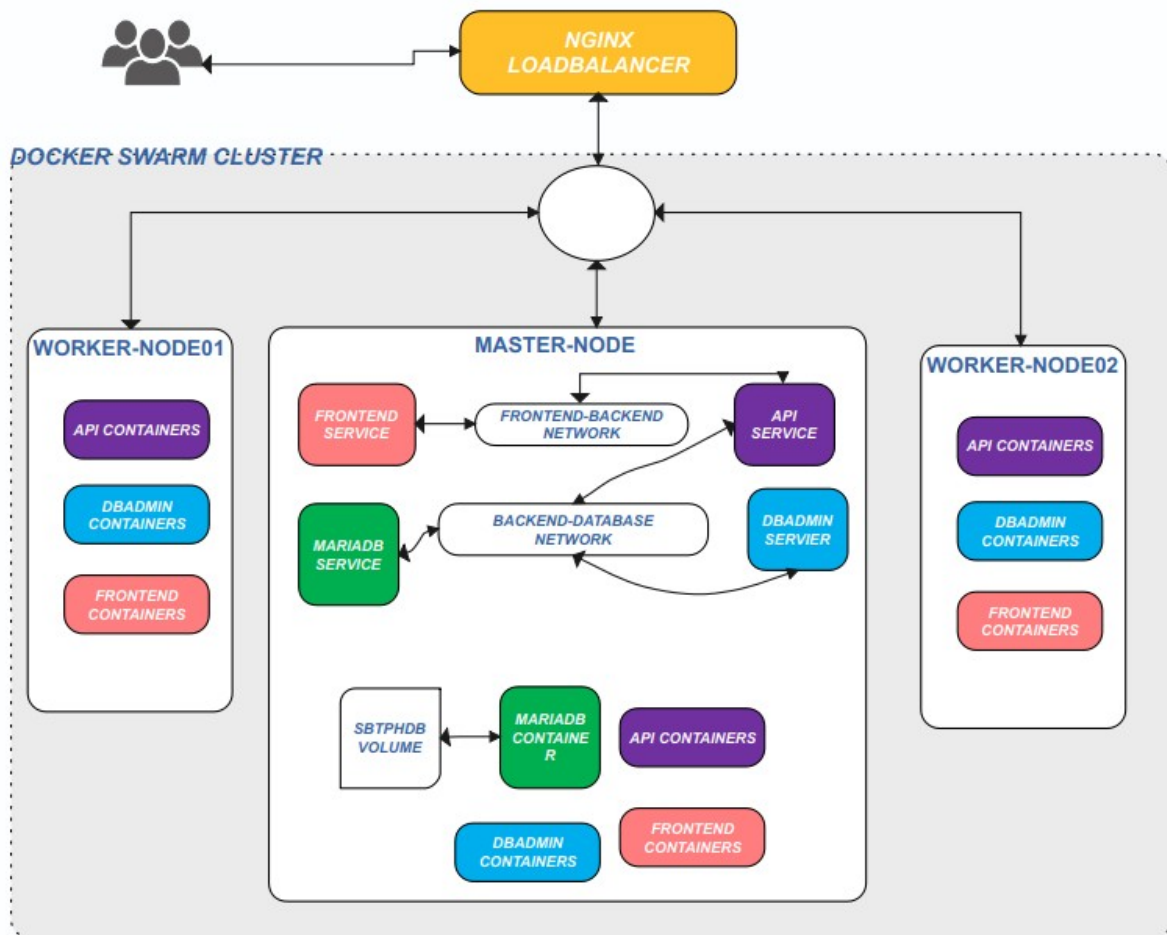


## PROJECT ARCHITECTURE:



## SBTPHAPP-PROJECT-DEVOPS(DOCKER-SWARM)

### PROJECT DESCRIPTION:

In this project, we will build a Docker Swarm cluster consisting of 1 Master Node and 2 Worker Nodes. We'll deploy our 'sbtphapp' application on this cluster. Additionally, we will add NGINX to act as a load balancer. This project will be deployed on the Digital Ocean Cloud Provider. I chose Digital Ocean because it offers \$200 of free credit for 2 months, which is ample for building and completing this project.

