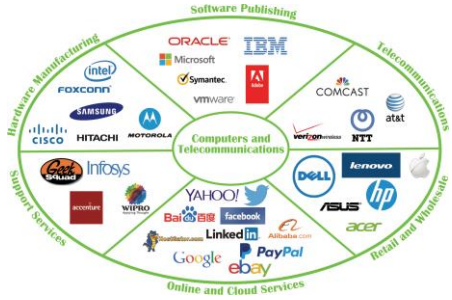
## 8 ICT Core Industries

- Companies and businesses create jobs, develop products, and offer services that drive the economy; they are classified into **economic sectors** according to the types of goods and services they provide
- The **information industry** has three major facets: content, computers, and telecommunications
- The focus of Unit 8 is the ICT industry, which is made up of businesses that focus on digital equipment, software, and communications technologies



## 8 ICT Core Industries

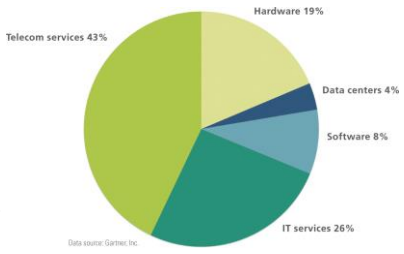
FIGURE 8-1: ICT INDUSTRY CORE COMPONENTS



## 8 ICT Core Industries

- ICT is one of the world's largest economic sectors; revenues exceed those of the oil and gas industry and the world's airlines

FIGURE 8-2: REVENUE FROM CORE ICT INDUSTRY ACTIVITIES






## 8 ICT Core Industries

- The ITC industry has fueled the economies of many countries and was not as deeply affected as some sectors of the economy, during the 2009 global recession
- The so-called "dot-com bubble" was fueled by a frenzy of online business startups called **dot-coms**
- A dot-com bubble that began in the late 1990s burst with devastating effects on ICT stock values; a **stock market bubble** refers to a sharp rise in stock values that is later followed by a sudden decline



## 8 ICT Goods and Services

- In economics, **goods** are things that can be used or consumed, whereas **services** are intangible actions performed for a consumer
- ICT goods and services can be distributed locally, nationally, or internationally, and are purchased by individuals and corporations
- **Consumer goods**, such as laptops, are purchased by individuals; **Capitol goods** are raw materials used by businesses to make consumer goods



## 8 ICT Goods and Services

- The terms *outsourcing* and *offshoring* are often used interchangeably, but they are slightly different
  - **Outsourcing** is the use of components or labor from outside suppliers
  - **Offshoring** relocates business processes, manufacturing and customer support, to lower-cost locations in other countries



## 8 ICT Goods and Services

- Until the 1990s, ICT companies performed all phases of product development in house
- Prototyping and mass production moved to Taiwan, then to China
- Outsourcing and manufacturing efficiencies contributed to falling prices of ICT goods and services



## 8 ICT Goods and Services

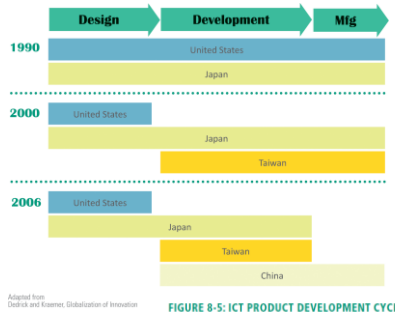



FIGURE 8-5: ICT PRODUCT DEVELOPMENT CYCLE LOCATIONS

# 8 ICT Goods and Services

FIGURE 8-6: PRICE AND PERFORMANCE OF DIGITAL DEVICES, 1995 AND 2015

In 1995, $1,800 purchased a desktop computer with a 33 MHz processor, 8 MB of RAM, a 200 MB hard disk, a CD drive, and a bulky CRT monitor with a maximum 1024 x 768 resolution.

In 2015, $500 paid for a laptop computer with a 1.7 GHz processor, 4 GB RAM, a 500 GB hard disk, and an integrated 15" screen with a maximum 1600 x 900 resolution.



# 8 Technology Life Cycles

- The **product life cycle** (PLC) maps the expected profitability of a product from its inception to its demise

FIGURE 8-7: PRODUCT LIFE CYCLE



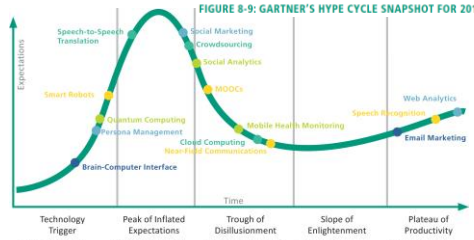

# 8 Technology Life Cycles

- To try and track a product's life cycle, analysts and sociologists devised the following:
  - **Moore's law** – Gordon Moore, co-founder of Intel Corp., predicted that technological innovation would double the number of transistors in an integrated circuit every two years without raising its cost
  - **Rogers' bell curve** – frequently used to describe patterns in the way consumers adopt technology products; developed by a team of sociologists including Everett M. Rogers
  - **Gartner Hype Cycle** – represents the position of a product during its life cycle of publicity or "hype"; developed by analysts at Gartner, Inc.



