Tishk International University
Department of Information Technology
Database Systems 1
Week 6
Fall 2023-24
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DML and Referential Integrity

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Outline

- What is Data Manipulation Language (DML)
  - Insertion
  - Deletion
  - Updating
- Referential Integrity
- Query for Relationships

Data Manipulation Language (DML)

- DML is considered as a sublanguage of SQL, used to modify database.

- It is used for:
  - **Insertion** of new records to a given relation
  - **Deletion** of records from a given relation
  - **Updating** records in a given relation

Insertion

- The **INSERT** statement is used to add new records to a given relation.

The syntax is:

insert into $r\ (A_1, A_2, \ldots, A_n)$

values ($v_1, v_2, \ldots, v_n$ **);**

- ***r*** represents a relation
- **A** represents attribute(s)
- ***v*** represent value(s)

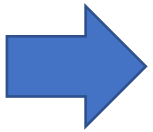
Insertion (cont.)

- Example: Add a new student:

```
insert into student
values (6, 'Ali', 'Omer', 'Arch');
```

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT

Student



Query result

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT
6	Ali	Omer	Arch

Insertion (cont.)

- Example: Add a new student without any department name:

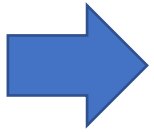
insert into student
values (6, 'Ali', 'Omer', **null**);

OR

insert into student (SID, F_name, L_name)
values (6, 'Ali', 'Omer');

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT

Student



Query result

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT
6	Ali	Omer	

Deletion

- The **DELETE** statement is used to delete records from a given relation.

- Example: Delete all students:

delete from student;

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT

Student

Query result

SID	F_name	L_name	Department

Deletion (cont.)

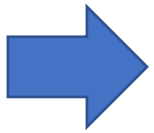
- Example: Delete all students from IT department:

delete from student

where department = 'IT';

SID	F_name	L_name	Department
1	Dara	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT

Student



Query result

SID	F_name	L_name	Department
2	Zara	Nawzad	Civil

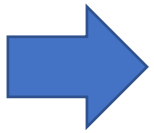
Updating

- The **UPDATE** statement is used to change records in a given relation.
- Example: Update student(s) with F_name Dara to Aras:

```
update student
set F_name = 'Aras'
where F_name = 'Dara';
```

Student

SID	F_name	L_name	Mark
1	Dara	Azad	90
2	Zara	Nawzad	95
3	Nasrin	Kawa	85



Query result

SID	F_name	L_name	Mark
1	Aras	Azad	IT
2	Zara	Nawzad	Civil
3	Nasrin	Kawa	IT

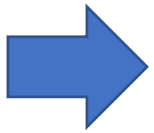
Updating (cont.)

- Example: Give 5 marks to the students whose mark is less than 92.

```
update student
set Mark = Mark + 5
where Mark < 92;
```

Student

SID	F_name	L_name	Mark
1	Dara	Azad	90
2	Zara	Nawzad	95
3	Nasrin	Kawa	85



Query result

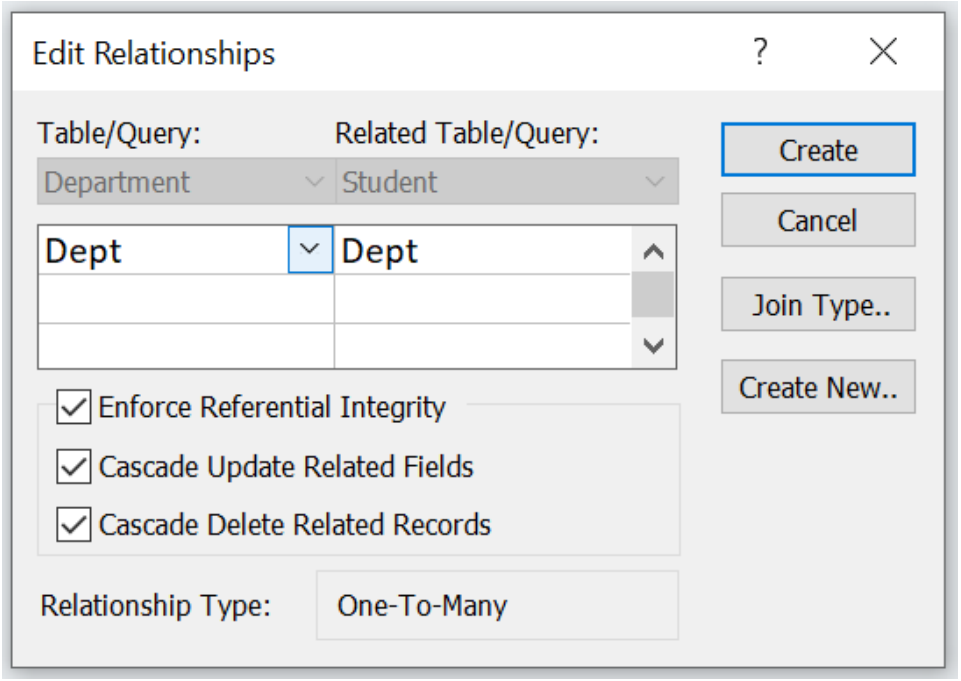
SID	F_name	L_name	Mark
1	Dara	Azad	95
2	Zara	Nawzad	95
3	Nasrin	Kawa	90