### PROJECT REQUIREMENTS:

1. **Digital Ocean Accounts** – for Servers
2. **DockerHub Account** – for storing the docker image

## SETUP INSTRUCTIONS:

1. On Your Digital Ocean account, 4 Droplets with:
  - OPERATING SYSTEM => Ubuntu Server 20.04
  - SHARED CPU
  - Regular Disk type: SSD
  - 4GB/2CPU
  - Authentication Method => Password => **Type your choosen password**
  -
2. Name your 4 Droplets, and click **Create Droplet**

### Finalize Details

#### Quantity

Deploy multiple Droplets with the same configuration.

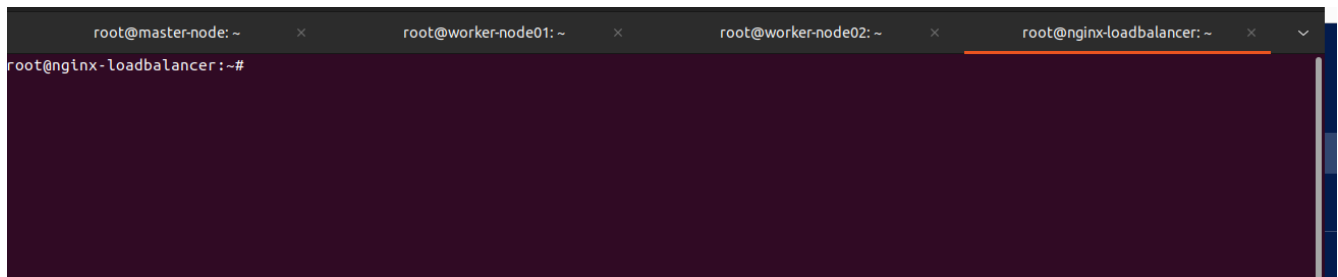
—	4 Droplets	+
---	------------	---

#### Hostname

Give your Droplets an identifying name you will remember them by.

nginx-loadbalancer
manager-node
worker-node01
worker-node02

3. Once the Droplets are created, it's time to install the Docker engine on the manager node, worker node 01, and worker node 02, and Nginx on the Nginx load balancer droplet. SSH into these four droplets.



4. Installing docker engines on **manager-node**, **worker-node01** and **worker-node02**:

### Commands:

```
for pkg in docker.io docker-doc docker-compose docker-compose-v2 podman-docker containerd runc; do sudo apt-get remove $pkg; done
```

```
sudo apt-get update -y
```

```
sudo apt-get install ca-certificates curl gnupg -y
```

```
sudo install -m 0755 -d /etc/apt/keyrings
```

```
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg
```

```
sudo chmod a+r /etc/apt/keyrings/docker.gpg
```

```
echo \ "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg]
```

```
https://download.docker.com/linux/ubuntu \ $(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \
```

```
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

```
sudo apt-get update -y  
sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin -y
```

4. On **master-node**, get eth0 (Public IP) and type this command: (Make sure replace it without Public IP)

**docker swarm init --advertise-addr {MANAGER-ETH0-PUBLIC-IP}**

```
root@master-node:~/sbtphapp-project-devops/docker# docker swarm init --advertise-addr 159.223.59.252
Swarm initialized: current node (q01blfv7t6as0n5a8ib48svjq) is now a manager.

