Cairo University
Faculty of Computers & Artificial Intelligence
Computer Science Department
Year 2022 – 2023
Second Term

Assignment 2

Deadline of assignment submission is 25/12.

The students per group should not exceed 3 students.

Assignment Goal

The goal form this Assignment is to know how to build ontology with several constraints using protégé.

Problem Description

Every airport consists of multiple facilities. These facilities are mainly the airfield (which consists of runways, taxiways, and gates), air traffic controller towers, passengers' terminals, and finally maintenance shops for the aircrafts. This aim of this project is to develop an ontology for airfield.

Every airfield has an elevation which describes how much is the elevation of the field's surface from the sea level. It also has a four-letter unique identifier and a usage type. This type describes for which mission the airfield is used (civilian, military, charter).

Every runway has a name (code specifying its direction, e.g.: 05C) and a length specifying the maximum takeoff or landing distance for the different types of aircrafts. Finally, it has a type (asphalt or grass) and one or more exit. These exits lead to the taxiways.

Every taxiway has a name (usually just a letter, example A, pronounced Alpha) and a maintenance status (open or locked) and every gate has a gate number and capacity and compatibility (specific aircraft types).

Every aircraft has a unique identification number and a type (e.g, Airbus A330). It also has a manufacturer (e.g. Boeing, Airbus), a class (wide body and narrow body), engine-count, passengers' capacity, max-speed, and finally its position (which will be a taxiway or a runway).

Every airport is also has a name.

Some rules and tips:
Make sure that no part of the airfield can belong to a taxiway and also a runway at the same time (hint: no one instance can belong to both of those classes).

Make the relationship between the aircraft and the taxiway (and runway) go in both directions (hint: use inverse properties).

Taxiway and Runway are subclasses of a "ground surface" concept.

Task
1. **Create an ontology describing this domain and scenario. (4 marks)**
2. **Fill in the given data to create your knowledgebase and run the reasoner**

Data

1. Airports
Airport name: **Cairo International Airport**
Airport name: **Almaza Airport**

2. Airfields
Almaza Airport has an airfield with the following data:
Airfield ID: **HELA**
Usage Type: **Military**
Elevation: **200**
Runways: **"05C" and "14D"**
Taxiways: **"A", and "M"**
Gates: **A1, A2.**

Cairo International Airport has an airfield with the following data:
Airfield ID: **CAI**
Usage Type: **Civilian**
Elevation: **300**
Runways: **"06D" and "02E"**
Taxiways: **"B", and "K"**
Gates: **B1, B2, C1.**

3. Runways
Runway name: **05C**
Length: **1200 (ft)**
Type: **Grass**
TaxiWay**: M**

Runway name: **14D**
Length: **1500 (ft)**
Type: **Asphalt**
TaxiWay: **A**

Runway name: **06D**
Length: **1200 (ft)**
Type: **Asphalt**
TaxiWay: **B**

Runway name: **02E**
Length: **2000 (ft)**
Type: **Asphalt**
TaxiWay: **K**

4. Taxiways
Taxiway name: **A**
Maintenance status: **Open**

Taxiway name: **M**
Maintenance status: **Locked**

Taxiway name: **B**
Maintenance status: **Locked**

Taxiway name: **K**
Maintenance status: **Open**

5. Gates
Gate number: **A1**
Capacity: 350
Compatible With: AirBus A320, A330, A380

Gate number: **A2**
Capacity: 300
Compatible With: AirBus A330, A380

Gate number: **B1**
Capacity: 150
Compatible With: Boeing737,767,787

Gate number: **B2**
Capacity: 300
Compatible With: AirBus A320

Gate number: **C1**
Capacity: 100
Compatible With: Boeing787

6. Aircrafts
Aircraft ID: **SKU10**
Type: **A330**
Manufacturer: AirBus
Class: Wide Body
Engine Count: 4
Capacity: 200
Max Speed: 900 (km/h)

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Position: **Runway 05C**

Aircraft ID: **KMN20**
Type: **A380**
Manufacturer: AirBus
Class: Wide Body
Engine Count: 4
Capacity: 300
Max Speed: 1000 (km/h)
Position: **Runway 05C**

Aircraft ID: STU30
Manufacturer: Boeing
Type: Boeing737
Class: Narrow Body
Engine Count: 2
Capacity: 150
Max Speed: 800 (km/h)
Position: **Runway 06D**

Aircraft ID: UWD20
Manufacturer: Boeing
Type: Boeing787
Class: Narrow Body
Engine Count: 2
Capacity: 100
Max Speed: 1000 (km/h)
Position: **Taxiway K**