Department of Computer Science and Software Engineering
Xi'an Jiaotong-Liverpool University

HW 3 – While Loops, the Scanner, and Methods

Aim

This lab will give you additional practice at problem solving with while loops, and reading other code. There is code on ICE to help you with this.

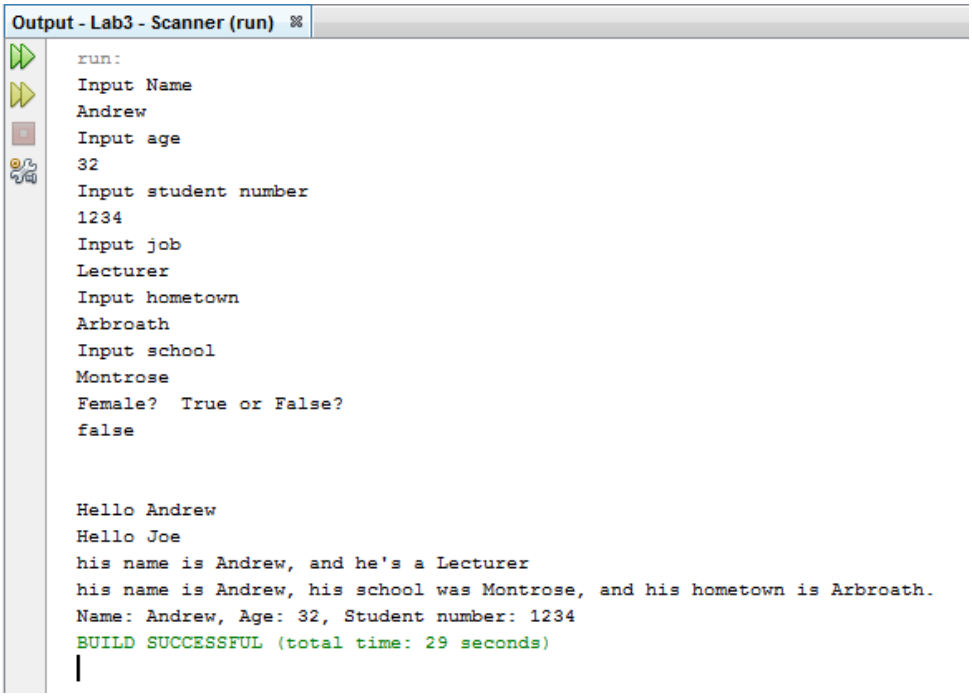
HW Extending your Existing Programs

- Last week you were asked to modify your hello program from Lab1, and use an if statement to decide the gender format.

- By now, you should have several lines of text, you should have variables instead of personal information hard coded, and an If statement to change to the appropriate gender.

- If you haven't finished this, then take some time to do this. Consult the previous labs as to what you need to do. The result should look similar to one of the examples before. If you have a finished version, drag a copy of it into a project for this week.

- Expand it using a Scanner to input all the details. The console result should look like this. Ask a classmate to input their details to test it makes sense:



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While Loops

In the labs this week, you used a **While** loop is much more useful.

- Download the Java file 'tanker.java' from Ice, and create a new project with it.
- This code simulates a milk tanker with a capacity for 5000 litres of milk, which visits farms until it is full. As each farm produces a random quantity of milk, it is unknown how many farms the tanker will visit before it is full, meaning that a for loop is not suitable
- The code is well commented so study it carefully. Note the use of **Math.Random()** to generate random numbers, and the while loop. Note that **the condition has to be met before the while loop ends**, and **the condition has to be set outside the while loop**.

```
double condition = value
while (condition check){
      Process Action
      Adjust condition variable
}
```

- Also note the use of System.outs with variables, operators, doubles and integers, and if statements. All things which you have used in this practical!
- Run the program several times. Look at the output carefully. Does it always produce the same results? Why not?
- If we use a tanker with a larger capacity, how many more farms can we visit? Experiment with increasing the capacity of the tanker.
- This program is currently incomplete. In addition to considering the capacity, we also wish to cap the number of farms visited at 12. Use what you have learned this week to complete this program:
    - You need to set the maximum number of farms
    - You need to add an additional condition
    - You should also change the final output to take account of whether the tanker is returning because it is full, or because it has reached the max number of farms
    - **Hint**, test with a very large tanker!
- As you can see, this program uses everything that you have learned to solve a real world problem!

Finishing the Tanker Program

- As you might be able to see, the program description covers "kilometres driven" as an additional condition, but this is not used in the program. Restructure and improve the program so that it will stop if a set distance is driven.
- Assume that each farm is located between 0 and 100 km away from the previous one.

- The output from the redesigned program should look like:

```
Visiting Farm Number 3
Milk Produced =219.72943112247222 litres
Farm Distance =695.2328743915499 km
Remaining capacity in tanker is 8443.993244760868 litres
Distance driven is 1616.027832767431km

Max distance covered, returning to factory

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```

- Everything you need to know is covered in the lecture notes or the practical!