To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-1yonpk9mpyu0soo6sm2wvaj116a5z21p23mmkcz0cwq9p3j770-cv8i7a755y6ltrhpn5g7e9p4d 159.223.59.252:2377

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

root@master-node:~/sbtphapp-project-devops/docker#
```

On **worker-node01** and **worker-node02**, paste this command: **docker swarm join --token \*\*\*\*\***

On **master-node**, check if two workers nodes are successfully joined:

**docker node ls**

```
root@master-node:~/sbtphapp-project-devops/docker# docker node list
ID                HOSTNAME          STATUS    AVAILABILITY    MANAGER STATUS    ENGINE VERSION
q01blfv7t6as0n5a8ib48svjq * master-node      Ready     Active           Leader             24.0.7
1ed2uo1krtvq7xjjanhgntshj worker-node01    Ready     Active           -                  24.0.7
mln309zp7la8hi95b62sgmmu8 worker-node02    Ready     Active           -                  24.0.7
root@master-node:~/sbtphapp-project-devops/docker#
```

5. On **master-node** clone this github repo:

**git clone -b docker <https://github.com/robudexIT/sbtphapp-project-devops.git>**

6. cd to **sbtphapp-project-devops/docker**, get your nginx-loadbalancer server public ip and run this command: (make sure you replace it your **nginx-loadbalancer server ip** before running the command)

**find frontend/dist/js/\* -type f -exec sed -E -i 's/([0-9]{1,3}).{3}([0-9]{1,3}):8081\b/YOUR\_NGINX\_LOADBALANCER\_PUBLIC\_IP\_HERE:8081/g' {} +**

7. Run this command:

**docker compose build**

8. Login to your **docker hub account**, check the docker images created, tag the images and push it to your docker hub.

**docker login**

**docker images**

**docker tag docker-api:latest {YOURDOCKERHUBUSERNAME}/sbtphapi:latest**

**docker tag docker-frontend:latest {YOURDOCKERHUBUSERNAME}/sbtphapp:latest**

**docker push {YOURDOCKERHUBUSERNAME}/sbtphapi:latest**

**docker push {YOURDOCKERHUBUSERNAME}/sbtphapp:latest**

9. On the **master-node**, create docker overlay network

```
docker network create -d overlay frontend-backend  
docker network create -d overlay backend-database
```

10. On the **master-node** create **mariadb service**, check if mariadb service was created, check if which Node **mariadb container** is running

```
docker service create --detach=true --name mariadb --network backend-database \  
--env-file ./env/db.env \  
--mount type=volume,source=sbtpbdb,target=/var/lib/mysql \  
--mount type=bind,source=$(pwd)/database,target=/docker-entrypoint-initdb.d \  
--publish 3307:3306 mariadb
```

```
docker service ls
```

```
docker service ps mariadb
```

```
root@master-node:~/sbtp happ-project-devops/docker# docker service create --detach=true --name mariadb --network backend-database \
> --env-file ./env/db.env \
> --mount type=volume,source=sbtpbdb,target=/var/lib/mysql \
> --mount type=bind,source=$(pwd)/database,target=/docker-entrypoint-initdb.d \
> --publish 3307:3306 mariadb
lrowliagjl1l12ymr7k7hr1xs
root@master-node:~/sbtp happ-project-devops/docker#
root@master-node:~/sbtp happ-project-devops/docker#
root@master-node:~/sbtp happ-project-devops/docker# docker service ls
ID NAME MODE REPLICAS IMAGE PORTS
lrowliagjl11 mariadb replicated 1/1 mariadb:latest *:3307->3306/tcp
root@master-node:~/sbtp happ-project-devops/docker#
root@master-node:~/sbtp happ-project-devops/docker#
root@master-node:~/sbtp happ-project-devops/docker# docker service ps mariadb
ID NAME IMAGE NODE DESIRED STATE CURRENT STATE ERROR
ORTS
l6mseofnfx9 mariadb.1 mariadb:latest master-node Running Running 9 seconds ago
ysj15doorf4p \ mariadb.1 mariadb:latest worker-node02 Shutdown Rejected 15 seconds ago "invalid mount config for type..."
root@master-node:~/sbtp happ-project-devops/docker#
```

11. On master-node create **api service**, check if api service was created, check if which Node **api container** is running. (Make sure your replace it with your docker hub username account

