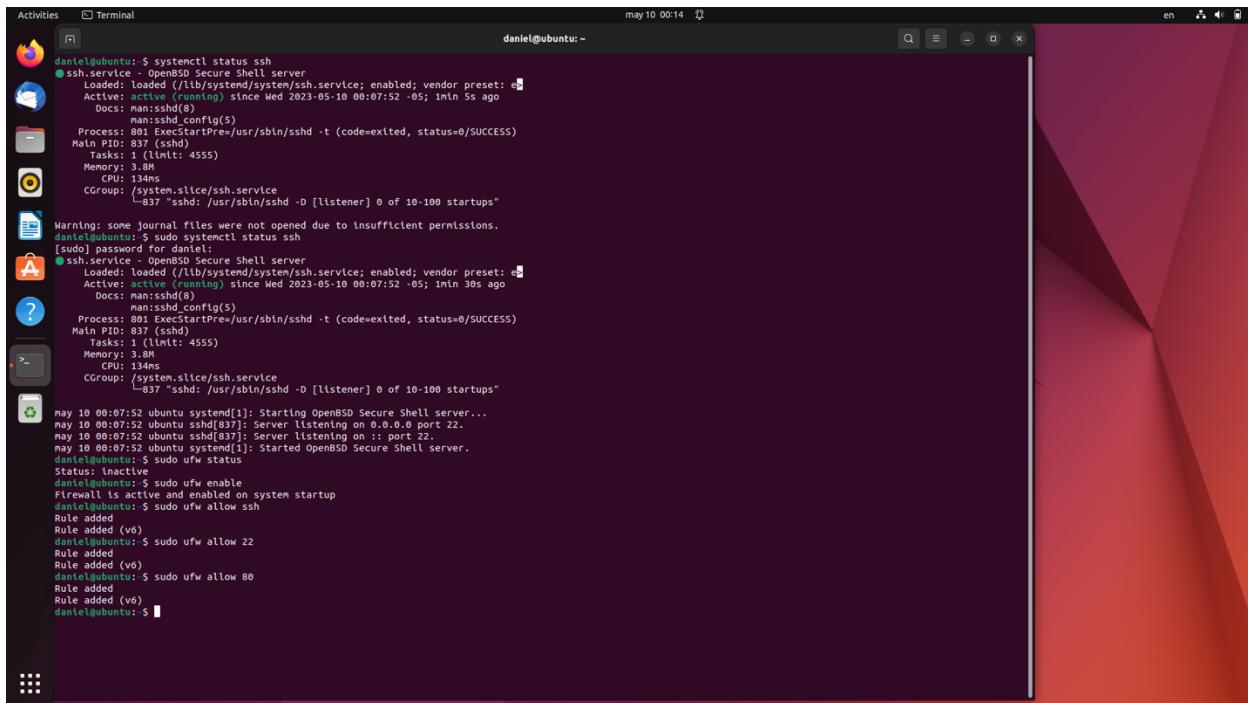


## Lab 2: Networking & Security. Web Servers.

- Part 1. Installing and configuring remote OS on VBox.

