

Bitcoin Mining using Erlang

COP5615 - Distributed Operating Systems Principles - Project 1

The goal of this project is to use Erlang and the actor model to build a good solution to the bitcoin mining problem that runs well on multi-core machines.

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Outline

This is a distributed system using Erlang and Actor Model. Actors are spawned to generate random strings and hash them using the SHA256 algorithm and mine coins based on the input. This is a client-server-based system. The worker actors concurrently keep mining bitcoins in both client and server systems.

Compile and run

1. Extract the zip file -> unzip project1.zip
2. Compile server.erl, client.erl, utils.erl
3. For distributed implementation: a) server -> server:start() b) client -> client:start(lIpAddress)

I) Size of the work unit

The size of the work unit is equal to the number of logical processors available on a machine. This program is run on a machine that has 8 logical processors.

II) Result of running program for input '4'

```
no of process 8<0.89.0>
hemanth.bandari;c7jpm 000024d642b7bfe65f67204e3b2af2796c33dd8c628174409c91d38071f5bdac
hemanth.bandari;npopa 00004d27d46d93dcd840ce0604121870e18452f7042f11aa6b9c4452786e5e8d
hemanth.bandari;g6a@u 00006d5e37974f4dab15d2d0095724e37be4e06e3619e6713924c250ab1a210d
hemanth.bandari;ow3uh 00007d56bf078981696add705176504ba2bfdc6b21b908dd6ab60a57b06440f8
hemanth.bandari;630fb 0000db1a99ab1f57928ec51fef2126f216efb23035798ff52e6ea6d357cd53bg
hemanth.bandari;8g21i 00008cd1ae0f9051db0e0c7cbb790c11e838091070f3fee6ca8fcc1e32357c10
hemanth.bandari;2kvo6 00000b8a0da82964d6781131754dbbb3a3a196f8762320c4229e43ff9d4f8dde
hemanth.bandari;utdht 00003308014930bf5e60b3c399011bf0ab840e1efed5279a0e5d325c90a3dda0
hemanth.bandari;a19xz 0000695b1e194aea331da580740b5a4b6b6391dd695d9a084fbd906764fff76c
hemanth.bandari;6ce2w 000047d6c664d9d91711fa3549695eb6f58774592b65003ed6e409e40d15ce54
hemanth.bandari;so8i1 0000ecd8d190c01bf894a67b0f71edaaaaf72e9d6e72cae22d9f683a7a6a7ae1
hemanth.bandari;nubb3 0000e71445260cc7381451255d6e3ae3a7b0a425e15fdb1608e42a74c2bae02
hemanth.bandari;0z0es 00004b429d8d04ef1f300c0920416ee1ba516a92acf01ab86ba9540d7e8640d1
hemanth.bandari;8rkxv 00003ed71b77dd5dcb8f5d8a8edf627625e2a7276c7a7675600527dac6fb347e
hemanth.bandari;ag591 0000bfd4117cd502bbe09364297fad077de759618b4256d3d80ade9b618dac77
hemanth.bandari;qroib 0000d6443c1c6e5bb9064a6df097205d74d5b0cbf98b3b1e1257f15d34d2ec97
```

III) Running Time and Ratio of CPU time to Real Time

```
CPU Time -> 278
Real Time -> 88
Ratio: CPU Time/Real Time -> 3.15
```

```
CPU Time is : 278, Real Time is : 88, CPU Time/Real Time is: 3.159090909090909
```

IV) Bitcoin with most 0's managed to find

The bitcoin with highest number of leading 0's that we managed to find is the coin with 5 leading 0's.

```
hemanth.bandari;lgiwg 0000079a1e2bb0cb5658ed2f5853b98b01261ad567f0d27aecca65b2e5eee425
hemanth.bandari;4igsa 000004d687d23b64d3e96e4c2bc3d6a5844e14f4d902271a96a40544b9b64b13
hemanth.bandari;a0tij 00000c1c464744a49328816e1b04d66f9dfdd04305dcb8c1806dd0d60eefc775
hemanth.bandari;lrsq2 000007fb577914c77a37fa7b900e9a0f81ba571fe88b7433b4b82adee4bad616
hemanth.bandari;458sc 00000d99b11324c1cf4417731d989d1fc8107e2a97b3c55a245f5a883becea4a
hemanth.bandari;h9pjf 0000029a8d6fc10106cc43322cbd9cb8d0469562f2cbd5d1be65c15b637512e8
hemanth.bandari;sasbe 000007ded815dbf8da747f86f02e55e4d107463dbd63943208c2f9a86692d3ff
hemanth.bandari;y6tpj 00000f2f8b1c63c61a09b11e468c2144f9437bd094115520b7976d4260fe511b
```

V) Highest number of machines working parallelly

We were able to run the application on 2 machines. However, based on the statistics and performance it is evident that we can run on more than 2 machines.