Tutorial: Translation of E-R Diagram into Relational Schema

Strong Entity Set

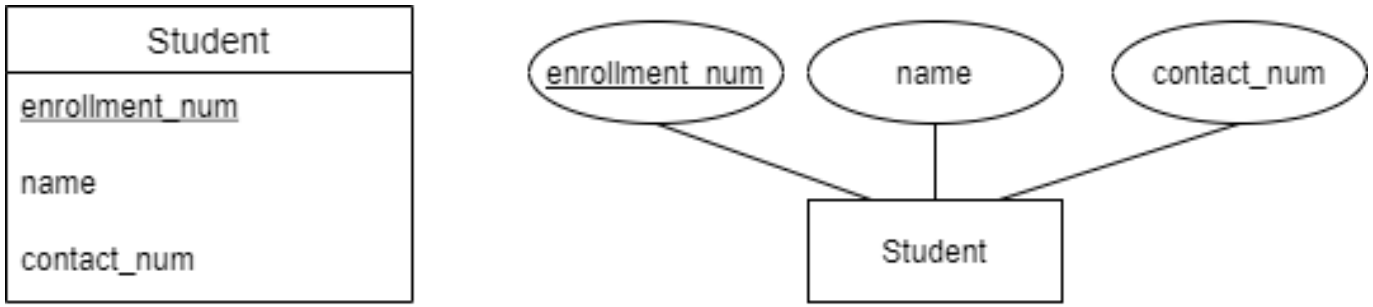

Figure: Strong entity with simple attributes

Student{*enrollment_num*, *name*, *contact_num*}

enrollment_num	name	contact_num
101	RAJ KUMAR MISHRA	222-222
102	SANAT K ROY	333-333

Figure: Table **Student**

Strong Entity Set with Composite Key

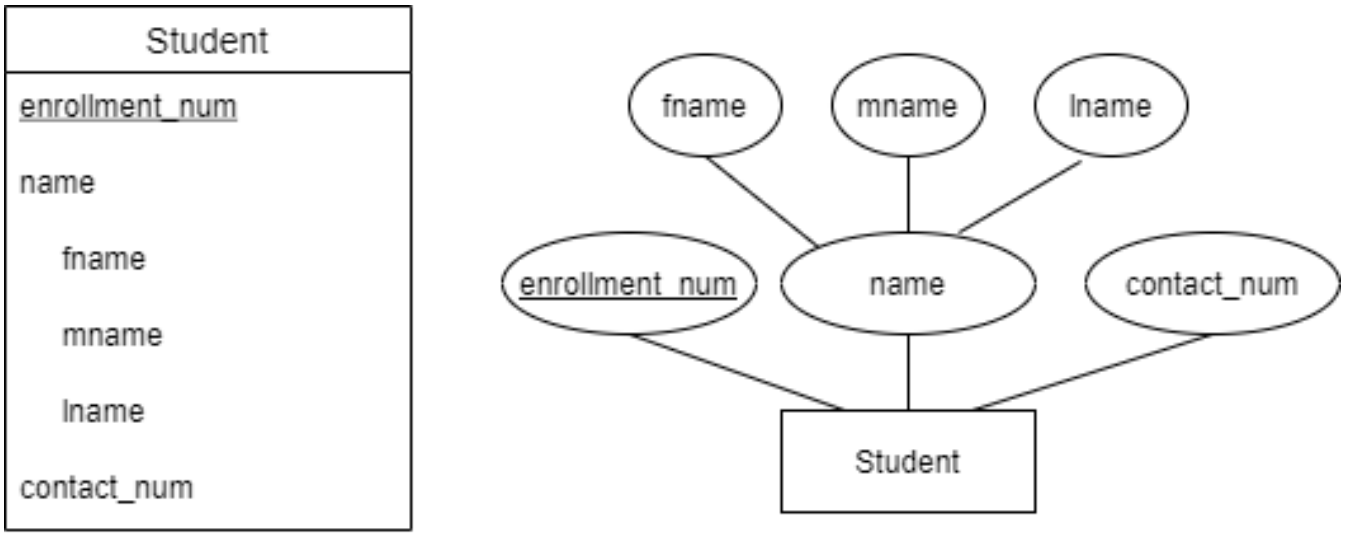

Figure: Entity set **Student** with simple and composite attributes

Student{*enrollment_num*, *fname*, *mname*, *lname*, *contact_num*}

enrollment_num	fname	mname	lname	contact_num
101	RAJ	KUMAR	MISHRA	222-222
102	SANAT	K	ROY	333-333

