

Bitcoin Miner - DOSP Fall 2022

Bitcoin miner is a distributed application in Erlang that mines bitcoin strings in the multiples of 20 million using SHA 256 algorithm. This model uses the actor model of Erlang and distributes actors in the multiples of 300 across different systems.

Project Members

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Project Description

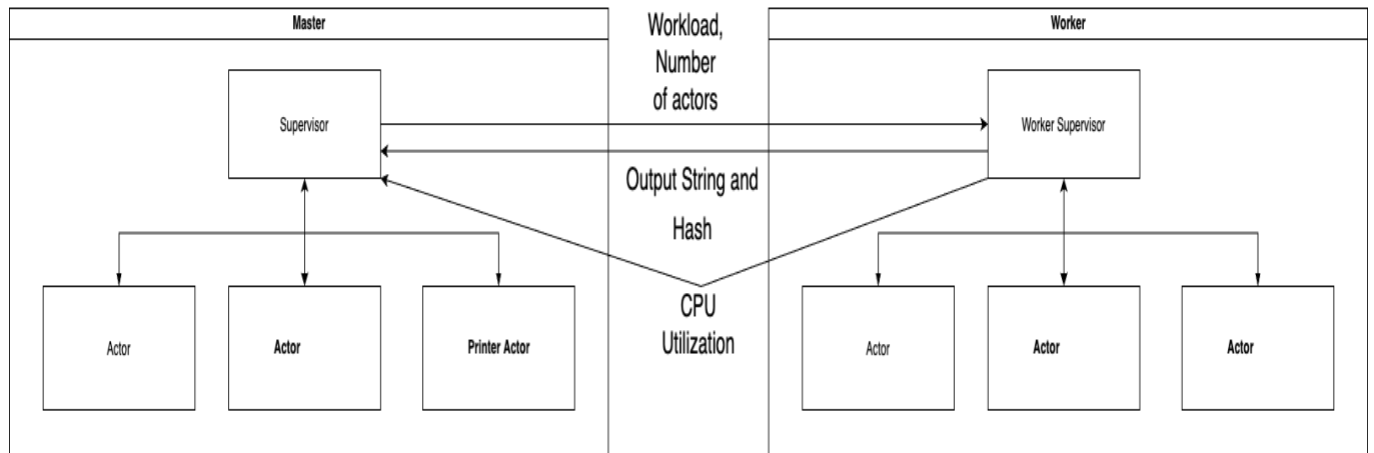
This application aims to find the bitcoins whose hashes have a given number of leading zeroes. The application takes an integer, k , as an input. After the establishment of a successful connection with all the nodes (systems) involved, the master sets the workload to be $k * 20$ million.

The master then spawns an actor which acts as a supervisor to monitor the application. The supervisor spawns $k * 300$ actors in each of the nodes. It then distributes the workload among all the ($k * 300 * \text{number of nodes}$) actors including itself. Each actor then generates random alphanumeric strings of 15 characters in the order of its own workload. The random strings generated are prefixed by one of the project member's gator link.

These strings are then hashed using SHA 256 algorithm. The hashes which have k number of leading zeroes along with their respective strings are sent back to the supervisor. The master then prints these strings and hashes. Further, the CPU time taken to execute the entire application is also computed.

Example string: `bajaj.anmol;88eR25yqTQ3wy1w`

Architecture



Requirements

- Erlang

Steps to execute the application

After cloning the project, execute the following steps.

Start the server

- In the master system, execute `cd Master`
- Execute `master:startNode("{IP of your server}")`.

Start the worker

- In the worker system, execute `cd Worker`
- Execute `worker:startNode("{Worker IP}", "{Server IP}")`.

Start the application

- In Master system, execute `master:start({k})`.

