CS 355 Project 1

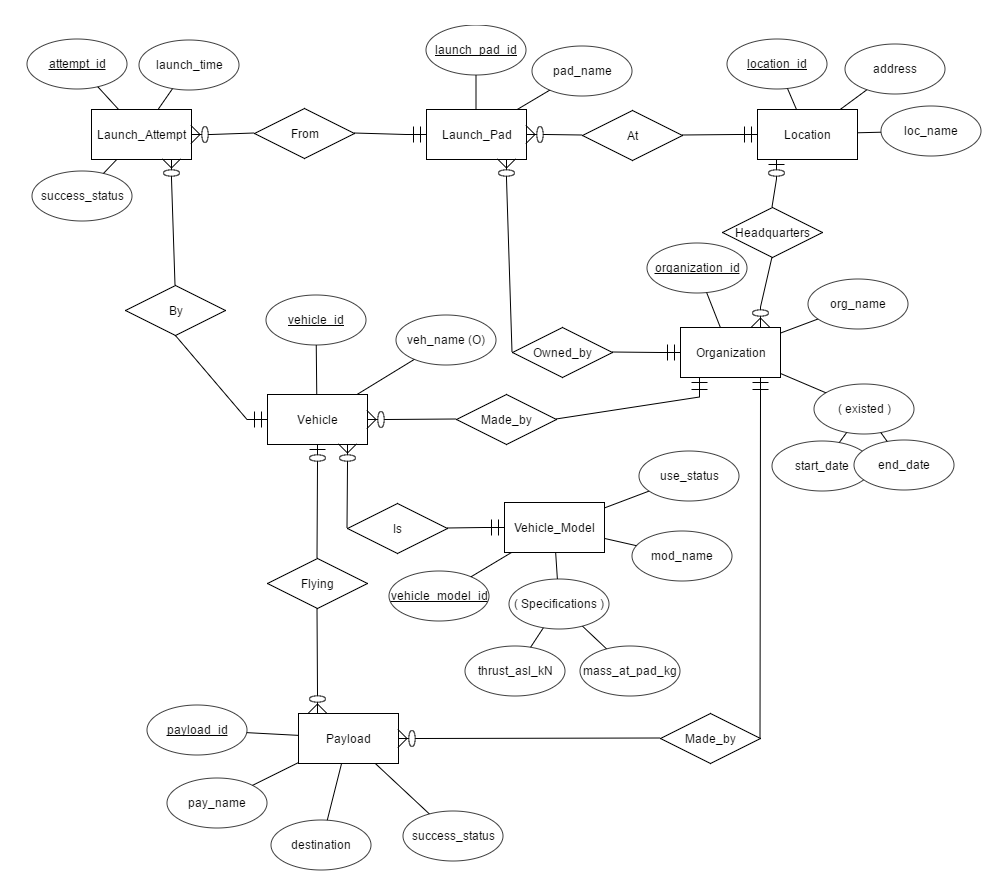
1. Overview

This database is intended to keep track of and organize data about space launch attempts and their outcomes, as well as the parties involved in these launches.

