TOPIC: QUESTION 19

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QUESTION 19

The Hudson Engineering Group (HEG) has contacted you to create a conceptual model whose application will meet the expected database requirements for the company's training program. The HEG administrator gives you the description (see below) of the training group's operating environment. The HEG has 12 instructors and can handle up to 30 trainees per class. HEG offers five "advanced technology" courses, each of which may generate several classes. If a class has fewer than 10 trainees, it will be cancelled. Therefore, it is possible for a course not to generate any classes. Each class is taught by one instructor. Each instructor may teach up to two classes or may be assigned to do research only. Each trainee may take up to two classes per year.

- ❏ Construct an ER diagram.
- ❏ List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.
- ❏ Map the ERD in the relational model corresponding to the described application.
- ❏ Also make sure to have the primary keys and foreign keys clearly

ER DIAGRAM
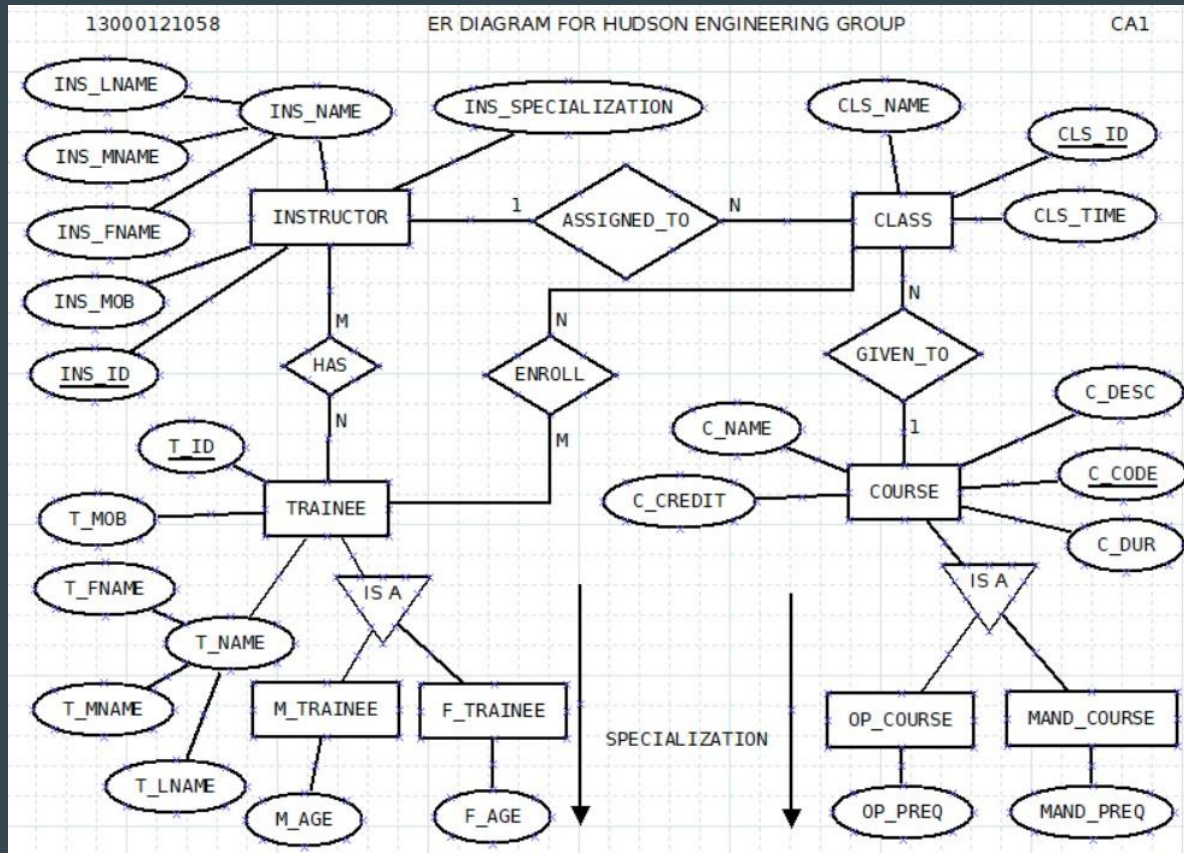
ENTITIES AND THEIR ATTRIBUTES

❑ INSTRUCTOR { <u>INS_ID</u>, INS_MOB, INS_FNAME, INS_MNAME, INS_LNAME, INS_SPECIALIZATION }

❑ TRAINEE { <u>T_ID</u>, T_MOB, T_FNAME, T_MNAME, T_LNAME, T_SPECIALIZATION }

❑ M_TRAINEE { M_AGE }

❑ F_TRAINEE { F_AGE }

❑ CLASS { <u>CLS_ID</u>, CLS_TIME, CLS_NAME }

❑ COURSE { <u>C_CODE</u>, C_NAME, C_DESC, C_CREDIT, C_DUR }

❑ OP_COURSE { OP_PREQ }

❑ MAND_COURSE { MAND_PREQ }

ENTITIES AND RELATIONSHIPS

Cardinality with limits

```
0..2                                          1..1
INSTRUCTOR      ASSIGNED_TO        CLASS
```

