区块链第一次实验报告

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【实验过程】

1. 使用 keygen.py 生成三个密钥作为客户。客户为：

	私钥	Address
客户一	cQcwJtZp9sAvtwdBwCbjc57wbsHvJkLkLjq7g7xH8r25VBUHUiAX	mnz38qj3Eq5U4o3iDMfSoGLb5fKRJNsV8U
客户二	cNwGZD8gBxZvyGYpow8LPmBbn5c91kNVksAcePQhNJwihY3tSRPb	mzitDL44Rtfn1fqwuTqPeWVid4CSt9dMsS
客户三	cRKnrsyVqK4xjUJVGRUhPBfRs7txVrt5SLJM4yuUk8YrRfXV7XLN	n4KGQSbwDdSvW6nYbEdxbN6RTT2YgfSsap

银行用户即之前创建的有比特币的用户：

私钥	Address
cQf8sE9fhMtF6gBCv8Kb5Q7cPgcDvUm4VDGc3TDRKKiEbRekKdap	mz1BD2BUobyRWhMsSnzjkp43bYCJWEVMVf

2. 将客户的私钥粘贴到 ex2a.py 对应位置中，并且为了能够正常生成客户对应的地址，我们需要导入包。

```
9   #解决CBitcoinSecret报错
10  from bitcoin import SelectParams
11  from bitcoin.base58 import decode
12  from bitcoin.wallet import CBitcoinAddress, CBitcoinSecret, P2PKHBitcoinAddress
13
14  cust1_private_key = CBitcoinSecret(
15      'cQcwJtZp9sAvtwdBwCbjc57wbsHvJkLkLjq7g7xH8r25VBUHUiAX')
16  cust1_public_key = cust1_private_key.pub
17  cust2_private_key = CBitcoinSecret(
18      'cNwGZD8gBxZvyGYpow8LPmBbn5c91kNVksAcePQhNJwihY3tSRPb')
19  cust2_public_key = cust2_private_key.pub
20  cust3_private_key = CBitcoinSecret(
21      'cRKnrsyVqK4xjUJVGRUhPBfRs7txVrt5SLJM4yuUk8YrRfXV7XLN')
22  cust3_public_key = cust3_private_key.pub
23
```

3. 由于题目中提到“需要银行与其他任何一个用户的签名才能赎回交易，而不仅仅是银行或者客户”，因此我们重写 ex2a_txout_scriptPubkey 如下：

```
ex2a_txout_scriptPubKey =
[my_public_key,OP_CHECKSIGVERIFY,OP_1,cust1_public_key,cust2_publ
ic_key,cust3_public_key,OP_3,OP_CHECKMULTISIG]
```