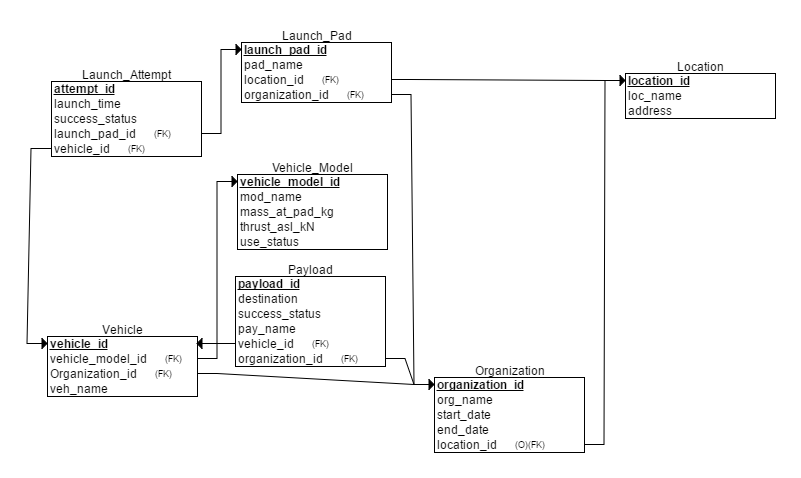
Launch attempts involve a launch vehicle which may have payloads, and a launch pad, and occur at a defined date and time, and may result in a successful launch, a delay/scrub, or a more catastrophic failure that destroys the rocket and payload. A launch vehicle is of a particular model, and provided by an organization, and may host multiple payloads to multiple destinations. This vehicle model will have a specific thrust at sea level, mass at launch, and may be in continued operation or defunct. A payload will have an intended destination, which may be an orbit type or extraterrestrial body, and will belong to some organization. Payloads will be launched by one launch vehicle, and may be a success, partial success, or failure independent of the success of any of its launch attempts. Launch pads are operated by an organization, and will be located at some location (often an Air Force Base) with an address, which bay be host to several launch pads. An organization may own/operate launch vehicles, payloads, or launch pads, and will have a start and end date, along with a location for its headquarters.

This can be summarized as following: An organization may operate launch vehicles, payloads, and launch pads. A launch vehicle is of a particular type, and hosts multiple payloads. Both a launch pad and an organization headquarters has a location. A launch attempt involves a vehicle carrying payloads, and a launch pad.

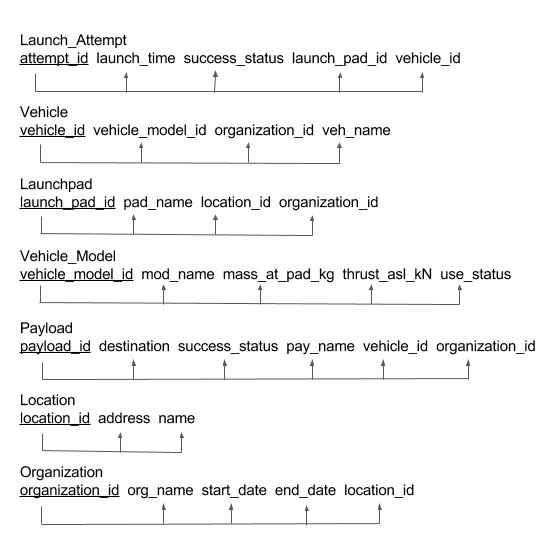
Entity Relationship Diagram:



Relational Schema:



Functional Dependency Diagram:



1. Description of tables, attributes, and keys

Table 1: location

Purpose: Stores the addresses and names of locations.

Attributes: The name of the location (for instance, Vandenberg AFB), the address of that location. The address should be unique.

Keys: Each location is assigned a unique location ID, which is its primary key.

MySQL:

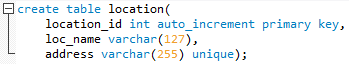


Table 2: organization

Purpose: Stores information on organizations.

Attributes: The name of the organization, the date the organization was founded, the date the organization was ended, and the organization headquarters’ location ID.

Keys: Each organization is assigned a unique organization ID, which is its primary key. The location ID should be referred to the location table prior to the entry.

MySQL:

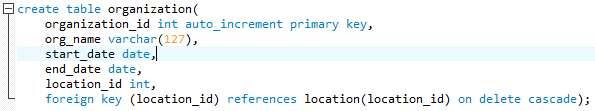


Table 3: launch\_pad

Purpose: Stores information on launch pads’ ownership and location.

Attributes: The name of the pad, the location ID where the pad is located, and the organization ID of the pad owner.

