A high availability web application powered by nginx using a distributed aerospike data system as backend.

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Problem statement

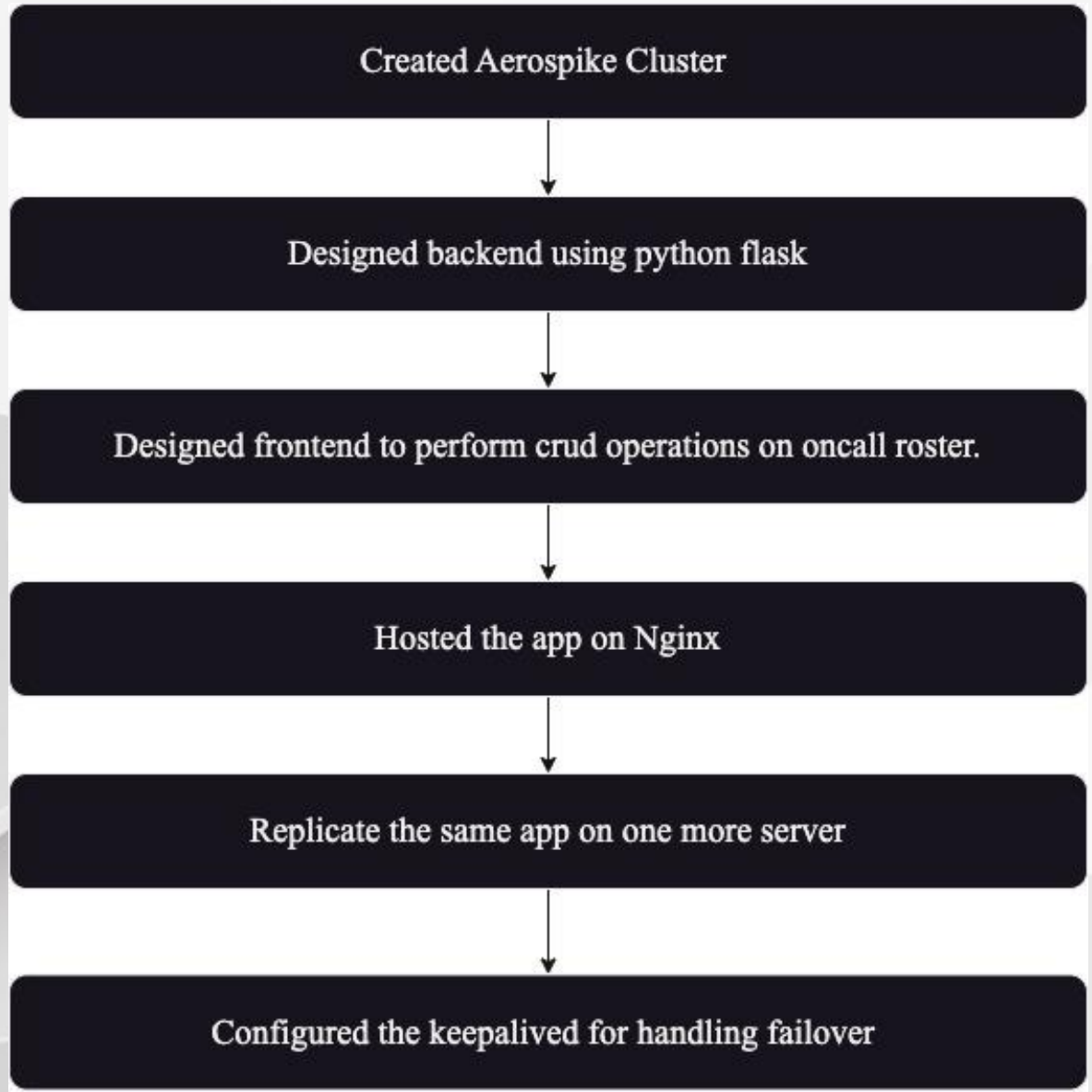
Build a web application powered by nginx using a distributed aerospike data system as backend and demonstrate its high availability.

