Data Science for Managerial Decisions (MB 511)
Introduction to Data Science

Instructor
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Data Science for Managerial Decisions (MB 511)

Program Overview

- Introduction to Data Science
- Information Technology: An Overview
- Applications of Data Science in various fields
- MIS and Control Systems
- Data Collection and Data Pre-Processing
- Building Information Systems
- Support Systems for Management Decisions

EMBA Program
MB-511

Information Technology: An Overview

- Foundations of Information Technology
- Information Systems and Management
- Cybersecurity and IT Governance
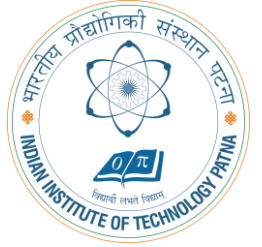- Future Trends in Information Technology

Information Technology: An Overview
Foundations of Information Technology

Information Technology (IT) in a management perspective refers to the use of technology to organize, process, store, retrieve, and transmit information within an organization. It encompasses a broad range of tools, systems, and applications designed to facilitate effective communication, streamline business processes, and support decision-making at various levels of management.

In a management context, IT serves as a crucial enabler, providing the infrastructure and tools necessary for efficient operations. It involves hardware components like computers, servers, and networking devices, as well as software applications that aid in data analysis, project management, and communication. The integration of IT into management practices has transformed the way business operate, enhancing their ability to adapt to changing environments and stay competitive.

Information Technology: An Overview
Foundations of Information Technology

Key aspects of the definition of Information Technology in a management perspective include:

Information Management: IT involves the systematic handling of information, including its collection, storage, retrieval, and dissemination.

This supports managerial decision-making by providing timely and accurate data.

Automation of Processes: IT helps automate routine tasks and business processes, reducing manual efforts and improving efficiency. This

allows management to focus on strategic initiatives rather than routine operational tasks.

Communication and Collaboration: Information Technology facilitates seamless communication within and outside the organization. Email,

video conferencing, and collaborative platforms enhance teamwork and information sharing among different levels of management.

Decision Support Systems: IT systems provide decision-makers with tools for data analysis and reporting. This empowers management to

make informed and data-driven decisions, leading to more effective strategic planning.

Security and Risk Management: In the context of management, IT plays a crucial role in ensuring the security of sensitive information. It

involves implementing measures to protect data from unauthorized access, ensuring compliance with regulations, and managing
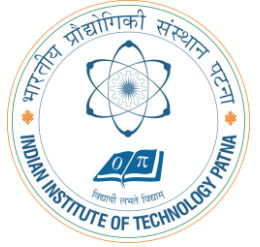
cybersecurity risks.

Information Technology: An Overview
Historical context and evolution

1. Early Computing Machines (Pre-20th century): The roots of IT can be traced back to early mechanical devices like the abacus and the Jacquard loom, which utilized punch cards for automated textile pattern weaving. However, it was Charles Babbage's design for the Analytical Engine in the 19th century that laid the conceptual groundwork for modern computing.

2. Mechanical and Electromechanical Computers (1930s-1940s): The 1930s and 1940s saw the development of mechanical and electromechanical computers, such as Konrad Zuse's Z3 in Germany and the Harvard Mark I in the United States. These machines were the precursors to electronic computers, employing gears, levers, and relays to perform calculations.

3. Electronic Computers (1940s-1950s): The invention of the electronic computer marked a turning point. The ENIAC (Electronic Numerical Integrator and Computer), completed in 1945, is considered the first general-purpose electronic computer. Subsequent developments led to the creation of stored-program computers, with the UNIVAC I becoming the first commercially produced computer in 1951.

Early Computing Machines (Pre-20th century) → Mechanical and Electromechanical Computers (1930s-1940s) → Electronic Computers (1940s-1950s) → Mainframe Era (1950s-1970s) → Personal Computer Revolution (1970s-1980s) → Networking and the Internet (1980s-1990s) → Mobile Computing and Connectivity (2000s-Present) → Big Data, Analytics, and Artificial Intelligence (2010s-Present)

Information Technology: An Overview

Historical context and evolution

4. Mainframe Era (1950s-1970s): Mainframe computers dominated the computing landscape during this era. They were large, powerful machines designed for centralized computing and data processing. IBM played a pivotal role in the mainframe era, introducing systems like the IBM System/360, which set standards for compatibility across different models.

5. Personal Computer Revolution (1970s-1980s): The advent of microprocessors and the development of personal computers (PCs) marked a shift towards decentralized computing. Companies like Apple and Microsoft emerged, and the IBM PC, introduced in 1981, became a standard. This era democratized computing, making it accessible to individuals and small businesses.

