



INFORMATION TECHNOLOGY

What is information technology?

Information technology (IT) is a set of related fields that encompass computer systems, software, programming languages and data and information processing and storage. IT forms part of information and communications technology (ICT). An information technology system (IT system) is generally an information system, a communications system, or, more specifically speaking, a computer system — including all hardware, software, and peripheral equipment — operated by a limited group of IT users, and an IT project usually refers to the commissioning and implementation of an IT system. IT systems play a vital role in facilitating efficient data management, enhancing communication networks, and supporting organizational processes across various industries. Successful IT projects require meticulous planning, seamless integration, and ongoing maintenance to ensure optimal functionality and alignment with



organizational objectives. Although humans have been storing, retrieving, manipulating, and communicating information since the earliest writing systems were developed, the term information technology in its modern sense first appeared in a 1958 article published in the Harvard Business Review; authors Harold J. Leavitt and Thomas L. Whisler commented that "the new technology does not yet have a single established name. We shall call it information technology (IT). 'Their definition consists of three categories: techniques for processing, the application of statistical and mathematical methods to decision-making, and the simulation of higher-order thinking through computer programs.

The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several products or services within an economy are associated with information technology, including computer hardware, software, electronics, semiconductors, internet, telecom equipment, and e-commerce. Based on the storage and processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical (3000 BC – 1450 AD), mechanical (1450 – 1840), electromechanical (1840 – 1940), and electronic (1940 to present).

Information technology is also a branch of computer science, which can be defined as the overall study of procedure, structure, and the processing of various types of data. As this field continues to evolve across the world, its overall priority and importance has also grown, which is where we begin to see the



introduction of computer science-related courses in K-12 education.

What Are the Types of Information Technology?

Information technology is a broad term that involves the use of technology to communicate, transfer data and process information.

The different trends within information technology include, but aren't limited to:

- Analytics
- Automation
- Artificial intelligence
- Cloud computing
- Communications
- Cybersecurity
- Data/database management
- Infrastructure
- Internet of things
- Machine learning
- Maintenance and repair
- Networks



- Robotics
- Software/application development
- SCADA

This list is by no means exhaustive and new applications for technology are constantly emerging.

What Is the Role of Information Technology?

Information technology plays a prominent role in business and provides a foundation for much of our current workforce. From communications to data management and operational efficiency, IT supports many business functions and helps drive productivity.

Why Do We Need Information Technology?

Information technology drives much of what we do in our personal and professional lives. It is the foundation of our communication, technological advancement, innovation, sustainability and recreation. We use information technology on a personal level to connect and communicate with others, play games, share media, shop and be social. From a career perspective, information technology is largely responsible for much of our business operations and spans nearly every industry. From healthcare to food services, manufacturing to sales, and beyond, we rely on IT to help connect us to others, store and



manage information and create more efficient processes.

IT Career Opportunities

According to Cyberstates 2020, there were 12.1 million technology-based jobs in 2020, which continues to grow year over year. Careers in IT span many different areas, from computer hardware and software development to networking, computer repair, technical support, cybersecurity, cloud computing, artificial intelligence, data science and so much more. What originally began as a siloed department, information technology is now considered a critical business function that impacts nearly every aspect of an organization.

What Exactly Is an IT Job?

An IT job is any position that involves the implementation, support, maintenance, repair or protection of data or computer systems. Those involved in development, deployment or support of the systems or applications others use are the most common examples of IT jobs. If you like problem solving and being an active learner, a technology job could be right for you.

Examples of IT Jobs

IT jobs run the gamut. Here's a brief rundown of some IT job possibilities. Keep in mind that these positions can also be



industry specific, so you could work one of the following roles in an industry of your choice.

Hardware-based IT jobs could include any of the following:

- Help desk technician
- Computer technician
- Network engineer/architect
- Hardware manufacturer
- Cloud engineer
- Cloud architect

Software-based jobs might involve developing applications or programs and may include the following:

- Software developer
- Software engineer
- Programmer
- Mobile application developer
- Web developer
- Product owner/support

IT jobs that involve data protection or incident response fall under cybersecurity and may include the following:



- Cybersecurity specialist
- Cybersecurity analyst
- Cybersecurity architect
- Forensic analyst
- Incident responder
- Malware analyst
- Pen tester/ethical Hacker
- Threat hunter

Jobs in information technology that involve data collection, storage or analysis fall under data jobs, which may include:

- Data scientist/analyst
- Data engineer
- Database engineer
- Data privacy officer
- Business intelligence analyst

As with any industry, there are several IT jobs that are leadership positions. These may include jobs such as:



- IT manager/team lead
- Director of IT
- Chief Information Security Officer (CISO) Chief Information Officer (CIO)
- Chief Technology Officer (CTO)
- Chief Data Officer (CDO)

What IT Jobs Pay the Best?