Referential Integrity

- **Cascade Update Related Fields**

  ☑ (Checked) When primary key fields are updated, then foreign key fields will be updated too.

  ☐ (Unchecked) When primary key fields are updated, then foreign key fields will not be updated.

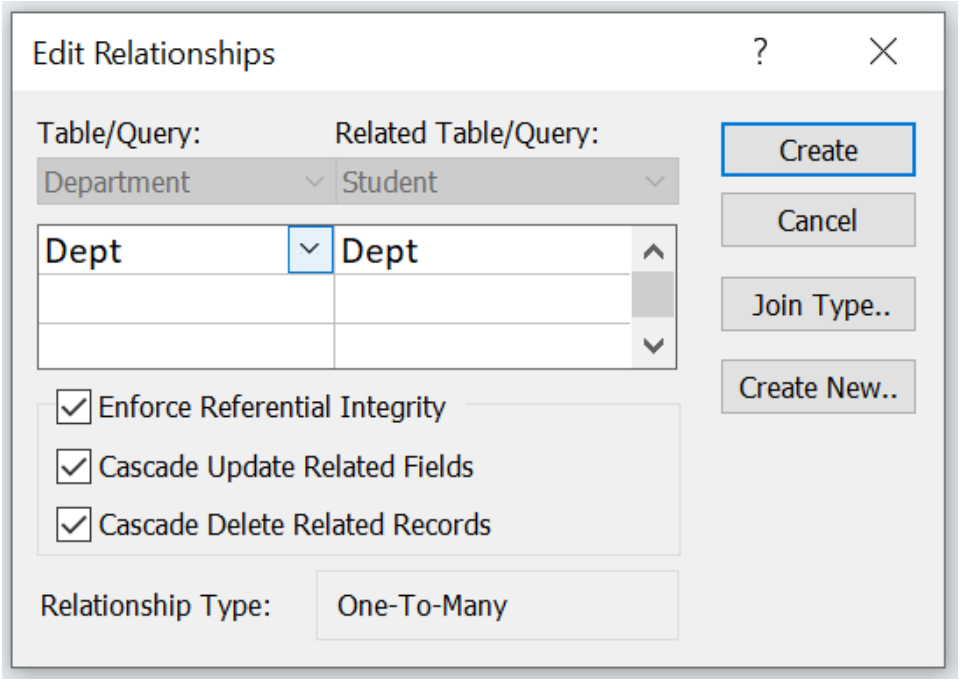


Referential Integrity (cont.)

- **Cascade Delete Related Records**

  ☑ (Checked) When primary key records are deleted, then all the foreign key records related to it will be deleted too.

  ☐ (Unchecked) When primary key records are deleted, then all the foreign key records related to it will not be deleted.



One to One Relationship

- **Step 1:** Creating tables.

