DBMS HW1 Report

R10625016 森林所 許致銓
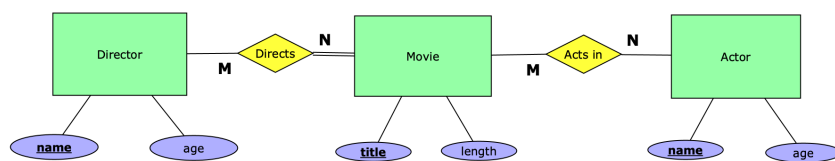
March 20, 2024

1. A

(a) **Description**

   (1) **Entity**

- Movie: 2 attributes, "title" and "length". "title" is the key attribute.
- Director: 2 attributes, "name" and "age". "name" is the key attribute.
- Actor: 2 attributes, "name" and "age". "name" is the key attribute.

   (2) **Relationship**

- Directs: The cardinality ratio is M to N, and "all movies must be directed by directors" means total participation of "Movie".
- Acts in: The cardinality ratio is M to N, and "Actor" and "Movie" are both partial participation because "An actor can act in zero or more movies. A movie can have zero or more actors".

(b) **ER Diagram**
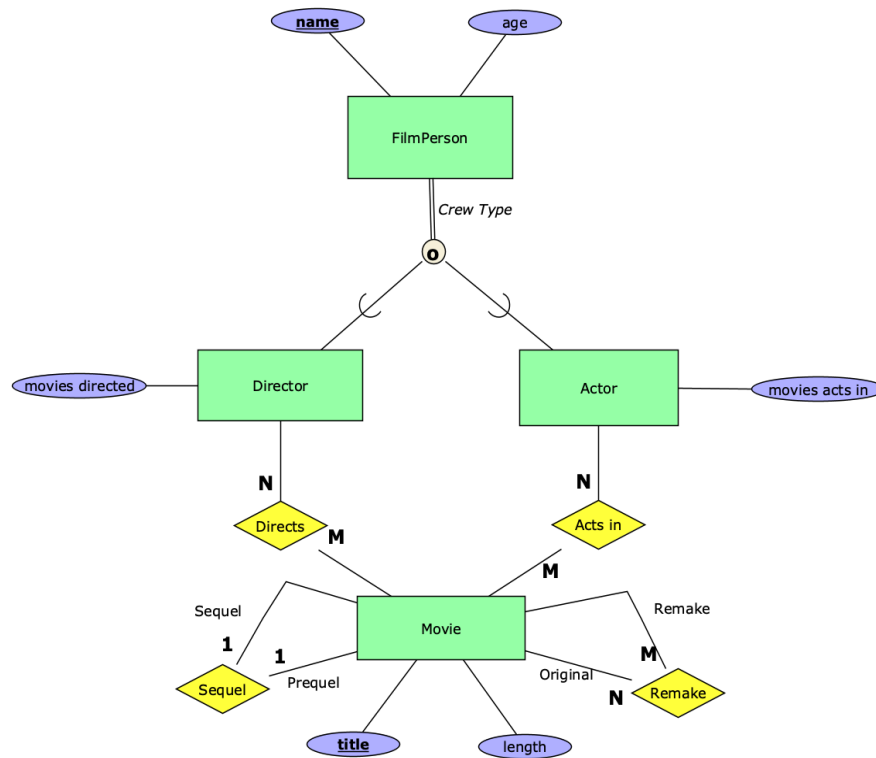

2. B

(a) **Description**

   (1) **Entity**

- Based on A.
- FilmPerson: The superclass with overlapping and total specialization of membership "Crew Type" into "Director" and "Actor". 2 attributes are "name" and "age", and "name" is the primary key.
- Director: The subclass of "FilmPerson". 1 attribute "movies directed" to record.

– Actor: The subclass of "FilmPerson". 1 attribute "movies acts in" to record.

(2) **Relationship**

– Based on A.

– Sequel: The cardinality ratio is 1 to 1 for "Sequel" because the sequel shouldn't be transitive.

– Remake: The cardinality ratio is M to N for "Remake" because the remake movie is based on the movies made before.

