Tecnología de la Programación - Academic Year 2018/2019

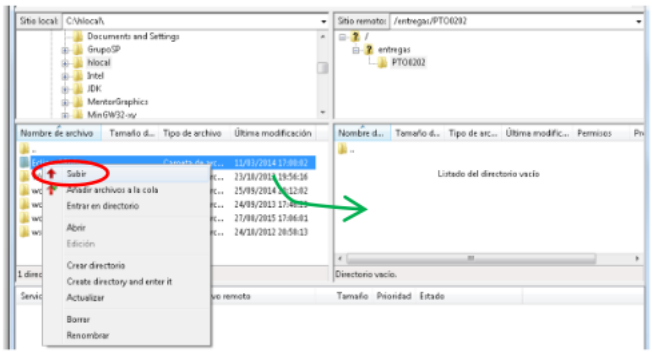
May's Exam (04/07/2019) - Duration: 2 hours.
Maximum grade: 5 points

Grados en Ingeniería Informática, del Software, de Computadores y Doble Grado en ADE - Informática (Grupos A, B, C, D, E, F y I) y Doble Grado en Informática y Matemáticas (Grupo DG)

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.
- **In order to get the extra material** (slides, Java API doc, and an icon **exam.png** to be used in P3): click on **Publicación docente de ficheros** that is on the Desktop; choose **ALUMNO recogida docente**; and look for the directory **Todos/TP2019**.

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. 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 created and drag it to the right panel (or use the right button of the mouse and then select the option **Subir**). See the figure. Before leaving the lab, you have to pass by the professor table to verify that your code has been submitted correctly and sign the submission form.

Questions

1. **[2.5pt]** Add a new kind of body called *overgrown* to the simulator. An *overgrown* body moves like a basic body, but in each simulation step, after moving, it duplicates its current mass. When it reaches a maximum mass `maxM` it explodes and its mass goes back to the initial one, and from that moment it starts to behave completely like a basic body (i.e., it does not duplicate mass). The following is an example of a JSON defining a body of this kind (maxM is the maximum mass of type Double).

```
{
  "type" : "overgrown",
  "data" : {
             "id"   : "b1",
             "pos"  : [0.0e00, 4.5e10],
             "vel"  : [1.0e04, 1.0e04],
             "mass" : 1.5e30,
             "maxM" : 10e300
           }
}
```

2. **[2.5pt]** Add a new table to the graphical user interface such that the ith row it includes: the steps number i in the first column; the identifier of the body with the *minimum distance from the origin* (and the distance) in the second column; and the identifier of the body with the *maximum distance from the origin* (and the distance) in the third column. See the figure below. Note that in each simulation step the number of rows grow.