ASSIGNMENT 4

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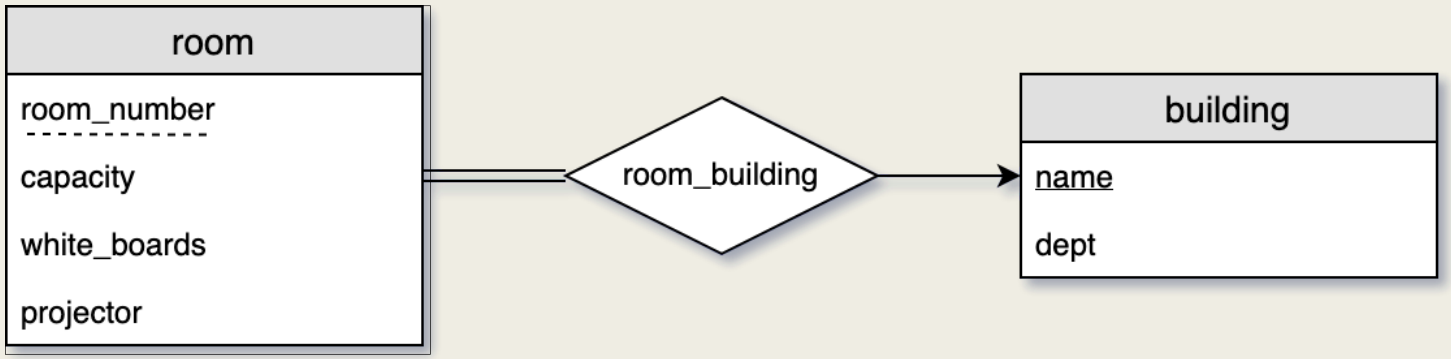
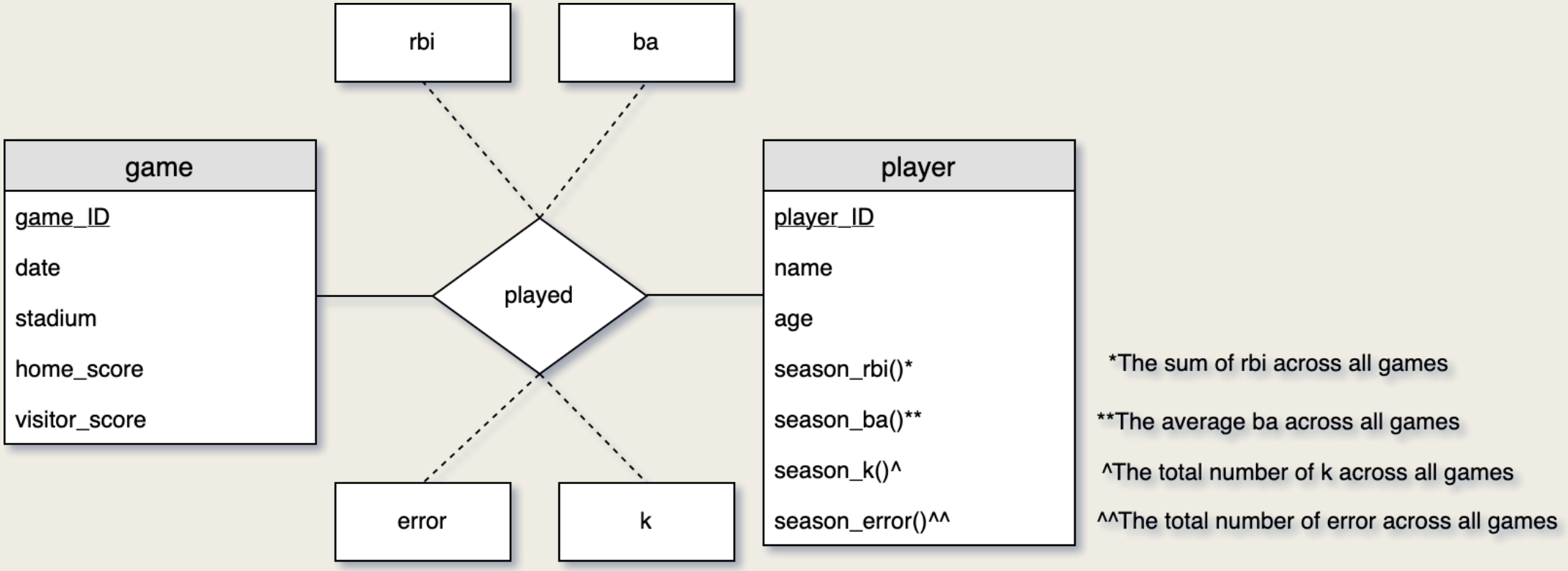
1. Weak vs. Strong Entity Sets

- A weak entity set depends on another entity set, called an identifying entity set
  - *Cannot be identified by attributes alone*
  - *A good identifying feature is that they often do not have their own primary keys*
  - *Example:*
    - Rooms exist within buildings; attributes are not necessarily unique even within each building