# 8 Technology Life Cycles

FIGURE 8-9: GARTNER'S HYPE CYCLE SNAPSHOT FOR 2014






# 8 Disruptive Technology

- **Disruptive technology** displaces an existing business process, market, industry, or product

Flat-screen LCD technology replaced CRT displays.

Digital photography replaced film photography, which affects camera manufacturers, film manufacturers, and photo processing shops.

Computers with word processors replaced typewriters.

Digital publishing and Web-based access to information have had a devastating effect on newspapers.

Movies replaced radio as a form of entertainment. Movies were then disrupted by television, which in turn has been disrupted by download and streaming technology.

The telegraph was disrupted by the telephone system, long distance by VoIP, and land line service by cellular service.

Smartphones have the potential to replace devices such as MP3 players, portable game consoles, point-and-shoot cameras, personal video players, voice recorders, handheld GPS devices, wristwatches, paper maps, and handheld calculators.

FIGURE 8-10: DISRUPTIVE TECHNOLOGIES



# 8 ICT and Productivity

- In the context of economics, **productivity** is a measurement of the amount of output that is produced per unit of input

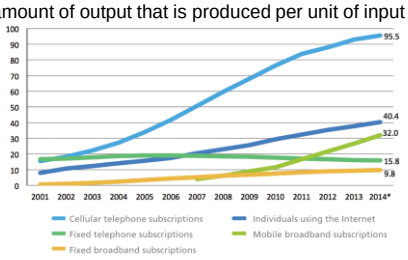
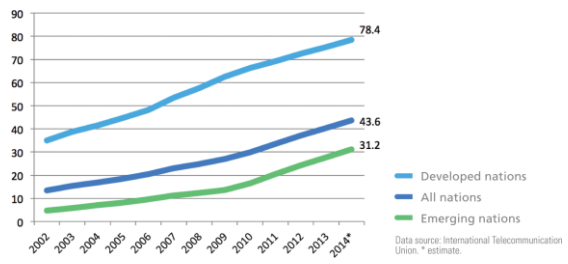



FIGURE 8-11: GLOBAL USE OF ICT TECHNOLOGY PER 100 INHABITANTS

## 8 ICT and Productivity

FIGURE 8-12: PERCENTAGE OF HOUSEHOLDS WITH INTERNET ACCESS

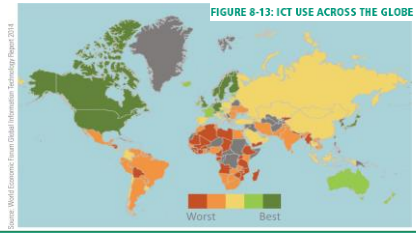





## 8 ICT and Productivity

- The World Economic Forum produces an annual report on the global influence of the ICT industry and identifies how well countries leverage ICT technologies

FIGURE 8-13: ICT USE ACROSS THE GLOBE






## 8 ICT and Productivity

- Economist use indicators, such as **GDP** (gross domestic product), to measure the total output of a nation
- Between 2011 and 2013 digitization boosted world economic output by US$193 billion and created 6 million jobs during that period
- These factors are a compelling argument for national investment in digital technologies



## 8 ICT and National Security

- Programs of surveillance, espionage and sabotage are carried out today using cyberwarfare hacking tools
- The ITC industry plays a major role in national security for countries throughout the world
- Infiltrating and disabling computers storing sensitive corporate, government, or military data could create chaos and temporarily weaken military defenses



## 8 ICT and National Security

FIGURE 8-14: TARGETS AND THREATS

| | |
|---|---|
| Jam communications satellites | Pilots, ship captains, and military units rely on satellite-based GPS, communications, surveillance, navigation, and missile warning. |
| Shut down power grids including nuclear generators | Massive power outages can disrupt military defense operations and cause civilian chaos. |
| Disrupt air traffic control | Without air traffic control systems, flights are grounded. |
| Shut down water and fuel pipelines | A lack of water and fuel creates chaos, especially in major cities. |
| Disrupt financial assets such as banking networks and the stock market | Without banking networks, consumers cannot obtain cash or make credit card purchases. |
| Cut off Internet access with DDoS attacks | Both civilian and military communications can be cut off during a massive DDoS attack. |
| Industrial espionage | Cyber break-ins at companies that develop military weaponry are especially dangerous. |
| Interfere with SCADA control devices | Malware that randomly targets SCADA devices can shut down power plants, dams, and manufacturing facilities. |



