

Unit 1 - Industry in the Profession

Lesson 1.

At the end of the lesson the students should be able to:

- a. Identify the different functions and specializations in Information Technology profession.
- b. Explain the contributions of computing in different fields
- c. Discuss the evolution of computing.
- d. Differentiate the different generations of computers.
- e. Explain digital revolution.
- f. Cite examples of different trends in computing.

INTRODUCTION

The computer hardware, software and IT services industry is a key example of knowledge production, as the value of what a software company produces is almost entirely in the knowledge embodied in its products and services. It is a fast-growing industry producing high value services for its customers. Although it is dominated by firms based in major industrialized countries of the world, it continues to offer great prospects for economic growth and industrial development within developing economies. Indeed, the software industry has become a leading source of employment creation and economic growth in the world (Schware, 1995). In this lesson you will learn about the scope and economics of these dynamic industries.

LEARNING CONTENT

Is there a difference between the computer industry and the information technology industry?

Computer industry encompasses those companies that manufacture computers and components. It is also used more broadly to include software publishers and peripheral device manufacturers. (Ex. Apple, Dell, Hewlett-Packard, IBM and Intel).

An even broader term, **information technology industry** (or IT industry), is used to refer to the companies that develop, produce, sell, or support computers, software, and computer-related products. It includes companies in the computer industry, software publishers, communications service vendors such as AT&T, information services such as LexisNexis online law library, and service companies such as HP Enterprise Services.

Is every company that uses computers part of the IT industry?

A bank uses computers to track money flowing into and out of accounts, but it is classified as part of the banking industry. Such businesses make use of information technology, but they are definitely not part of the computer industry and are not considered part of the IT industry either.

What kinds of companies are included in the IT Industry?

Equipment Manufacturers design and manufacture computer hardware and communications products, such as personal computers, mainframes, mice, monitors, storage devices, routers, scanners, and printers. Examples of these companies include Computer manufacturers (IBM, Dell, Lenovo, and Hewlett-Packard). Network hardware companies such as Cisco and its subsidiary Linksys, are also examples of equipment manufacturers.

In the context of computing, the terms "industry" and "profession" refer to different aspects of the field. Let's break down each term:

1. **Industry in Computing:** The term "industry" in computing refers to the broader sector that encompasses all activities related to the development, production, distribution, and maintenance of computer hardware, software, and services. It includes a wide range of activities, such as software development, hardware manufacturing, IT services, cybersecurity, data analysis, cloud computing, artificial intelligence, and more. The computing industry is vast and dynamic, playing a crucial role in modern society and the global economy.
2. **Profession in Computing:** The term "profession" in computing pertains to the specialized roles, skills, and expertise that individuals develop and apply within the computing industry. These roles often require a deep understanding of specific technologies, programming languages, methodologies, and best practices. Professions in computing can include software engineers, data scientists, system administrators, network engineers, cybersecurity experts, user experience designers, and many others. These professionals typically have formal education, training, and experience in their respective areas of expertise.

In summary, the computing industry encompasses the entire ecosystem of technology-related activities, while professions within computing refer to the specialized roles and expertise required to contribute to and excel within that industry. The computing industry relies on skilled professionals to drive innovation, develop cutting-edge technologies, and address the ever-evolving challenges and opportunities in the digital world.

Information technology (IT) is a vast and evolving field with numerous specializations that cater to various aspects of technology and its applications. Here are some of the different specializations within the field of information technology:

1. **Software Development:** This specialization focuses on designing, developing, and maintaining software applications and systems. It includes programming languages, software engineering methodologies, and tools used to create software solutions.
2. **Web Development:** Web developers specialize in creating websites and web applications. They work with various programming languages, frameworks, and tools to design and develop user-friendly and interactive web interfaces.

