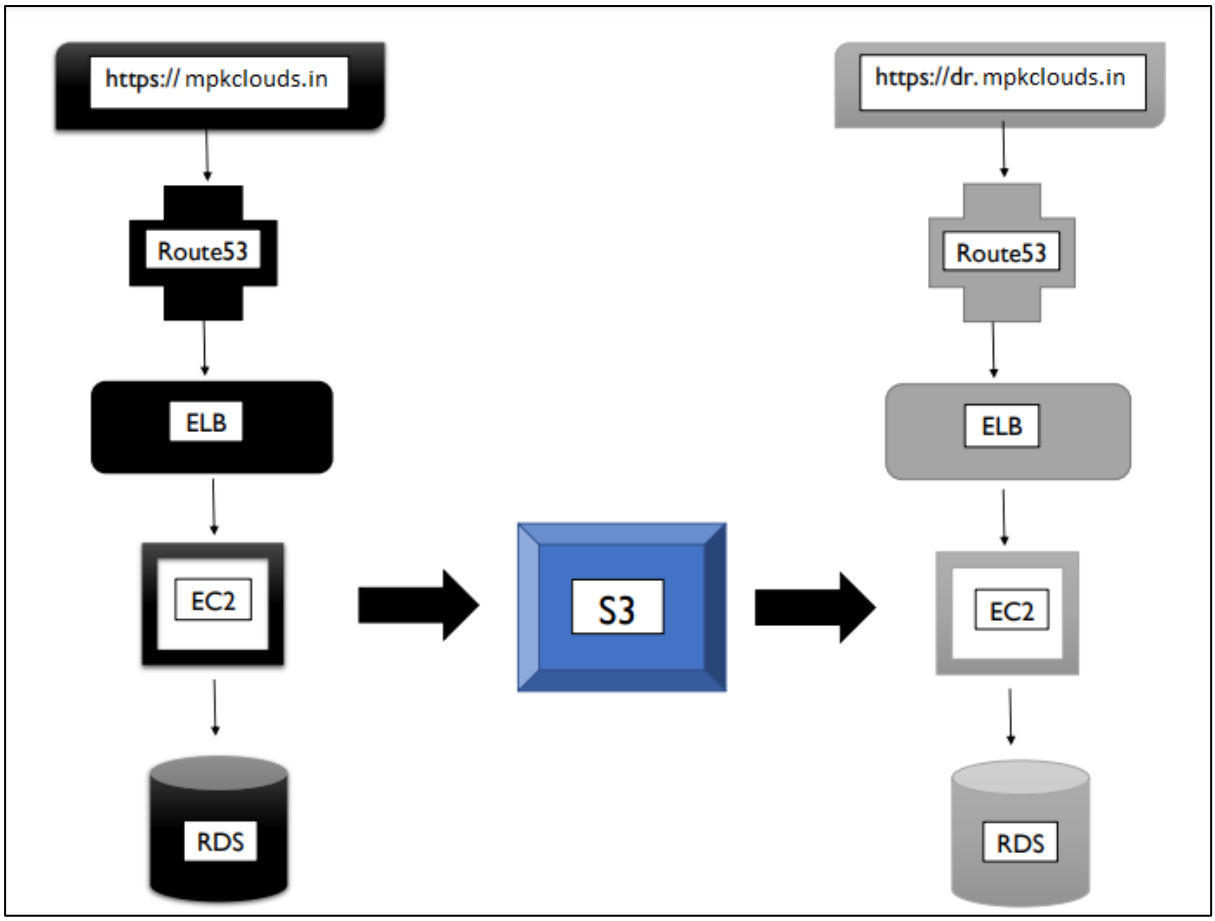
IMPLEMENTION OF PRODUCTION AND DISASTER RECOVERY ENVIRONMENT FOR A TWO-TIERED APPLICATION DEPLOYMENT USING ACM, ROUTE53, EC2, ELB, RDS, IAM, S3, CLOUD WATCH

ARCHITECTURE

This project done by using AWS - ACM , ROUTE 53, ELB, EC2, S3, RDS and IAM and CLOUD WATCH



ACM:

AWS Certificate Manager is a service that lets you easily provision, manage, and deploy public and private Secure Sockets Layer/Transport Layer Security (SSL/TLS) certificates for use with AWS services and your internal connected resources.

ROUTE 53:

It is a highly available and scalable Domain Name System (DNS) web service It is designed for developers and corporates to route the end users to Internet applications by translating human readable names like www.mydomain.com, into the numeric IP addresses like 192.0.2.1 that computers use to connect to each other.

EC2:

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) Cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

ELB:

Elastic Load Balancing (ELB) automatically distributes incoming application traffic across multiple targets and virtual appliances in one or more Availability Zones (AZs).

IAM:

AWS Identity and Access Management (IAM) is a web service that helps you securely control access to AWS resources. You use IAM to control who is authenticated (signed in) and authorized (has permissions) to use resources.

S3:

Amazon Simple Storage Service is a scalable, high-speed, web-based cloud storage service. The service is designed for online backup and archiving of data and applications on Amazon Web Services. Amazon S3 was designed with a minimal feature set created to make web-scale computing easier for developers.

CLOUD WATCH:

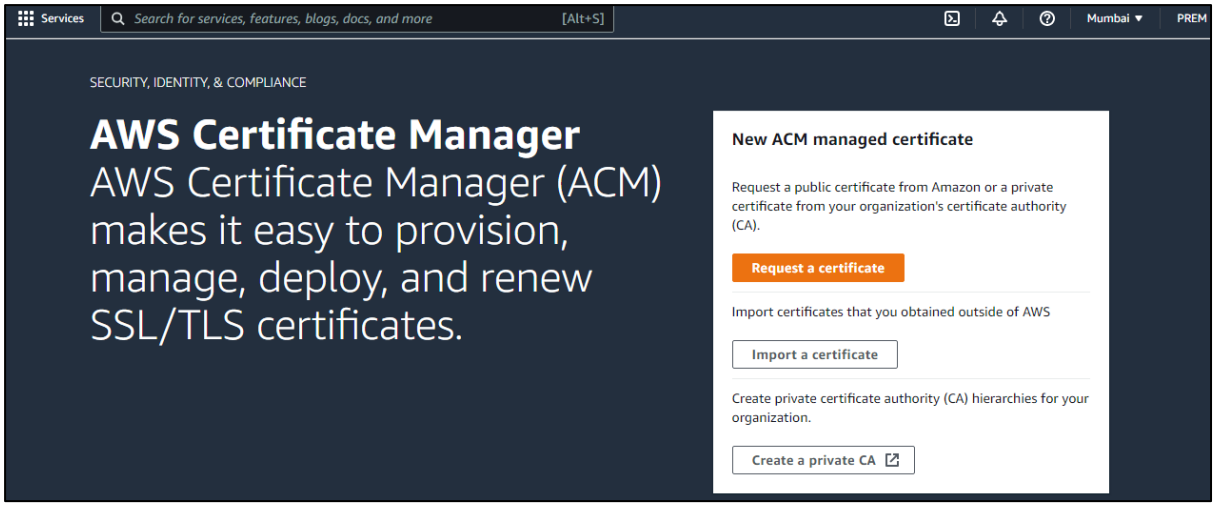
CloudWatch enables you to monitor your complete stack (applications, infrastructure, and services) and use alarms, logs, and events data to take automated actions and reduce mean time to resolution (MTTR).

WORKING PROCEDURE:

1. AWS CERTIFICATE MANAGER CREATION:

Request public certificates as per the registered domains. ACM certifications can be used to establish secure access to communications over the Internet or within an internal network.

Go to aws certificate manager – request a certificate – request of public certificate.



Domain name : mpkclouds.in

Subdomain name: *.mpkclouds.in

Validation method:

There are two types of validations exist.

1. DNS validation

2. Email validation

Choose DNS validation. DNS validation is the SSL/TSL certificates in Route 53 service. Route 53 requires validation of this certificate.

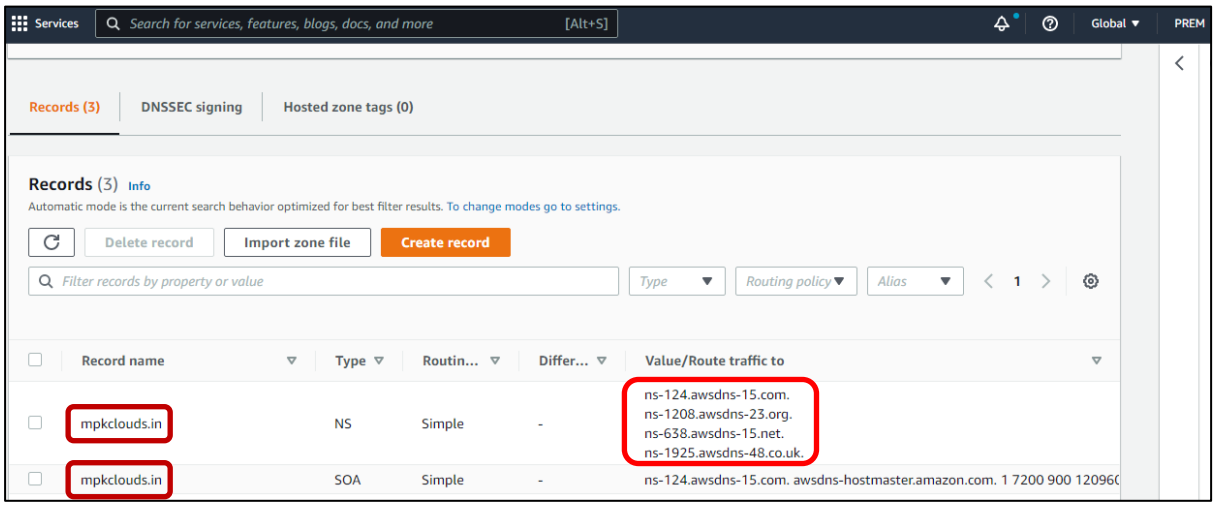
2. AWS ROUTE53 SETUP & LINK TO GODADDY DOMAIN DNS MGMT:

A. Create Hosted Zone:

Go to route53 – create hosted zone.

Purchase a domain from godaddy .

