CS 186 Discussion Section
Week 1

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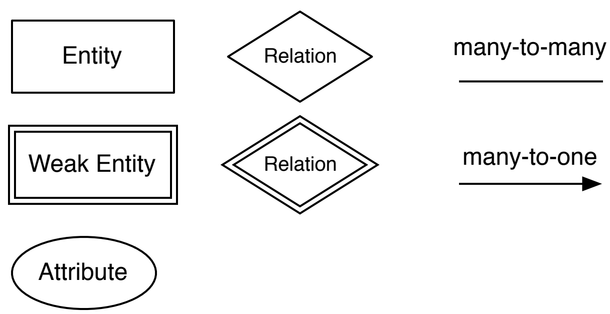
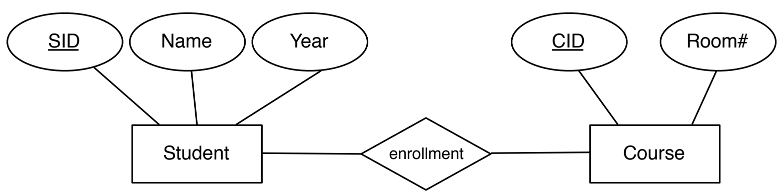
1 ER Modeling

1.1

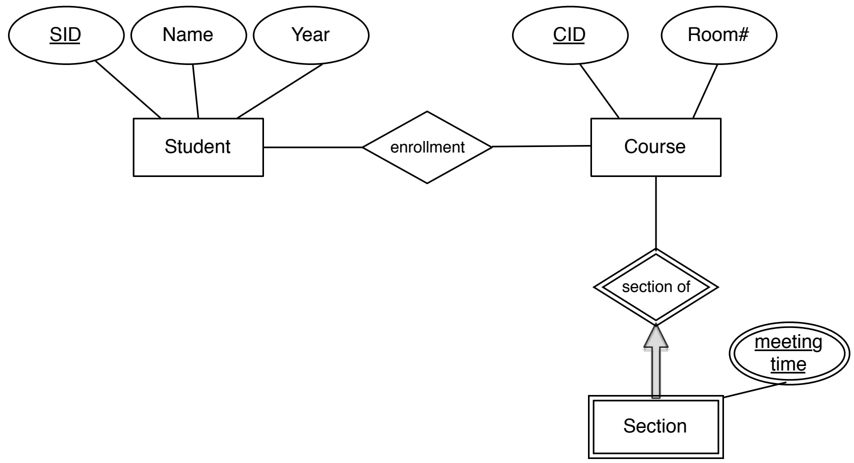


1.2



Note that the relation enrollment between courses and students is unconstrained: a student can take many courses, and a course can have many students. The constraint that a student can only be enrolled once in a given course is not expressible in this model, as a set contains no duplicates.

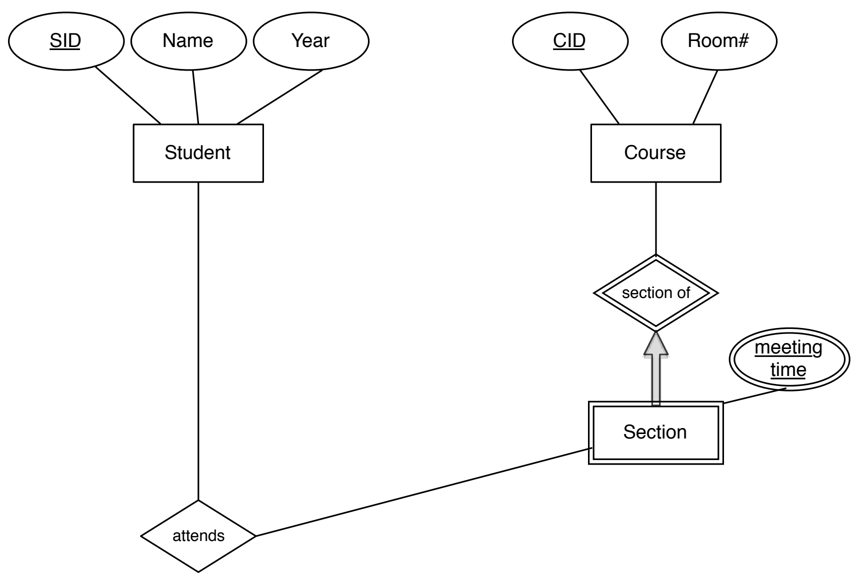
1.3



Section is a weak entity with a partial key of "meeting time" (pretend that meeting time is underlined with a dotted line). We can only uniquely identify a section with reference to its parent entity's key: a section is identified by a course number and a meeting time.