Keys: Each launch pad is assigned a unique launch pad ID, which is its primary key. The location ID and organization ID should be referred to the location and organization tables respectively prior to entry.

MySQL:

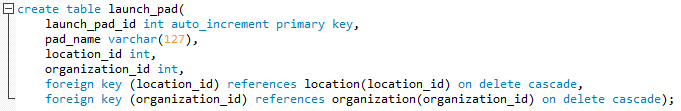


Table 4: vehicle\_model

Purpose: Stores information on launch vehicle models/iterations.

Attributes: The name of the model/iteration, the mass of the fully fueled vehicle, the thrust of the vehicle at sea level, and whether it is still being used.

Keys: Each vehicle model is assigned a unique vehicle model ID, which is its primary key.

MySQL:

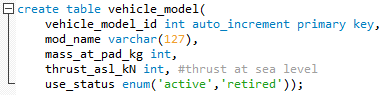


Table 5: vehicle

Purpose: Stores information on an individual launch vehicle.

Attributes: The name of the vehicle, if it has an individual designator, the vehicle model ID of the vehicle, and the organization ID of the vehicle’s owner/provider.

Keys: Each vehicle is assigned a unique vehicle ID, which is its primary key. The vehicle model ID and the organization ID should be referred to the vehicle model and organization tables respectively prior to the entry.

MySQL:

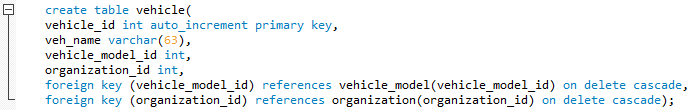


Table 6: launch\_attempt

Purpose: Stores information on launch attempts, whether they were scrubbed (cancelled) or not.

Attributes: planned time of launch, whether it succeeded or failed (or scrubbed), the ID of the pad it took place on, and the ID of the particular vehicle involved.

Keys: Each launch attempt is assigned a unique launch attempt ID, which is its primary key. The pad ID and the vehicle ID should be referred to the launch\_pad and vehicle tables respectively prior to the entry.

MySQL:

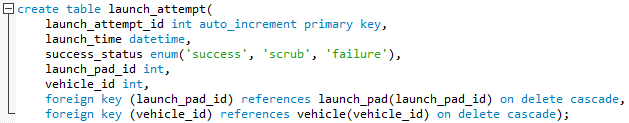


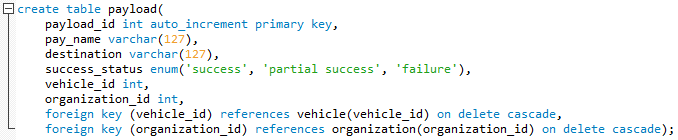
Table 6: payload

Purpose: Stores information on a payload

Attributes: The name of the payload, the destination of the payload (an orbit or celestial body), the success status of the payload, the vehicle ID of the payload’s launcher, and the organization ID of the payload’s owner.

Keys: Each payload is assigned a unique payload ID, which is its primary key. The vehicle ID and organization ID should be referred to the vehicle and organization tables respectively prior to the entry.

MySQL:



1. **Description of operations:**

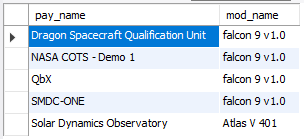
Query utilizing join between 3+ tables:

Returns payloads, and the vehicle model they were launched with

MySQL:



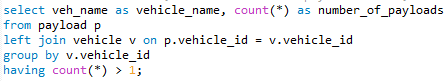
Output:



Query utilizing a join, group by, having, and an aggregate function:

Returns launch vehicle, and the number of payloads on it, if it has more than one.

MySQL:



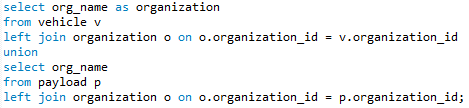
Output:



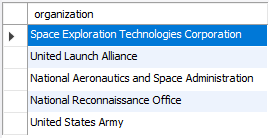
Query using a UNION:

Returns Organizations that work with either payloads or launch vehicles.

