Harbin Institute of Technology
School of Computer Science and Technology
Database System Concepts
Spring 2018

Disclaimer: The information here may include errors, typos, or missing items. Notify to your instructor.

Assignment Objective

- ✓ *Students are expected to complete writing short research papers. Topics are listed below. These researches are designed and intended to increase the breadth of knowledge on the foundation of lecturing, lab activities, and project activities.*

Writing Assignment for Research

- ✓ *Two page writing paper: The templates are provided below. Refer to the class schedule for a due date of each paper. I also reserve a right to change topics based on class performances and outcomes. This assignment will account for 10% of the total score.*
- ✓ *All **individual** two page research papers must be submitted in **electronic format** (free of spelling or grammatical errors).*

Evaluation Criteria for research assignments

- Quality of contents, the format strictly followed, and the provision of one or two references
- See the template on the last page for submission (***important!***)

No.	Assignment	Points
1	Research Topic: Data and Metadata	100
2	Research Topic: Connection Pooling	100
3	Research Topic: Data Warehouse	100
4	Research Topic: Data Modeling	100
5	Research Topic: Data Exchange	100
6	Research Topic: NoSQL Data stores	100
7	Research Topic: Sharding	100
8	Research Topic: Clustering	100
9	Research Topic: Database Security	100
	Possible Total Points:	900

Assignments:

**All assignments should be uploaded to a designated website unless otherwise noted.*

1) Data and Metadata

- Explain briefly what is the data and metadata, their differences, and in DBMS, how they are manipulated.

2) Connection Pooling

- Explain briefly what database problems the connection pooling solves with some examples. In other words, describe a problem and show how the connection pooling service solves the problem. Also offer your insights on what problem it might cause while solving the problem.

3) Data Warehouse

Select one of those topics for your paper:

- Identify what schemas exist in data warehouse, what are the processes of getting the data into a data warehouse, and what are the techniques for retrieving data.
- Compare Online Transaction Processing (OLAP) and Online Analytical Processing (OLAP) in the areas like: source of data, purpose of data, inserts and updates, and queries, etc.
- Describe advantages and disadvantages of normalization in data warehousing.
- Compare Inmon's and Kimball's approaches

4) Data Modeling

- Compare Information Engineering (IE), IDEF1X, UML, and E-R Diagram

5) Data Exchange

- Describe briefly data exchange problems, and explain how XML and JSON help solve these problems.

6) NoSQL Data Stores

- Describe briefly what database problems the nosql data stores try to solve and explain why the relational database cannot solve the problems if they cannot.

7) Sharding

- Explain briefly how "sharding" works, and investigate their benefits and challenges on databases.

8) Clustering

- Explain briefly how "clustering" works, and investigate their benefits and challenges in databases.

9) Database Security

- Investigate and describe how database controls like access controls, auditing, authentication, encryption, integrity, and backups work.

Two Page Paper Sample Templates

Font: Times Romans, Font Size: 12 pts, in Word

Only 2 pages!

Name

Week #<no.>: <topic>

Page #1

Problem Statement (5 points):

State what you are trying to solve. (i.e., Understand Database schema and describe what it is and how it works)

Reference (Required) (5 points):

Provide one or two main URLs you have referenced. (Not more than two -- Penalty: 10 points for each additional reference.)

Overview of <topic> (10 points):

Briefly describe what it is and how it works.

Critical Thinking (30 points):

Discuss advantages and disadvantages, differences, or similarities if appropriate. Explain why you think so.

Page #2

Question (20 points)

While reviewing the topic above and its related literature, what questions did you have? Pick one and come up with a method of answering it, and discuss the results.

Method (Optional):

Describe how you are going to answer your own question stated above.

Analysis and Discussion (30 points):

Did the method work if used? What are your results? What are your answers to your own question stated above?