An instructor can take 2 classes or none. A class can be taken by one instructor.

```
1                                              N
INSTRUCTOR      ASSIGNED_TO        CLASS
```

One to many relationship

ENTITIES AND RELATIONSHIPS

Cardinality with limits

	0..60			2..12	
INSTRUCTOR		HAS			TRAINEE

An instructor has maximum 60 students. A trainee can have minimum 2 and maximum 12 instructors

	M			N	
INSTRUCTOR		HAS			TRAINEE

Many to many relationship

ENTITIES AND RELATIONSHIPS

Cardinality with limits

```
                  0..2                    10..30
┌──────────────┐         ╱╲         ┌──────────────┐
│   TRAINEE    │────────╱    ╲────────│    CLASS     │
└──────────────┘       ╲ ENROLL ╱    └──────────────┘
                        ╲      ╱
                         ╲╱
```
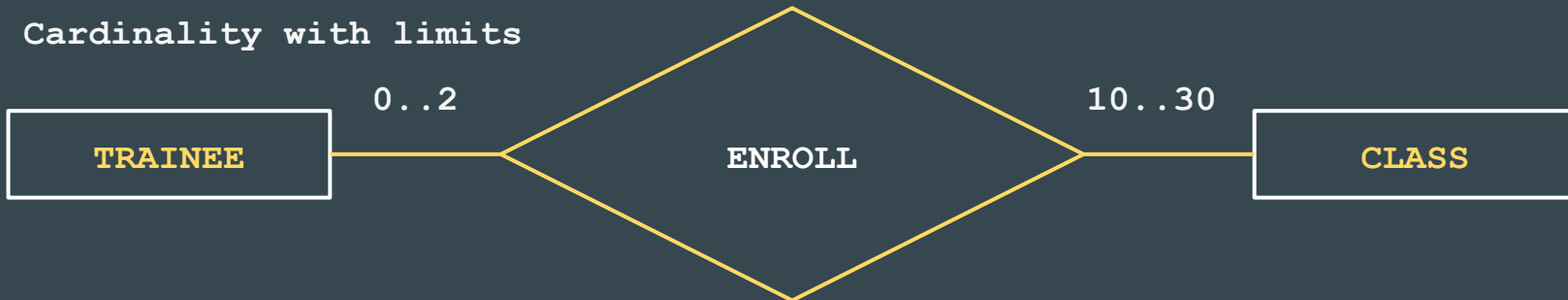
A trainee can take maximum 2 classes in a year. A class should have all unique trainee
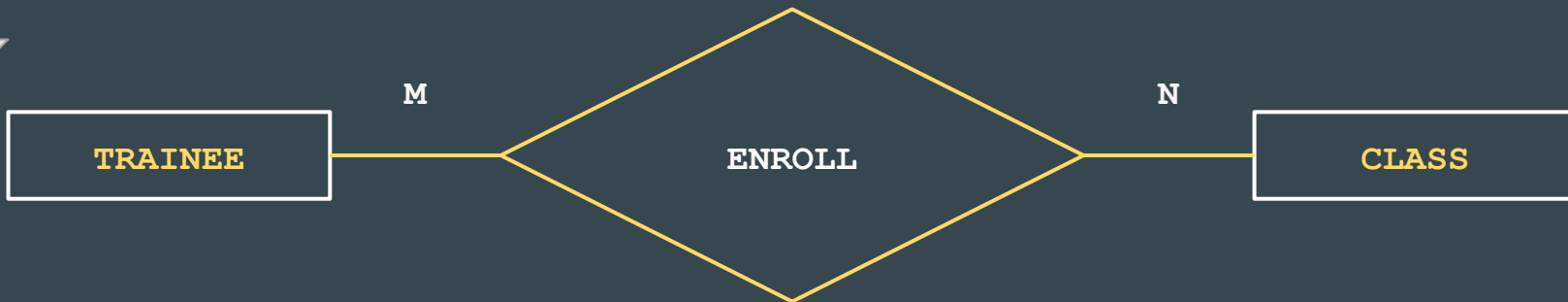
```
                   M                       N
┌──────────────┐         ╱╲         ┌──────────────┐
│   TRAINEE    │────────╱    ╲────────│    CLASS     │
└──────────────┘       ╲ ENROLL ╱    └──────────────┘
                        ╲      ╱
                         ╲╱
```

