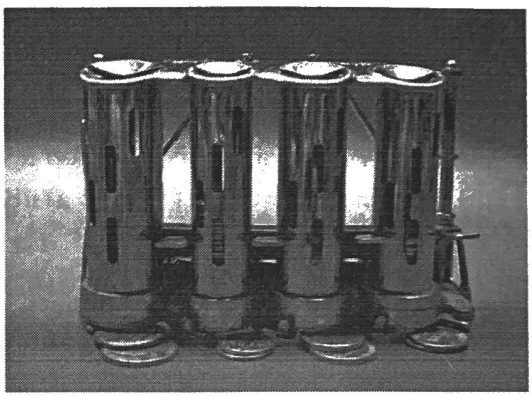
Challenge V
Change Maker
COSC 2329 Component-Based Programming
Deadline: Sunday, April 22, 2018 @ 11:59 PM
Late Deadline: Tuesday, April 24, 2018 @ 6:00 PM



Assignment

Your assignment is to create two properly documented constructs in Java:

- a ChangeMaker interface (see below) [**You will not be submitting this file – I will use my own**]
- a ChangeMakerImpl_*LastName* class (e.g., ChangeMakerImpl_Kart), which implements the ChangeMaker interface

ChangeMaker Concept

A ChangeMaker provides three main services, it can:

- figure out whether it can make change for a given value,
- give the correct change for a "changeable" value, and
- calculate the value for a pile of change.

Note that the ChangeMaker:

- is told which denominations are available at time of manufacture (i.e., at time of the constructor call),
- effectively has an infinite supply of "coins" of each denomination,
- is required to give change in a "greedy" manner.

Deliverables

- A .zip file uploaded to Canvas that contains the following files
  (Look for "Change Maker" assignment or similar):
  - ChangeMakerImpl_*LastName*.java (e.g., ChangeMakerImpl_Kart.java)
  - Any supporting Utils/classes/interfaces that you created (note that the filename suffix on these files must be *_LastName*)

Rules

- My test cases do not change based on your submission.
- I will not violate the preconditions on my interface in my test cases.
- **USE THE PACKAGE 'change' for all of your files!**

- Use the Eclipse IDE
- Ensure that I, with only modest effort, can understand your code
- Ensure that the code is properly documented
- Ensure that the code is properly formatted
- **Test your code!** (What test cases can you think of?)
  - What are the "middle-of-the-road" (i.e., "vanilla") test cases?
  - What are the "corner" (i.e., "extreme") test cases?
- **Test your code some more!** (What other test cases can you think of?)
- Code that doesn't compile will not pass any tests and receive a score of 0
- **Ensure that your files follow the naming convention under Deliverables**
- **WARNING: This specification may be misleading or incomplete! Part of the assignment is to read the assignment early, think about it, and ask any clarifying questions!**

Java Interface

```
public interface ChangeMaker
{
	//part of post: i in [0, rv.size() - 1) ==>
	//                    rv.get(i) > rv.get(i + 1)
	public List<Integer> getDenominations();

	//pre: student needs to figure out and write my pre
	//post: student needs to figure out and write my post
	public boolean canMakeExactChange(int valueInCents);

	//part of pre: canMakeExactChange(valueInCents)
	//part of post: calculateValueOfChangeList(rv) == valueInCents
	//part of post: i in [0, rv.size() - 1) ==>
	//getDenominations.get(i) > rv.get(i+1)*getDenominations.get(i+1)
	public List<Integer> getExactChange(int valueInCents);

	//part of pre: changeList.size() == getDenominations().size()
	//part of pre: SIZE = changeList.size()
	//                    [NOTE: purely for notation]
	//part of post: student needs to figure out and write my post
	public int calculateValueOfChangeList(List<Integer> changeList);
}
```

Java Impl

```
public class ChangeMakerImpl_LastName implements ChangeMaker
{
	//part of pre: i <= 0 ==> !denominations.contains(i)
	public ChangeMakerImpl(Set<Integer> denominations)
	...
	...
}
```