3. **Mobile App Development:** Mobile app developers focus on creating applications for mobile devices, such as smartphones and tablets. They work with platforms like iOS (Apple) and Android to build mobile apps.
4. **Database Management:** Database administrators (DBAs) specialize in managing and maintaining databases. They ensure data integrity, security, and availability, and optimize database performance.
5. **Network Administration:** Network administrators are responsible for managing and maintaining an organization's network infrastructure. This includes configuring routers, switches, firewalls, and ensuring network security.
6. **Cybersecurity:** Cybersecurity specialists focus on protecting computer systems, networks, and data from security breaches and cyberattacks. They develop strategies to prevent, detect, and respond to threats.
7. **Cloud Computing:** Cloud specialists work with cloud platforms and services to design, implement, and manage cloud-based solutions. They handle tasks such as cloud architecture, migration, and optimization.
8. **Artificial Intelligence (AI) and Machine Learning:** AI and machine learning specialists work on developing intelligent systems and algorithms that can learn from data and make predictions. They are involved in areas like natural language processing, computer vision, and data analysis.
9. **Data Science and Analytics:** Data scientists analyze large datasets to extract valuable insights and make informed business decisions. They use statistical analysis, data mining, and visualization techniques.
10. **IT Project Management:** IT project managers oversee the planning, execution, and completion of technology projects. They coordinate teams, manage resources, and ensure projects are delivered on time and within budget.
11. **UI/UX Design:** User interface (UI) and user experience (UX) designers focus on creating visually appealing and user-friendly interfaces for software applications and websites.
12. **Health Information Technology (Health IT):** This specialization combines healthcare and technology, involving the management and integration of electronic health records (EHRs), medical coding, telemedicine, and health informatics.
13. **Gaming and Multimedia:** Specialists in this area develop interactive and engaging multimedia applications, including video games, virtual reality (VR), and augmented reality (AR) experiences.
14. **Hardware Engineering:** Hardware engineers design and develop physical computer components, including processors, memory, circuit boards, and other hardware components.
15. **Enterprise Resource Planning (ERP):** ERP specialists work on implementing and managing integrated software systems that help organizations manage and automate various business processes.

These are just a few examples of the many specializations within the field of information technology. The industry continues to evolve, leading to the emergence of new areas of specialization as technology advances.

The field of Information Technology (IT) encompasses a wide range of functions and specializations that collectively work to manage, implement, and support technology systems and solutions within organizations. Here are some of the key functions and specializations within the IT profession:

1. Software Development and Programming:

- Software Engineer
- Application Developer
- Web Developer
- Mobile App Developer
- Game Developer
- DevOps Engineer
- Full Stack Developer

2. Network and Systems Administration:

- Network Administrator
- Systems Administrator
- Network Engineer
- Cloud Administrator
- Database Administrator
- Virtualization Specialist

3. Cybersecurity:

- Information Security Analyst
- Ethical Hacker / Penetration Tester
- Security Consultant
- Incident Responder
- Security Architect
- Cryptographer

4. Data Science and Analytics:

- Data Scientist
- Data Analyst
- Data Engineer
- Machine Learning Engineer
- Business Intelligence Analyst
- Big Data Engineer

5. IT Support and Helpdesk:

- Technical Support Specialist
- Helpdesk Technician
- IT Support Engineer
- Desktop Support Specialist
- IT Operations Analyst

6. IT Project Management:

- IT Project Manager
- Scrum Master
- Agile Coach

- IT Program Manager
- Project Coordinator
- 7. Enterprise Architecture:**
 - Enterprise Architect
 - Solution Architect
 - Infrastructure Architect
 - Data Architect
 - Application Architect
- 8. Business Analysis:**
 - Business Analyst
 - Systems Analyst
 - Requirements Analyst
 - Product Owner
- 9. Quality Assurance and Testing:**
 - QA Engineer
 - Test Analyst
 - Automation Tester
 - Performance Tester
- 10. UI/UX Design:**
 - UI Designer
 - UX Designer
 - Interaction Designer
 - User Researcher
- 11. IT Consulting:**
 - IT Consultant
 - Technology Advisor
 - Systems Integration Consultant
- 12. Health IT:**
 - Health IT Specialist
 - Health Informatics Analyst
 - Clinical Systems Analyst
- 13. E-commerce and Digital Marketing:**
 - E-commerce Developer
 - Digital Marketing Analyst
 - SEO Specialist
 - Social Media Manager
- 14. Education and Training:**
 - IT Trainer
 - Technical Writer
 - Curriculum Developer
- 15. Emerging Technologies:**
 - AI Engineer
 - Blockchain Developer
 - Internet of Things (IoT) Specialist