## 8 ICT and National Security

- The U.S. Department of Homeland Security identifies six national security functions supplied by the ICT sector:
  - Provide ICT products and services, such as servers, computers, and routers that are used in military and civilian installations
  - Provide incident management capabilities
  - Provide domain name resolution services
  - Provide identity management and trust support services
  - Provide Internet-based content, information, and communications services
  - Provide Internet routing, access, and communications services

## 8 ICT and National Security

- **Cyberwarfare** is the use of ICT technology to carry out politically motivated attacks designed to infiltrate, sabotage, or damage an opponent's information systems and defensive capabilities
- Recent examples of cyberwarfare include the Stuxnet virus that disabled Iranian nuclear centrifuges
- The international, non-binding document called the **Tallinn Manual**, is a cyber equivalent of the Geneva Convention; it sets out rules for conducting and responding to cyberwarfare



## 8 Section B: The Computer Industry

- Manual Calculators
- Mechanical Calculators
- Computer Prototypes
- Commercial Computers
- Personal Computers



## 8 Manual Calculators

- A **manual calculator** is a device that assists in the process of numeric calculations but requires the human operator to keep track of the algorithm
- An algorithm is the step-by-step process by which numbers are manipulated; even simple paper-and-pencil addition requires an algorithm
- A manual calculator called an **abacus** was used in ancient Rome, Greece, India, China, and Japan; only as the last century came to a close was the abacus replaced by handheld digital calculators



## 8 Manual Calculators

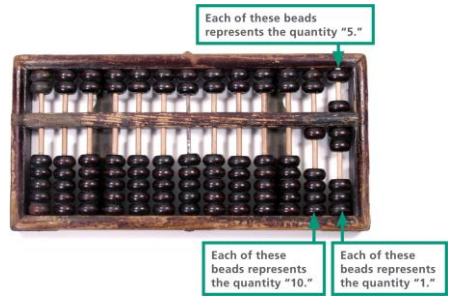



FIGURE 8-16: AN ABACUS—MANUAL BUT SURPRISINGLY QUICK



## 8 Mechanical Calculators

- A mechanical calculator implements algorithms autonomously
- Mechanical calculators were developed as early as 1623
- Schickard's Calculator had a series of interlocking gears; each of the ten spokes on a gear represented a digit; every time a gear completed a full circle, it moved the next gear one notch to the left to "carry the 1"



## 8 Mechanical Calculators

- Charles Babbage's **Analytical Engine** was an all-purpose computing device; historians believe that its design embodies many of the concepts that define modern computers, including:
  - Memory
  - A programmable processor
  - An output device
  - User-definable input of programs and data

## 8 Mechanical Calculators

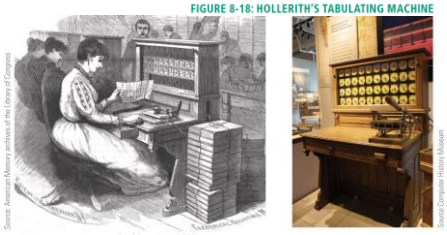
- In 1890, Herman Hollerith won the U.S. Census Bureau's competition to find a way to tabulate the census
- Hollerith won the competition with a design for an electronic punched card tabulating device
- The device used cards with designated areas representing data fields, such as "nationality"; once punched, the cards were fed into a reader that used an array of metal rods to electronically read data from the cards, tabulate the results, and display them on a series of dials



## 8 Mechanical Calculators

- Hollerith incorporated the Tabulating Machine Company in 1896; in 1924, the name was changed to International Business Machines—better known as IBM

FIGURE 8-18: HOLLERITH'S TABULATING MACHINE





## 8 Computer Prototypes

- Figuring out who invented the computer isn't easy because modern digital computers evolved from prototypes developed between 1936 and 1946 by various individuals and teams
- The **Atanasoff-Berry Computer** (ABC) was the first computing device to use vacum tubes instead of mechanical switches as processing circuitry
- Its design also incorporated the idea of basing calculations on the binary number system



