

Practical 3 Create multiple transaction and display them

```
In [1]: import datetime
import collections
import binascii
import Crypto #If not installed run pip install crypto and pip install pycryptodome
import Crypto.Random
from Crypto.Hash import SHA
from Crypto.PublicKey import RSA
from Crypto.Signature import import PKCS1_v1_5
```

```
In [2]: class Client:
    def __init__(self):
        random = Crypto.Random.new().read
        self._private_key = RSA.generate(1024, random)
        self._public_key = self._private_key.publickey()
        self._signer = PKCS1_v1_5.new(self._private_key)

    @property
    def identity(self):
        return binascii.hexlify(self._public_key.exportKey(format='DER')).decode("as
```

```
In [3]: def display_transaction(transaction):
    #for transaction in transactions:
    dict = transaction.to_dict()
    print ("sender: " + dict['sender'])
    print ('-----')
    print ("recipient: " + dict['recipient'])
    print ('-----')
    print ("value: " + str(dict['value']))
    print ('-----')
    print ("time: " + str(dict['time']))
    print ('-----')
```

```
In [4]: class Transaction:
    def __init__(self, sender, recipient, value):
        self.sender=sender
        self.recipient=recipient
        self.value=value
        self.time=datetime.datetime.now()
    def to_dict(self):
        if self.sender == "Genesis":
            identity = "Genesis"
        else:
            identity = self.sender.identity
        #Dictionary objects
        return collections.OrderedDict({
            'sender':identity,
            'recipient':self.recipient,
            'value':self.value,
            'time':self.time
        })
    def sign_transaction(self):
        private_key = self.sender._private_key
        signer = PKCS1_v1_5.new(private_key)
```

```
h = SHA.new(str(self.to_dict()).encode('utf8'))
return binascii.hexlify(signer.sign(h)).decode('ascii')
```

```
In [5]: transactions=[]
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In [6]: Alice=Client()
        Bob=Client()
        Jenny=Client()
        John=Client()
```

```
In [7]: t1=Transaction(Alice,Bob.identity,15.0)
        t1.sign_transaction()
        transactions.append(t1)

        t2=Transaction(Alice,Jenny.identity,5.0)
        t2.sign_transaction()
        transactions.append(t2)

        t3=Transaction(Jenny,John.identity,10.0)
        t3.sign_transaction()
        transactions.append(t3)

        t4=Transaction(Alice,John.identity,20.0)
        t4.sign_transaction()
        transactions.append(t4)

        t4=Transaction(John,Alice.identity,20.0)
        t4.sign_transaction()
        transactions.append(t4)
```

```
In [8]: for transaction in transactions:
        display_transaction(transaction)
        print("*****")
```

```
sender: 30819f300d06092a864886f70d010101050003818d0030818902818100ba5d80d5bef47996cb
67ae900626025385e66536f12c5b8d4e605969969b2df2bf0285ff4acee19130f61d1be4eb89d3c30731
2c32a8190485645c16154c8b853384af31510851038dc5dd8da4f21611406929421c9b150a8949c1b291
f046d201ddf8591ce7ea6bd69be9503747247ab8dc644daafb0ad8339d45884179cc9f0203010001
```

```
-----
recipient: 30819f300d06092a864886f70d010101050003818d0030818902818100cc84888eb53a87b
2d1a7862fde04f609f7e5b15c1fa1195f99b9c1d40106c627e47b891ecd3d7f86ded8db29806ef9eafb3
0992da477ebdfae251fb0ef5c27aa90a1076b55f6a172686ac52b802cf280ec034ef9e51d07a4c538ab2