### 1. Configuring ssh server and allowing 22 and 80 ports.

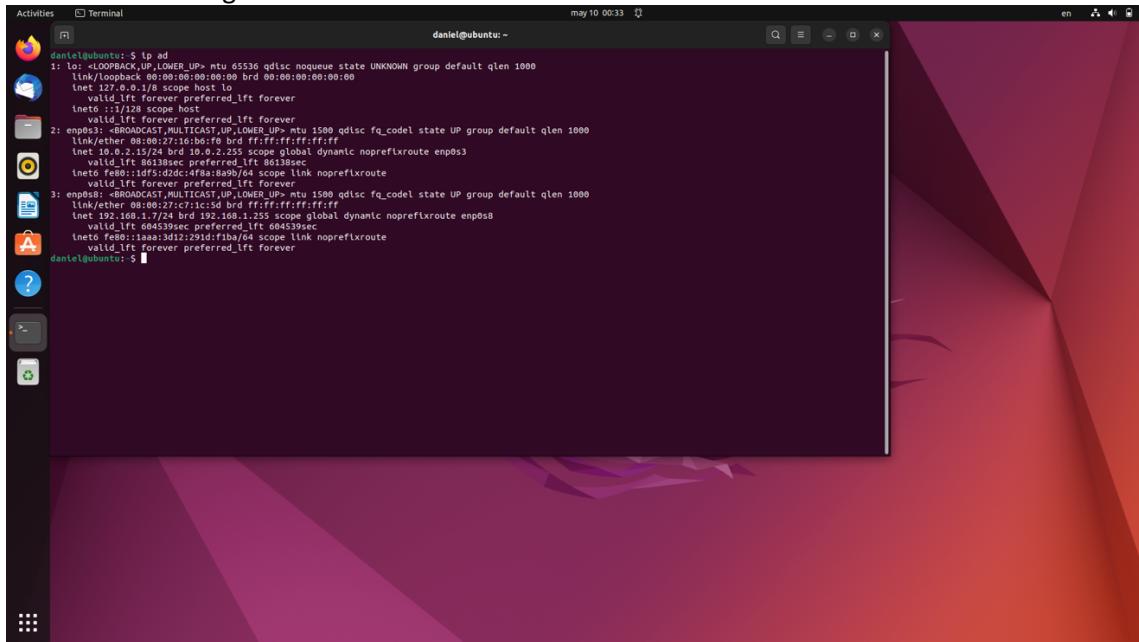


```
daniel@ubuntu: $ systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-05-10 00:07:52 -05; 1min 5s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
  Process: 801 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 837 (sshd)
   Tasks: 1 (limit: 4555)
    Memory: 3.8M
      CPU: 134ms
     CGroup: /system.slice/ssh.service
             └─837 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

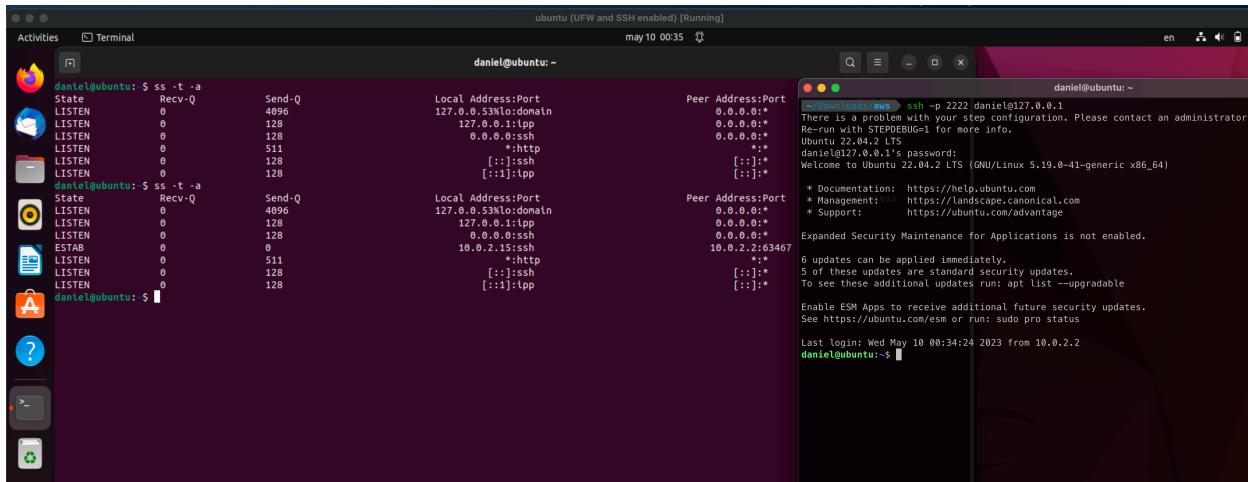
Warning: some Journal files were not opened due to insufficient permissions.
daniel@ubuntu: $ sudo systemctl status ssh
[sudo] password for daniel:
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2023-05-10 00:07:52 -05; 1min 30s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
  Process: 801 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
 Main PID: 837 (sshd)
   Tasks: 1 (limit: 4555)
    Memory: 3.8M
      CPU: 134ms
     CGroup: /system.slice/ssh.service
             └─837 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

may 10 00:07:52 ubuntu systemd[1]: Starting OpenBSD Secure Shell server...
may 10 00:07:52 ubuntu sshd[837]: Server listening on 0.0.0.0 port 22.
may 10 00:07:52 ubuntu sshd[837]: Server listening on :: port 22.
may 10 00:07:52 ubuntu systemd[1]: Started OpenBSD Secure Shell server.
daniel@ubuntu: $ sudo ufw status
Status: inactive
daniel@ubuntu: $ sudo ufw enable
Firewall is active and enabled on system startup
daniel@ubuntu: $ sudo ufw allow ssh
Rule added (v6)
Rule added (v6)
daniel@ubuntu: $ sudo ufw allow 22
Rule added (v6)
Rule added (v6)
daniel@ubuntu: $ sudo ufw allow 80
Rule added
Rule added (v6)
daniel@ubuntu: $
```

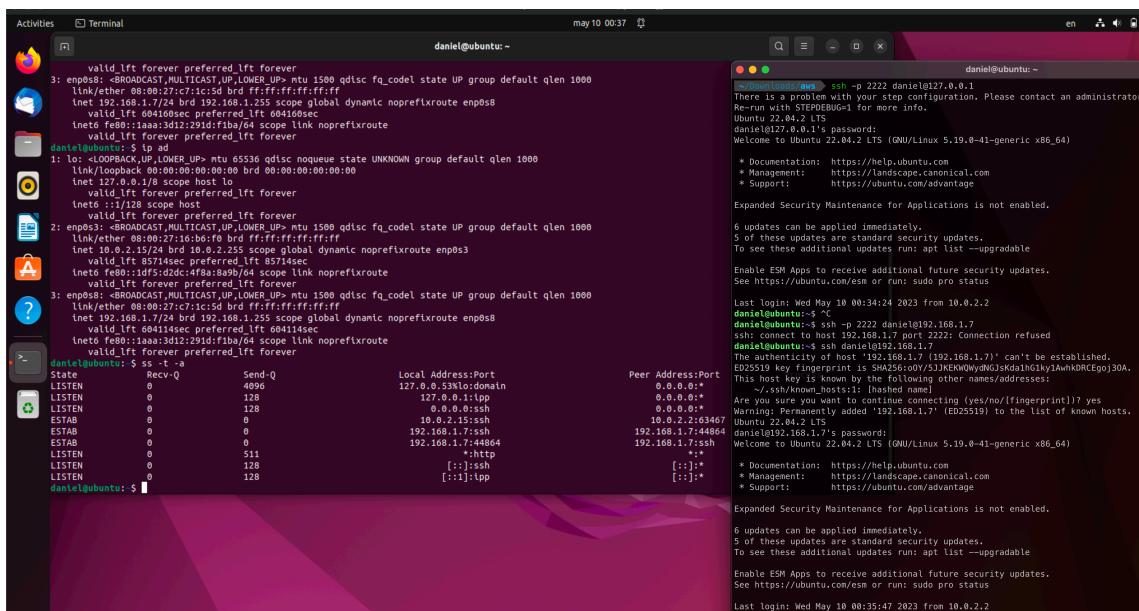
### 2. Connecting to Virtual OS ssh server from Host via NAT.



```
daniel@ubuntu: $ ip ad
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 brd 127.255.255.255 scope host lo
        valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: enp0s3: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:27:16:b5:fb brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 86138sec
        inet6 fe80::20c:27ff:fe16:b5fb/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
3: enp0s8: <NO-CARD,BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:27:c1:5d brd ff:ff:ff:ff:ff:ff
    inet 192.168.77.8/24 brd 192.168.77.255 scope global dynamic noprefixroute enp0s8
        valid_lft 644539sec
        inet6 fe80::1a0c:27ff:fe16:b5fb/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
daniel@ubuntu: $
```



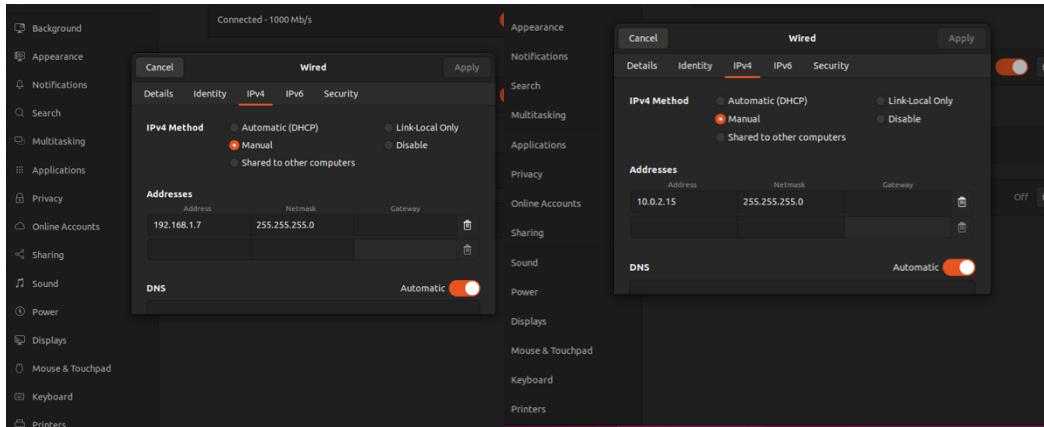
### 3. Connecting to Virtual OS ssh server from Host via Host-Only Adapter.



### 4. Ensuring connectivity with ping.

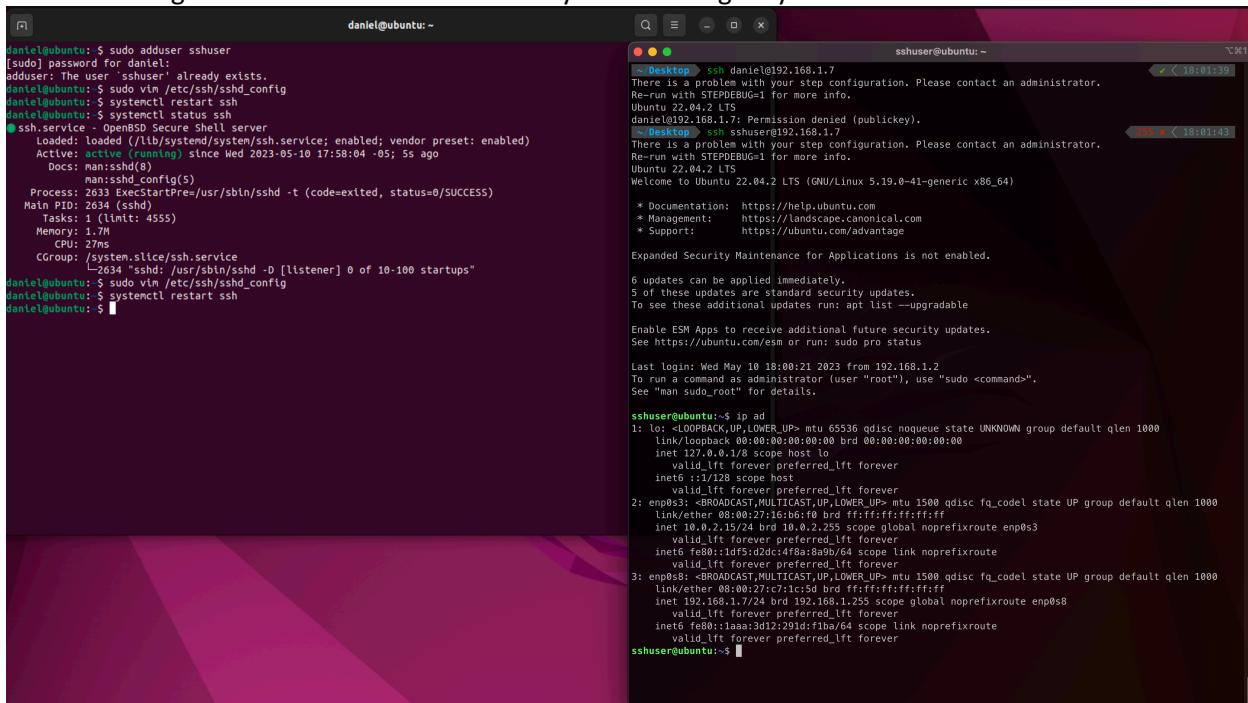
```
daniel@ubuntu:~$ ping 192.168.1.7
PING 192.168.1.7 (192.168.1.7) 56(84) bytes of data.
64 bytes from 192.168.1.7: icmp_seq=1 ttl=64 time=1.01 ms
64 bytes from 192.168.1.7: icmp_seq=2 ttl=64 time=0.033 ms
64 bytes from 192.168.1.7: icmp_seq=3 ttl=64 time=0.088 ms
64 bytes from 192.168.1.7: icmp_seq=4 ttl=64 time=0.064 ms
^C
--- 192.168.1.7 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3020ms
rtt min/avg/max/mdev = 0.033/0.299/1.012/0.411 ms
daniel@ubuntu:~$ ping 10.0.2.2
PING 10.0.2.2 (10.0.2.2) 56(84) bytes of data.
64 bytes from 10.0.2.2: icmp_seq=1 ttl=64 time=1.78 ms
64 bytes from 10.0.2.2: icmp_seq=2 ttl=64 time=0.703 ms
64 bytes from 10.0.2.2: icmp_seq=3 ttl=64 time=0.435 ms
64 bytes from 10.0.2.2: icmp_seq=4 ttl=64 time=0.569 ms
64 bytes from 10.0.2.2: icmp_seq=5 ttl=64 time=0.615 ms
64 bytes from 10.0.2.2: icmp_seq=6 ttl=64 time=0.335 ms
64 bytes from 10.0.2.2: icmp_seq=7 ttl=64 time=0.806 ms
^C
--- 10.0.2.2 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6100ms
rtt min/avg/max/mdev = 0.335/0.749/1.782/0.446 ms
daniel@ubuntu:~$
```

## 5. Setting static IPs for the Virtual OS adapters.

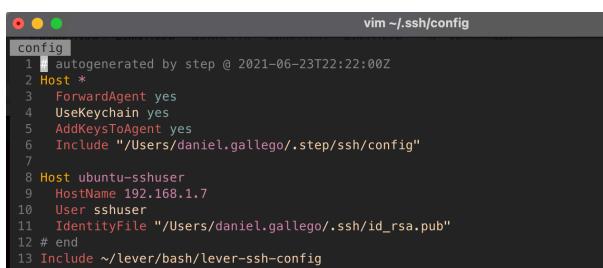


### ● Part 2. Configure SSH

#### 1. Testing SSH Authentication with ssh-key and allowing only the sshuser



#### 2. Creating alias for the ssh connection



### 3. Testing access with SSH alias

```
~/Desktop  vim ~/.ssh/config
~/Desktop  ssh ubuntu-sshuser
There is a problem with your step configuration. Please contact an administrator.
Re-run with STEPDEBUG=1 for more info.
Ubuntu 22.04.2 LTS
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.19.0-41-generic x86_64)

* Documentation:  https://help.ubuntu.com
* Management:     https://landscape.canonical.com
* Support:        https://ubuntu.com/advantage

Expanded Security Maintenance for Applications is not enabled.

6 updates can be applied immediately.
5 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Wed May 10 18:07:40 2023 from 192.168.1.2
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

sshuser@ubuntu:~$
```

- Part 3. Preparing Back-End & Front-End apps.

- Setting up Back-end (nestjs-api) and Front-end (shop-angular-cloudfront) applications and testing connection between them.

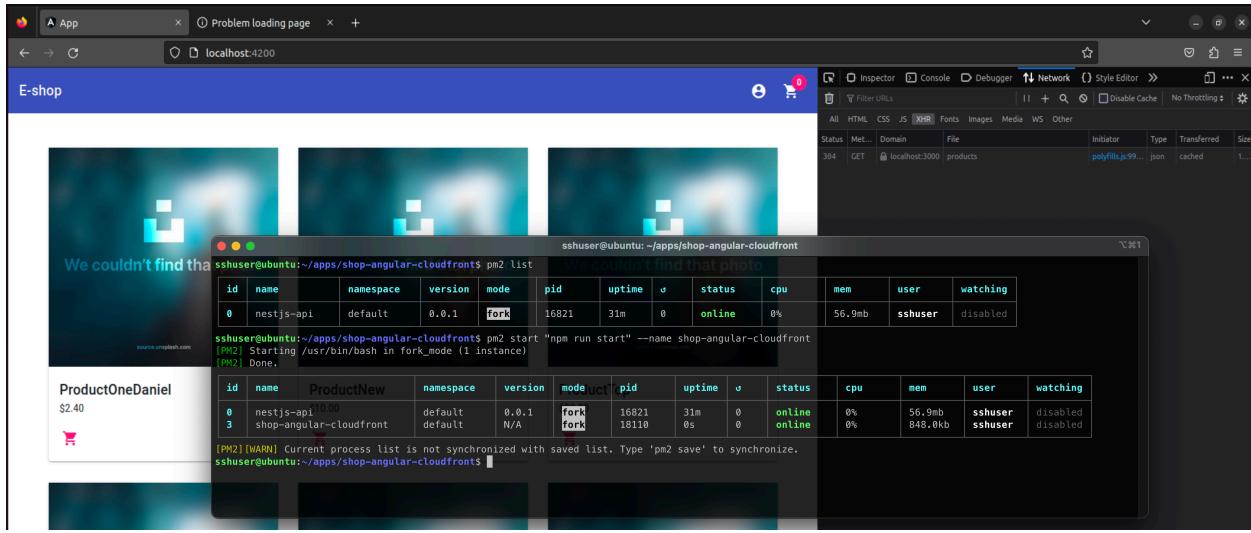
- Changing environment variables on the Angular app to pointing the NestJS API.

```
sshuser@ubuntu: ~/apps/shop-angular-cloudfront/src/environments
// This file can be replaced during build by using the `fileReplacements` array.
// `ng build --prod` replaces 'environment.ts' with 'environment.prod.ts'.
// The list of file replacements can be found in 'angular.json'.

import { Config } from './config.interface';

export const environment: Config = {
  production: false,
  apiEndpoints: [
    {
      product: 'https://execute-api.eu-west-1.amazonaws.com/dev',
      order: 'https://execute-api.eu-west-1.amazonaws.com/dev',
      import: 'https://execute-api.eu-west-1.amazonaws.com/dev',
      bff: 'http://localhost:3000', Count Action
      cart: 'https://execute-api.eu-west-1.amazonaws.com/dev',
    },
    {
      apiEndpointsEnabled: true, 4
      product: false,
      order: false,
      import: false, $10.00 6
      bff: true,
      cart: false,
    },
  ],
  environment: {
    product: '$23.00 7
    order: '$15.00 12
    import: '$15.00 8
    bff: true
    cart: false
  },
  /**
   * For easier debugging in development mode, you can import the following file
   * to ignore zone related error stack frames such as `zone.run`, `zoneDelegate.invokeTask`.
   */
  /**
   * This import should be commented out in production mode because it will have a negative impact
   * on performance if an error is thrown.
   */
  // import 'zone.js/plugins/zone-error'; // Included with Angular CLI.
}
```

## b. Testing connection between apps.



## ● Part 4. Nginx setup.

### 1. Including *app.conf* into the *nginx.conf* file

user www-data;
worker\_processes auto;
pid /run/nginx.pid;
include /etc/nginx/modules-enabled/\*.conf;

```
events {
    worker_connections 768;
    # multi_accept on;
}

http {
    include /apps/shop-angular-cloudfront/app.conf;

    ##
    # Basic Settings
    ##

    sendfile on;
    tcp_nopush on;
    types_hash_max_size 2048;
    # server_tokens off;

    # server_names_hash_bucket_size 64;
    # server_name_in_redirect off;

    include /etc/nginx/mime.types;
    default_type application/octet-stream;

    ##
    # SSL Settings
    ##

    ssl_protocols TLSv1 TLSv1.1 TLSv1.2 TLSv1.3; # Dropping SSLv3, ref: POODLE
    ssl_prefer_server_ciphers on;

    ##
    # Logging Settings
    ##

    access_log /var/log/nginx/access.log;
    error_log /var/log/nginx/error.log;

    ##
    # Gzip Settings
    ##

    gzip on;

    # gzip_vary on;
    # gzip_proxied any;
    # gzip_comp_level 6;
    # gzip_buffers 16 8k;
    # gzip_http_version 1.1;
    # gzip_types text/plain text/css application/json application/javascript text/xml application/xml+rss text/javascript;

    ##
    # Virtual Host Configs
    ##

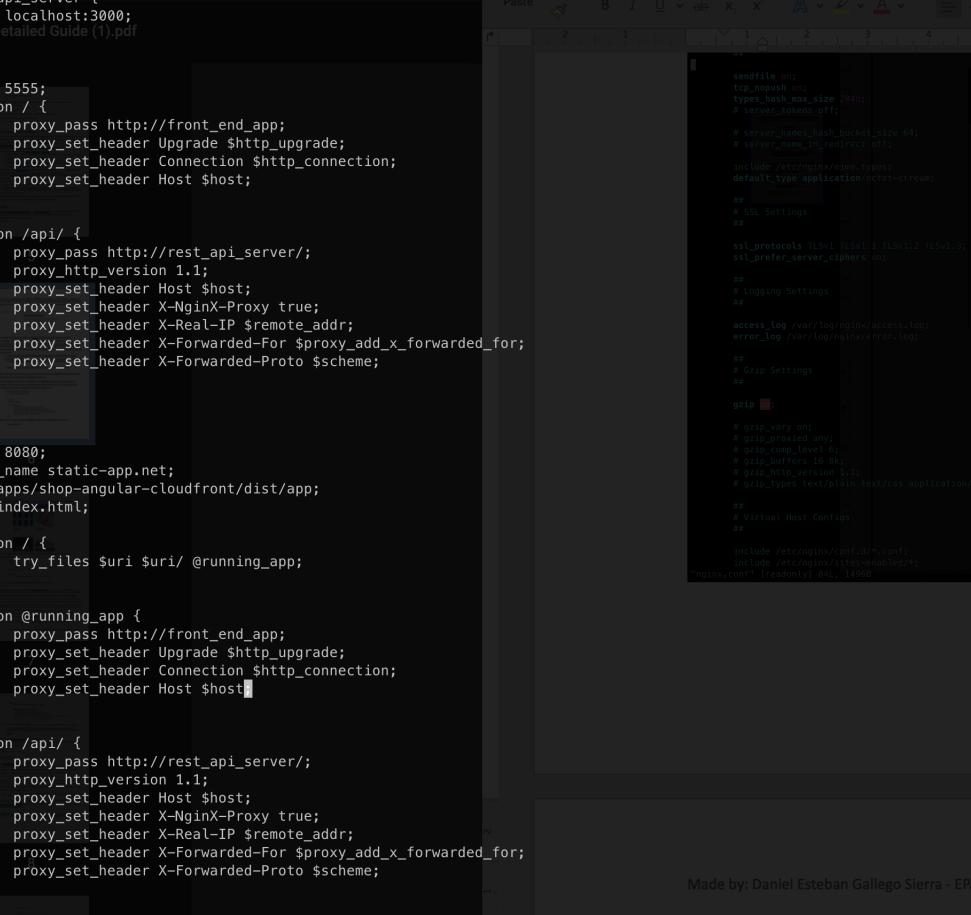
    include /etc/nginx/conf.d/*.conf;
    include /etc/nginx/sites-enabled/*;
```

