Course Number: MSCD 664

Course Title: Introduction to NoSQL Databases

Course Description:
The MSCD664 NoSQL database course will provide students with an introduction, overview and history of NoSQL databases (non-relational databases). The four types of NoSQL databases (e.g. Document-oriented, Key-Value Pair, Column-oriented and Graph) will be explored in detail.

Prerequisite Course(s):
MSCD600 – Database Architecture

Course Outcomes:
Upon completion of this course, learners should be able to:

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key-Value Pairs, Column-oriented and Graph).
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Graph NoSQL databases.
- Evaluate NoSQL database development tools and programming languages.
- Perform hands-on NoSql database lab assignments that will allow students to use the four NoSQL database types via products such as Cassandra, Hadoop Hbase, MongoDB, Neo4J and Riak.

Course Materials:

Required Texts:


**Required Readings:**
None

**Technology Tools:**

**CC&IS Virtual Lab** Login to your Citrix account using your RegisNet ID and password with the URL shown below. The browser that we recommend is Google Chrome or Firefox (avoid IE). The labs will provide detailed instructions for using the various tools that you will use during this course.

- [http://myregisapp.regis.edu/Citrix/StoreWeb/](http://myregisapp.regis.edu/Citrix/StoreWeb/)

**Required Resources:**

**Library Tutorials:**
Purdue Online Writing Lab (OWL). Retrieved from [https://owl.english.purdue.edu/owl/section/2/10/](https://owl.english.purdue.edu/owl/section/2/10/)

Research Tutorials (n.d.). Regis University Library.
- All tutorials, see [http://libguides.regis.edu/tutorials](http://libguides.regis.edu/tutorials).
- Computer and Information Science Research Tutorial, see [https://mediaspace.regis.edu/media/Regis+Library+-+Resources+for+computer+and+information+science+/0_blk905nh/10579702](https://mediaspace.regis.edu/media/Regis+Library+-+Resources+for+computer+and+information+science+/0_blk905nh/10579702)

**Optional Resources:**

**Pre-Assignment:**
See Course Assignments and Activities table below for Week 1.
### Course Assignments and Activities:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Readings and Videos</th>
<th>Assignments (see next pages for percentages)</th>
</tr>
</thead>
</table>
| 1    | Introduction, Overview, and History of NoSQL Databases – The Definition of the Four Types of NoSQL Databases | Sadalage & Fowler (2012). Chapters 1, 2, & 3  
Redmond & Wilson (2012). Chapter 1  
From the Expert: Introduction to Big Data, Hadoop, Map Reduce, and NoSQL | 1.1 Introductions – initial response required by Wednesday of Week  
1.2 Discussion Questions  
1.3 Quiz 1                                                                 |
| 2    | Column-oriented NoSQL databases using Apache HBASE                     | Sadalage & Fowler (2012). Chapters 4 & 5  
Redmond & Wilson (2012). Chapter 4  
From the Expert: Column-oriented NoSQL databases using Apache HBASE | 2.1 Discussion Questions  
2.2 Lab 1 - Hbase  
2.3 Quiz 2                                                                 |
| 3    | Column-oriented NoSQL databases using Apache Cassandra                 | Sadalage & Fowler (2012). Chapters 10, 12 & 13  
From the Expert: Introduction to Cassandra  
Course Resources: Review Scholarly Response Research Paper – Guidelines and Rubric | 3.1 Discussion Questions  
3.2 Lab 2 - Cassandra  
3.3 Quiz 3                                                                 |
| 4    | NoSQL Key/Value databases using MongoDB                                 | Sadalage & Fowler (2012). Chapter 9  
From the Expert: How to download and install the MongoDB | 4.1 Discussion Questions  
4.2 Lab 3 - Using and learning the MongoDB environment  
4.3 Quiz 4                                                                 |
| 5 | NoSQL Key/Value databases using Riak | Sadalage & Fowler (2012). Chapter 8
Redmond & Wilson (2012). Chapter 3
From the Expert: How to download and install the Riak-Ubuntu Virtualbox VM | 5.1 Discussion Questions
5.2 Scholarly Response Due
5.3 Lab 4- Using and learning the Riak environment
5.4 Quiz 5 |
| 6 | Graph NoSQL databases using Neo4J | Sadalage & Fowler (2012). Chapter 11
From the Expert: How to Download and Install Neo4j Video | 6.1 Discussion Questions
6.2 Lab 5 - Download and Install Neo4j for your computer platform
6.3 Quiz 6 |
| 7 | NoSQL database development tools and programming languages | Sadalage & Fowler (2012). Chapters 6, 7
From the Expert: Pig Programming, Hive and Python Map Reduce | 7.1 Discussion Questions
7.2 Lab 6 – HiveQL
7.3 Quiz 7 |
| 8 | Course Summary and Future Trends for NoSQL databases | Sadalage & Fowler (2012). Chapters 14 & 15
Redmond & Wilson (2012). Chapter 9
From the Expert: None | 8.1 Week 8 Discussion Questions
8.2 Final Exam |

