VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

FACULTY OF FUNDAMENTAL SCIENCES

DEPARTMENT OF INFORMATION SYSTEMS

OPENLDAP

Information Technology Security Methods

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VILNIUS 2024

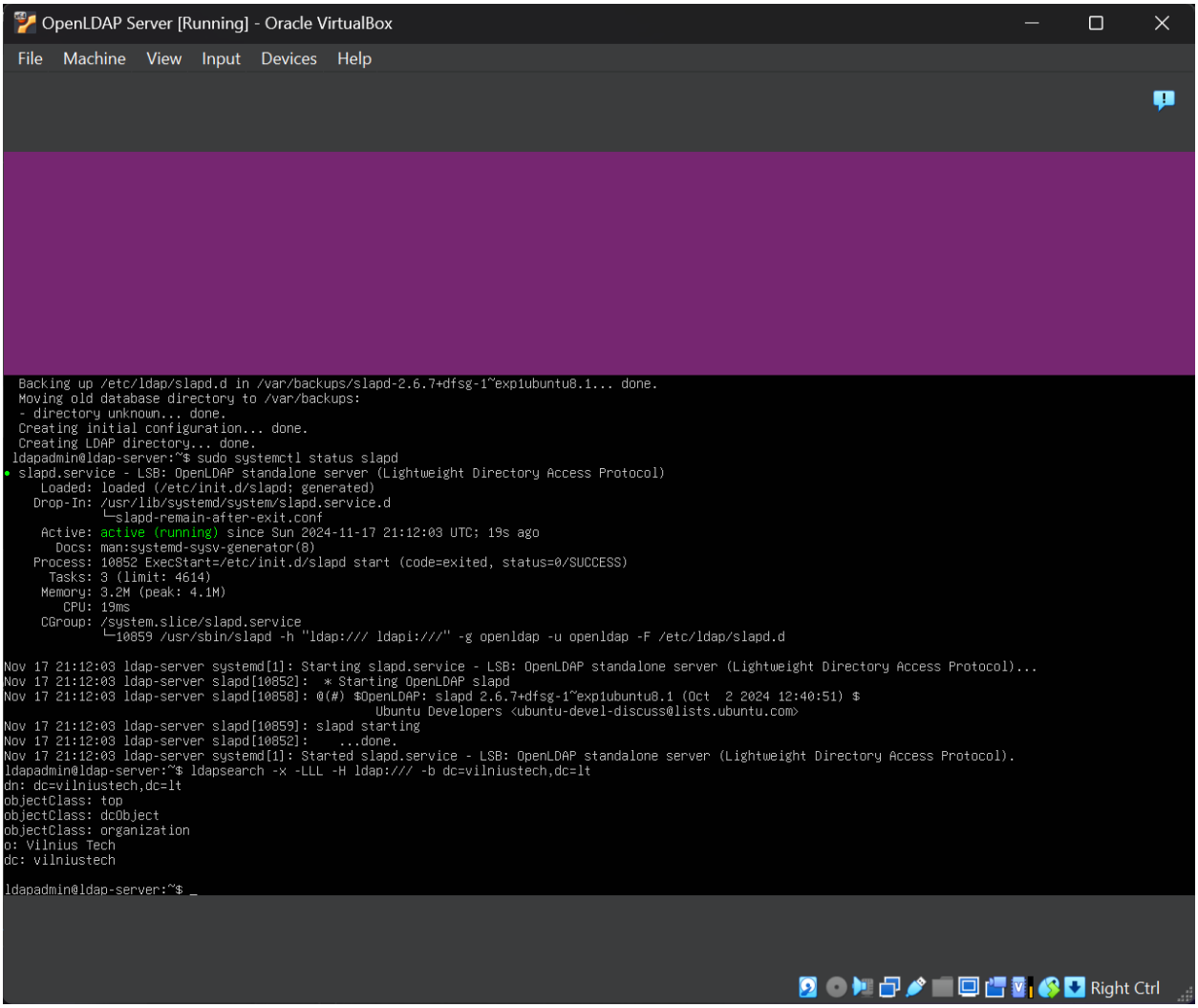
First, I installed the required packages with these commands

`sudo apt update` – updates the list of available packages and their versions to ensure the system retrieves the latest package data.

`sudo apt upgrade -y` – automatically upgrades all installed packages to the latest version. The -y flag confirms the upgrade without manual intervention.

`sudo apt install slapd ldap-utils -y` – **slapd** installs the OpenLDAP directory server daemon, **ldap-utils** provides command-line utilities for interacting with an LDAP directory.

Then, I configured OpenLDAP during installation by setting the admin password. To check if everything is running, I used **`sudo systemctl status slapd`** command:



To enhance the security of the LDAP server, I enabled SSL/TLS to encrypt communication between the client and server. First, with command **`sudo mkdir -p /etc/ldap/ssl`** I made a dedicated directory for SSL certificate and key:

```
ldapadmin@ldap-server:~$ sudo mkdir -p /etc/ldap/ssl
```

Then, I generated a self-signed certificate with **`sudo openssl req -new -x509 -days 365 -nodes -out /etc/ldap/ssl/ldap_cert.pem -keyout /etc/ldap/ssl/ldap_key.pem:`**

`-new` - creates a new certificate signing request (CSR).

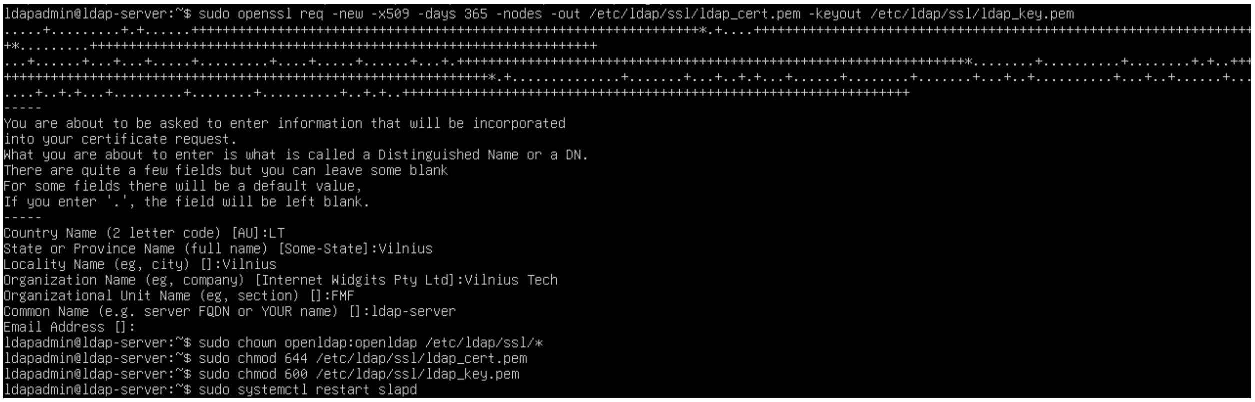
`-x509` - specifies X.509 as the certificate standard for SSL/TLS.

`-days 365` - validates the certificate for 365 days.

`-nodes` - ensures the private key is not password protected.

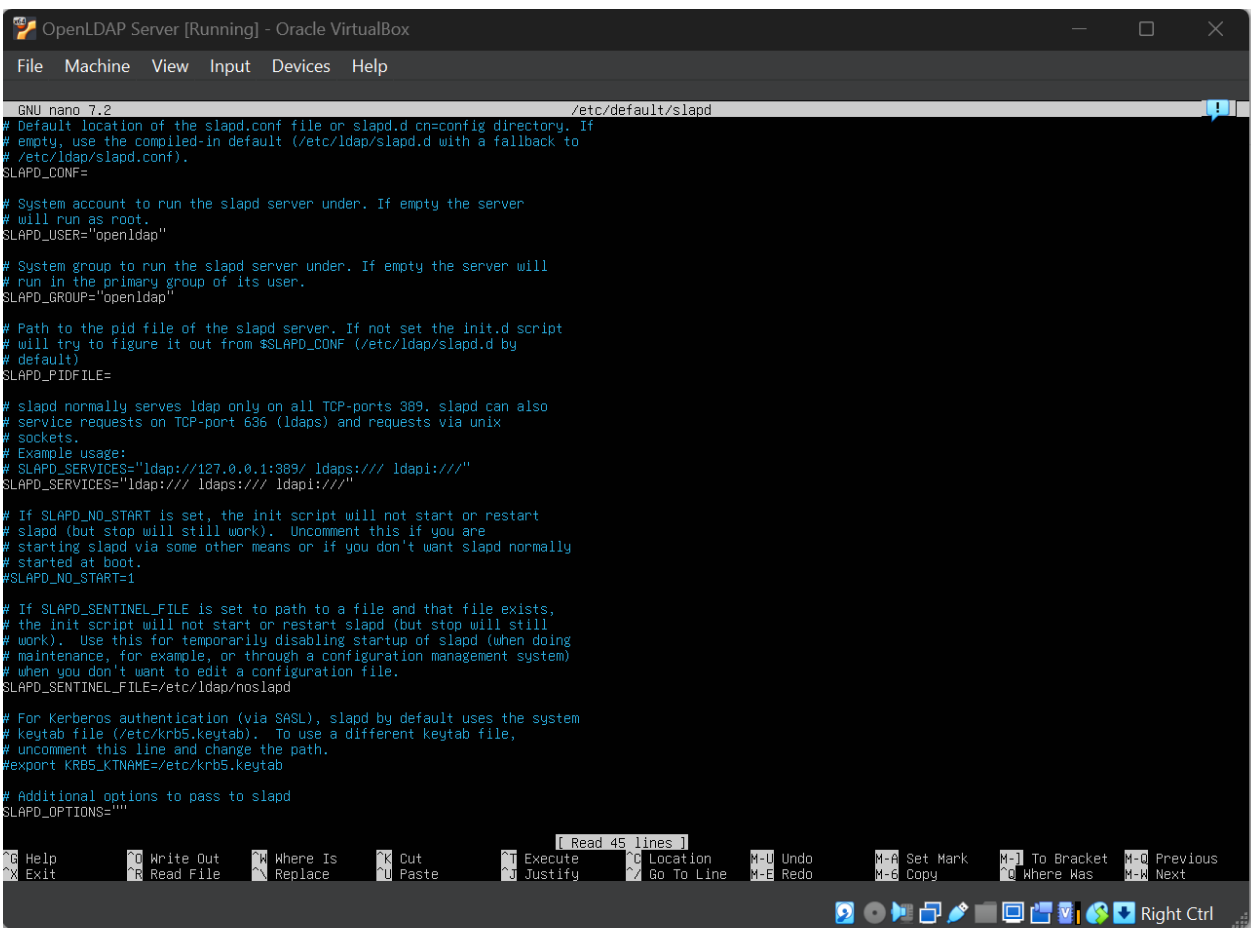
`-out and -keyout` - specify the output paths for the certificate and private key.

I provided the necessary information for the certificate, such as the organization name and domain.



I also edited slapd configuration file with **`sudo nano /etc/default/slapd`** command to configure slapd to support SSL:

There, I added to **`SLAPD_SERVICES`** that it could be used with SSL with **`ldaps:///`**:



Then, to apply the new configuration I restarted slapd service with **`sudo systemctl restart slapd`**:

I updated the LDAP configuration to include the generated SSL certificate and key by editing the file **`sudo nano /etc/ldap/slap.d/cn=config.ldif`**:

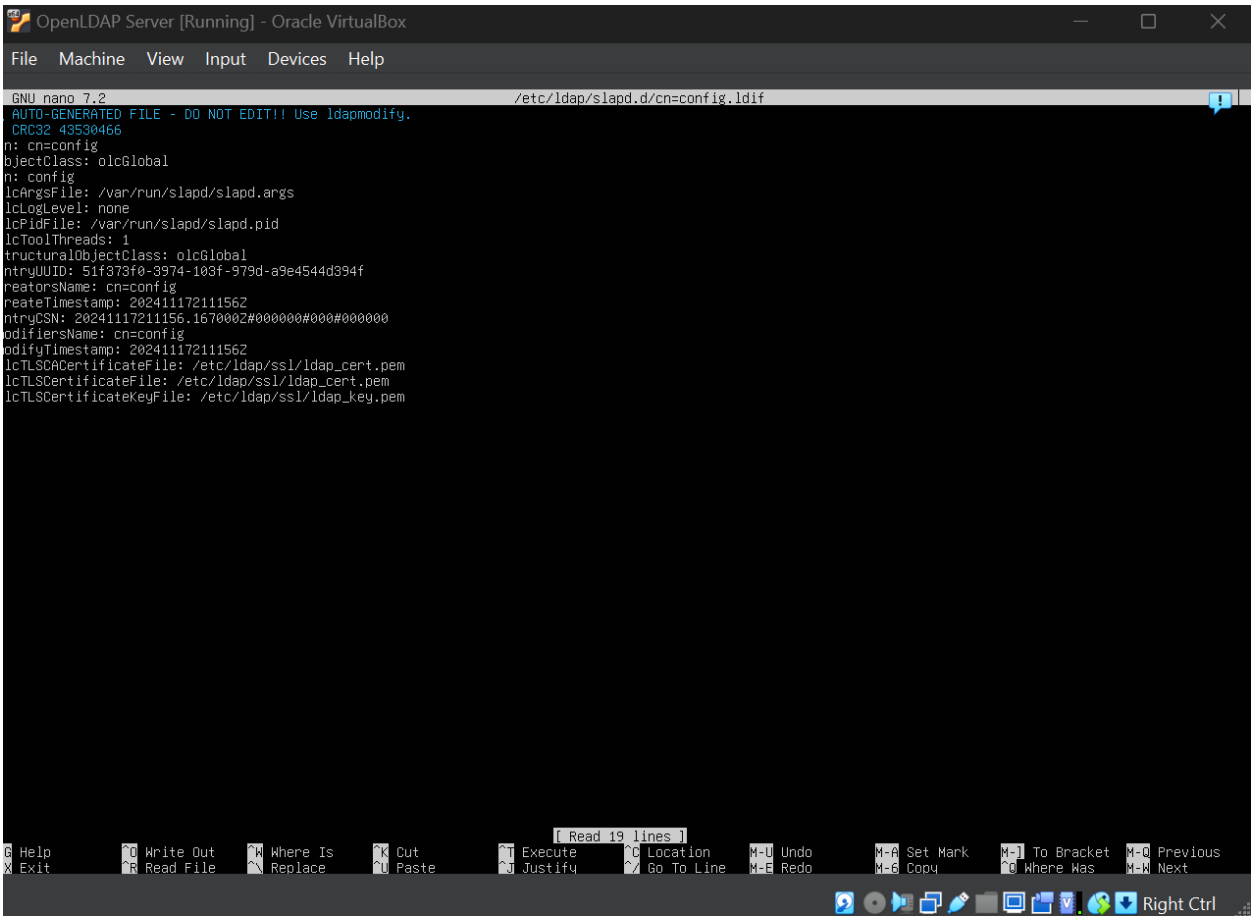
```
ldapadmin@ldap-server:~$ sudo nano /etc/ldap/slap.d/cn=config.ldif
```

The following lines were added to specify the certificate and key:

`olcTLSCACertificateFile: /etc/ldap/ssl/ldap_cert.pem`

`olcTLSCertificateFile: /etc/ldap/ssl/ldap_cert.pem`

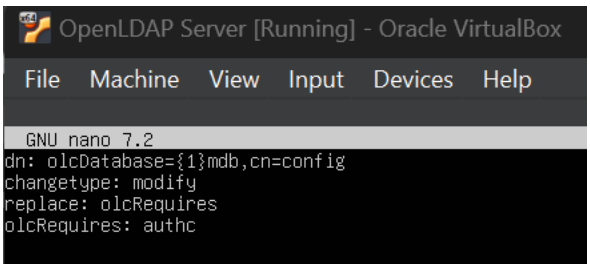
`olcTLSCertificateKeyFile: /etc/ldap/ssl/ldap_key.pem`



Then with **`sudo nano disable-anon.ldif`** I created a file to disable anonymous binds:

```
ldapadmin@ldap-server:~$ sudo nano disable-anon.ldif
```

Content of **`disable-anon.ldif`**:



Then, I applied the configuration with **`sudo ldapmodify -Y EXTERNAL -H ldapi:/// -f disable-anon.ldif`**:

```
ldapadmin@ldap-server:~$ sudo ldapmodify -Y EXTERNAL -H ldapi:/// -f disable-anon.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
modifying entry "olcDatabase={1}mdb,cn=config"
```

And tested it with **`ldapsearch -H ldap://localhost -x -b dc=vilniustech,dc=lt`** command. It can be seen here that the authentication is required and anonymous binds were disabled:

```
ldapadmin@ldap-server:~$ ldapsearch -H ldap://localhost -x -b dc=vilniustech,dc=lt
# extended LDIF
#
# LDAPv3
# base <dc=vilniustech,dc=lt> with scope subtree
# filter: (objectclass=*)
# requesting: ALL
#

# search result
search: 2
result: 53 Server is unwilling to perform
text: authentication required

# numResponses: 1
```

