NoSQL Databases

1.Description:

Introduction to non-relational (NoSQL) data models, such as Key-Value, Document, Column, Graph and Object-Oriented database models. Advantages and disadvantages of the different data architecture patterns will be discussed. Hands-on experience with a representative sample of open-source NoSQL databases will be provided. The rapid and efficient processing of data sets with a focus on performance, reliability, and agility will be covered. Big Data, distributed and cloud computing concepts will be introduced. Intended for students with previous programming experience.

2.STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

1.Define NoSQL, its characteristics and history, and the primary benefits for using NoSQL databases
2.Define the major types of NoSQL databases including a primary use case and advantages/disadvantages of each type
3.Create wide-column, document, key-value, graph and object-oriented databases, add content, and run queries
4.Describe the NoSQL data architecture patterns
5.Use NoSQL to manage Big Data.
6.Develop NoSQL desktop and cloud database solutions.

3.SPECIFIC INSTRUCTIONAL OBJECTIVES:

Upon successful completion of this course, a student will be able to:

1.Define NoSQL, its characteristics and history, and the primary benefits for using NoSQL data
2.Define the major types of NoSQL databases including a primary use case and advantages/disadvantages of each type
3.Create wide-column, document, key-value, graph and object-oriented databases, add content, and run queries
4.Describe the NoSQL data architecture patterns
5.Perform basic database administration tasks.
6.Develop NoSQL desktop and cloud database solutions.

4. COURSE CONTENT:

Lecture Content:

1. Introduction to NoSQL
• What is NoSQL
• NoSQL Overview
• NoSQL Database Environment
• NoSQL Options

2. When to Use NoSQL
• Benefits to using NoSQL DB
• Backend Management
• Deployment
• Front-End Development
• Open Source
• Drawbacks to Using NoSQL DB
• Open Source
• NoSQL vs. SQL

3. Introduction to NoSQL Development
• Schemaless Development

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• Data Models
• Distribution Models
• Consistency
• Categories of NoSQL
• Key-Value Stores
• Wide-Column Family Stores
• Document Databases
• Graph Databases
• Object-Oriented Databases
• Others
• NoSQL Scalability
• Searching

4. Wide-Column Databases - NoSQL
• Column Family
• Key and Keyspace
• Categories of NoSQL
• Examples
• Cassandra
• MapR
• Others

5. Key-Value Databases - NoSQL
• Major Keys
• Minor Keys
• Values
• Examples
• Oracle NoSQL Database
• Redis
• Others

6. Document Databases - NoSQL
• Attributes
• Metadata
• Formats
• XML
• JSON and BSON
• Examples
• ElasticSearch
• CouchDB
• MongoDB
• Others

7. Graph Databases - NoSQL
• Edges
• Nodes
• Relationships
• Examples
• Neo4J
• InfoGrid
• GraphBase
• Others

8. Object-Oriented Databases - NoSQL
• Object-Oriented Concepts
• Object Stores
• Examples
• ZODB
• ObjectDB
• Others

9. Cloud Computing with NoSQL Databases
• Big Data
• Remote Searches
• Hadoop
• MapReduce
• REST
• AWS

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