Figure: Table **Student**

Strong Entity Set with Composite Key + Multivalued Attribute

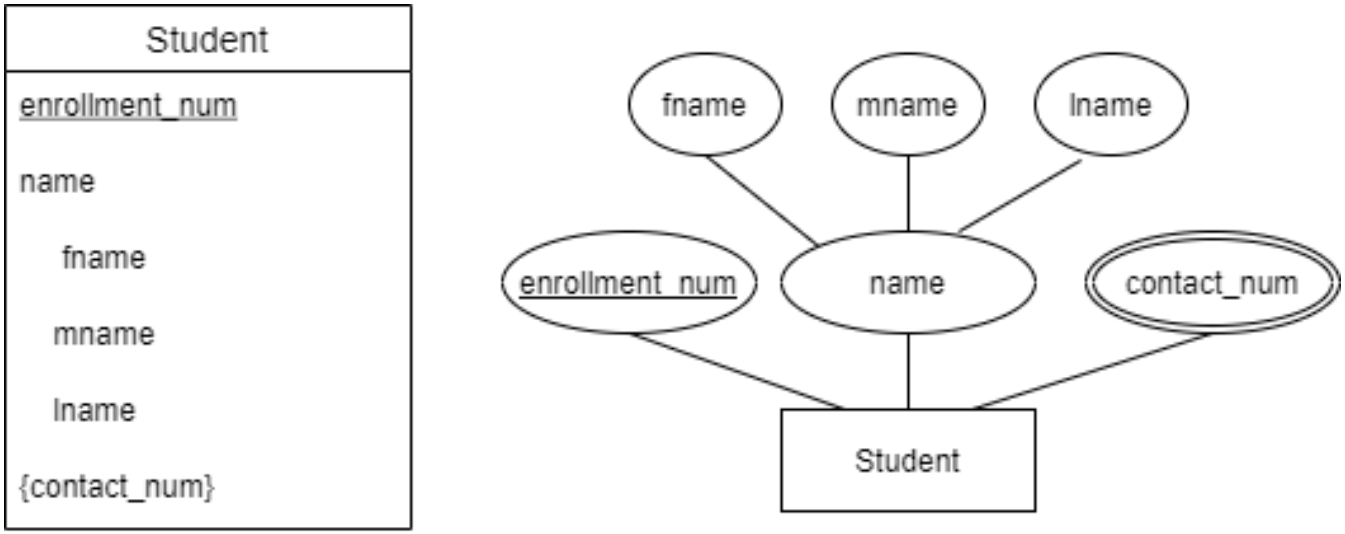

Figure: Entity set **Student** with simple, composite, and multivalued attributes

Student{*enrollment_num*, *fname*, *mname*, *lname*, *contact_num*}

enrollment_num	fname	mname	lname	contact_num
101	RAJ	KUMAR	MISHRA	222-222, 777-777
102	SANAT	K	ROY	333-333, 999-999, 666-666

Figure: Table **Student**

Strong Entity Set with Composite Key + Multivalued Attribute

Student{*enrollment_num*, *fname*, *mname*, *lname*, *contact_num*}

enrollment_num	fname	mname	lname	contact_num
101	RAJ	KUMAR	MISHRA	222-222
101	RAJ	KUMAR	MISHRA	777-777
102	SANAT	K	ROY	333-333
102	SANAT	K	ROY	999-999
102	SANAT	K	ROY	666-666

Figure: Table **Student**

Student{*enrollment_num*, *fname*, *mname*, *lname* }

enrollment_num	fname	mname	lname
101	RAJ	KUMAR	MISHRA
102	SANAT	K	ROY

Figure: Table **Student**

Contacts{*enrollment_num*, *contact_num*}

enrollment_num	contact_num
101	222-222
101	777-777
102	333-333
102	999-999
102	666-666