Examples

```
[100, 25, 10, 5, 1].canMakeExactChange(65) should return true
[100, 25, 10, 5, 1].getExactChange(65) should return [0, 2, 1, 1, 0]
[100, 25, 10, 5, 1].canMakeExactChange(55) should return true
[100, 25, 10, 5, 1].canMakeExactChange(10) should return true
[100, 25, 10, 5, 1].canMakeExactChange(11) should return true
[100, 25, 10, 5, 1].canMakeExactChange(180004) should return true

[32, 16, 8, 4, 2, 1].canMakeExactChange(0) should return true
[32, 16, 8, 4, 2, 1].getExactChange(0) should return [0, 0, 0, 0, 0, 0]

[100000000, 10000000, 1000000, 100000, 10000, 1000, 100, 10,
1].canMakeExactChange(123456789) should return true
[100000000, 10000000, 1000000, 100000, 10000, 1000, 100, 10,
1].getExactChange(123456789) should return [1, 2, 3, 4, 5, 6, 7, 8, 9]

[144, 89, 55, 34, 21, 13, 8, 5, 3, 2, 1].canMakeExactChange(0) should
return true
[144, 89, 55, 34, 21, 13, 8, 5, 3, 2, 1].canMakeExactChange(201) should
return true
[144, 89, 55, 34, 21, 13, 8, 5, 3, 2, 1].getExactChange(201) should
return [1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0]

[16777216, 2097152, 262144, 32768, 4096, 512, 64, 8,
1].canMakeExactChange(88888888) should return true
[16777216, 2097152, 262144, 32768, 4096, 512, 64, 8,
1].getExactChange(88888888) should return [5, 2, 3, 0, 5, 3, 0, 7, 0]

[537824, 38416, 2744, 196, 14, 1].calculateValueOfChangeList([0, 0, 0,
0, 0, 0]) should return 0

[144, 89, 55, 34, 21, 13, 8, 5, 3, 2, 1].calculateValueOfChangeList([0,
0, 0, 0, 0, 0, 0, 3, 2, 1, 0]) should return 23

[8000, 400, 20, 1].canMakeExactChange(492) should return true
[8000, 400, 20, 1].getExactChange(492) should return [0, 1, 4, 12]

[11, 7].canMakeExactChange(1) should return false
[11, 7].canMakeExactChange(2) should return false
[11, 7].canMakeExactChange(3) should return false
[11, 7].canMakeExactChange(4) should return false
[11, 7].canMakeExactChange(5) should return false
[11, 7].canMakeExactChange(6) should return false
[11, 7].canMakeExactChange(8) should return false
[11, 7].canMakeExactChange(9) should return false
[11, 7].canMakeExactChange(10) should return false
[11, 7].canMakeExactChange(12) should return false
```

[65536, 4096, 256, 16, 1].canMakeExactChange(78704) should return true
[65536, 4096, 256, 16, 1].getExactChange(78704) should return [1, 3, 3, 7, 0]

[100, 25, 10, 5, 1].canMakeExactChange(0) should return true
[100, 25, 10, 5, 1].getExactChange(0) should return [0, 0, 0, 0, 0]

[256, 128, 64, 32, 16, 8, 4, 2, 1].calculateValueOfChangeList([0, 0, 0, 1, 1, 0, 1, 1]) should return 27

[32, 16, 8, 4, 2, 1].canMakeExactChange(58) should return true
[32, 16, 8, 4, 2, 1].getExactChange(58) should return [1, 1, 1, 0, 1, 0]

[429981696, 35831808, 2985984, 248832, 20736, 1728, 144, 12, 1].canMakeExactChange(14) should return true
[429981696, 35831808, 2985984, 248832, 20736, 1728, 144, 12, 1].getExactChange(14) should return [0, 0, 0, 0, 0, 0, 0, 1, 2]

[10].canMakeExactChange(10) should return true
[10].canMakeExactChange(20) should return true
[10].canMakeExactChange(30) should return true
[10].canMakeExactChange(40) should return true
[10].canMakeExactChange(50) should return true
[10].canMakeExactChange(1) should return false
[10].canMakeExactChange(2) should return false
[10].canMakeExactChange(3) should return false
[10].canMakeExactChange(4) should return false
[10].canMakeExactChange(5) should return false
[10].canMakeExactChange(6) should return false
[10].canMakeExactChange(7) should return false
[10].canMakeExactChange(8) should return false
[10].canMakeExactChange(9) should return false
[10].canMakeExactChange(11) should return false
[10].canMakeExactChange(12) should return false
[10].canMakeExactChange(13) should return false