5175b8d52a1c3192e735f67744cc0179c77ac4126a0c6dcf9998ba150b08cfefaf39908070203010001
```

```
-----
value: 15.0
```

```
-----
time: 2022-06-16 10:33:25.248002
```

```
*****
```

```
sender: 30819f300d06092a864886f70d010101050003818d0030818902818100ba5d80d5bef47996cb
67ae900626025385e66536f12c5b8d4e605969969b2df2bf0285ff4acee19130f61d1be4eb89d3c30731
2c32a8190485645c16154c8b853384af31510851038dc5dd8da4f21611406929421c9b150a8949c1b291
f046d201ddf8591ce7ea6bd69be9503747247ab8dc644daafb0ad8339d45884179cc9f0203010001
```

```
-----
recipient: 30819f300d06092a864886f70d010101050003818d0030818902818100aa429714043eb47
5b4bac3c402b0678833bcb8bfcc84645c8618622d88f2970ce039b13858df73e39537cd04ac828b2e22c
af536ecc8f377ab00eaa86598ba312d734ef6feea48312abab9dfc054dac63d3364ca6dfc45c40f10f
b629cea792d1d436943e0c0859a86af8d9f04f6806e45f72edce5b4296e14c46078f074690203010001
```

```
-----
value: 5.0
-----
time: 2022-06-16 10:33:25.268906
-----
*****
sender: 30819f300d06092a864886f70d010101050003818d0030818902818100aa429714043eb475b4
bac3c402b0678833bcb8bfcc84645c8618622d88f2970ce039b13858df73e39537cd04ac828b2e22caf5
36ecc8f377ab00eaa86598ba312d734ef6feea48312abab9dfc054dac63d3364ca6dfcfff45c40f10fb62
9cea792d1d436943e0c0859a86af8d9f04f6806e45f72edce5b4296e14c46078f074690203010001
-----
recipient: 30819f300d06092a864886f70d010101050003818d0030818902818100c8ae941d88d889a
b6b2e4bf3d016386530293cdfb16bff9f8722b6cb8feda7dba382566a1cbeeb50ad30d45bffb10deb854
fe773b46f8e398dc339373a3937db07df6e83ed5c62908d2b7bf00422f73e028fe8079d120914239364e
9b3999762023f32b82d069731f5436b663574deb96969ee4a126fe4872d5b64fd9b69572b0203010001
-----
value: 10.0
-----
time: 2022-06-16 10:33:25.276476
-----
*****
sender: 30819f300d06092a864886f70d010101050003818d0030818902818100ba5d80d5bef47996cb
67ae900626025385e66536f12c5b8d4e605969969b2df2bf0285ff4acee19130f61d1be4eb89d3c30731
2c32a8190485645c16154c8b853384af31510851038dc5dd8da4f21611406929421c9b150a8949c1b291
f046d201ddf8591ce7ea6bd69be9503747247ab8dc644daafb0ad8339d45884179cc9f0203010001
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recipient: 30819f300d06092a864886f70d010101050003818d0030818902818100c8ae941d88d889a
b6b2e4bf3d016386530293cdfb16bff9f8722b6cb8feda7dba382566a1cbeeb50ad30d45bffb10deb854
fe773b46f8e398dc339373a3937db07df6e83ed5c62908d2b7bf00422f73e028fe8079d120914239364e
9b3999762023f32b82d069731f5436b663574deb96969ee4a126fe4872d5b64fd9b69572b0203010001
-----
value: 20.0
-----
time: 2022-06-16 10:33:25.282514
-----
*****
sender: 30819f300d06092a864886f70d010101050003818d0030818902818100c8ae941d88d889ab6b
2e4bf3d016386530293cdfb16bff9f8722b6cb8feda7dba382566a1cbeeb50ad30d45bffb10deb854fe7
73b46f8e398dc339373a3937db07df6e83ed5c62908d2b7bf00422f73e028fe8079d120914239364e9b3
999762023f32b82d069731f5436b663574deb96969ee4a126fe4872d5b64fd9b69572b0203010001
-----
recipient: 30819f300d06092a864886f70d010101050003818d0030818902818100ba5d80d5bef4799
6cb67ae900626025385e66536f12c5b8d4e605969969b2df2bf0285ff4acee19130f61d1be4eb89d3c30
7312c32a8190485645c16154c8b853384af31510851038dc5dd8da4f21611406929421c9b150a8949c1b
291f046d201ddf8591ce7ea6bd69be9503747247ab8dc644daafb0ad8339d45884179cc9f0203010001
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value: 20.0
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time: 2022-06-16 10:33:25.285504
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*****
```