

Course : NoSQL databases, challenges and solutions

Seminar - 2d - 14h00 - Ref. NSQ

Price : 2170 CHF E.T.

★★★★☆ 4,3 / 5

NoSQL databases don't offer a query language as rich as SQL. They are primarily a response to volume constraints and a lack of data structuring. This seminar presents the different types of NoSQL databases, their architectures, their uses and the products on the market.

Teaching objectives

At the end of the training, the participant will be able to:

- ✓ Identify the differences between SQL DBMS and NoSQL DBMS
- ✓ Evaluate the advantages and disadvantages of NoSQL technologies
- ✓ Analyze the main NoSQL solutions for each data model
- ✓ Identify the fields of application of NoSQL DBMS in operations and analytics
- ✓ Understand different architectures, data models and technical implementations

Intended audience

IT and functional management. IT managers, project managers, architects, developers.

Prerequisites

Basic knowledge of technical architectures and IS management. Knowledge of databases.

Course schedule

PARTICIPANTS

IT and functional management. IT managers, project managers, architects, developers.

PREREQUISITES

Basic knowledge of technical architectures and IS management. Knowledge of databases.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more. Participants also complete a placement test before and after the course to measure the skills they've developed.

1 Introduction to NoSQL

- The history of the NoSQL movement.
- Different DBMS management approaches over time: hierarchical, relational, object-based, XML, NoSQL.
- The five "V" of big data: Volume, Variety, Velocity, Veracity, Validity.
- Unstructured data: web activity, document exchange, social networks, open data, IoT.
- The big players behind the NoSQL and big data analytics movement: Google and Amazon.
- Synoptic view of the different types of NoSQL engines from a data model point of view.
- NoSQL, big data and cloud architectures: common and divergent architecture principles.
- Distribution modes: mastered and decentralized.
- Distributed transactions, failover, backup points, query parallelization, load balancing.
- Positioning NoSQL within big data analytics: from the transaction era to the interaction era.

Group discussion

Why NoSQL? And why its success? Requirements, the evolution of architectures, distribution and elasticity, commodity hardware, a few usage scenarios.

2 Relational and NoSQL.

- Relational databases: their strengths and limitations.
- Strong data structuring (explicit schema) versus flexible structure (implicit schema) and agile modeling.
- From ACID qualities to BASE qualities.
- CAP theorem (consistency, availability, partition tolerance).
- The different levels of coherence.
- SQL language, join performance. Key access in NoSQL.
- The evolution towards distributed systems: vertical and horizontal scalability.
- Understanding NoSQL through the aggregation and data-centricity model.
- NewSQL, a redesign of relational engines for distribution. A study of CockroachDB.

Group discussion

The aggregate model versus the relational model: how to choose? How to manage interoperability?

TEACHING AIDS AND TECHNICAL RESOURCES

- The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
- At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
- A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

3 The worlds of NoSQL

- The world of NoSQL through its technical choices and various free NoSQL databases (from the least structured to the most structured).
- Distributed architecture: principles, shared-nothing.
- Availability and delayed consistency: gossip, timestamps, majority rule, Merkle tree.
- Patterns and models. How to model and work efficiently with NoSQL.
- In-memory, key-value-oriented databases: Redis, Riak, Aerospike.
- Document-oriented databases: the JSON format. Couchbase Server, MongoDB.
- Distributed column-oriented databases for operational Big Data: Hbase, Cassandra, ScyllaDB...
- Graph-oriented engines: Neo4j, OrientDB...
- JSON search engines: Elasticsearch, SOLR.
- Time series databases: InfluxDB, KDB, Prometheus.

Demonstration

Technical demonstrations of the main free NoSQL engines, from the development, implementation and administration points of view.

4 Choosing and setting up

- What are NoSQL databases used for?
- How do you approach migration?
- How to develop efficiently with NoSQL databases?
- Which supervision tools should you choose?
- What's the administrative complexity and learning curve?
- Use cases in existing companies.
- Manage interactions with relational databases.
- Implementing NoSQL strategies with relational engines. The example of PostgreSQL and its extensions.
- Implementing NoSQL in public clouds. Database-as-a-service practices and offerings.

Group discussion

What are the advantages of deploying NoSQL engines in your own context, and which NoSQL engine should you choose?

5 NoSQL and big data

- Big data analytics: the Hadoop ecosystem.
- Storage and processing. Different forms of storage in HDFS: SequenceFile, Apache Parquet.
- Functions and uses: search engines, commercial suggestion tools, intrusion detectors...
- Different types of processing: MapReduce, acyclic directed graphs, flows, machine learning, distributed graphs...
- Features, tools and algorithms: search engines, Google Search, the PageRank algorithm.
- The integrated tool: Apache Spark.
- Connection with operational engines: ETL, Apache Sqoop.

Demonstration

Demonstrations of the use of an integrated big data analytics platform such as Apache Spark.

Dates and locations

REMOTE CLASS

2026 : 19 May, 13 Oct., 17 Dec.