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

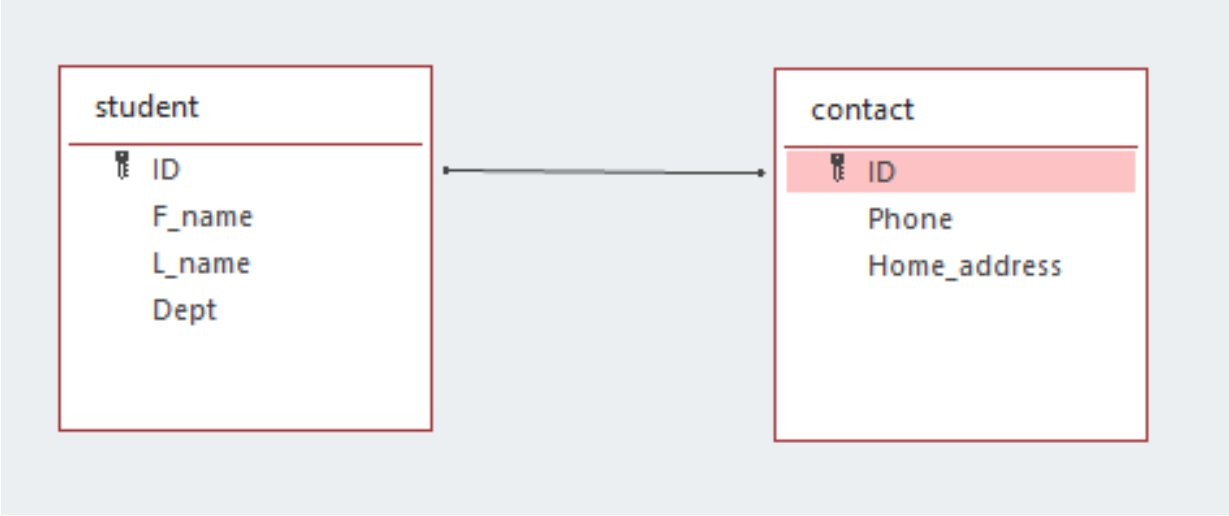
CID	Phone	Address
1	444 4444	40th m. street
2	555 5555	60th m. street
3	777 7777	100th m. street

Contact

One to One Relationship (cont.)

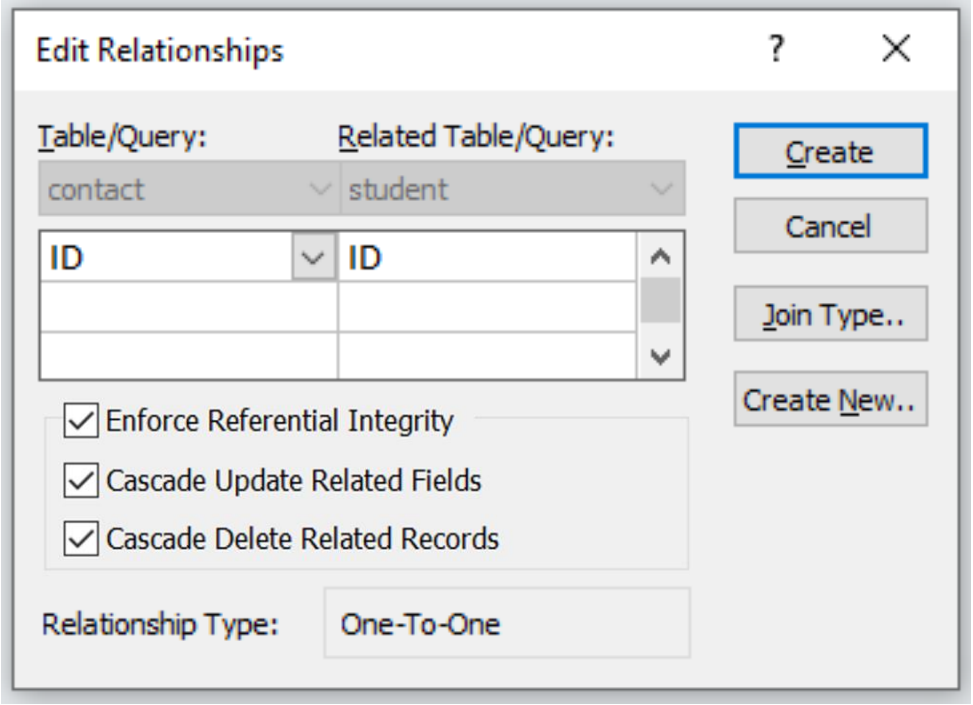
- **Step 2:** Creating relationship.

Note: both fields must have the **same data type** and include **same values**.



One to One Relationship (cont.)

- **Step 3:** Checking Referential Integrity.



One to One Relationship (cont.)

- **Step 4:** Writing query.