- Augmented Reality (AR) / Virtual Reality (VR) Developer
- 16. **IT Management and Leadership:**
 - Chief Information Officer (CIO)
 - IT Director
 - IT Manager
 - IT Team Lead

These are just a few examples of the diverse functions and specializations within the Information Technology profession. The field is constantly evolving, and new roles and responsibilities continue to emerge as technology advances.

Computing has revolutionized various fields and industries, bringing about significant advancements, increased efficiency, and new possibilities. Here are some examples of how computing is appreciated in different fields:

1. **Healthcare:**

- **Medical Imaging and Diagnostics:** Computing enables advanced imaging techniques like MRI, CT scans, and ultrasound, aiding in accurate diagnosis.
- **Genomic Research:** High-performance computing assists in analyzing massive genetic data, leading to personalized medicine and targeted therapies.
- **Telemedicine:** Computing facilitates remote patient consultations, enabling access to medical expertise irrespective of location.
- **Drug Discovery:** Computational modeling speeds up drug discovery by simulating and predicting the behavior of molecules.

2. **Finance:**

- **Algorithmic Trading:** High-frequency trading relies on complex algorithms and computing power to make rapid trading decisions.
- **Risk Assessment:** Computing models help assess and manage financial risks through simulations and predictive analytics.
- **Fraud Detection:** Machine learning algorithms identify patterns of fraudulent transactions in real-time.
- **Personal Finance:** Computing aids in budgeting, investment tracking, and financial planning through various apps and software.

3. **Education:**

- **E-Learning:** Computing supports online courses, virtual classrooms, and interactive learning platforms.
- **Adaptive Learning:** Algorithms personalize learning experiences by analyzing student performance and adapting content accordingly.
- **Research:** Researchers utilize computing for data analysis, simulations, and collaborative work across institutions.

4. **Transportation:**

- **Autonomous Vehicles:** Computing drives self-driving cars, enhancing safety and potentially transforming the transportation industry.

- **Traffic Management:** Computing optimizes traffic flow through real-time data analysis and smart signaling systems.
- **Navigation:** GPS and mapping applications make navigation efficient and user-friendly.
- 5. **Agriculture:**
 - **Precision Farming:** Computing aids in monitoring crops, soil conditions, and weather, optimizing resource usage and crop yields.
 - **Drones:** Unmanned aerial vehicles equipped with computing systems enable crop monitoring and pest control.
 - **Genetic Engineering:** Computing assists in designing genetically modified crops with desired traits.
- 6. **Entertainment:**
 - **Gaming:** High-end graphics and realistic simulations are powered by computing, providing immersive gaming experiences.
 - **Streaming Services:** Computing supports on-demand video and music streaming platforms.
 - **Digital Content Creation:** Artists and designers use computing tools for graphic design, animation, and multimedia production.
- 7. **Energy:**
 - **Smart Grids:** Computing enables efficient distribution and management of electricity through smart grids.
 - **Renewable Energy:** Computing aids in optimizing the placement and operation of solar panels and wind turbines.
 - **Energy Modeling:** Complex simulations help forecast energy demand and assess the impact of policy changes.
- 8. **Environmental Science:**
 - **Climate Modeling:** Supercomputers simulate climate patterns, aiding in understanding and predicting climate change.
 - **Ecological Monitoring:** Computing assists in tracking wildlife behavior, environmental changes, and habitat preservation.