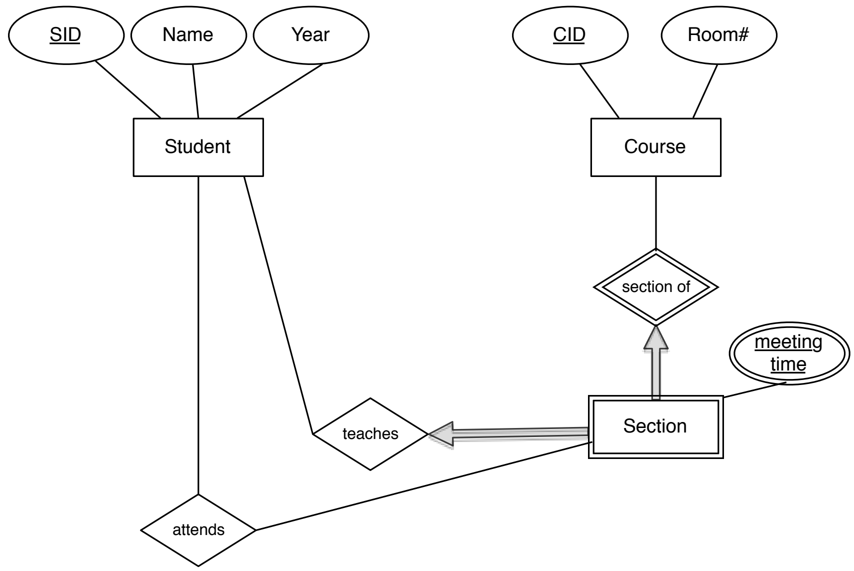
The participation constraint (thick line) follows from this, and is mandatory, as is a key constraint (arrow). Why?

1.4



What happened? We needed to create a relation between students and sections, and by doing so, made the relation between students and courses redundant, because we know what courses a student is taking if we know what sections she is taking.

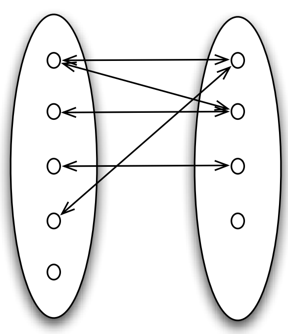
1.5



Once again, we use the composition of the ”many-1” or key constraint and the ”at least one” or participation constraint. As you may have surmised, this yields the ”exactly one” constraint indicated by a thick arrow. A section MUST have a TA, and only one TA.

2 Constraints and Mappings

2.1

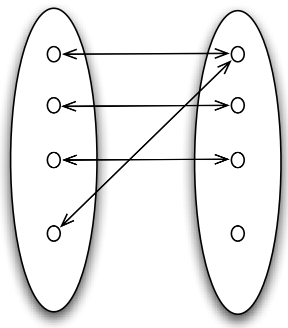


Mapping diagrams like this can be useful to visualize relation instances. Above is a completely unconstrainted relation, and could correspond to an instance of the enrollment relation. It is:

(1) inconsistent with a participation constraint in either direction, as both sets contain items not mapped to the other set.

(2) inconsistent with a key constraint in either direction, as items in one set map to multiple items in the other.

2.2

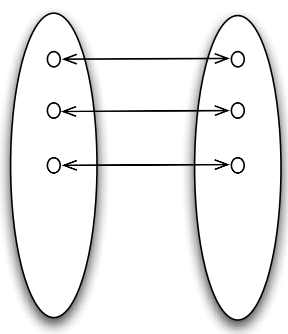


This mapping is (call the left set A and the right one B):

(1) consistent with a participation constraint from A to B, because every member of A is mapped to a member of B.

(2) consistent with a many-1 key constraint from A to B, because every member of A is mapped to only 1 member of B.

2.3



It should be obvious that this instance is consistent with every possible constraint. Given this instance, what can we infer about an appropriate model?

Answer: NOTHING! This could very easily be a snapshot of an instance of students, in which each student has enrolled in only one course, and each course has only one student enrolled. A model must apply for every possible instance of entity and relation sets.

3 Questions that came up

3.1 Given Figure 1.5, how can we prevent a student who TAs a class from also being enrolled in that class?

This is tricky. Creating a separate entity TAs would create a lot of redundancy, since all TAs are students. Worse still, this would not in itself prevent a student from existing in both tables and violating the constraint we want. A check constraint (which we'll learn about later) would solve this in the relational model but is not expressible in the ER model.

3.2 Does it matter on which side of the relation a participation constraint is drawn?

Yes, where we draw the line (or arrow) shows which of the entities participating in a relation are bound by the constraint. The mapping diagram in section 2.2, for example, is consistent withe a participation constraint from A to B but not in the other direction, as there are items in B not mapped to A.