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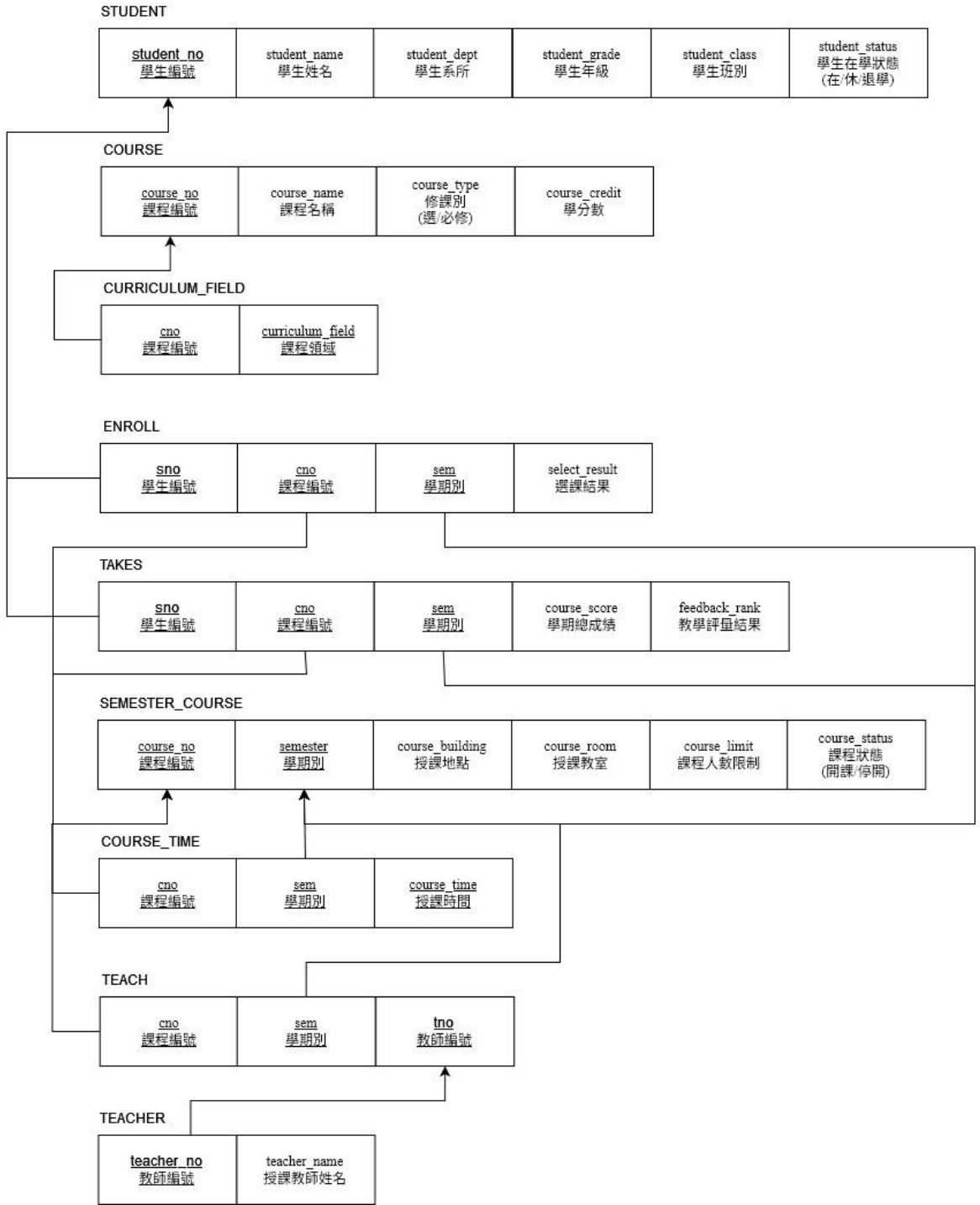
