E-R model, Relational model, SQL

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Introduction

Lecture topics

- E-R model.
- Relational model.
- SQL, and examples.

E-R model

Overview

- Highest level of database modelling.
- Model the conceptual aspect of the database.
- Far from the physical representation in the DBMS.

E-R model

Entity

- Anything which can exist on its own on the database
- Consider a database for a space shooter game
- Starships, asteroids are entities, they have a meaning on their own

E-R model

Attributes

- They model characteristics of the entity.
- **Starship:** velocity, shield, armour, weapon, [...]
- **Asteroid:** velocity, mass, integrity, [...]

E-R model

Relations

- They describe the associations among entities (two or more).
- They have a cardinality: number of participants for each side.

E-R model

Relations - 1 : 1

- Entity modelling a pilot and one modelling a starship.
- Related by “drives”.
- The cardinality is 1:1 : one pilot drives at most one starship, and one starship can contain only one pilot.

E-R model

Relations - 1 : N

- Entity modelling a starship and one modelling a weapon.
- Realted by “mounted”
- The cardinality is 1:N : a weapon can be mounted only on one starship, but a starship can mount more than one weapon.

E-R model

Relations - N : M

- Entity modelling a starship and one modelling an asteroid.
- Realted by “collides with”
- The cardinality is N : M : several starships can collide with several asteroids.

E-R model

Keys

- A way to uniquely identify an entity.
- A key is a set of attributes that have unique values among entities.
- **Starship:** Serial number.

E-R model

Weak entities

- Entities which do not have a key attribute.
- **Asteroids:** There can be two asteroids with the same position, same mass, velocity, etc.