2. Baseball E-R Diagram



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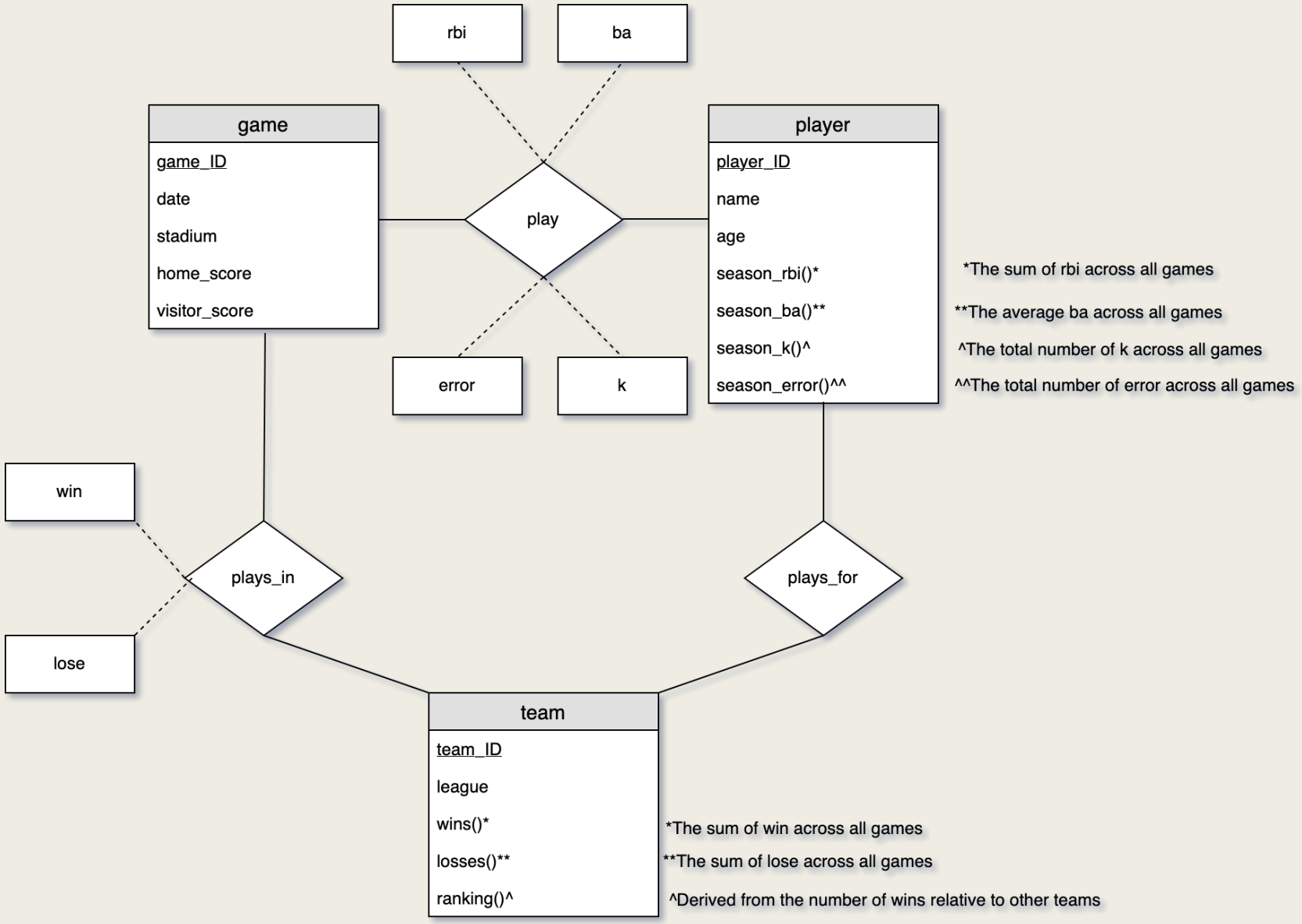

3a. SQL Exercise

- i. Including a natural join to *section* would not change the result because course_id is a primary key in both *takes* and *course*, bypassing the need for section
- ii. This is confirmed through testing:

```
1 select course_id, semester, year, sec_id, avg (tot_cred)
2 from takes natural join student
3 where year = 2017
4 group by course_id, semester, year, sec_id
5 having count (ID) >= 2;
```

course_id	semester	year	sec_id	avg (tot_cred)
CS-101	Fall	2017	1	65
CS-190	Spring	2017	2	43
CS-347	Fall	2017	1	67

```
1 select course_id, semester, year, sec_id, avg (tot_cred)
2 from takes natural join student natural join section
3 where year = 2017
4 group by course_id, semester, year, sec_id
5 having count (ID) >= 2;
```

course_id	semester	year	sec_id	avg (tot_cred)
CS-101	Fall	2017	1	65
CS-190	Spring	2017	2	43
CS-347	Fall	2017	1	67

3b. SQL Exercise

- Write an SQL query using the university schema to find the ID of each student who has never taken a course at the university

```sql
SELECT DISTINCT s.id, s.name
FROM student AS s
LEFT OUTER JOIN takes AS t
ON s.id = t.id
WHERE t.id IS NULL
```

```sql
SELECT s.id, s.name FROM student s
WHERE s.id NOT IN (SELECT id FROM takes)
```

ID	name
70557	Snow