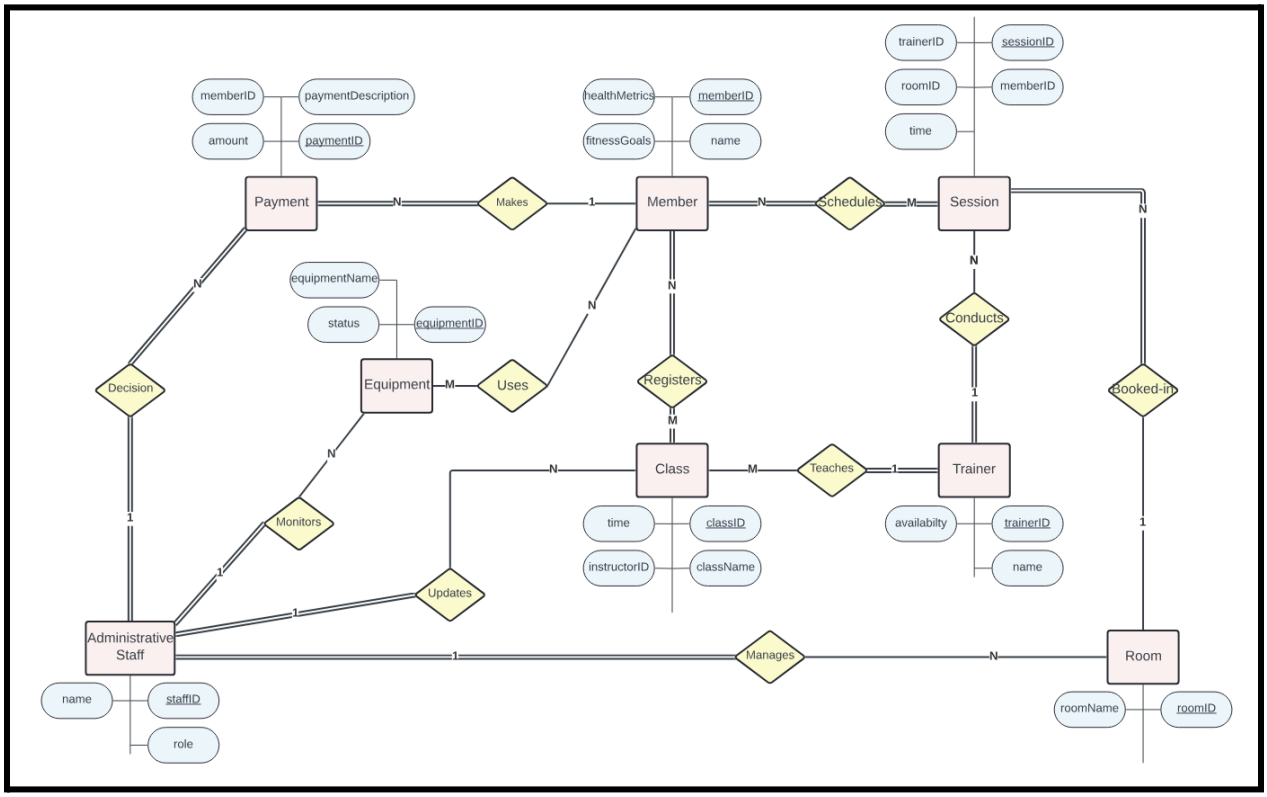
2.1

ER Diagram choices: This database design centers around the core entities of Member, Class, and Trainer. Members can register for multiple classes, creating a many-to-many relationship. Similarly, members can schedule individual sessions, also a many-to-many relationship. Sessions are linked to trainers in a one-to-many relationship, meaning a single trainer can lead multiple sessions. Trainers also teach classes in a one-to-many relationship. Rooms are booked for sessions (one-to-many), and equipment use is tracked with a many-to-many relationship between members and equipment. Finally, the system records payments, with each member potentially having multiple payments associated with them (one-to-many).

