- Solve the problem.
- Write the app.
- Ompile the app.
- Q Run the app.

- Analysis (define the problem)
- Obsign (solve the problem)
- Implementation (write and compile the app)
- Testing (run the app)
- Opployment

We will come back to this in Chapter 7.

## Is your mouse faster than Usain Bolt?





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meraneed.com and greatrun.org

As we have seen before, the average speed of Usain Bolt when he ran his 100 meter world record was 23.35 miles per hour.

#### Problem

Determine the average speed of your mouse cursor in miles per hour.

Part of the analysis phase.

- Is any input needed? If so, how is it provided? Is any validation of the input needed?
- Is there any output? If so, how should the output be provided?

## Problem

Print on the console

Move your mouse immediately after entering the width of the screen in centimeters:

Compute the average speed of the mouse during 0.1 seconds in miles per hour. Print on the console the average speed with two digits precision.

To solve the problem, we can use components that

- return x-coordinate of the mouse cursor
- return y-coordinate of the mouse cursor
- return the maximal x-coordinate (minimum is zero)
- return the maximal y-coordinate (minimum is zero)
- pause the execution by *n* milliseconds

## Question

How do we solve the problem?

Each component consists of

- a jar (Java archive) file and
- an API.

To use the component,

- download the jar file and add it to the classpath and
- study the API.

Different ways:

- Download the jar file and save it in the folder Java/jdk1.7.0\_??/jre/lib/ext
- Download the jar file and save it in the folder ???/?????. In eclipse, select the project, and click on

Project > Properties

> Java Build Path > Libraries > Add External JARs Locate the jar file saved in the folder ???/?????? and double click on the jar file. Yet another way:

Download the jar file and save it in the folder ???/?????.
In the folder with your code, create a file named, say begin.bat, with content

set classpath=.;???/???/franck.jar;%classpath%

Open the command prompt and go the folder containing your code. Before running javac and java, run begin.

Study the APIs of

- franck.cse1020.Mouse
- franck.cse1020.Timing

```
_1 int speed = ...;
```

```
2 ...
```

```
3 \text{ assert speed} >= 0;
```

```
4 ...
```

According to programmer, whenever we reach line 3, the value of the variable  ${\rm speed}$  is non-negative.

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_1 int speed = ...;
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2 ...
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```

...

According to programmer, whenever we reach line 3, the value of the variable  ${\rm speed}$  is non-negative.

Running your app with assertions enabled (during development) java –ea MouseSpeed

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1 int speed = ...;
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2 ...
```

```
3 \text{ assert speed} >= 0;
```

```
4
```

...

According to programmer, whenever we reach line 3, the value of the variable speed is non-negative.

Running your app with assertions enabled (during development)

java –ea MouseSpeed

Running your app without assertions enabled (once deployed)

java MouseSpeed

How would you test whether the speed of your mouse and Usain Bolt are the same?

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How would you test whether the speed of your mouse and Usain Bolt are the same?

#### Answer

final double EPSILON = 1.E-5; boolean equal = Math.abs(mouse - bolt) < EPSILON;

How would you test whether the speed of your mouse and Usain Bolt are the same?

#### Answer

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## Question

Why not simply use boolean equal = (mouse == bolt)?

How would you test whether the speed of your mouse and Usain Bolt are the same?

#### Answer

final double EPSILON = 1.E-5; boolean equal = Math.abs(mouse - bolt) < EPSILON;

## Question

Why not simply use boolean equal = (mouse == bolt)?

#### Answer

Because most real numbers are not represented exactly (round-off errors).

- When: Thursday January 23, 17:00-19:00
- Where: Vari Hall, lecture hall D
- Material: review of Chapter 1 and 2 of the textbook

# Test 2

- When: Friday January 24, during the lab (14:30–16:00)
- Where: Lassonde building, labs 1006, 1004, 1002
- Material: Chapter 1 and 2 of the textbook, with a focus on Chapter 2
- What: One programming question similar to Check02A and five multiple choice/short answer questions
- Advise: Do the five multiple choice/short answer questions first
- Note: You get 1 mark (out of 5) for the fact that your compiles
- Note: Your code is not only marked for correctness (3 marks out of 5) but also style (1 mark out of 5)

Our class representative, Blaine Fekade, has booked for a study group the rooms Group B in Scott Library from 10:30 to 11:30 and Group C in Scott Library from 13:00 to 14:30, both on Friday January 24.

- Study Section 3.2 of the textbook.
- Submit <u>Check03A</u> (in the textbook and on Moodle) before Sunday to obtain feedback.