

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)

III B. Tech II Semester

No SQL Databases

Course Code	23DS4602D	Year	III	Semester	II
Course Category	PEC	Branch	CSE (Data Science)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Database Management Systems
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

Upon Successful completion of course, the student will be able to		
CO1	Describe the evolution, types, and architectural principles of NoSQL databases in comparison with relational database systems to <i>understand their design and practical applications.</i>	L2
CO2	Apply appropriate NoSQL models like key-value, document, column-family, and graph databases to real-time use cases using tools like MongoDB, Cassandra, HBase, and Neo4j	L3
CO3	Use the replication, sharding, consistency, and scaling aspects in NoSQL databases for high availability and distributed processing to <i>ensure reliable and efficient data operations</i>	L3
CO4	Analyse suitable NoSQL solutions for modern web applications based on consistency requirements, transaction support, and data structures to <i>select and implement optimal database architectures</i>	L4

Contribution of course outcomes towards achievement of program outcomes & Strength of correlations (3: Substantial,2: Moderate,1: Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PO11	PSO1	PSO2
CO1	2												
CO2	3												
CO3	3												
CO4		3									2		

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Syllabus		
Unit No	Contents	Map ped CO
I	Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points	CO1
II	Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases. Replication and sharding, MapReduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.	CO1, CO2, CO4
III	NoSQL Key/Value databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, WebAnalytics or Real-Time Analytics, E-Commerce Applications, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.	CO1, CO2, CO4
IV	Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.	CO1, CO3, CO4
V	NoSQL Key/Value databases using Riak, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets. Graph NoSQL databases using Neo4, NoSQL database development tools and programming languages, Graph Databases, Graph Database. Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases	CO1, CO3, CO4

Learning Resources

Text Books

1.NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pramod J. Sadalage and Martin Fowler, 1st Edition, 2019, Wiley Publications.

References

- Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement, Eric Redmond and Jim R. Wilson, 2nd Edition, 2018, Pragmatic Bookshelf.
- Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems, Martin Kleppmann, 1st Edition, 2017, O'Reilly Media.

E-Recourses and other Digital Material

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1. <https://www.ibm.com/cloud/learn/nosql-databases>
2. <https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp>
3. <https://www.geeksforgeeks.org/introduction-to-nosql/>
4. <https://www.javatpoint.com/nosql-databa>