## 8 Computer Prototypes

- Even though the ABC is often considered the first electronic digital computer, the work of its inventor was largely ignored
- Other computer prototypes followed:
  - **Z3** – used vacuum tubes and was designed to work with binary numbers; built in Nazi Germany during WWII
  - **Harvard Mark I** – officially named the IBM Automatic Sequence Controlled Calculator; used decimal rather than binary representation, which is used by today's computers
  - **Colossus** – developed in 1943 by British engineers; an electronic device designed to decode messages that were sent between the German High Command and their field commanders



## 8 Commercial Computers

FIGURE 8-20: THE HARVARD MARK I



## 8 Computer Prototypes

- **ENIAC** (Electronic Numerical Integrator and Computer) was designed for the U.S. Army during WWII, but wasn't finished until three months after the war ended
- ENIAC was over 100 feet long and 10 feet high and weighed 30 tons!
- Containing over 18,000 vacuum tubes and consuming over 174,000 watts of power, it was programmed by manually connecting cables and setting 6,000 switches—a process that usually took two days to complete

## 8 Computer Prototypes

- ENIAC's first programmers were a team of six women

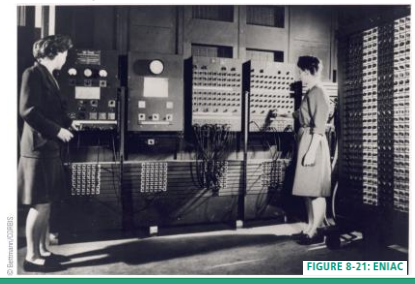


FIGURE 8-21: ENIAC



## 8 Commercial Computers

- A computer called **UNIVAC** is considered by most historians to be the first commercially successful digital computer
- At 14.5 feet long, 7.5 feet high, and 9 feet wide, UNIVAC was physically smaller than ENIAC, but more powerful
- As technology evolved, relay switches and vacuum tubes were replaced with smaller, less power-hungry components



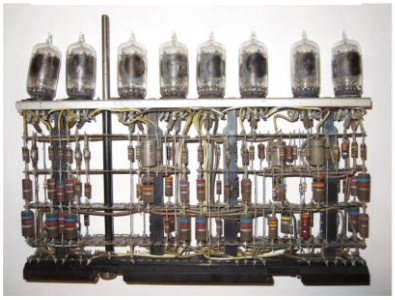
## 8 Commercial Computers

- **First-generation computers**, such as UNIVAC, can be characterized by their use of vacuum tubes to store individual bits of data
- A **vacuum tube** is an electronic device that controls the flow of electrons in a vacuum
- Each tube can be set to one of two states; one state is assigned a value of 0 and the other a value of 1



## 8 Commercial Computers

FIGURE 8-23: VACUUM TUBES USED TO STORE AND PROCESS DATA





## 8 Commercial Computers

- **Second-generation computers** used transistors instead of vacuum tubes
- **Transistors** regulate current or voltage flow and act as a switch for electronic signals
- Transistors performed functions similar to vacuum tubes, but they were much smaller, cheaper, less power-hungry, and more reliable


FIGURE 8-24: TRANSISTORS



## 8 Commercial Computers

- **Third-generation computers** became possible in 1958, when integrated circuits were developed
- IBM 360 offered integrated circuit technology; the first orders for these computers were filled in 1965
- **Fourth-generation computers** appeared in 1974 with the development of the first general-purpose microprocessor, called the Intel 4004
- Intel's 4004 was smaller than a cornflake but matched the computing power of ENIAC

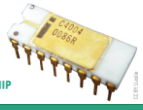


FIGURE 8-27: THE INTEL 4004 CHIP

## 8 Personal Computers

- In the 1970s, many hobbyists built their own computer systems based on integrated circuit and microprocessor technologies
- The **Mark-8** and the **MITS Altair**, where some of the first personal computers to be developed
- The Altair was sold as a kit for $395; it had no keyboard, no monitor, and no permanent storage device

FIGURE 8-28: ALTAIR COMPUTER KITS WERE SNAPPED UP BY HOBBYISTS



## 8 Personal Computers

- In 1976 Apple Computer Co. was founded by Steve Jobs and Steve Wozniak
- Apple released several computers during the 1970s & 1980s, including:
  - **Apple I** – a kit containing a system board with 4 KB of RAM that sold for $666.66
  - **Apple II** – featured color graphics, expansions slots, a disk drive, a 1.07 MHz 6502 processor, and 16 KB of RAM for $1,195
  - **Apple Lisa** – introduced in 1983, it made computers even easier for the average person to use; its key feature was a graphical user interface; at $10,000 it proved too expensive for most consumers
  - **Apple Macintosh** – featured a graphical user interface; it became the computer of choice for desktop publishing; cost was $2,495



## 8 Personal Computers

The Apple II was the most popular computer of its time.

The Apple Macintosh computer popularized graphical user interfaces.