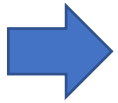
```
SELECT F_name,L_name, Phone, Address
FROM Student, Contact
WHERE Student.SID = Contact.CID;
```

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

CID	Phone	Address
1	444 4444	40th m. street
2	555 5555	60th m. street
3	777 7777	100th m. street

Contact



F_name	L_name	Phone	Address
Dara	Azad	444 4444	40th m. street
Zara	Nawzad	555 5555	60th m. street
Kawa	Omer	777 7777	100th m. street

Query result

One to One Relationship (cont.)

- **Step 4:** Writing query.

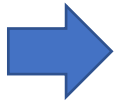
```
SELECT Student.F_name, Student.L_name, Contact.Phone, Contact.Address
FROM Student, Contact
WHERE Student.SID = Contact.CID;
```

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

CID	Phone	Address
1	444 4444	40th m. street
2	555 5555	60th m. street
3	777 7777	100th m. street

Contact



F_name	L_name	Phone	Address
Dara	Azad	444 4444	40th m. street
Zara	Nawzad	555 5555	60th m. street
Kawa	Omer	777 7777	100th m. street

Query result

One to Many Relationship (cont.)

- **Step 1:** Creating tables.

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

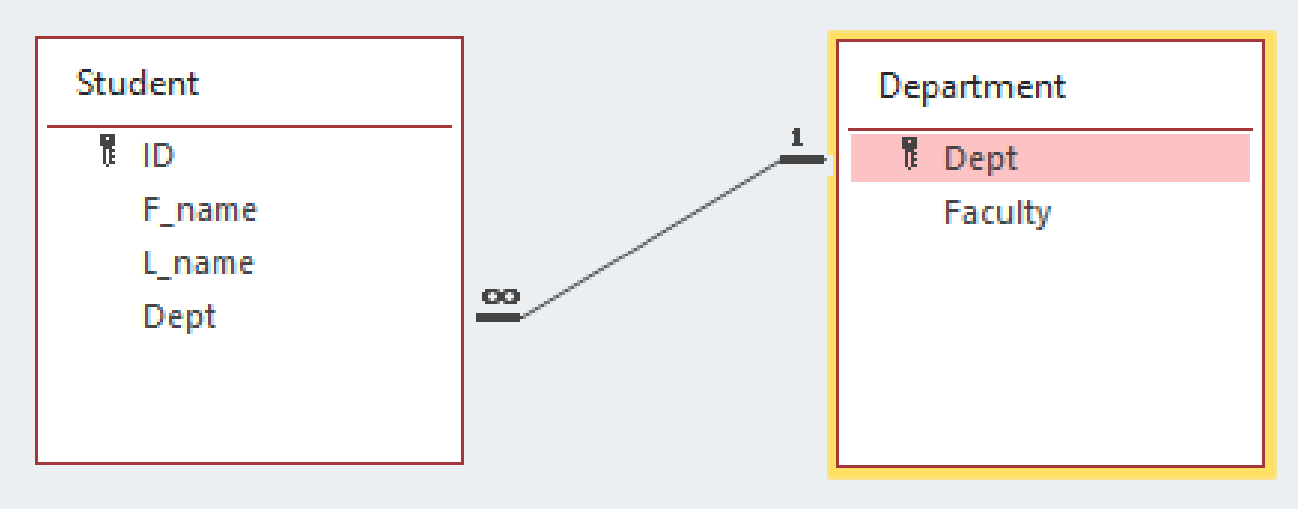
Dept	Faculty
IT	Science
Biology	Education

Department

One to Many Relationship (cont.)