Many to many relationship

ENTITIES AND RELATIONSHIPS

Cardinality with limits

| CLASS | 1..1 ——— GIVEN_TO ——— 0..* | COURSE |

A course can generate any number of classes. A class can be given for one course

| CLASS | N ——— GIVEN_TO ——— 1 | COURSE |

Many to one relationship

RELATIONAL MODEL
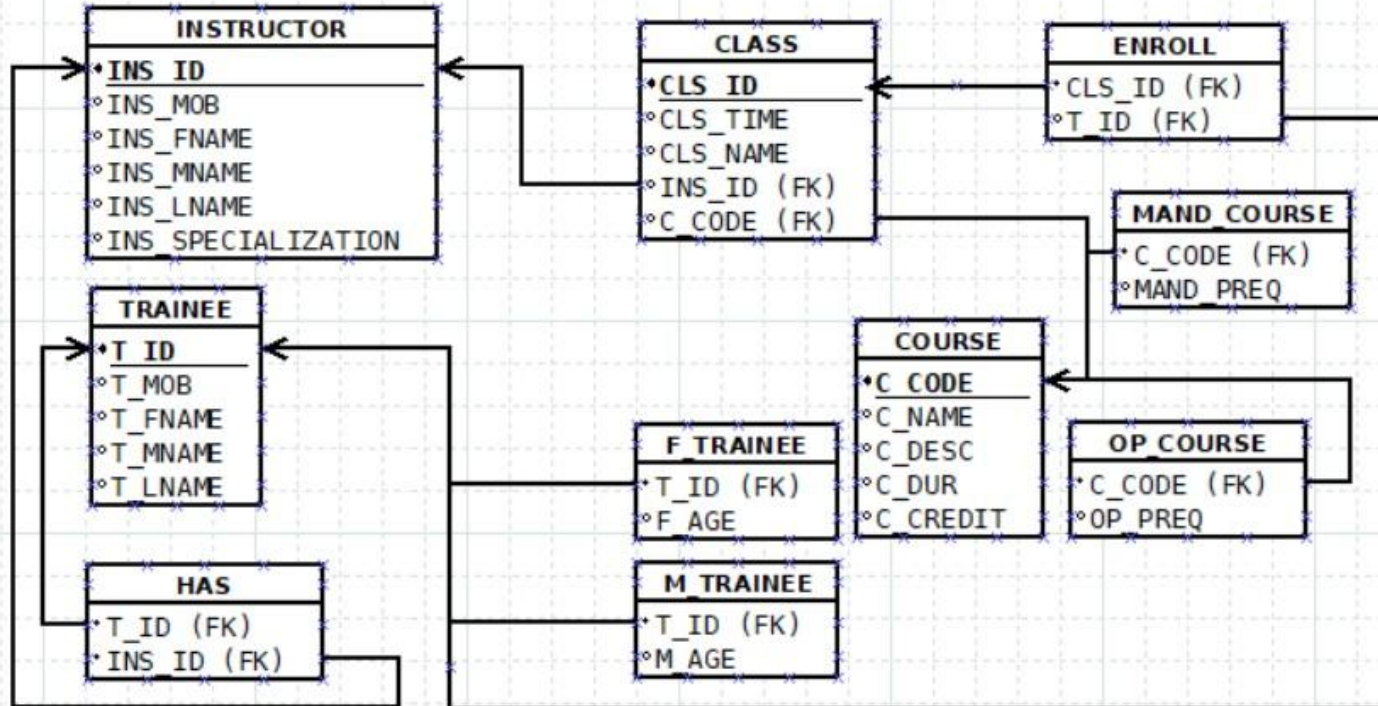
KEYS

PRIMARY KEYS	FOREIGN KEYS
INS_ID in table **INSTRUCTOR**	**INS_ID** in table **CLASS , HAS**
T_ID in table **TRAINEE**	**T_ID** in table **F_TRAINEE , M_TRAINEE , HAS , ENROLL**
CLS_ID in table **CLASS**	**CLS_ID** in table **ENROLL**
C_CODE in table **COURSE**	**C_CODE** in table **CLASS , MAND_COURSE , OP_COURSE**

ASSUMPTIONS

➔ An instructor can teach zero or more classes. According to the question the maximum number of class can be 2.

➔ A class can be taught by one instructor at a time.

➔ An instructor can have zero or more trainee. According to the question the maximum number of trainee can be 60 as one instructor can teach maximum 2 classes. A class can have maximum 30 trainee.

➔ A trainee can be taught by one instructor in a class.

➔ A trainee can enroll in multiple classes. The maximum number of classes is 2 in a year.

➔ A trainee can be male or female.

➔ A class has unique trainee. A class can have minimum 10 and maximum 30 trainees.

➔ A course can be given to multiple classes.

➔ A class can be given for one course at a time.

➔ A course can be optional or mandatory depending on the prerequisites.

REFERENCES

❏ Database System Concepts by Abraham Silberschatz Henry F. Korth S. Sudarshan

THANK YOU