

Evolution of Information Systems

This overview traces the development of information systems and databases. It covers key concepts from early computing challenges to modern big data, AI integration, and environmental concerns.

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Main Takeaways

1

Early Computing (1950s-1960s)

Faced challenges of data preservation, integrity, and access times.

2

Key Developments (1960s-1980s)

Introduced transactional processing, data independence, and relational databases.

3

1990s Emergence

Saw new data types, web applications, and object-oriented databases.

4

Big Data Era (2000s-present)

Introduced the 5V model, new database technologies, and real-time analysis.

5

Modern Data Storage Challenges and Innovations

Addresses new challenges in data volume, velocity, variety, and veracity.



Early Computing Challenges (1950s-1960s)

1

Data Preservation and Integrity

Ensuring data remained intact and accurate over time, despite hardware failures or power outages.

2

Access Times

Managing efficient data retrieval, given limited memory and processing power of early computers.

3

Concurrent Access

Handling multiple users or processes accessing and modifying data simultaneously without conflicts.

Key Developments (1960s-1980s)

ACID properties are crucial for ensuring data integrity and reliability in database systems.

Atomicity

All operations in a transaction completed successfully, or aborted with no changes.

Consistency

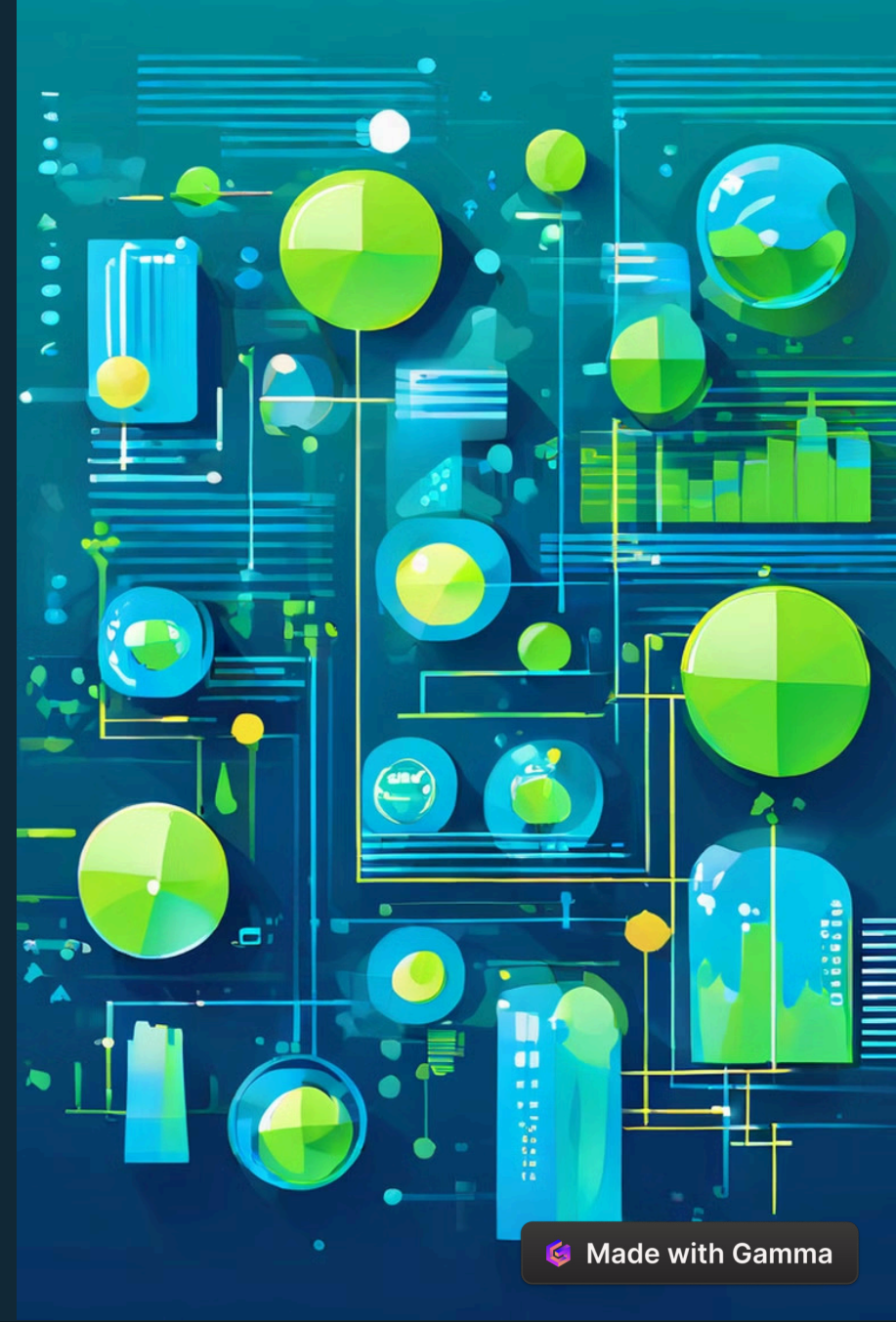
Transactions bring the database from one valid state to another, maintaining rules.

Isolation

Concurrent transactions leave the database as if executed sequentially.

Durability

Committed transactions remain so, even in case of system failure.



Developments in the 90s



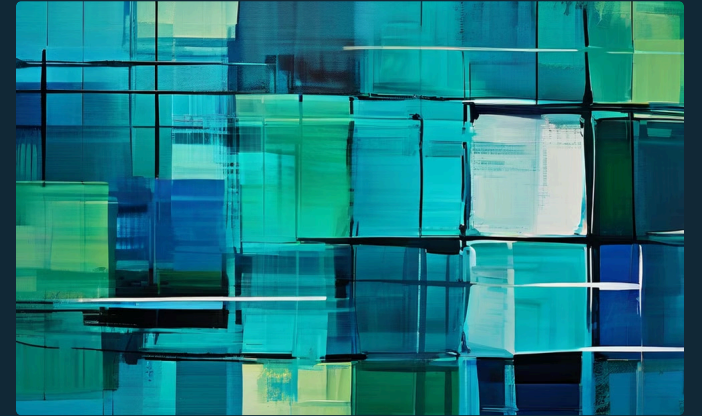
New Data Types

The 90s saw the emergence of semi-structured data formats like XML and JSON, expanding the scope of database content.



Internet Rise

The internet's rapid growth in the 90s led to the development of web-based applications and databases designed to support dynamic web content.



Object-Oriented Databases

Efforts were made in the 90s to align database systems with object-oriented programming paradigms, promoting a more intuitive data model.

Big Data Era (2000s-Present)



Volume

Dealing with extremely large datasets, often petabytes or exabytes in size.



Velocity

Managing rapid generation and processing of data in near real-time.



Variety

Handling diverse types of structured, semi-structured, and unstructured data.



Value

Extracting meaningful insights and business value from the data.



Modern Data Storage Challenges and Innovations

1

Distributed and Cloud Storage

Offers unlimited capacity but raises security concerns. Hybrid solutions balance scalability with control.

2

Data Lifecycle Management

Tiered storage strategies optimize costs and performance based on data usage patterns.

3

Emerging Technologies

DNA storage promises ultra-high density. Other technologies offer interesting long-term prospects.

4

Environmental Concerns

Data centers contribute significantly to global carbon emissions, highlighting need for sustainable solutions.



Test Your Knowledge

What was a major challenge faced by early computers in the 1950s-1960s?

Which principles ensure data integrity in DBMS?

What significant database development emerged during the 1980s?

What does the term "data independence" refer to?

Which are modern data storage concerns?