

CSCI 5333.1 DBMS

Fall 2021

Homework #1

Database Modeling in UML

Download and install the *student* version of Astah's UML Editor: <http://astah.net/download> and <https://astah.net/pricing/academic/>. This is one of the best free UML editors available. It has some restrictions but should be more than sufficient for our class.

The homework assignment is to model a drastically simplified toy online survey application SSE Survey Ease (SSE). Multiplicities for attributes and associations should be as specific as possible. Attribute and association documentation are optional, but they are encouraged when not trivial. For example, the roles or names of associations should be displayed when appropriate. Operations for classes are not necessary. Use the stereotypes <<PK>>, <<CK>>, <<unique>> and <<derived>> for attributes when appropriate. Create suitable data types for SQL, such as SQL::Datetime, SQL::time, SQL::PhoneType, SQL::Decimal, SQL::Password, etc. For string types, you may use 'string', 'varchar', 'char' or user-defined types when appropriate.

Save your files as <<last-name>>_<<student>>_h1_class.asta (Astah's file format) and <<last-name>>_<<student>>_h1_documentation.docx (optional; for additional information). Examples: bajaj_0007007_h1_class.asta. Also include a PDF version of your class diagram: <<last-name>>_<<student>>_h1_class.pdf.

Submit your homework through Blackboard.

SSE Survey Ease (SSE)

Create a data model using an UML class diagram to support a part of the portion of the community version of SSE. This is a drastically simplified portion that does not support all functions. Make reasonable assumptions.

Anyone can sign up as a member in SSE. A unique username and a unique screen name should be set up for a member. The email address of a member should be stored with a unique member Id and the start date time of the membership. The username is used for logon and thus a password should also be stored. You can assume that the data type of the password is SQL::password in your solution.

A member can set up and thus own surveys for other members to take. A survey has a unique id and a name. The date time of the creation of the survey should be noted and the owner may put in a comment on a survey.

In the current scaled-down version, any member can respond to any survey once and only once. A survey may be hash-tagged with multiple tags: e.g., '#database',

`#CSCI5333', `#examination', `#hobby,' etc. A hash tag has a name (e.g., `database') and an optional comment.

At the top level, a survey is a question group. Currently, only multiple-choice questions are modeled.

A question has a text. Four examples:

1. What is your current student status?
2. Do you like MySQL?
3. Are you satisfied with CSCI 5333 DBMS?
4. Who are your favorite cricket ball players?

A question has a list of responses. For an example, the following question has a list of four responses.

Do you like MySQL?

1. Yes
2. No
3. Don't know
4. Oh, don't ask me?

This question has a list of five responses:

Q3. Are you satisfied with CSCI 5333 DBMS?

1. Very satisfied
2. Satisfied
3. Neutral
4. Unsatisfied
5. Very unsatisfied

Each response is numbered internally. However, it may be displayed in different orders and formats by an application using the SSE database. For example:

Q10. Are you satisfied with CSCI 5333 DBMS?

- A. Very Unsatisfied
- B. Unsatisfied
- C. Neutral
- D. Satisfied
- E. Very satisfied

A response may have an optional comment associated with it. A list of response may have a name and a comment. A list of response may be used by more than

one questions. For example, many questions may use the list of response named "5 levels of satisfaction #1":

1. Very satisfied
2. Satisfied
3. Neutral
4. Unsatisfied
5. Very unsatisfied

In fact, a survey owner may define a response list without a question with a plan to use it in the future.

A survey contains a single top-level group, which may recursively contain descendant groups. A group may have a name and a comment. Question groups, or just groups, are used to organize logically cohesive questions together and provide navigation.

There are three types of groups.

A *simple* question group contains a sequence of one or more questions. For example, a simple question group SG1 may contain a ordered sequence of three questions:

- [1] Question A
- [2] Question P
- [3] Question X

A question can be shared by multiple question groups. Thus, another simple question group SG2 may contain:

- [1] Question G
- [2] Question P
- [3] Question A
- [4] Question R

A *branching* group contains only one question at the beginning, and then a list of subgroups. The response of the question determines which subgroup the respondent may branch to answer next. For example, a branching group named 'Student Status' may contain the following question with six response choices:

What is your current student status?

1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Graduate Student

6. Others

The subgroup the respondent will go to next depends on the choice he made. For example:

1. Freshman: go to subgroup "lower #1"
2. Sophomore: go to subgroup "lower #1"
3. Junior: go to subgroup "upper #1"
4. Senior: go to subgroup "upper #1"
5. Graduate Student: go to subgroup "graduate"
6. Others: no next subgroup within "Student Status" (i.e., the current branch group terminates)

A group can also be a *sequence* group, which contains a ordered sequence of subgroups. Any subgroup can be any kind of groups: simple group, sequence group, or branching group. For example, the sequence group SEQG1 may contain an ordered sequence of three subgroups:

- [1] SG1: a simple question group
- [2] BRANCHG1: a branch group
 - [2.1] Branch #1: SG2
 - [2.2] Branch #2 (response #2): SEQG1, a sequence group
 - [2.2.1] SG3
 - [2.2.2] SEQG2
 - ...

When a member completed a survey, the completion time should be noted.

Your model should be able to support many expected reporting features. Examples:

1. What are the number and percentage for every response of every question in the survey "CSCI 5333"?
2. What are the surveys owned by the member with id 10212034?
3. What are the surveys that the member with id 0909221 has responded to?
4. What are the branching questions in the survey "CSCI 5333"?