**ECE 59500**

**Spring 2016**

**Midterm**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

A database has been designed for recent internal research grants from the IUPUI Office of the Vice Chancellor for Research (OVCR) awarded to professors at the different schools in IUPUI. The OVCR provides funding for academic research at IUPUI. Researchers submit proposals to various programs (for example, the “Signature Centers Initiative Grant “ (SCI) program, the Research Support Funds Grant (RSFG) program, and others. More information can be found at <http://research.iupui.edu/funding/>. After grants are funded, they are administered by the school fiscal offices on behalf of the researchers. Researchers pay graduate students, postdocs, and staff, purchase equipment and supplies, and pay expenses (such as travel) from these grants.

The database has all the data for all recent (since 2000) grants awarded to School of ET, School of Sciences, School of Informatics, and School of Medicine (there are several hundreds such grants). The image shows the database design that has the following information

- information about the grants, with their associated meta-data (e.g., amount of funding, start and end date, the researchers who work on them, etc.)

- information about the schools which receive grants,

- information about the Researchers who receive grants

- information about the internal funding Programs run by the OVCR that award grants,

- information about the program directors at OVCR who run programs that award grants, and

- information about the research areas that describe high level topic-areas for grants.

- Create the relationships among the above information.

Suppose that you have the database created and the data inserted.

Part 1: Using the relational algebra to answer the following question:

1. Lists all the program started between 2002 and 2008;
2. Lists all the schools who have awards from the RSFG programs in 2010;
3. Lists all the researchers’ last names who have served as the PI for the IUCRG program.
4. List the titles of the grants for which Professor Brian King is the principal investigator (PI).
5. List the researcher names from school of ET who have research funding from the RSFG program
6. List the programs who have grants to all the schools
7. Lists the grants who have been managed by director Etta Ward.
8. List the fields covered by the grants from the RSFG program
9. Find the total amount of the grants for which Professor Stanley Chien is the principal investigator (PI).
10. Find the number of times an ET researcher has received (not necessarily a PI) a grant over $100,000 million since 1/1/2008. Retrieve the name of the researcher and the number of such grants awarded.

Part II: For the databases, create indexes for the following scenario and explain the rationale for your choice of the index (which table, which attribute, and why)

1. For frequent queries about the grant information based on the funding amounts;
2. For frequent queries of the researchers’ last name and the corresponding schoolID;
3. For frequent queries of the funding programs based on the program starting time.

Part III. Create views for the following scenarios:

1. Create a view called ***AwardsList*** which lists the grants awards by program name, school name, PI name (fname followed by last name as one column), title, and award amount.
2. Create a view called ***ProgramDirectory*** which lists the program name, director lname, and yearStarted.
3. Create a view called ***AwardedAreas*** which lists the program name and the research areas.

Part IV. Answer the following queries in **two** ways: one way is to use at least one of the views above and the other is without using any of the views.

1. List all the distinctive research areas funded by at least one program (No duplicates).
2. List the program name which has awards to any School of ET researchers.
3. List the director names and the total numbers of programs charged by the director.
4. List the program names, director names, and the total awarded amount by the program for the PI.

Program V. insert through views

1. If you want to insert records through each of the three views. Please answer for each view, it you can insert a record successfully or not. If yes, list the original tables which will be modified by the insert statements; If not, explain why.