MySQL:



Output:



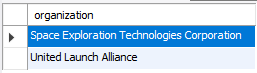
Query using DISTINCT:

Lists Organizations that have vehicles.

MySQL:



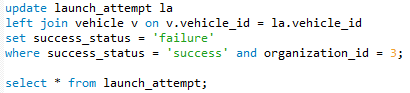
Output:



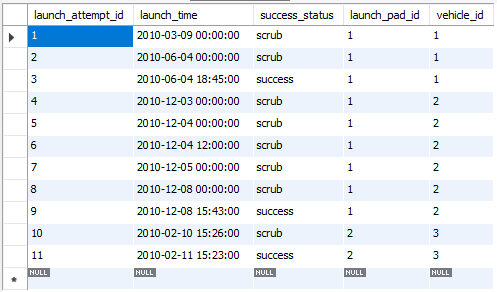
Non-trivial data record modification other than INSERT VALUES (like UPDATE, or INSERT using SELECT)

Travels back in time to destroy all of spacex's rockets on their successful flight.

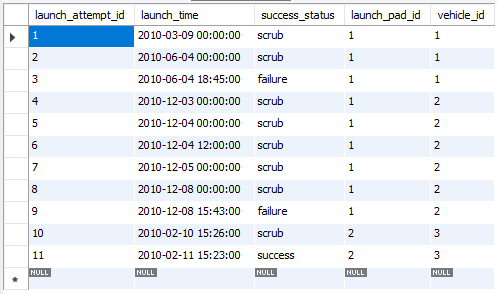
MySQL:



launch\_attempts before:



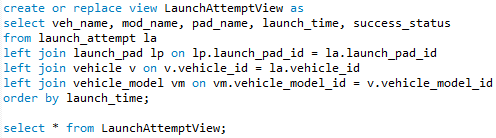
launch\_attempts After:



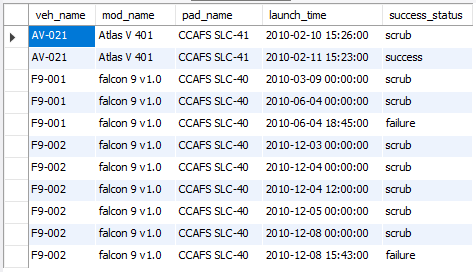
Non-trivial VIEW:

Has every launch attempt's time and success status, as well as the model of rocket, rocket name, and the name of the launch pad.

MySQL:



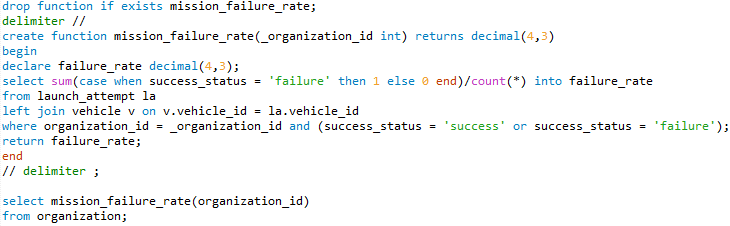
Output:



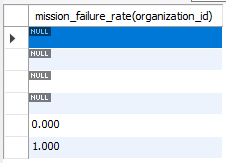
A function:

Given a company id, returns the failure rate (failure/failure+success).

MySQL:



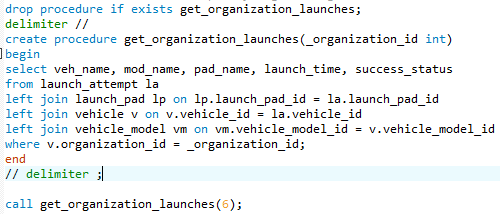
Output:



A procedure:

Returns info on launch attempts by a given organization.

MySQL:



Output:

