

Introduction
to NoSQL
Databases

Skill Networks
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Overview of
NoSQL

Characteristics
of NoSQL
Databases

Key-Value
NoSQL
Databases

Document-
Based NoSQL
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Column-Based
NoSQL
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Graph NoSQL
Databases

Introduction to NoSQL Databases

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October 20, 2025

Database Administration: NoSQL.

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Content has been extracted from "*Introduction to NoSQL Databases*" at Coursera by IBM and Skills Network. Visit <https://www.coursera.org/learn/introduction-to-nosql-databases>.

Overview of NoSQL



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What is NoSQL?

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- NoSQL = Not Only SQL
- Family of non-relational databases
- Flexible schemas, designed for modern applications
- Provide (horizontal) scalability, availability and fault tolerance

History of NoSQL

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- 1970-2000: Dominated by relational databases
- 2000s: Internet boom → need for best scalability and high availability
- Innovations: Google's MapReduce, Amazon's Dynamo
- Emergence of open-source NoSQL databases: Cassandra, MongoDB, CouchDB, HBase

Why NoSQL?

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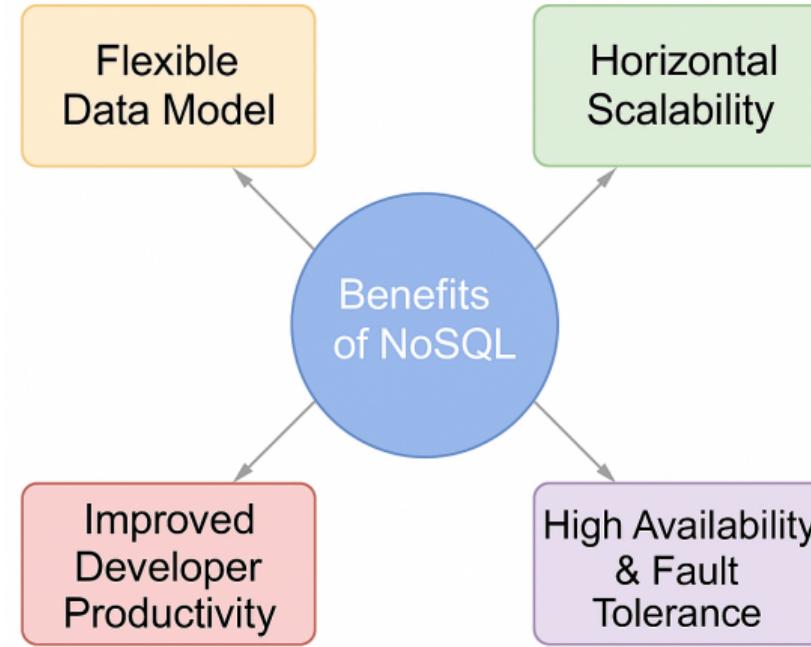
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- Flexible data models (unstructured, semi-structured data)
- Horizontal and vertical scalability
- High availability and fault tolerance
- Designed for distributed environments

Characteristics of NoSQL Databases



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- Non-relational architecture
- Open-source origins
- Specialized for specific use cases
- Flexible schemas for agile development

Benefits of NoSQL

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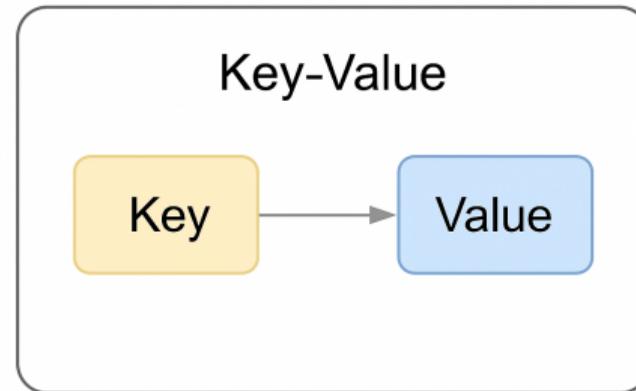
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- Scalability (elastic horizontal scaling)
- Performance (low latency with high concurrency)
- High availability (distributed replication)
- Cost-efficient (cloud and commodity hardware)
- Flexible schemas and intuitive data models

