



Asian Institute of Technology
Final Examination
August 2022

Course: AT82.02 Data Modeling and Management	Total score: 75 (25%)
Date: Wednesday 23 November 2022	Time: 09:00-12:00 (3 hours)

Exam Instructions

- This examination is Open-Book. Number of pages: 3, Number of Questions: 4.
 - Mobile phones, PDAs, tablets and other communication devices **are prohibited**.
 - **Be concise!**
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Case Study: SkillUp

SkillUp is an online learning platform where individual experts, professional organizations or education institutes (such as Elon Musk, Google, AIT) can offer any kind of online courses, and learners can take any interesting courses to upskill or reskill themselves and obtain a corresponding professional certificate upon the completion of the course.

The platform stores and manages data of the offered online courses, the providers/instructors, the course description, syllabus and related details, the skills developed, the learner profiles, their enrollments and completion.

Example course and some details are:

Course Title: Foundation of Data Analytics

Description: The course will equip you with the skills you need to apply to introductory-level data analyst jobs. Organizations of all kinds need data analysts to help them improve their processes, identify opportunities and trends, launch new products, and make thoughtful decisions. In this course, you'll be introduced to the world of data analytics through hands-on curriculum.

Course Category: Data Science, Data Analysis

Learning Hours: 15

Course Fee: 5000

Language: English, Thai

Offered by: Google

Instructor rating: 4.86/5 (30,155 Ratings)

Skills you will gain:

- Spreadsheet
- Data Cleansing
- Data Analysis
- Data Visualization
- SQL

Syllabus:

- Introduction to data analytics
- Analytical thinking
- Preparing and transforming data
- Presenting data

Important operations/queries are:

Q1: Insert a new course with full details.

Q2: Search for a course which develops "SQL" and "Data Analysis" skills, offered in English and takes less than 20 hours to complete. Returns all details of the course including the offered organization, language and syllabus. Rank the results by the course rating.

Q3: Search for all learners who have obtained the skills "SQL" and "NoSQL" in 2022.

Refer to the given Case Study to answer all questions. For any missing details, explicitly state necessary assumptions or conditions you make. Make your assumptions rational and practical.

1. (20 points) Design proper data models (with proper diagrams) to capture the given data requirements. Show how the model can store data with **at least 2** data entries for each entity type, such as course, learner, enrollment, etc. Show the model using
 - a. Relational Model
 - b. Document Model
 - c. Graph Model
2. (30 points) Implement the given operational and query requirements (Q1 – Q3) for each corresponding model (relational, document and graph). Propose and implement 2 additional and interesting queries to analyze learners and the enrollment.
3. (10 points) Compare and contrast the three data models. Which one is more/less appropriate for managing data and for implementing the queries/operations of the given case study. Explain.
4. (15 points) The data analytics division of the SkillUp Company has initiated the “course recommendation project”. The project aims to analyze data about courses, learner profiles, the enrollment records as well as the learning performance and behaviors. Then, it will recommend suitable courses for each learner. Discuss important data governance issues of this project and give your recommended solutions?

-- End of Exam Paper --