Objective:

1. Setup freeradius (on ubuntu server) for RADIUS authentication
2. We will create a database (use MariaDB) based authentication
3. To create users and clients to RADIUS, we will use web-based application called DaloRADIUS
4. Host DaloRADIUS on Apache web-server

Requirements:

1. Ubuntu 18.04 TLS desktop
2. Root password and internet connection

Follow following steps for convenient installation and configuration

1. **Get Started**
   First, login as root user and update your system's package to the latest version with the following command:

   ```
   apt-get update -y
    apt-get upgrade -y
   ```

   Once all the packages are updated, restart your system to apply all the configuration changes

2. **Install LAMP Server**
   LAMP stands for Linux, Apache, MySQL, PHP/Perl/Python. You can install them all using following command:

   ```
   apt-get install apache2 mariadb-server php libapache2-mod-php php-mail php-mail-mime php-mysql php-gd php-common php-pear php-db php-mbstring php-xml php-curl unzip wget -y
   ```

3. **Configure database for freeRADIUS**
   By default, MariaDB is not secured. So, you will need to secure it first. You can secure it with the following command:

   ```
   mysql_secure_installation
   ```

   Answer all the questions as shown below:

   ```
   Enter current password for root (enter for none):
   ```
   Just press the Enter

```
Set root password? [Y/n]: Y
New password: Enter password
Re-enter new password: Repeat password
Remove anonymous users? [Y/n]: Y
Disallow root login remotely? [Y/n]: Y
Remove test database and access to it? [Y/n]:  Y
Reload privilege tables now? [Y/n]:   Y
```

Next, you will need to create a database and user for FreeRADIUS. To do so, log in to MariaDB shell with the following command:

```
mysql -u root -p
Enter password: Just enter the newly created password
```

Enter your root password when prompt then create a database and user with the following command:

```
MariaDB [(none)]> CREATE DATABASE radiusdb;
 MariaDB [(none)]> GRANT ALL ON radiusdb.* TO
radius@localhost IDENTIFIED BY "password";
```

Each statement in MariaDB is ended by semi-colon (;) sign. To remove confusion please keep the password of `radius@localhost` as `root`. Next, flush the privileges and exit from the MariaDB shell with the following command:

```
MariaDB [(none)]> FLUSH PRIVILEGES;
 MariaDB [(none)]> EXIT;
```

4. **Install freeRADIUS**
   By default, FreeRADIUS is available in the Ubuntu 18.04 default repository. You can install it with the following command:

```
apt-get install freeradius freeradius-mysql freeradius-
utils
```

Once installed, import the freeradius MySQL database schema with the following command:

```
mysql -u root -p radiusdb < /etc/freeradius/3.0/mods-
config/sql/main/mysql/schema.sql
```

Provide your radius database user password when prompt and hit Enter to import the database schema. Next, you will need to create a symbolic link for sql module. You can do it with the following command:

```
ln -s /etc/freeradius/3.0/mods-available/sql
/etc/freeradius/3.0/mods-enabled/
```

Next, log in to MariaDB shell and check the created tables with the following command:

```
mysql -u root -p
Enter Password: Just enter the root password (do not worry as both users
```
have same password, if you did so)

Once login, change the database to radiusdb with the following command:

```
MariaDB [(none)]> use radiusdb;
```

Next, list the created tables to verify using the following command:

```
MariaDB [radiusdb]> show tables;
```

You should see the following output:

```
+--------------------+
| Tables_in_radiusdb |
+--------------------+
| nas                |
| radacct            |
| radcheck           |
| radgroupcheck      |
| radgroupreply      |
| radpostauth        |
| radreply           |
| radusergroup       |
+--------------------+
```

Next, exit from the MariaDB shell with the following command:

```
MariaDB [radiusdb]> EXIT;
```

Next, you will need to define your database connection details in freeradius SQL module. You can do it by editing /etc/freeradius/3.0/mods-enabled/sql file:

```
nano /etc/freeradius/3.0/mods-enabled/sql
```

nano is default editer, you can use others for convenience. However, make the
following changes as per your database:

```
sql {
driver = "rlm_sql_mysql"
dialect = "mysql"

# Connection info:
server = "localhost"
port = 3306
login = "radius"
password = "password"

# Database table configuration for everything except Oracle
radius_db = "radiusdb"

read_clients = yes
client_table = "nas"
}
```

Save and close the file, when you are finished. Then, change the ownership of
/etc/freeradius/3.0/mods-enabled/sql with the following command:

```
chgrp -h freerad /etc/freeradius/3.0/mods-available/sql
 chown -R freerad:freerad /etc/freeradius/3.0/mods-
enabled/sql
```

Debug your freeRADIUS using following command:

```
freeradius -X
```

when everything is fine you will get something like this:

```
Listening on auth address 127.0.0.1 port 18120 bound to
server inner-tunnel
Listening on auth address * port 1812 bound to server
default
Listening on acct address * port 1813 bound to server
default
Listening on auth address :: port 1812 bound to server
```

```
default
Listening on acct address :: port 1813 bound to server
default
Listening on proxy address * port 41316
Listening on proxy address :: port 33426
Ready to process requests
```

This gives the port numbers of RADIUS authentication (1812), accounting i.e. billing (1813) and proxy (41316). Our objective is only authentication, so we use port 1812. Finally, (re)start freeradius service to apply all the configuration changes with following command:

systemctl restart freeradius

You can also verify the freeradius status with the following command:

systemctl status freeradius

You should see the following output:

```
● freeradius.service – FreeRADIUS multi-protocol policy
server
   Loaded: loaded (/lib/systemd/system/freeradius.service;
disabled; vendor pres
   Active: active (running) since Thu 2020-01-09 11:20:58
CST; 6s ago
     Docs: man:radiusd(8)
           man:radiusd.conf(5)
           http://wiki.freeradius.org/
           http://networkradius.com/doc/
  Process: 3992 ExecStart=/usr/sbin/freeradius
$FREERADIUS_OPTIONS (code=exited,
  Process: 3990 ExecStartPre=/usr/sbin/freeradius
$FREERADIUS_OPTIONS -Cxm -lstd
 Main PID: 3994 (freeradius)
    Tasks: 6 (limit: 4915)
   CGroup: /system.slice/freeradius.service
           └─3994 /usr/sbin/freeradius

 ⼀  09 11:20:58 dlink freeradius[3990]:
[/etc/freeradius/3.0/mods-config/attr_f
 ⼀  09 11:20:58 dlink freeradius[3990]: tls: Using cached
TLS configuration fro
```

```
⟶  09 11:20:58 dlink freeradius[3990]: tls: Using cached
TLS configuration fro
⟶  09 11:20:58 dlink freeradius[3990]: Ignoring "ldap"
(see raddb/mods-availab
⟶  09 11:20:58 dlink freeradius[3990]:  # Skipping
contents of 'if' as it is a
⟶  09 11:20:58 dlink freeradius[3990]: radiusd: ####
Skipping IP addresses and
⟶  09 11:20:58 dlink freeradius[3990]: Configuration
appears to be OK
⟶  09 11:20:58 dlink freeradius[3990]: rlm_sql (sql):
Removing connection pool
⟶  09 11:20:58 dlink freeradius[3990]: rlm_sql (sql):
Closing connection (0)
```

Exit and proceed further.

