

## The Entity-Relationship Model

**Time representation**

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## 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

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## Temporal attributes

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

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## 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

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## Binary relationship

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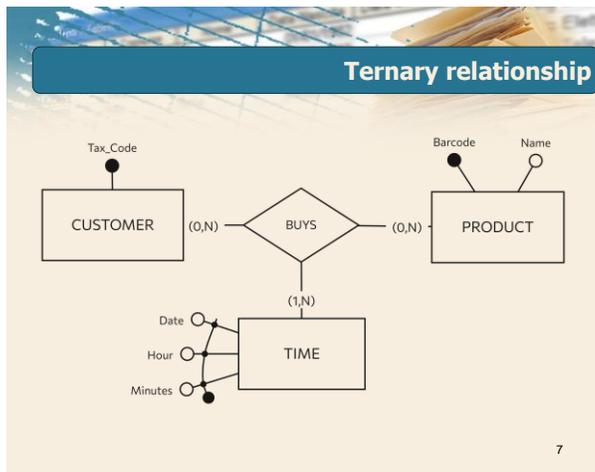
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## Ternary relationship

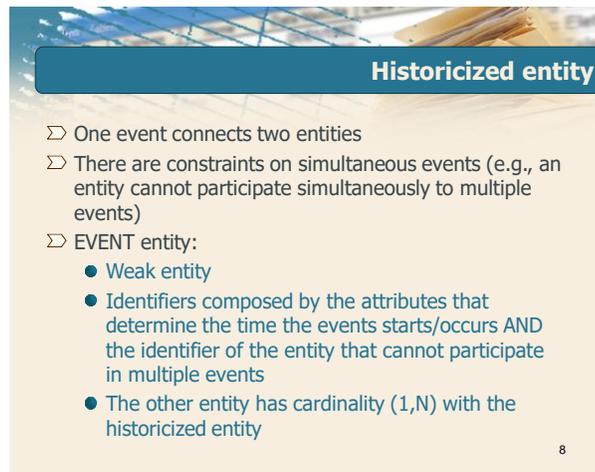
- ▷ One event connects two entities
- ▷ The relationship between the two entities can occur multiple times; participation is optional
- ▷ Information related to the event (e.g., duration or final timestamp) are attributes of the relationship
- ▷ TIME entity:
  - Identifiers composed by the attributes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

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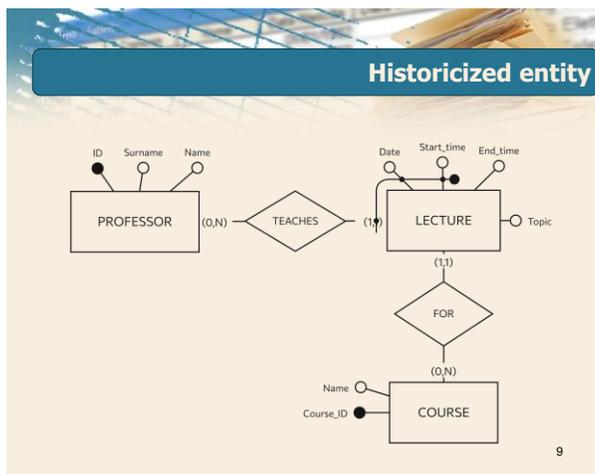
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