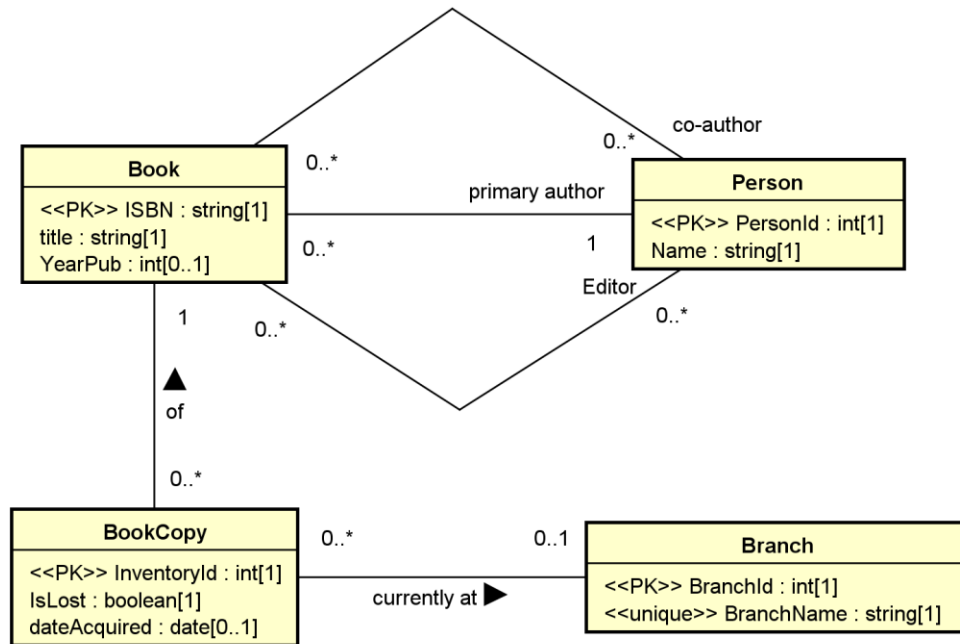
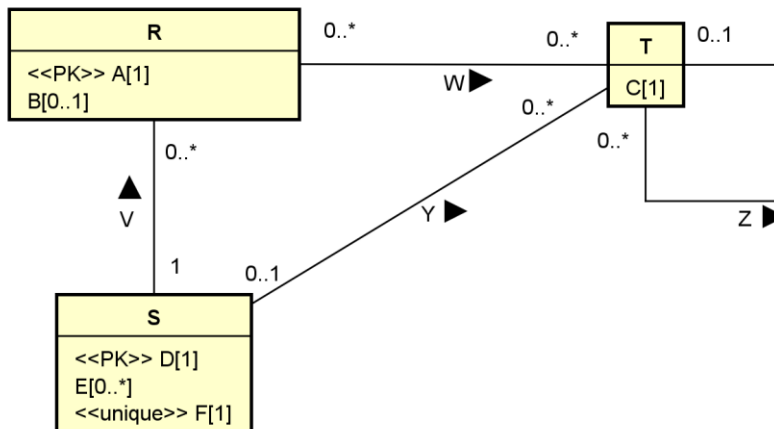


CSCI 4333 Design of Database Systems Fall 2023 Suggested Solution to Section 1 Mid-Term Examination

(1) For example:



(2) For example: for:



Relation	R(A, B, D)	Relation	S(D, F)
[CK] (1) A		[CK] (1) D, (2) F	
[FK] (1) D references S(D)		[FK]	
		[Nullable]	

[Nullable] B [Non-nullable] A, D [Note]	[Non-nullable] D, F [Note]
Relation T(<u>T_Id</u> , C, D, Z_T_Id)	Relation W(<u>W_Id</u> , A, T_Id)
[CK] (1) T_Id [FK] (1) D references S(D), (2) Z_T_Id references T(T_Id) [Nullable] D, Z_T_Id [Non-nullable] T_Id, C [Note] (1) T_Id is created as the surrogate primary key.	[CK] (1) W_Id, (2) A, T_Id [FK] (1) A references R(A), (2) T_Id references T(T_Id) [Nullable] [Non-nullable] W_Id, A, T_Id [Note] (1) W_Id is created as the surrogate primary key.
Relation SE(<u>SE_Id</u> , D, E)	Relation
[CK] (1) SE_Id, D, E [FK] (1) D references S(D) [Nullable] [Non-nullable] SE_Id, D, E [Note] (1) SE_Id is created as the surrogate primary key.	[CK] [FK] [Nullable] [Non-nullable] [Note]

(3)

(a)	F	(b)	F	(c)	F	(d)	T	(e)	T
(f)	F	(g)	T	(h)	T	(i)	F	(j)	T
(k)	T	(l)	T	(m)	F	(n)	T		

(4)

(a)

```
SELECT DISTINCT f.facId,
                CONCAT(f.fname, ' ', f.lname) AS faculty,
                COUNT(s.stuId) AS `Number of advisees`
FROM faculty AS f LEFT JOIN student AS S ON (f.facId = s.advisor)
WHERE f.deptCode = 'CSCI'
GROUP BY facId, faculty
ORDER BY `Number of advisees` DESC;
```

(b)

```
SELECT DISTINCT s.stuId,
                CONCAT(s.fname, ' ', s.lname) AS student,
                CONCAT(f.fname, ' ', f.lname) AS advisor
FROM student AS s INNER JOIN enroll AS e USING (stuId)
INNER JOIN class AS c USING (classId)
```

```
INNER JOIN course AS co USING (courseId)
INNER JOIN faculty AS f ON (s.advisor = f.facId)
WHERE f.deptCode = 'CSCI'
AND co.rubric = 'CINF';
```

(c)

```
SELECT DISTINCT s.stuld,
    CONCAT(s.fname, ' ', s.lname) AS student,
    COUNT(c.classId) AS `# of CINF classes`
FROM student AS s LEFT JOIN
    (enroll AS e INNER JOIN class AS c USING (classId)
    INNER JOIN course AS co ON (c.courseId = co.courseId AND co.rubric = 'CINF'))
    USING (stuld)
GROUP BY s.stuld, student
HAVING `# of CINF classes` < 2;
```

(d)

```
SELECT DISTINCT s.stuld,
    CONCAT(s.fname, ' ', s.lname) AS student
FROM student AS s INNER JOIN enroll AS e USING (stuld)
    INNER JOIN class AS c USING (classId)
    INNER JOIN course AS co USING (courseId)
WHERE co.rubric = 'CSCI'
AND s.stuld NOT IN
    (SELECT DISTINCT e2.stuld
    FROM enroll AS e2 INNER JOIN class AS c2 USING (classId)
    INNER JOIN course AS co2 USING (courseId)
    WHERE co2.rubric = 'CINF');
```