Tecnología de la Programación - Academic Year 2017/2018

September's Exam (07/09/2018) - Duration: 2 hours.

Maximum grade: 5 points

Grados en Ingeniería Informática, del Software y de Computadores
y Doble Grado en Informática y Matemáticas

Instrucciones

- In this exam you have to start from the last version of assignment 5 that you have uploaded to the Campus Virtual recently. Shortly you will be provided with instructions on how to download it.
- **Create a text file `changes.txt` in the root of your project (inside `src`).** In this file you will have to include the names of all files (classes, etc.) that you have modified or added. In addition, you can include other comments regards your solution that will be taken into account during the marking process.
- The submitted code ***MUST COMPILE***, otherwise you fail the exam.
- ***Breaking encapsulation*** (accessing private and protected fields from external classes, use of public fields, etc.) implies failing the exam.
- When marking the exam, we will evaluate functionality, clarity of the code, the use of object oriented principles (inheritance, polymorphism and dynamic binding) and comments.

You are advised to ...

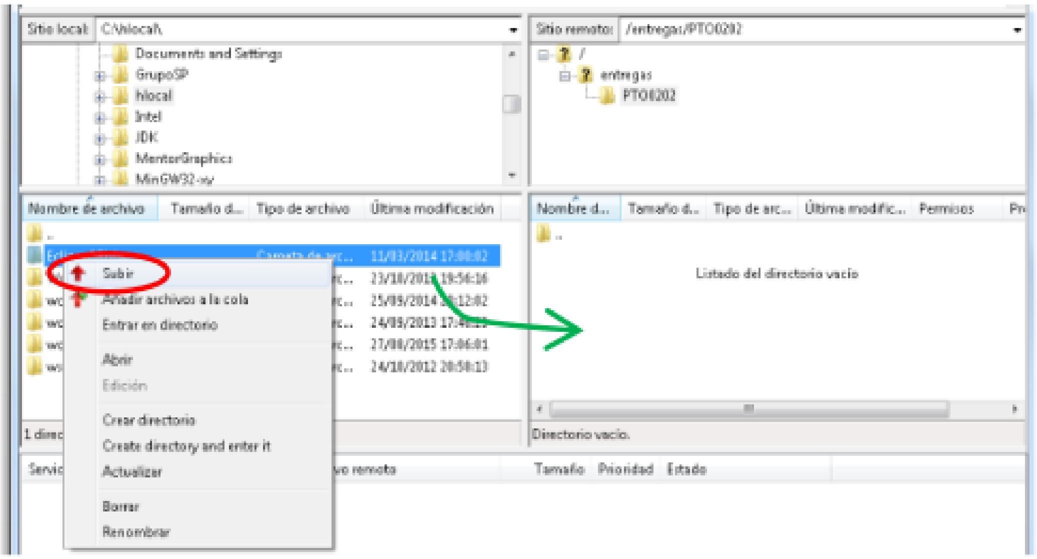
- Solve the different parts of the exam in the same order as they appear in the exam statement. Make sure the application still works correctly after each change. Whenever you finish one part, make a copy of the current solution just in case something goes wrong in the next parts.
- It is very recommended to include comments in `changes.txt` in which you briefly explain and justify the changes that you have done.

Submission Instructions

- To submit the exam, create a file called `YourName.zip` that includes your modified code and a file `student.txt` with your name.

  # Use only ZIP format, not rar, not 7z, etc.

- Double click on the icon **"EXAMENES en LABs entregas..."** that appears on the desktop, this will open a new window. Inside the window click on **"ALUMNOS entrega de practicas y examenes"**. A new window will pop up, in which you have to select the `zip` file that you have create and drag it to the right panel (or use the right button of the mouse and then select the option **Subir**). See the next figure.



Sitio local: C:\hlocal\

Sitio remoto: /entregas/PTO0202

Listado del directorio vacío

Directorio vacío.

- Before leaving the lab, you have to pass by the professor table to verify that you code has been submitted correctly and sign the submission form.

Questions:

1. **[2pt]** You are requested to add a new kind of vehicle to the simulator, called *bus*, for transporting passengers. A bus has a fixed capacity (maximum number of passengers), and at the beginning the bus is empty. When a bus is waiting in a junction, it is possible that some passengers *get off* and some *get on* the bus. Passengers can get on/off only at junctions, just before moving to the next road or arriving to the end of the itinerary. Obviously, the number of passengers that get off cannot exceed the number of passengers currently in the bus, and the number of passengers can never exceed the capacity. The number of passengers that get on/off at every junction is calculated randomly, respecting all constraints mentioned before. In addition, the speed of a bus can never exceed

   $$v = \texttt{Math.max}(\texttt{max\_speed} - (\texttt{num\_of\_passengers}/10), 1)$$

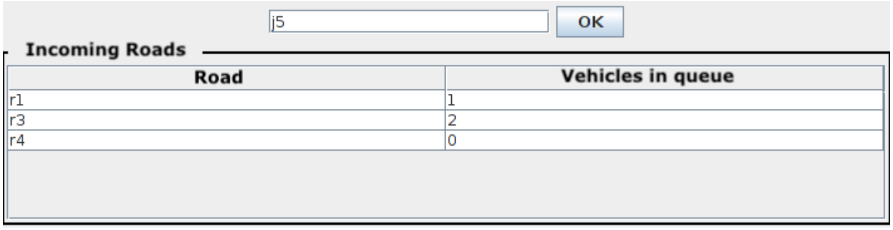
   This mean that whenever the speed exceeds v, we should put it back to v. The event associated to a bus includes a field `type` with value `bus`, and, in addition, has a new field called `capacity` that indicates the maximum number of passengers. Similarly, the corresponding report should include the fields `type` and `capacity`, and another field called `passengers` that indicates the current number of passengers. For example

   ```
   [new_vehicle]
   time = 0
   id = v1
   itinerary = j1,j2,j3
   max_speed = 20
   capacity = 40
   type = bus
   ```

   ```
   [vehicle_report]
   id = v1
   time = 1
   speed = 9
   kilometrage = 9
   faulty = 0
   location = (r1,9)
   capacity = 40
   passengers = 19
   type = bus
   ```

   NOTE: You can add new classes, but you cannot modify any existing class (except adding the corresponding event builder to the list of builders, and adding getters if needed).

2. **[3pt]** You are requested to add a new section to the Swing view of your assignment in which, for a given junction selected by the user, the list of incoming roads that has a *red* light together with the number of vehicles in the queues are viewed. Each line includes the identifier of one incoming road together with the number of vehicles waiting in the corresponding queue. It should be similar to the following (not necessarily identical):

Road	Vehicles in queue
r1	1
r3	2
r4	0

   You can place the text field and the button in the tool bar if you like. Initially (or when the simulator is reset) the table should be empty. When the user specifies a junction X in the text field and clicks the button, the table is updated to include the corresponding information for junction X only, and it should be refreshed in each simulation step.

   NOTE: You can modify the view classes, not the model (except adding getters if needed). *During marking we will strongly take into account the appropriate use of collections.*