Then, I tried to login with admin account with command **`ldapsearch -H ldaps://localhost -x -D "cn=admin,dc=vilniustech,dc=lt" -w password123 -b dc=vilniustech,dc=lt`** and it worked:

```
ldapadmin@ldap-server:~$ ldapsearch -H ldaps://localhost -x -D "cn=admin,dc=vilniustech,dc=lt" -w password123 -b dc=vilniustech,dc=lt
# extended LDIF
#
# LDAPv3
# base <dc=vilniustech,dc=lt> with scope subtree
# filter: (objectclass=*)
# requesting: ALL
#

# vilniustech.lt
dn: dc=vilniustech,dc=lt
objectClass: top
objectClass: dcObject
objectClass: organization
o: Vilnius Tech
dc: vilniustech

# search result
search: 2
result: 0 Success

# numResponses: 2
# numEntries: 1
ldapadmin@ldap-server:~$
```

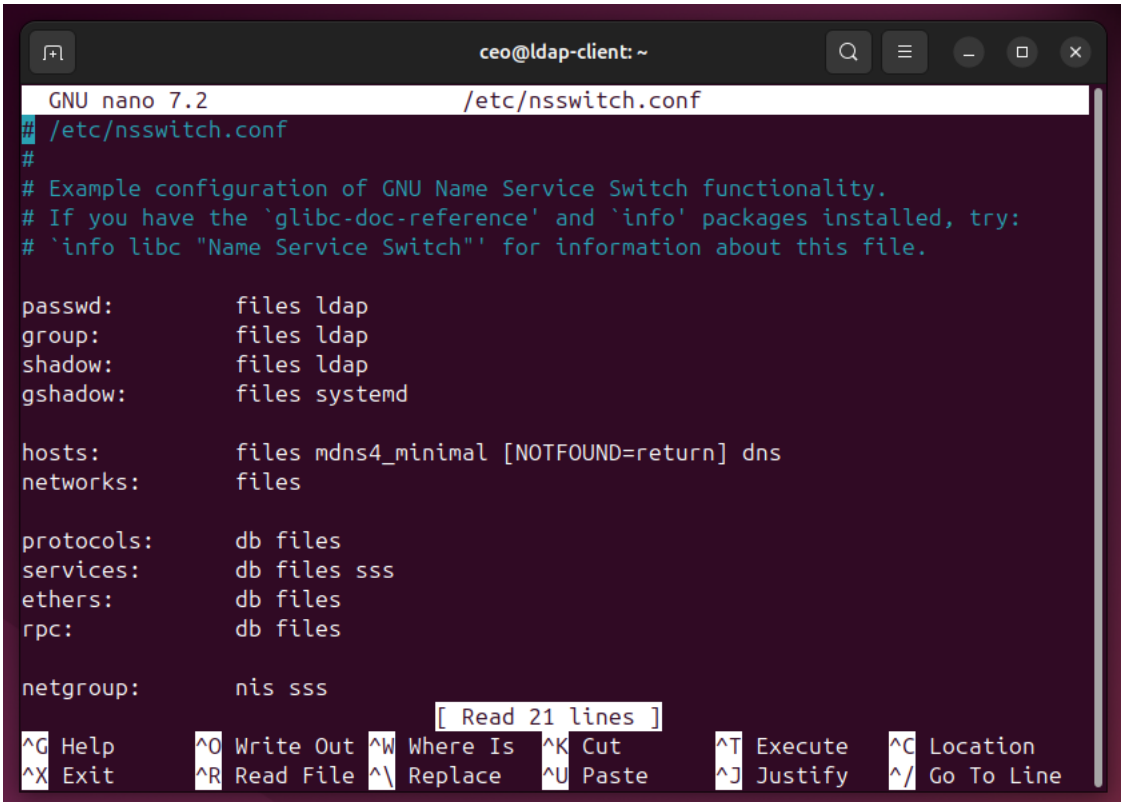
For client I updated system packages on the client machine to ensure it had the latest versions of the required dependencies with commands **`sudo apt update`** and **`sudo apt upgrade -y`**, then I installed the necessary LDAP utilities and PAM/NSS modules with command **`sudo apt install ldap-utils libnss-lidapd libpam-ldapd nslcd`**. ldap-utils – command-line utilities for interacting with the LDAP directory, libnss-ldapd – enables LDAP support for NSS (Name Service Switch), libpam-ldapd – allows PAM (Pluggable Authentication Module) to authenticate users using LDAP, nslcd – the daemon that handles LDAP name service lookups.

```
ldap-client@ldap-client:~$ sudo apt install ldap-utils libnss-ldap libpam-ldapd nslcd -y
```

Then, I configured NSS (Name Service Switch). I opened **`sudo nano /etc/nsswitch.conf`** for editing:

```
ldap-client@ldap-client:~$ sudo nano /etc/nsswitch.conf
```

I modified the following lines to include **`ldap.`** This allows the system to query the LDAP server for user, group, and shadow information.:



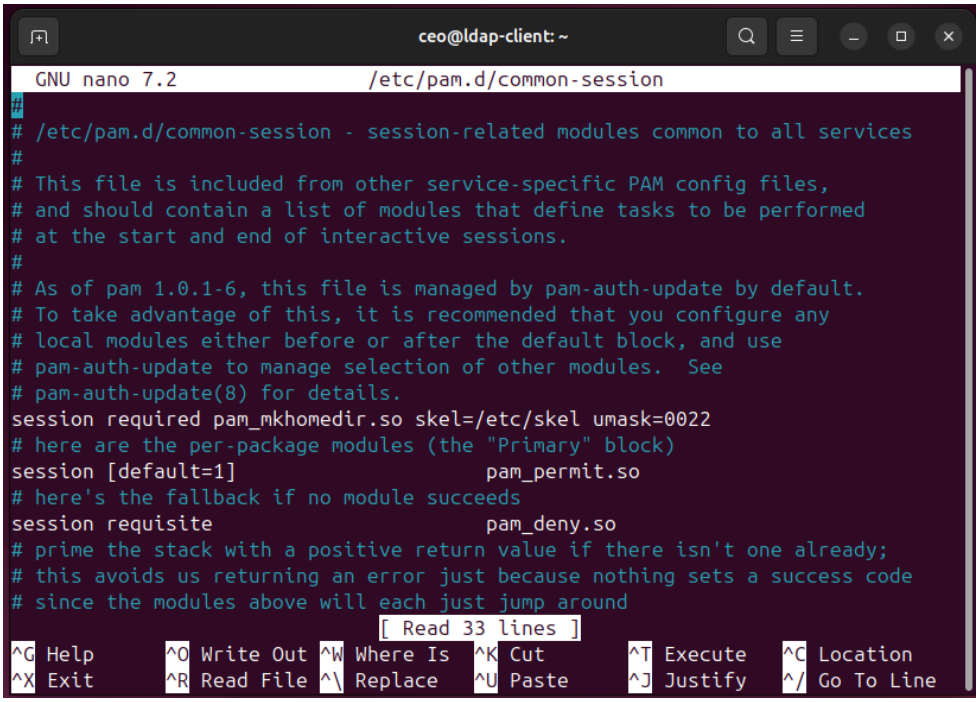
Then, with I opened **`sudo nano /etc/pam.d/common-session`** and added the following line to enable automatic home directory creation upon first login:

`session required pam_mkhomedir.so skel=/etc/skel umask=0022`

`pam_mkhomedir.so` - creates the user's home directory if it doesn't exist.

`skel=/etc/skel` - specifies the skeleton directory for creating the default home directory structure.

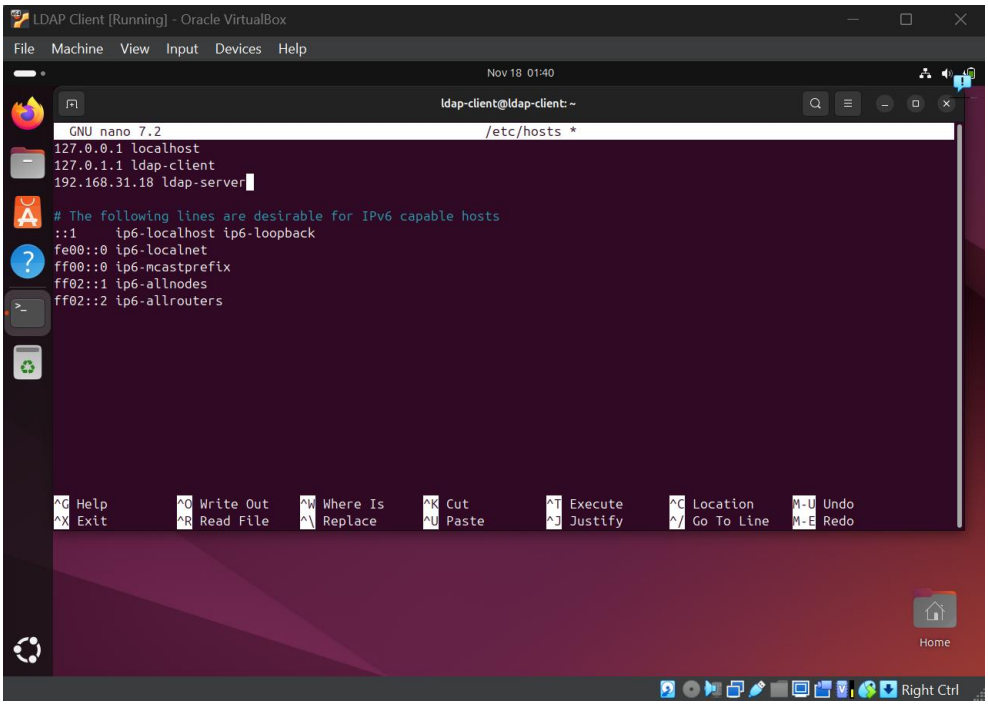
`umask=0022` - sets the default permissions for new directories and files.



To simplify communication with the LDAP server, I added server ip address to **`/etc/hosts`** with command **`sudo nano /etc/hosts`**:

```
ldap-client@ldap-client:~$ sudo nano /etc/hosts
```

There I added ip address and named it **`ldap-server.`** This ensures the client can resolve ldap-server to the server's IP address:



To establish secure communication, I copied the SSL certificate from the server to the client using the scp command:

```
ldapadmin@ldap-server:~$ scp /etc/ldap/ssl/ldap_cert.pem ldap-client@192.168.31.196:~/
ldap-client@192.168.31.196's password:
ldap_cert.pem
ldapadmin@ldap-server:~$
```

Then, on the client machine I created **`/etc/ldap/ssl`** folder to store certificates with **`mkdir -p /etc/ldap/ssl`**:

```
ldap-client@ldap-client:~$ sudo mkdir -p /etc/ldap/ssl
```

Then, I moved certificate to this directory:

```
ldap-client@ldap-client:~$ sudo chmod 755 /etc/ldap/ssl
```

```
ldap-client@ldap-client:~$ sudo mv ~/ldap_cert.pem /etc/ldap/ssl/
```

```
ldap-client@ldap-client:~$ sudo chmod 644 /etc/ldap/ssl/ldap_cert.pem
```

I configured **`nslcd`** with opening **`sudo nano /etc/nslcd.conf`** and updated the configuration with the following:

```
ldap-client@ldap-client:~$ sudo nano /etc/nslcd.conf
ldap-client@ldap-client:~$
```

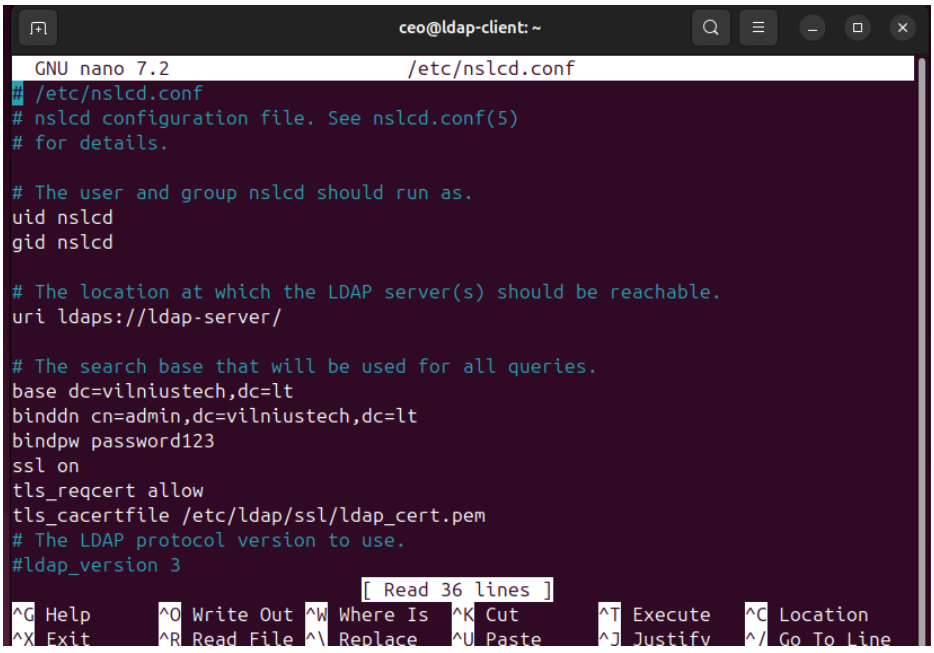
`uri` – specifies the LDAP server's URI using the ldaps protocol for secure communication.

`base` – the base DN for LDAP queries.

`binddn` and **`bindpw`** – the DN and password of the admin user for binding.

`tls_reqcert allow` – accepts self-signed certificates.

`tls_cacertfile` – points to the path of the server's SSL certificate.



Then, to configure the LDAP client globally I opened **`sudo nano /etc/ldap/ldap.conf`**:

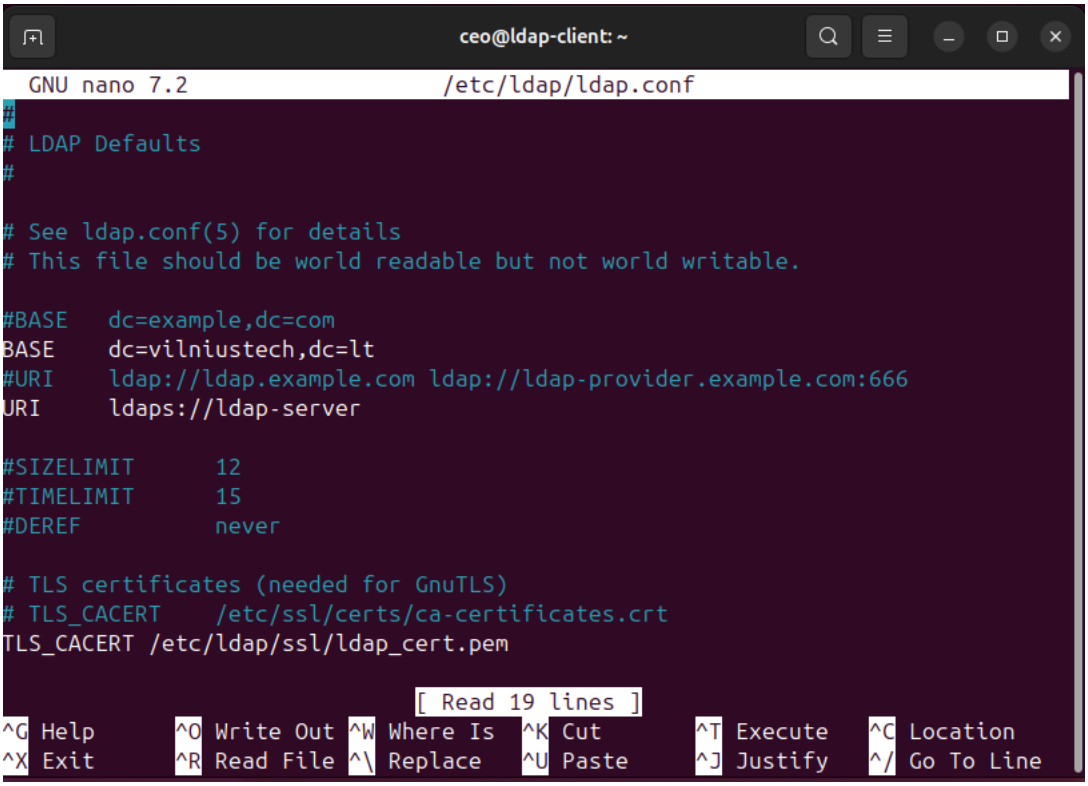
```
ldap-client@ldap-client:~$ sudo nano /etc/ldap/ldap.conf
```

I updated the file:

`BASE` – sets the base DN for all LDAP operations.