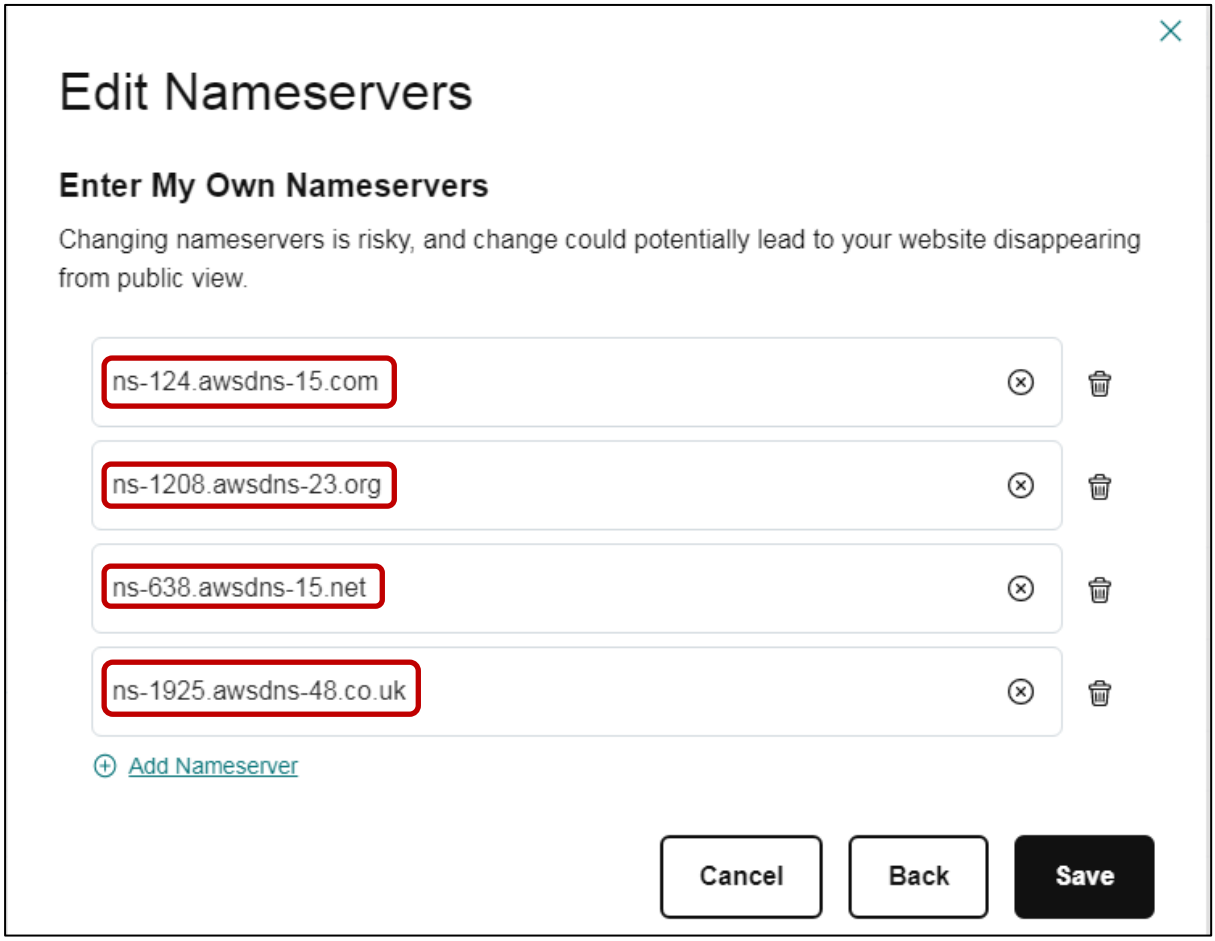
Domain name: mpkclouds.in (Default two record sets will be created)



2.Map The N-S Under Godaddy Domain:

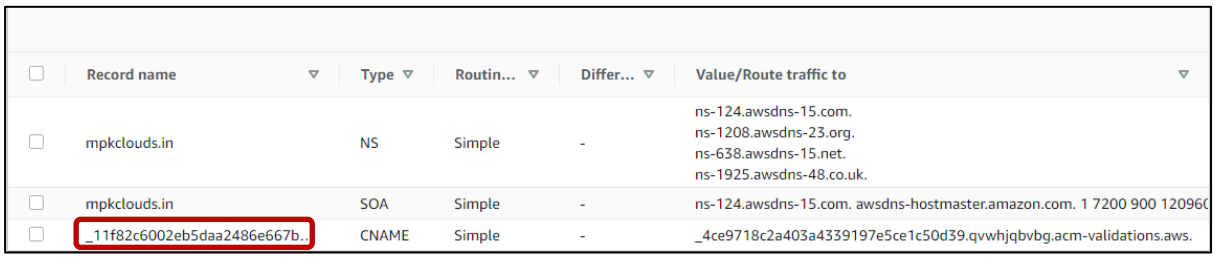
Copy these name servers and paste it under godaddy's name server .

- ns-124.awsdns-15.com
- ns-1208.awsdns-23.org
- ns-638.awsdns-15.net
- ns-1925.awsdns-48.co.uk



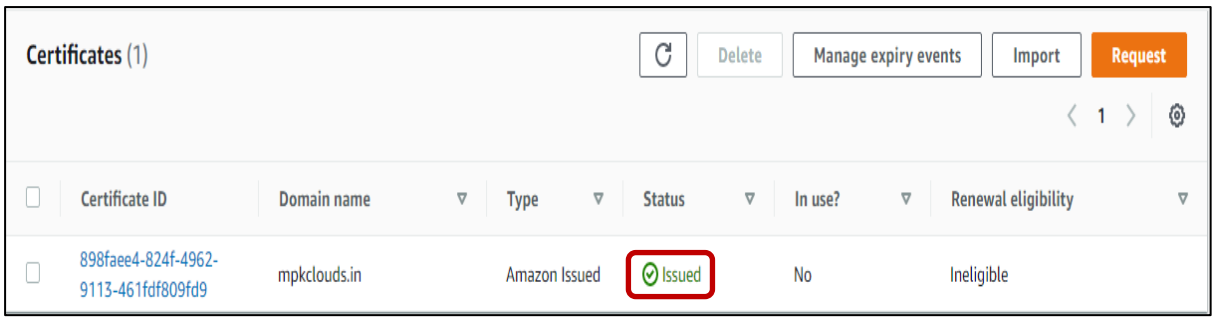
3.CREATE RECORD SET FROM ACM

Go to ACM – select existing certificate ID – domains – create records in Route53 (Now three number of record set is available in route 53)



Record name	Type	Routin...	Differ...	Value/Route traffic to
mpkclouds.in	NS	Simple	-	ns-124.awsdns-15.com. ns-1208.awsdns-23.org. ns-638.awsdns-15.net. ns-1925.awsdns-48.co.uk.
mpkclouds.in	SOA	Simple	-	ns-124.awsdns-15.com. awsdns-hostmaster.amazon.com. 1 7200 900 120960
_11f82c6002eb5daa2486e667b...	CNAME	Simple	-	_4ce9718c2a403a4339197e5ce1c50d39.qvwhjqbvbg.acm-validations.aws.

Go to ACM – It shows Certificates validation is success. Status shows issued.



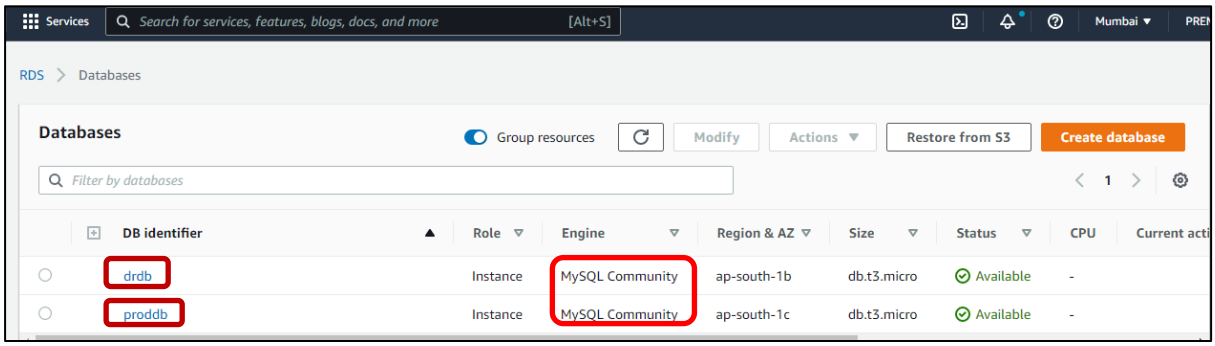
3. AWS RDS SETUP:

create two number of data base.

i) production db - In this data base security group make as all traffic

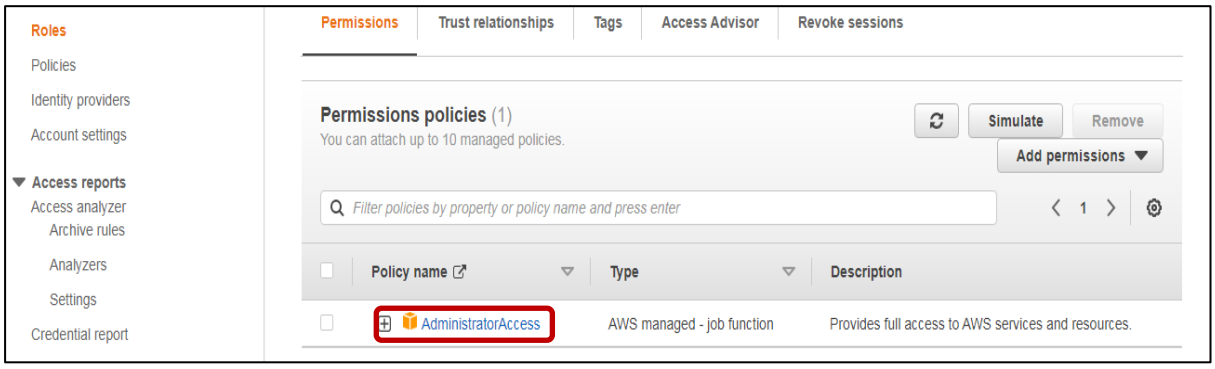
ii) dr db – In this data base security group make as all traffic

MySQL data base engine is used for both data bases.



4. AWS IAM ROLE

Create an iam role with full access.