5. Install daloRADIUS

Next, you will need to install daloRADIUS to manage FreeRADIUS from the web browser. First, download the latest version of daloRADIUS from the Git repository with the following command:

```
wget
https://github.com/lirantal/daloradius/archive/master.zip
```

Once downloaded, unzip the downloaded file with the following command:

```
unzip master.zip
```

Next, move the extracted directory to the Apache web root directory with the following command:

```
mv daloradius-master /var/www/html/daloradius
```

Next, import daloRADIUS mysql tables to radiusdb with the following command:

```
cd /var/www/html/daloradius
 mysql -u root -p radiusdb < contrib/db/fr2-mysql-
daloradius-and-freeradius.sql
 mysql -u root -p radiusdb < contrib/db/mysql-
daloradius.sql
```

Next, give proper permission to the daloradius directory with the following command:

```
chown -R www-data:www-data /var/www/html/daloradius/
 chmod 664
/var/www/html/daloradius/library/daloradius.conf.php
```

Next, open daloradius.conf.php file and define the database connection details:

```
nano /var/www/html/daloradius/library/daloradius.conf.php
```

Make the following changes that match your database:

```
$configValues['DALORADIUS_VERSION'] = '1.1-3 BETA';
$configValues['DALORADIUS_DATE'] = '06 Dec 2019';
$configValues['FREERADIUS_VERSION'] = '3';
$configValues['CONFIG_DB_ENGINE'] = 'mysqli';
$configValues['CONFIG_DB_HOST'] = 'localhost';
$configValues['CONFIG_DB_PORT'] = '3306';
$configValues['CONFIG_DB_USER'] = 'radius';
$configValues['CONFIG_DB_PASS'] = 'password';
$configValues['CONFIG_DB_NAME'] = 'radiusdb';
```

Save and close the file. Then, stop freeradius and debug it using following command:

```
freeradius -X
```

Then (re)start freeradius and apache service with the following command:

```
systemctl restart freeradius
 systemctl restart apache2
```

Once you have done, you can proceed to the next step.

6. **Access daloRADIUS Web Interface**
   FreeRADIUS and daloRADIUS are now installed and configured. It's time to access daloRADIUS web interface. To access the web inetrface, open your web browser and type the URL http://your-server-ip/daloradius/login.php. You will be redirected to the daloRADIUS login page:

Now, provide default username and password as administrator and radius respectively, and click on the **Login** button. You should see the daloRADIUS default dashboard in the following page:

Congratulations! you have successfully installed and configured FreeRADIUS and daloRADIUS on your Ubuntu 18.04. For more information, you can visit the official documentation at https://github.com/lirantal/daloradius.

7. **Add clients and users to RADIUS**
   Go to http://your-server-ip/daloradius/mng-rad-nas-new.php to add client (NAS) as below

New NAS Record ⍰

NAS Info	NAS Advanced

NAS IP/Host	172.17.3.4/24	
NAS Secret	dbapassap2	
NAS Type	other	other ▾
NAS Shortname	dba-ap-2	

Apply

After clicking apply the client will be added and you can list all clients as:

NAS Listing in Database ⍰

SELECT: ALL NONE
Delete

1

NAS ID	NAS IP/Host	NAS Shortname	NAS Type	NAS Ports	NAS Secret	NA
☐ 8	172.17.3.3/24	radius_testing	other	0	testradius	
☐ 9	172.17.3.4/24	dba-ap-2	other	0	dbapassap2	

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Similarly, add users (to be authenticated) by going http:// your-server-ip/daloradius/mng-new.php as:

New User ?

Account Info User Info Billing Info Attributes

◉ Username Authentication

Username	testuser	Random	💬
Password	testpass	Random	💬
Password Type	Cleartext-Password ▼		
Group	Select Groups ▼	Add 💬	

Apply

This is the minimum details of users. You can modify as your requirements. After clicking apply the user will be added and you can list all users as:

Users Listing ?

SELECT: ALL NONE

Delete Disable Enable CSV Export

1

ID	Name	Username	Password
☐ 1		◼ faiyaz	ansari
☐ 2		◼ tc	wang
☐ 3		◼ adam	wang
☐ 4		◼ stella	goro
☐ 7		◼ testuser	testpass

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This is the minimum configuration you need for RADIUS with client and users.