"nginx.conf" [readonly] 84L, 1496B 5 of 5 134 words English (United States)

## b. Testing connection between apps.

## ● Part 4. Nginx setup.

## 2. Creating app.conf file into the front end application folder



```
upstream front_end_app {
    server localhost:4200;
}

upstream rest_api_server {
    server localhost:3000;
}

server {
    listen 5555;
    location / {
        proxy_pass http://front_end_app;
        proxy_set_header Upgrade $http_upgrade;
        proxy_set_header Connection $http_connection;
        proxy_set_header Host $host;
    }

    location /api/ {
        proxy_pass http://rest_api_server/;
        proxy_http_version 1.1;
        proxy_set_header Host $host;
        proxy_set_header X-NginX-Proxy true;
        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;
    }

    listen 8080;
    server_name static-app.net;
    root /apps/shop-angular-cloudfront/dist/app;
    index index.html;

    location / {
        try_files $uri $uri/ @running_app;
    }

    location @running_app {
        proxy_pass http://front_end_app;
        proxy_set_header Upgrade $http_upgrade;
        proxy_set_header Connection $http_connection;
        proxy_set_header Host $host;
    }

    location /api/ {
        proxy_pass http://rest_api_server/;
        proxy_http_version 1.1;
        proxy_set_header Host $host;
        proxy_set_header X-NginX-Proxy true;
        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;
    }
}

"app.conf" 55L, 1316B
```

sshuser@ubuntu: /apps/shop-angular-cloudfront

Home Insert Draw Design Layout References Mailings Review View

Calibri (Bo

Paste

B I U

Page 6 of 6 141 words English (United States)

ABC 2.

### 3. Testing connection on `localhost:5555` (running app) and `localhost:8080` (static files)

The screenshots show the 'E-shop' application running on two different ports. Both versions display a grid of six product cards. Each card features a placeholder image with the text 'We couldn't find that photo' and a link to 'source.unsplash.com'. The Network tab in the browser's developer tools is active, showing the requests made by the browser. The top screenshot (localhost:5555) shows 31 requests and a total load time of 2.71s. The bottom screenshot (localhost:8080) shows 29 requests and a total load time of 1.83s. This indicates that the static files are being served from the local host, while the running application is being proxyed.

In the last screenshot, I tested the case where if the `/dist/app` folder is not found then redirects to the `localhost:5555` which is the proxy of the running app.

#### 4. Creating self-signed certificate

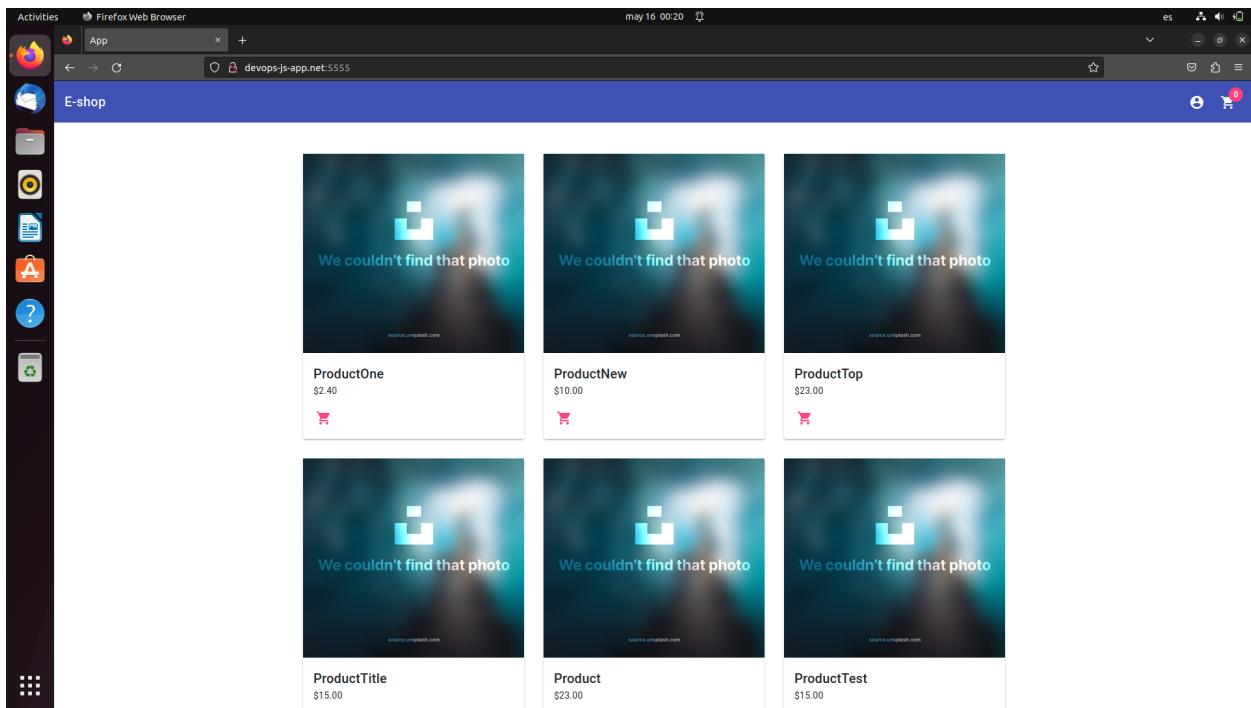
5. Modifying `/etc/hosts` file adding a new domain for localhost called `devops-js-app.net`