5. AWS EC2 CREATION

- create two no of ec2 server with iam roles enabled & add user data under advanced section
- add the below details in the advanced section,

USER DATA:

#!/bin/bash

yum install httpd php-mysql -y

amazon-linux-extras install -y php7.3

cd /var/www/html

echo "healthy" > healthy.html

wget https://wordpress.org/latest.tar.gz

tar -xzf latest.tar.gz

cp -r wordpress/* /var/www/html/

rm -rf wordpress

rm -rf latest.tar.gz

chmod -R 755 wp-content

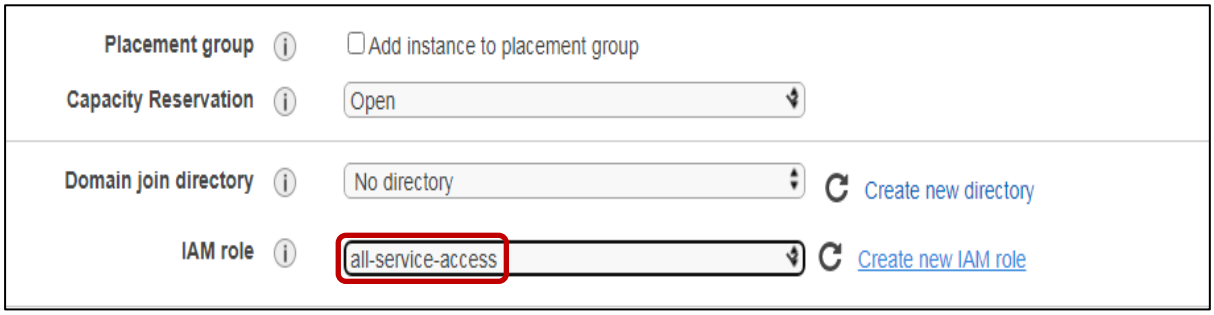
chown -R apache:apache wp-content

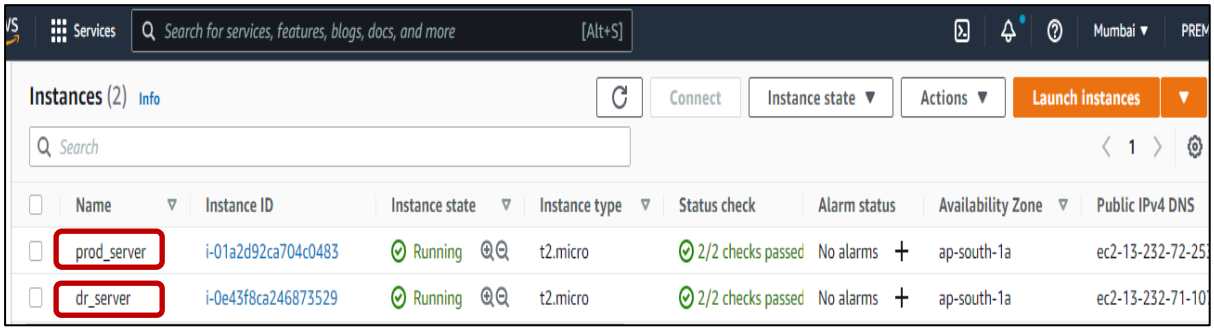
wget https://s3.amazonaws.com/bucketforwordpresslab-donotdelete/htaccess.txt

mv htaccess.txt .htaccess

chkconfig httpd on

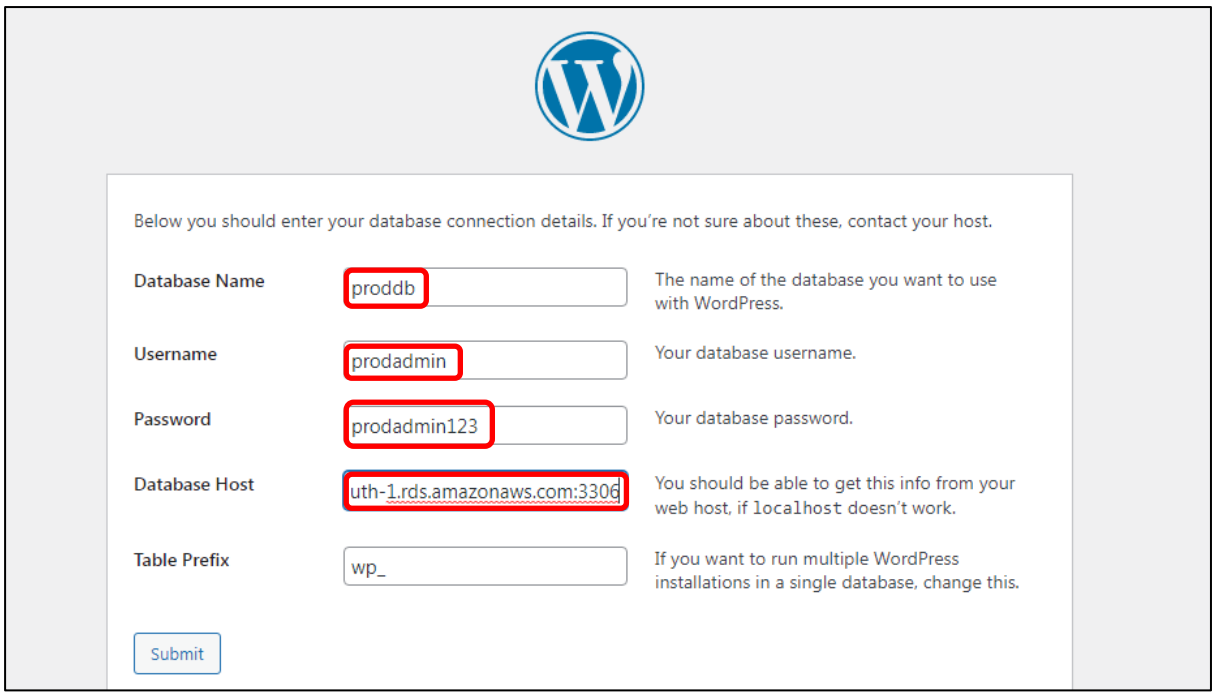
service httpd start

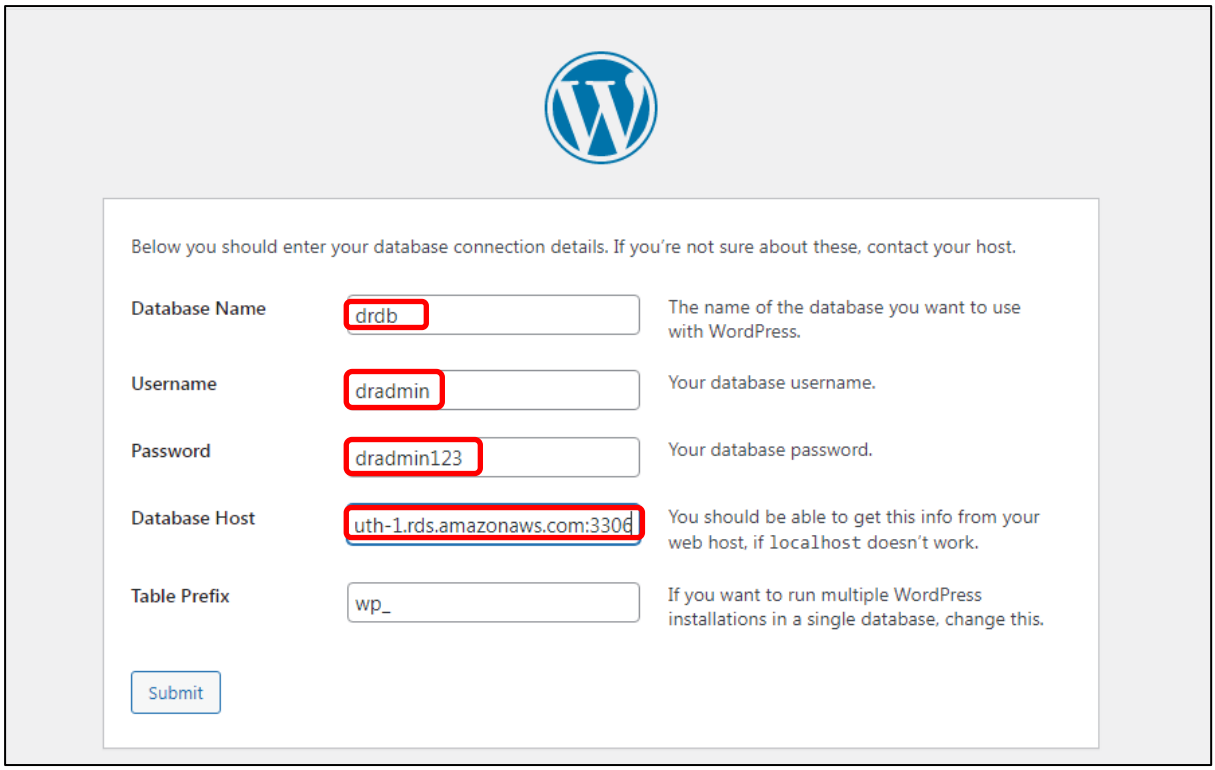




7. ADD THE DB DETAILS UNDER WORDPRESS APPLICATION FOR BOTH DR & PRODUCTION

Hit the browser by production ip and dr server ip to access word press web page.