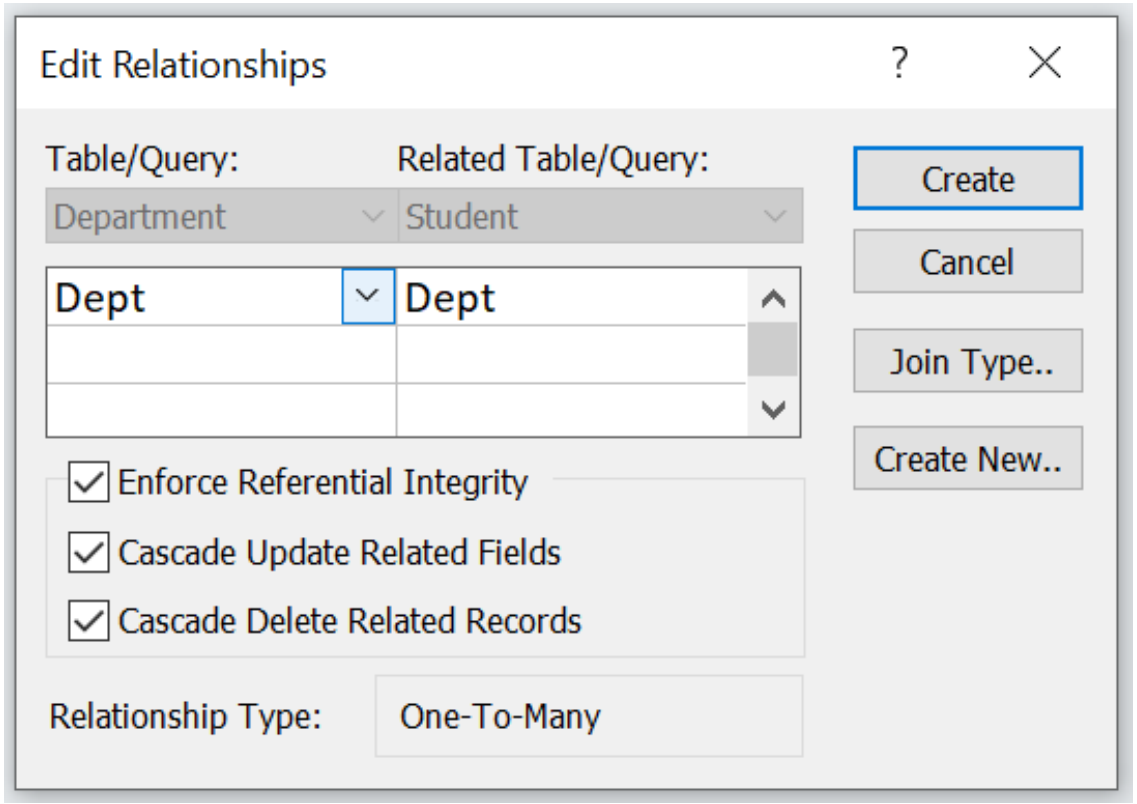
- **Step 2:** Creating relationship.

Note: both fields must have the **same data type** and include **same values**.



One to Many Relationship (cont.)

- **Step 3:** Checking Referential Integrity.



One to Many Relationship (cont.)

- **Step 4:** Writing query.

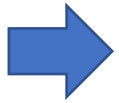
```
SELECT F_name, L_name, Department.Dept, Faculty
FROM Student, Department
WHERE Student.dept = Department.dept;
```

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

Dept	Faculty
IT	Science
Biology	Education

Department



F_name	L_name	Dept	Faculty
Dara	Azad	IT	Science
Zara	Nawzad	IT	Science
Kawa	Omer	Biology	Education

Query result

One to Many Relationship (cont.)

- **Step 4:** Writing query.

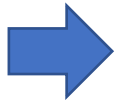
```
SELECT Student.F_name, Student.L_name, Department.Dept, Department.Faculty
FROM Student, Department
WHERE Student.dept = Department.dept;
```

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	Biology

Student

Dept	Faculty
IT	Science
Biology	Education

Department



F_name	L_name	Dept	Faculty
Dara	Azad	IT	Science
Zara	Nawzad	IT	Science
Kawa	Omer	Biology	Education

Query result

Many to Many Relationship

- **Step 1:** Creating tables.