Typically, IT jobs pay more based on complexity or leadership level. For example, if an IT position requires a high level of technical expertise, a degree in computer science, or is an executive position, you are looking at a higher wage.

According to Salary.com, here are some of the highest paid IT jobs.

- Computer and information systems managers earn a median wage of \$146,360
- Cloud engineers earn a median wage of \$136,479
- Cybersecurity engineers earn a median wage of \$134,340
- Computer and information research scientists earn a median wage of \$122,840
- Computer hardware engineers earn a median wage of



\$117,220

- Computer network architects earn a median wage of \$112,690
- Software developers and software QA analysts and testers earn a median wage of \$107,510





INFORMATION SYSTEMS

What is information systems?

An information system (IS) is an interconnected set of components used to collect, store, process and transmit data and digital information. At its core, it is a collection of hardware, software, data, people and processes that work together to transform raw data into useful information. An IS supports a variety of business objectives such as improved customer service or increased efficiency.



People often use the term "information system" interchangeably with "computer system," but these systems are not the same. While computer systems are part of an IS, they do not encompass all the components and processes that make up an IS, such as people and processes. "Information technology" (IT) is another similar term, but IT focuses on the technical aspects of the hardware and software that support enterprise computing. An IS, on the other hand, focuses on how people use IT and data to manage and make decisions within an organization. In addition to decision-making, IS supports knowledge management and communication. IT allows data sharing to take place between different departments, providing consistent data for analysis by a variety of teams. An IS supports various business functions such as accounting, finance, marketing, human resources, operations and supply chain management. It can also enable new business models and opportunities, such as e-commerce, social media and artificial intelligence (AI).

How does an information system work?

An IS is a powerful tool that can bring many different functions together. By connecting system components, it enables IT departments to collect, store and process information in an efficient way and distribute it for a variety of purposes. The system can also produce reporting in different formats and to a variety of devices. Reports can include text files, spreadsheets, graphics and complex data visualizations. This comprehensive platform streamlines internal operations and allows businesses



to access data quickly and accurately.

The basic process an IS follows includes the following steps:

- **Input.** The system collects data and information from various sources, such as sensors, keyboards, scanners or databases.
- **Processing.** The system transforms the raw data into meaningful information by applying various operations, such as sorting, classifying, calculating, analyzing or synthesizing.
- **Storage.** The system stores the processed information in a structured and secure way, such as in a database, a file system or in cloud storage.
- **Output.** The system presents the information to the users in a usable format, such as reports, graphs, charts or dashboards.
- **Feedback.** The system collects feedback from users and other stakeholders to evaluate its performance and improve its design and functionality.

The effectiveness of an IS depends on its alignment with the organization's goals, reliability, security and usability.



Typical components of information systems

An IS is composed of a variety of components, from physical hardware to software and data. Each component serves an important role in the overall functioning of the system.

Hardware for an IS includes computers and servers. Computer hardware is essential for providing users with access to the system, while servers provide storage space for data, programs and applications that make up the system.

Networks such as local area networks (LANs), wide area networks (WANs), intranets and cloud networks are important for interconnecting different components and allowing user access from anywhere in an organization.

Software is an integral part of an IS. Operating systems such as Windows or Linux provide underlying platforms, while databases allow users to store and retrieve large amounts of data. An enterprise may run on hundreds of different software applications, as well as large software packages that integrate multiple applications.

Data is another important component. This includes structured data stored in databases, as well as unstructured data such as text documents, images or audio files. Users can access this data through various applications within the system for reporting or



analysis purposes.

People play a key role in any IS, from administrators who manage the system itself to users who interact with it daily.

Administrators must understand how to configure hardware and software and troubleshoot issues. Meanwhile, end users must become familiar with interfaces and learn to perform tasks within the system to get work done.

Processes governing how components work together within an IS are critical. IT leaders must define procedures for everything from setting up secure user accounts to creating emergency backup plans. Understanding how all these pieces fit together is essential for an IS to meet a company's needs effectively.

Types of information systems

Businesses can optimize their operations with five types of IS.

Management information systems (MIS) are computerized systems that collect, store, process and present data to support management decision-making. For example, an MIS in a hospital may collect data on patient admissions, treatments and outcomes to help its administrators make decisions about resource allocation and process improvements.