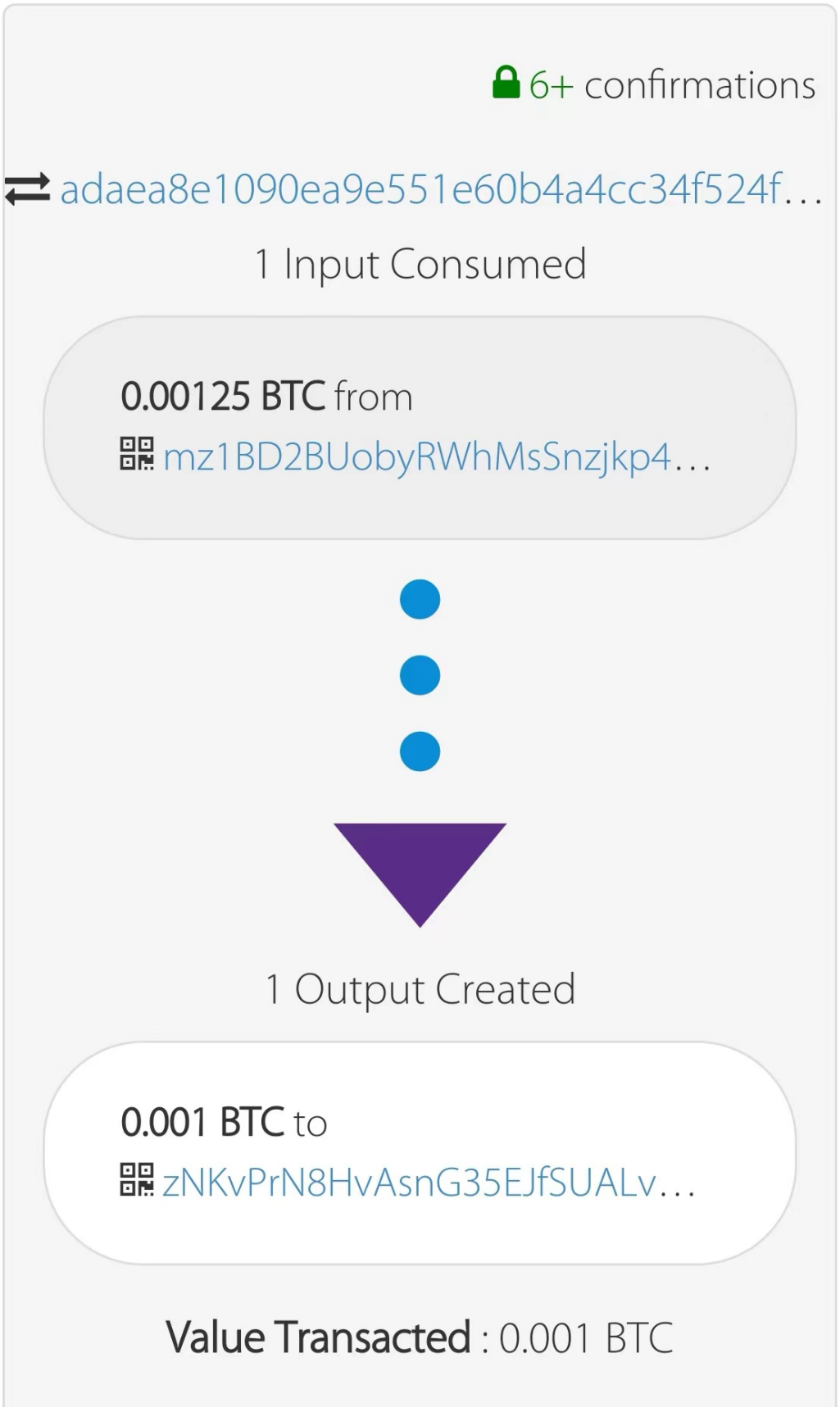
首先必须要有银行公钥，故放在第一个，之后使用签名确认，OP_1 表明至少要有一个客户的签名，OP_3 表明一共的客户人数，之后使用多重签名确认。

4. 使用之前作业的第五次分发作为此次加锁结果，运行后如下：


```
201 Created
{
  "tx": {
    "block_height": -1,
    "block_index": -1,
    "hash":
"adaea8e1090ea9e551e60b4a4cc34f524fc910e2d3d9ef44ee4803b86a4b21e3",
    "addresses": [
      "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4",
      "mz1BD2BUobyRWhMsSnzjkp43bYCJWEVMVf"
    ],
    "total": 100000,
    "fees": 25000,
    "size": 307,
    "vsize": 307,
    "preference": "medium",
    "relayed_by": "2001:250:401:6576:5d9a:fc62:357e:9356",
    "received": "2022-10-25T02:09:22.702983239Z",
    "ver": 1,
    "double_spend": false,
    "vin_sz": 1,
    "vout_sz": 1,
    "confirmations": 0,
    "inputs": [
      {
        "prev_hash":
"a93e884b671e0bcaf6ec605905616db063d2a37140bb6eff0dcfc86b17d90cf8",
        "output_index": 4,
        "script":
"483045022100d99bd697a22b5bd47a490290a180c7779d8272032e7b94ff09bf
c4d14ed332cc0220440094c66f4c1d3542635e4f0517b92acfe837ddab2951a43
647b3733376f091012103040cd5870921a2afa090af6db9638676b33c05c43d98
596a6f4a2e203f53a778",
        "output_value": 125000,
      {
        "value": 100000,
```

```
            "script":
"2103040cd5870921a2afa090af6db9638676b33c05c43d98596a6f4a2e203f53a
778ad512103ce6e4afc6f58e1727a1535b8d48d81ec20057fb01b4bc0380c29aa
46b32183512102bb4b4b8912be0861bb05f3d5a610d1d31bcbbf13ea82c67d9e
37698c3a78cf9521028745a869b8d152a71201ad30b439df17ee4f040fe427614
e3a10ecadef4a480353ae",
            "addresses": [
               "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
            ],
            "script_type": "pay-to-multi-pubkey-hash"
         }
      ]
   }}
```


