## **DOSP Project1 README**

#### **Group Members**

- Vishisht Khilariwal
- Siddhant Jain

#### Size of work unit

Giving the workers a range of 10000000 ( $10^7$ ) produced the best CPU/Real Time ratio. Tested the ratio for ranges in power of 10 till  $10^9$  Performance Improvement with increased work unit stopped after  $10^7$  units

CPU/Real Time ratio ( $10^{9}$ -> 4.43

```
let system = create "BitCoinGenerator" config // ActorSystem
24 let chars = Array.concat([[|'a' .. 'z'|]]) // []<char>
25 let size = Array.length chars - 1 // int
26 let ufID = "vkhilariwal" // string
29 let workers = 6 // int
       let zeros = String(Array.create trailZeros '0') // String
       let range = 1000000000; // int
      let processorNode (mailbox: Actor<_>) = // Actor<int> -> Cont<int, 'a>
            let rec loop () = actor {
                let ranStr n =
                     let r = Random()
                     let chars = Array.concat([[['a' .. 'z']];[['A' .. 'Z']];[['0' .. '9']]])
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
Real: 00:00:00.000, CPU: 00:00:00.000, GC gen0: 0, gen1: 0, gen2: 0
[INFO][9/24/2021 6:59:27 PM][Thread 0001][remoting (akka://BitCoinGenerator)] Starting remoting
[INFO][9/24/2021 6:59:27 PM][Thread 0001][remoting (akka://BitCoinGenerator)] Remoting started; listening on addresses : [akka.tcp
[INFO][9/24/2021 6:59:27 PM][Thread 6001][remoting (akka://BitCoinGenerator)] Remoting now listens on addresses: [akka.tcp://BitCo
vkhilariwalB4r0b 000009BFABD9875B08805FE81162114C5D8C11E8A06CCBE132203142B11B4ACE
vkhilariwalrBZlE 000002B30CFB732D4EC2994ACB3ECEA6F3A737B3DCA77BAC1F7CDD99BD62E229
vkhilariwalJDVBC 0000066319063F18121788672AD1180675805FE24DFE2C2118D81C188CFAAACF
vkhilariwal032ka 000000057A33F279811A68509A3D1C0E9558F67211C1BAD0B3824F965726AE29
vkhilariwal6rxqU 000007AD8E46A37DEEB196D90B79784E188DC44F4EB9D8F22CCF0E3CFDBD589B
vkhilariwal4oZ1b 000004730DFE4A71F9A4E43994D720927FC938D6078DD84540073665705B8FBF
Real: 00:00:25.728, CPU: 00:01:54.015, GC gen0: 2383, gen1: 5, gen2: 1
```

```
let system = create "BitCoinGenerator" config // ActorSystem
       let chars = Array.concat([[|'a' .. 'z'|]]) // []<char>
       let size = Array.length chars - 1 // int
      let ufID = "vkhilariwal" // string
       let trailZeros = 5 // int
       let workers = 6 // int
       let zeros = String(Array.create trailZeros '0') // String
       let range = 10000000; // int
       let processorNode (mailbox: Actor< >) = // Actor<int> -> Cont<int, 'a>
            let rec loop () = actor {
                let ranStr n =
                     let r = Random()
                     let chars = Array.concat([[['a' .. 'z']];[['A' .. 'Z']];[['0' .. '9']]])
           OUTPUT TERMINAL
Real: 00:00:00.000, CPU: 00:00:00.000, GC gen0: 0, gen1: 0, gen2: 0
[INFO][9/24/2021 6:57:36 PM][Thread 0001][remoting (akka://BitCoinGenerator)] Starting remoting
[INFO][9/24/2021 6:57:36 PM][Thread 0001][remoting (akka://BitCoinGenerator)] Remoting started; listening on add
:9001
[INFO][9/24/2021 6:57:36 PM][Thread 0001][remoting (akka://BitCoinGenerator)] Remoting now listens on addresses:
vkhilariwalyd9Ad 00000BFBEE2853E2C0D9C5CBD068DDAF043D72C8A3319F695D66D4BC079FD903
vkhilariwal0x91R 0000012345C4259B194D668CD4129208EFE1391216C03C7084113BFB802F606D
vkhilariwalZM2q4 0000011BE325520B317FC33F8F99D45061BFB35BDDAE77157F94C56908AB7F56
vkhilariwalnGf99 00000E14457BB5D97636F4F7703D25C0E3DEFFFA96E0E2B21D53857CE47894DE
Real: 00:00:32.859, CPU: 00:02:22.468, GC gen0: 3042, gen1: 5, gen2: 0
Press any key to continue . . .
```

Also increasing the number of total actors helps improve the CPU/Real time ratio since increasing the number of actors effectively helps in parallelizing the computation

## **Output for size 4**

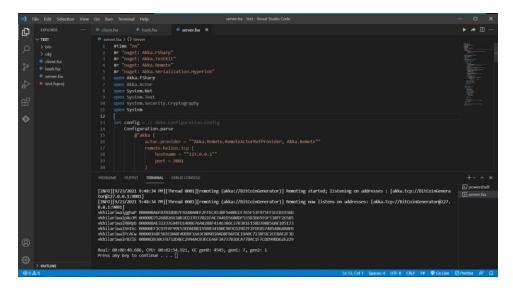
Few of the size 4 bitcoins found

vkhilariwalFVFcAnU 00006DC7EF673EE61FC7A3B3DED50C40C0EBE321DD235491791F69757388DEEA vkhilariwalMFivPlM 0000DC61CF14FE2D0C514349B4B4AE57A86D4AF446A7F528C4F0DEA1B71E14CC vkhilariwal2oN8jKc 0000A46A38116B395BA4955B50996872DB9B24CE947A5A037842A88E6C494CB8 vkhilariwalSYuybba 000041D7123B86815AD1218026EA7E4326478D89DE1548706482799F9144F0C4 vkhilariwalDO34i9b 0000F81F782D576CD06F856BDED60EBC7C8E511C1F5F8476A47E7022584C0A1A

#### **Running Time Analysis**

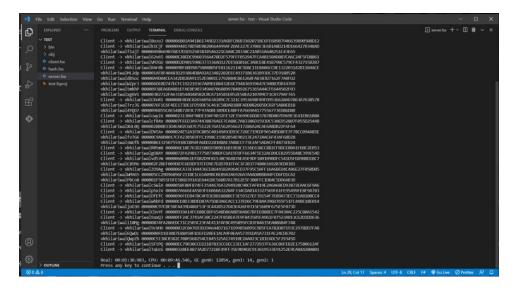
For Single System

CPU time/Real Time: 2:54.921/40.686 = 4.301



For Server + Client

CPU time/Real Time : 9:46.546/1:30.983 = 6.44



# **Max Bitcoin Size 7**

vkhilariwalmXrn2Mj 0000000B1DB336AD83DF708D4AC9A865184AC930337793484CC44A9D9A21CA16

The largest number of working machines we were able to run