NAME: ANKIT KUMAR JHA
REG.NO.20BPS1050

EXERCISE 3
SMART CONTRACT USING CORDA

Cloning the cordapp Tutorial Repository

Running cordapp in the home directory

```
C:\Windows\System32\cmd.exe                                                                    —  □  ×
Download https://jcenter.bintray.com/net/corda/corda/3.3-corda/corda-3.3-corda.jar
Download https://jcenter.bintray.com/net/corda/corda-webserver/3.3-corda/corda-webserver-3.3-corda.jar

> Task :java-source:deployNodes
Bootstrapping local network in C:\Users\ANKIT JHA\cordapp-example\java-source\build\nodes
Node config files found in the root directory - generating node directories
Generating directory for Notary
Generating directory for PartyA
Generating directory for PartyB
Generating directory for PartyC
Nodes found in the following sub-directories: [Notary, PartyA, PartyB, PartyC]
Waiting for all nodes to generate their node-info files...
Checking for duplicate nodes
Distributing all node-info files to all nodes
Gathering notary identities
Notary identities to be used in network parameters: O=Notary, L=London, C=GB (non-validating)
No existing whitelist file found.
Calculating whitelist for current installed CorDapps..
CorDapp whitelist generated in C:\Users\ANKIT JHA\cordapp-example\java-source\build\nodes\whitelist.txt
Updating whitelist
Bootstrapping complete!

w: C:\Users\ANKIT JHA\cordapp-example\kotlin-source\src\main\kotlin\com\example\api\ExampleApi.kt: (106, 9): Unreachable code
w: C:\Users\ANKIT JHA\cordapp-example\kotlin-source\src\main\kotlin\com\example\api\ExampleApi.kt: (106, 13): Variable 'results' is never used

> Task :kotlin-source:deployNodes
Bootstrapping local network in C:\Users\anass\cordapp-example\kotlin-source\build\nodes
Node config files found in the root directory - generating node directories
Generating directory for Notary
Generating directory for PartyA
Generating directory for PartyB
Generating directory for PartyC
Nodes found in the following sub-directories: [Notary, PartyA, PartyB, PartyC]
Waiting for all nodes to generate their node-info files...
Checking for duplicate nodes
Distributing all node-info files to all nodes
Gathering notary identities
Notary identities to be used in network parameters: O=Notary, L=London, C=GB (non-validating)
No existing whitelist file found.
Calculating whitelist for current installed CorDapps..
CorDapp whitelist generated in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\whitelist.txt
Updating whitelist
Bootstrapping complete!


BUILD SUCCESSFUL in 3m 39s
12 actionable tasks: 11 executed, 1 up-to-date
C:\Users\anass\cordapp-example>
```