FIGURE 8-29: PERSONAL COMPUTERS



## 8 Personal Computers

- In 1981, IBM began marketing what it called a personal computer, or PC
- The $3,000 **IBM PC** had a 4.77 MHz Intel 8088 processor, 16 KB of RAM, and floppy disk drives
- The operating system used on these computers was called PC-DOS and was created by a young entrepreneur named Bill Gates

The IBM PC was launched in 1981 and evolved into today's popular Windows-based PCs.



## 8 Personal Computers

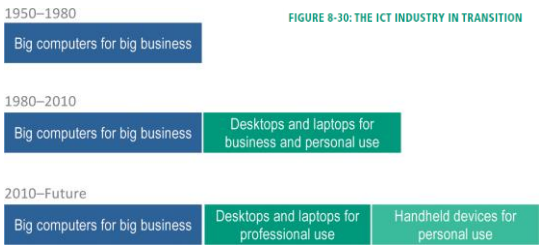



FIGURE 8-30: THE ICT INDUSTRY IN TRANSITION



## 8 Section C: The Telecom Industry

- Telegraph
- Telephone
- Radio
- Cellular Phones
- Television

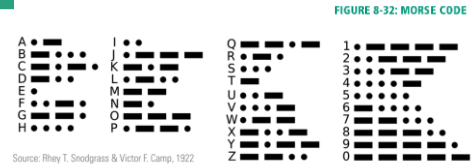
## 8 Telegraph

- **Telegraphy** refers to transmitting text or symbolic information over long distances without the use of a living carrier
- The **telegraph** was built in 1816 using a cable connected at either end to dials marked with the letters of the alphabet
- In 1837, U.S. inventor Samuel Morse developed a telegraph system that transmitted data using his **Morse code** alphabet, a binary encoding system based on dots and dashes

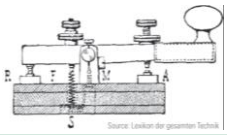


## 8 Telegraph

FIGURE 8-32: MORSE CODE




Source: Rhey T. Snodgrass & Victor F. Camp, 1922



Source: Lexikon der gesamten Technik



## 8 Telephone

- A **telephone** is, very simply, a device that transmits human voices over a distance using cables or airborne signals
- The first telephone was invented and patented by Alexander Graham Bell in 1876
- Telephones evolved through several design form factors, including box phones, and phones with rotary dialers



## 8 Telephone

FIGURE 8-34: TELEPHONE FORM FACTORS



**1890–1910**

Early box phones had no dialing mechanism. Turning the crank alerted the operator, who would ask for the number.



**1890–1930**

Candlestick telephones separated the microphone/transmitter from the speaker/receiver.



**1940–1970**

Rotary telephones included a rotary dialer; the handset included both a speaker and a microphone.



**1960–2010**

Trimline telephones introduced touch-tone dialing in 1963.



## 8 Telephone

- A **telephone exchange** managed connections between callers
- The world's first commercial telephone exchange opened in 1877, in Germany
- Its manual switch board was controlled by a switchboard operator
- Automated exchanges, developed in 1900, eliminated the need for human operators

FIGURE 8-35: HOW A TELEPHONE SWITCHBOARD WORKS





## 8 Radio

- A **radio** is a device that sends and recieves sound as electromagnetic waves
- Like computers, radios originally used vacuum tubes but moved on to new technologies like the transistor
- Radio technology is the basis for cell phones, Wi-Fi, Bluetooth, and near-field communications (NFC)—all indispensible tools of the digital age

## 8 Cellular Phones

- A **cellular telephone** is a device that uses a low-power radio transmitter to carry out two-way voice communications
- Two-way radio technology went portable during WWII
- In 1984 Motorola brought to market the first cell phone model named the Motorola DynaTAC 8000X; it weighed almost 2 pounds and was more than 12 inches long



## 8 Cellular Phones

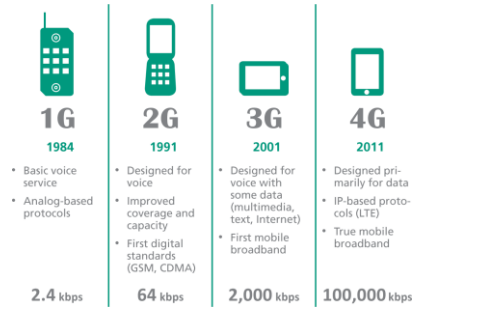
FIGURE 8-41: CELL PHONE HANDSET EVOLUTION