ID	SID	CID
1	1	IT320
2	1	IT215
3	2	IT215
4	3	IT113

Student_Course

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	IT

Student

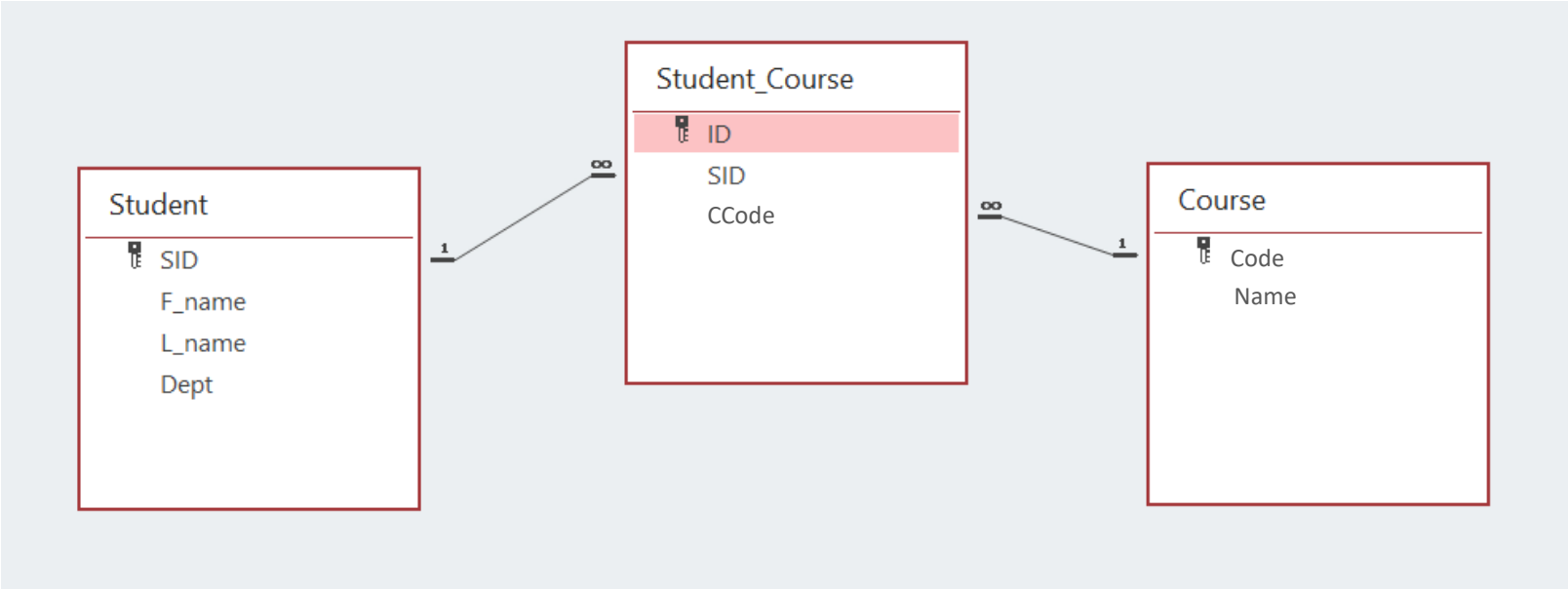
Code	Name
IT215	Database I
IT113	Programming
IT320	Web Design

Course

Many to Many Relationship (cont.)

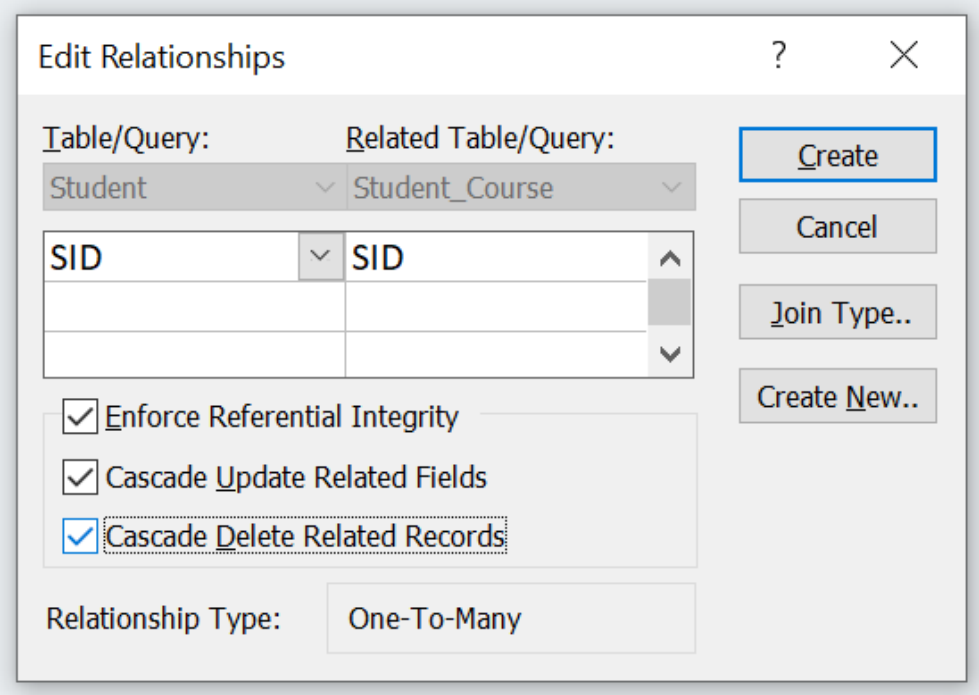
- **Step 2:** Creating relationship.