Summary of Assignments and Percentage Weight towards course grade:

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Weighted Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion Questions and Class Participation (7 )</td>
<td>15%</td>
</tr>
<tr>
<td>Scholarly Response Research Paper (1)</td>
<td>15%</td>
</tr>
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</table>
Labs (6) 25%  
Quizzes (7) 20%  
Final Exam 25%  
Total 100%

CC&IS Grading Scale

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 to 100</td>
<td>4.00</td>
</tr>
<tr>
<td>A–</td>
<td>90 to less than 93</td>
<td>3.67</td>
</tr>
<tr>
<td>B+</td>
<td>87 to less than 90</td>
<td>3.33</td>
</tr>
<tr>
<td>B</td>
<td>83 to less than 87</td>
<td>3.00</td>
</tr>
<tr>
<td>B–</td>
<td>80 to less than 83</td>
<td>2.67</td>
</tr>
<tr>
<td>C+</td>
<td>77 to less than 80</td>
<td>2.33</td>
</tr>
<tr>
<td>C</td>
<td>73 to less than 77</td>
<td>2.00</td>
</tr>
<tr>
<td>C–</td>
<td>70 to less than 73</td>
<td>1.67</td>
</tr>
<tr>
<td>D+</td>
<td>67 to less than 70</td>
<td>1.33</td>
</tr>
<tr>
<td>D</td>
<td>63 to less than 67</td>
<td>1.00</td>
</tr>
<tr>
<td>D–</td>
<td>60 to less than 63</td>
<td>.67</td>
</tr>
<tr>
<td>F</td>
<td>Less than 60</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Additional information about grading can be found in the latest edition of the University Catalog, available at [http://www.regis.edu/Academics/Course%20Catalog.aspx](http://www.regis.edu/Academics/Course%20Catalog.aspx).

CC&IS Policies and Procedures

Each of the following CC&IS Policies & Procedures is incorporated here by reference. Students are expected to review this information each term, and agree to the policies and procedures as identified here and specified in the latest edition of the University Catalog, available at [http://www.regis.edu/Academics/Course%20Catalog.aspx](http://www.regis.edu/Academics/Course%20Catalog.aspx) or at the link provided.

- The CC&IS Academic Integrity Policy.
- The Student Honor Code and Student Standards of Conduct.
- Incomplete Grade Policy, Pass / No Pass Grades, Grade Reports.
- The Information Privacy policy and FERPA. For more information regarding FERPA, visit the [U.S. Department of Education](http://www.ed.gov).  
- The HIPAA policies for protected health information. The complete Regis University HIPAA Privacy & Security policy can be found here: [http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx](http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx).

The CC&IS Policies & Procedures Syllabus Addendum summarizes additional important policies including, Diversity, Equal Access, Disability Services, and Attendance & Participation that apply to every course offered by the College of Computer & Information Sciences at Regis University. A copy of the CC&IS Policies & Procedures Syllabus Addendum can be found here: https://in2.regis.edu/sites/ccis/policies/Repository/CCIS%20Syllabus%20Addendum.docx.