Concordia University | CENTRE FOR CONTINUING EDUCATION

CEWP MOD4B: OBJECT-ORIENTED METHODS WITH UML

Final Project

High level description

You are tasked with making a sample training software which would become tricky and cumbersome to make without planning in advance. First you will plan by creating UML Diagrams for the core architecture and features. Then you will implement a functional prototype following the design you laid out.

Description

The user of this simulated training software is an air traffic controller. The simulation begins at 0h00. Each "hour" begins by giving the user a few of many randomly chosen **requests**. The user will then make a decision which will affect many internal variables. Once the user has answered all requests. The simulation moves forward one hour and the sequence begins all over again.
The simulation ends after 24 hours or if 350 passengers die.

An "hour" passes every time the user selects the "Advance time" **option** in the main menu. This will only be available once all requests have been completed.

It is important your code cannot enter an erroneous state, less your client be unhappy. Be villigilant in testing use cases.

Requirements

Below are all the menus the user interacts with.

Main menu

- Top right displays current hour and #passengers killed
- Menu options
    - Go to **Request Menu**
        - This menu option is only visible when requests exist.
    - Go to **Waiting Planes** menu
    - **Advance** to the next **hour**
        - This menu option is only visible when no requests exist

Runway menu

- User starts with 8 runways
- Shows an index table
    - Each row is a runway.
    - Columns: Name of occupant, Occupied time remaining
- **Option** to return to **main menu**

Waiting Planes menu

- Shows an index tabled, each row contains the following:
    - Plane name
    - Fuel left
- **Option** to select a plane to land
    - A plane can only land when a runway is open
- **Option** to return to main menu

Advance hour screen

- When the user advances hour. A simple menu appears which states events which occurred while the hour passed. These events are the following
    - Current time
    - Number of new requests coming in (Just the amount)
    - Number of passengers dead from waiting planes crashing
    - Game Over if number of passengers killed >= 350
    - Continue to **main menu** if number of passengers killed < 350
    - Victory message if hour > 24h

Requests

Every “hour” of gameplay, the user will receive a random number of requests (1-3). The requests each contain a title, description, rarity and several options. The user will be able to select one of the available options in order to fulfill the request. Each option has a requirement, and consequences.
The options below are the ones you need to program into the training simulation.
The rarity determines the percent chance that request is chosen when randomly choosing a request. Multiple of the same requests can happen in an hour.

SEE THE END OF THE DOCUMENT FOR ALL THE REQUESTS SPECIFICATIONS.

UML Diagrams

The following diagrams are required for your system:

Class Diagram
Activity Diagram
Sequence Diagram

Everyone should understand the diagrams even if they did not make them. The diagrams should make it quick and painless to implement the code.

Grading

The project is too big for just one person to complete stress free. Although from an integration standpoint, it is easier for one person to create and integrate all the separate functions. In the job field, you will each only work on a part of a whole and need to integrate all your parts in a manner that will make a working prototype. This is a time for valuable practice on how to separate work in a single project amongst multiple people.
Your git and scrums will be the primary method the teacher will track your work. Students will be graded for their work, not on the final state of the prototype. Even if the prototype is functional, but all the work is shown to be done by only a small portion of the group, the part of the group that did no work will still fail even though the prototype works.

Technical Request specifications

Rarity	Title	Desc	Requirements	Consequences
40%	Plane Landing	Plane requests to land. It has [3-5] hours of fuel left to wait. It needs [1-4] hours of runway time. It has [100-500] passengers		
	Option Desc		Requirements	Consequences
Option A	Allow landing		1 empty runway	Plane lands and occupies the runway for stated time.
Option B	Place on standby		None	Airplane joins “waiting” planes.

Rarity	Title	Desc	Requirements	Consequences
5%	Emergency landing	Plane requests to land. It has [1-3] hours of fuel left to wait. It requires [3-5] hours of runway time. It has [100-500] passengers		
	Option Desc		Requirements	Consequences
Option A	Allow landing		1 empty runway	Plane lands and occupies the runway for stated time.
Option B	Place on standby		None	Airplane joins “waiting” planes.

Rarity	Title	Desc	Requirements	Consequences
10%	Funding Event	Increase in funding allows for one of the following bonuses		
	Option Desc		Requirements	Consequences
Option A	Empty random runway		1 full runway	Empties a random runway.
Option B	Rescue team		None	Reduces number of dead passengers by 100
Option C	Air refueling		At least one plan in air	All waiting airplanes in air

Rarity	Title	Desc	Requirements	Consequences
15%	Jumbo jet	A large aircraft carrying [300-600] passengers with [4-6] hours of fuel wishes to land.		
	Option Desc		Requirements	Consequences
Option A	Allow landing		1 empty	Plan lands and occupies

		runway	runway for stated time.
Option B	Place on standby	None	Airplane joins “waiting” planes.

Rarity	Title	Desc	Requirements	Consequences
10%	Bad Weather	Select a bad weather event		
	Option Desc		Requirements	Consequences
Option A	Cross winds		None	Remove 1 hour of fuel from all waiting planes in air.
Option B	Icy run ways		None	Add 2 hours wait time to all planes waiting in runway.
Option C	Ice storm		At least 1 runway	Remove a runway

Rarity	Title	Desc	Requirements	Consequences
10%	Snakes on the plane	A pilot is reporting that their plane is being overrun by snakes. They want to land at your airport.		
	Option Desc		Requirements	Consequences
Option A	Let them land		Free run way	Plane will occupy runway for 7 hours
Option B	Refuse them		None	Counts as letting 50 people die

Rarity	Title	Desc	Requirements	Consequences
5%	Protests	A group of protestors are blocking the runway claiming that your airplanes are dropping chemtrails which has caused the the following health issues: “makes their toothpaste taste like mint.”		
	Option Desc		Requirements	Consequences
Option A	Allow them the space to protest		Free run way	One runway will be blocked for 10 hours
Option B	Get police involved		2 Free runways	Two run ways will be blocked for 4 hours
Option C	Let the planes land anyways		None	Counts as 100 passengers dying

Rarity	Title	Desc	Requirements	Consequences
5%	john mcclain	Security reports of a man hijacking a plane on the runway. He claims he needs to stop the terrorists from stealing christmas. Do you lock down the runway or let them go?		

	Option Desc	Requirements	Consequences
Option A	Lockdown the runway	Free run way	One runway will be blocked for 8 hours
Option B	Let the man go	None	He crashes the plane into another random **Waiting plane** and saves christmas. Remove the waiting plane (no cost) and kill 100 passengers.