(b) **ER Diagram**

3. C

(a) **Description**

(1) **Database Name** : NTU Basketball Team's Management System.

(2) **Entity**

– TeamMember: The superclass with two total specializations representing the membership "Type" and "Identity". "Type" membership is overlapping specialization of "Player", "Coach", "Manager", "Analyst", and "PhysicalTherapist". "Identity" membership is a disjoint specialization of "Student" and "TheEmployed". 6 attributes, "SSN", "TeamID", "Birthday", "Name", "PhoneNumber", "Address". "SSN" is the primary key, and "Address" is a multi-valued attribute.

– Player: The subclass of "TeamMember". 5 attributes, "Stats", "Height", "Join-Date", "LeaveDate", "Position". "Stats" is a composite value attribute, including "Season", "Turnovers", "Score", "Rebound", "Assist", "Block", "Steal", "Time", and "Role". "Rebound" is a composite value attribute, including "OffensiveRebound" and "DefensiveRebound". "Position" is a multi-valued attribute.

- Coach: The subclass of "TeamMember". 4 attributes, "Role", "Payment", "Join-Date", "LeaveDate".
- Manager: The subclass of "TeamMember". 3 attributes, "Skill", "JoinDate", "Leave-Date".
- Analyst: The subclass of "TeamMember". 3 attributes, "Skill", "JoinDate", "Leave-Date".
- PhysicalTherapist: The subclass of "TeamMember". 3 attributes, "Responsibility", "JoinDate", "LeaveDate". "Responsibility" is a multi-valued attribute.
- Student: The subclass of "TeamMember" based on "Identity" membership. 5 attributes, "StudentID", "School", "Department", "UniversityYear", and "GPA".
- TheEmployed: The subclass of "TeamMember" based on "Identity" membership. 3 attributes, "Company", "Salary", and "Title". Besides, it is the superclass of "Sponsor" with the partial union.
- OtherAlumni: The superclass of "Sponsor" with the partial union. 5 attributes, "SSN", "Name", "Department", "Occupation", "PhoneNumber". "SSN" is the primary key.
- Company: The superclass of "Sponsor" with the partial union. 4 attributes, "CompanyID", "Address", "CapitalAmount", "PhoneNumber". "CompanyID" is the primary key.
- Sponsor: The subclass of "TheEmployed", "OtherAlumni", and "Company" based on the partial union. 3 attributes, "SponsorshipType", "SponsorshipPeriod", and "SpecialRequest".
- Rival: A weak entity. 5 attributes, "Report", "School", "Tactics", "Stats", and "Season". "Season" is the partial key.
- Team: 4 attributes, "TeamID", "School", "Division", and "SportsType". "TeamID" is the primary key.

(3) **Relationship**

- Instruct:
  * Data Analysis:
    "All players must be instructed by some coaches."
    "A coach can instruct zero or more players."
  * Description:
    The cardinality ratio is M to N. "Player" is total participation, and "Coach" is partial participation.

- Manage
  * Data Analysis:
    "All players are supervised as supervisees by the captain (including himself)."
    "Some players are supervised as supervisees by some of the older players (學長學弟制 & 小隊長制)."
    "A player (supervisor) can supervise zero or more players."
  * Description:
    The cardinality ratio is M to N, and the supervisee is of total participation.

- Treat
  * Data Analysis:
    "A player can be treated by zero or more physical therapists."
    "A physical therapist can treat zero or more players."

* Description:
  The cardinality ratio is M to N. "Player" and "PhysicalTherapist" are both partial participation.

– Analyze

* Data Analysis:
  "An analyst can analyze zero or more rivals."
  "A rival can be analyzed by 1 or more analysts."

* Description:
  The cardinality ratio is M to N. "Analyst" is partial participation, and "Rival" is total participation.

– Support

* Data Analysis:
  "All sponsors support 1 or more teams."
  "A team can be supported by zero or more sponsors."

* Description:
  The cardinality ratio is M to N. "Team" is partial participation, and "Sponsor" is total participation.

(b) **ER Diagram**