Figure: Table **Student**

Strong Entity Set with Composite Key + Multivalued Attribute + Derived Attribute

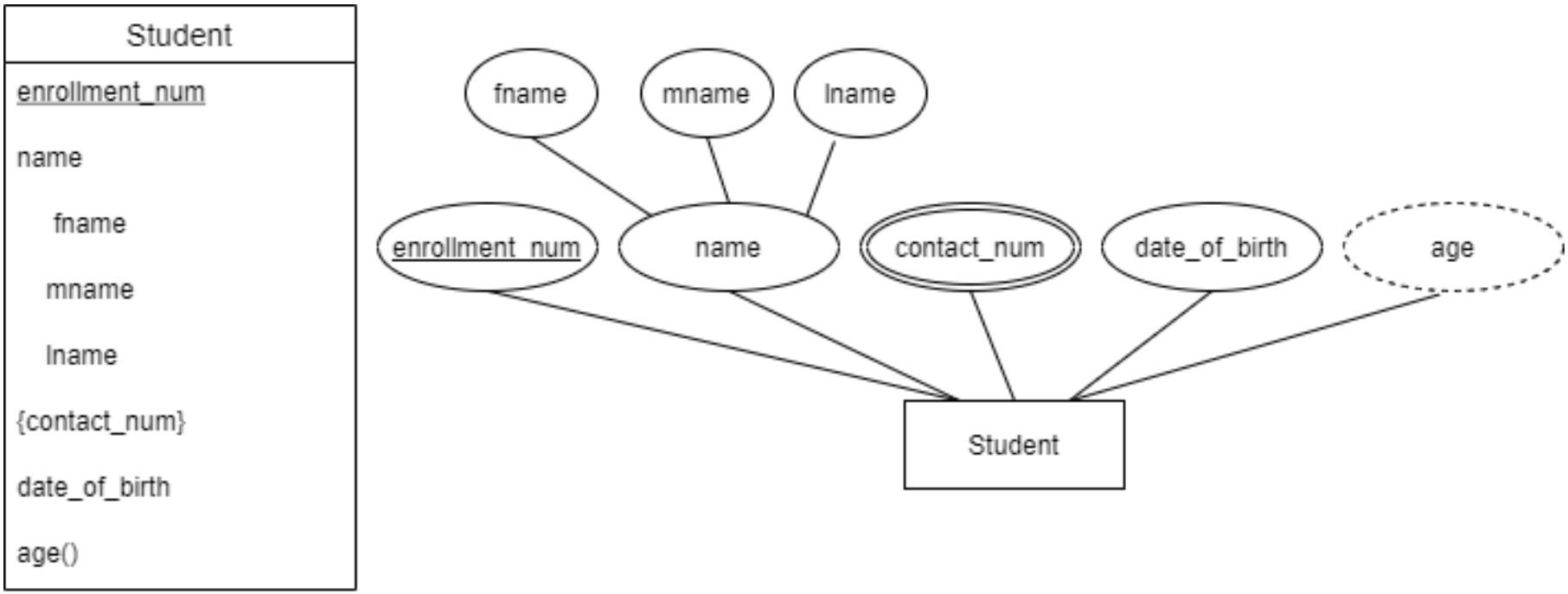

Figure: Entity set **Student** with simple, composite, multivalued attributes, and derived attribute

Student{*enrollment_num*, *fname*, *mname*, *lname*, *data_of_birth* }

Contacts{*enrollment_num*, *contact_num*}

Relationship: Cardinality Constraint (many-to-many)

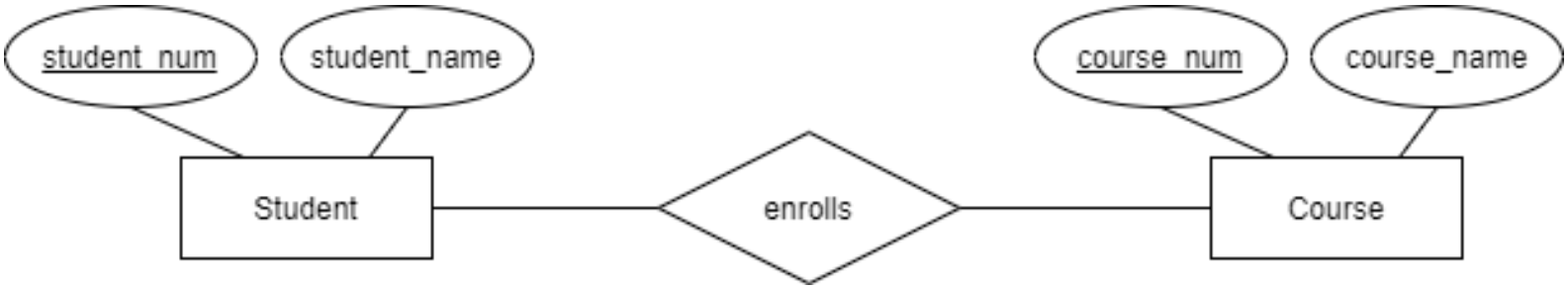

Figure: A many-to-many relationship between **Student** and **Course**

- **Student**{*student_num*, *student_name*}
- **Course**{*course_num*, *course_name*}
- **enrolls**{ *student_num*, *course_num* }