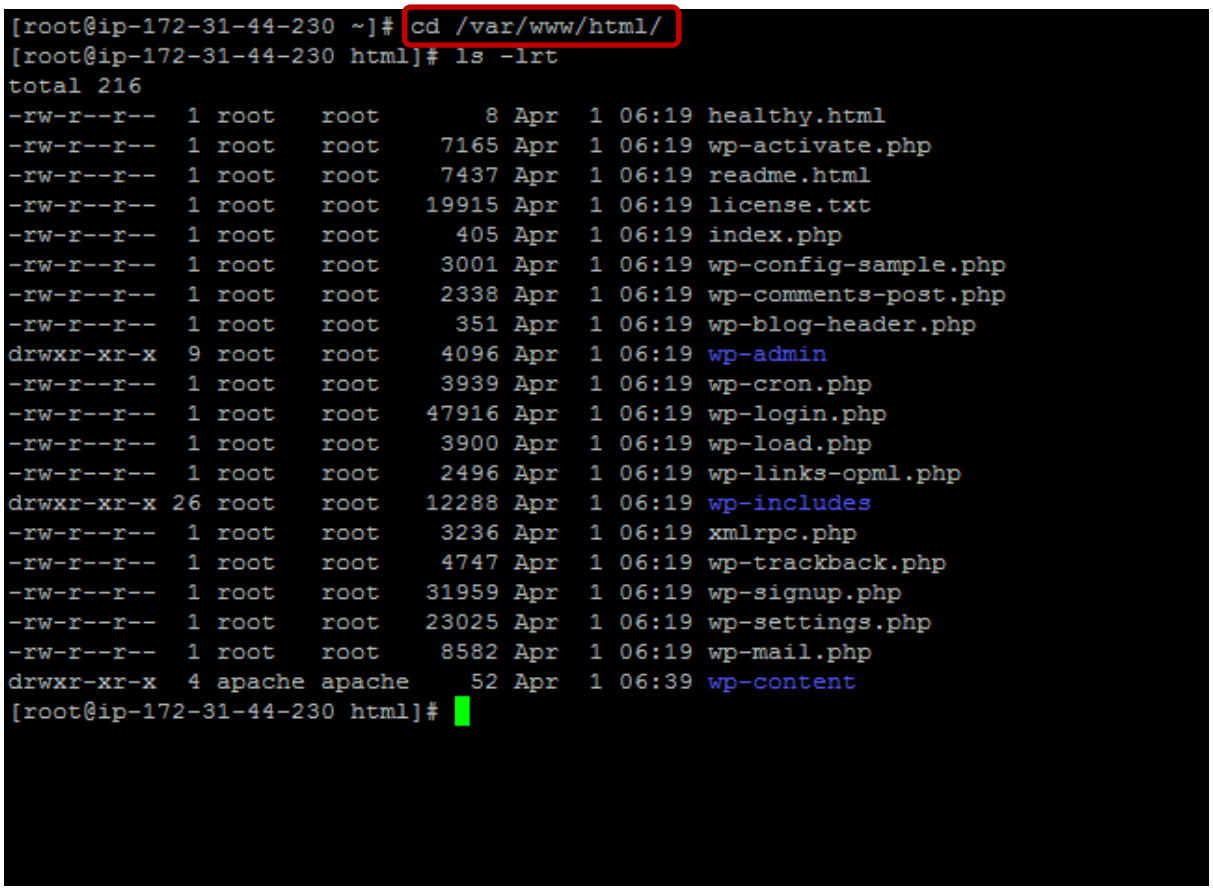


cd /var/www/html

create & edit the wp-config.php file in both the ec2s

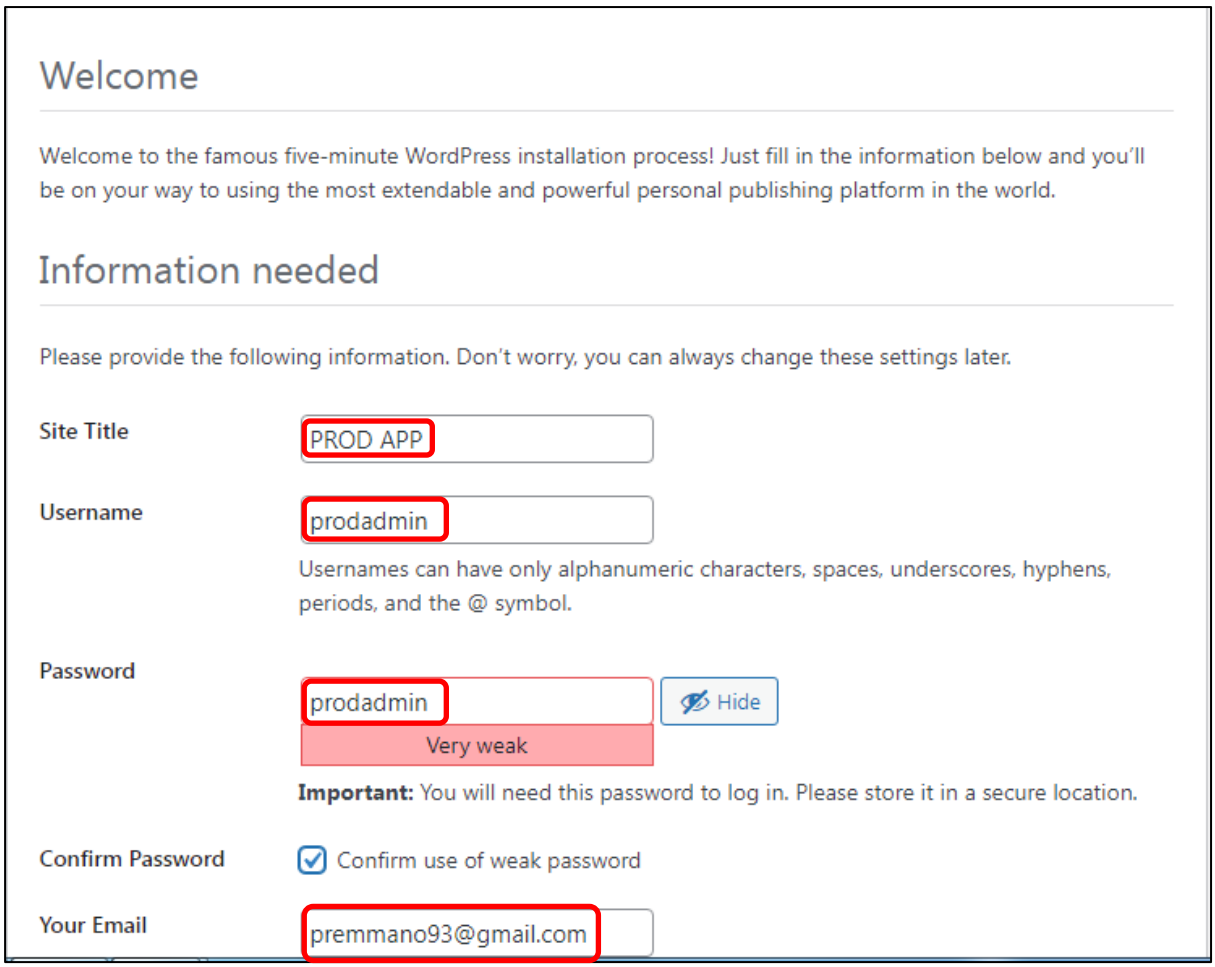
php file is missing. So you have to create wp-config.php file.

Copy the content from hosted application page and paste it inside the wp-config.php file and run the installation

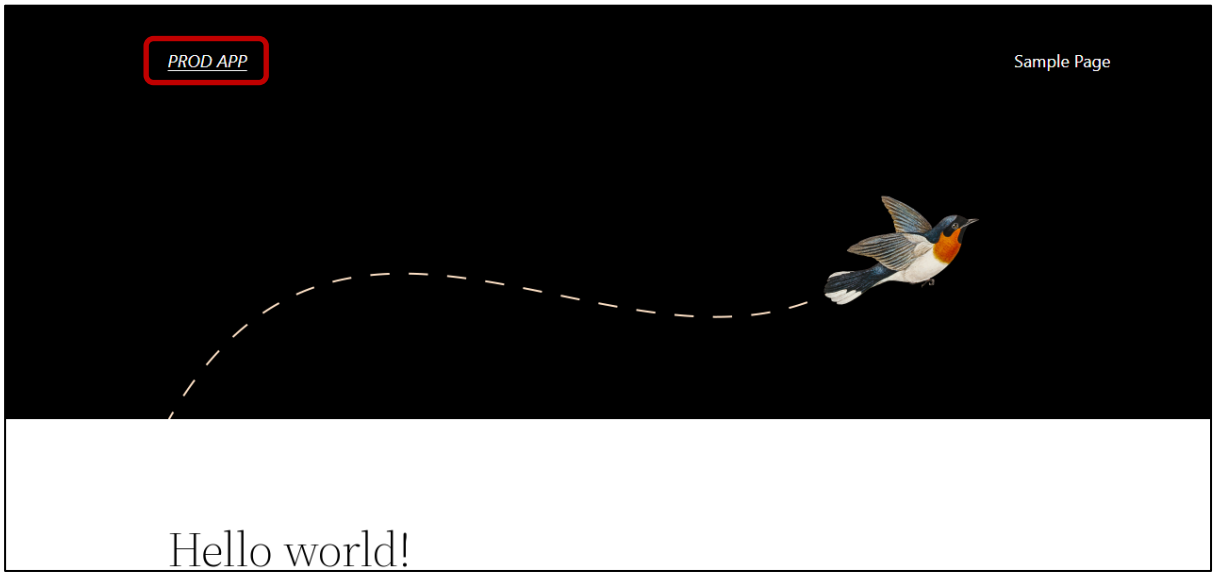

[root@ip-172-31-44-230 ~]# cd /var/www/html/
[root@ip-172-31-44-230 html]# ls -lrt
total 216
-rw-r--r-- 1 root   root   8 Apr 1 06:19 healthy.html
-rw-r--r-- 1 root   root   7165 Apr 1 06:19 wp-activate.php
-rw-r--r-- 1 root   root   7437 Apr 1 06:19 readme.html
-rw-r--r-- 1 root   root   19915 Apr 1 06:19 license.txt
-rw-r--r-- 1 root   root   405 Apr 1 06:19 index.php
-rw-r--r-- 1 root   root   3001 Apr 1 06:19 wp-config-sample.php
-rw-r--r-- 1 root   root   2338 Apr 1 06:19 wp-comments-post.php
-rw-r--r-- 1 root   root   351 Apr 1 06:19 wp-blog-header.php
drwxr-xr-x 9 root   root   4096 Apr 1 06:19 wp-admin
-rw-r--r-- 1 root   root   3939 Apr 1 06:19 wp-cron.php
-rw-r--r-- 1 root   root   47916 Apr 1 06:19 wp-login.php
-rw-r--r-- 1 root   root   3900 Apr 1 06:19 wp-load.php
-rw-r--r-- 1 root   root   2496 Apr 1 06:19 wp-links-opml.php
drwxr-xr-x 26 root   root   12288 Apr 1 06:19 wp-includes
-rw-r--r-- 1 root   root   3236 Apr 1 06:19 xmlrpc.php
-rw-r--r-- 1 root   root   4747 Apr 1 06:19 wp-trackback.php
-rw-r--r-- 1 root   root   31959 Apr 1 06:19 wp-signup.php
-rw-r--r-- 1 root   root   23025 Apr 1 06:19 wp-settings.php
-rw-r--r-- 1 root   root   8582 Apr 1 06:19 wp-mail.php
drwxr-xr-x 4 apache apache   52 Apr 1 06:39 wp-content
[root@ip-172-31-44-230 html]#

vi wp-config.php

```
/**#@-*/

/**
 * WordPress database table prefix.
 *
 * You can have multiple installations in one database if you give each
 * a unique prefix. Only numbers, letters, and underscores please!
 */
$table_prefix = 'wp_';

/**
 * For developers: WordPress debugging mode.
 *
 * Change this to true to enable the display of notices during development.
 * It is strongly recommended that plugin and theme developers use WP_DEBUG
 * in their development environments.
 *
 * For information on other constants that can be used for debugging,
 * visit the documentation.
 *
 * @link https://wordpress.org/support/article/debugging-in-wordpress/
 */
define( 'WP_DEBUG', false );

/* Add any custom values between this line and the "stop editing" line. */



/* That's all, stop editing! Happy publishing. */

/** Absolute path to the WordPress directory. */
if ( ! defined( 'ABSPATH' ) ) {
        define( 'ABSPATH', __DIR__ . '/' );
}

/** Sets up WordPress vars and included files. */
require_once ABSPATH . 'wp-settings.php';
```



Now the application page will be opened and used by the administrator rather than the end user.



```
[root@ip-172-31-38-1 ~]# cd /var/www/html
[root@ip-172-31-38-1 html]# ls -lrt
total 216
-rw-r--r--  1 root   root       8 Apr  1 06:19 healthy.html
-rw-r--r--  1 root   root    7165 Apr  1 06:19 wp-activate.php
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-rw-r--r--  1 root   root     351 Apr  1 06:19 wp-blog-header.php
drwxr-xr-x  9 root   root    4096 Apr  1 06:19 wp-admin
-rw-r--r--  1 root   root    3939 Apr  1 06:19 wp-cron.php
-rw-r--r--  1 root   root    3236 Apr  1 06:19 xmlrpc.php
-rw-r--r--  1 root   root    4747 Apr  1 06:19 wp-trackback.php
-rw-r--r--  1 root   root   31959 Apr  1 06:19 wp-signup.php
-rw-r--r--  1 root   root   23025 Apr  1 06:19 wp-settings.php
-rw-r--r--  1 root   root    8582 Apr  1 06:19 wp-mail.php
-rw-r--r--  1 root   root   47916 Apr  1 06:19 wp-login.php
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drwxr-xr-x 26 root   root   12288 Apr  1 06:19 wp-includes
drwxr-xr-x  4 apache apache    52 Apr  1 07:17 wp-content
[root@ip-172-31-38-1 html]# vi wp-config.php
[root@ip-172-31-38-1 html]#
```

```
/**#@-*/

/**
 * WordPress database table prefix.
 *
 * You can have multiple installations in one database if you give each
 * a unique prefix. Only numbers, letters, and underscores please!
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}

/** Sets up WordPress vars and included files. */
require_once ABSPATH . 'wp-settings.php';

:wq
```

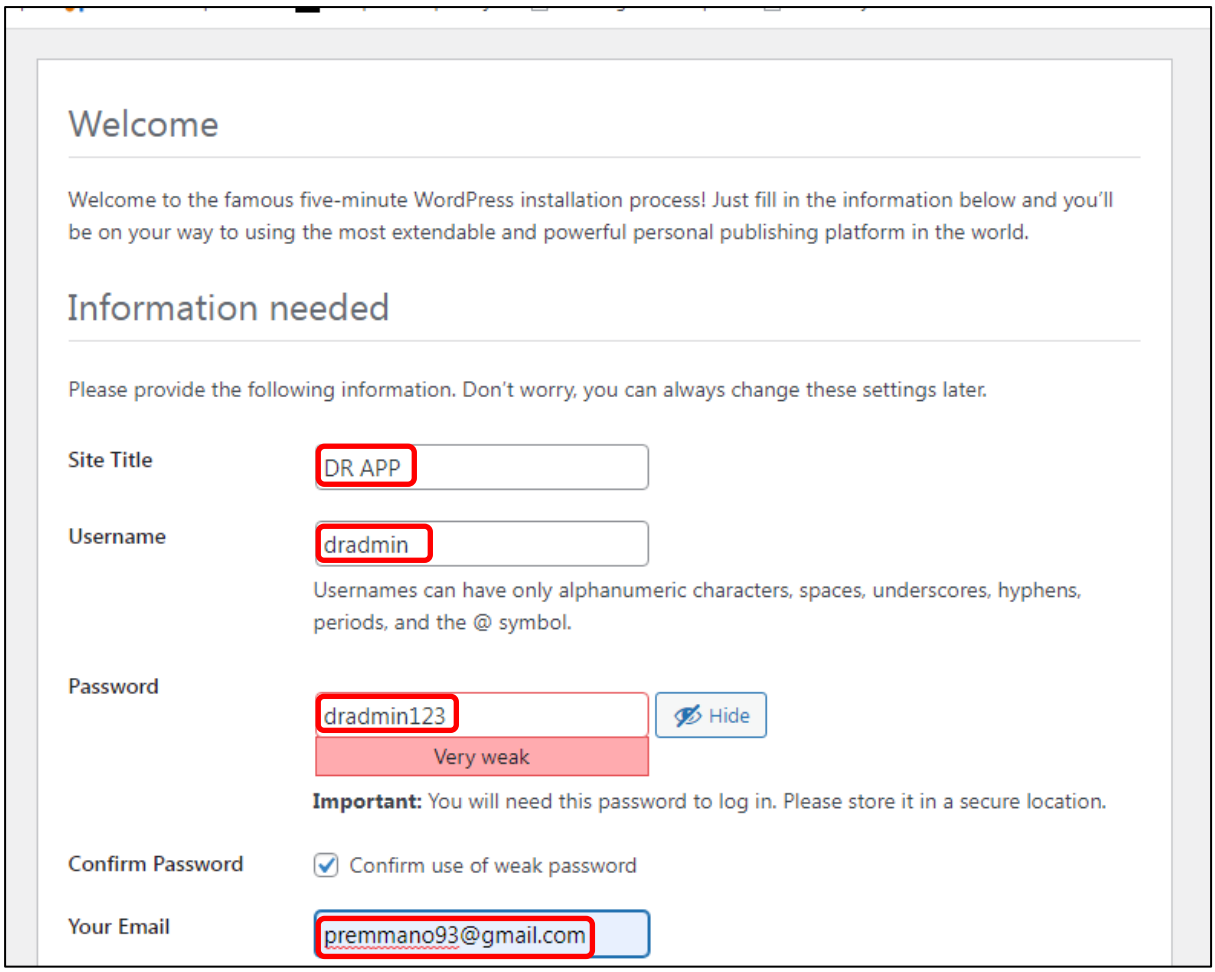

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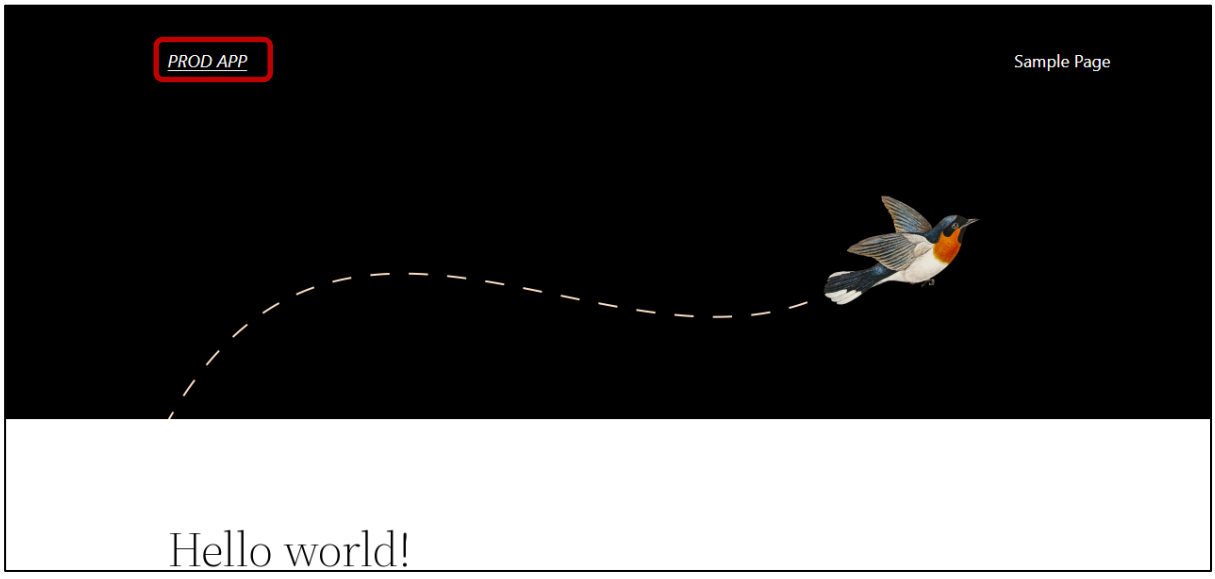
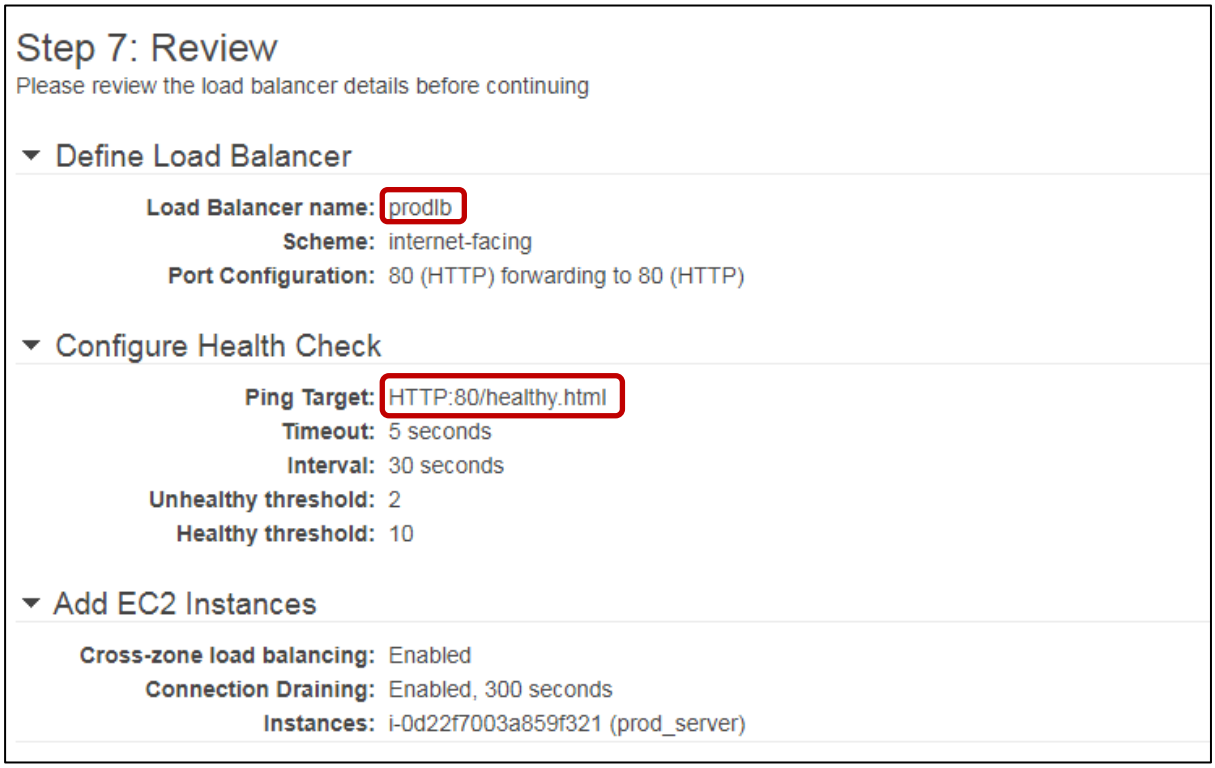
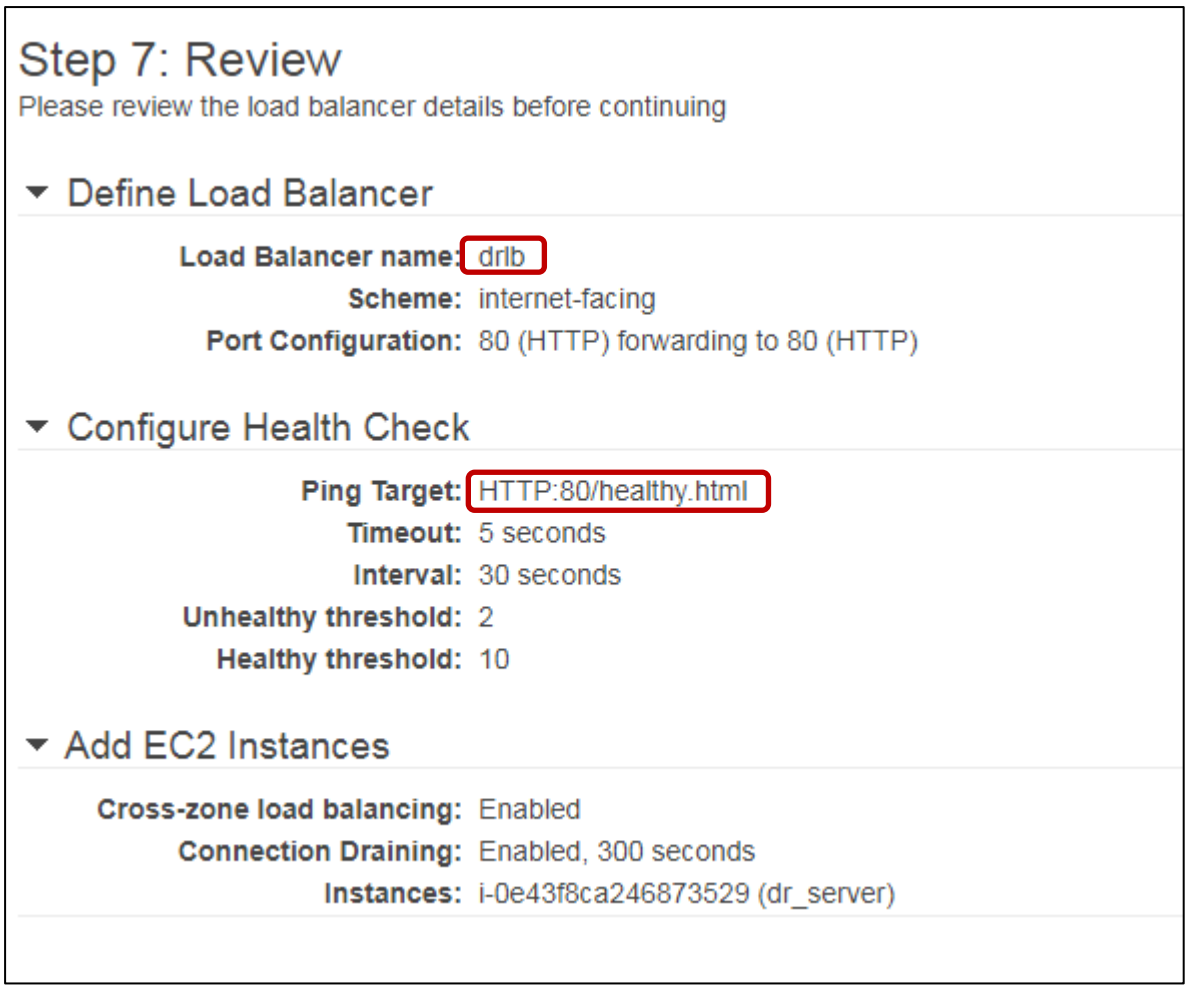