Minimum Features:

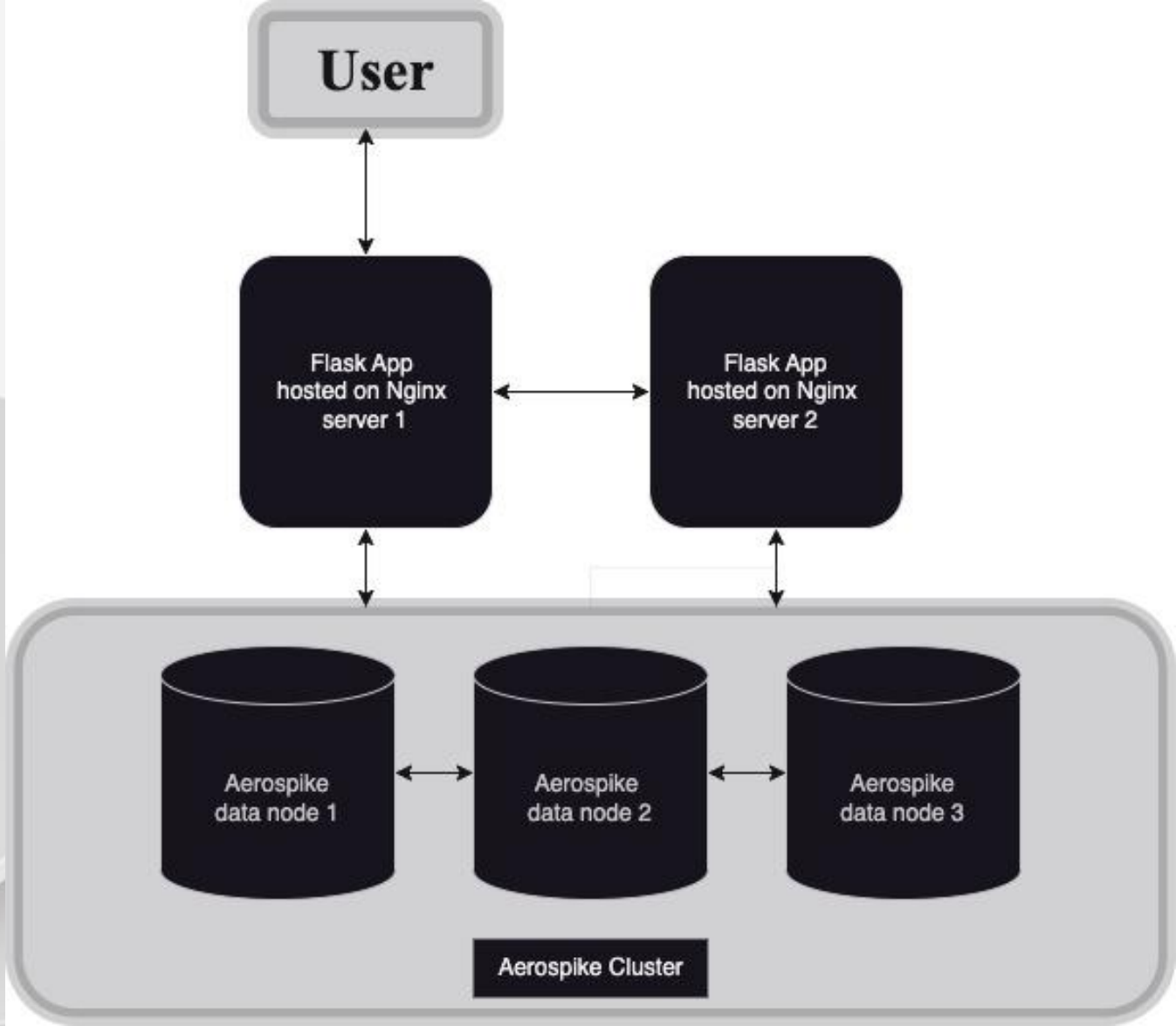
The assignment or project must at least have the following features:

- A distributed data system capable of maintaining high availability despite the failure of one or more nodes.
- An nginx-hosted web application to manage Daily Oncall Roster. This web application should support CRUD operations to add / fetch / update the name of the Oncall Person using the Inputs from Web Page and APIs for the backend.
- Even if one node of the distributed system enters a failing condition, your web application should still function without any degradation.

Data flow diagram



Architecture diagram



Aerospike Configuration

```
  GNU nano 4.8                                  aerospike.conf
# Aerospike database configuration file for use with systemd.

service {
        proto-fd-max 15000
}

logging {
        file /var/log/aerospike/aerospike.log {
                context any info
        }
}

network {
        service {
                address any
                port 3000
        }

        heartbeat {
                mode mesh
                #multicast-group 239.1.99.222
                address 192.168.64.21
                port 3002
                mesh-seed-address-port 192.168.64.21 3002
                mesh-seed-address-port 192.168.64.20 3002
                mesh-seed-address-port 192.168.64.19 3002
                # To use unicast-mesh heartbeats, remove the 3 lines above, and see
                # aerospike_mesh.conf for alternative.

                interval 150
                timeout 10
        }

        fabric {
                port 3001
        }

        info {
                port 3003
        }
}

                              [ Read 63 lines ]
^G Get Help  ^O Write Out  ^W Where Is  ^K Cut Text  ^J Justify  ^C Cur Pos  M-U Undo  M-A Mark Text  M-] To Bracket
^X Exit      ^R Read File  ^\ Replace   ^U Paste Text ^T To Spell ^_ Go To Line M-E Redo  M-6 Copy Text  ^Q Where Was
```

