Assignment 5

Object oriented programming IT308G – spring term 2018

School of Informatics, University of Skövde

1. Assignment

Your assignment is to create a program which uses threads to simulate a number of people eating fruits from a magical fruit bag. Every person should have a unique name and energy. The energy should be an integer between 0 and 100 where 0 represents hungry and 100 represents that the person has a full stomach. When the person becomes hungry (energy scale <20) the person tries to take out a fruit from the shared fruit bag. Every fruit gives an amount of energy to the person: A pear gives 20-40, an apple gives 20-30 and a banana gives 25-35. When a fruit is taken out from the bag and has been consumed by a person, there is 20% chance that 5 new fruits are created in the bag (e.g. the number of fruits in the bag is increased). A person takes a second to take a fruit. In the beginning there should be 20 fruits in the bag and every person begins with an energy between 30 and 90. For every person, their energy decreases with every second with 10. In case a person doesn't have any more energy (value of <=0), it cannot take any more fruits.

Figure 1, Figure 2 and Figure 3 below displays an example.

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- Pear with 29 energy was added to the fruit bag
- Banana with 21 energy was added to the fruit bag
- Banana with 11 energy was added to the fruit bag
- Apple with 26 energy was added to the fruit bag
- Banana with 19 energy was added to the fruit bag
- Banana with 14 energy was added to the fruit bag
- Apple with 26 energy was added to the fruit bag
- Banana with 22 energy was added to the fruit bag
- Banana with 22 energy was added to the fruit bag
- Banana with 27 energy was added to the fruit bag
- Pear with 24 energy was added to the fruit bag
- Apple with 22 energy was added to the fruit bag
- Banana with 26 energy was added to the fruit bag
- Apple with 25 energy was added to the fruit bag
- Apple with 21 energy was added to the fruit bag
- Pear with 20 energy was added to the fruit bag
- Banana with 32 energy was added to the fruit bag
- Banana with 22 energy was added to the fruit bag
- Pear with 20 energy was added to the fruit bag
- Apple with 24 energy was added to the fruit bag
Apple bag created with 20 fruits.
Anders created with 41 energy
Anna created with 62 energy
Beta created with 85 energy
Anders has 21 energy and is hungry...
Anders picked Apple and starts to eat it
Anders ate Apple with 24 energy and now has 45 energy
```

Figure 1 Screenshot from the example program

```
-The fruit bag now contains 19 fruits
Anna has 22 energy and is hungry...
Anna picked Pear and starts to eat it
Anders has 25 energy and is hungry...
Anders picked Banana and starts to eat it
Anna ate Pear with 20 energy and now has 42 energy
-The fruit bag now contains 17 fruits
Beta has 25 energy and is hungry...
Beta picked Banana and starts to eat it
Anders ate Banana with 22 energy and now has 47 energy
-The fruit bag now contains 16 fruits
Beta ate Banana with 32 energy and now has 57 energy
-The fruit bag now contains 16 fruits
Anna has 22 energy and is hungry...
Anna picked Pear and starts to eat it
Anders has 27 energy and is hungry...
Anders picked Apple and starts to eat it
Anna ate Pear with 20 energy and now has 42 energy
-The fruit bag now contains 14 fruits
Anders ate Apple with 21 energy and now has 48 energy
-The fruit bag now contains 14 fruits
Beta has 27 energy and is hungry...
Beta picked Apple and starts to eat it
Anna has 22 energy and is hungry...
Anna picked Banana and starts to eat it
Anders has 28 energy and is hungry...
Anders picked Apple and starts to eat it
Anna ate Banana with 26 energy and now has 48 energy
-The fruit bag now contains 11 fruits
Beta ate Apple with 25 energy and now has 52 energy
-The fruit bag now contains 11 fruits
Anders ate Apple with 22 energy and now has 50 energy
- Banana with 12 energy was added to the fruit bag
- Pear with 26 energy was added to the fruit bag
- Apple with 28 energy was added to the fruit bag
- Apple with 23 energy was added to the fruit bag
- Pear with 33 energy was added to the fruit bag
-The fruit bag now contains 16 fruits
Anna has 28 energy and is hungry...
Anna picked Pear and starts to eat it
Anders has 30 energy and is hungry...
Anders picked Apple and starts to eat it
Anna ate Pear with 33 energy and now has 61 energy
-The fruit bag now contains 14 fruits
Beta has 22 energy and is hungry...
Beta picked Apple and starts to eat it
Anders ate Apple with 23 energy and now has 53 energy
-The fruit bag now contains 13 fruits
Beta ate Apple with 28 energy and now has 50 energy
-The fruit bag now contains 13 fruits
Beta has 30 energy and is hungry...
Beta picked Pear and starts to eat it
Anna has 21 energy and is hungry...
Anders has 23 energy and is hungry...
Anders picked Banana and starts to eat it
Beta ate Pear with 26 energy and now has 56 energy
```

Figure 2 An example