Opening nodes (8 nodes –> 4 nodes & 4 web servers)

```
C:\Windows\System32\cmd.exe                                                          —     □    ×

C:\Users\ANKIT JHA\cordapp-example>cd kotlin-source/build/nodes

C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes>runnodes
Starting nodes in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes
Starting corda.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\Notary on debug port 5005
Starting corda.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyA on debug port 5006
Starting corda-webserver.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyA on debug port 5007
Starting corda.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyB on debug port 5008
Starting corda-webserver.jar in C:\Users\anass\cordapp-example\kotlin-source\build\nodes\PartyB on debug port 5009
Starting corda.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyC on debug port 5010
Starting corda-webserver.jar in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyC on debug port 5011
Started 7 processes
Finished starting nodes

C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes>
```
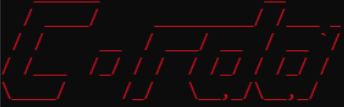
Created nodes and webservers

```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                    —    □    ×

Listening for transport dt_socket at address: 5005


    ___        ___        ___
   /  /       /  /       /  /_
  /  /       /  /       /  /_/         I asked for insurance if the nearby
 /  /___    / _/___    /  /  /         volcano erupted. They said I'd be covered.
 _____/  /_/  \_/   /_/\_/


--- Corda Open Source 3.3-corda (c834162) ------------------------------------------


Logs can be found in                    : C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\Notary\logs
Database connection url is              : jdbc:h2:tcp://172.17.176.1:55916/node
Advertised P2P messaging addresses      : [2401:4900:628c:ed44:ada1:5005:8690:a38f]:10006
Loaded CorDapps                         : corda-finance-3.3-corda, cordapp-example-0.1, corda-core-3.3-corda
Node for "Notary" started up and registered in 61.69 sec


Welcome to the Corda interactive shell.
Useful commands include 'help' to see what is available, and 'bye' to shut down the node.

Wed Apr 05 14:42:35 IST 2023>>> Jolokia: Agent started with URL http://127.0.0.1:7005/jolokia/
_
```
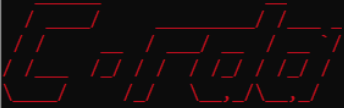


```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                    —    □    ×

Listening for transport dt_socket at address: 5006


    ___        ___        ___
   /  /       /  /       /  /_
  /  /       /  /       /  /_/         Top tip: never say "oops", instead
 /  /___    / _/___    /  /  /         always say "Ah, Interesting!"
 _____/  /_/  \_/   /_/\_/


--- Corda Open Source 3.3-corda (c834162) ------------------------------------------


Logs can be found in                    : C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyA\logs
Database connection url is              : jdbc:h2:tcp://172.17.176.1:55809/node
Advertised P2P messaging addresses      : [2401:4900:628c:ed44:ada1:5005:8690:a38f]:10007
RPC connection address                  : localhost:10008
RPC admin connection address            : localhost:10048
Loaded CorDapps                         : corda-finance-3.3-corda, cordapp-example-0.1, corda-core-3.3-corda
Node for "PartyA" started up and registered in 80.25 sec


Welcome to the Corda interactive shell.
Useful commands include 'help' to see what is available, and 'bye' to shut down the node.

Wed Apr 05 14:42:30 IST 2023>>> Jolokia: Agent started with URL http://127.0.0.1:7006/jolokia/
```

```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                          —    □    ✕

Listening for transport dt_socket at address: 5008


       __ ___ _                  "It's OK computer, I go to sleep after
      /  /__ _/__/                twenty minutes of inactivity too!"
     /__ /__/ / /
    /__/   /__/ \_/\_/

--- Corda Open Source 3.3-corda (c834162) ------------------------------------------------


Logs can be found in                      : C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyB\logs
Database connection url is                : jdbc:h2:tcp://172.17.176.1:55920/node
Advertised P2P messaging addresses        : [2401:4900:628c:ed44:ada1:5005:8690:a38f]:10010
RPC connection address                    : localhost:10011
RPC admin connection address              : localhost:10051
Loaded CorDapps                           : corda-finance-3.3-corda, cordapp-example-0.1, corda-core-3.3-corda
Node for "PartyB" started up and registered in 72.05 sec


Welcome to the Corda interactive shell.
Useful commands include 'help' to see what is available, and 'bye' to shut down the node.

Wed Apr 05 14:42:46 IST 2023>>> Jolokia: Agent started with URL http://127.0.0.1:7008/jolokia/
```

```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                          —    □    ✕

Listening for transport dt_socket at address: 5007
This Corda-specific web server is deprecated and will be removed in future.
Please switch to a regular web framework like Spring, J2EE or Play Framework.

Logs can be found in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyA\logs\web
Starting as webserver: localhost:10009
Could not start Jolokia agent: java.lang.IllegalArgumentException: Cannot find net.corda.webserver.JolokiaSlf4Adapter
Webserver started up in 94.09 sec
```

```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                          —  □  ×
Listening for transport dt_socket at address: 5009
Could not start Jolokia agent: java.lang.IllegalArgumentException: Cannot find net.corda.webserver.JolokiaSlf4Adapter
This Corda-specific web server is deprecated and will be removed in future.
Please switch to a regular web framework like Spring, J2EE or Play Framework.

Logs can be found in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyB\logs\web
Starting as webserver: localhost:10012
Webserver started up in 109.98 sec
```



```
C:\Program Files\OpenJDK\jdk-8.0.352.08-hotspot\jre\bin\java.exe                          —  □  ×
Listening for transport dt_socket at address: 5011
This Corda-specific web server is deprecated and will be removed in future.
Please switch to a regular web framework like Spring, J2EE or Play Framework.

Logs can be found in C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\PartyC\logs\web
Could not start Jolokia agent: java.lang.IllegalArgumentException: Cannot find net.corda.webserver.JolokiaSlf4Adapter
Starting as webserver: localhost:10015
Webserver started up in 98.05 sec
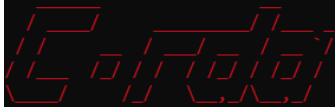```

Transaction:

O=PartyB, L=New York, C=US  [Create IOU]

**Recorded IOUs:**
- Lender: O=PartyB, L=New York, C=US
- Borrower: O=PartyC, L=Paris, C=FR
- Value: 10

**My IOUs:**
- Lender: O=PartyB, L=New York, C=US
- Borrower: O=PartyC, L=Paris, C=FR
- Value: 10