```
docker service create --name api --env-file ./env/api.env \  
--network backend-database -p 8081:80 --replicas=5 \  
{YOUR-DOCKER-HUB-USER}/sbtp hapi
```

```
docker service ls
```

```
docker service ps api
```

```

root@master-node:~/sbtphapp-project-devops/docker# docker service create --name api --env-file ./env/api.env \
> --network backend-database -p 8081:80 --replicas=5 \
> robudex17/sbtphapi:latest
srwi8eetx0fb6ghzu3nanqzff
overall progress: 5 out of 5 tasks
1/5: running [=====]
2/5: running [=====]
3/5: running [=====]
4/5: running [=====]
5/5: running [=====]
verify: Service converged
root@master-node:~/sbtphapp-project-devops/docker# docker service ls

```

ID	NAME	MODE	REPLICAS	IMAGE	PORTS
srwi8eetx0fb	api	replicated	5/5	robudex17/sbtphapi:latest	*:8081->80/tcp
lrowl1agjl11	mariadb	replicated	1/1	mariadb:latest	*:3307->3306/tcp

```

root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker# docker service ps api

```

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE	ERROR	PORTS
8z4445a30sje	api.1	robudex17/sbtphapi:latest	worker-node02	Running	Running 27 seconds ago		
9gttk63pl8dd	api.2	robudex17/sbtphapi:latest	master-node	Running	Running 28 seconds ago		
lf9ekj0z7ong	api.3	robudex17/sbtphapi:latest	worker-node01	Running	Running 27 seconds ago		
v3gey5seduo8	api.4	robudex17/sbtphapi:latest	worker-node02	Running	Running 27 seconds ago		
6e0qffvvehyr	api.5	robudex17/sbtphapi:latest	worker-node01	Running	Running 27 seconds ago		

```

root@master-node:~/sbtphapp-project-devops/docker#

```

12. On **master-node** create **frontend** service, check if **frontend** service was created, check if which Node **frontend** container is running. (Make sure your replace it with your docker hub username account

```

docker service create --name frontend \
--network frontend-backend -p 8082:80 --replicas=5 \
{YOUR-DOCKER-HUB-USER}/sbtphapp:latest

```

```
docker service ls
```

```
docker service ps frontend
```

```

root@master-node:~/sbtphapp-project-devops/docker# docker service create --name frontend \
> --network frontend-backend -p 8082:80 --replicas=5 \
> robudex17/sbtphapp:latest
mg3ntwu3s4yco7bb9o78vlfz4
overall progress: 5 out of 5 tasks
1/5: running [=====]
2/5: running [=====]
3/5: running [=====]
4/5: running [=====]
5/5: running [=====]
verify: Service converged
root@master-node:~/sbtphapp-project-devops/docker# docker service ls

```

ID	NAME	MODE	REPLICAS	IMAGE	PORTS
srwi8eetx0fb	api	replicated	5/5	robudex17/sbtphapi:latest	*:8081->80/tcp
mg3ntwu3s4yc	frontend	replicated	5/5	robudex17/sbtphapp:latest	*:8082->80/tcp
lrowl1agjl11	mariadb	replicated	1/1	mariadb:latest	*:3307->3306/tcp

```

root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker# docker service ps frontend

```

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE	ERROR	PORTS
iftfkez9phaw	frontend.1	robudex17/sbtphapp:latest	master-node	Running	Running 21 seconds ago		
gbk3yy1loonn	frontend.2	robudex17/sbtphapp:latest	worker-node01	Running	Running 21 seconds ago		
djzurwo0mmth	frontend.3	robudex17/sbtphapp:latest	worker-node02	Running	Running 22 seconds ago		
nspchvsvtpgn	frontend.4	robudex17/sbtphapp:latest	master-node	Running	Running 21 seconds ago		
xjhsbwiztq2	frontend.5	robudex17/sbtphapp:latest	worker-node01	Running	Running 21 seconds ago		

```

root@master-node:~/sbtphapp-project-devops/docker#

```

12. On **master-node** create **dbadmin** service, check if dbadmin service was created, check if which Node **dbadmin** container is running.

