Distributed Operating System - Project 1: Mining Bitcoins

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Steps for Execution

- The project folder **Project1_Gagan_Umar** consists of two sub-projects names **GaganServer** and **UmarClient,** one being the listener and other being the remote respectively.

- To execute open two terminals

- In Terminal-1 reach **/Project1_Gagan_Umar/GaganServer**

- After reaching this path type **sbt run**. It will run the server and start mining coins. The server has the capability to mine the coins itself if even Client is not available.

- In Terminal-2 reach **/Project1_Gagan_Umar/UmarClient**

- After reaching this path type **sbt run**. It will join the server and accept coins from Server to mine, sending the result back.

- Update the application config file of Gagan Server to the servers IP and update the IP in the remoteserver.scala file to the clients IP address and update the application config file of Umar Client to the clients IP and update the IP in the localclient.scala file to the server IP address for running on multiple machines

- Source code path:
  - **\Project1_Gagan_Umar\GaganServer\src\main\scala\remote\RemoteServer.scala**
  - **\Project1_Gagan_Umar\UmarLocal\src\main\scala\local\LocalClient.scala**

Size of Work Unit: We created a random string of 9 alphanumeric characters added with GatorID (umarmajeed). Total string of 19 character was sent to Hash Function. We initially created a big chunk of 100,000 such strings and passed in parts to workers. However this method appeared adamant as system consumed much of the time just to create 100,000 strings and no output was visible on screen.

So we started calling actors in a "for" loop, where after creating a string the actor acts on it (valid for both local or remote).

Number of Actors: We tried a lot of ways to define the number of actors. We started from defining it explicitly by numbers ranging from 10 to 1000. Somehow we realized that higher number have lesser effect on the overall performance. Thus came to a conclusion that approximately 1.5 - 2 times the number of available processors.

Result with 4 leading zeroes: String Passed: 900,000 to Local and 100,000 to Remote and we mined 21-bit coins.

```
Bitcoin: umarmajeedoQCap7psN      0000e4f5a91f4bb430da5961ccf7b74ab371cf13d2c92b24
203337418e1e9bdb
Bitcoin: umarmajeedfCCLFXRR9      00005e7704d3148a40347636eea9981222ba7f135f0ffd63
1814a613c506086b
Bitcoin: umarmajeedeQfjU8diA      0000c9bd09136a5855aebbfb7d9ab04a75595f4879d2b586
8d04454a7857a0fb
Bitcoin: umarmajeedW0IozP1Yq      0000bfbeb6f86e486de004075bb07d66bcacd8a8b38abb26
c6d2c3ed41d4dba0
Bitcoin: umarmajeed45T2ROQ6i      000069ec546630befee924d7e854071f1afeee74aadce80b
e7531a2c62818d57
Bitcoin: umarmajeedRALcpncqU      0000346ab9c96fb43df81e16119cc10d49eff9f06e34ad2b
5e157fb77ed570ac
Bitcoin: umarmajeedGYPThE2xU      0000dbed9c467ff3e982ca4dc87645eb889e0552748d96ba
5492f63d4614deea
Bitcoin: umarmajeedsGW8kpTrd      0000468fca473779f789931f91c24935573c0d9ea814ef39
8f88dda65356dcd8
Bitcoin: umarmajeeduHsZL0n8c      0000a83325e418cbdedf70d6cb5095a402d3736897e6e5a0
843c2919ec94d675
Bitcoin: umarmajeedGurMbO6EH      0000ec00a69bb77788641a31d1334f28e4892ad91c2d1de1
10b746b18b49a1f3
Bitcoin: umarmajeede3vwNeam1      0000db07bf52ebde0e77c15f33c06e42c5117c562a5717ee
cf2403814029c736
Bitcoin: umarmajeedwZHuw6iKc      0000ffd25329c5709fffdb72ed26cae6a6465515895350b1
e6575f517641433e
Bitcoin: umarmajeedkn28WrFbM      00008f928238046a43dac1fbfbf228161e8dabe981f6f0e1
5aa3c907356ff012
Bitcoin: umarmajeedwD9UtaaP0      0000ce2c94d636df06eab559ebb4bed6a1fa1f6a64d0c7aa
54d14f5e7136b386
[INFO] [09/13/2015 22:34:54.545] [RemoteSystem-18] [NettyRemoteTransport(akka://
RemoteSystem@127.0.0.1:5150)] RemoteClientStarted@akka://LocalSystem@127.0.0.1:1
3383
Server received message:
I'm ready to work
Server received message:
From Client: Bitcoin: umarmajeedzGCUQo6kD      00009f3b96f587a07d9d1a107dd041d3a466
b27fb5a40867e3b7b43da67dbf13
Server received message:
From Client: Bitcoin: umarmajeedf14B4lhpb      0000f983326e907fef75059be9170b60a649
1649c52b7c75ac44988a71d90e85
Server received message:
From Client: Bitcoin: umarmajeed9UxKOTYhl      00007502b2e9f290a649320806901f69bdf4
6a22c0648528ef3f0edc7a28812a
Server received message:
From Client: Bitcoin: umarmajeedjOQqN60Co      0000943fd014605322e53826c4bcf03be1f6
022e02b2eb81f05b9470a6e68289
Server received message:
From Client: Bitcoin: umarmajeedkXxXXYeQU      00005a66128e674714401bc5103575421b47
4e3fe524f933e61d5bd1e1562e40
Server received message:
From Client: Bitcoin: umarmajeedz1LC4YbU0      0000247eedcf2846c4c12f5c4bfb147ee9df
d5872831a0fd6d80c4ea573ce545
Server received message:
From Client: Bitcoin: umarmajeedtROCePimn      00009f01fb1cac9fa1218451b31612870340
3dd98c0439cc049670d82e04178a
```

Result with 5 leading zeroes:

Bitcoin: umarmajeed1Y5cv1QK8   00000dd6357fb3d144a8c26241ad09f2c92cd9bc139f93b41eb42fccd9976caa

Bitcoin: umarmajeedgcJgkAMps   00000bc114e7f57f970a8bb768afb9c2dcd0681397c76f2967f0767bf2da72a4

We observed that multiple actors were running and thus multiple cores were utilized. The observed CPU time was lesser than real time.

Coins with most zeroes: **5 zeroes.**

Bitcoin: umarmajeedKVRV4OILU   00000ae0e5ccfc1acb6fc5d418e905ef642fe5258a40ea03e220a75b89a1663e

Largest working machines: We were able to work on two multiple machines. Though we faced a lot of issues because of Windows 10 firewall settings.