`URI` – specifies the secure LDAP server URI.

`TLS_CACERT` – points to the certificate file for secure communication.


ceo@ldap-client: ~
GNU nano 7.2 /etc/ldap/ldap.conf
#
LDAP Defaults
#
See ldap.conf(5) for details
This file should be world readable but not world writable.
#BASE dc=example,dc=com
BASE dc=vilniustech,dc=lt
#URI ldap://ldap.example.com ldap://ldap-provider.example.com:666
URI ldaps://ldap-server
#SIZELIMIT 12
#TIMELIMIT 15
#DEREF never
TLS certificates (needed for GnuTLS)
TLS_CACERT /etc/ssl/certs/ca-certificates.crt
TLS_CACERT /etc/ldap/ssl/ldap_cert.pem
[Read 19 lines]
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^/ Go To Line

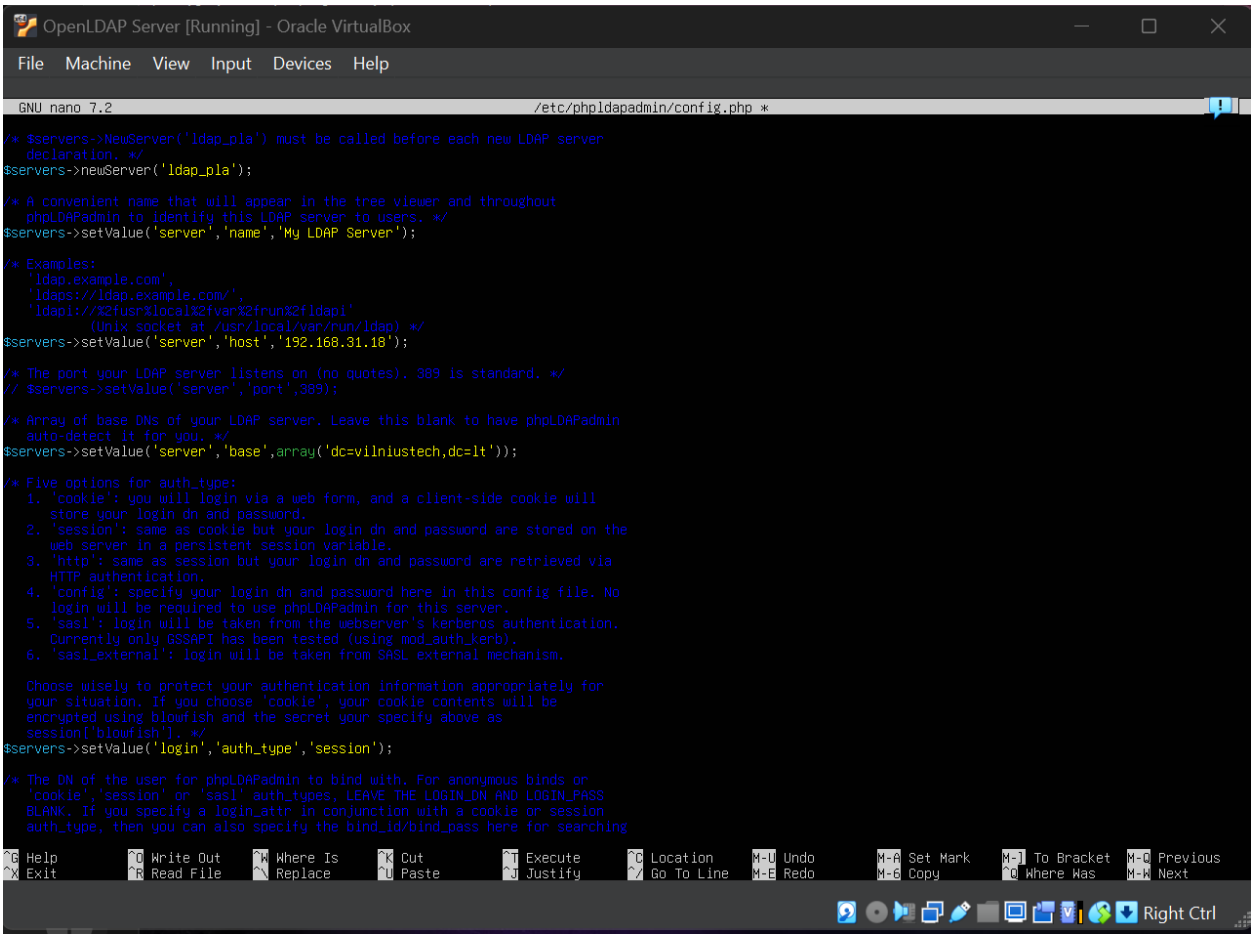
To simplify user management in the OpenLDAP directory, I installed and configured phpLDAPadmin on the LDAP server with **`sudo apt install phpldapadmin -y`**:

```
ldapadmin@ldap-server:~$ sudo apt install phpldapadmin -y_
```

I edited config file **`sudo nano /etc/phpldapadmin/config.php`**:

```
ldapadmin@ldap-server:~$ sudo nano /etc/phpldapadmin/config.php
```

There, I set host to server ip address and base to **`dc=vilniustech,dc=lt`**:



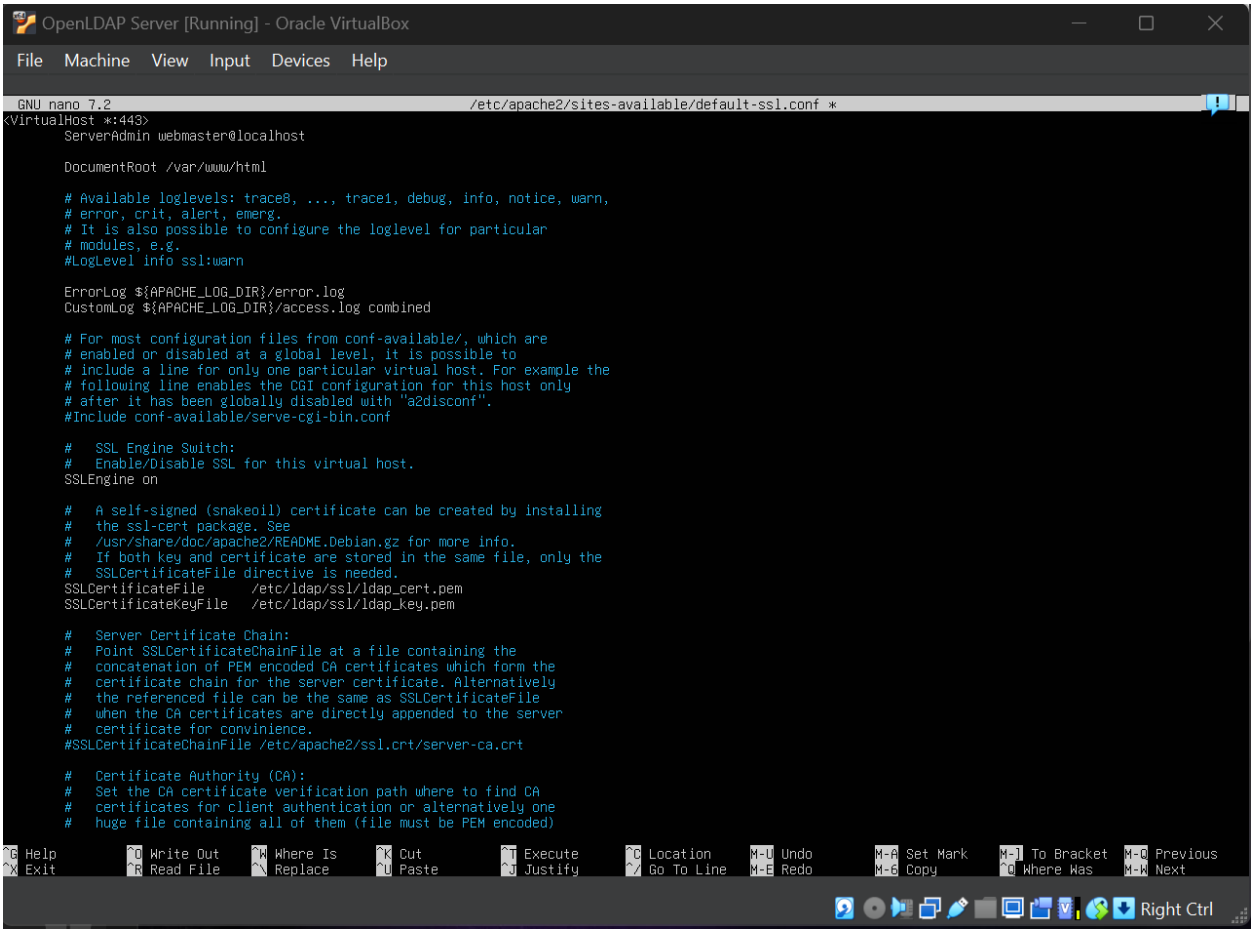
Then, to secure communication between the browser and phpLDAPadmin I implemented SSL on the Apache web server. I enabled SSL module with **`sudo a2enmod ssl`** command:

```
ldapadmin@ldap-server:~$ sudo a2enmod ssl
Considering dependency mime for ssl:
Module mime already enabled
Considering dependency socache_shmcb for ssl:
Enabling module socache_shmcb.
Enabling module ssl.
See /usr/share/doc/apache2/README.Debian.gz on how to configure SSL and create self-signed certificates.
To activate the new configuration, you need to run:
  systemctl restart apache2
ldapadmin@ldap-server:~$ sudo a2ensite default-ssl
Enabling site default-ssl.
To activate the new configuration, you need to run:
  systemctl reload apache2
```

I opened the default SSL configuration file **`sudo nano /etc/apache2/sites-available/default-ssl.conf`**:

```
ldapadmin@ldap-server:~$ sudo nano /etc/apache2/sites-available/default-ssl.conf_
```

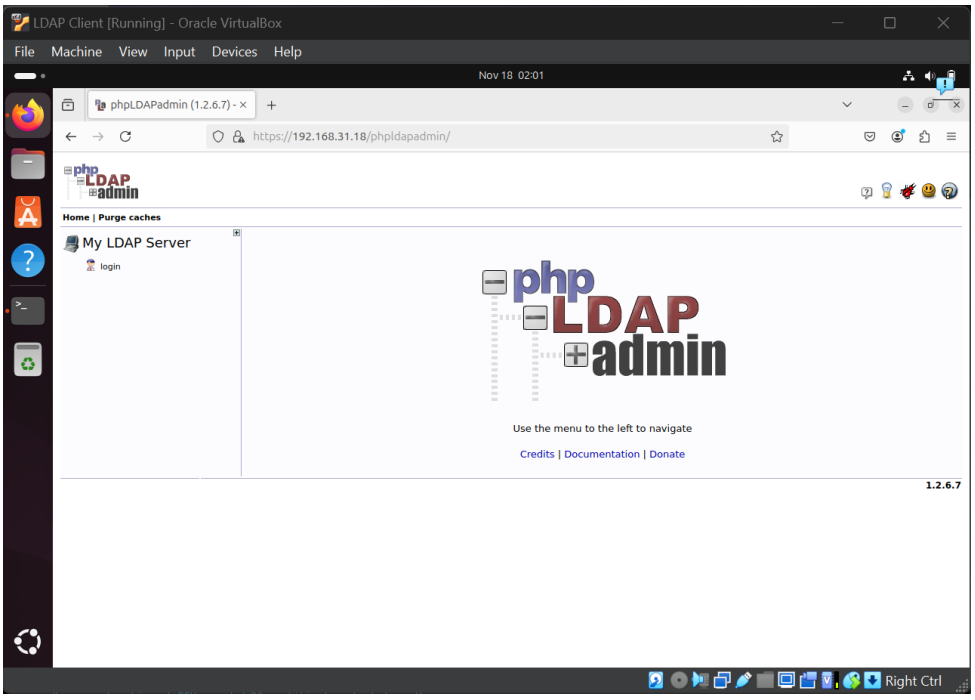
There, I put **`SSLCertificateFile`** to **`/etc/ldap/ssl/ldap_cert.pem`** and **`SSLCertificateKeyFile`** to **`/etc/ldap/ssl/ldap_key.pem`**:



I restarted service with **`sudo systemctl restart apache2`** command to apply the changes:

```
ldapadmin@ldap-server:~$ sudo systemctl restart apache2
```

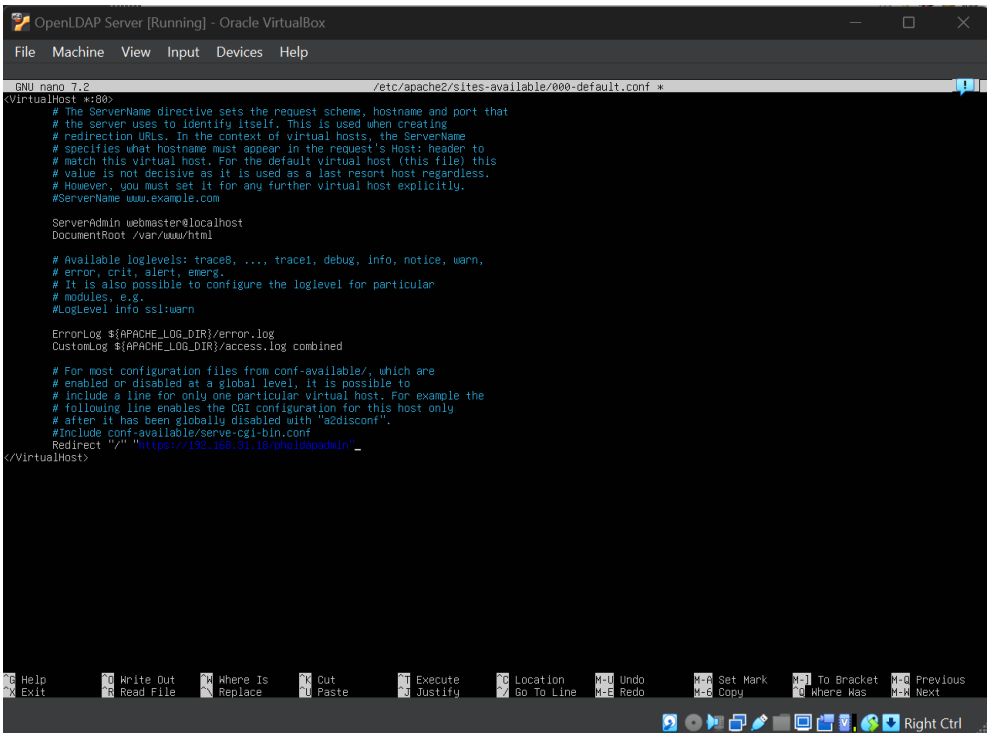
This configuration enabled secure access to phpLDAPadmin via HTTPS:



I also did that only via https it could be accessed by editing **`sudo nano /etc/apache2/sites-available/000-default.conf`**:

```
ldapadmin@ldap-server:~$ sudo nano /etc/apache2/sites-available/000-default.conf
```

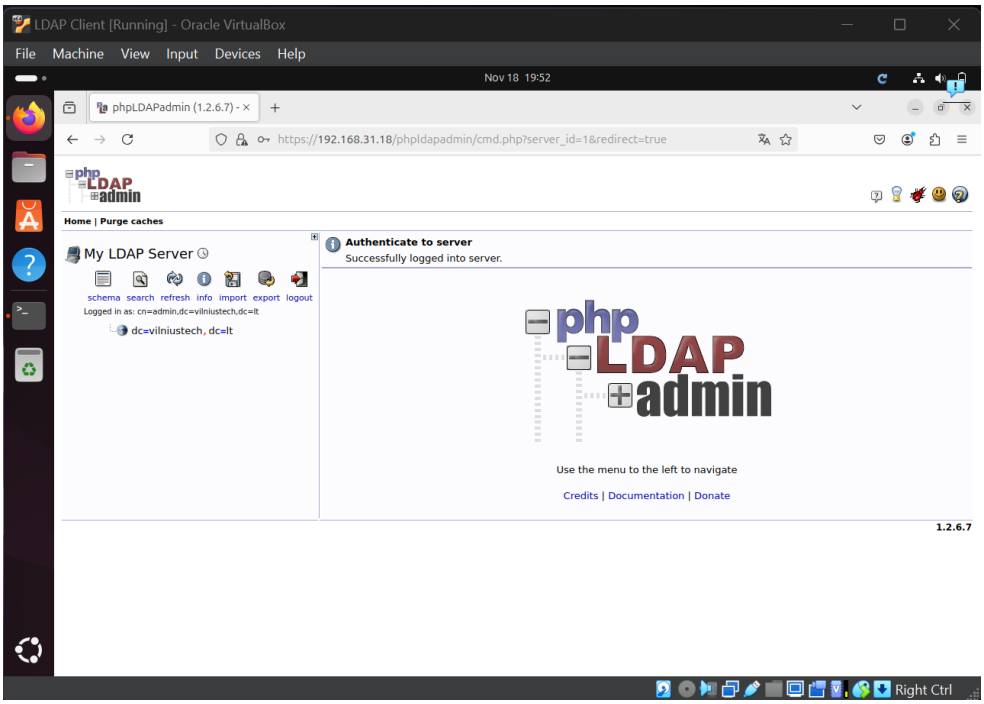
I added a redirect rule to automatically redirect all HTTP requests to the HTTPS phpLDAPadmin page:



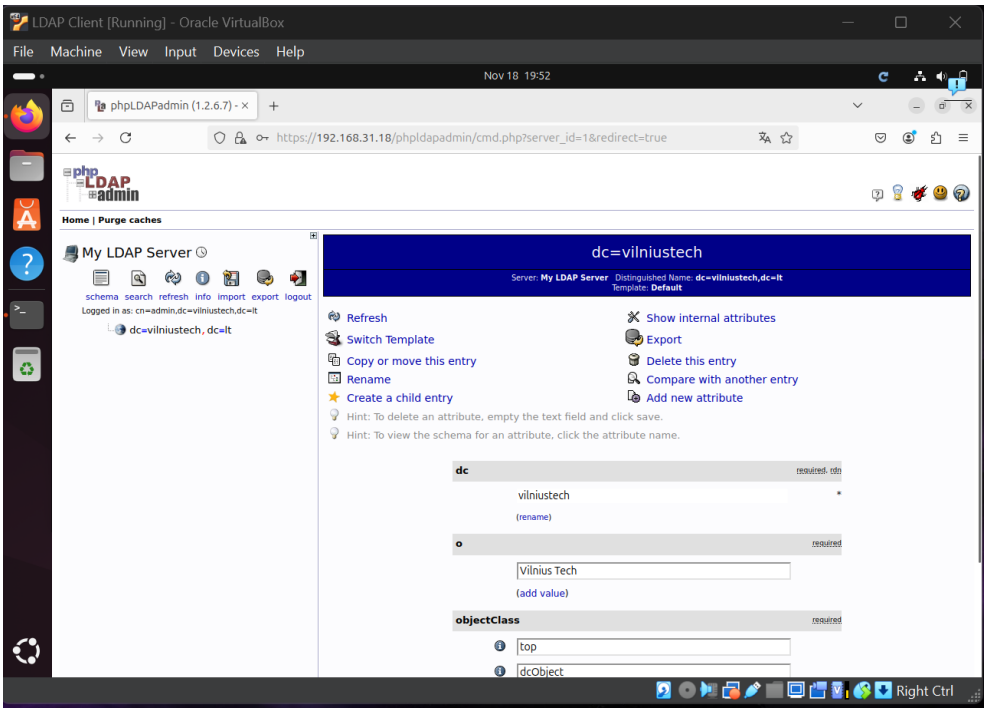
Once again, I restarted **apache2** with **sudo systemctl restart apache2**:

```
ldapadmin@ldap-server:~$ sudo systemctl restart apache2
```

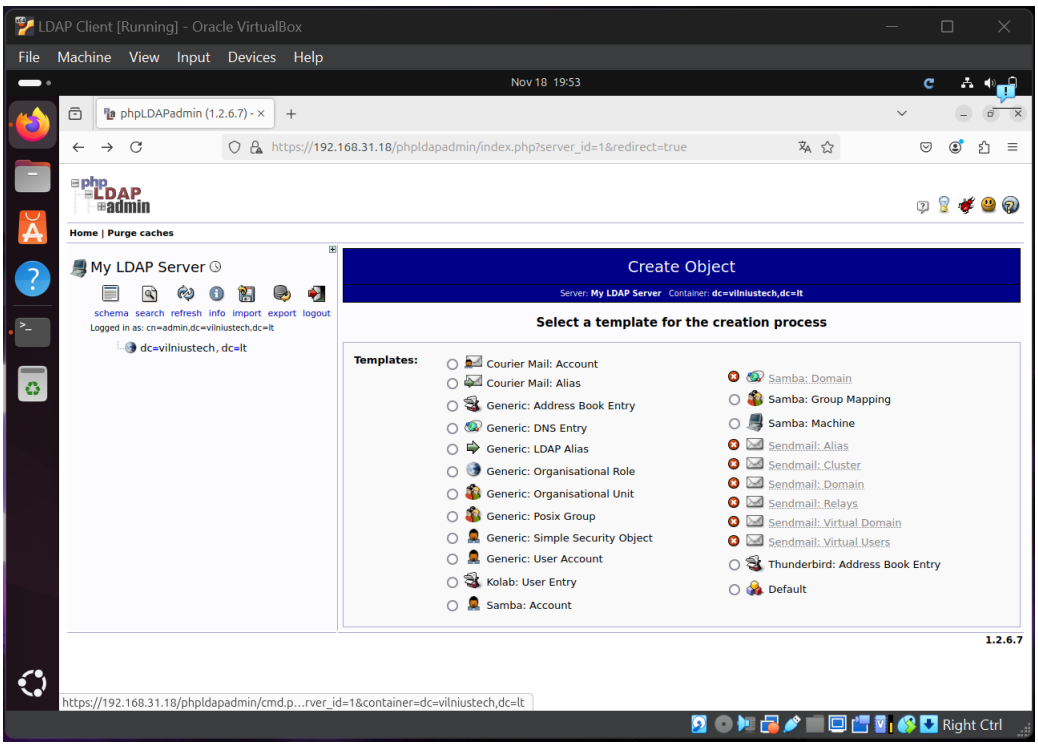
I logged in to phpLDAPadmin with admin account:



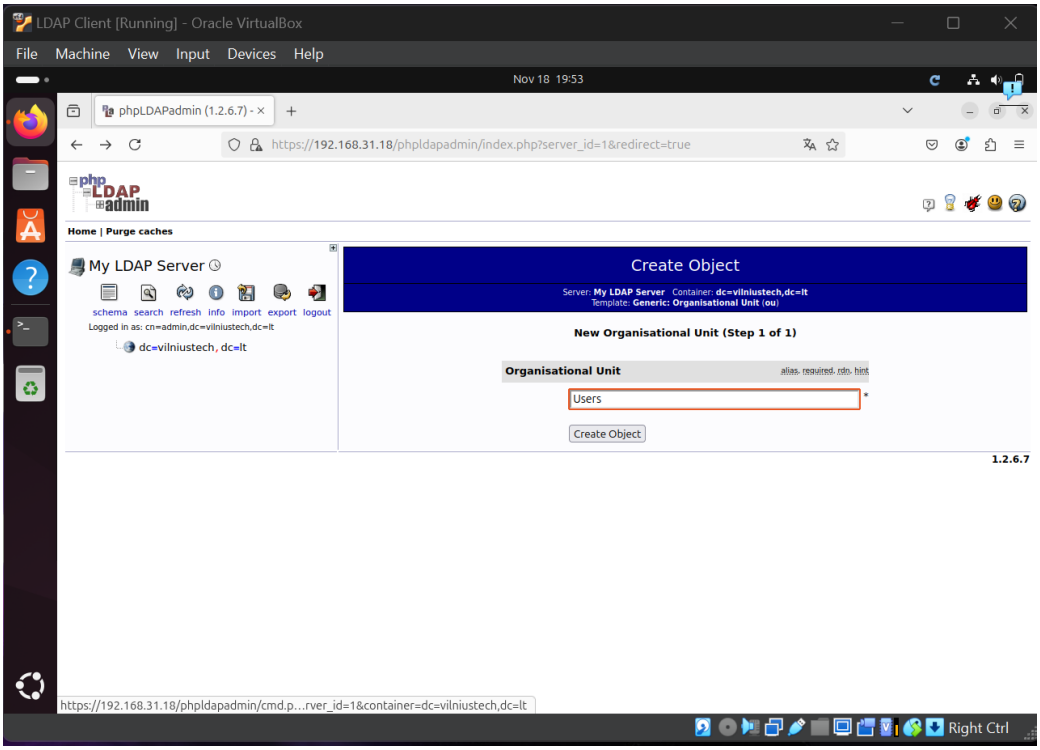
Then, for **`dc=vilniustech, dc=lt`** I created a child entry:



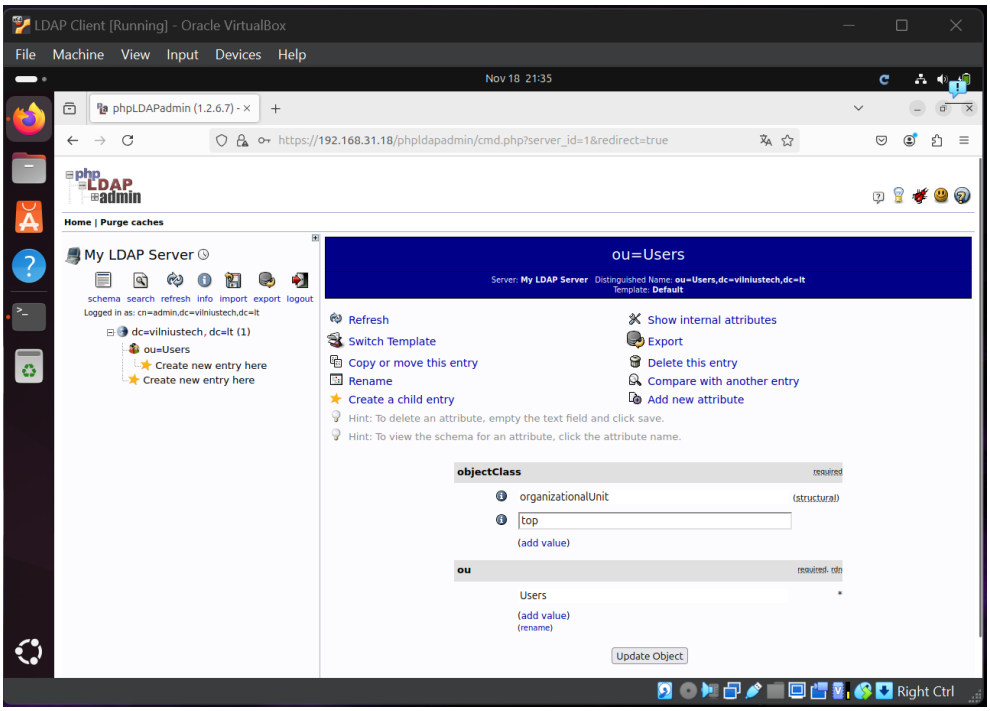
I selected “Generic: Organisational Unit”:



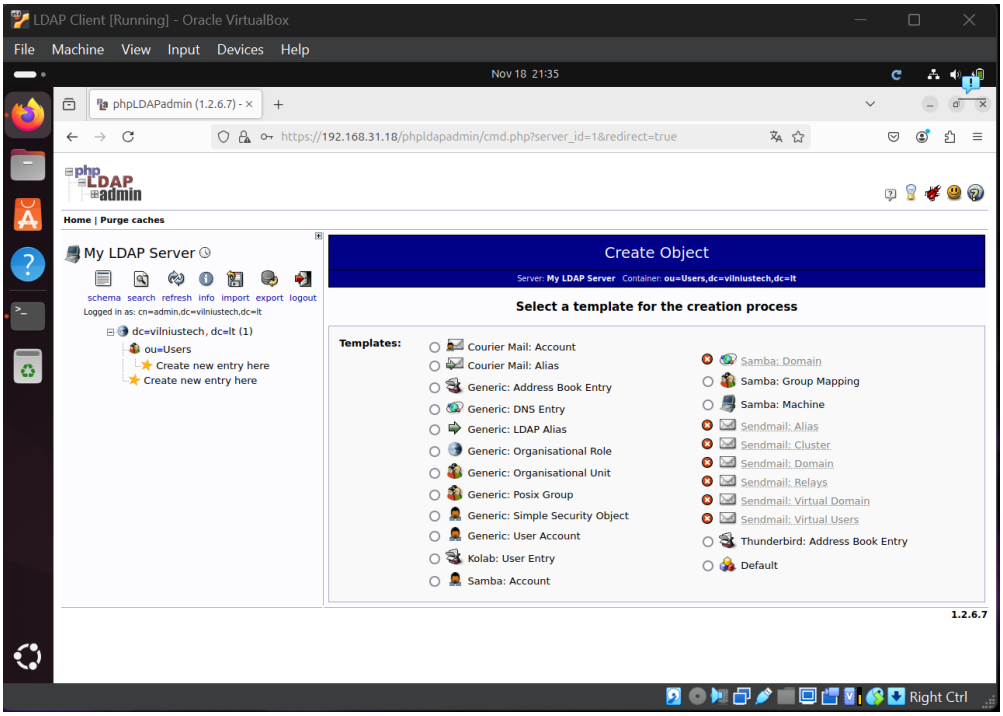
Then, I named that unit as “Users”:

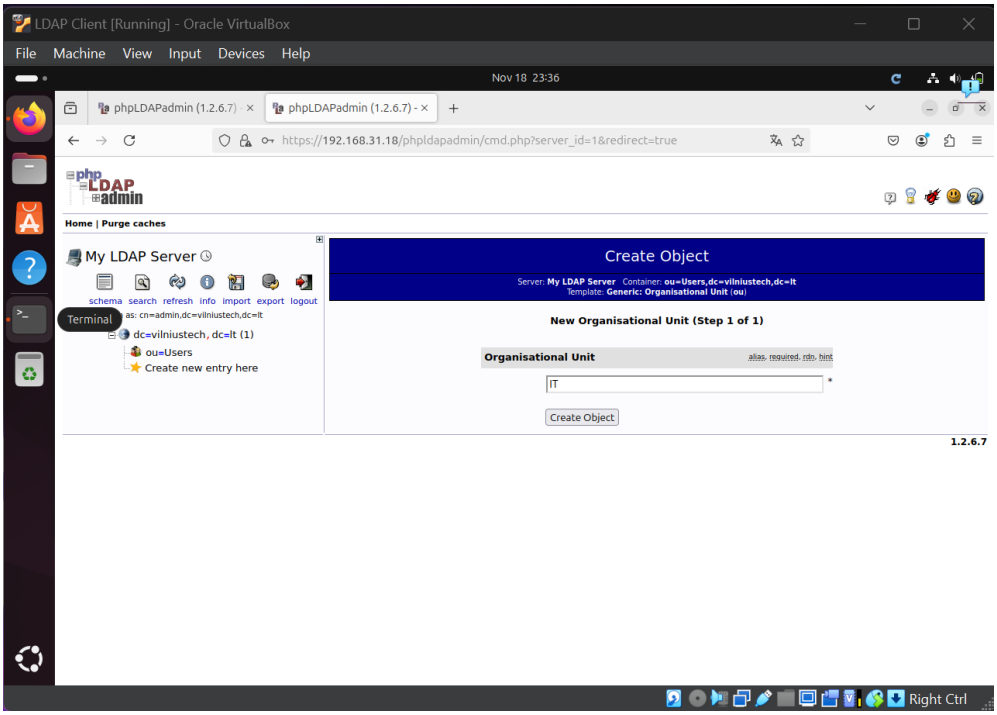


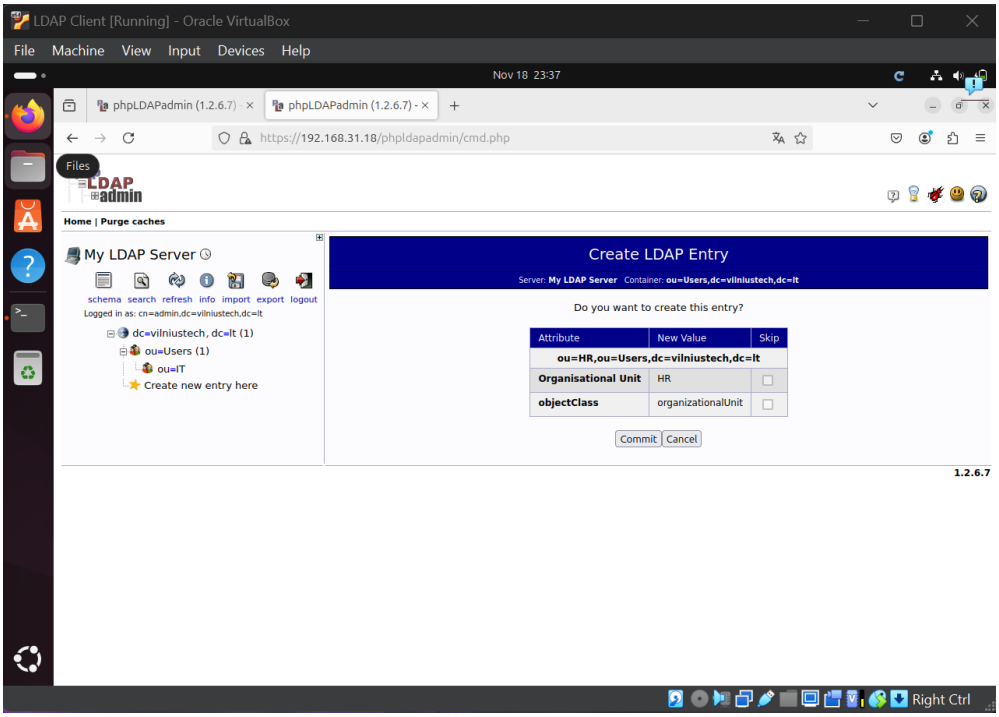
It was created successfully:



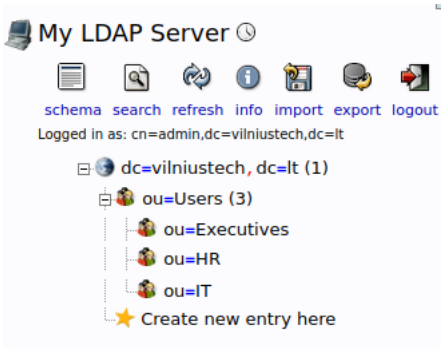
Then, I created “Generic: Organisational Unit” for Users – IT, HR, and Executives. Each OU represents a department, making it easier to manage users based on their roles and responsibilities.


LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 18 21:35
phpLDAPadmin (1.2.6.7) -
https://192.168.31.18/phpldapadmin/cmd.php?server_id=1&redirect=true
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (1)
ou=Users
Create new entry here
Create new entry here
Create Object
Server: My LDAP Server Container: ou=Users,dc=vilniustech,dc=lt
Select a template for the creation process
Templates:
Courier Mail: Account
Courier Mail: Alias
Generic: Address Book Entry
Generic: DNS Entry
Generic: LDAP Alias
Generic: Organisational Role
Generic: Organisational Unit
Generic: Posix Group
Generic: Simple Security Object
Generic: User Account
Kolab: User Entry
Samba: Account
Samba: Domain
Samba: Group Mapping
Samba: Machine
Sendmail: Alias
Sendmail: Cluster
Sendmail: Domain
Sendmail: Relays
Sendmail: Virtual Domain
Sendmail: Virtual Users
Thunderbird: Address Book Entry
Default
1.2.6.7
Right Ctrl

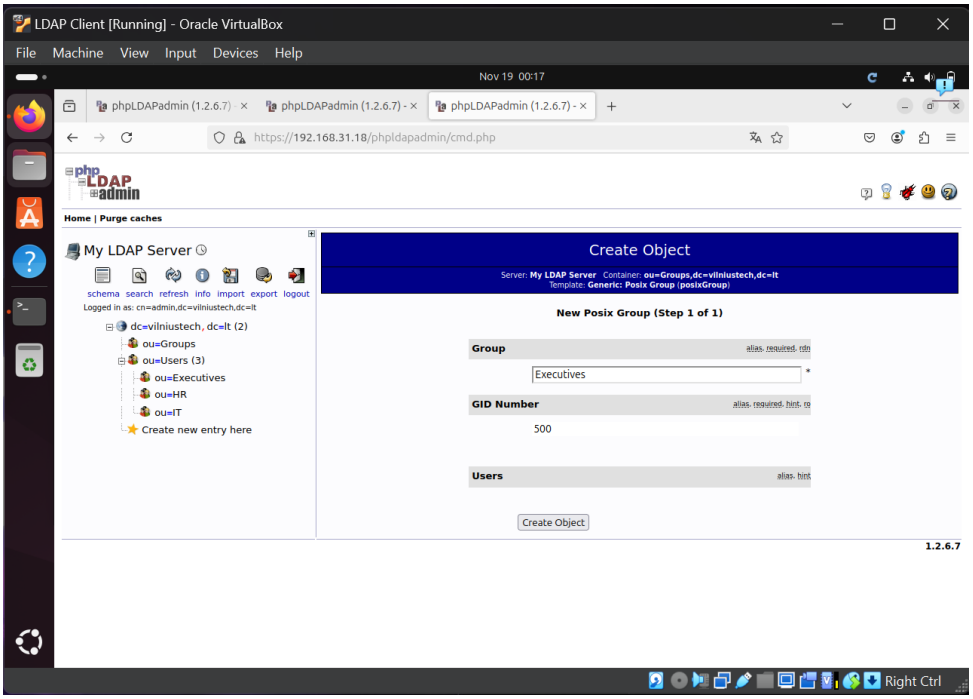

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 18 23:36
phpLDAPadmin (1.2.6.7)
phpLDAPadmin (1.2.6.7) -
https://192.168.31.18/phpldapadmin/cmd.php?server_id=1&redirect=true
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Terminal
as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (1)
ou=Users
Create new entry here
Create Object
Server: My LDAP Server Container: ou=Users,dc=vilniustech,dc=lt
Template: Generic: Organisational Unit (ou)
New Organisational Unit (Step 1 of 1)
Organisational Unit
alias, required, rdn, hint
IT
Create Object
1.2.6.7
Right Ctrl

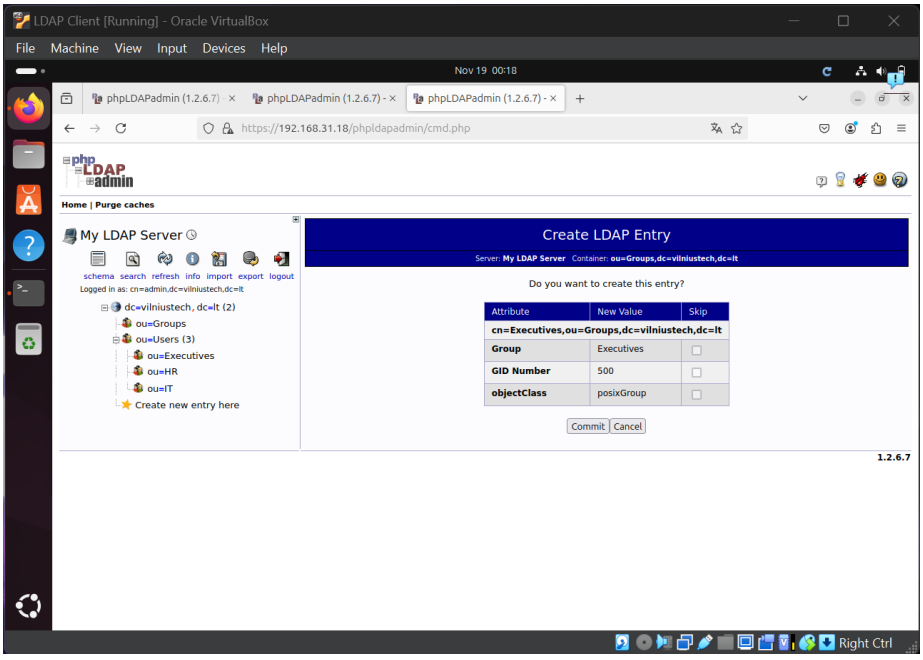


When everything was created it looked like this:

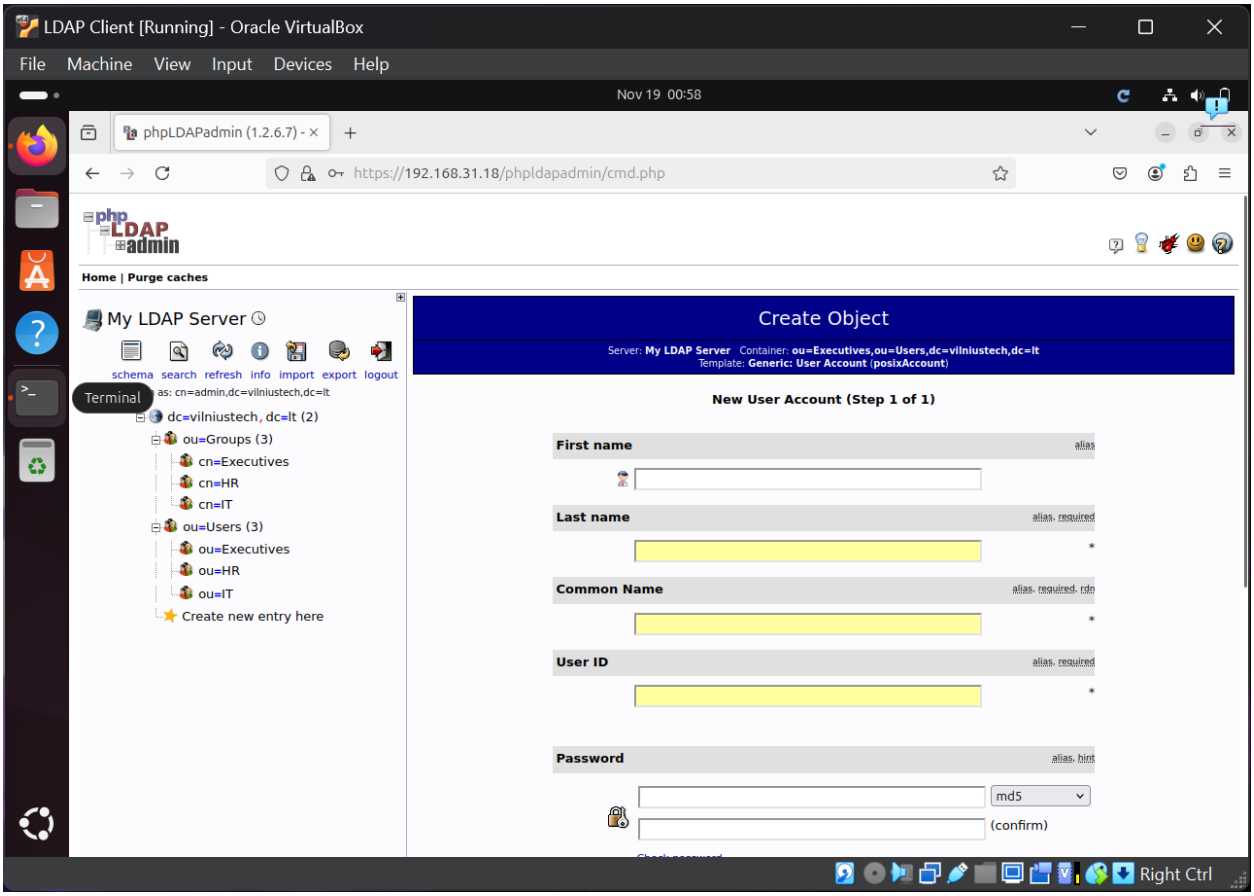


Then, I created an organizational unit for groups to create posix groups with GID numbers so I could add users:

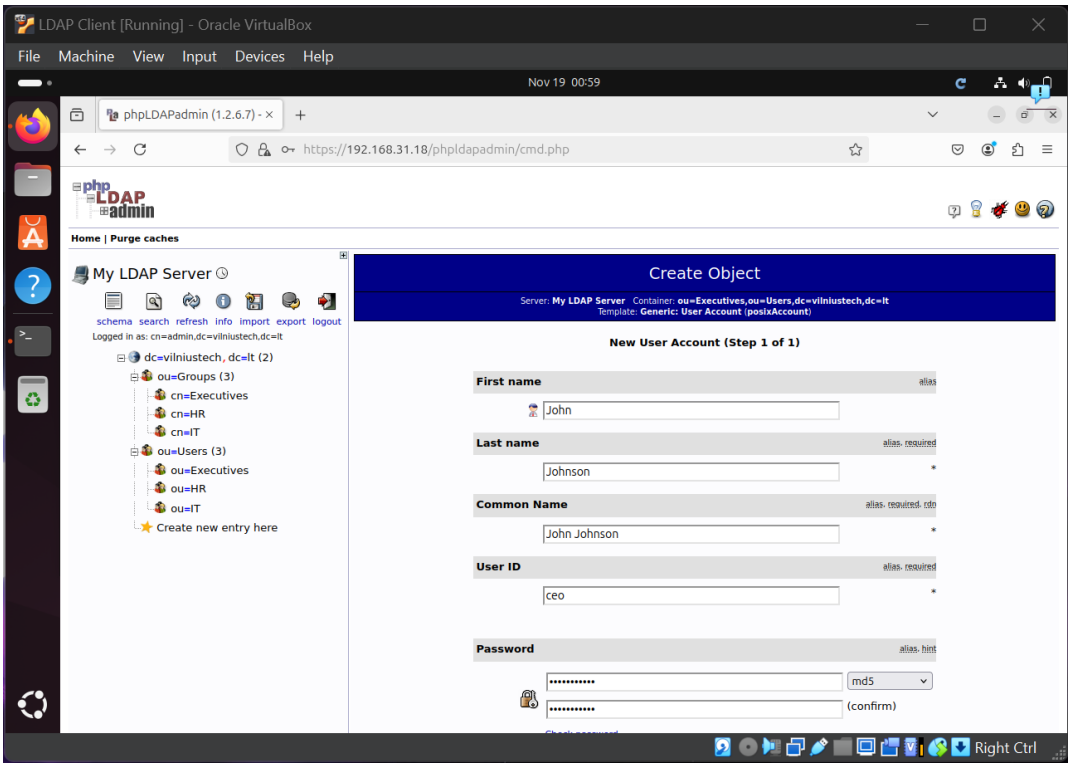

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 00:17
phpLDAPadmin (1.2.6.7)
https://192.168.31.18/phpldapadmin/cmd.php
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups
ou=Users (3)
ou=Executives
ou=HR
ou=IT
Create new entry here
Create Object
Server: My LDAP Server Container: ou=Groups,dc=vilniustech,dc=lt
Template: Generic: Posix Group (posixGroup)
New Posix Group (Step 1 of 1)
Group
Executives
GID Number
500
Users
Create Object
1.2.6.7
Right Ctrl

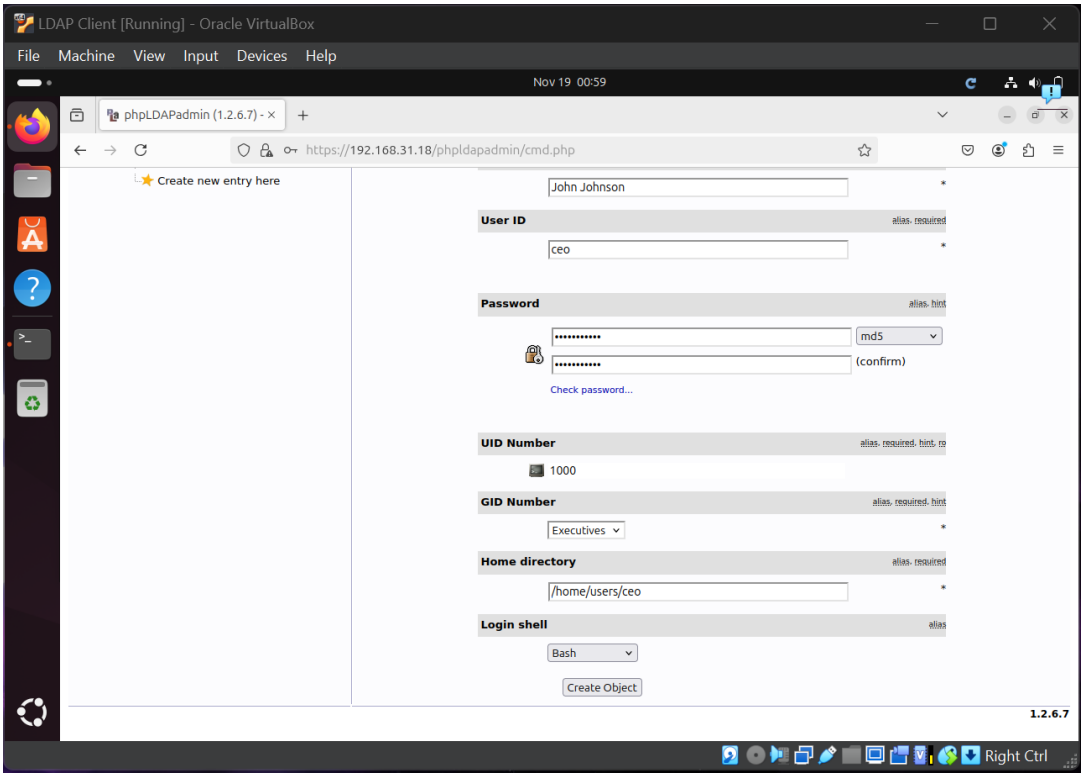

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 00:18
phpLDAPadmin (1.2.6.7)
https://192.168.31.18/phpldapadmin/cmd.php
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups
ou=Users (3)
ou=Executives
ou=HR
ou=IT
Create new entry here
Create LDAP Entry
Server: My LDAP Server Container: ou=Groups,dc=vilniustech,dc=lt
Do you want to create this entry?
Attribute
New Value
Skip
cn=Executives,ou=Groups,dc=vilniustech,dc=lt
Group
Executives
GID Number
500
objectClass
posixGroup
Commit
Cancel
1.2.6.7
Right Ctrl