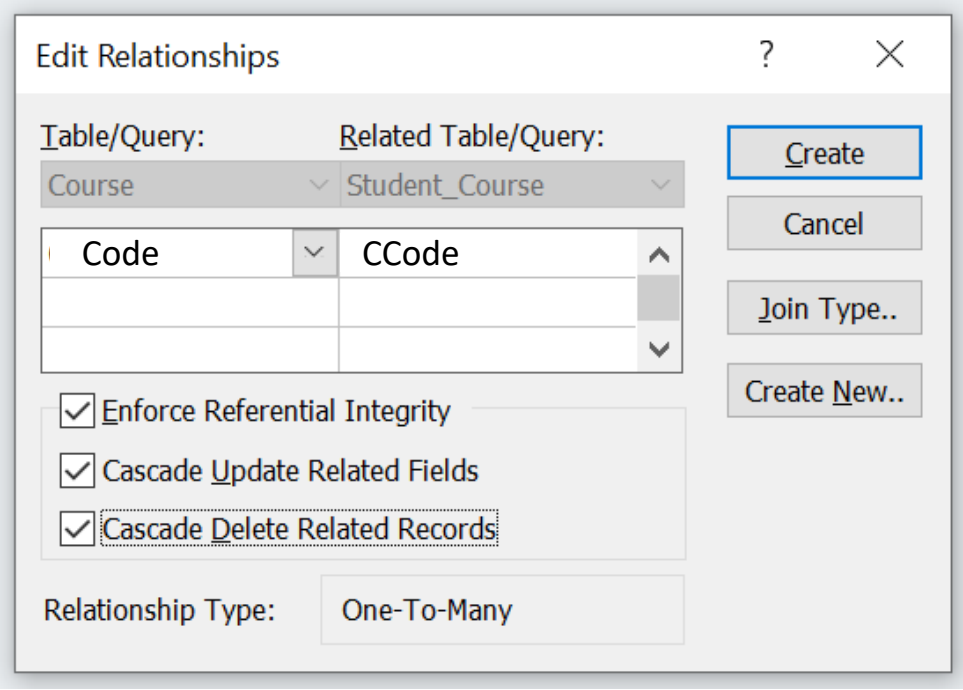
Note: both fields must have the **same data type** and include **same values**.



Many to Many Relationship (cont.)

- **Step 3:** Checking Referential Integrity.





Many to Many Relationship (cont.)

Step 4: Writing query.

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	IT

Student

ID	SID	CCode
1	1	IT320
2	1	IT215
3	2	IT215
4	3	IT113

Student_Course

Code	Name
IT215	Database I
IT113	Programming
IT320	Web Design

Course

SELECT F_name, L_name, Code, Name **AS** CourseName

FROM Student, Course, Student_Course

WHERE Student.SID=Student_Course.SID AND Course.Code=Student_Course.CCode;

F_name	L_name	Code	CourseName
Dara	Azad	IT320	Web Design
Dara	Azad	IT215	Database I
Zara	Nawzad	IT215	Database I
Kawa	Omer	IT113	Programming

Query result

Many to Many Relationship (cont.)

Step 4: Writing query.

SID	F_name	L_name	Dept
1	Dara	Azad	IT
2	Zara	Nawzad	IT
3	Kawa	Omer	IT

Student

ID	SID	CCode
1	1	IT320
2	1	IT215
3	2	IT215
4	3	IT113

Student_Course

Code	Name
IT215	Database I
IT113	Programming
IT320	Web Design

Course

SELECT Student.F_name, Student.L_name, Course.Code, Course.Name **AS** CourseName

FROM Student, Course, Student_Course

WHERE Student.SID=Student_Course.SID AND Course.Code=Student_Course.CCode;

F_name	L_name	Code	CourseName
Dara	Azad	IT320	Web Design
Dara	Azad	IT215	Database I
Zara	Nawzad	IT215	Database I
Kawa	Omer	IT113	Programming

Query result

Thank You