Evaluation

Duration: 3h.
All the material of the course is allowed, including the solution of TPs. Internet access is allowed, excluding communication programs (e-mail, instant messaging, …).
At the end of the evaluation, export all the Eclipse projects in a single zip file and upload it on Campus.

Exercise 1 (4pts)

Write a textual syntax in Xtext for a language to represent GUI windows. Each window includes a list of multiple labels and (action-less) buttons.
Here is an example of program in this language:

```
frame A {
  title: "Frame A"
  width: 200
  height: 100
  content {
    label: "Hello"
    button: "World!"
  }
}
```

Exercise 2 (5pts)

Write a compiler in Xtend for the language in Exercise 1.
The example program in Exercise 1 should produce the following Java code:

```
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JButton;
import javax.swing.SwingUtilities;

import java.awt.FlowLayout;

public class FrameApplication {
   public static void main(String[] args) {
     SwingUtilities.invokeLater(new Runnable() {
       public void run() {
         JFrame A = new JFrame();
         A.setLayout(new FlowLayout());
         A.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         A.setTitle("Frame A");
         A.setSize(200, 100);
         JLabel label0 = new JLabel();
         A.add(label0);
         label0.setText("Hello");
         JButton button1 = new JButton();
         A.add(button1);
         button1.setText("World!");
         A.setVisible(true);
       }
     });
  }
}
```

Exercise 3 (6pts)

Write a Fluent API for the language in Exercise 1, following the pattern and naming conventions explained during the course.

Exercise 4 (5pts)

Extend the syntax and generator of the GUI language for considering multiple windows, and buttons for switching among them.

Consider the following example and its translation.

```
frame A {
  title: "Frame A"
  width: 200
  height: 100
  content {
    label: "Hello"
    button: "..." -> B
  }
}

frame B {
  title: "Frame B"
  width: 300
  height: 100
  content {
    label: "...World!"
    button: "Restart" -> A
  }
}
```

```
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JButton;
import javax.swing.SwingUtilities;

import java.awt.FlowLayout;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class FrameApplication {
   public static void main(String[] args) {
     SwingUtilities.invokeLater(new Runnable() {
       public void run() {

              JFrame A = new JFrame();
              JFrame B = new JFrame();

              A.setLayout(new FlowLayout());
              A.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
              A.setTitle("Frame A");
              A.setSize(200, 100);
              JLabel labelA0 = new JLabel();
              A.add(labelA0);
              labelA0.setText("Hello");
              JButton buttonA1 = new JButton();
              buttonA1.addActionListener(new ActionListener(){
                     @Override
```

```
                        public void actionPerformed(ActionEvent e)
                        {
                                A.setVisible(false);
                                B.setVisible(true);
                        }
                });
                A.add(buttonA1);
                buttonA1.setText("...");

                B.setLayout(new FlowLayout());
                B.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                B.setTitle("Frame B");
                B.setSize(300, 100);
                JLabel labelB0 = new JLabel();
                B.add(labelB0);
                labelB0.setText("...World!");
                JButton buttonB1 = new JButton();
                buttonB1.addActionListener(new ActionListener(){
                        @Override
                        public void actionPerformed(ActionEvent e)
                        {
                                B.setVisible(false);
                                A.setVisible(true);
                        }
                });
                B.add(buttonB1);
                buttonB1.setText("Restart");

                A.setVisible(true);
        }
    });
  }
}
```