student_num	student_name
101	RAJ
102	SANAT

Student

student_num	course_num
101	CS101
102	CS101
102	MT110

enrolls

course_num	course_name
CS101	Computer Science
MT110	Mathematics

Course

Figure: Table: **Student**, **Course** and **enrolls**

Relationship: Cardinality Constraint (many-to-many) with Descriptive Attributes

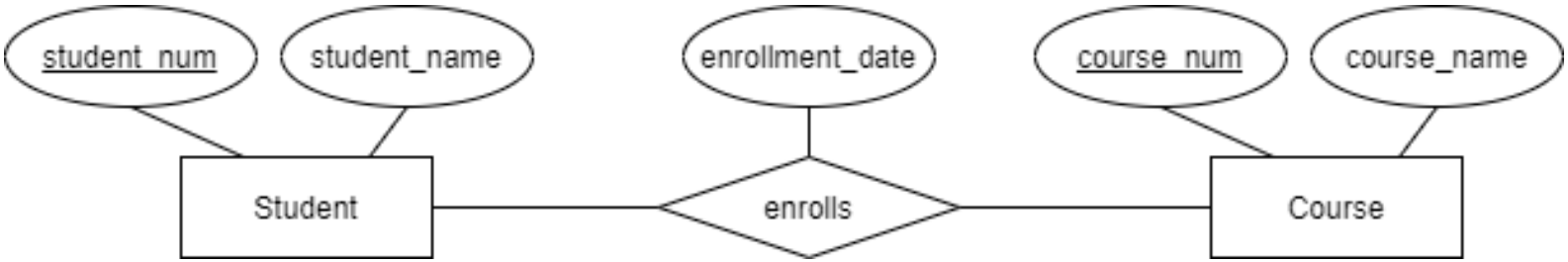

Figure: A many-to-many relationship between **Student** and **Course**

- **Student**{*student_num*, *student_name*}
- **Course**{*course_num*, *course_name*}
- **enrolls**{ *student_num*, *course_num*, *enrollment_date* }

Relationship: Cardinality Constraint (many-to-one)

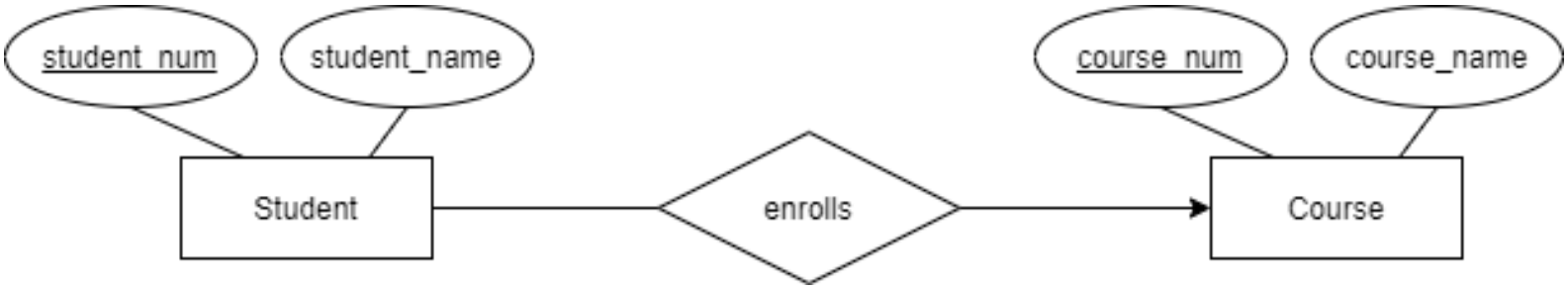

Figure: An many-to-one relationship between **Student** and **Course**

- **Student**{*student_num*, *student_name*, *course_num*}
- **Course**{*course_num*, *course_name*}

Relationship: Cardinality Constraint (one-to-one)

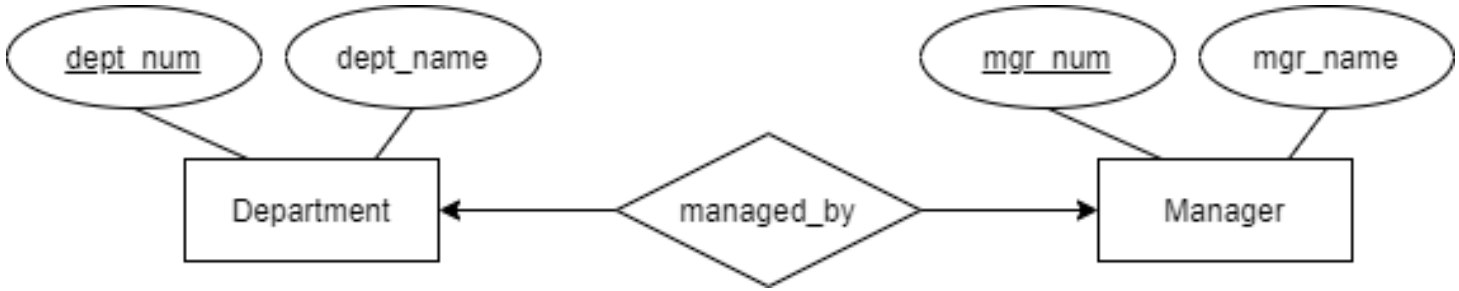

Figure: An one-to-one relationship between **Department** and **Manager**

- **Department**{*dept_num*, *dept_name*}
- **Manager**{*mgr_num*, *mgr_name*, *dept_num*}

