Department of Computer Engineering

Faculty of Engineering Chulalongkorn University

Course ID: 2190436 Course Name: Data Warehousing

Second Semester, Midterm Examination,   Date: Thu, May 6, 2021   Part 2 (1.30 hours)

Part2: Data Warehouse Design (20 points – 1.30 hours)

New Future University is one of the biggest universities in Thailand, which offers only **bachelor programs**. Everybody wants to study and graduate here. But have you ever been interested in this university grading system? So, here is the database diagram that represents this university grading system as shown in Figure 4.
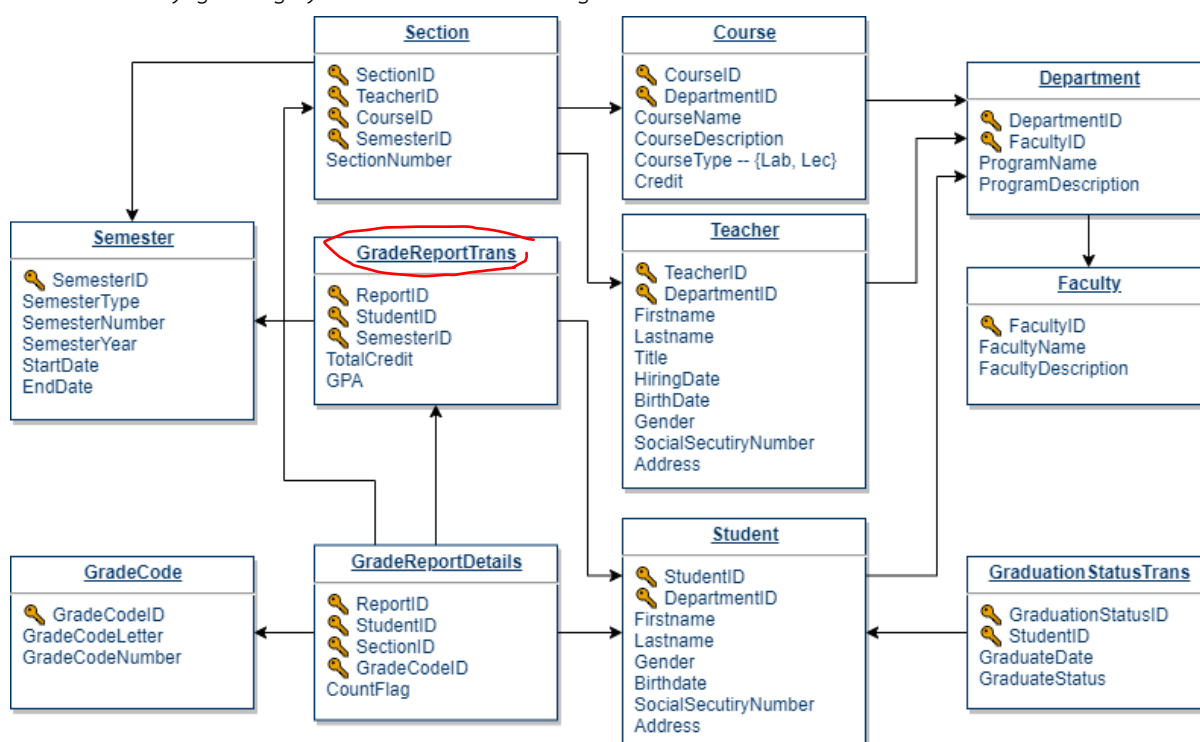

Figure 1. The database diagram of New Future University Grading System.

This database is only for bachelor's degree students. In the source database (in Figure 4) contains information of many entities with two main transactions: (1) grade report transaction and (2) graduation status transactions. For the grade report, the are two tables: (1) GradeReportTrans refers to the overall grade of each student/semester and (2) GradeReportDetails shows the details of each enrolled subject, where CountFlag is a boolean identifying whether each enrolled subject is calculated and counted in GPA. For the graduate status, there are 4 statuses: In progress, Graduated, Late, and Retired.

Some subject doesn't count for gpa

For simplicity, there are some assumptions as follows:

- Each course can have **many** sections, while each section can be in only ONE course.

- Each section can have only **ONE** teacher.

- The department and program are equivalent (one department offers only one program). Each department can only belong to **ONE** faculty. For example, ICE is a department (also a program) in ISE faculty (ISE is in the same hierarchy as Faculty of Engineering).

- Student, teacher, and course can belong to only **ONE** department.

Student's **grade code letter** can be defined in two categories: (1) Grade code letter that can be calculated which are A, B+, B, C+, C, D+, D and F (2) Grade code letter that can't be used for calculation which are S, U, W, M and I. In each calculatable grade we can define a **grade code number** from A = 4, B+ = 3.5, B = 3 and so on until F = 0. Assume that other grades (S, U, V, W, M, I) cannot be counted and included into GPAX, so these grade code number are 0.

The curriculum manager wants to **analyze the grade** of each student in each course in each semester. In addition, he/she wants to see the grade point (**GP** can be calculated by grade number * credit) and whether this grade can be used to calculate or not. Lastly, Zero anyway whether teacher's teaching can affect student's grade is also one of important things that need to be considered.

Moreover, he/she also want **to analyze the whole lifecycle** of each student. In every year (all semesters combined), what is the GPAX and total credit of each student. He/she needs to understand the difference of GPAX in each year. For simplicity (again), students in this university can only study here for 4 years. Ultimately, it's crucial to know whether student is graduated or not. Hint: there are two important factors including:

- (1) student start & end semesters, so we can analyze performance of each student batch

- (2) department

Instruction

Use a 4-step design. Identify business process, granularity, dimensions, and measures (with calculation if there is any). If there are more than one fact table, you should provide 4-step design for each of your fact tables in order to explain your design concept. Also, please identify the following items:

- Type of fact tables: transactional fact, periodic snapshot fact, transaction type fact, accumulating snapshot fact
- Any special techniques, such as Degenerate Dimension, Dimension Role-Playing, Aggregated Fact Table (if any), etc.

How to calculate a score:

- clearly show each step in 4-Step design
- give correct dimension tables with complete attributes

*** Please draw the full diagram only ONCE at the end ***

*** Lastly, please provide a conformed bus matrix. ***