These examples showcase how computing has become an integral part of various fields, contributing to advancements and innovations across industries.

The evolution of computing has been a remarkable journey spanning several decades, marked by profound advancements in technology and innovations. Here's an overview of the key stages in the evolution of computing:

1. **Mechanical Computing (1600s - 1800s):** The earliest forms of computing can be traced back to mechanical devices like the abacus and slide rule. Blaise Pascal's mechanical calculator (1642) and Charles Babbage's designs for the Analytical Engine (1837) laid the conceptual foundation for modern computers.

2. **Electromechanical Computing (1930s - 1940s):** The first truly programmable computers emerged during this era. Devices like the Atanasoff-Berry Computer (ABC) and the Harvard Mark I employed mechanical and electrical components to perform calculations.
3. **Vacuum Tube Computing (1940s - 1950s):** The advent of vacuum tubes enabled the development of electronic computers, which were faster and more reliable than their electromechanical predecessors. The Electronic Numerical Integrator and Computer (ENIAC) and the Universal Automatic Computer (UNIVAC) are notable examples from this era.
4. **Transistor Computing (1950s - 1960s):** Transistors replaced vacuum tubes, leading to smaller, faster, and more energy-efficient computers. The IBM 7090 and the DEC PDP-8 are examples of transistor-based machines that expanded the use of computers in scientific and business applications.
5. **Integrated Circuit Computing (1960s - 1970s):** The invention of the integrated circuit (microchip) by Jack Kilby and Robert Noyce paved the way for miniaturization and further improved computing power. Mainframe and minicomputer systems became more accessible.
6. **Microprocessor Revolution (1970s - 1980s):** The development of microprocessors, which integrated multiple components onto a single chip, led to the birth of personal computers. The Altair 8800, Apple II, and IBM PC are iconic products of this era.
7. **Home Computing and Graphical User Interfaces (1980s - 1990s):** The 1980s witnessed the rise of user-friendly interfaces and graphical operating systems. The Macintosh, Windows, and the introduction of the mouse revolutionized the way people interacted with computers.
8. **Internet and Networking (1990s - 2000s):** The widespread adoption of the internet transformed computing into a global network of information exchange. The World Wide Web (WWW) became a cornerstone of communication and information dissemination.
9. **Mobile Computing and Smartphones (2000s - present):** The 21st century saw the rise of mobile computing with the proliferation of smartphones and tablets. These devices brought computing power and internet access to people's pockets, enabling new forms of communication and application usage.
10. **Cloud Computing and Big Data (2000s - present):** Cloud computing emerged as a paradigm where computing resources are delivered over the internet. This allowed for scalable and flexible infrastructure for various applications, and it contributed to the handling of massive amounts of data (Big Data) for analysis and insights.
11. **Artificial Intelligence and Quantum Computing (2010s - present):** Recent years have seen significant advancements in artificial intelligence and machine learning, enabled by powerful hardware and algorithms. Quantum computing has also gained attention for its potential to solve complex problems much faster than classical computers.

The evolution of computing continues to be driven by ongoing research and innovation, with breakthroughs in areas like quantum computing, neuromorphic computing, and bioinformatics promising to shape the future of computing technology.

Computer generations refer to distinct phases in the development of computer technology, characterized by significant advancements in hardware, architecture, and functionality. These generations mark important milestones in the evolution of computers. Here are the main computer generations along with examples of computers from each generation:

1. First Generation (1940s-1950s):

- Vacuum tubes were used for electronic components.
- Computers were large, bulky, and consumed a lot of power.
- Examples: ENIAC (1945), UNIVAC I (1951)

2. Second Generation (1950s-1960s):

- Transistors replaced vacuum tubes, leading to smaller and more reliable computers.
- Assembly language and early high-level programming languages were introduced.
- Examples: IBM 1401 (1959), DEC PDP-8 (1965)