结果：


6+ confirmations
adaea8e1090ea9e551e60b4a4cc34f524f...
1 Input Consumed
0.00125 BTC from
mz1BD2BUobyRWhMsSnzjkp4...
1 Output Created
0.001 BTC to
zNKvPrN8HvAsnG35EJfSUALv...
Value Transacted : 0.001 BTC

5. ex2b 用于解锁之前的脚本，发回给 faucet_address，这里我们设定还给其的金额为 0.0007，哈希值为第四步中交易得到的哈希值，index=0；而对于签名组合，我们使用 cust1+bank：

```
39
40  if __name__ == '__main__':
41      ######################################################################
42      # TODO: set these parameters correctly
43      amount_to_send = 0.0007
44      txid_to_spend = 'adaea8e1090ea9e551e60b4a4cc34f524fc910e2d3d9ef44ee4803b86a4b21e3'
45      utxo_index = 0#使用结果0
46      ######################################################################
47
48      txin_scriptPubKey = ex2a_txout_scriptPubKey
49      txout_scriptPubKey = P2PKH_scriptPubKey(faucet_address)
50
51      response = send_from_multisig_transaction(
52          amount_to_send, txid_to_spend, utxo_index,
53          txin_scriptPubKey, txout_scriptPubKey)
54      print(response.status_code, response.reason)
55      print(response.text)
56
```

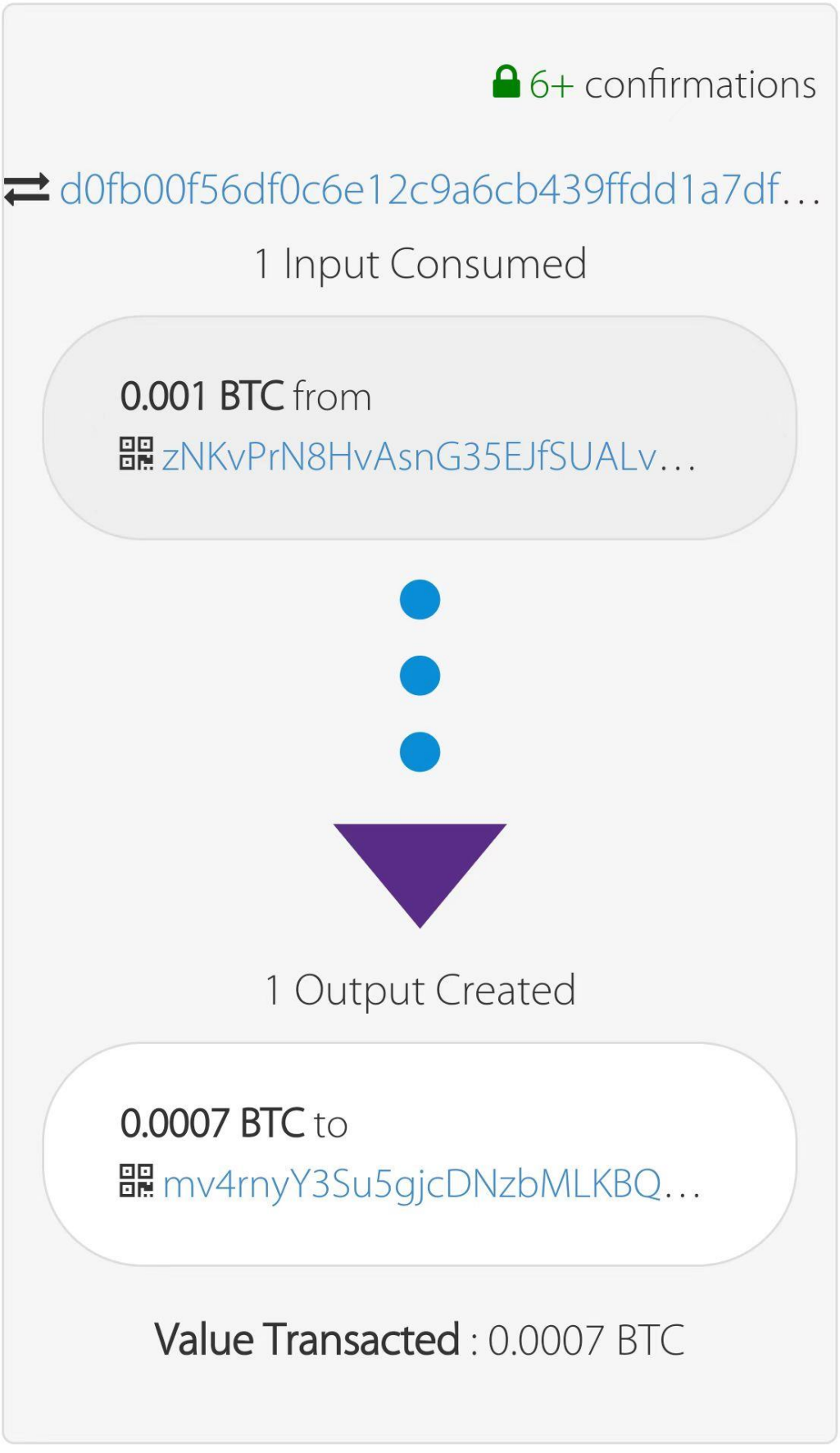
```
10
11  def multisig_scriptSig(txin, txout, txin_scriptPubKey):#解锁脚本
12      bank_sig = create_OP_CHECKSIG_signature(txin, txout, txin_scriptPubKey,
13                                              my_private_key)
14      cust1_sig = create_OP_CHECKSIG_signature(txin, txout, txin_scriptPubKey,
15                                               cust1_private_key)
16      cust2_sig = create_OP_CHECKSIG_signature(txin, txout, txin_scriptPubKey,
17                                               cust2_private_key)
18      cust3_sig = create_OP_CHECKSIG_signature(txin, txout, txin_scriptPubKey,
19                                               cust3_private_key)
20      ######################################################################
21      # TODO: Complete this script to unlock the BTC that was locked in the
22      # multisig transaction created in Exercise 2a.
23      #注意顺序，因为先验证银行，所以银行的pubkey要在栈顶
24      return [OP_0,cust1_sig,bank_sig]
25      ######################################################################
26
```

