

- 1) A flight control system must be developed. A flight takes place on a given day and has an estimated departure and arrival time. A flight is operated with an aircraft which has an id code, brand, model, and maximum flight time. An aircraft belongs to a type/category of aircrafts. A flight is also operated by a number of crew members among which two are pilots. One of the pilots is the captain of the flight. Each crew member has an id number, name and age. The flight must follow a flight plan. A flight plan has a cruising altitude and it is a sorted sequence of points called VOR that the plane must cross during the flight. A VOR point is a radio beacon located on Earth at some latitude and longitude and it has a radio frequency. Each VOR in a flight plan must be reached with a given entry angle and must be left behind by the aircraft with a given exit angle.

The flight has a departure and an arrival airport. Each airport has a city name, an altitude, the radio frequency of the control tower and several runways. A runway is identified with a code and has a given length. A runway may have several approaching paths. An approaching path is only valid for certain types of aircrafts. An approaching path is identified by a code and has a type (a string such as "ILS", "Visual", etc). An approaching path consists of several control points. A control point is located at a given distance from the airport and has a minimum and maximum height at which aircrafts may pass. Moreover, every approaching path must have a special control point known as the escape point. If an aircraft reaches the escape point and it is outside the height limits specified for the point then the aircraft must abort the landing and go to a nearby VOR point. The collection of possible VOR points to go when aborting the landing must be described in the system for every escape point. To go to a VOR point from an escape point the aircraft must follow a given orientation (angle), reach a specified altitude and must stay around the VOR describing a circle trajectory of a given specified radius. This information must also be part of the information system.

1. Obtain the class diagram for the previous information system (2 points)
2. Define the following restrictions using OCL (1 point)
  - a. The captain of the flight is one of its pilots.
  - b. The destination airport of a flight must have at least one runway with a valid approximation path for the type of aircraft that operates the flight.
  - c. Given an approximation path, its escape point must be one of its control points and it must be the one with minimum distance to the airport (you may assume the existence of an operation `min()` over collections of numbers)
  - d. Given a VOR and a date "*d*", all the flights that cross the VOR on that date (the VOR is part of the flight plan) must have different cruising altitudes.