

Data Architecture

50 שעות אקדמיות
תכנית הלימודים 2025



Data Architecture

The Data Architecture Course is a comprehensive professional program designed to develop expertise in modern cloud data architecture. This intensive course covers the complete spectrum of skills needed to design, implement, and manage sophisticated data solutions in cloud environments. Participants will master everything from fundamental cloud data principles to advanced architectural patterns like Data Mesh and Data Lakehouse, gaining both theoretical knowledge and practical implementation skills across major cloud platforms.

Throughout eight specialized modules, the course explores cloud storage technologies, processing methodologies, data governance, security practices, and integration with AI/ML capabilities. The curriculum balances conceptual understanding with real-world application through case studies, architecture document analysis, and a culminating final project where participants design a complete cloud data architecture for a specific business scenario.

By the end of this course, graduates will be equipped to design end-to-end cloud data solutions that align with business requirements, make informed technology selections, implement proper governance and security controls, and lead architectural decisions within their organizations.



Syllabus

Module 1: Introduction to Cloud Data Architecture

- **Overview of the Cloud Data Architect role**
Defining responsibilities, strategic impact on the organization, and position within the organizational structure.
- **Fundamental principles of cloud data architecture:**
High availability, scalability, reliability, data security, performance, and cost management.
- **Types of data architectures:**
Comparative review of traditional, cloud, hybrid, and multi-cloud architectures – characteristics, advantages, and disadvantages.
- **The relationship between data architecture and cloud services:** Cloud service models (IaaS, PaaS, SaaS) and their implementation in data architecture.

Module 2: Data Methodologies in the Cloud

- **Relevant development methodologies:**
Agile, DevOps, and DataOps in the context of cloud data projects – principles and practical implementation.
- **Data Lifecycle Management:**
Planning and implementing an effective and secure data lifecycle in the cloud using managed services.
- **Data Quality Management:**
Data quality dimensions, quality improvement processes, and use of automated tools in the cloud.
- **Data Governance:**
Data governance policies, roles and responsibilities, data catalog, data mesh, information security, and regulatory compliance in the cloud



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Module 3: Cloud Data Storage: Technologies and Applications

- **Relational Databases (SQL Databases) in the cloud:**
In-depth review of managed services (RDS, Azure SQL Database, Cloud SQL), selection considerations, and practical implementation.
- **Non-Relational Databases (NoSQL Databases) in the cloud:**
Comprehensive review of NoSQL types (Document, Key-Value, Column-Family, Graph) and managed services (DynamoDB, Cosmos DB, Datastore, etc.), use cases, and selection considerations.
- **Data Warehouse in the cloud:**
Cloud Data Warehouse solutions (Snowflake, Redshift, BigQuery), architecture, advantages, data models, ETL/ELT tools, and implementation considerations.
- **Data Lake in the cloud:**
Cloud Data Lake architecture (S3, Data Lake Storage, Cloud Storage), advantages, use cases, data processing in Data Lake, and implementation considerations.
- **Selecting appropriate storage technology in the cloud:**
Selection criteria, use cases, and comparison between different storage technologies



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Module 4: Advanced Data Architectures: Data Mesh and Data Lakehouse in the Cloud

- **Data Mesh in the cloud:**

Data Mesh principles (Domain Ownership, Data as a Product, Self-serve Data Platform, Federated Computational Governance), architecture, advantages, disadvantages, and implementation challenges in the cloud.

- **Data Lakehouse in the cloud:**

Evolution from Data Lake to Data Lakehouse, combining advantages, architecture, leading technologies (Databricks, Iceberg, Delta Lake), and implementation considerations in the cloud.

- **Comparison between architectural approaches:**

Comparative analysis between Data Mesh, Data Lakehouse, and Data Warehouse in the cloud – advantages, disadvantages, use cases, and selection considerations.

- **Case Studies and practical examples:**

Analysis of use cases and implementation examples of Data Mesh and Data Lakehouse in cloud projects.



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Module 5: Types of Data Processing in the Cloud

- **Batch Processing in the cloud:**
Applications, cloud technologies (AWS Batch, Azure Batch, managed Hadoop/Spark), advantages, disadvantages, and cost optimization.
- **Stream Processing in the cloud:**
Applications (IoT, real-time monitoring), cloud technologies (managed Kafka, Kinesis, Event Hubs, managed Flink), advantages, disadvantages, and selection considerations.
- **Real-time Processing and Micro-batch Processing in the cloud:**
Characteristics, applications, relevant technologies (Fast Data Platforms, Serverless Functions), and implementation considerations.
- **Selecting the appropriate processing type in the cloud:**
Selection criteria, use cases, and guidance for informed decision-making.

Module 6: Information Security and AI Implementation in Cloud Data Architecture

- **Information security in cloud data architecture:**
Shared responsibility model, identity and access services (IAM), data security at rest and in transit, network security, compliance, and regulation.
- **Introduction to working with AI in cloud data architecture:**
Overview of AI/ML services in the cloud, data architecture for AI/ML applications, the role of the data architect in AI/ML projects, and future trends (Serverless AI, AutoML).



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Module 7: Analysis of Sample Architecture Documents and Case Studies

- **Architecture document analysis:**

Review and analysis of real architecture documents of cloud data solutions from leading companies.

- **Case Studies:**

Analysis of case studies of cloud data architecture implementations in various industries – business challenges, architectural solutions, and results.

- **Open discussion and in-depth analysis:**

Open classroom discussion, breaking down architectures, understanding design considerations, trade-offs, and key lessons.

Module 8: Summary, Future Trends& Final Project

- **Course summary:**

Review of key concepts and acquired skills.

- **Future trends in cloud data architecture:**

Overview of key technological trends and their impact on the field.

- **Final project guidelines:**

Presentation of requirements, goals, evaluation criteria, and brainstorming for project ideas.

Final Project

Practical application of knowledge acquired in the course in planning cloud data architecture for a defined business scenario. The project includes requirements analysis, logical and physical architecture design, selection of cloud technologies, documentation, and project presentation.



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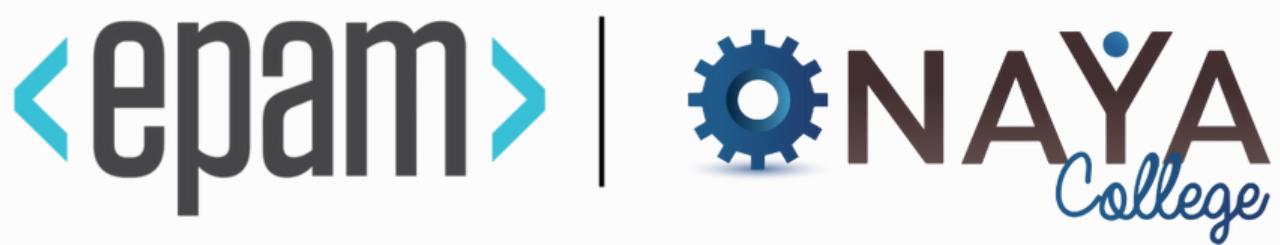
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