DynaTAC 8000X 1984 | Flip Phone 1996 | Smartphone 2007



## 8 Cellular Phones

FIGURE 8-42: CELL PHONE GENERATIONS






## 8 Television

- Television is a technology designed to send moving images over a distance
- Beginning with black-and-white sets, televisions progressed to colored programming and eventually transitioned to **digital television** (DTV)
- **Pay television** is a popular subscription service in which consumers pay to receive a selection of television channels



## 8 Television

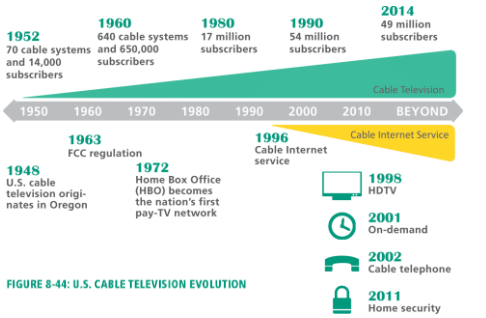



FIGURE 8-44: U.S. CABLE TELEVISION EVOLUTION



## 8 Section D: Tech Careers

- Jobs and Salaries
- Education
- Certification
- Resumes

## 8 Jobs and Salaries

- Tech sector careers are part of a broad set of information, technology, and communications industries
- The classification **technology workers** encompasses jobs, such as:
  - Telephone cable installers
  - Radio broadcasters
  - Computer programmers
  - Web designers
  - Software developers



## 8 Jobs and Salaries

- A different classification of tech sector careers comes from STEM (science, engineering, technology, and math)
- STEM is increasingly used to define an employment sector that includes jobs in:
  - Biology
  - Chemistry
  - Information Technology
  - Engineering
  - Math
  - Physics



## 8 Jobs and Salaries

- A third classification of tech sector careers focuses on computer professionals
- A **computer professional** is anyone whose primary occupation involves the design, configuration analysis, development, modification, testing, or security of computer hardware or software
- Many computer professionals work in an IT department—the wing of a business or organization responsible for computer, data, software, and support services; A **chief information-officer** (CIO) heads the IT department



## 8 Jobs and Salaries

FIGURE 8-47: TECH SECTOR OCCUPATIONS

A **systems analyst** investigates the requirements of a business or an organization, its employees, and its customers in order to plan and implement new or improved computer services. This job requires the ability to identify problems and research technical solutions. Good communication skills are essential for interacting with managers and other employees.

A **computer programmer** (sometimes described as a programmer/analyst) designs, codes, and tests computer programs. In addition, programmers modify existing programs to meet new requirements or eliminate bugs. Computer programming requires concentration and a good memory for the countless details that pertain to a programming project. Programming projects range from entertainment and games to business and productivity applications. Programmers get satisfaction from devising efficient ways to make a computer perform specific jobs, tasks, and routines.



## 8 Jobs and Salaries

A **security specialist** analyzes a computer system's vulnerability to threats from viruses, worms, unauthorized access, and physical damage. Security specialists install and configure firewalls and antivirus software. They also work with management and employees to develop policies and procedures to protect computer equipment and data. Computer security jobs are punctuated by crises when a virus hits or a security breach is discovered. A security specialist must have a wide-ranging knowledge of computers and communication protocols that can be applied for a quick resolution to any crisis that occurs.

A **database administrator** analyzes a company's data to determine the most effective way to collect and store it. Database administrators create databases, data entry forms, and reports. They also define backup procedures, provide access to authorized users, and supervise the day-to-day use of databases.



## 8 Jobs and Salaries

A **network administrator** plans, installs, and maintains one or more local area networks and may also manage cloud resources. These specialists provide network accounts and access rights to approved users. They troubleshoot connectivity problems and respond to requests from network users for new software. Network administrators might be responsible for maintaining the security of a network, plus they often pick up Web master duties to maintain an organization's Web site.

A **computer operator** works with system software for network servers, mainframes, and supercomputers. Computer operators monitor computer performance, install software patches and upgrades, perform backups, and restore data as necessary.

A **technical support specialist** troubleshoots hardware and software problems. Good interpersonal skills and patience are required for this job.

## 8 Jobs and Salaries

A **Web site developer** creates, tests, posts, and modifies Web pages. A good sense of design and artistic talent are required for this job, along with an understanding of how people use graphical user interfaces. Familiarity with Web tools, such as HTML and JavaScript, is becoming more important for this job, as is a knowledge of computer programming and database management.

A **social networking analyst** manages an organization's online reputation by establishing and maintaining social media sites and evaluating analytics to support its mission. This occupation requires familiarity with social networking sites and an ability to interpret statistical metrics obtained from analytical tools.