6. Networking and the Internet (1980s-1990s): The development of computer networks and protocols, such as TCP/IP, led to the creation of the Internet. This interconnected global network revolutionized communication and information exchange. The World Wide Web (WWW), introduced in the early 1990s, further accelerated the accessibility of information.

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Information Technology: An Overview
Historical context and evolution

7. Mobile Computing and Connectivity (2000s-Present): The 21st century witnessed the proliferation of mobile devices and wireless connectivity. Smartphones and tablets became ubiquitous, enabling users to access information and applications on the go. Cloud computing emerged as a dominant paradigm, providing scalable and flexible computing resources.

8. Big Data, Analytics, and Artificial Intelligence (2010s-Present): The increasing volume of data led to a focus on Big Data analytics, with technologies like Hadoop and Spark enabling the processing of massive datasets. Artificial Intelligence (AI) and machine learning gained prominence, revolutionizing data analysis, automation, and decision-making.

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Information Technology: An Overview
Key Components of Information Technology

Hardware:

Computers: The foundation of IT, computers range from personal devices like laptops and desktops to powerful servers that manage

and process organizational data.

Networking Equipment: Includes routers, switches, and other devices that enable communication and data transfer between

computers and systems within an organization.

Software:

Operating Systems: Fundamental software that manages computer hardware and provides services for computer programs.

Applications: Specific software applications tailored to support various management functions, such as project management tools,

customer relationship management (CRM) systems, and enterprise resource planning (ERP) software.

Data and Databases:

Databases: Systems for storing, organizing, and retrieving data. Relational databases and NoSQL databases are commonly used to

manage structured and unstructured data.

Data Warehousing: Centralized repositories that consolidate and store data from various sources, providing a unified view for reporting

and analysis.

Information Technology: An Overview

Key Components of Information Technology
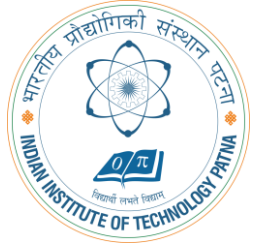
Networking and Communication:

Internet and Intranet: Enable global connectivity and internal communication within an organization.

Communication Protocols: Standards that govern data transmission, such as TCP/IP, ensuring seamless communication between devices.

Cybersecurity:

Firewalls and Security Software: Protect the organization's network by monitoring and controlling incoming and outgoing network traffic.

Encryption: Safeguards sensitive data by converting it into a code that can only be deciphered by authorized parties.

Access Controls: Restricting access to information based on user roles and permissions to ensure data security.

Cloud Computing:

Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS): Cloud computing models that offer scalable computing resources, platforms, and software over the internet, reducing the need for physical infrastructure.

Information Technology: An Overview
Key Components of Information Technology

IT Services and Support:

  Help Desk Services: Provide assistance and support for IT-related issues to ensure smooth operations.

  IT Consulting: Involves expert guidance on technology strategy, implementation, and optimization to align with organizational goals.

Emerging Technologies:

  Artificial Intelligence (AI) and Machine Learning (ML): Enhance decision-making processes and automate tasks by leveraging algorithms and data analysis.

  Internet of Things (IoT): Connects physical devices to the internet, enabling data collection and automation in various contexts, from manufacturing to logistics.

Strategic Planning and Governance:

  IT Governance: Frameworks and processes to ensure that IT aligns with organizational strategies and complies with regulations.

  Strategic Planning: Involves the development of IT strategies that support organizational goals and growth.
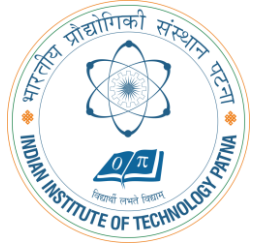
# Information Technology: An Overview
Overview of databases and data management

A database is a structured collection of data organized in a way that allows for efficient storage, retrieval, and management of information. It serves as a central repository for storing and managing data in a systematic and structured manner. Databases are fundamental components in information systems and are widely used in various applications, ranging from business operations to scientific research.

Database Types:

Relational Databases (RDBMS): Organize data into tables with predefined relationships between them. Examples include MySQL, PostgreSQL, and Microsoft SQL Server.
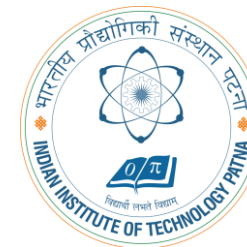
NoSQL Databases: Designed to handle unstructured or semi-structured data and offer flexible schemas. Examples include MongoDB (document-oriented) and Cassandra (wide-column store).

Graph Databases: Specifically designed to represent and query data in the form of a graph, with nodes and edges representing entities and relationships. Examples include Neo4j.
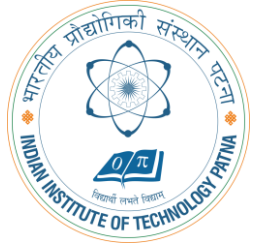
Have a question?
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