A screenshot of a terminal window on a Mac OS X desktop. The terminal shows the output of the command 'ifconfig -a', which lists various network interfaces including 'lo' (loopback), 'eth0' (ethernet), and 'wlan0' (wireless). The 'lo' interface has an IPv6 address ::1. The terminal window has a dark background with light-colored text. In the top right corner, the window title is 'sshuser@ubuntu: /etc'. Below the terminal, a Microsoft Word document is open, showing a table with three columns and three rows. The table is empty, with only the header row visible. The Microsoft Word ribbon is visible at the top of the document window.

## 6. Modifying `angular.json` on the front end app to disable the host check

```
sshuser@ubuntu: /apps/shop-angular-cloudfront
```

## 7. Testing app with the new domain name



## 8. Modifying the *app.conf* adding the SSL properties for redirection from HTTP to HTTPS using the certificate

<pre># https secured configuration with SSL keys server {     listen 443 ssl http2;     listen [::]:443 ssl http2;     server_name devops-js-app.net;      ssl_certificate /apps/certificates/my-cert.crt;     ssl_certificate_key /apps/certificates/my-cert.key;      location / {         proxy_pass http://127.0.0.1:8080/; # redirection to configuration for serving static client app     } }  # configuration for redirection http -&gt; https server {     listen 80;     listen [::]:80;     server_name devops-js-app.net;      location / {         return 301 https://\$host\$request_uri;     } }</pre>	<p>State/Province      Antioquia Locality            Medellin Organization        EPAM Systems Organizational Unit    Engineering Common Name        Daniel Gallego Email Address      daniel_gallego@epam.com</p> <p>Not Before            Tue, 16 May 2023 04:41:50 Not After            Fri, 13 May 2033 04:41:50</p> <p>Subject Alt Names</p> <table><tr><td>DNS Name</td><td>devops-js-app.net</td></tr><tr><td>DNS Name</td><td>10.0.2.15</td></tr></table>	DNS Name	devops-js-app.net	DNS Name	10.0.2.15
DNS Name	devops-js-app.net				
DNS Name	10.0.2.15				

## 9. Testing front end application with new domain and self-signed certificate with HTTPS connection

Activities Firefox Web Browser Certificate for Daniel Gallego Page Info — https://devops-js-app.net/

General Media Permissions Security

**Website Identity**  
Website: devops-js-app.net  
Owner: This website does not supply ownership information.  
Verified by: EPAM Systems

**Privacy & History**  
Have I visited this website prior to today? No  
Is this website storing information on my computer? No  
Clear Cookies and Site Data  
Have I saved any passwords for this website? No  
View Saved Passwords

**Technical Details**  
Connection Encrypted (TLS/AES 256-GCM SHA384, 256 bit keys, TLS 1.3)  
The page you are viewing was encrypted before being transmitted over the Internet.  
Encryption makes it difficult for unauthorized people to view information traveling between computers. It is therefore unlikely that anyone read this page as it travelled across the network.

E-shop

We could...  
ProductOne  
\$2.40  
ProductTitle  
\$15.00  
ProductTest  
\$15.00

source.unsplash.com source.unsplash.com source.unsplash.com

ProductTitle  
\$15.00  
Product  
\$23.00  
ProductTest  
\$15.00

source.unsplash.com source.unsplash.com source.unsplash.com

Activities Firefox Certificate for Daniel Gallego

**Daniel Gallego**

**Subject Name**

Country	CO
State/Province	Antioquia
Locality	Medellin
Organization	EPAM Systems
Organizational Unit	Engineering
Common Name	Daniel Gallego
Email Address	daniel_gallego@epam.com

**Issuer Name**

Country	CO
State/Province	Antioquia
Locality	Medellin
Organization	EPAM Systems
Organizational Unit	Engineering
Common Name	Daniel Gallego
Email Address	daniel_gallego@epam.com