OR

- **Department**{*dept_num*, *dept_name*, *mgr_num*}
- **Manager**{*mgr_num*, *mgr_name* }

Relationship: Cardinality Constraint (many-to-one) with Participation Constraint

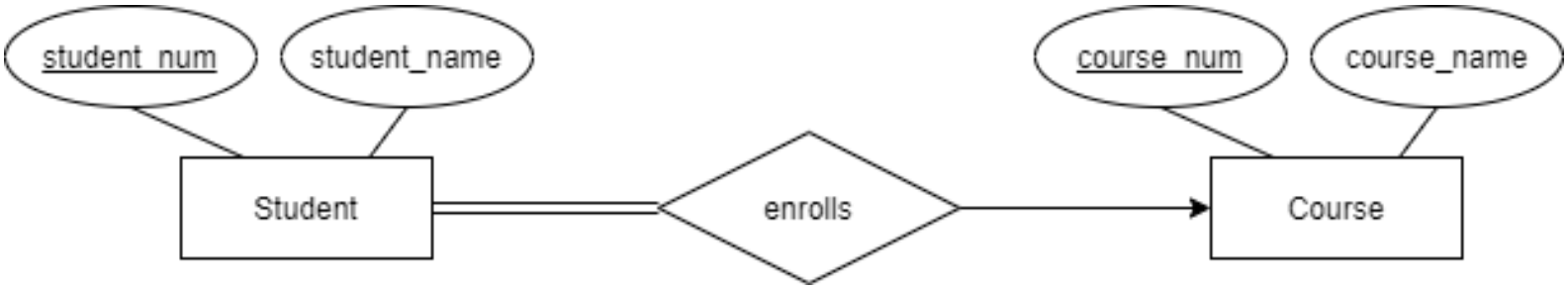

Figure: An many-to-one relationship between **Student** and **Course**

- **Student**{*student_num*, *student_name*, *course_num*}
- **Course**{*course_num*, *course_name*}

Relationship: Cardinality Constraint (one-to-one) with Participation Constraint

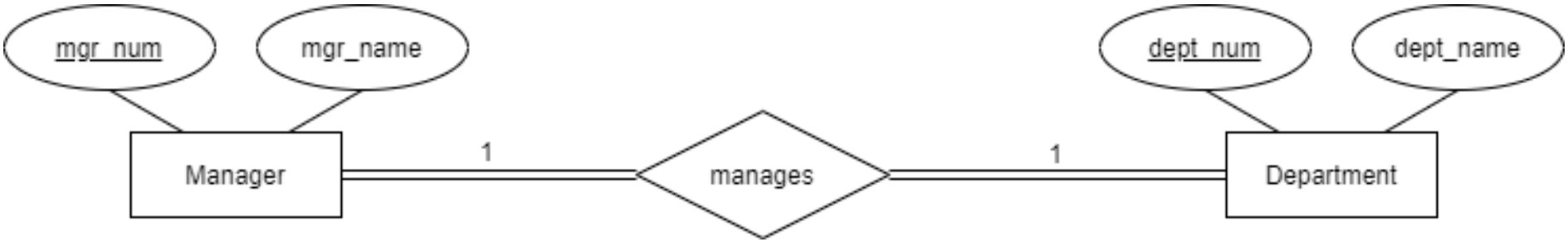

Figure: A one-to-one relationship between **Manager** and **Department**

- **Mgr_Dept**{*mgr_num*, *dept_num*, *mgr_name*, *dept_name* }

Weak Entity Set

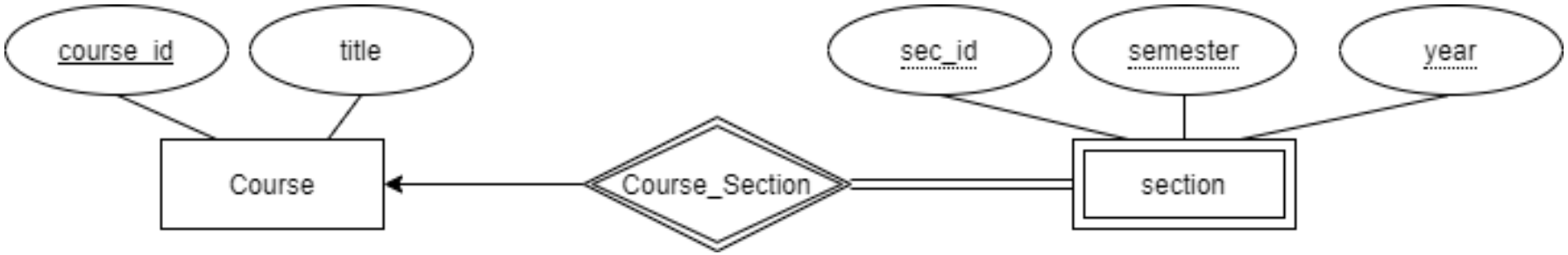

Figure: A one-to-one relationship between **Course** and **Section**

- **Course**{*course_id*, *title* }
- **Section**{*course_id*, *sec_id*, *semester*, *year* }

