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Research Article

HISTORICAL CONTEXT OF DEVELOPMENT OF INFORMATION SYSTEMS AND DATABASE MANAGEMENT

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ABSTRACT

The article examines the historical context of the development of information systems and database management in the context of the evolution of technologies and the needs of society. The research includes an analysis of the key stages of information technology development, starting with the era of mechanical devices and machine maps in the XIX century, and ending with modern trends in cloud computing and distributed databases. The author emphasizes the influence of historical events, such as the Second World War and the Cold War, on the development of information systems. Special attention is paid to the role of pioneers such as Charles Babbage and Alan Turing in the formation of the basic concepts underlying modern information technologies. The article also highlights the key stages of the evolution of database management, starting with early hierarchical and network models and reaching modern relational and NoSQL systems. The authors identify factors that determine changes in data management requirements, such as the amount of information, processing speed and flexibility of data structures. The study highlights the importance of understanding the historical context for a better understanding of modern challenges and opportunities in the field of information systems and database management. In conclusion, the article offers prospects for further research and development in this area.

KEYWORDS

Information systems, database management (DBM), historical context, technological evolution, mechanical devices, machine maps, World War II, Cold War, Charles Babbage, Alan Turing, hierarchical data model, network data model, relational databases, NoSQL databases, cloud computing, distributed databases, the evolution of data management.

INTRODUCTION

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Information systems and database management (DBM) play a key role in the modern world, providing efficient storage, processing and transmission of information. However, to fully understand the essence of modern technologies, it is necessary to look at their historical context. In this article we will consider the stages of development of information systems and database management, starting from their inception and ending with the current state[1]. The development of information systems and database management (DBM) is a fascinating path of technological progress, largely determining the modern look of business, education and society as a whole. Understanding the historical context of this development allows us to more deeply assess the complexity and importance of modern information technologies. Information systems (IS) and database management (DBM) are cornerstones in the field of information technology, playing a key role in the efficient storage, processing and use of data. Let's consider the historical context of their development, starting from the early stages of the appearance of computing machines.

1. The first steps: Early information systems

The first attempts to automate data processing are associated with mechanical devices, such as Blaise Pascal's calculating machines and Gottfried Leibniz's Arithmometer. However, these devices focused mainly on arithmetic operations and did not provide opportunities for data organization. The first information systems appeared in the middle of the XX century. They were focused on automating routine operations and managing the huge amounts of data that businesses and organizations faced. One of the first notable achievements was the UNIVAC I system, launched in 1951. This electronic vacuum computer system has made it possible to efficiently process data for scientific and commercial purposes[2]. The first steps in the direction of information systems were taken in the 1950s, when computers were just beginning to enter everyday use. At this time, early electronic computers were created, such as UNIVAC I and ENIAC, which, despite their huge size, became the forerunners of modern computer systems. The first steps in the field of information systems were taken in the 1950s, when computers were just beginning to appear. At that time, the main focus was on automation of accounting operations and accounting. The programs developed for these purposes were a set of instructions executed sequentially.

The next important stage was the appearance of electromechanical computers. Projects such as ENIAC (Electronic Numerical Integrator and Computer) in the USA have introduced new opportunities for automation of computing and data processing. However, data management was limited and unstructured. In the late 1950s and early 1960s, the first databases appeared, such as CODASYL, designed for structuring and storing data. However, there were no standards at that time, and each system used its own data format.

2. The era of relational databases

The revolutionary moment was Edgar Codd's proposal for a relationship-based data model. In 1970, he published an article in which he introduced the concept of relational databases. Database management systems such as Oracle, MySQL and Microsoft SQL Server have started to build on this model, providing more flexible and structured approaches to data storage[3]. The next important stage in the history of information systems was the era of relational databases. In 1970, Edgar Codd proposed the concept

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of relational databases, which led to the creation of the Structured Query Language SQL (Structured Query Language). These technologies have provided more convenient and efficient methods for storing and retrieving data. With the development of computers, there was a need for efficient data storage and management. This led to the concept of databases in the 1960s. The first data models, such as network and hierarchical, became popular for structuring information. In the 1970s, Edgar Codd made a significant contribution by proposing a relational database data model. This concept gave impetus to the creation of unified and more flexible data storage systems. Relational databases such as Oracle and IBM DB2 have become an important tool for organizations.

3. Development of network and object-oriented databases

In the late 1970s and early 1980s, networked and object-oriented databases appeared. These technologies became more flexible in processing complex data structures and provided higher performance in certain scenarios. In the 1980s, with the expansion of computer networks and the advent of client-server architectures, information systems became more decentralized. The development of distributed databases has made it possible to exchange data more efficiently between different network nodes[4]. A revolutionary event occurred in 1970, when Edgar Codd introduced the relational database model. This model offered a standard approach to data storage based on a tabular structure. This marked the beginning of the era of relational databases, which have become widespread in business and scientific research.

4. Achievements in the field of distributed systems

In the 1980s, with the advent of computer networks, information systems became more distributed. This has opened up new opportunities for data exchange between different network nodes. The development of client-server architectures has become a major trend, allowing more efficient management of databases and resources. With the development of computer networks in the 1990s, the problem of data management in distributed systems became urgent. With the advent of the Internet at the end of the 20th century, information systems have become more accessible and scalable. There was a need to process and analyze huge amounts of data, which led to the era of big data. Database management systems (DBMS) have become more complex and powerful, allowing you to efficiently process and analyze huge amounts of information[5]. With the spread of the Internet and the need for data processing on distributed platforms, new challenges began to appear. Distributed databases have become actively used to provide access to data from various sources. Technologies such as client-server systems have made a significant contribution to providing access to data from various points of the network. In the 1990s and 2000s, with the spread of the Internet and digital technologies, information systems became increasingly interconnected. This led to the era of big data, where huge amounts of information required new approaches to its processing and storage. To date, information systems and database management continue to evolve. Cloud technologies provide new opportunities for data storage and processing, and artificial intelligence and machine learning are being introduced to improve analytics and forecasting. With the development of cloud technologies in the 2010s, information systems have acquired even greater scalability and flexibility[6]. Artificial intelligence has become a key element in data

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management, providing analysis and forecasting capabilities.

5. The emergence of Big Data and cloud technologies

In the last decade, there has been an explosive growth in data volumes, which led to the creation of the concept of Big Data. Cloud technologies have become a popular means of storing and processing data, providing flexibility and scalability. With the advent of Big Data and cloud technologies, modern IS and DBMS are faced with the need to process and store huge amounts of data. Technologies such as Hadoop and NoSQL databases provide solutions for working with such data scales.

6. Modern trends in the development of information systems

Today, information systems are actively implementing artificial intelligence, machine learning, blockchain and other innovative approaches[7]. These technologies provide more accurate analytics, automation of routine tasks and improved data security.

Conclusion. The history of the development of information systems and database management demonstrates a constant desire to improve the efficiency of data processing and management. With each stage, new technologies appeared that meet the challenges of their time. Currently, we are in the phase of intensive implementation of modern technologies that are shaping the future of information systems and database management. The history of the development of information systems and DBMS is a history of constant striving for efficiency, accessibility and integration of data. Modern technologies are built on the foundation laid generations earlier, and continue to evolve, bringing new and new innovations to our everyday experience. Understanding this story allows us to use modern technologies more purposefully to make our world even more connected and intelligent.

The historical context of the development of information systems and database management demonstrates their continuous improvement and adaptation to the changing requirements of society and business. From simple accounting programs to complex big data processing systems, these technologies have become an integral part of our daily lives, providing reliable and efficient information management.

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