```

docker service create --name dbadmin --network backend-database --env-file ./env/admin.env -p 8083:80
phpmyadmin

```

*docker service ls*

*docker service ps dbadmin*

```
root@master-node:~/sbtphapp-project-devops/docker# docker service create --name dbadmin --network backend-database --env-file ./env/admin.env
-p 8083:80 phpmyadmin
6a1zf2ag9do64royur82372v3
overall progress: 1 out of 1 tasks
1/1: running [=====>]
verify: Service converged
root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker#
root@master-node:~/sbtphapp-project-devops/docker# docker service ls
ID                NAME      MODE      REPLICAS  IMAGE                                  PORTS
srwi8eetx0fb     api       replicated 5/5        robudex17/sbtphapi:latest           *:8081->80/tcp
6a1zf2ag9do6     dbadmin   replicated 1/1        phpmyadmin:latest                   *:8083->80/tcp
mg3ntwu3s4yc     frontend replicated 5/5        robudex17/sbtphapp:latest           *:8082->80/tcp
lrowl1agjl11     mariadb  replicated 1/1        mariadb:latest                      *:3307->3306/tcp
root@master-node:~/sbtphapp-project-devops/docker# docker service ps dbadmin
ID                NAME      IMAGE      NODE      DESIRED STATE  CURRENT STATE      ERROR      PORTS
wrtn67pe7xfy     dbadmin.1 phpmyadmin:latest worker-node02 Running         Running 33 seconds ago
```

13. On **nginx-loadbalancer**, inginx

**sudo apt update**

**sudo apt-get install nginx**

14. Create **/etc/nginx/conf.d/load-balancer.conf** file and paste this config below: **(Make sure you update the ip address on the upstream directives:**

```
upstream frontend {
    server {MASTER-NODE-IP-HERE}:8082;
    server {WORKER-NODE01-IP-HERE}:8082;
    server {WORKER-NODE02-IP-HERE}:8082;
    # Add more Swarm nodes as needed
}
```

```
upstream backend {
    server {MASTER-NODE-IP-HERE}:8081;
    server {WORKER-NODE01-IP-HERE}:8081;
    server {WORKER-NODE02-IP-HERE}:8081;

    # Add more servers as needed
}
```

```
upstream phpmyadmin {
    server {MASTER-NODE-IP-HERE}:8083;
    server {WORKER-NODE01-IP-HERE}:8083;
    server {WORKER-NODE02-IP-HERE}:8083;

    # Add more servers as needed
}
```

```
server {  
    listen 8082;  
    server_name yourdomain.com;  
  
    location / {  
        proxy_pass http://frontend;  
        proxy_set_header Host $host;  
        proxy_set_header X-Real-IP $remote_addr;  
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;  
        proxy_set_header X-Forwarded-Proto $scheme;  
    }  
}
```

```
server {  
    listen 8081;  
    server_name yourdomain.com;  
  
    location / {  
        proxy_pass http://backend;  
        proxy_set_header Host $host;  
        proxy_set_header X-Real-IP $remote_addr;  
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;  
        proxy_set_header X-Forwarded-Proto $scheme;  
    }  
}
```