## 8 Jobs and Salaries

FIGURE 8-49: IT WORKPLACES REFLECT CORPORATE CULTURES

- The U.S. Bureau of Labor and Statistics predicts that in the decade 2012-2022, employment in the information and technology sector could grow by 18%, generating 650,000 new jobs
- An unknown number of these jobs will be outsourced, which may negatively affect U.S. workers but will benefit offshore workers

IBM London

Google Dublin



## 8 Jobs and Salaries

- Workers in many industries are interested in becoming a **telecommuter** who uses available technology to work from home or an off-site location
- Telecommuters tend to be more productive and work longer hours because they have no commute time and are not interrupted by routine office chatter
- Finding a job in the IT industry is similar to finding a job in most other industries
  - Use online job listing sites (Tech Jobs, ComputerJobs.com)
  - Network (in person or via email)
  - Use social networking tools (LinkedIn)



## 8 Education

- Computer science is only one of many computer-related degrees that colleges and universities offer
- According to the Association for Computing Machinery (ACM), there are five major computing disciplines:
  - Computer engineering
  - Computer science
  - Information systems
  - Information technology
  - Software engineering



## 8 Education

| DEGREE | CURRICULUM | CAREERS |
|---|---|---|
| **Computer engineering** focuses on the design of computer hardware and peripheral devices, often at the chip level. | This degree involves basic studies in calculus, chemistry, engineering, physics, computer organization, logic design, computer architecture, microprocessor design, and signal processing.<br><br>Students learn how to design new computer circuits, microchips, and other electronic components, plus they learn how to design new computer instruction sets and combine electronic or optical components to provide powerful, cost-effective computing. | Working at a chip manufacturer, such as Intel, Motorola, IBM, AMD, or Texas Instruments. |



## 8 Education

| DEGREE | CURRICULUM | CAREERS |
|---|---|---|
| **Computer science** focuses on computer architecture and how to program computers to make them work effectively and efficiently. | This degree involves courses in programming, algorithms, software development, computer architecture, data representation, logic design, calculus, discrete math, and physics.<br><br>Students investigate the fundamental theories of how computers solve problems, and they learn how to write application programs, system software, computer languages, and device drivers. | Computer programmers, with good possibilities for advancement to software engineers, object-oriented/GUI developers, and project managers in technical applications development.<br><br>Also, theorists, inventors, and researchers in fields as diverse as artificial intelligence, virtual reality, and computer games. |

## 8 Education

| DEGREE | CURRICULUM | CAREERS |
|---|---|---|
| **Information systems** degree programs, typically offered by a university's college of business, focus on applying computers to business problems. | This degree involves coursework in business, accounting, computer programming, communications, systems analysis, and human psychology.<br><br>This degree is recommended for students who want to become computer professionals but lack strong math aptitude. | Programming or technical support jobs, with good possibilities for advancement to systems analyst, project manager, database administrator, network manager, or other management positions. |



## 8 Education

| DEGREE | CURRICULUM | CAREERS |
|---|---|---|
| **Information technology** degree programs focus on computer equipment and software used by businesses. | This degree involves hands-on coursework with hardware, networks, Web pages, multimedia, email systems, and security. | Network specialists and administrators, systems analysts, forensic technicians, and help desk technicians. |
| **Software engineering** takes a disciplined approach to developing software that is reliable, efficient, affordable, user-friendly, and scalable. | This degree involves studying statistics, software design, programming, systems analysis, and courses from information systems and computer science curricula. | Programmers, analysts, or managers on large-scale, safety-critical applications. |



## 8 Certification

- Approximately 300 computer-related certification exams are offered in areas of specialty that range from desktop publishing to network installation
- Certification exams can be divided into several categories, including the following:
  - General computer knowledge
  - Software applications
  - Database administration
  - Networking
  - Computer hardware
  - Computer security



## 8 Certification

FIGURE 8-54: BEYOND FORMAL TRAINING AND CERTIFICATION


**AP Exam**

Students who pass the AP Computer Science exam in high school have a head start on their college-level courses and may increase their chances of acceptance into an elite computer science program.

**Open Source Projects**

Participants in open source community projects get experience and make connections with other professionals that can be valuable resources during a job hunt. You can find projects at GitHub, SourceForge, OpenHatch, and Open Hub.



## 8 Certification

FIGURE 8-54: BEYOND FORMAL TRAINING AND CERTIFICATION

**Internships**

Internships are resume builders. Look for opportunities during summer break or for an after-school job. Working in the field before graduating adds relevant work experience to your list of qualifications.