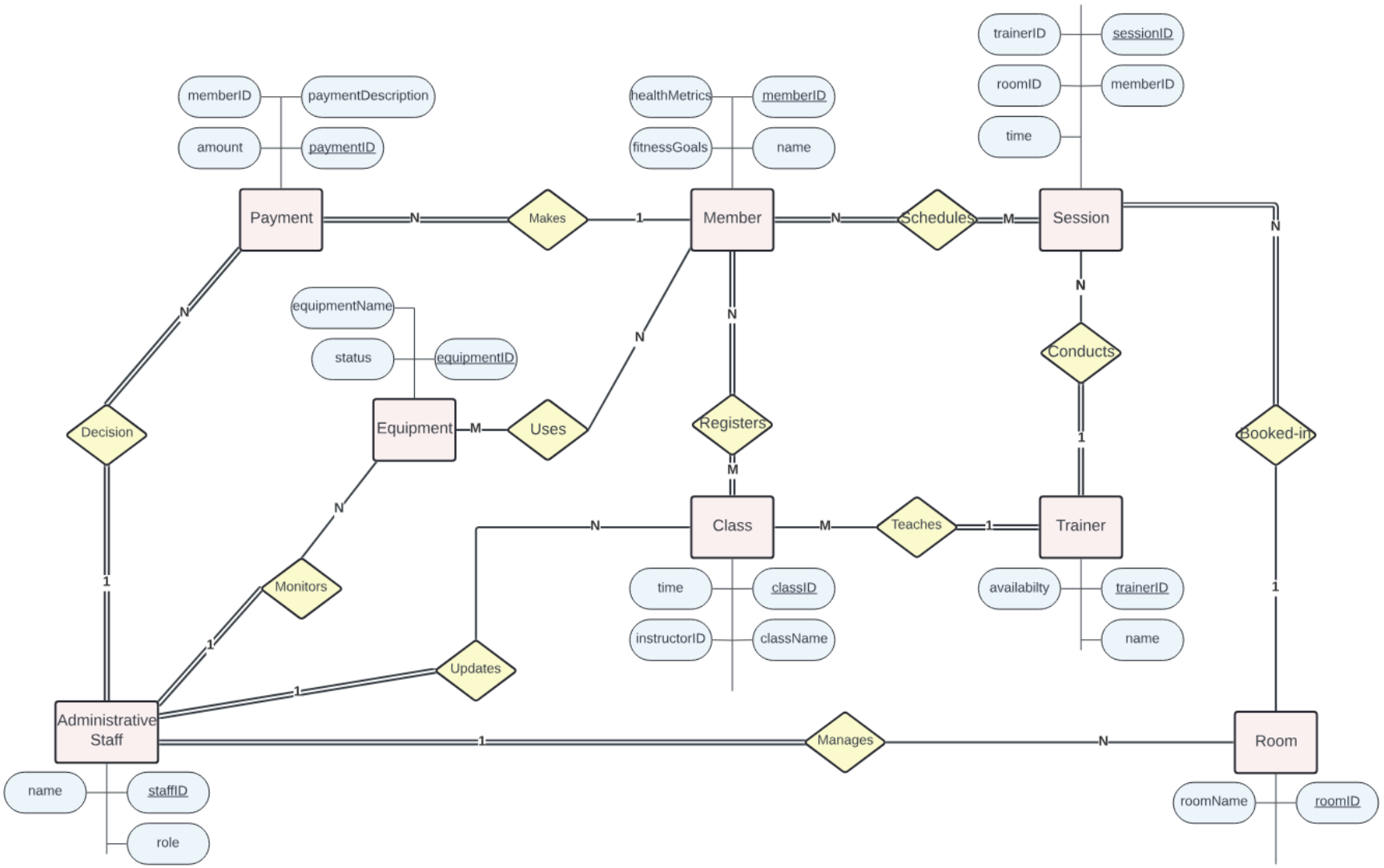
Cardinalities and Participation Constraints

- Registers-for: Many-to-many, both Member and Class must participate.
- Schedules: Many-to-many, both Member and Session must participate.
- Conducts: One-to-many, a Trainer must participate, a Session is optional (can be scheduled but not yet have a trainer).
- Teaches: One-to-many, a Trainer must participate, a Class is optional (may be on the schedule but not yet assigned an instructor).
- Booked-in: One-to-many, a Session must participate, a Room is optional (a session might be outdoors, for example).
- Uses: Many-to-many, participation is optional for both Member and Equipment.
- Makes: One-to-many, a Member must participate, a Payment must participate.

2.2 ER Diagram



Full sideways view on next page: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paymentDescription
amount
paymentID
Payment
N
Makes
1
healthMetrics
memberID
fitnessGoals
name
Member
N
Schedules
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roomID
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Booked-in
1
Room
roomName
roomID
equipmentName
status
equipmentID
Equipment
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Uses
N
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Registers
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Class
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time
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className
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Monitors
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1
Updates
1
Decision
1
Administrative Staff
1
Manages
N
name
staffID
role

2.3 Relational Schema