Prof. Dr. Oscar Nierstrasz
Pascal Gadient, Mohammadreza Hazhirpasand

Assignment 09 — 17.11.2021 – v1.0
Fairness and Optimism

IMPORTANT:
The next time (14 November 2021) we will perform the hands-on lab from 10:15am to 12:00pm at a different location, because we need more space to assist you. It is mandatory to attend the lab in person! Please be there on time and bring your own charged notebook (don't forget the power adapter) that can connect to the university network to access the internet!

Address where the lab will take place:
Universität Bern
Schanzeneckstrasse 1
3012 Bern
Room S003

Exercise 1 (5 pts)

Answer the following questions:

a) What criteria might you use to prioritize threads (list at least 5 different criteria)?

b) What are different possible definitions of fairness (list at least 3 different definitions)?

c) What are Pass-Throughs?

d) What is Lock-Splitting?

e) When should you consider using optimistic methods (list at least 3 different enablers)?

Please continue on the next page!

Exercise 2 (3 pts)

In this exercise you have to implement a class that represents graphical objects that consist of an x-coordinate, a y-coordinate, a width and a height (i.e., a rectangle). The class has to implement methods for:

- Increase the x-coordinate by 10% and decrease the y-coordinate by 20% (change position)
- Increase the width by 50% and decrease the height by 70% (change dimension)
- Increase the y-coordinate by 40% and decrease the height by 60% (change position and dimension)

Implement it once using Lock-Splitting and once using Pass-Throughs (use the provided Shape interface of which an excerpt is listed below).

```
public interface Shape {

        public void changePosition();

        public void changeDimension();

        public void changePositionAndDimension();
}
```

You will find additional comments and hints in the code that may help and guide you. The SCG Geometry Simulation Environment is available on GitHub. You can find the project on https://github.com/pgadient/concurrency_e09t02.git. Please submit your project within a zip file. You can easily achieve that by exporting the project with the Eclipse export assistant.
Please clone immediately as the repository will be turned back into a private one in the following days.

Exercise 3 (2 pts)

Answer the following general questions:

a) How do threads waiting in a Thread.join() loop get aware of that thread's termination?

b) How could you optimize the code below?

```
Thread t = new Thread(new Runnable() {
  @Override
  public void run() {
    <insert your code here>
  }
});
t.start();
t.join();
```

c) Are *String* objects in Java mutable or immutable? Justify your answer!

d) Does the FSP progress property below enforce fairness? Justify your answer!

```
progress HeadsOrTales = {head, tale}
```