Knowledge work systems (KWS) are computer-based systems that support knowledge workers, such as researchers, analysts and consultants, by helping them create reports and presentations. For example, a KWS used by a marketing team may help create marketing materials, analyze customer data and track marketing campaigns.

Decision support systems (DSS) and business intelligence (BI) provide users with the ability to explore and analyze data to gain insights into business performance. For example, a system used by a retail chain may collect and analyze data on customer demographics, buying behavior and sales performance to guide changes in inventory management and marketing campaigns.

Transaction processing systems (TPS) support operational processes that produce and consume data. For example, a TPS used by a bank may process customer transactions, such as deposits and withdrawals, and maintain account balances.

Executive information systems (EIS), a type of DSS, provide senior executives with access to high-level information about the organization. EIS provides executives with real-time information and analytical tools to support strategic decision-making. For example, an EIS intended for a CEO may provide information on



the company's financial performance, market trends and competitive landscape.

Managing information systems

Effective management and maintenance of an IS requires a deep understanding of the system's capabilities, as well as the needs and requirements of the users who rely on it. Professionals working in IS must become experts in the existing system and adapt to changing technologies and business needs. In order to run the system effectively, they must understand the disciplines included in managing the IS, and often hire specialists for each area.

System security

Security is critical for an IS because it is vulnerable to threats such as hacking, viruses, malware and unauthorized access. IS administrators must implement and maintain a wide range of tools and measures, including access control, firewalls, intrusion detection and prevention systems, antivirus software and data encryption. They must also make sure they apply security patches and updates promptly to fix any vulnerabilities in the system. Regular security audits and vulnerability assessments should also be conducted to identify and mitigate any potential security risks.



Data management

Data management involves maintaining the accuracy, consistency and integrity of the data stored in the system. IS administrators must develop and implement data backup processes to prevent data loss in case of system failures or disasters. They must also ensure that data is stored in a structured and organized manner so that it can be easily accessed and analyzed. Data security is another key aspect of data management, and administrators must ensure that data access controls and encryption mechanisms are in place to prevent unauthorized access and data breaches.

Network management

Network management involves monitoring and maintaining the network infrastructure to keep it functioning correctly. IS administrators must ensure that network devices such as routers, switches and servers are correctly configured and the network is working at optimal performance levels. They must also troubleshoot network issues as they arise and manage traffic to avoid congestion and delays. In addition, network management involves implementing network security devices and measures, such as firewalls and intrusion detection and prevention systems, to prevent unauthorized access and attacks.

System maintenance



IS administrators must make sure that the system is running smoothly by performing regular maintenance tasks such as system updates and hardware upgrades, as well as implementing a patch management process. They must also monitor system performance metrics, such as CPU and memory usage, to identify and troubleshoot performance issues.

User support

Users rely on the IS to perform their jobs successfully; therefore, administrators must provide users with the necessary training and support to enable them to use the system effectively. They must also offer help desk support to assist users with any problems they encounter while using the system. Administrators must also ensure that users have access to job-appropriate data, while also maintaining access control to protect sensitive information.

Information systems jobs and education

IS jobs are in high demand across a variety of industries. Professionals in this field should ideally have a combination of technical, business and communication skills, as well as an understanding of the components and processes associated with IS. Those pursuing an education in IS can expect to learn computer programming languages, database management and data analysis techniques, network design and security principles, system development methodologies, business intelligence tools



and techniques, project management principles, change control processes, user interface design principles and software engineering practices.

Most companies require applicants for IS positions to hold a bachelor's degree or higher in computer science or a related field like software engineering or IT. Many employers also prefer candidates who have obtained IT certifications, especially if the open role is specific to security or networking.

For those interested in pursuing an IS degree, colleges and universities offer a variety of programs ranging from associate degrees to doctoral courses of study. These typically cover topics such as system architecture, operating systems, databases and data structures, networking, security, cloud computing, project management, programming and software development.

Job opportunities abound within the field of IS. They vary from entry-level positions such as support technicians to higher positions such as senior engineers or architects. Other potential career paths include application developer, database analyst and administrator, IT consultant, business intelligence specialist and systems integrator.

Areas of IS with a great deal of demand in today's job market



include automation technologies such as robotic process automation, AI and machine learning. Employers also seek candidates experienced in cloud computing due to the popularity of services like Amazon Web Services and Microsoft Azure. In addition, security knowledge is perennially in high demand due to its importance and the need to adapt to the changing threat landscape.