Aerospike Cluster info

```
ubuntu@node1:/etc/aerospike$ asadm -e 'info'
Seed:        [('127.0.0.1', 3000, None)]
Config_file: /home/ubuntu/.aerospike/astools.conf, /etc/aerospike/astools.conf
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~Network Information (2023-05-18 22:01:01 UTC)~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
              Node|          Node ID|                 IP|     Build|Migrations|~~~~~~~~~~~~~~~~~~Cluster~~~~~~~~~~~~~~~~~~|Client|   Uptime
                  |                  |                   |          |          |Size|          Key|Integrity|       Principal| Conns|
192.168.64.19:3000|*BB9F21876005452|192.168.64.19:3000|C-6.1.0.1|   0.000  |   3|7F2A19EAE517|True     |BB9F21876005452|     6|21:58:06
192.168.64.20:3000| BB97619E8005452|192.168.64.20:3000|C-6.1.0.1|   0.000  |   3|7F2A19EAE517|True     |BB9F21876005452|     6|21:58:19
node1:3000        | BB97C0019005452|192.168.64.21:3000|C-6.1.0.1|   0.000  |   3|7F2A19EAE517|True     |BB9F21876005452|     6|22:19:26
Number of rows: 3

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~Namespace Usage Information (2023-05-18 22:01:01 UTC)~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
   Namespace|              Node|    Total|Expirations|Evictions|   Stop|~Device~|~~~~~~~~~~Memory~~~~~~~~~~|~Primary~
            |                  |  Records|           |         |Writes|    HWM%|     Used|Used%|HWM%|Stop%|~~Index~~
            |                  |         |           |         |      |        |         |     |    |     |     Type
bar         |192.168.64.19:3000|  0.000  |    0.000  |  0.000  |False |       0|0.000 B  |  0.0|   0|   90|mem
bar         |192.168.64.20:3000|  0.000  |    0.000  |  0.000  |False |       0|0.000 B  |  0.0|   0|   90|mem
bar         |node1:3000        |  0.000  |    0.000  |  0.000  |False |       0|0.000 B  |  0.0|   0|   90|mem
bar         |                  |  0.000  |    0.000  |  0.000  |      |        |0.000 B  |  0.0|    |     |
daily_roster|192.168.64.19:3000|  8.000  |    0.000  |  0.000  |False |       0|2.014 KB |  0.0|   0|   90|mem
daily_roster|192.168.64.20:3000|  6.000  |    0.000  |  0.000  |False |       0|1.508 KB |  0.0|   0|   90|mem
daily_roster|node1:3000        | 12.000  |    0.000  |  0.000  |False |       0|3.016 KB |  0.0|   0|   90|mem
daily_roster|                  | 26.000  |    0.000  |  0.000  |      |        |6.537 KB |  0.0|    |     |
Number of rows: 6

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~Namespace Object Information (2023-05-18 22:01:01 UTC)~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
   Namespace|              Node|Rack|   Repl|    Total|~~~~~~~~~~~Objects~~~~~~~~~~~|~~~~~~~~~~Tombstones~~~~~~~~~|~~~~Pending~~~~
            |                  |  ID|Factor|  Records|   Master|    Prole|Non-Replica|  Master|   Prole|Non-Replica|~~~~Migrates~~~~
            |                  |    |      |         |         |         |           |        |        |           |      Tx|      Rx
bar         |192.168.64.19:3000|   0|     2|  0.000  |  0.000  |  0.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
bar         |192.168.64.20:3000|   0|     2|  0.000  |  0.000  |  0.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
bar         |node1:3000        |   0|     2|  0.000  |  0.000  |  0.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
bar         |                  |    |      |  0.000  |  0.000  |  0.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
daily_roster|192.168.64.19:3000|   0|     2|  8.000  |  3.000  |  5.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
daily_roster|192.168.64.20:3000|   0|     2|  6.000  |  6.000  |  0.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
daily_roster|node1:3000        |   0|     2| 12.000  |  4.000  |  8.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
daily_roster|                  |    |      | 26.000  | 13.000  | 13.000  |    0.000  |0.000   |0.000   |    0.000  |0.000   |0.000
Number of rows: 6
```

Nginex Configuration

Server 1

```
  GNU nano 4.8                                                    myproject
server {
    listen 80;
    server_name 192.168.64.22;

    location / {
        include proxy_params;
        proxy_pass http://127.0.0.1:5000;
    }
}
```

Server 2

```
  GNU nano 4.8                                        /etc/nginx/sites-available/myproject

server {
        listen 80;
        server_name 192.168.64.23;

        location / {
                include proxy_params;
                proxy_pass http://localhost:5000;
        }
}
```

KeepAlived Configuration

server 1(master)

```
  GNU nano 4.8                                  /etc/keepalived/keepalived.conf
global_defs {
        router_id web-ha
}

vrrp_instance web-vrrp {
        state MASTER
        interface ens3
        virtual_router_id 50
        priority 100
        advert_in 1
        authentication {
                auth_type PASS
                auth_pass newPass
        }
        virtual_ipaddress {
                192.168.64.100/24
        }
}
```

server 2(backup)

```
  GNU nano 4.8                                  /etc/keepalived/keepalived.conf
global_defs {
        router_id web-ha
}

vrrp_instance web-vrrp {
        state BACKUP
        interface ens3
        virtual_router_id 50
        priority 99
        advert_in 1
        authentication {
                auth_type PASS
                auth_pass newPass
        }
        virtual_ipaddress {
                192.168.64.100/24
        }
}
```

Frontend UI

Conclusion

- Through this project I have learnet various cutting edge technologies such as aerospike, nginx, saltstack, HA Proxy, etc. and got a great hands on experience by buliding this project.
- This project gave me the opportunity to implement, how to configure nginx to host an app, setting up a load balancer, creating aerospike cluster, etc.

THANK YOU