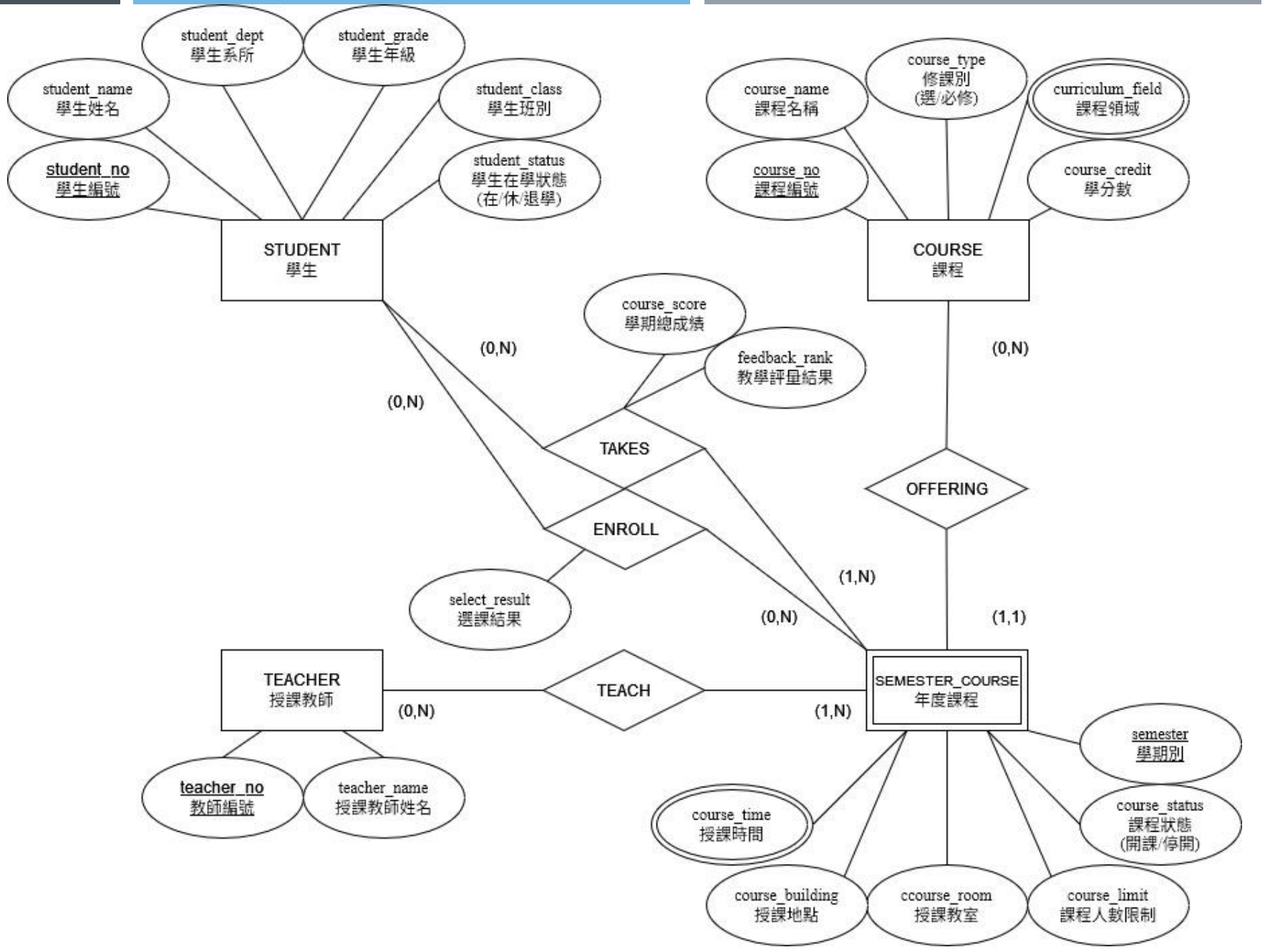
3NF OR BCNF