Ternary Relationship

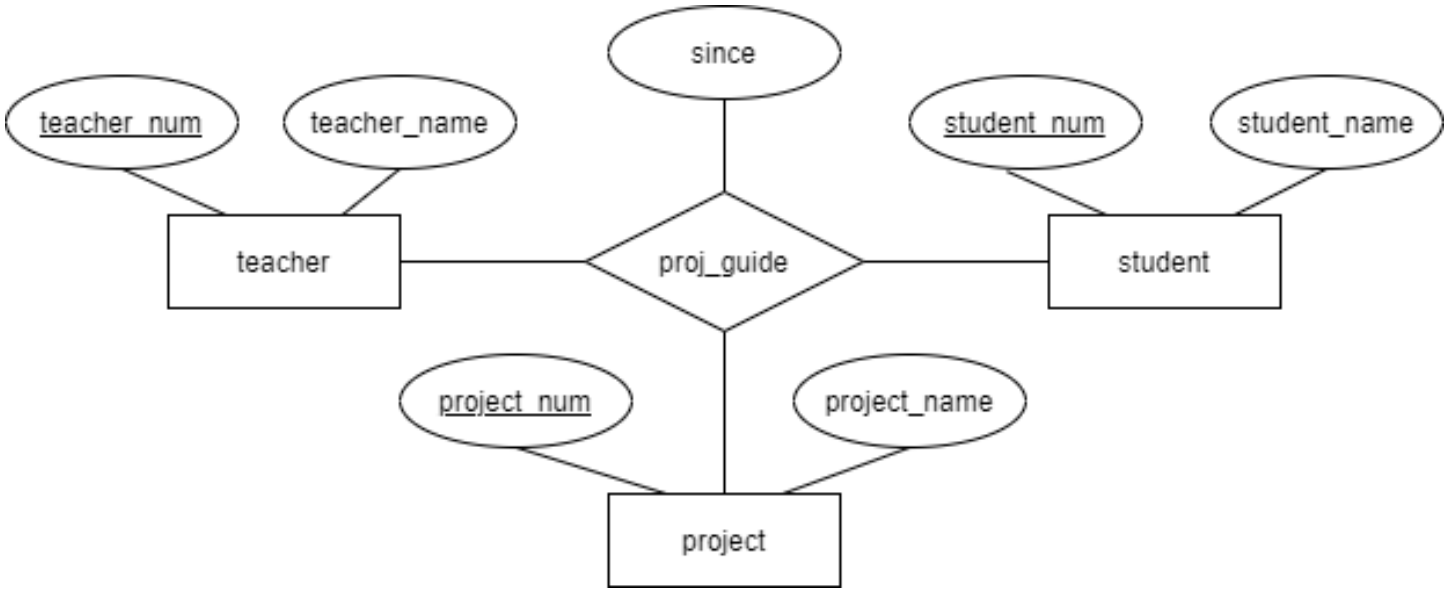

Figure: Example of ternary relationship

- **teacher**{*teacher_num*, *teacher_name* }
- **student**{*student_num*, *student_name* }
- **project**{*project_num*, *project_name* }
- **proj_guide**{*teacher_num*, *student_num*, *project_num*, *since* }

