# Progettazione Logica

Giorgio Ghelli

# The relational data model

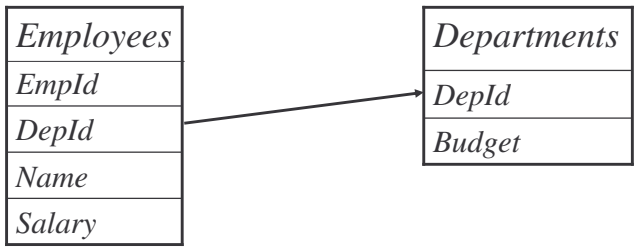
- All data in flat *tables* of *rows* with a *primary key* (access operators: later)
- Associations as *foreign keys*

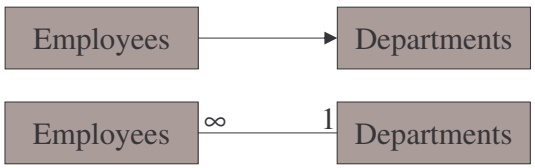
| *Employees* | | | |
|---|---|---|---|
| *EmpId* | *Name* | *Salary* | *DepId* |
| 232 | John | 1000 | Y1 |
| 143 | Mary | 1200 | X2 |
| 254 | Joan | 900 | Y1 |

| *Departments* | |
|---|---|
| *DepId* | *Budget* |
| Y1 | 100000 |
| X2 | 750000 |



# The relational data model: graphic notation









# Phases of database design

- Conceptual design
- Logical design
- Physical design

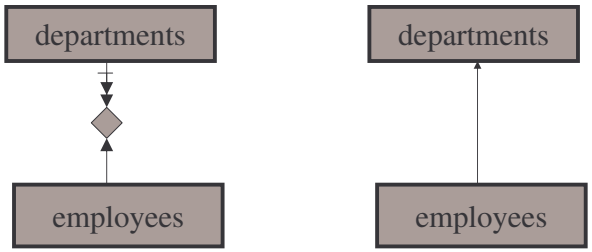
# Translating a conceptual plan to the relational model

- Add an artificial primary key to any collection which needs one
- Translate associations and inclusions into foreign keys
- Flatten complex attributes
- Translate multivalued attributes into tables



# Translating a conceptual plan

- 1-N associations become foreign keys






# M-N associations

- Encoded as a table with two *foreign keys*

| *Projects* | |
|---|---|
| *Budget* | *PrId* |
| 23000 | P1 |
| 32000 | P2 |

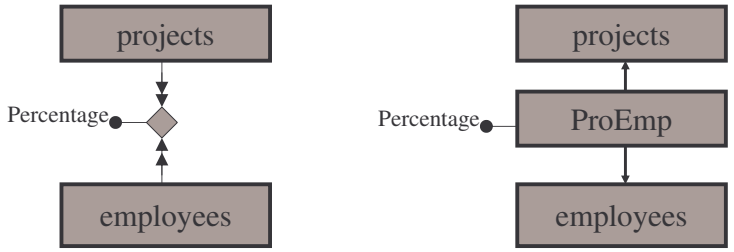
| *ProEmp* | |
|---|---|
| *PId* | *EId* |
| P1 | 232 |
| P1 | 143 |
| P2 | 232 |
| P2 | 254 |

| *Employees* | | |
|---|---|---|
| *EmpId* | *Name* | ... |
| 232 | John | ... |
| 143 | Mary | ... |
| 254 | Joan | ... |



# M-N associations

- M-N associations become tables
- They get association attributes



# Subcollections

- Conceptual:
  - Persons(PId, Name)
    - Employees ext Persons(Dept, Salary)
    - Consultants ext Persons(Project, Fee)
- Logical: ?

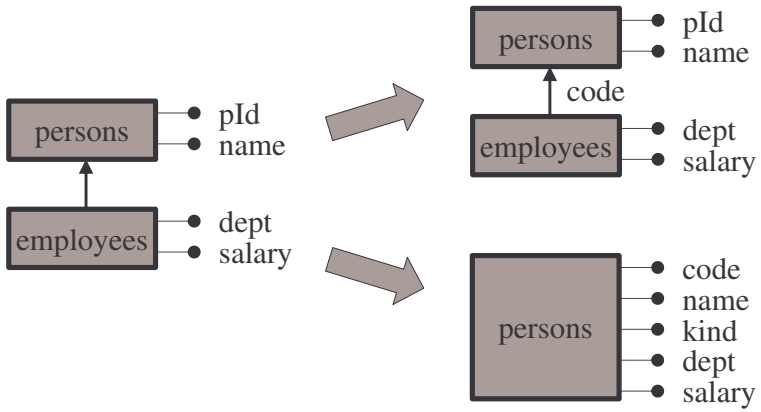


# Subcollections

- Conceptual:
  - Persons(PId, Name)
    - Employees ext Persons(Dept, Salary)
    - Consultants ext Persons(Project, Fee)
- Logical:
  - Persons(<u>PId</u>, Name)
    - Employees(Dept, Salary, <u>PId*</u>)
    - Consultants(Project, Fee, <u>PId*</u>)
  - Persons(<u>PId</u>, Name, Kind, Dept, Salary, Project, Fee)



# Subcollections






# All together, now