6. AWS ELB CREATION & SETUP

create two number of classic elb & map the appropirate ec2 to it.





8. LAUNCH THE WORDPRESS PAGE & POST IT WITH APPROPIRATE DR & PROD IMAGES TO GET DIFFERENCE IN THE APPLICATION PAGE.

9. AWS R53 & ELB SYNC:

Hit the browser by following urls http://mpkclouds.in and http://dr.mpkclouds.in . It shows app is not secured.

refresh the r53

create record set and map the appropirate elb under the alias

Integtrating Route 53 with Load Balancer . Now we have to Create Record two domains

1.Record name : mpkclouds.in

Record type – A – Route traffic to an IPV4 address and some AWS resources

Route traffic to Alias is Enable

-Alias to Application and classic Load Balancer

-Asia Pacific (Mumbai) [ap-south-1]

-dualstack.prodlb-125612298.ap-south-1.elb.amazonaws.com

Route policy - simple routing.

2.Record name : dr.mpkclouds.in

Record type – A – Route traffic to an IPV4 address and some AWS resources

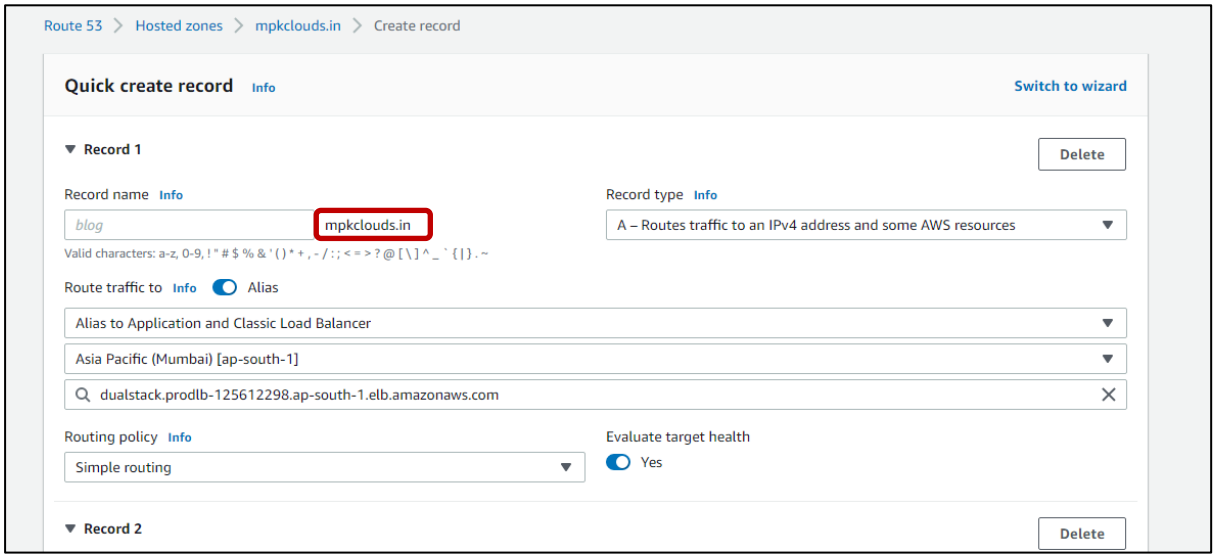
-Route traffic to Alias is Enable

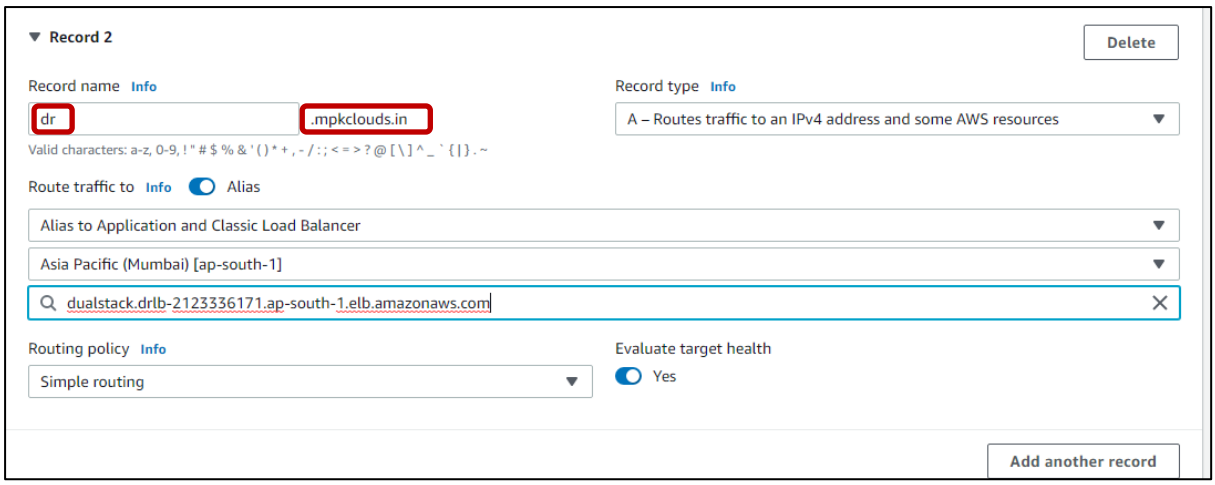
-Alias to Application and classic Load Balancer

-Asia Pacific (Mumbai) [ap-south-1]

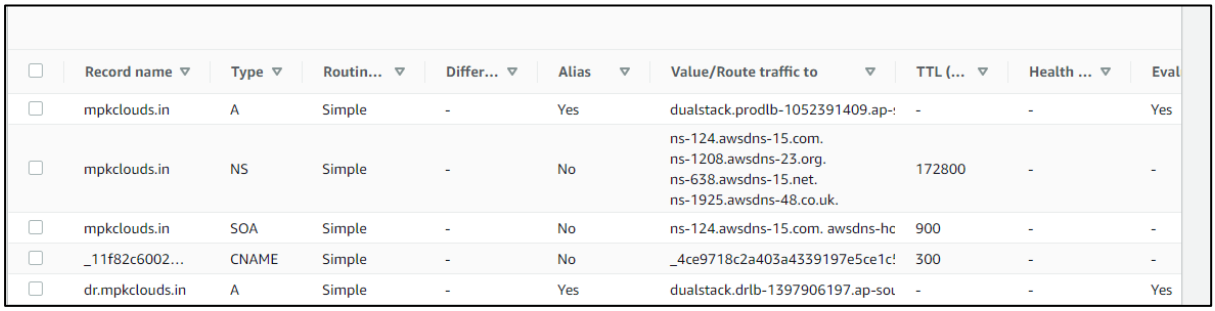
-dualstack.drlb-2123336171.ap-south-1.elb.amazonaws.com

Route policy - simple routing.





Now five number of record set has been created.



Record name	Type	Routin...	Differ...	Alias	Value/Route traffic to	TTL (...	Health ...	Eval
mpkclouds.in	A	Simple	-	Yes	dualstack.prodlb-1052391409.ap-	-	-	Yes
mpkclouds.in	NS	Simple	-	No	ns-124.awsdns-15.com. ns-1208.awsdns-23.org. ns-638.awsdns-15.net. ns-1925.awsdns-48.co.uk.	172800	-	-
mpkclouds.in	SOA	Simple	-	No	ns-124.awsdns-15.com. awsdns-hc	900	-	-
_11f82c6002...	CNAME	Simple	-	No	_4ce9718c2a403a4339197e5ce1c!	300	-	-
dr.mpkclouds.in	A	Simple	-	Yes	dualstack.drlb-1397906197.ap-sou	-	-	Yes

INSTALLING THE SSL CERTIFICATE USING ACM AND MAKING THE APP SECURED:

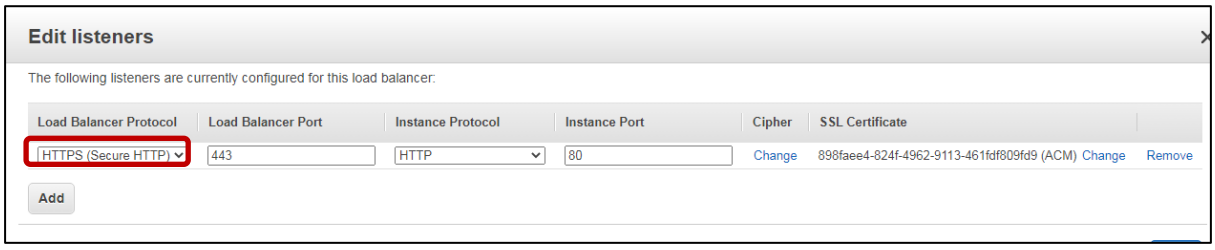
Security will be provided in ELB. Because ELB is the entry point of the architect.