E-R Diagram with Aggregation

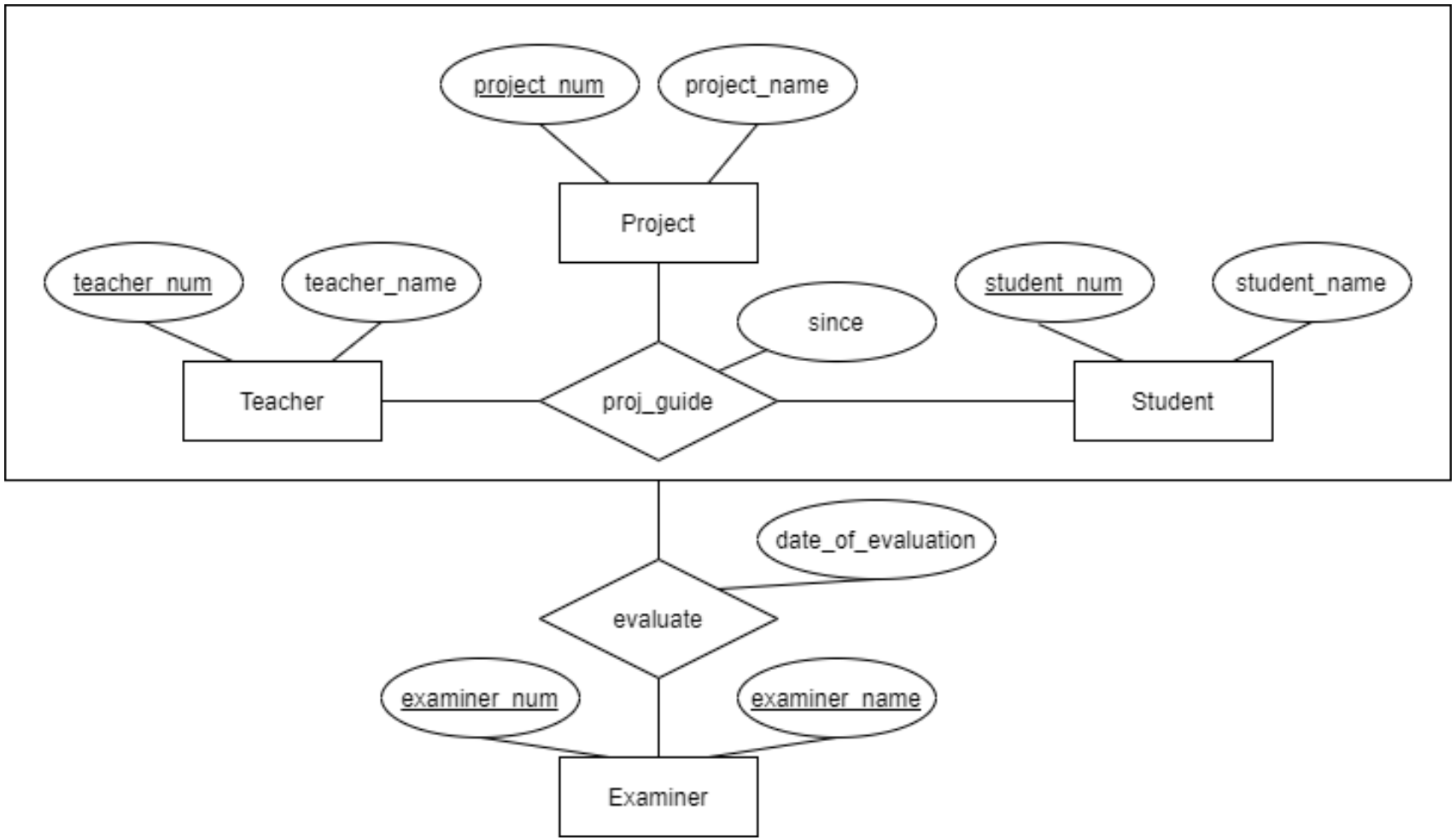

Figure: Example of Aggregation

- **proj_guide**{*teacher_num*, *student_num*, *project_num*, *since* }
- **Examiner**{*examiner_num*, *examiner_name* }
- **evaluate**{*teacher_num*, *student_num*, *project_num*, *examiner_num*, *date_of_evaluation* }