运行 ex2b 解锁结果：

```
201 Created
{
  "tx": {
    "block_height": -1,
    "block_index": -1,
    "hash":
"d0fb00f56df0c6e12c9a6cb439ffdd1a7dfd2028c061cd3e8fe3ce359db435e8",
    "addresses": [
      "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4",
      "mv4rnyY3Su5gjcDNzbMLKBQkBicCtHUtFB"
    ],
    "total": 70000,
    "fees": 30000,
    "size": 232,
```

```
      "vsize": 232,
      "preference": "high",
      "relayed_by": "2001:250:401:6576:5d9a:fc62:357e:9356",
      "received": "2022-10-25T02:12:51.578251567Z",
      "ver": 1,
      "double_spend": false,
      "vin_sz": 1,
      "vout_sz": 1,
      "confirmations": 0,
      "inputs": [
        {
          "prev_hash":
"adaea8e1090ea9e551e60b4a4cc34f524fc910e2d3d9ef44ee4803b86a4b21e3",
          "output_index": 0,
          "script":
"00483045022100bb48e2a9612100ec5fcd8663679160735bc62382e7c239a7e1fe8d
9cf38338850220058812d66fd6ca407b1563830d75775fa79f2c48bc5656c548fbbc6
62fb3108f01483045022100cf48b7e4f0b35d3d9637a2b64e2905cf48af557b3d1b7ff
0e3bad7bd7f3821870220470f438037fec439cecd8036825b5614f7a8dd9a74041968
17ea5ae73fb7e02401",
          "output_value": 100000,
          "sequence": 4294967295,
          "addresses": [
            "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
          ],
          "script_type": "pay-to-multi-pubkey-hash",
          "age": 0
        }
      ],
      "outputs": [
        {
          "value": 70000,
          "script": "76a9149f9a7abd600c0caa03983a77c8c3df8e062cb2fa88ac",
          "addresses": [
            "mv4rnyY3Su5gjcDNzbMLKBQkBicCtHUtFB"
          ],
          "script_type": "pay-to-pubkey-hash"
        }
      ]
    }
}
```