```
server {  
    listen 8083;  
    server_name yourdomain.com;  
  
    location / {  
        proxy_pass http://phpmyadmin;  
        proxy_set_header Host $host;  
        proxy_set_header X-Real-IP $remote_addr;  
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;  
        proxy_set_header X-Forwarded-Proto $scheme;  
    }  
}
```

#### 14. Restart nginx service

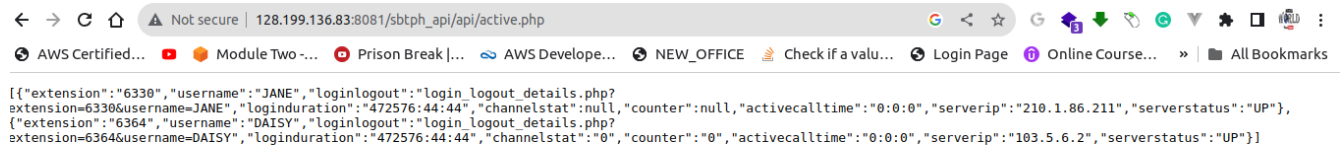
```
nginx -t  
systemctl reload nginx  
systemctl restart nginx
```



## TESTING THE APP: Get the nginx-loadbalancer ip address

### For Api Testing:

[http://{NGINX-LOADBALANCER-IP}:8081/sbtph\\_api/api/active.php](http://{NGINX-LOADBALANCER-IP}:8081/sbtph_api/api/active.php)



A screenshot of a web browser window. The address bar shows the URL `128.199.136.83:8081/sbtph_api/api/active.php` with a "Not secure" warning. The browser's bookmark bar is visible with several entries. The main content area displays a JSON array of two objects, each representing a user's login session details.

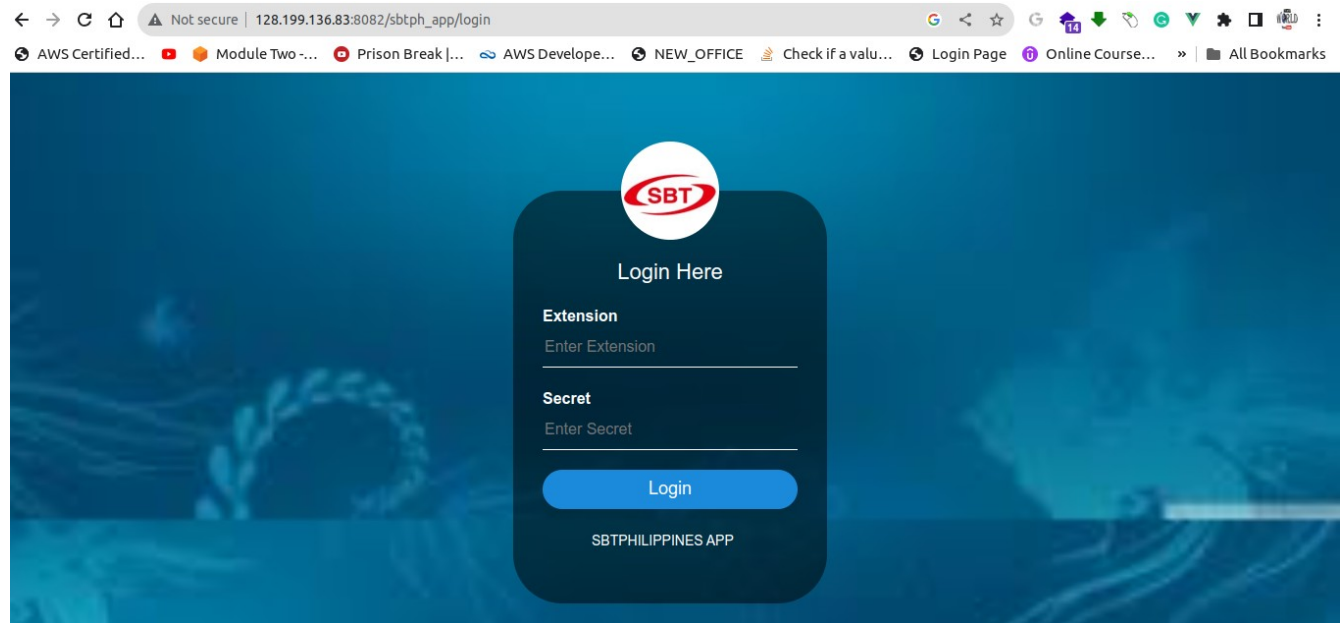
```
[{"extension": "6330", "username": "JANE", "loginlogout": "login_logout_details.php?extension=6330&username=JANE", "loginduration": "472576:44:44", "channelstat": null, "counter": null, "activecalltime": "0:0:0", "serverip": "210.1.86.211", "serverstatus": "UP"}, {"extension": "6364", "username": "DAISY", "loginlogout": "login_logout_details.php?extension=6364&username=DAISY", "loginduration": "472576:44:44", "channelstat": "0", "counter": "0", "activecalltime": "0:0:0", "serverip": "103.5.6.2", "serverstatus": "UP"}]
```

### For Frontend Testing:

[http://{NGINX-LOADBALANCER-IP}:8082/sbtph\\_app/login](http://{NGINX-LOADBALANCER-IP}:8082/sbtph_app/login)

**Extension: 6336**

**Secret: 99999**



A screenshot of a web browser window showing the login page of the SBT Philippines App. The page has a blue background with a faint image of a person. In the center, there is a dark blue rounded rectangle containing the SBT logo, the text "Login Here", and two input fields labeled "Extension" and "Secret". Below the input fields is a blue "Login" button. At the bottom of the rectangle, it says "SBTPHILIPPINES APP". The browser's address bar shows the URL `128.199.136.83:8082/sbtph_app/login` with a "Not secure" warning.