STUDENT
student_no 學生編號
student_name 學生姓名
student_dept 學生系所
student_grade 學生年級
student_class 學生班別
student_status 學生在學狀態 (在/休/退學)
COURSE
course_no 課程編號
course_name 課程名稱
course_type 修課別 (選/必修)
course_credit 學分數
CURRICULUM_FIELD
cno 課程編號
curriculum_field 課程領域
ENROLL
sno 學生編號
cno 課程編號
sem 學期別
select_result 選課結果
TAKES
sno 學生編號
cno 課程編號
sem 學期別
course_score 學期總成績
feedback_rank 教學評量結果
SEMESTER_COURSE
course_no 課程編號
semester 學期別
course_building 授課地點
course_room 授課教室
course_limit 課程人數限制
course_status 課程狀態 (開課/停開)
COURSE_TIME
cno 課程編號
sem 學期別
course_time 授課時間
TEACH
cno 課程編號
sem 學期別
tno 教師編號
TEACHER
teacher_no 教師編號
teacher_name 授課教師姓名

ER MODEL


student_dept
學生系所
student_grade
學生年級
student_name
學生姓名
student_class
學生班別
student_no
學生編號
student_status
學生在學狀態
(在/休/退學)
STUDENT
學生
course_type
修課別
(選/必修)
course_name
課程名稱
curriculum_field
課程領域
course_no
課程編號
course_credit
學分數
COURSE
課程
course_score
學期總成績
feedback_rank
教學評量結果
(0,N)
(0,N)
(0,N)
TAKES
OFFERING
ENROLL
select_result
選課結果
(1,N)
(0,N)
(1,1)
TEACHER
授課教師
TEACH
SEMESTER_COURSE
年度課程
(0,N)
(1,N)
teacher_no
教師編號
teacher_name
授課教師姓名
semester
學期別
course_time
授課時間
course_status
課程狀態
(開課/停開)
course_building
授課地點
ccourse_room
授課教室
course_limit
課程人數限制

SQL PROBLEM – 1

- 「A0001微積分」上課地點要由K205修改到K210 大教室，該怎麼做？
- Ans:

```
1 UPDATE semester_course
2 SET course_room = "K210"
3 WHERE course_no = "A0001" AND semester = 1112
```

SQL PROBLEM – 2

- 請列出「A0002 計算機概」的修課名單（點名表）
- Ans:

```sql
SELECT student_no, student_name
FROM
    semester_course AS SC
    JOIN enroll AS E ON SC.course_no = E.cno
                        AND SC.semester = E.sem
    JOIN student AS S ON E.sno = S.student_no
WHERE course_no == "A0003"
      AND semester == 1112
      AND select_result IN ('中選', '人工加選')
      AND student_status = '在學'
```

SQL PROBLEM – 3

- 請列出課程成績不及格的學生比例資料（大學部：低於60分、碩博：70分）

課名	授課教師	不及格人次	修課人次	不及格比例

- Ans:

```sql
WITH
course_info (course_no, course_name, teacher_name) AS (
    SELECT
        SC.course_no,
        course_name,
        GROUP_CONCAT(teacher_name, ',') AS teacher_name
    FROM
        course AS C
        JOIN semester_course AS SC ON C.course_no = SC.course_no
        JOIN teach ON SC.course_no = teach.cno
                      AND SC.semester = teach.sem
        JOIN teacher AS T ON teach.tno = T.teacher_no
    WHERE SC.semester = 1112
    GROUP BY SC.course_no
),
num_stu (course_no, student_num) AS (
    SELECT SC.course_no, COUNT(T.sno)
    FROM
        semester_course AS SC
        JOIN takes AS T ON SC.course_no = T.cno
                           AND SC.semester = T.sem
        JOIN student AS S ON T.sno = S.student_no
    WHERE SC.semester = 1112 AND S.student_status = '在學'
    GROUP BY SC.course_no
),
num_failed (course_no, failed_num) AS (
    SELECT SC.course_no, COUNT(T.sno)
    FROM
        semester_course AS SC
        JOIN takes AS T ON SC.course_no = T.cno
                           AND SC.semester = T.sem
        JOIN student AS S ON T.sno = S.student_no
    WHERE SC.semester = 1112 AND
          T.course_score < CASE WHEN (S.student_dept LIKE '%研究所'
OR S.student_dept LIKE '%碩士班') THEN 70 ELSE 60 END
    GROUP BY SC.course_no
)
```

```sql
SELECT
    course_name AS 課名,
    teacher_name AS 授課老師,
    failed_num AS 不及格人次,
    student_num AS 修課人次,
    ROUND(CAST(failed_num AS REAL)/student_num, 2) AS 不及格比例
FROM
    course_info AS CI
    JOIN num_stu AS NS ON CI.course_no = NS.course_no
    JOIN num_failed AS NF ON NS.course_no = NF.course_no
```

SQL PROBLEM – 3(CONT.)

