**Data Modeling in the Age of Big Data**

Course Outline

**Module 1 – Big Data Fundamentals**

* What is Big Data
  + Big Data
  + NoSQL
  + Structured Data
  + Beyond Structured Data
* Big Data Opportunities
  + Beyond Enterprise Data
  + Beyond Transactions
  + Understanding Cause and Effect
  + Business Impact
* NoSQL Technologies
  + Relational Technology
  + Key-Value Stores
  + Document-Oriented Databases
  + Graph Databases
  + Summary of Database Technologies
  + Vendor Landscape
* Big Data Challenges
  + Beyond Enterprise Data
  + Multiple Management Platforms
  + Lack of Fixed Schema
  + Multiple Uses for Data
  + Traditional Focus on Transactions
  + Relational Perspective
* Exercise: Big Data Opportunities

**Module 2 – Modeling and Data**

* Models
  + What is a Model?
  + What is a Data Model?
  + Why Model Data?
  + More than a Diagram
* Modeling for Relational Storage
  + Relational Storage and BI
  + Fixed Structure and Content
  + Schema on Write
  + Requirements First
  + Data Modelers and Architects
* Modeling for Non-Relational Storage
  + Big Data and BI
  + Flexible Schema
  + Big Data Notation
  + Schema on Read
  + Data First, Requirements Last
  + Business SMEs, Analytic Modelers, and Programmers
* Complementary Approaches
  + Relational and Non-Relational Data
  + Incremental Value of Big Data
  + Rigor vs. Agility
  + Roles
* Exercise: Modeling Purpose

**Module 3 – Key-Value Stores**

* Key-Value Stores Defined
  + The Basics
  + NoSQL Foundation
* Key-Value Data Representation
  + Representing Things
  + Representing Identities
  + Representing Properties
  + Representing Associations
  + Representing Metrics
* Use Cases
  + Embedded Systems
  + High-Performance In-Process Databases
  + NoSQL Foundation
* Examples
  + Common Key-Value Store Products
* Exercise: Key-Value Pairs Modeling

**Module 4 – Document Stores**

* Document Stores Defined
  + Document-Oriented Databases
  + Basic Terminology
  + Flexible Internal Structure
  + Document Stores and Key-Value Stores
  + Fields Can Have Multiple Values
  + Fields Can Contain Sub-Documents
  + Summary of Characteristics
* Document Data Representation
  + Representing Things
  + Representing Identifiers
  + Representing Properties
  + Representing Associations
  + Representing Metrics
* Use Cases
  + Choosing Document Storage
  + Capture: Data Arrives in Document Format
  + Explore Sources that Track Information Differently
  + Augment
  + Extend
* Examples
  + Common Document Store Databases
* Exercise: Document Modeling

**Module 5 – Graph Databases**

* Graph Databases Defined
  + The Basics
  + Data about Relationships
  + The Terminology – Nodes and Edges
  + The Terminology – Hyperedges
  + The Terminology – Properties
* Graph Data Representation
  + Representing Things
  + Representing Identities
  + Representing Associations
  + Representing Properties
  + Representing Metrics
* Use Cases
  + Social Networks
  + Network Analysis and Visualization
  + Semantic Networks
* Examples
  + Common Graph Database Products

**Module 6 – Embracing Big Data**

* BI Programs and Big Data
  + Big Data and Information Asset Management
  + The Gaps
    - What Is Lost with Non-Relational
    - BI and Analytics Gap
    - Role/Skill Gaps
  + Organization and Planning
    - Balancing Standards with Flexibility
    - Organize Around Purpose, Not Tools
    - IAM Roadmap Including Big Data
    - Architecture Still Important
  + The Journey
    - Cataloging and Prioritizing Opportunities
    - Evolving Skills
    - Technology Decision Models
    - Responding to Tool Failures
* Human Side of Big Data
  + Changing Role of Data Modeling
  + Traditional Data Modeler Role
  + More Roles Doing Data Modeling
  + When Data Modeling Occurs
  + Merging Data Modeling and Profiling
* Tapping Into Big Data
  + Process Agility and Flexibility Over Formality
  + More Exploration, Iteration, and Risk
  + Importance of Metadata
* Taking the Next Steps
  + Conversations to Gather Opportunities
  + Proofs of Concept
  + Business Case / ROI
  + Ongoing Value of Data Modeling
  + New Tools, Same Workbench
* Exercise: Embracing Big Data

**Module 7 – Summary and Conclusion**

* Summary of Key Points
  + A Quick Review
* References and Resources
  + To Learn More