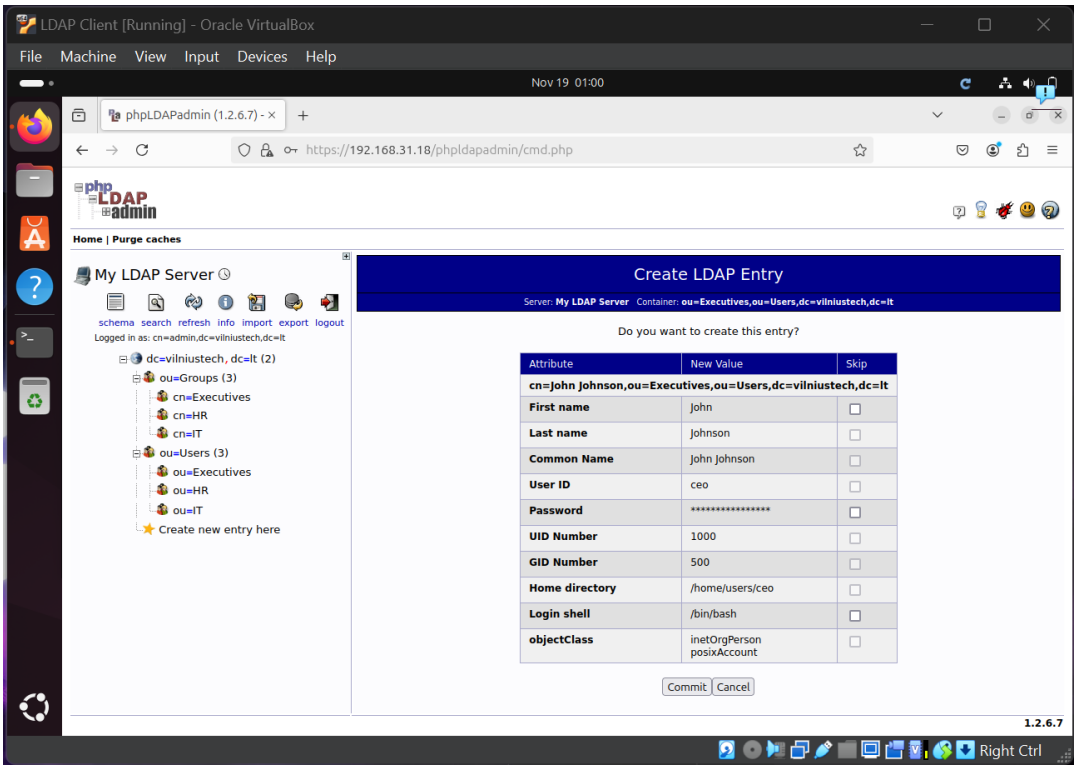
As the groups were created I started creating user accounts:



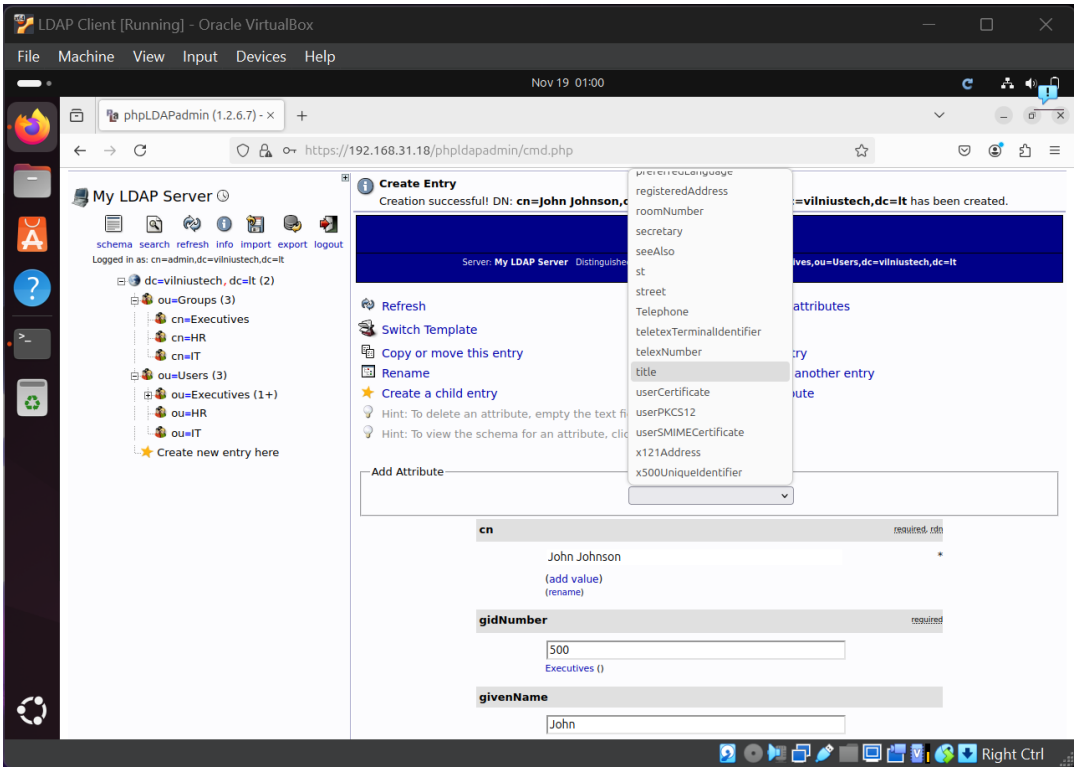
Here, I would fill the details, give user id and select group from created groups:

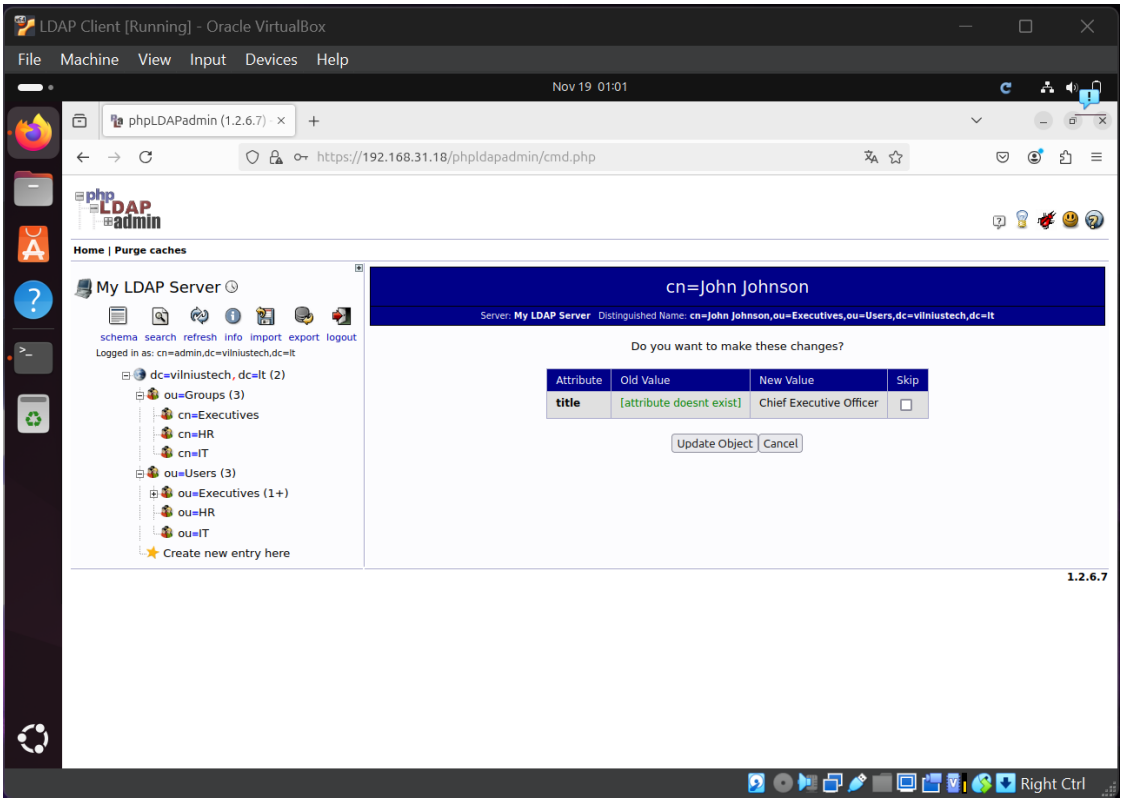




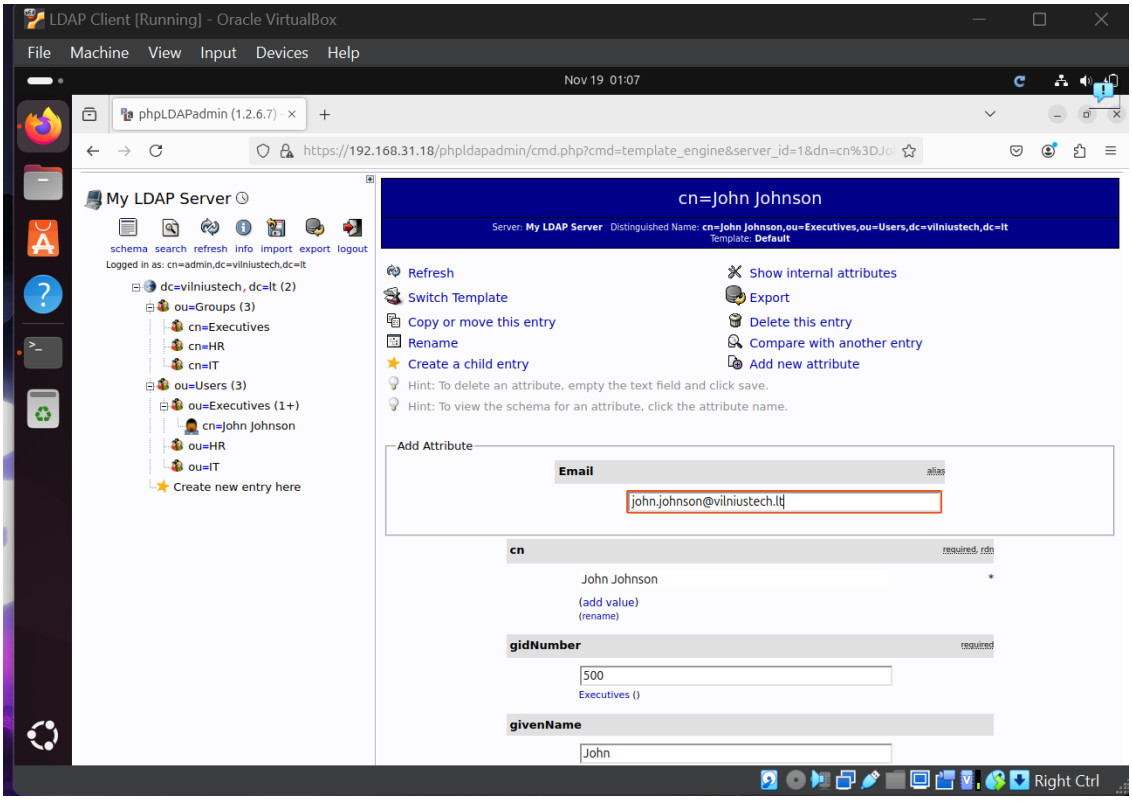


I also added additional attributes, such as titles:

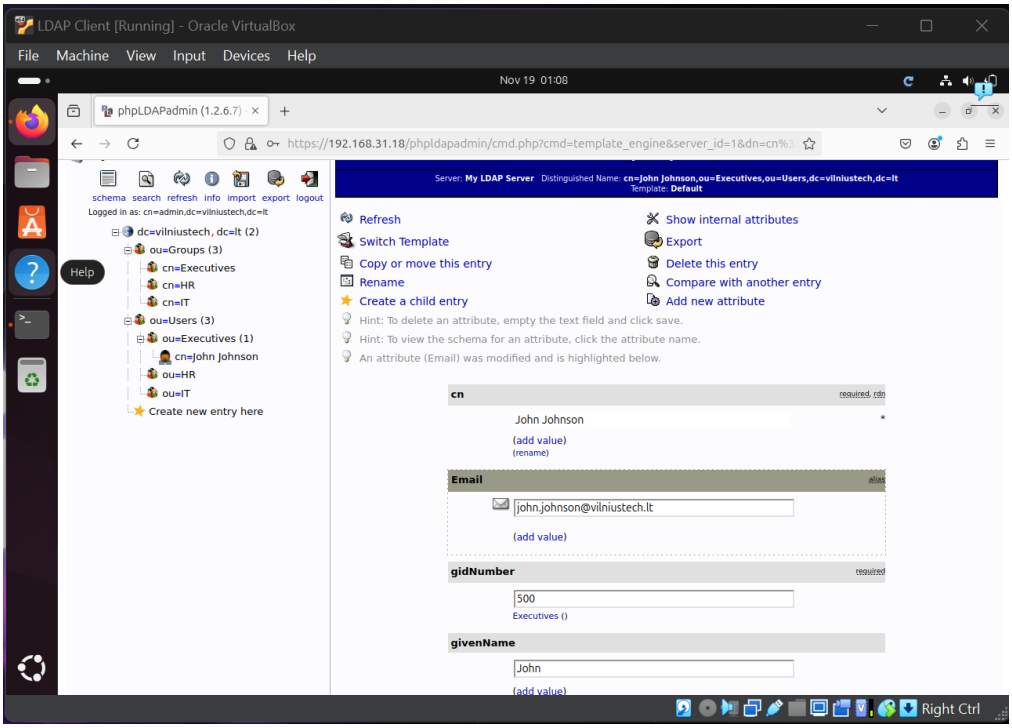




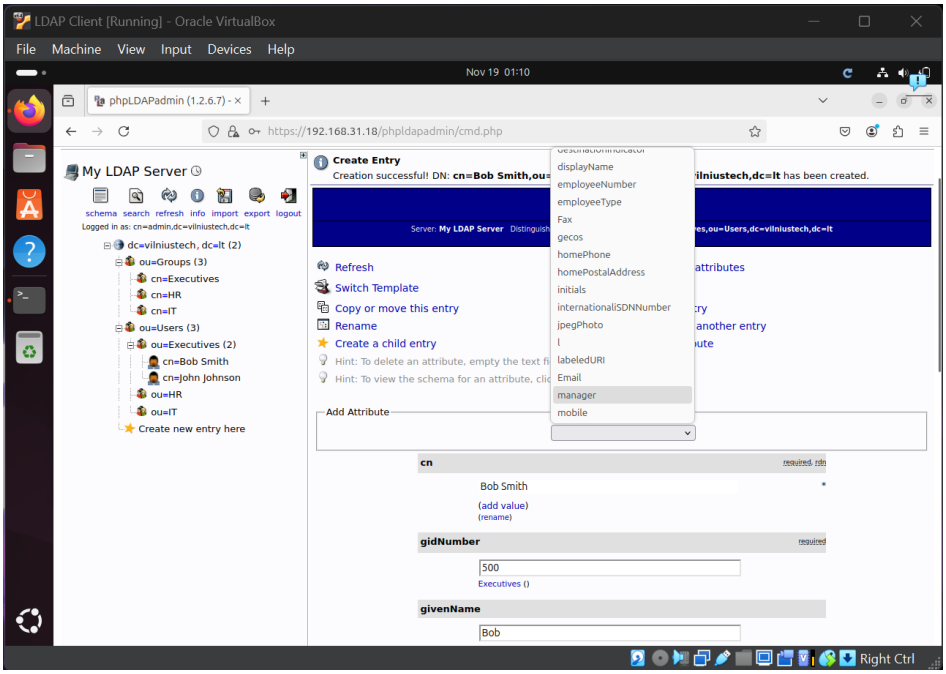
I also added additional attributes such as emails:



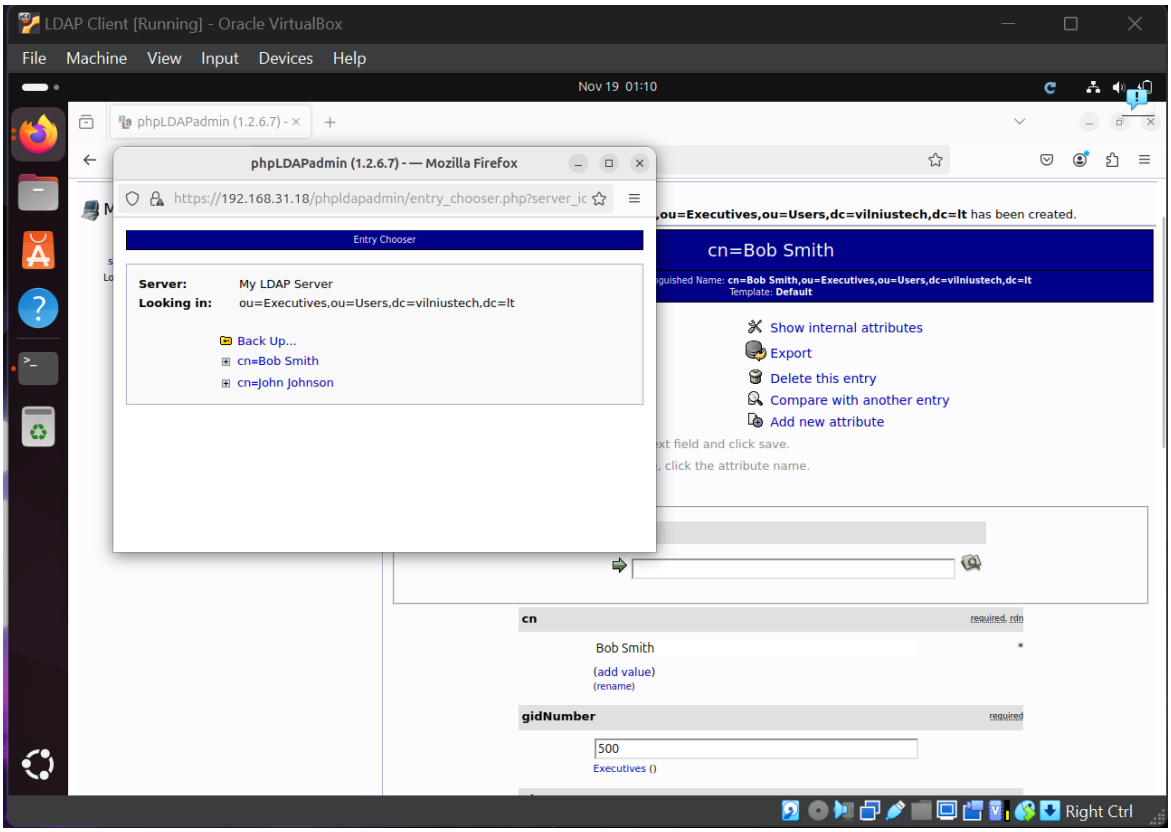
Then, I added new attributes by clicking “Add new attribute”:

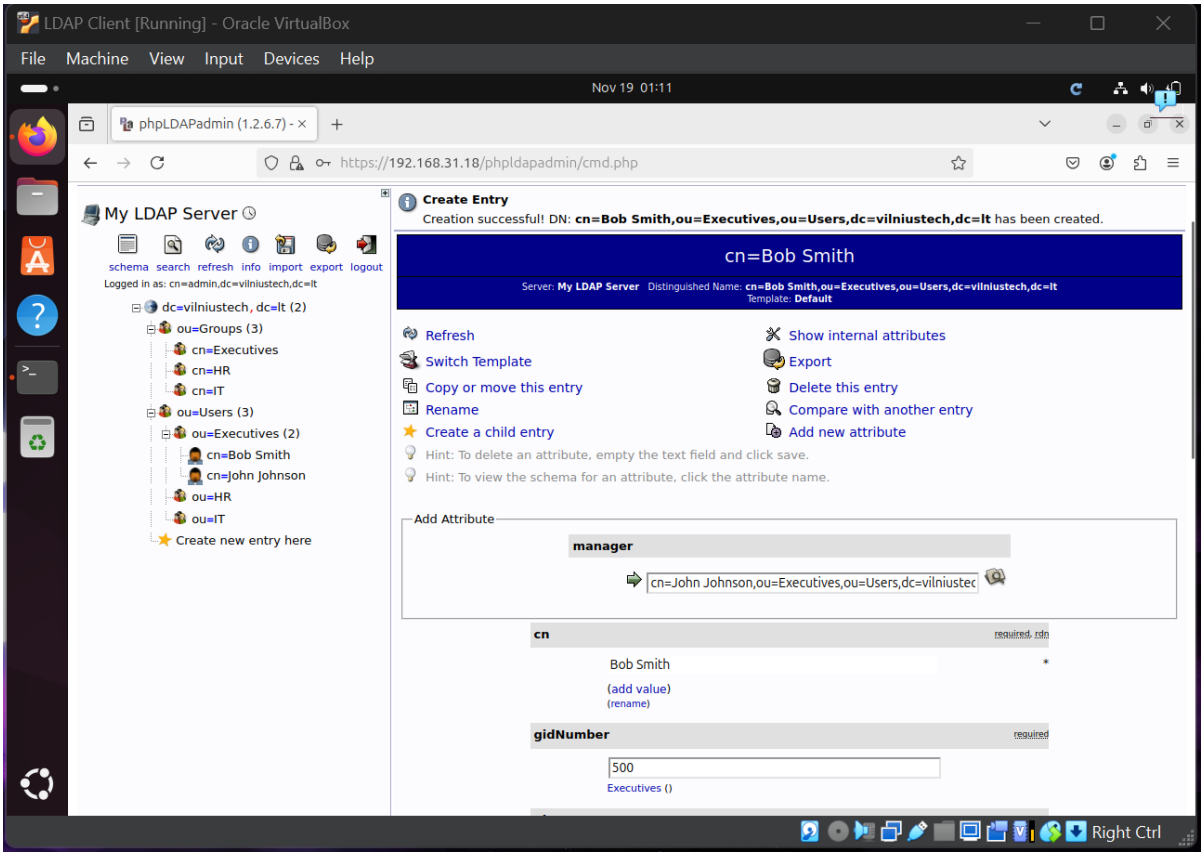


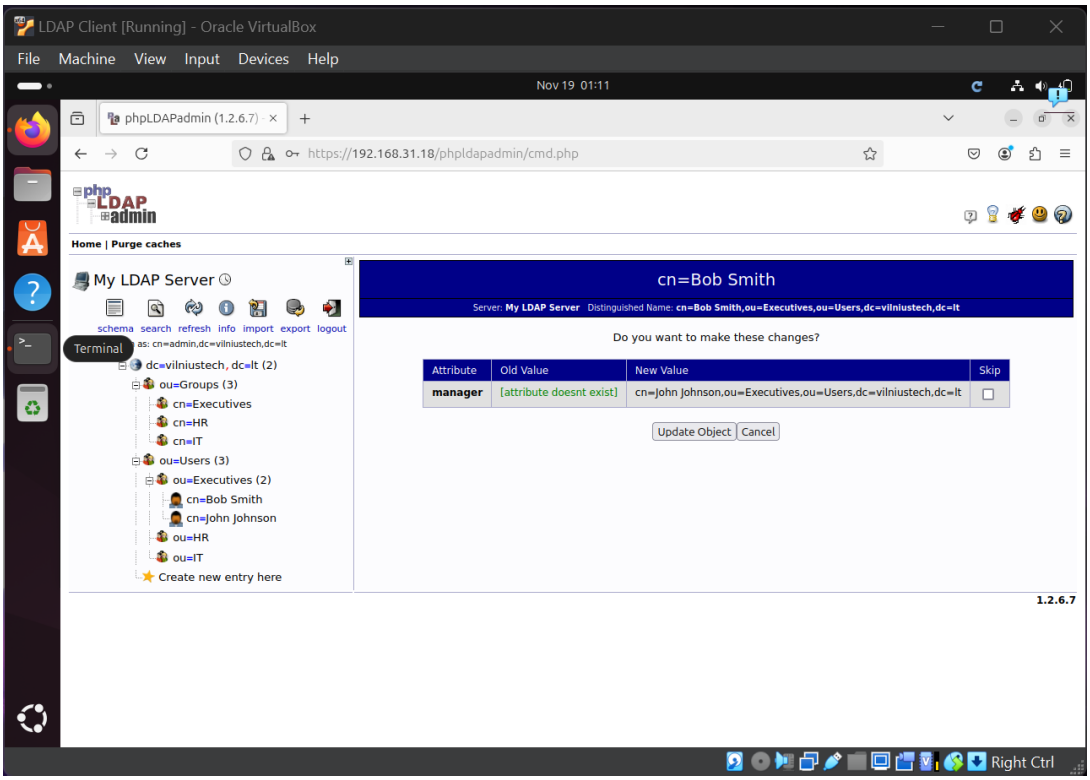
For hierarchy, I added “managers”:

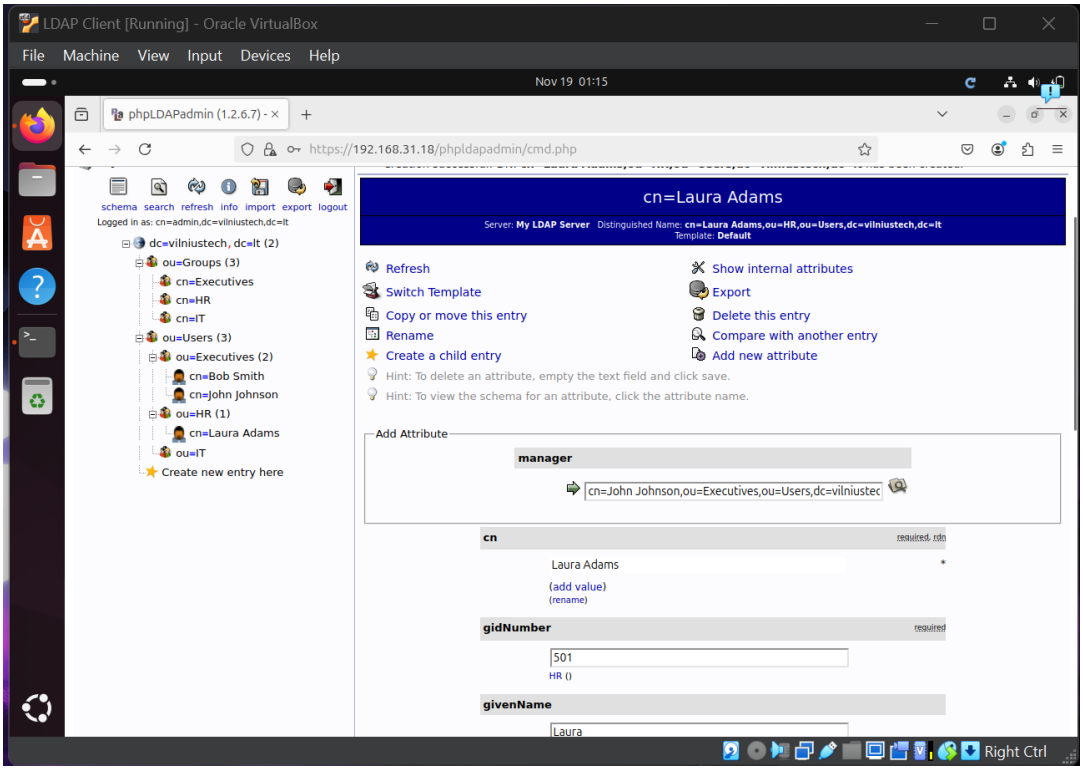


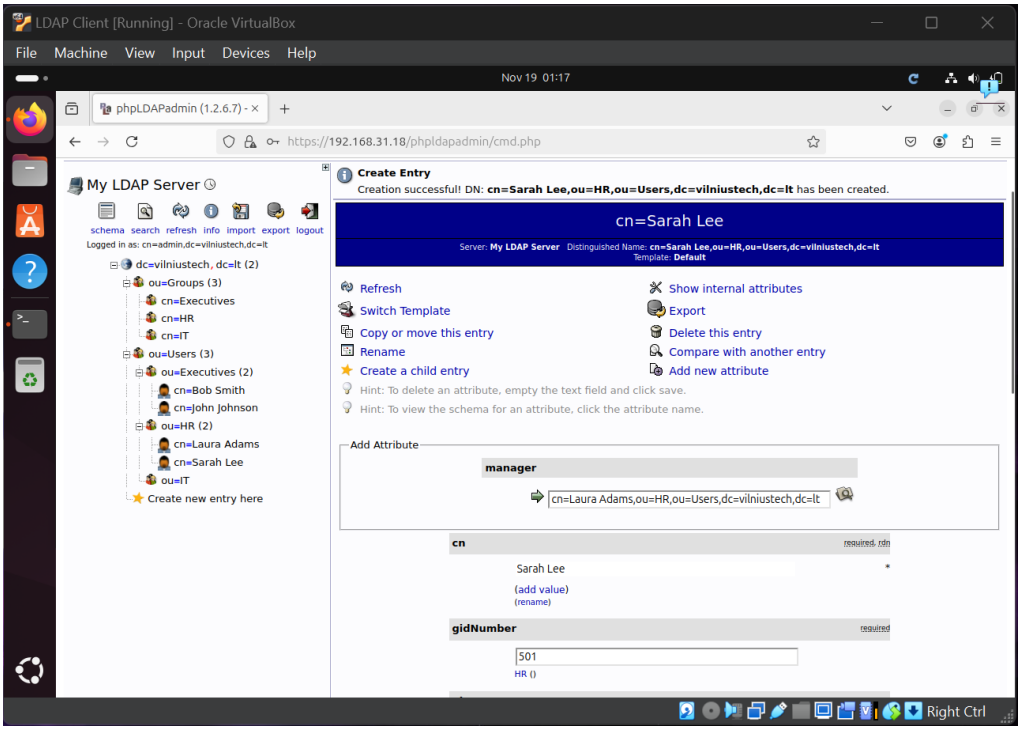
I made hierarchy so that CTO would have manager CEO, HR lead would have manager CEO, HRs would have manager HR lead, IT Team Lead would have manager CTO and other IT team members would have manager IT Team Lead:

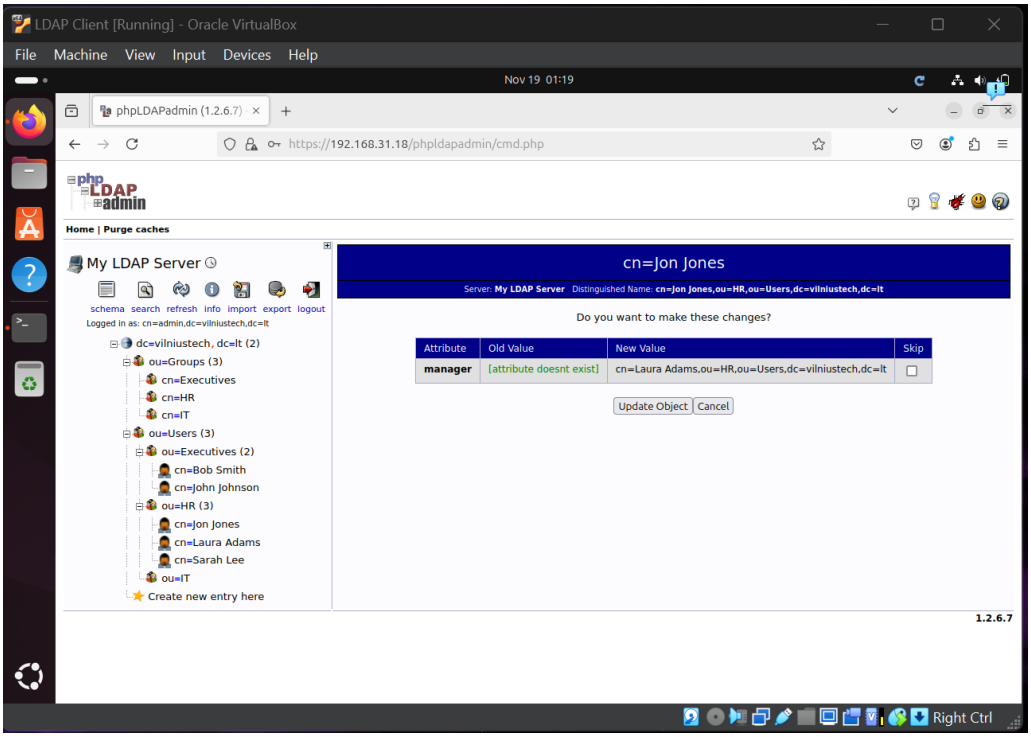


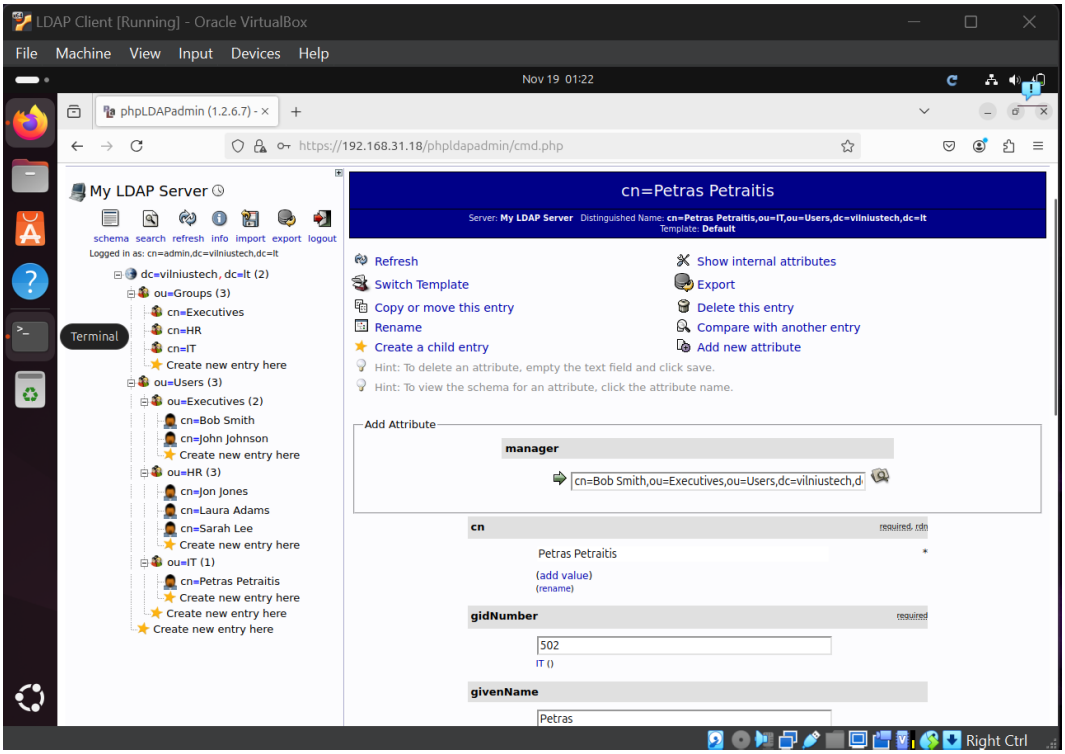

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:11
phpLDAPadmin (1.2.6.7) -
https://192.168.31.18/phpldapadmin/cmd.php
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
ou=HR
ou=IT
Create new entry here
Create Entry
Creation successful! DN: cn=Bob Smith,ou=Executives,ou=Users,dc=vilniustech,dc=lt has been created.
cn=Bob Smith
Server: My LDAP Server Distinguished Name: cn=Bob Smith,ou=Executives,ou=Users,dc=vilniustech,dc=lt
Template: Default
Refresh
Switch Template
Copy or move this entry
Rename
Create a child entry
Show internal attributes
Export
Delete this entry
Compare with another entry
Add new attribute
Hint: To delete an attribute, empty the text field and click save.
Hint: To view the schema for an attribute, click the attribute name.
Add Attribute
manager
cn=John Johnson,ou=Executives,ou=Users,dc=vilniustec
cn
Bob Smith
(add value)
(rename)
gidNumber
500
Executives ()
Right Ctrl

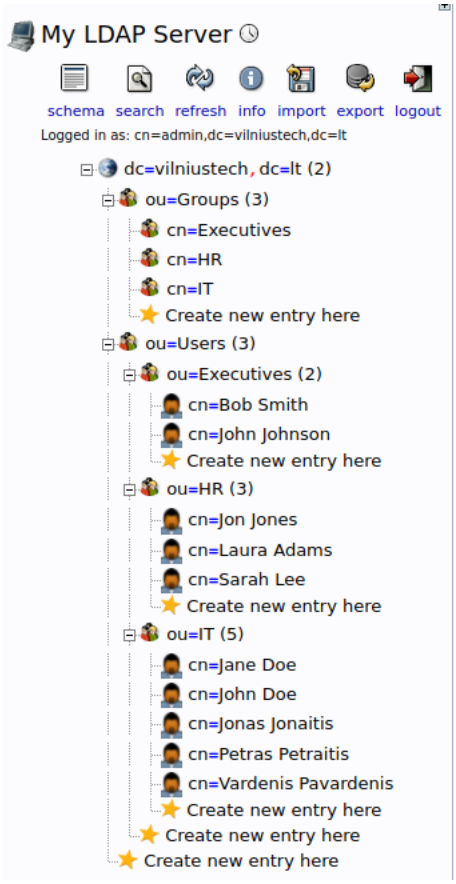

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:11
phpLDAPadmin (1.2.6.7)
https://192.168.31.18/phpldapadmin/cmd.php
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Terminal
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
ou=HR
ou=IT
Create new entry here
cn=Bob Smith
Server: My LDAP Server Distinguished Name: cn=Bob Smith,ou=Executives,ou=Users,dc=vilniustech,dc=lt
Do you want to make these changes?
Attribute
Old Value
New Value
Skip
manager
[attribute doesnt exist]
cn=John Johnson,ou=Executives,ou=Users,dc=vilniustech,dc=lt
Update Object
Cancel
1.2.6.7
Right Ctrl


LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:15
phpLDAPadmin (1.2.6.7) -
https://192.168.31.18/phpldapadmin/cmd.php
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
ou=HR (1)
cn=Laura Adams
ou=IT
Create new entry here
cn=Laura Adams
Server: My LDAP Server Distinguished Name: cn=Laura Adams,ou=HR,ou=Users,dc=vilniustech,dc=lt
Template: Default
Refresh
Switch Template
Copy or move this entry
Rename
Create a child entry
Show internal attributes
Export
Delete this entry
Compare with another entry
Add new attribute
Hint: To delete an attribute, empty the text field and click save.
Hint: To view the schema for an attribute, click the attribute name.
Add Attribute
manager
cn=John Johnson,ou=Executives,ou=Users,dc=vilniustec
cn
required, rdn
Laura Adams
(add value)
(rename)
gidNumber
required
501
HR ()
givenName
Laura
Right Ctrl


LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:17
phpLDAPadmin (1.2.6.7) -
https://192.168.31.18/phpldapadmin/cmd.php
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
ou=HR (2)
cn=Laura Adams
cn=Sarah Lee
ou=IT
Create new entry here
Create Entry
Creation successful! DN: cn=Sarah Lee,ou=HR,ou=Users,dc=vilniustech,dc=lt has been created.
cn=Sarah Lee
Server: My LDAP Server Distinguished Name: cn=Sarah Lee,ou=HR,ou=Users,dc=vilniustech,dc=lt
Template: Default
Refresh
Switch Template
Copy or move this entry
Rename
Create a child entry
Show internal attributes
Export
Delete this entry
Compare with another entry
Add new attribute
Hint: To delete an attribute, empty the text field and click save.
Hint: To view the schema for an attribute, click the attribute name.
Add Attribute
manager
cn=Laura Adams,ou=HR,ou=Users,dc=vilniustech,dc=lt
cn
required, rdn
Sarah Lee
(add value)
(rename)
gidNumber
required
501
HR ()
Right Ctrl

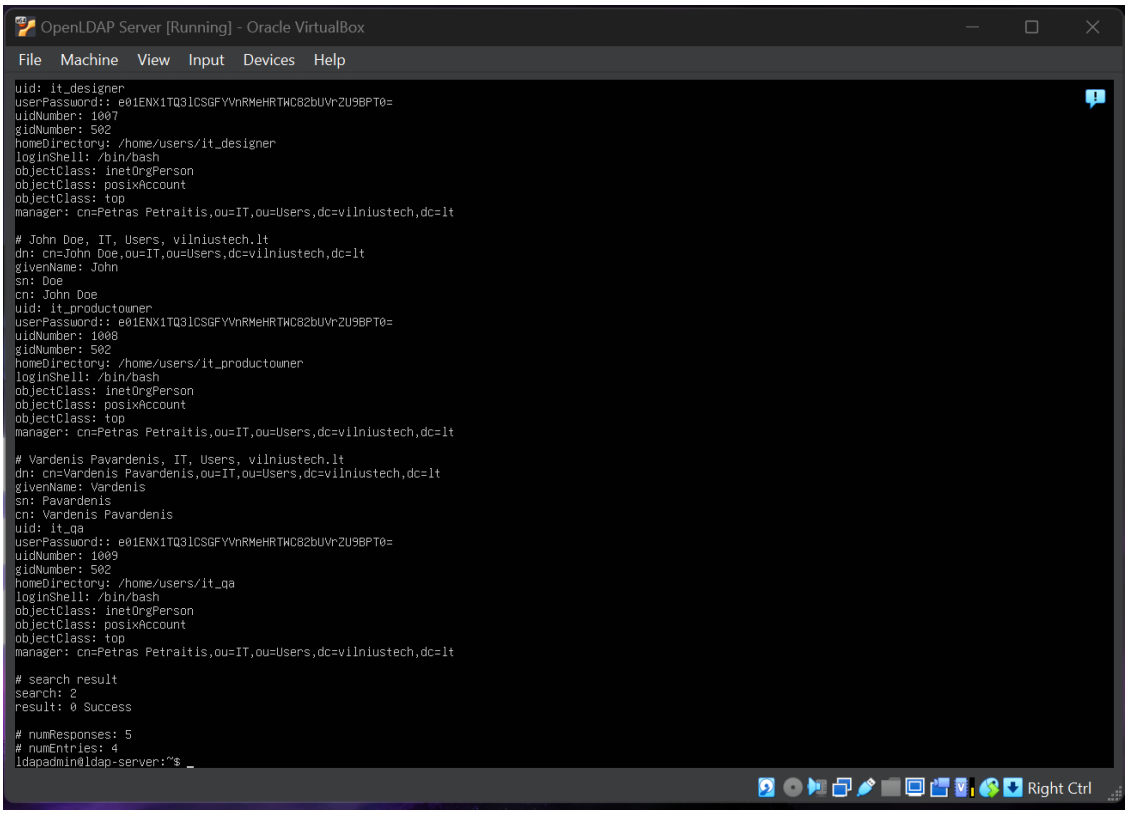

LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:19
phpLDAPadmin (1.2.6.7)
https://192.168.31.18/phpldapadmin/cmd.php
Home | Purge caches
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
ou=HR (3)
cn=Jon Jones
cn=Laura Adams
cn=Sarah Lee
ou=IT
Create new entry here
cn=Jon Jones
Server: My LDAP Server Distinguished Name: cn=Jon Jones,ou=HR,ou=Users,dc=vilniustech,dc=lt
Do you want to make these changes?
Attribute
Old Value
New Value
Skip
manager
[attribute doesnt exist]
cn=Laura Adams,ou=HR,ou=Users,dc=vilniustech,dc=lt
Update Object
Cancel
1.2.6.7
Right Ctrl


LDAP Client [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Nov 19 01:22
phpLDAPadmin (1.2.6.7)
https://192.168.31.18/phpldapadmin/cmd.php
My LDAP Server
schema search refresh info import export logout
Logged in as: cn=admin,dc=vilniustech,dc=lt
Terminal
dc=vilniustech, dc=lt (2)
ou=Groups (3)
cn=Executives
cn=HR
cn=IT
Create new entry here
ou=Users (3)
ou=Executives (2)
cn=Bob Smith
cn=John Johnson
Create new entry here
ou=HR (3)
cn=Jon Jones
cn=Laura Adams
cn=Sarah Lee
Create new entry here
ou=IT (1)
cn=Petras Petraitis
Create new entry here
Create new entry here
Create new entry here
cn=Petras Petraitis
Server: My LDAP Server Distinguished Name: cn=Petras Petraitis,ou=IT,ou=Users,dc=vilniustech,dc=lt
Template: Default
Refresh
Switch Template
Copy or move this entry
Rename
Create a child entry
Show internal attributes
Export
Delete this entry
Compare with another entry
Add new attribute
Hint: To delete an attribute, empty the text field and click save.
Hint: To view the schema for an attribute, click the attribute name.
Add Attribute
manager
cn=Bob Smith,ou=Executives,ou=Users,dc=vilniustech,d
cn
required, rdn
Petras Petraitis
(add value)
(rename)
gidNumber
required
502
IT ()
givenName
Petras
Right Ctrl

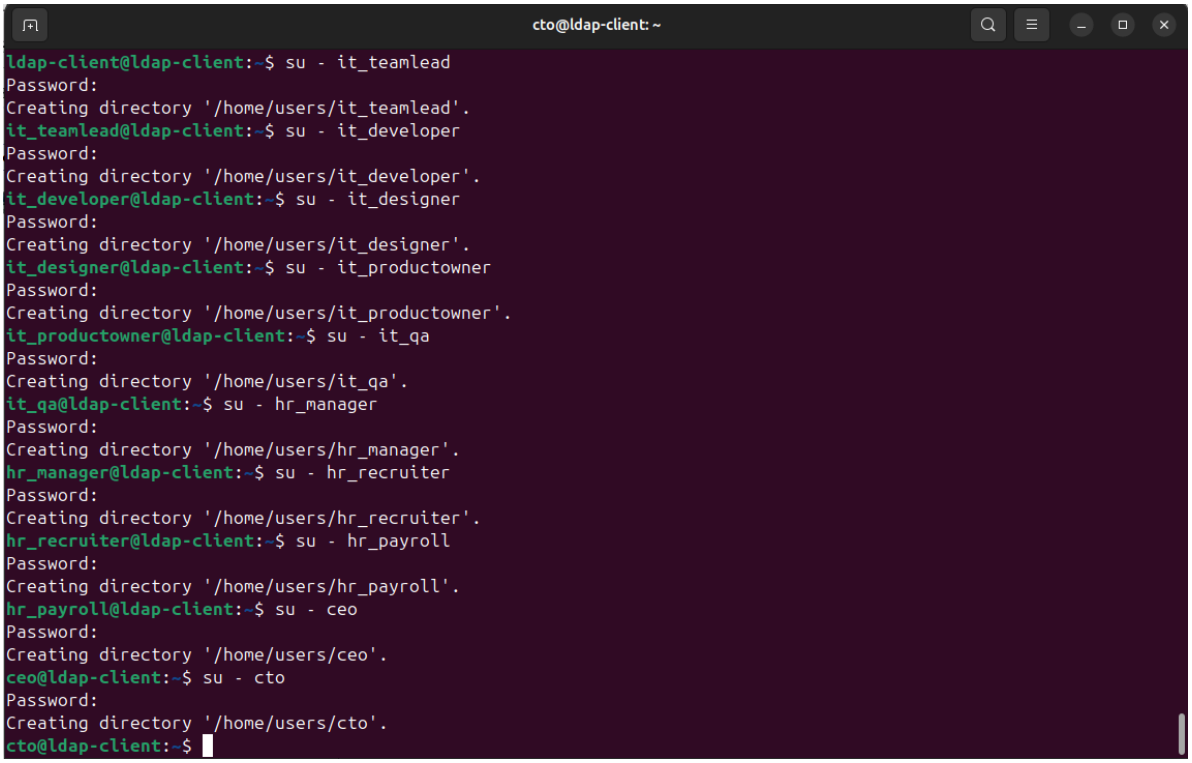


I also tried to search in server for users whose manager is “Petras Petraitis”:

```
ldapadmin@ldap-server:~$ ldapsearch -H ldaps://localhost -x -D "cn=admin,dc=vilniustech,dc=lt" -w password123 -b "dc=vilniustech,dc=lt" "(manager=cn=Petras Petr
aitis,ou=IT,ou=Users,dc=vilniustech,dc=lt)"
```



Lastly, I tried to login with each user in ldap client:


cto@ldap-client: ~
ldap-client@ldap-client:~$ su - it_teamlead
Password:
Creating directory '/home/users/it_teamlead'.
it_teamlead@ldap-client:~$ su - it_developer
Password:
Creating directory '/home/users/it_developer'.
it_developer@ldap-client:~$ su - it_designer
Password:
Creating directory '/home/users/it_designer'.
it_designer@ldap-client:~$ su - it_productowner
Password:
Creating directory '/home/users/it_productowner'.
it_productowner@ldap-client:~$ su - it_qa
Password:
Creating directory '/home/users/it_qa'.
it_qa@ldap-client:~$ su - hr_manager
Password:
Creating directory '/home/users/hr_manager'.
hr_manager@ldap-client:~$ su - hr_recruiter
Password:
Creating directory '/home/users/hr_recruiter'.
hr_recruiter@ldap-client:~$ su - hr_payroll
Password:
Creating directory '/home/users/hr_payroll'.
hr_payroll@ldap-client:~$ su - ceo
Password:
Creating directory '/home/users/ceo'.
ceo@ldap-client:~$ su - cto
Password:
Creating directory '/home/users/cto'.
cto@ldap-client:~$