**Validity**

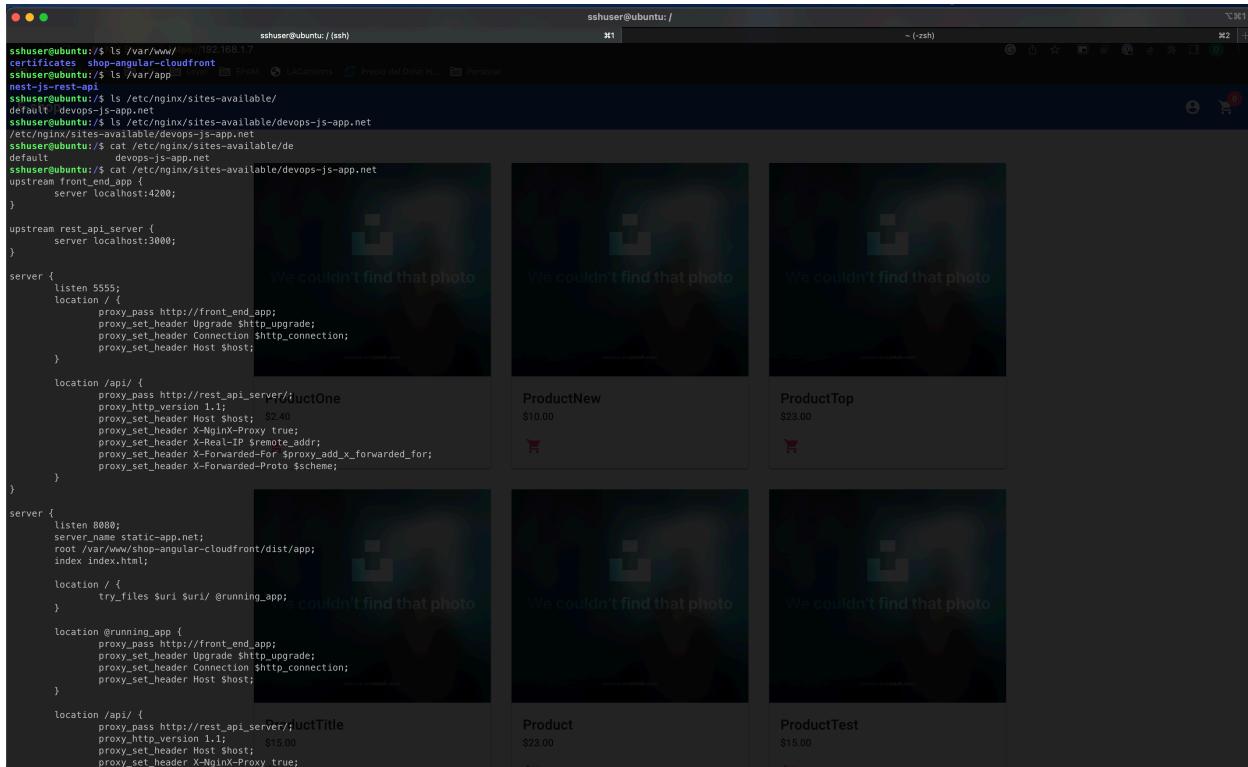
Not Before	Tue, 16 May 2023 04:41:50 GMT
Not After	Fri, 13 May 2033 04:41:50 GMT

**Subject Alt Names**

DNS Name	devops-js-app.net
DNS Name	10.0.2.15

- Part 5. Starting and serving BE & FE apps on remote OS

- Setting up the `/var/www` and `/var/app` folders with client and server applications + certificates and creating the `app.conf` on the `/etc/nginx/sites-available/devops-js-app.net`.



```

sshuser@ubuntu: /var/www/ [192.168.1.7]
certificates shop-angular-cloudfront
sshuser@ubuntu: /var/app
nest-js-rest-api
sshuser@ubuntu: /etc/nginx/sites-available/
default_ devops-js-app.net
sshuser@ubuntu: /etc/nginx/sites-available/devops-js-app.net
rest/nginx/sites-available/devops-js-app.net
sshuser@ubuntu: /etc/nginx/sites-available/default_
default_ devops-js-app.net
sshuser@ubuntu: /etc/nginx/sites-available/devops-js-app.net
upstream front_end_app {
    server localhost:4200;
}

upstream rest_api_server {
    server localhost:3000;
}

server {
    listen 5555;
    location / {
        proxy_pass http://front_end_app;
        proxy_set_header Upgrade $http_upgrade;
        proxy_set_header Connection $http_connection;
        proxy_set_header Host $host;
    }

    location /api/ {
        proxy_pass http://rest_api_server/ductOne
        proxy_http_version 1.1;
        proxy_set_header Host $host;
        proxy_set_header X-NginX-Proxy true;
        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 8080;
        server_name static-app.net;
        root /var/www/shop-angular-cloudfront/dist/app;
        index index.html;
        location / {
            try_files $uri $uri/ @running_app;
        }

        location @running_app {
            proxy_pass http://front_end_app;
            proxy_set_header Upgrade $http_upgrade;
            proxy_set_header Connection $http_connection;
            proxy_set_header Host $host;
        }

        location /api/ {
            proxy_pass http://rest_api_server/ductTitle
            proxy_http_version 1.1;
            proxy_set_header Host $host;
            proxy_set_header X-NginX-Proxy true;
        }
    }
}

```

- Testing the connection to the apps that are served on the Virtual OS (ubuntu) from the Host (macOS).