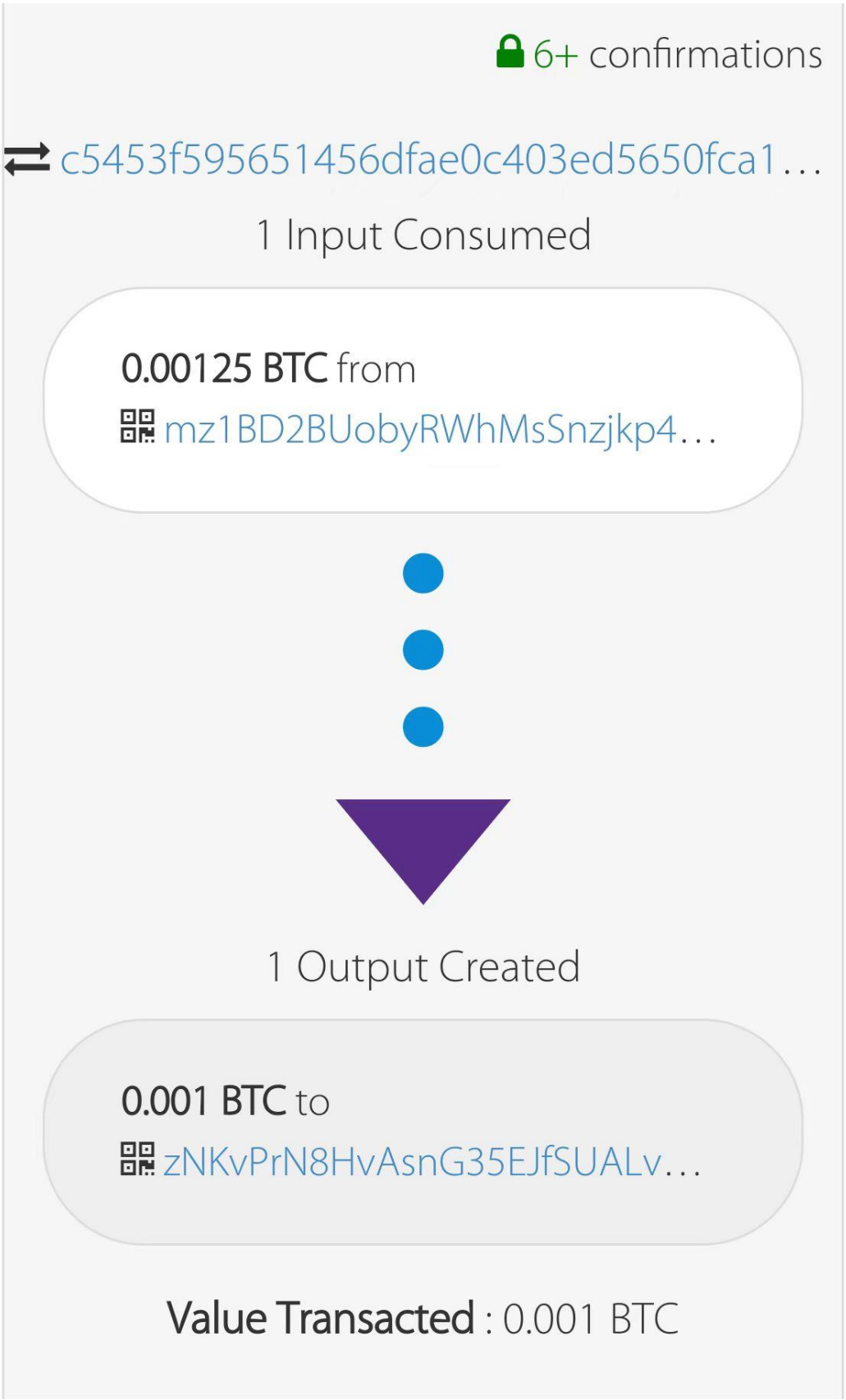

交易结果为：


6+ confirmations
d0fb00f56df0c6e12c9a6cb439ffdd1a7df…
1 Input Consumed
0.001 BTC from
zNKvPrN8HvAsnG35EJfSUALv…
1 Output Created
0.0007 BTC to
mv4rnyY3Su5gjcDNzbMLKBQ…
Value Transacted : 0.0007 BTC

