

Name: \_\_\_\_\_ Student Number: \_\_\_\_\_

Do all questions.

Where you are asked to *modify a schema* you must draw a diagram (similar to appendix) illustrating any new tables and any modified tables. These schema changes can be incorporated into a single diagram.

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1. What are the two basic types of tables in a star schema?
2. Name the 3 basic architectures used in data warehousing.
3. What does it mean to say that a fact table is sparse?
4. What dimension is most likely to appear in a star schema?
5. Given two tables A and B with PKs a and b respectively.

| A        |     |
|----------|-----|
| <u>a</u> | x   |
| 1        | 100 |
| 2        | 200 |

| B        |     |
|----------|-----|
| <u>b</u> | y   |
| 2        | 200 |
| 3        | 300 |

- a) What is the result of  
Select a, x, b, y from A inner join B on (a = b);
  - b) What is result of  
Select a, x, b, y from A full outer join B on (a = b);
  - c) What is result of  
Select a, x, b, y from A right outer join B on (a = b);
  - d) What is result of  
Select a, x, b, y from A left outer join B on (a = b) where y=100;
6. Consider the Professor and Student dimensions in the appendix. Both of these have *city* and *country* fields. Modify the schema by introducing an outrigger that includes *city* and *country*.
  7. Consider the Registrations schema in the appendix. Note the Registrations fact table has a field *comment* where a comment regarding a registration is placed. The contents of the comment field is either blank, or selected from: *On time, Late, Bursary, Grant, Third*

*party*. Modify the schema so comments are not in the fact table but stored in a dimension. Illustrate the rows (pk, fields, data) in the Comments dimension.

8. Consider the Professor dimension in the appendix. Suppose the DBA realizes this dimension is undergoing too many updates because of frequent changes occurring with respect to *tenure* and *position*.

The *tenure* domain is: true, false;

The *position* domain is: assistant, associate, full.

To alleviate the problem caused by volatile attributes the DBA creates a mini-dimension for *tenure* and *position*.

- a) Modify the schema for this new mini-dimension
  - b) Assuming the DBA uses the standard approach of pre-populating the mini-dimension, show the contents (pk, fields, data) of the mini-dimension.
9. Assume the Grade dimension in the appendix has been in use at the UW since 1967. Note there is no A- grade. Now suppose on January 1, 2005 the DBA modified the dimension to be a type 2.
- a) Illustrate the contents (pk, fields, data) of the Grade dimension on January 2, 2005.
  - b) The Grade dimension has remained unaltered until January 1, 2009. On this day the UW introduced a new grade (the A-). The grade point value of the A- is 4.0. Also at this time, the UW altered the grade point value of the A to be 4.25. Illustrate the contents (pk, fields, data) of the Grade dimension.
  - c) Give the SQL required to list the grades and grade points for each course taken by student number 123 as they were when the student took the courses.

10. Consider the Registrations and Declarations schemas in the appendix.

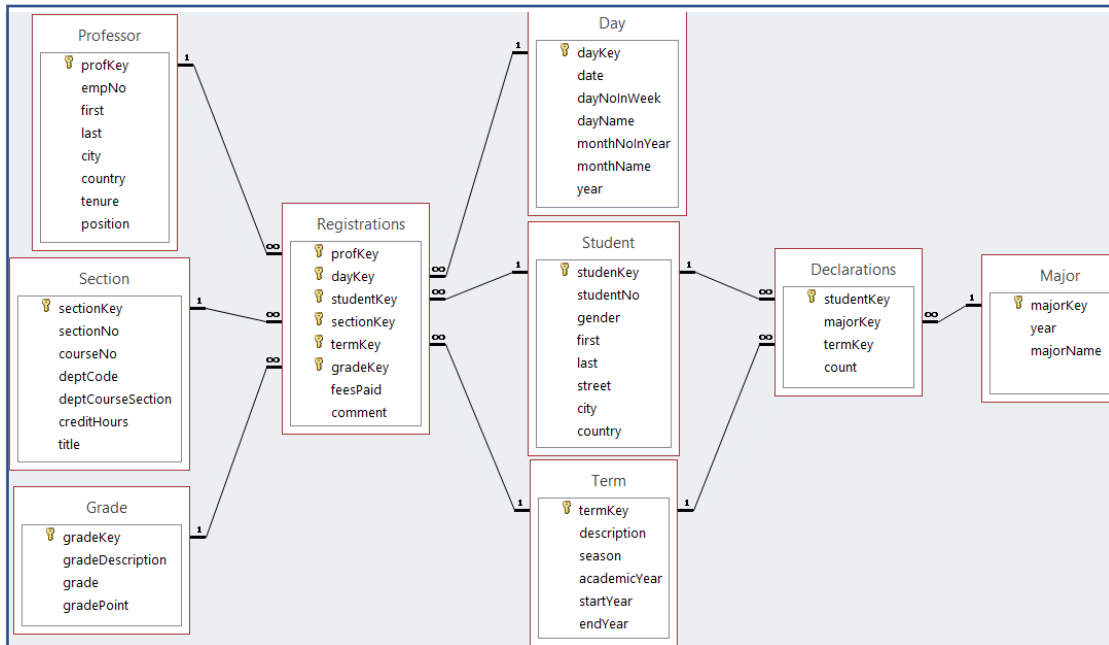
For each student only one major is recorded (hence the PK of Declarations is studentKey). The termKey attribute indicates when the declaration was made. Some students will not have declared a major – there is no row in Declarations for such students.

The Registrations schema has a fact table with one row for each registration of a student in a course.

We need to run a query that shows how many A's have been awarded to students by student major, in sequence by number awarded. The first few lines of a sample report are given in the appendix. Give the SQL statement(s) to generate the results.

## APPENDIX

### Registrations and Declarations Schemas



#### Initial Data for Grade

| <u>gradeKey</u> | <u>grade</u> | <u>gradePoint</u> |
|-----------------|--------------|-------------------|
| 0               | none         | null              |
| 1               | F            | 0                 |
| 2               | D            | 1                 |
| 3               | C            | 2                 |
| 4               | C+           | 2.5               |
| 5               | B            | 3                 |
| 6               | B+           | 3.5               |
| 7               | A            | 4                 |
| 8               | A+           | 4.5               |

#### Sample query result:

#### Number of A's by major

| Major name         | Number of A's awarded |
|--------------------|-----------------------|
| English            | 0                     |
| No major           | 50                    |
| Health Informatics | 100                   |
| ACS                | 150                   |
| ...                | ...                   |

The above shows 0 A's were obtained by students who declared a major in English, 50 A's were obtained by students who have not declared a major, etc.