Introduction to NoSQL

CISC-525

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Overview

- What is NoSQL?
- Categories of NoSQL databases
- Strengths and Weaknesses
- Applications of NoSQL databases

What is NoSQL

- ▶ Originally referred to an open source relational database

- ▶ Term repurposed to describe databases using models other than relational

- ▶ Sometimes expressed as Not Only SQL

Categories of NoSQL Databases

▶ Key-Value Store

▶ Document Store

▶ Columnar Store

▶ Graph Database

▶ Multi-Model

Category Comparison

Data Model	Performance	Scalability	Flexibility	Complexity	Functionality
Key–Value Store	high	high	high	none	variable (none)
Column-Oriented Store	high	high	moderate	low	minimal
Document-Oriented Store	high	variable (high)	high	low	variable (low)
Graph Database	variable	variable	high	high	Graph theory
Relational Database	variable	variable	low	moderate	Relational Algebra

Strengths and Weaknesses

- Strengths
  - Scalable
  - Highly Available
  - Flexible
  - Handle Large Data Sets
- Weaknesses
  - Fewer tools for querying
  - Fewer integrity checks
  - No atomic operations or transactions
  - Harder to model relational data

Applications of NoSQL Databases

- Key-Value Stores
  - Fast lookup over very large associative arrays
- Document Stores
  - Document Management
  - Indexing
  - Blogs

Applications of NoSQL Databases

- Columnar Stores
  - Analytics over large datasets
  - High-speed ETL
- Graph Databases
  - Semantic analytics
  - Link analysis

Examples

Model	Implementation
Key-Value Store	Dynamo, Riak
Document Store	MongoDB, CouchDB, MarkLogic
Columnar Store	HBase, Accumulo, Cassandra
Graph Database	Allegro, Neo4J, InfiniteGraph

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