6. 使用之前作业的第七次分发作为另一次加锁结果以验证 bank+cus2 的结果。取回 0.0065


```
201 Created
{
  "tx": {
    "block_height": -1,
    "block_index": -1,
    "hash":
"c5453f595651456dfae0c403ed5650fca100abb8cfa60579bc0a4ea8786b6cf3",
    "addresses": [
      "mz1BD2BUobyRWhMsSnzjkp43bYCJWEVMVf",
      "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
    ],
    "total": 100000,
    "fees": 25000,
    "size": 306,
    "vsize": 306,
    "preference": "medium",
    "relayed_by": "2001:250:401:6576:5d9a:fc62:357e:9356",
    "received": "2022-10-25T02:37:22.559598132Z",
    "ver": 1,
    "double_spend": false,
    "vin_sz": 1,
    "vout_sz": 1,
    "confirmations": 0,
    "inputs": [
      {
        "prev_hash":
"a93e884b671e0bcaf6ec605905616db063d2a37140bb6eff0dcfc86b17d90cf8",
        "output_index": 6,
        "script":
"473044022052c4bab6263b7f9f1ac09eb753faf970eb7e91228d96442bbd8f73c47aa
34bbb02206c73ee2d875d34b730f1e96bc7c98ba1356112e1b046b51c58dbfb323500
81b9012103040cd5870921a2afa090af6db9638676b33c05c43d98596a6f4a2e203f5
3a778",
        "output_value": 125000,
        "sequence": 4294967295,
        "addresses": [
          "mz1BD2BUobyRWhMsSnzjkp43bYCJWEVMVf"
        ],
        "script_type": "pay-to-pubkey-hash",
        "age": 2350569
      }
```

```
      ],
      "outputs": [
         {
            "value": 100000,
            "script":
"2103040cd5870921a2afa090af6db9638676b33c05c43d98596a6f4a2e203f53a778a
d512103ce6e4afc6f58e1727a1535b8d48d81ec20057fb01b4bc0380c29aa46b32183
512102bb4b4b8912be0861bb05f3d5a610d1d31bcbbf13ea82c67d9e37698c3a78cf9
521028745a869b8d152a71201ad30b439df17ee4f040fe427614e3a10ecadef4a48035
3ae",
            "addresses": [
               "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
            ],
            "script_type": "pay-to-multi-pubkey-hash"
         }
      ]
   }
}
```