```
Listening for transport dt_socket at address: 5005



                                    I asked for insurance if the nearby
                                    volcano erupted. They said I'd be covered.


--- Corda Open Source 3.3-corda (c834162) -----------------------------------------


Logs can be found in                : C:\Users\ANKIT JHA\cordapp-example\kotlin-source\build\nodes\Notary\logs
Database connection url is           : jdbc:h2:tcp://172.17.176.1:55916/node
Advertised P2P messaging addresses   : [2401:4900:628c:ed44:ada1:5005:8690:a38f]:10006
Loaded CorDapps                      : corda-finance-3.3-corda, cordapp-example-0.1, corda-core-3.3-corda
Node for "Notary" started up and registered in 61.69 sec


Welcome to the Corda interactive shell.
Useful commands include 'help' to see what is available, and 'bye' to shut down the node.

Wed Apr 05 14:42:35 IST 2023>>> Jolokia: Agent started with URL http://127.0.0.1:7005/jolokia/


Wed Apr 05 14:47:42 IST 2023>>> flow list
com.example.flow.ExampleFlow$Initiator
net.corda.core.flows.ContractUpgradeFlow$Authorise
net.corda.core.flows.ContractUpgradeFlow$Deauthorise
net.corda.core.flows.ContractUpgradeFlow$Initiate
net.corda.finance.flows.CashConfigDataFlow
net.corda.finance.flows.CashExitFlow
net.corda.finance.flows.CashIssueAndPaymentFlow
net.corda.finance.flows.CashIssueFlow
net.corda.finance.flows.CashPaymentFlow

Wed Apr 05 14:47:48 IST 2023>>> _
```

```
Wed Apr 05 14:42:46 IST 2023>>> Jolokia: Agent started with URL http://127.0.0.1:7008/jolokia/


Wed Apr 05 14:49:19 IST 2023>>> run vaultQuery contractStateType: com.example.state.IOUState
{
  "states" : [ {
    "state" : {
      "data" : {
        "value" : 10,
        "lender" : "O=PartyB, L=New York, C=US",
        "borrower" : "O=PartyC, L=Paris, C=FR",
        "linearId" : {
          "externalId" : null,
          "id" : "8b0ebddb-b8b2-4465-bd68-5181ee0cea81"
        },
        "participants" : [ "O=PartyB, L=New York, C=US", "O=PartyC, L=Paris, C=FR" ]
      },
      "contract" : "com.example.contract.IOUContract",
      "notary" : "O=Notary, L=London, C=GB",
      "encumbrance" : null,
      "constraint" : {
        "attachmentId" : "84E8BD4C3310052879E65E75F5D608C43AD31A7E1C0C5EE8C5C5B6CFA662ED07"
      }
    },
    "ref" : {
      "txhash" : "F8A22A203F428AC0B2CB2896AE61FE3DB17F39BA7C7701FB6069DAF2B426D6B5",
      "index" : 0
    }
  } ],
  "statesMetadata" : [ {
    "ref" : {
      "txhash" : "F8A22A203F428AC0B2CB2896AE61FE3DB17F39BA7C7701FB6069DAF2B426D6B5",
      "index" : 0
    },
    "contractStateClassName" : "com.example.state.IOUState",
    "recordedTime" : "2023-04-05T09:16:24.336Z",
    "consumedTime" : null,
    "status" : "UNCONSUMED",
    "notary" : "O=Notary, L=London, C=GB",
    "lockId" : null,
    "lockUpdateTime" : null
  } ],
  "totalStatesAvailable" : -1,
  "stateTypes" : "UNCONSUMED",
  "otherResults" : [ ]
}

Wed Apr 05 14:49:34 IST 2023>>>

Wed Apr 05 14:49:34 IST 2023>>>
```