## 8 Certification

FIGURE 8-54: BEYOND FORMAL TRAINING AND CERTIFICATION

**Badges**

Badges are inspired by videogame awards and Boy Scout patches. Online education providers, such as Khan Academy and OpenStudy, offer badges to students who complete various milestones.

**Nanodegrees**

Nanodegrees are awarded upon completion of one or more targeted online courses. These offshoots of MOOCs (massive open online courses) offer self-study training to career-minded individuals who might not have the time or means to complete a traditional degree program.

## 8 Resumes

- Job seekers need to produce resumes in a variety of formats, including the following:
  - Print
  - Email
  - HTML
  - LinkedIn
  - Online Job service
  - Web portfolio (a hypertext version of your resume)



## 8 Resumes

FIGURE 8-55: TIPS FOR EFFECTIVE RESUMES

**Be clear and concise.**

Eliminate unnecessary words, phrases, and sentences.

Be efficient with words when describing tasks, duties, titles, and accomplishments.

Be brief and to the point without selling yourself short.

**Place the most important point first.**

List your qualifications by importance and relevance to the job you seek.

Summarize skills at the top of the resume.

Use a bold font to emphasize skills and accomplishments that are required for the position you seek.

Include pertinent information about training, certification, and professional affiliations, but avoid personal information, such as church affiliation and hobbies, that is not directly related to the job.

**Use language effectively.**

Target terms and wording to prospective employers.

Use industry jargon wherever appropriate.

Use action verbs to maintain the reader's interest.

Use past and present tenses consistently.

Double-check grammar and spelling.

When posting information in a database, use nouns that describe your skills.



## 8 Section E: ICT Laws and Ethics

- ICT Laws
- ICT Ethics
- Ethical Decision Making
- Whistleblowing



## 8 ICT Laws

- **Information technology** law is the legal framework that applies to the collection, storage, and distribution of digital information
- Some of the most significant areas of information technology law include the following:
  - Copyright and intellectual property
  - Domain names
  - Patents
  - Cybercrime
  - Software and computer contracts
  - Privacy
  - Communication



## 8 ICT Ethics

- The term **professional ethics** refers to on-the-job choices and actions that reflect a person's values
- **Confidentiality** is the obligation not to disclose willingly any information that should be kept private
- **Proprietary information** includes knowledge about company finances, procedures, products, and research that competitors would find valuable
- A **non-compete clause** is designed to prevent employees from divulging proprietary information to competitors



## 8 ICT Ethics

- It's never a good idea to use facilities at work for personal activities unless you have a specific agreement with your employer and your activities do not breach your employment contract

FIGURE 8-60: PERSONAL USE

## 8 Ethical Decision Making

- Ethical decisions that you make on the job can have long-term consequences for your career and lifestyle, so it is important to approach these decisions seriously
- **Use the following strategies when making decisions at work:**
  - Talk to people whose judgment you respect
  - Consider what the most ethical person you know would decide to do
  - Think about what you would do if your actions were made public
  - Look at the problem from the opposite perspective
  - Consult a code of professional ethics



## 8 Ethical Decision Making

- A code of ethics is a set of guidelines designed to help professionals thread their way through a sometimes tangled web of ethical on-the-job decisions
- Some codes of ethics are short and concise, whereas others are long and detailed
- Most codes contain principles similar to those from the Computer Ethics Institute (CEI)



## 8 Ethical Decision Making

FIGURE 8-64: ETHICAL PRINCIPLES FROM THE COMPUTER ETHICS INSTITUTE

- Do not use a computer to harm other people.
- Do not interfere with other people's computer work.
- Do not snoop around in other people's files.
- Do not use a computer to steal.
- Do not use a computer to bear false witness.
- Do not use or copy software for which you have not paid.
- Do not use other people's computer resources without authorization.
- Do not appropriate other people's intellectual output.
- Think about the social consequences of the programs you write.
- Use a computer in ways that show consideration and respect.



## 8 Whistleblowing

- A widely accepted definition of **whistleblowing** is the disclosure by an employee (or professional) of confidential information that relates to some danger, fraud, or other illegal or unethical conduct connected with the workplace
- A whistleblower is someone in an organization who decides to speak out against on-the-job activities that are contrary to the mission of the organization or threaten the public interest



## 8 Whistleblowing

- Employee advocates have the following suggestions for reducing the risk of career repercussions that are often experienced by whistleblowers:
  - Examine your motives
  - Try the normal chain of command
  - Collect evidence to back up your accusations

Cont…



## 8 Whistleblowing

- Record events as they unfold
- Act ethically
- Be ready to accept repercussions
- Establish a support network
- Consult a lawyer
- Consider your strategy

NEW PERSPECTIVES

# Unit 8 Complete

## Computer Concepts 2016