Key-Value NoSQL Databases



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- Data stored as key and opaque value blob
- Simple CRUD operations
- Highly scalable and easily sharded
- Examples: Amazon DynamoDB, Redis, Oracle NoSQL

Key-Value Use Cases

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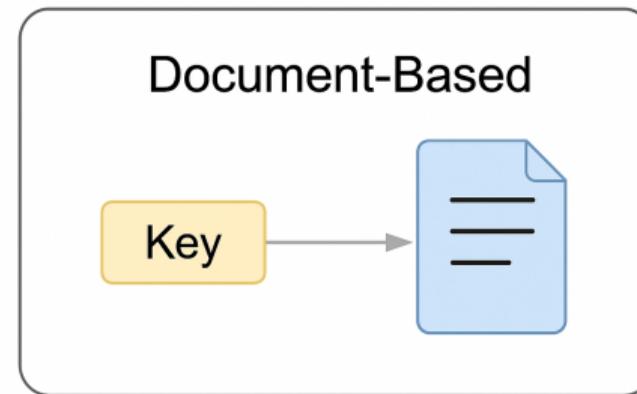
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- Session management
- User profile storage
- Shopping cart data

Document-Based NoSQL Databases



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- Extends key-value model with visible, queryable documents
- Flexible schema (JSON, XML)
- Horizontal scalability and indexing support
- Examples: MongoDB, CouchDB, IBM Cloudant

Document Use Cases

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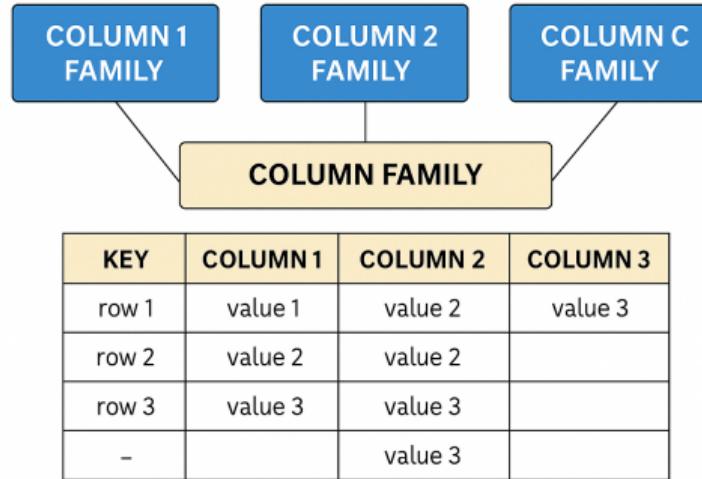
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- Event logging
- Blogging platforms
- Operational datasets for web/mobile apps

Column-Based NoSQL Databases



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- Inspired by Google's Bigtable
- Store data in columns grouped into families
- Ideal for large, sparse datasets
- Examples: Cassandra, HBase, Accumulo

Column-Based Use Cases

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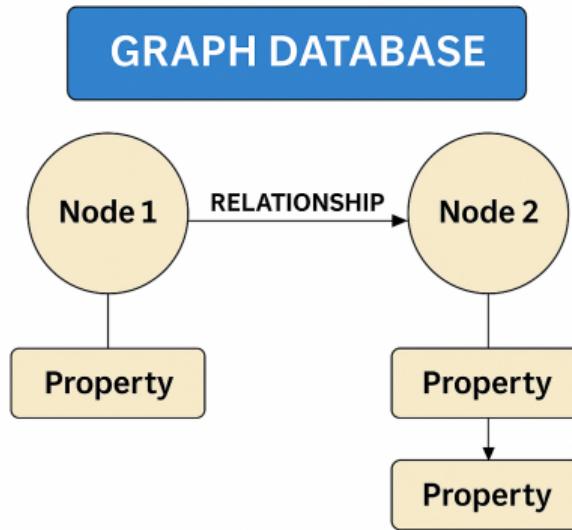
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Graph NoSQL
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- Data warehousing and business intelligence
- IoT data management
- Financial and scientific analysis

Graph NoSQL Databases



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Graph NoSQL
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- Store entities (nodes) and relationships (edges)
- Efficient for traversing highly connected data
- ACID-compliant
- Examples: Neo4j, ArangoDB, Amazon Neptune

Graph Use Cases

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- Social networking
- Routing and spatial applications
- Recommendation engines

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