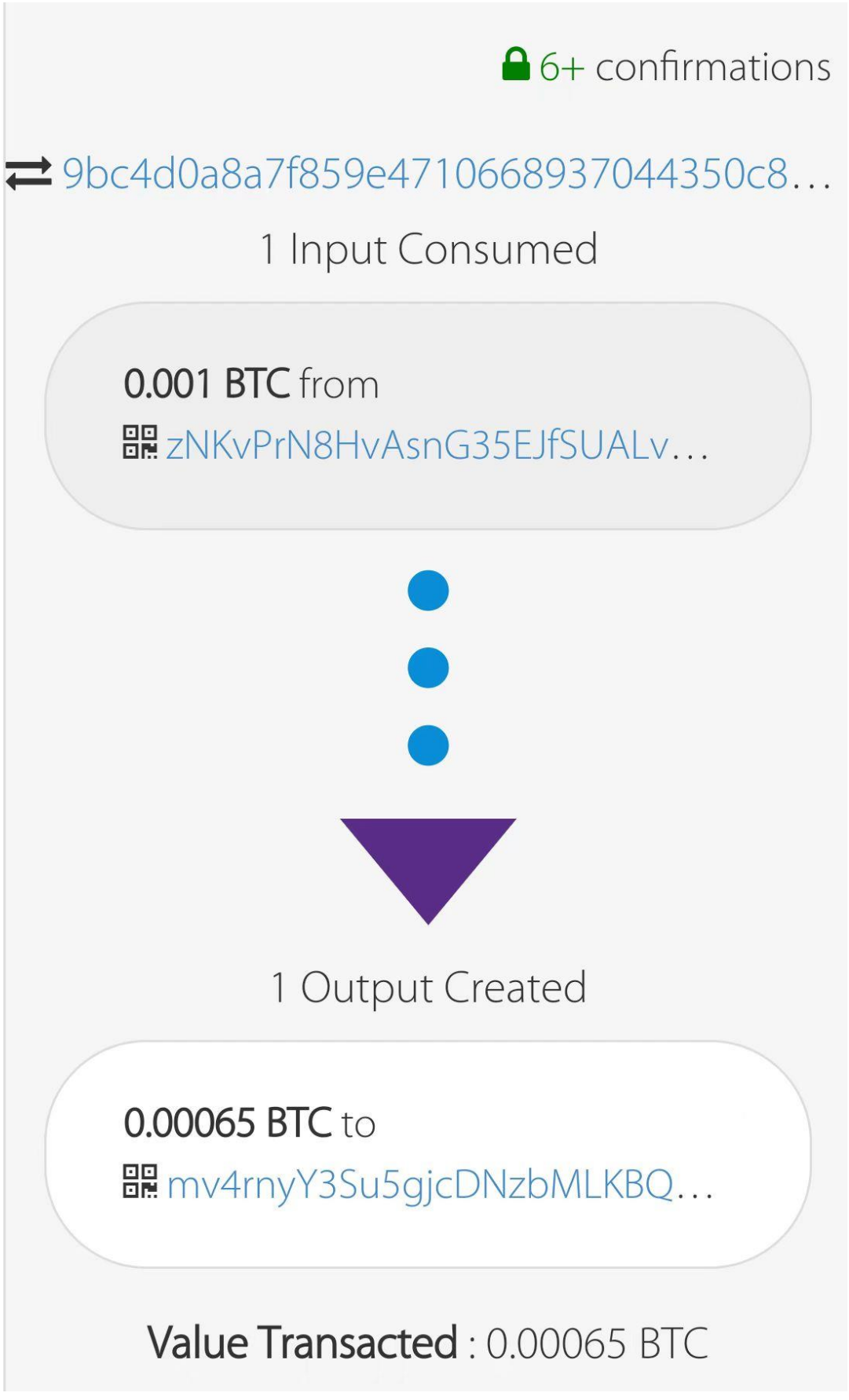


解锁结果为

```
201 Created
{
```

```
  "tx": {
    "block_height": -1,
    "block_index": -1,
    "hash":
"9bc4d0a8a7f859e4710668937044350c8e19d8596a5101778b3812de05bcac42",
    "addresses": [
      "mv4rnyY3Su5gjcDNzbMLKBQkBicCtHUtFB",
      "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
    ],
    "total": 65000,
    "fees": 35000,
    "size": 231,
    "vsize": 231,
    "preference": "high",
    "relayed_by": "2001:250:401:6576:5d9a:fc62:357e:9356",
    "received": "2022-10-25T02:39:04.572806252Z",
    "ver": 1,
    "double_spend": false,
    "vin_sz": 1,
    "vout_sz": 1,
    "confirmations": 0,
    "inputs": [
      {
        "prev_hash":
"c5453f595651456dfae0c403ed5650fca100abb8cfa60579bc0a4ea8786b6cf3",
        "output_index": 0,
        "script":
"00483045022100e627a5c90a936b8e56e6361b43499ea3e3b13383c7a0e1448e967
d369b59eb3202204c7af0c54dc88cdce2645ec38bff9695a366a7d04d9a23f8c5d35be
f11456be50147304402206bc6b90daa05d49656f8b2c4107403c31a53037019d9a8f0
a97221a925af090c02203f8f0abce9aa83f413f84f58917b14be8a8f2114a9d32dfcfec0
fe9e2365cced01",
        "output_value": 100000,
        "sequence": 4294967295,
        "addresses": [
          "zNKvPrN8HvAsnG35EJfSUALvWrrWvghuj4"
        ],
        "script_type": "pay-to-multi-pubkey-hash",
        "age": 0
      }
    ],
    "outputs": [
      {
        "value": 65000,
```

```
            "script": "76a9149f9a7abd600c0caa03983a77c8c3df8e062cb2fa88ac",
            "addresses": [
               "mv4rnyY3Su5gjcDNzbMLKBQkBicCtHUtFB"
            ],
            "script_type": "pay-to-pubkey-hash"
         }
      ]
   }
}
```


6+ confirmations
9bc4d0a8a7f859e4710668937044350c8…
1 Input Consumed
0.001 BTC from
zNKvPrN8HvAsnG35EJfSUALv…
1 Output Created
0.00065 BTC to
mv4rnyY3Su5gjcDNzbMLKBQ…
Value Transacted : 0.00065 BTC