SBT

Login Here

**Extension**  
Enter Extension

**Secret**  
Enter Secret

Login

SBTPHILIPPINES APP



← → ↻ ⌂ ⚠ Not secure | 128.199.136.83:sbtph\_app/phone/loggedin

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IT/SYSADMIN APPSRogmer BulacLogout

ACTIVE INACTIVE CSD-INBOUND CSD-OUTBOUND CSD-MISSED-CALLS(0) PARKED-CALLS(0) VOICE-MAILS (0) COLLECTION-TEAM SALES-TEAM MANAGEMENT

#	EXTENSION	NAME	LOGIN/LOGOUT	LOGIN DURATION	SERVER USED	SERVER STATUS	CHANNEL STAT
0	6330	JANE	<a href="#">Click Details</a>	472577:45:54	210.1.86.211	UP	
1	6364	DAISY	<a href="#">Click Details</a>	472577:45:54	103.5.6.2	UP	0

For dbadmin Testing:

<http://{NGINX-LOADBALANCER-IP}:8083>

← → ↻ ⌂ ⚠ Not secure | 128.199.136.83:8083

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phpMyAdmin

Recent Favorites

Information\_schema  
sbtphcsd  
New  
calltype  
collectionteam  
collectionteam\_calls  
csdinbound  
event\_log  
inbound\_callstatus  
login  
logs  
outbound  
posistion\_descriptions  
salesteam  
sip\_channels  
tag  
voicemail  
waiting\_calls

Databases SQL Status Export Import Settings Variables Charsets Engines Plugins

General settings

Server connection collation: utf8mb4\_unicode\_ci  
[More settings](#)

Appearance settings

Language: English  
Theme: pmahomme [View all](#)

Database server

- Server: mariadb via TCP/IP
- Server type: MariaDB
- Server connection: SSL is not being used
- Server version: 11.2.2-MariaDB-1:11.2.2+maria-ubu2204 - mariadb.org binary distribution
- Protocol version: 10
- User: python@10.0.2.4
- Server charset: UTF-8 Unicode (utf8mb4)

Web server

- Apache/2.4.57 (Debian)
- Database client version: libmysql - mysqlnd 8.2.13
- PHP extension: mysqli curl mbstring sodium
- PHP version: 8.2.13

phpMyAdmin

- Version information: 5.2.1 (up to date)
- [Documentation](#)