Results of the Application for Input k = 4

String	Hash
bajaj.anmol;88eR25yqTQ3wy1w	00004245fd396bdb7c4924f2593421a1919d382b896c7d56101d6d779b57711a
bajaj.anmol;RYq9Q6tqyR9eewt	000098475fc214cf498f23a7fddf5c891206a688cb6e3fab96b12abc2774132c
bajaj.anmol;75436553Q6qr5ww	00009d3ede341789c80e1c555adb0b754124b8c0037d10f70904d782741f2315
bajaj.anmol;4W91W3Tq6EWr4qE	0000aa63708f22be545b16f17b4d3c251d8cf8caba898872697faa933c1717a8
bajaj.anmol;0EQr0YW8yW6T00w	0000903f2423038fd9517f66be4641d4e74fea269ed11d0d6c11863414d3c3b8
bajaj.anmol;Ty14t9t2q90y1WQ	0000b11fedcdd3a69a2b93cca9f08384d2c0e4b3df4b6139b8c8e6b19b07185a
bajaj.anmol;167QeERTQ88ETQe	0000d2a390559f0664ad41125055036cdd4d0e916740c899a9966ba858267d5b
bajaj.anmol;TET14trEe5erYRT	00002226ebf1f8723db87df616de5973db61d6d4b41832169c5fadf6db26bf62
bajaj.anmol;48yW54tEw2e41WT	0000e6f0f968fa5a4f5feeb22ae1ff7d29646c6af2d9ff3691cb4aab6c832351
bajaj.anmol;60852YT46t90YW6	00009bd6216534fe2a797884ec891051089c4bd457d2535adb83f9d7d3d725b3
bajaj.anmol;rTQQ01Y4yWEE8Wr	00004cca4e50a0d6a96ca8206fcacf4606f4eb3f6d52a6ac5bed5be104625479f
bajaj.anmol;94TwerY13ET88R8	000088d3a964bc47b90c42352dc90329a35495a94559d4378d3cd5629edadb90
bajaj.anmol;W5Ww22e6w1tQEeq3	0000b74832be01b0ec5d08fe906776ce248e0312f7e195532eb5d779b6f6db21
bajaj.anmol;YWW1Yt497122tt1	0000b601f8293ac3ec2dfc3f36fb760207a0221a7dff460e4f3e57f646efdcbf
bajaj.anmol;ee4We29y39Q63eR	00002c3db42120f531d694bf6757d14e53a44276656c72394cabe2afcd2eb297
bajaj.anmol;w150ET2Q1T23564	0000b56da3937f05685fc7e75ddaff44a72ffa159400bfd4ee70fc2e6d8dfdc3

All actors are done with their work... Switching off the supervisor

Total Coins Mined 1227

CPU Utilization Ratio for Worker node is 3.3249843507385637

CPU Utilization Ratio for Master node is 6.00250081044783

Set up details

This application is tested with 2 systems. The actors are for input 4.

System 1:

- Processor: Apple M1
- Cores : 8
- Actors : 1200
- CPU-Absolute Ratio = 6.0

```
"bajaj.anmol;79y31e6Y6e59TWw" "00006402452563f29251fa6d21da4e6c1402bfdace423ebbebfdba7b7afe6c07"
"bajaj.anmol;rYyYTe40y2EWR07" "000024a56683d65922686d9313a3f56fbdda86d10b6c5788874b6afa4694f56b"
"bajaj.anmol;r78e19y89rt0RQ1" "0000ed0af46da38403c94edbf8ab009bb63469eb51b2b83950285edefc8194a1"
"bajaj.anmol;y42y045tTwr1q8R" "00009e3f34c00c2d0592f377a6621b7e96a84a3f6b32c7192ebc2a2b0c9c224d"
All actors are done with their work on node 'Master@10.20.108.43'
CPU Utilization Ratio of node "Master@10.20.108.43" is 6.00250081044783
"bajaj.anmol;0er89ett38e03W4" "00001ac43fc85d767617e541b27eba5cd749dd4d916c8d6969e588f25797fa0e"
```

System 2:

- Processor: Intel i5 Dual core
- Cores : 2
- Actors : 1200
- CPU-Absolute Ratio = 3.4175793028585213

```
"bajaj.anmol;Eq5t9W79r5T6WeW" "00003a9bce55de72424c9196bab4a9095d974416c769463e5cb7418a1fa7e6dc"
"bajaj.anmol;TR8YeTeTRYWyeQ" "0000e5bc2356b382969fef6e70238ef57f6415364a400dc5b3f8ce88189b150d"
"bajaj.anmol;R6Qqq4w30EyQ20E" "00006171de996b4c41fb498267d38dda969bf784ce9e95a1c42f7358e7afa09a"
"bajaj.anmol;2Q08RrRQ41TqwQ0" "000000e16445bf316b0975b37f3451374d26b5dc9b28245dc37630dc60793513"
All actors are done with their work on the node 'Worker@10.3.4.2' ... Switching off the Worker Supervisor
CPU Utilization Ratio of node 'Worker@10.3.4.2' is 3.3249843507385637
Total Coins Mined 1227
Bitcoin mining completed... Switching off the supervisor
```

Note: The size of workload has been determined by trial-and-error method. The aim was to have the number of leading zeros closer to 10. The trails started with 0.1 million and increased in multiples of 50.

Highest Number of Leading Zeros:

The highest leading zeros: **8**. The coins with most zeros are the following:

CPU Utilization Ratio of node "Master@10.20.108.43" is 5.939775228826324

"bajaj.anmol;W08R8wqqRtqR5w0"

"00000000200ced10c63d709b08d65d9785ae20cdd054de4702c065dfc02d5eb1"

CPU Utilization Ratio of node 'Worker@10.3.4.2' is 3.4175793028585213

Total Coins Mined 1