



The Entity-Relationship Model

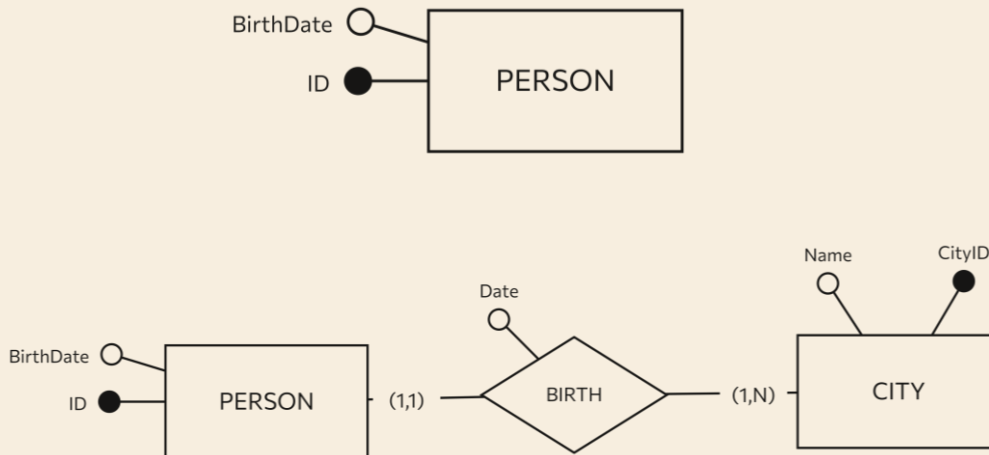
Time representation

Time in E-R models

- Time is needed to represent:
 - Events
 - Temporal changes in values and/or relationships
- Time can be modelled using:
 - Temporal attributes
 - Binary relationships
 - Ternary relationships
 - Entity historicization

Temporal attributes

- Temporal information related to a single entity or relationship
- Unique events for each entity instance
 - Example: birth date, film release date



Binary relationship

➤ Multiple events connected to a single entity

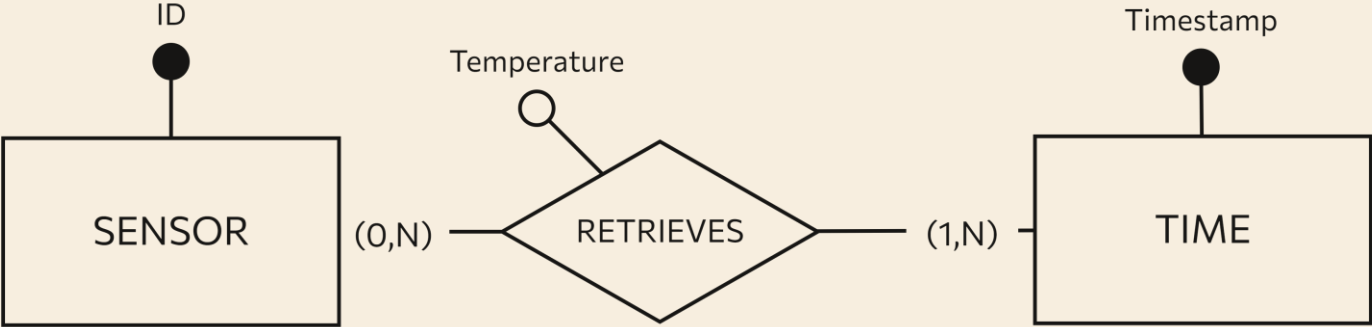
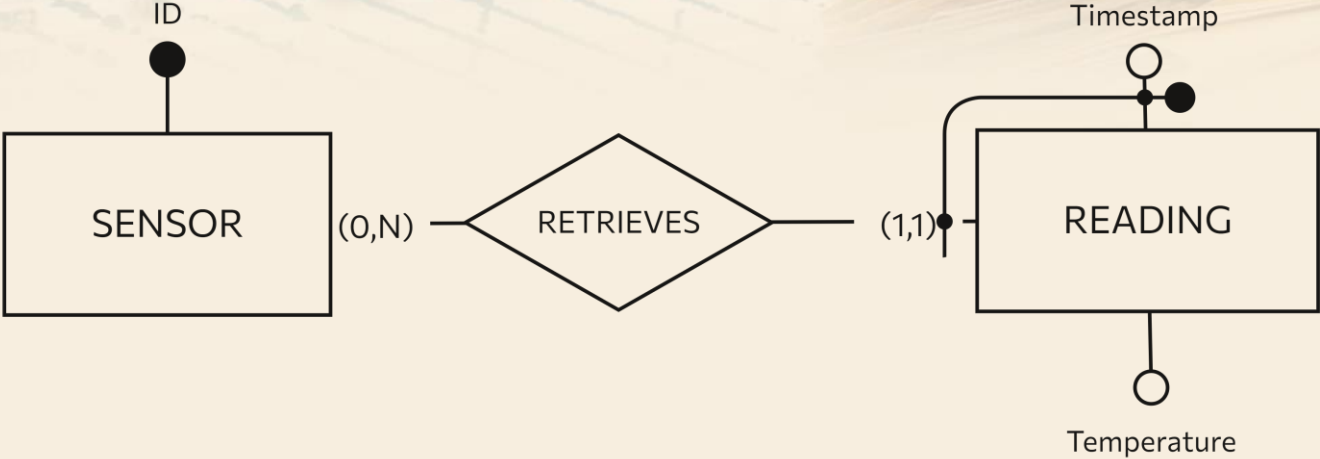
➤ TIME entity

