HOW TO MAP A RELATIONAL DIAGRAM OR SCHEMA TO AN ERD (AN EXAMPLE)

a. Attribute CRS_CODE in the entity COURSE is a Primary Key (PK); the attribute CLASS_CODE in the entity CLASS is a PK; the attribute STU_NUM in the entity STUDENT is a PK; and the attributes CLASS_CODE and STU_NUM are both PKs (they make-up a composite key) for the bridge or composite entity ENROLL.

b. The foreign keys (FKs) in the diagram (they carry the same names as the corresponding primary keys they reference) are DEPT_CODE in COURSE (even though the DEPARTMENT entity is not shown here), CRS_CODE and PROF_NUM in CLASS (again, even though the PROFESOR table is not shown here), STU_NUM and CLASS_CODE in ENROLL, and DEPT_CODE and PROF_NUM in STUDENT.

c. You should take some time to identify all entities, attributes, relationships, cardinalities, and connectivities (not depicted below but can be identified nonetheless). For example, two entities not shown here, but inferred from the FK inclusions, are PROFESSOR and DEPARTMENT.

OTHER IMPORTANT THINGS TO NOTE:

All of the relationships are 1:M. The relationships may be written as follows:

- COURSEs generate CLASSes. One COURSE can generate many CLASSes. Each CLASS is generated by one COURSE. 1:M
- ENROLLments are found in CLASSes. One CLASS can be found in many ENROLLments. Each ENROLLment can have only one CLASS. 1:M
- STUDENTs request ENROLLments. One STUDENT can have many ENROLLments. Each ENROLLment can have only one STUDENT. 1:M

[see below for all connectivities and cardinalities on ERDs].

CLASS_CODE is referenced in ENROLL. One class can be referenced in enrollment many times. Each individual enrollment references one class. Note that the ENROLL entity is also related to STUDENT (by the STU_NUM). Each entry in the ENROLL entity references one student and the class for which that student has enrolled. A student cannot enroll in the same class more than once. If a student enrolls in four classes, that student will appear in the ENROLL entity four times, each time for a different class.

STUDENT is shown in ENROLL (by the STU_NUM FK). One student can be shown in enrollment many times. (In database design terms, “many” simply means “more than once.”) Each individual enrollment entry shows one student.
NOTE: This diagram was drawn using the Dia Portable diagramming tool (http://dia-installer.de/download/index.html.en)

Because the ENROLL entity is a bridge or composite entity, there are no relationship between it and the connecting entities CLASS and STUDENT (a bridge or composite entity is the result of breaking up a M:N relationship into two 1:M relationships).

Also note that CamelCase is used in naming the attributes above. Also note that primary keys (PKs) are underlined in the Chen ERD (i.e., Crs_code in COURSE, Stu_num in STUDENT, Class_code in CLASS and Class_code and Stu_num in ENROLL) and foreign keys (FKs) are italicized in the Chen ERD (i.e., Dept_code in COURSE, Dept_code and Prof_num in STUDENT, Crs_code and Prof_num in CLASS, and Class_code and Stu_num in ENROLL). Both cardinalities [i.e., (1,1), (0,5), (0,25), (0,M)] and connectivities [i.e., 1, M] are represented on this diagram.

Cardinalities:

Each COURSE can have zero to 5 CLASS occurrences (0,5)
Each CLASS is generated from one and only one COURSE (1,1)
Each STUDENT can be enrolled in zero to many ENROLLments (0,M)
Each ENROLLment is for one and only one STUDENT (1,1)
Each CLASS can have zero to 25 ENROLLments (0,25)
Each ENROLLment is associated with one and only one CLASS (1,1)

Connectivities:

A COURSE can generate many CLASSes and a CLASS can be generated from only one COURSE (1:M)
A STUDENT can be included in many ENROLLments and each ENROLLment can be for only one STUDENT (1:M)
A CLASS can have many ENROLLments and each ENROLLment can be associated with only one CLASS (1:M)
NOTE: CamelCase is used in naming the attributes above. This is the required notation for attributes in this course. Also note that because the ENROLL entity is a bridge or composite entity, the lines connecting ENROLL to STUDENT and ENROLL to CLASS are solid to indicate a strong relationship. A strong relationship shows a weak entity (ENROLL). A strong relationship exists when the PK of the related entity contains at least one of the PK attributes of the parent entity. For example, if the PK of a CLASS entity is CLASS_CODE and the PK of the related ENROLL entity is STU_NUM + CLASS_CODE, the relationship between CLASS and ENROLL is strong. A strong relationship is indicated by a solid line in the (Visio) ERD.

Also note that primary keys (PKs) are labeled as such (PK) in the Crows Foot ERD (i.e., Crs_Code in COURSE, Stu_Num in STUDENT, Class_Code in CLASS and Class_Code and Stu_Num in ENROLL) and foreign keys (FKs) are labeled as such (FK1, FK2) in the Crows Foot ERD (i.e., Dept_Code in COURSE, Dept_Code and Prof_Num in STUDENT, Crs_Code and Prof_Num in CLASS, and Class_Code and Stu_Num in ENROLL). Both cardinalities [i.e., (1,1), (0,5), (0,25), (0,M)] and connectivities [i.e., 1, M] are represented on this diagram. Last, Stu_Age was left off of this diagram because it is derived or calculated and does not need to be stored. This is often done with Crows Foot diagrams because there is no way to designate derived like there is in Chen ERDs (using a dashed line or dashed attribute ellipse).

Cardinalities:

same as for Chen ERD above

Connectivities:

same as for Chen ERD above

NOTE: Both of these diagrams follow the ERD Rules outlined for you HERE. It is expected that you follow these same rules when drawing any diagrams for this class.