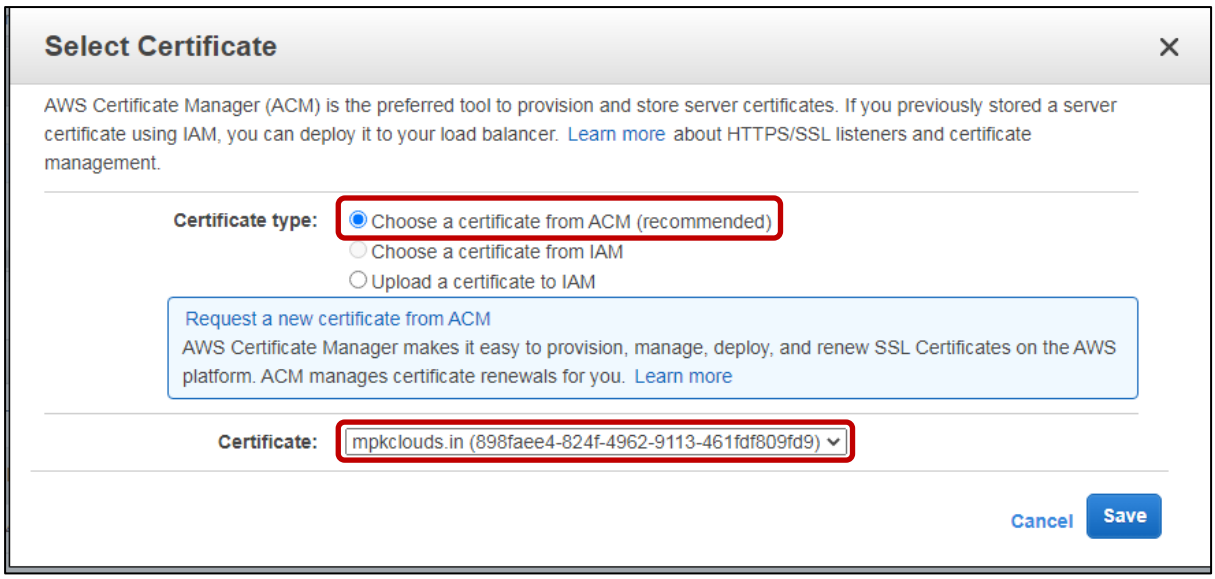
Go to production ELB - listeners – edit – add

Load balancer protocol – https

Load balancer – 443

SSL certificate – Choose a certificate from ACM



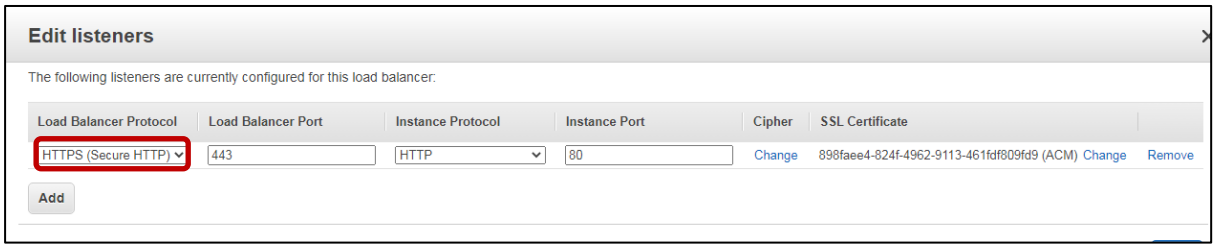


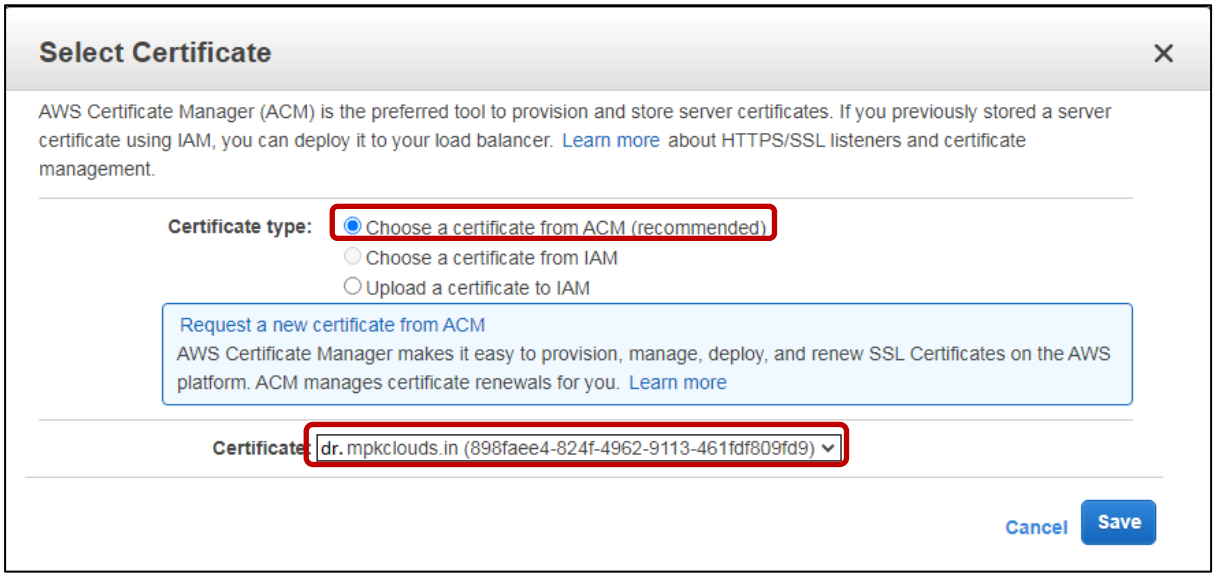
Go to dr ELB - listeners – edit – add

Load balancer protocol – https

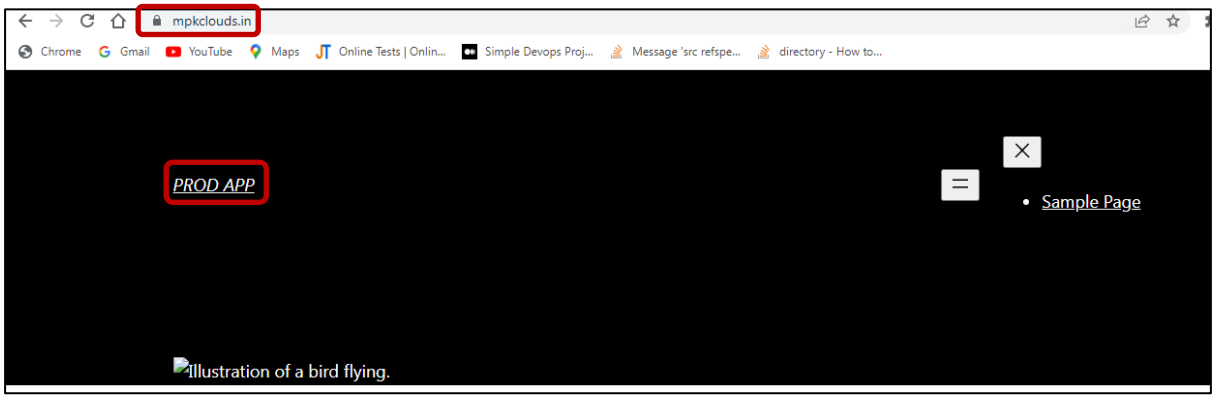
Load balancer – 443

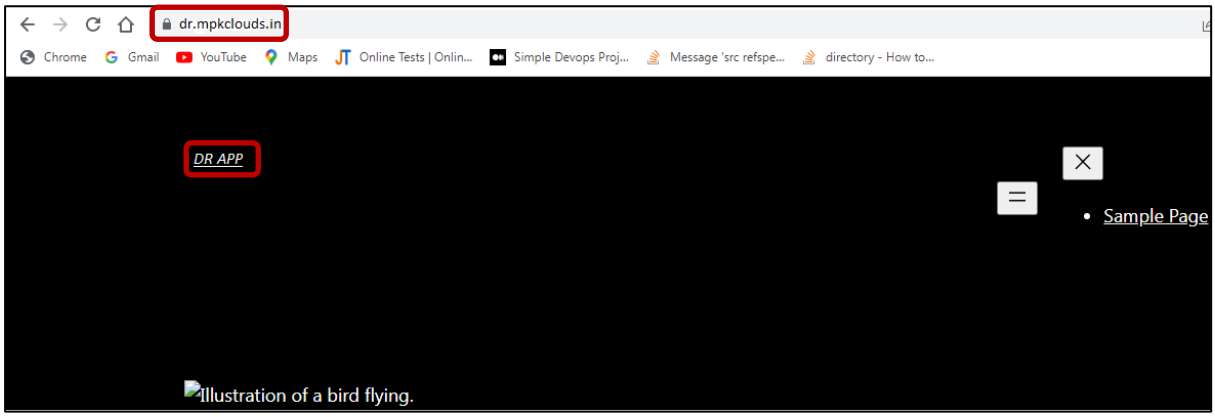
SSL certificate – Choose a certificate from ACM





Hit the browser by following urls https://mpkclouds.in and https://dr.mpkclouds.in . It shows app is secured

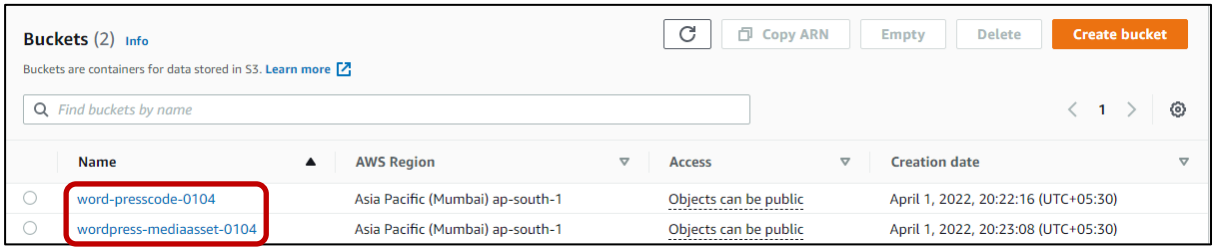




10. AWS S3 BUCKET CREATION AND SYNCHORONIZATION OF ENVIRONMENTS (PROD&DR)

create two number of s3 buckets.