3. Third Generation (1960s-1970s):

- Integrated circuits (ICs) allowed for even smaller computers and increased processing power.
- Operating systems and timesharing systems were developed.
- Examples: IBM System/360 (1964), DEC PDP-11 (1970)

4. Fourth Generation (1970s-1980s):

- Microprocessors, which contained entire CPUs on a single chip, were introduced.
- Personal computers (PCs) became more affordable and accessible.
- Examples: Intel 8086 (1978), Apple II (1977), IBM PC (1981)

5. Fifth Generation (1980s-Present):

- Advancements in microprocessor technology continued, leading to higher performance.
- Graphical User Interfaces (GUIs) and networking became prominent.
- Examples: Intel Pentium processors (1993), Apple Macintosh (1984), IBM ThinkPad (1992)

6. Sixth Generation (1990s-Present):

- High-performance microprocessors with advanced features, such as multiple cores, emerged.
- Internet and the World Wide Web became widely accessible.
- Examples: Intel Core processors (2006), AMD Ryzen processors (2017)

7. Seventh Generation (2000s-Present):

- Further advancements in microprocessor technology, including improved energy efficiency and integration.
- Cloud computing and mobile devices gained prominence.
- Examples: Intel Core i7 processors (2008), Apple iPhone (2007), AMD Ryzen 5000 series (2020)

8. Eighth Generation (2020s-Present):

- Ongoing developments in microarchitecture, artificial intelligence, and quantum computing.
- Continued focus on energy efficiency and new computing paradigms.

- Examples: Intel 11th Gen processors (Tiger Lake, 2020), AMD Ryzen 6000 series (2023)

Each generation represents a significant leap in technology and has contributed to the rapid advancement of computing capabilities and applications.

DIGITAL REVOLUTION

The computer revolution (digital revolution) is a continuing progression of community; government and financial transformation bring in relation to digital technology. The Technology motivating the computer revolution (digital revolution) is build on calculation by numerical methods and the thought that data can be converted into electrical signals, such as figures, words, pictures and music. Without this method, computers would be just a huge machine with limited capabilities. Digital Electronics change the form of words, figures, sound, pictures and film into data. The transformation of numbers, images, letters, sound, and videos into data is called Digitization

Stages of Digital Revolution

- **Data processing** is a cluster of linked procedures for the primary stage of the digital revolution. The idea or notions of large computers carry out function based on the key in (input)-processing-output (key out) cycle.

EDP (Electronic Data Processing)

The refining of information by computer and any additional device and its application in terms of linking electronic communication. EDP advances from information processing a word that was shaped as soon as most computing code was actually put into the computer. The processing of data is done by use of automated methods. It means that large volumes of similar information are process by using repetitive activities

- **Personal Computing**, A computing system for the subsequent stage of the digital revolution. It is distinguish by small, self contained computers utilizing local software. Local software is any program that is set in on a computer hard drive.

Throughout this stage of the digital revolution, computers unit were not linked to cyberspace; they were basically autonomous units that permitted individual to interrelate with installed program

- **Network Computing**, the triennial stage of the digital revolution occur as computers are linked and the cyberspace was publicly opened to use. A computer is linked together to share information and capability.

As the third stage of the digital revolution widely spread, network technology become user-friendly; granting users to attach multiple computers, interchanges archive, and most significantly, allocate a cyberspace connection. Cyberspace is a worldwide computer initially started as venture for military and was subsequently relinquish to the National Science Foundation for Research as well as Academic use.

A lot of people considered web as a major progressive influence during digital revolution. The World Wide Web or web is a data structure where the documents and other web resources are recognized by Uniform Resources Locators (URL) which interlinked by hypertext and accessible over the internet.

- **Cloud computing** allocates way in to information, program, links and storage space over the Internet. Previous to cloud computing, the computer usually ran software based locally. Normally hard disk or flash drives are the storage for e-mail, documents, photos, and music. In cloud computing, one can use web browser to access word processing programs that take off from the cyberspace, as a alternate of program that have equipped or put up on a local hard disk.