```
-The fruit bag now contains 10 fruits
Anna picked Pear and starts to eat it
Anna ate Pear with 24 energy and now has 45 energy
Anders ate Banana with 12 energy and now has 35 energy
-The fruit bag now contains 10 fruits
-The fruit bag now contains 10 fruits
Anders has 25 energy and is hungry...
Anders picked Banana and starts to eat it
Anna has 25 energy and is hungry...
Anna picked Banana and starts to eat it
Anders ate Banana with 27 energy and now has 52 energy
- Apple with 20 energy was added to the fruit bag
- Apple with 26 energy was added to the fruit bag
- Pear with 23 energy was added to the fruit bag
- Pear with 29 energy was added to the fruit bag
- Pear with 29 energy was added to the fruit bag
-The fruit bag now contains 13 fruits
Beta has 26 energy and is hungry...
Beta picked Pear and starts to eat it
Beta ate Pear with 29 energy and now has 55 energy
-The fruit bag now contains 12 fruits
Anna ate Banana with 22 energy and now has 47 energy
-The fruit bag now contains 12 fruits
Anders has 22 energy and is hungry...
Anders picked Pear and starts to eat it
Anna has 27 energy and is hungry...
Anna picked Pear and starts to eat it
Anders ate Pear with 29 energy and now has 51 energy
-The fruit bag now contains 10 fruits
Anna ate Pear with 23 energy and now has 50 energy
-The fruit bag now contains 10 fruits
Beta has 25 energy and is hungry...
Beta picked Apple and starts to eat it
Beta ate Apple with 26 energy and now has 51 energy
- Apple with 23 energy was added to the fruit bag
- Apple with 21 energy was added to the fruit bag
- Banana with 16 energy was added to the fruit bag
- Pear with 25 energy was added to the fruit bag
- Banana with 15 energy was added to the fruit bag
-The fruit bag now contains 14 fruits
Anna has 30 energy and is hungry...
Anna picked Banana and starts to eat it
Anders has 21 energy and is hungry...
Anders picked Pear and starts to eat it
Anna ate Banana with 15 energy and now has 45 energy
-The fruit bag now contains 12 fruits
Anders ate Pear with 25 energy and now has 46 energy
-The fruit bag now contains 12 fruits
Beta has 21 energy and is hungry...
Beta picked Banana and starts to eat it
Beta ate Banana with 16 energy and now has 37 energy
- Apple with 21 energy was added to the fruit bag
- Apple with 29 energy was added to the fruit bag
- Pear with 29 energy was added to the fruit bag
Anna has 25 energy and is hungry...
- Pear with 23 energy was added to the fruit bag
```

Figure 3 An example

Please note that this is an individual assignment where you need to follow your own plan to create your program. This means you are expected to create all of the content you are submitting. It is ok to discuss with other students about your ideas and get help from others to get better understanding, however in the end all material you are submitting needs to be created by you. Plagiarism of the code or other material is prohibited

2. Requirements

Requirements to get a pass on this assignment are:

- The assignment is solved
- At least five classes has been created and used
- At least one inheritance has been implemented
- At least two active threads are used
- Mechanisms for synchronization are used in an appropriate way
- All code and comments are written in English

3. Submission

The assignment shall be submitted via SCIO at the dedicated assignment location in the course page. All files should be submitted via a single compressed (zip) file. The file should have the name OOP2018_login_assignment5.zip, where the login is your login name, for example a17abcde.

4. Assessment

The assignment gives the grade U, 3, 4 and 5. To get a grade 3 on the assignment, all requirements must be fulfilled. For grade 4 or 5, the following attributes are taken into consideration and are setting the grade:

- Use of object-orientation
- Breakdown of functionality and abstraction (class, method and interface level)
- Readability, goal and structure of code
- Use of appropriate naming convention on class, method and variable level
- Low coupling, high cohesion both on class and function level
- Appropriate amount of comments
- Correctness of code