- 1.word-presscode-0104
- 2.wordpress-mediaasset-0104



set crontab jobs in the ec2 in some small intervals to copy the content from prod to s3 & s3 to dr,

crontab -e

PRODUCTION:

- */2 * * * * aws s3 sync --delete /var/www/html/wp-content/uploads s3://wordpress-mediaasset-greens0811
- */2 * * * * aws s3 sync --delete /var/www/html/ s3://wordpress-code-greens0811

```
[root@ip-172-31-5-238 html]# cd
[root@ip-172-31-5-238 ~]# crontab -e
no crontab for root - using an empty one
crontab: installing new crontab
[root@ip-172-31-5-238 ~]# crontab -l
*/2 * * * * aws s3 sync --delete /var/www/html/wp-content/uploads s3://wordpress-mediaasset-0104
*/2 * * * * aws s3 sync --delete /var/www/html/ s3://word-presscode-0104
[root@ip-172-31-5-238 ~]#
```

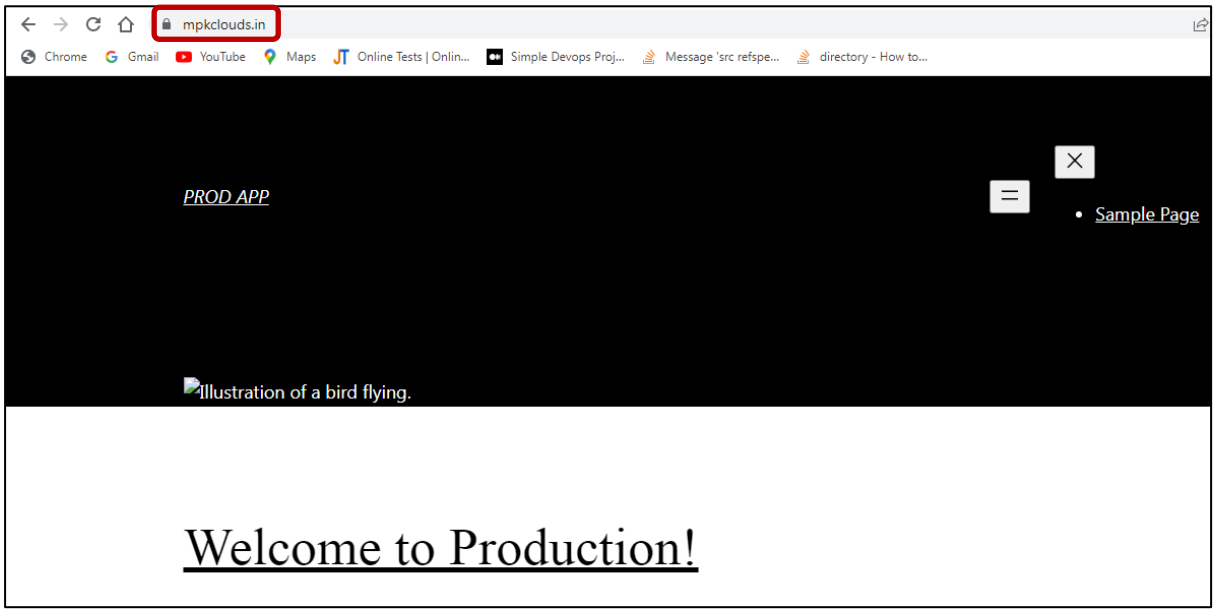
DR:

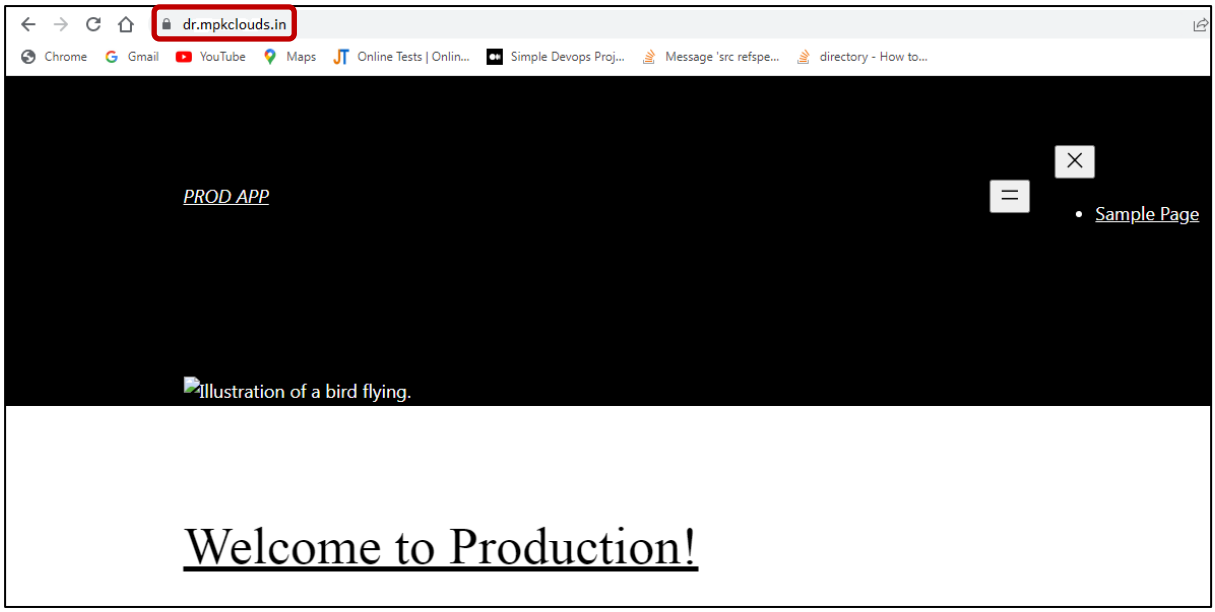
- */2 * * * * aws s3 sync --delete s3://wordpress-mediaasset-greens0811 /var/www/html/wp-content/uploads
- */2 * * * * aws s3 sync --delete s3://wordpress-code-greens0811 /var/www/html/

```
[root@ip-172-31-38-1 ~]# crontabe -e
-bash: crontabe: command not found
[root@ip-172-31-38-1 ~]# crontab -e
no crontab for root - using an empty one
crontab: installing new crontab
[root@ip-172-31-38-1 ~]# crontab -l
*/2 * * * *  aws s3 sync --delete  s3://wordpress-mediaasset-0104 /var/www/html/wp-content/uploads
*/2 * * * *  aws s3 sync --delete  s3://word-presscode-0104 /var/www/html/
[root@ip-172-31-38-1 ~]#
```

Do some changes in prod server it will reflect in dr server.

wait for few mins and check the below things,





CLOUD WATCH:

sudo yum install -y perl-Switch perl-DateTime perl-Sys-Syslog perl-LWP-Protocol-https perl-Digest-SHA.x86_64

Curl https://awscloudwatch.s3.amazonaws.com/downloads/CloudWatchMonitoringScripts-1.2.2.zip -O

unzip CloudWatchMonitoringScripts-1.2.2.zip && \rm CloudWatchMonitoringScripts-1.2.2.zip && \

cd aws-scripts-mon

mon-put-instance-data.pl

./mon-put-instance-data.pl --mem-util --verify –verbose

The above command is used show the memory utilization of servers. And we have to export this date from ec2 server to cloudwatch using IAM roles.

./mon-put-instance-data.pl --mem-used-incl-cache-buff --mem-util --mem-used --mem-avail

The above command is used to send the data from ec2 server to cloud watch.

```
[root@ip-172-31-5-238 ~]# clear
[root@ip-172-31-5-238 ~]# sudo yum install -y perl-Switch perl-DateTime perl-Sys-Syslog perl-LWP-Protocol-https perl-Digest-SHA.x86_64
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core
amzn2extra-docker
amzn2extra-kernel-5.10
amzn2extra-php7.3
Resolving Dependencies
```

```
[root@ip-172-31-5-238 ~]# curl https://aws-cloudwatch.s3.amazonaws.com/downloads/CloudWatchMonitoringScripts-1.2.2.zip -O
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 24225  100 24225    0     0  24941      0 --:--:-- --:--:-- --:--:-- 24922
[root@ip-172-31-5-238 ~]# ls -lrt
total 24
-rw-r--r-- 1 root root 24225 Apr  1 17:14 CloudWatchMonitoringScripts-1.2.2.zip
[root@ip-172-31-5-238 ~]# unzip CloudWatchMonitoringScripts-1.2.2.zip
Archive:  CloudWatchMonitoringScripts-1.2.2.zip
 extracting: aws-scripts-mon/awscreds.template
  inflating: aws-scripts-mon/AwsSignatureV4.pm
  inflating: aws-scripts-mon/CloudWatchClient.pm
  inflating: aws-scripts-mon/LICENSE.txt
  inflating: aws-scripts-mon/mon-get-instance-stats.pl
  inflating: aws-scripts-mon/mon-put-instance-data.pl
  inflating: aws-scripts-mon/NOTICE.txt
[root@ip-172-31-5-238 ~]# ls -lrt
total 24
-rw-r--r-- 1 root root 24225 Apr  1 17:14 CloudWatchMonitoringScripts-1.2.2.zip
drwxr-xr-x 2 root root   185 Apr  1 17:15 aws-scripts-mon
[root@ip-172-31-5-238 ~]#
```

```
[root@ip-172-31-5-238 ~]# unzip CloudWatchMonitoringScripts-1.2.2.zip && \
> rm CloudWatchMonitoringScripts-1.2.2.zip && \
> cd aws-scripts-mon
Archive:  CloudWatchMonitoringScripts-1.2.2.zip
 extracting: aws-scripts-mon/awscreds.template
  inflating: aws-scripts-mon/AwsSignatureV4.pm
  inflating: aws-scripts-mon/CloudWatchClient.pm
  inflating: aws-scripts-mon/LICENSE.txt
  inflating: aws-scripts-mon/mon-get-instance-stats.pl
  inflating: aws-scripts-mon/mon-put-instance-data.pl
  inflating: aws-scripts-mon/NOTICE.txt
rm: remove regular file 'CloudWatchMonitoringScripts-1.2.2.zip'?
[root@ip-172-31-5-238 aws-scripts-mon]# ls -lrt
total 96
-rw-r--r-- 1 root root   138 Mar 26  2018 NOTICE.txt
-rwxr-xr-x 1 root root 18144 Mar 26  2018 mon-put-instance-data.pl
-rwxr-xr-x 1 root root  9739 Mar 26  2018 mon-get-instance-stats.pl
-rw-r--r-- 1 root root  9124 Mar 26  2018 LICENSE.txt
-r--r--r-- 1 root root 22519 Mar 26  2018 CloudWatchClient.pm
-r--r--r-- 1 root root 17021 Mar 26  2018 AwsSignatureV4.pm
-rw-r--r-- 1 root root    30 Mar 26  2018 awscreds.template
[root@ip-172-31-5-238 aws-scripts-mon]#
```

```
[root@ip-172-31-5-238 aws-scripts-mon]# ./mon-put-instance-data.pl --mem-util --verify --verbose
MemoryUtilization: 46.9320462195753 (Percent)
No credential methods are specified. Trying default IAM role.
Using IAM role <all-service-access>
Endpoint: https://monitoring.ap-south-1.amazonaws.com
Payload: {"MetricData":[{"Timestamp":1648833869,"Dimensions":[{"Value":"i-03fd02e21af921bb7","Name":"InstanceId"}],"Value":46.9320462195753,"Unit":"Percent","MetricNam
":"MemoryUtilization"}],"Namespace":"System/Linux","__type":"com.amazonaws.cloudwatch.v2010_08_01#PutMetricDataInput"}

Verification completed successfully. No actual metrics sent to CloudWatch.

[root@ip-172-31-5-238 aws-scripts-mon]# ./mon-put-instance-data.pl --mem-used-incl-cache-buff --mem-util --mem-used --mem-avail

Successfully reported metrics to CloudWatch. Reference Id: f189a1b5-0725-4b2f-a45c-e17e30a97876
```

Go to cloud watch - dashboard – create dash board – name (prod server) – Number – instance id – linux-system papmeter

We can view memory utilization , memory available and memory used by the prod server.