EECS 395 BLOCKCHAIN AND CRYPTOCURRENCY

Assignment 2

In this assignment you will implement a function that's part of a block-chain-based distributed consensus protocol. Specifically, your code will receive a block, validate this block and add it to the chain.

Files provided:

`Block.java`	Stores the block data structure.
`ByteArrayWrapper.java`	A utility file which creates a wrapper for byte arrays such that it could be used as a key in hash functions. (See `TransactionPool.java`)
`Transaction.java`	This is similar to Transaction.java as provided in Assignment 1 except for introducing functionality to create a coinbase transaction. Take a look at `Block.java` constructor to see how a coinbase transaction is created.
`TransactionPool.java`	Implements a pool of transactions, required when creating a new block.
`UTXO.java`	From Assignment 1.
`UTXOPool.java`	From Assignment 1.
`TxHandler.java`	From Assignment 1.
`BlockChain.java`	Responsible for maintaining a block chain.

The BlockChain class is responsible for maintaining a block chain. **Basically what you need to do is to complete function "addBlock" in "starterCodeAssignment2/assignment2/BlockChain.java" and satisfy:**

```
/**
 * Add {@code block} to the block chain if it is valid. For validity, all transactions
 * should be valid and block should be at {@code height > (maxHeight - CUT_OFF_AGE)}.
 * For example, you can try creating a new block over the genesis block (block height 2)
 * if the block chain height is {@code <= CUT_OFF_AGE + 1}. As soon as {@code height >
 * CUT_OFF_AGE + 1},  you cannot create a new block at height 2.
 * @return true if block is successfully added
*/
```

when checking for validity of a newly received block, just checking if the transactions form a valid set is enough. The set need not be a maximum possible set of transactions. Also, you needn't do any proof-of-work checks.

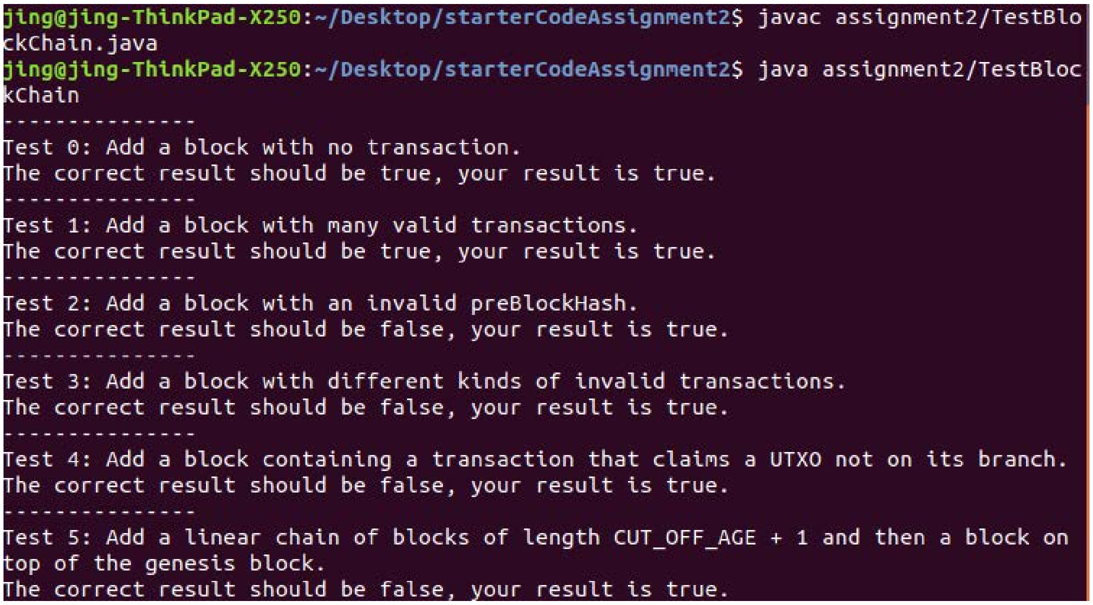
Submission Format

The starter code is given in folder “starterCodeAssignment2”. The starter code has implemented parts of the APIs. A correct implementation of TxHandler.java is provided in the starter code, and you should not use their own solution from assignment 1.

To compile and test your code,
3. Open your command line, navigate to directory "starterCodeAssigment2", and execute javac /

```
assignment2/TestBlockChain.java
java /assignment2/TestBlockChain
```

You will see the result of running 6 test transactions.



```
jing@jing-ThinkPad-X250:~/Desktop/starterCodeAssignment2$ javac assignment2/TestBlo
ckChain.java
jing@jing-ThinkPad-X250:~/Desktop/starterCodeAssignment2$ java assignment2/TestBloc
kChain
---------------
Test 0: Add a block with no transaction.
The correct result should be true, your result is true.
---------------
Test 1: Add a block with many valid transactions.
The correct result should be true, your result is true.
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Test 2: Add a block with an invalid preBlockHash.
The correct result should be false, your result is true.
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Test 3: Add a block with different kinds of invalid transactions.
The correct result should be false, your result is true.
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Test 4: Add a block containing a transaction that claims a UTXO not on its branch.
The correct result should be false, your result is true.
---------------
Test 5: Add a linear chain of blocks of length CUT_OFF_AGE + 1 and then a block on
top of the genesis block.
The correct result should be false, your result is true.
```

Currently the starter code passes 2 out of the 6 test transactions. After filling in "BlockChain" function, you can run

```
javac /assignment2/TestBlockChain.java
java /assignment2/TestBlockChain
```

again, and check whether your code is running correctly with these 6 test transactions. Passing all these 6 test cases doesn't guarantee getting 10 points, since your work will be graded with a much larger test set.

When submitting, please rename file "BlockChain.java" (the file you worked on) to "Firstname_Lastname_BlockChain.java" and upload this file (instead of the entire folder) to Canvas. The "Firstname" and "Lastname" here should be your own first name and last name.