SQL PROBLEM – 4

- 請列出各系學生修課領域分佈情況

學生系所	課程領域	人次	佔比

- Ans:

```sql
WITH
course_info (sno, dept, field) AS (
    SELECT
        student_no,
        CASE WHEN S.student_dept LIKE '%研究所%'
                THEN SUBSTR(S.student_dept, 1,
                    INSTR(S.student_dept, '研究所')-1)||'系'
             WHEN S.student_dept LIKE '%碩士班%'
                THEN SUBSTR(S.student_dept, 1,
                    INSTR(S.student_dept, '碩士班')-1)
        ELSE SUBSTR(S.student_dept, 1, LENGTH(S.student_dept)) END,
        curriculum_field
    FROM
        student AS S
        JOIN takes AS T ON S.student_no = T.sno
        JOIN curriculum_field AS CF ON T.cno = CF.cno
    WHERE S.student_status = '在學'
),
dept_counts (dept, sum_dept) AS (
    SELECT tmp_dept, SUM(tmp_sum_dept)
    FROM (
        SELECT
            CASE WHEN S.student_dept LIKE '%研究所%'
                    THEN SUBSTR(S.student_dept, 1,
                        INSTR(S.student_dept, '研究所')-1)||'系'
                 WHEN S.student_dept LIKE '%碩士班%'
                    THEN SUBSTR(S.student_dept, 1,
                        INSTR(S.student_dept, '碩士班')-1)
            ELSE SUBSTR(S.student_dept, 1, LENGTH(S.student_dept))
END
            AS tmp_dept,
            COUNT(S.student_no) AS tmp_sum_dept
        FROM student AS S
        WHERE S.student_status = '在學'
        GROUP BY S.student_dept
    )
    GROUP BY tmp_dept
)
```

```sql
SELECT
    CI.dept AS 學生系所,
    CI.field AS 課程領域,
    COUNT(CI.sno) AS 人次,
    ROUND(CAST(COUNT(CI.sno) AS REAL)/sum_dept, 2)  AS 佔比
FROM course_info AS CI
     JOIN dept_counts AS DC ON CI.dept = DC.dept
GROUP BY
    CI.dept,
    CI.field
```

SQL PROBLEM – 4 (CONT.)

SQL PROBLEM – 5

- 請列出教學評量平均分數及總分

課名	授課教師	教學評量總分	教學評量平均分數

- Ans:

```sql
WITH
course_info (course_no, course_name, teacher_name) AS (
    SELECT
        SC.course_no,
        course_name,
        GROUP_CONCAT(teacher_name, ',') AS teacher_name
    FROM
        course AS C
        JOIN semester_course AS SC ON C.course_no = SC.course_no
        JOIN teach ON SC.course_no = teach.cno
                      AND SC.semester = teach.sem
        JOIN teacher AS T ON teach.tno = T.teacher_no
    WHERE SC.semester = 1112
    GROUP BY SC.course_no
),
feedback (course_no, sum_feedback, avg_feedback) AS (
    SELECT
        SC.course_no,
        SUM(T.feedback_rank),
        ROUND(AVG(T.feedback_rank), 2)
    FROM
        semester_course AS SC
        JOIN takes AS T ON SC.course_no = T.cno
                           AND SC.semester = T.sem
    WHERE SC.semester = 1112
    GROUP BY SC.course_no
)
```

```sql
SELECT
    course_name AS 課名,
    teacher_name AS 授課教師,
    sum_feedback AS 教學評量總分,
    avg_feedback AS 教學評量平均分數
FROM course_info
     JOIN feedback ON course_info.course_no = feedback.course_no
```

SQL PROBLEM – 5 (CONT.)