The growth of cloud computing is owed in fraction to convergence. The convergence of communication technologies make one device used for various functions. A communication technology is a procedure by which different functionalities progress to shape a single product. A computer plays movies; a cell phone has a camera, a clock can play music. Some devices related to convergence are cell phones, computers, and portable media player. It is significant to the digital revolution for the reason that it formed complicated portable machine whose possessor insist connection to the similar use possible from regular computer.

As of September 2021, here are some of the ongoing trends in the field of computing. Keep in mind that these trends might have evolved or changed since then, so it's always a good idea to check for the most up-to-date information.

1. **Artificial Intelligence (AI) and Machine Learning (ML):** AI and ML continue to shape various industries by enabling automation, predictive analytics, and data-driven decision-making. Neural networks, deep learning, and natural language processing have been driving advancements in this field.
2. **Edge Computing:** With the rise of IoT devices, edge computing involves processing data closer to the source, reducing latency and improving efficiency. This trend aims to address challenges related to data volume, speed, and privacy.

3. **5G Technology:** The rollout of 5G networks is expected to significantly enhance connectivity and enable faster data transfer, which will further enable technologies like IoT, augmented reality (AR), and virtual reality (VR).
4. **Quantum Computing:** While still in its early stages, quantum computing has the potential to revolutionize computing by solving complex problems that are currently infeasible for classical computers. Researchers are working on developing practical quantum algorithms and hardware.
5. **Cybersecurity and Privacy:** As technology advances, so do security threats. The need for robust cybersecurity measures and privacy protection is growing, with a focus on developing advanced encryption techniques and security protocols.
6. **Cloud Computing:** Cloud computing continues to evolve, with an emphasis on hybrid and multi-cloud solutions. Serverless computing and containerization (e.g., Docker, Kubernetes) are gaining popularity for their efficiency and scalability.
7. **Augmented Reality (AR) and Virtual Reality (VR):** AR and VR technologies are finding applications beyond gaming, including in fields like education, healthcare, architecture, and training simulations.
8. **Natural Language Processing (NLP):** NLP is expanding its horizons with advancements in conversational AI, chatbots, language translation, sentiment analysis, and content generation.
9. **Robotics and Automation:** Robotics is being integrated into various industries, from manufacturing to healthcare. Advances in robotics are driven by AI, computer vision, and machine learning.
10. **Biocomputing and Bioinformatics:** The intersection of computing and biology is gaining traction, with applications in genetic research, drug discovery, and personalized medicine.
11. **Ethical and Responsible AI:** There is an increasing focus on ensuring that AI technologies are developed and deployed ethically, addressing biases, transparency, and accountability.
12. **Sustainable Computing:** As environmental concerns grow, there's a push for more energy-efficient and eco-friendly computing solutions, including green data centers and efficient algorithms.

Remember that trends can change rapidly, and new developments may have emerged since my last update. It's essential to stay informed through reliable sources to get the latest information on computing trends.

Name: _____
Yr. & Sec. _____

Score: _____
Date: _____

Activity # 1

NO ERASURE.

I. **Identification:** Identify the following. (10 pts.)

_____ 1. is first used as the essential piece of equipment for recollection and electrical for CPU (Central Processing Unit).

_____ 2. It allocates way in to information, program, links and storage space over the Internet.

_____ 3. A computer is linked together to share information and capability.

_____ 4. a cluster of linked procedures for the primary stage of the digital revolution.

_____ 5. It simulates the human intelligence which translates way and technique of making computers assume like human.

II. Enumerate the following: (10 pts.)

A. Give at least 4 computers used in the first generation

- 1.
- 2.
- 3.
- 4.

B. Phases of Digital Revolution

- 5.
- 6.
- 7.
- 8.

C. Give at least 3 computers used in the fourth generation

- 9.
- 10
- 11.

D. Give at least 4 computers used in the third generation

- 12.
- 13.
- 14.
- 15.