E-R Diagram with Aggregation

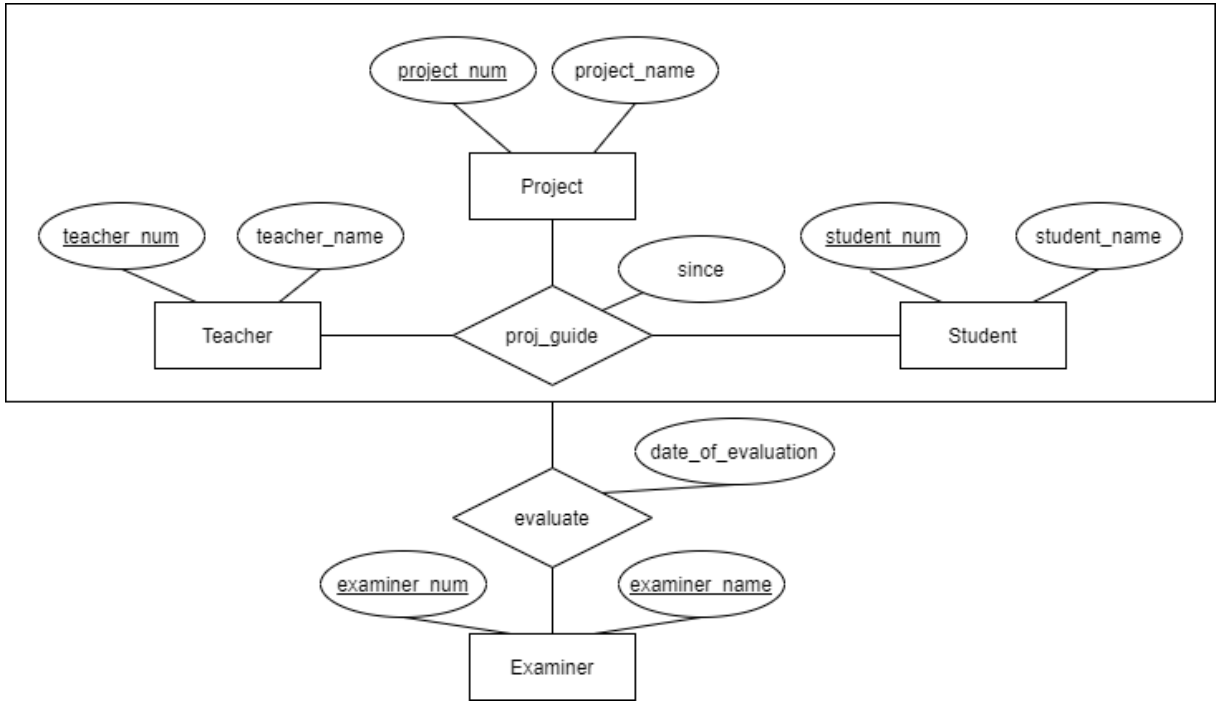

Figure: Example of Aggregation

- **Teacher**{*teacher_num*, *teacher_name* }
- **Student**{*student_num*, *student_name* }
- **Project**{*project_num*, *project_name* }
- **Examiner**{*examiner_num*, *examiner_name* }
- **proj_guide**{*teacher_num*, *student_num*, *project_num*, *since* }
- **evaluate**{*teacher_num*, *student_num*, *project_num*, *examiner_num*, *date_of_evaluation* }

Representation of Specialization

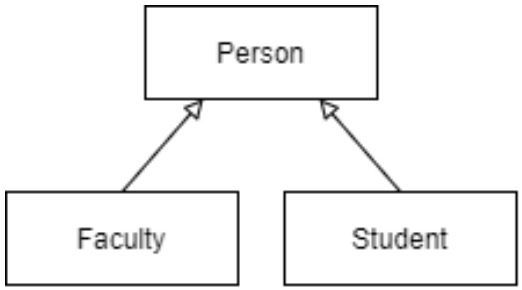

Figure: Overlapping and Partial

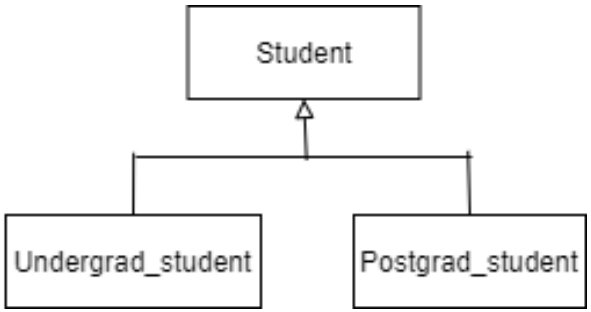

Figure: Disjoint and Partial

Solution:

- **Person**{*ID*, *name* }
- **Faculty**{*ID*, *salary* }
- **Student**{*ID*, *grade* }

- **Person**{*ID*, *name* }
- **Faculty**{*ID*, *name*, *salary* }
- **Student**{*ID*, *name*, *grade* }

- **Student**{*ID*, *name* }
- **undergrad_student**{*ID*, *project_marks* }
- **postgrad_student**{*ID*, *thesis_marks* }

- **Student**{*ID*, *name* }
- **undergrad_student**{*ID*, *name*, *project_marks* }
- **postgrad_student**{*ID*, *name*, *thesis_marks* }

Representation of Specialization (cont.)

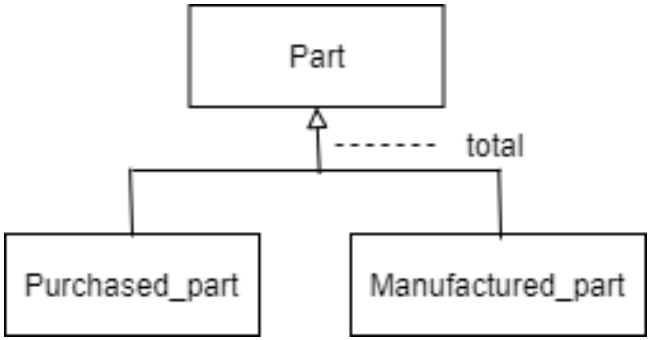

Figure: Disjoint and Complete

Solution:

- **Purchased_part**{*part_num*, *name*, *price*, *vendor* }
- **Manufactured_part**{*part_num*, *name*, *grade*, *department* }