- Identified by the initial timestamp (timestamp, date, date and time)
- The duration or final timestamp are attributes of the relationship

➤ EVENT entity

- weak entity identified by all the attributes that represent the time at which the event starts/occurs
- Events characteristics are associated with attributes of the weak entity

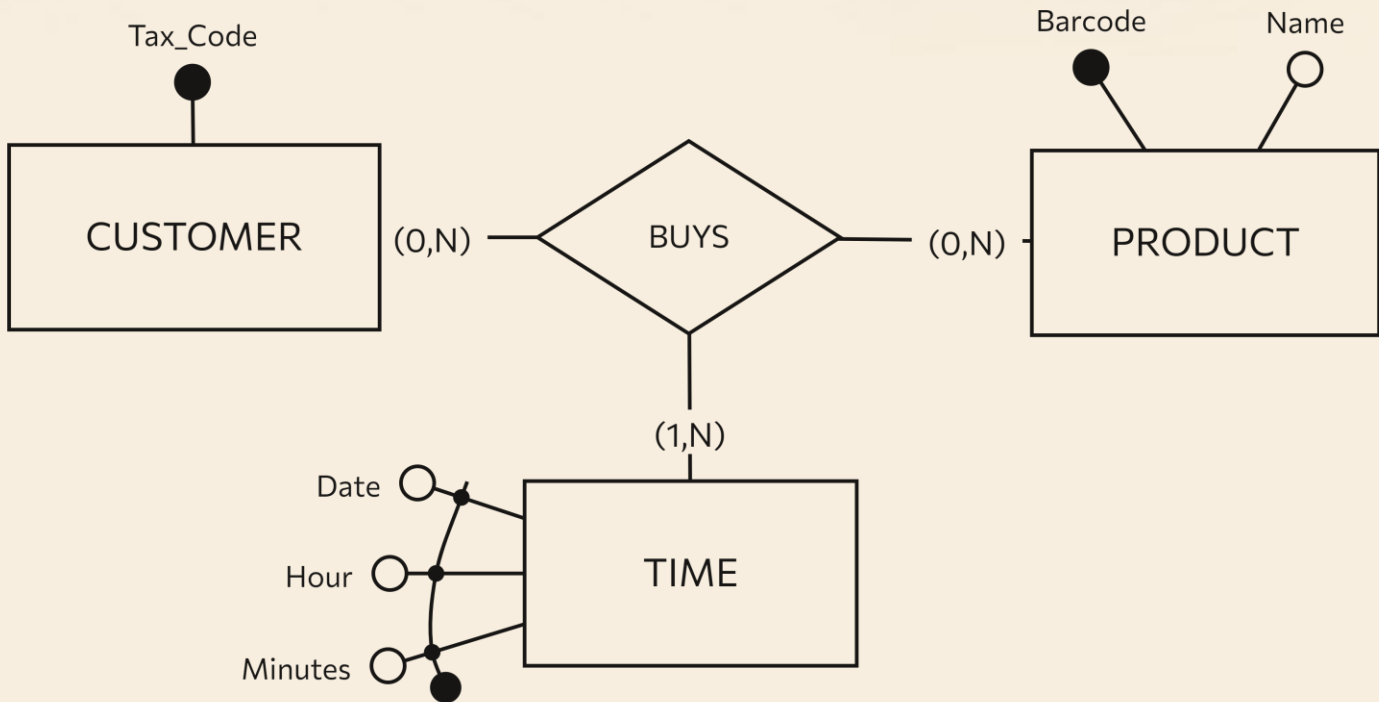
Binary relationship



Ternary relationship

- One event connects two entities
- The relationship between the two entities can occur multiple times; participation is optional
- Information related to the event (e.g., duration or final timestamp) are attributes of the relationship
- TIME entity:
 - Identifiers composed by the attributes that determine the time the events starts/occurs

Binary relationship



Historicized entity

- One event connects two entities
- There are constraints on simultaneous events (e.g., an entity cannot participate simultaneously to multiple events)
- EVENT entity:
 - Weak entity
 - Identifiers composed by the attributes that determine the time the events starts/occurs AND the identifier of the entity that cannot participate in multiple events
 - The other entity has cardinality (1,N) with the historicized entity

Historicized entity

