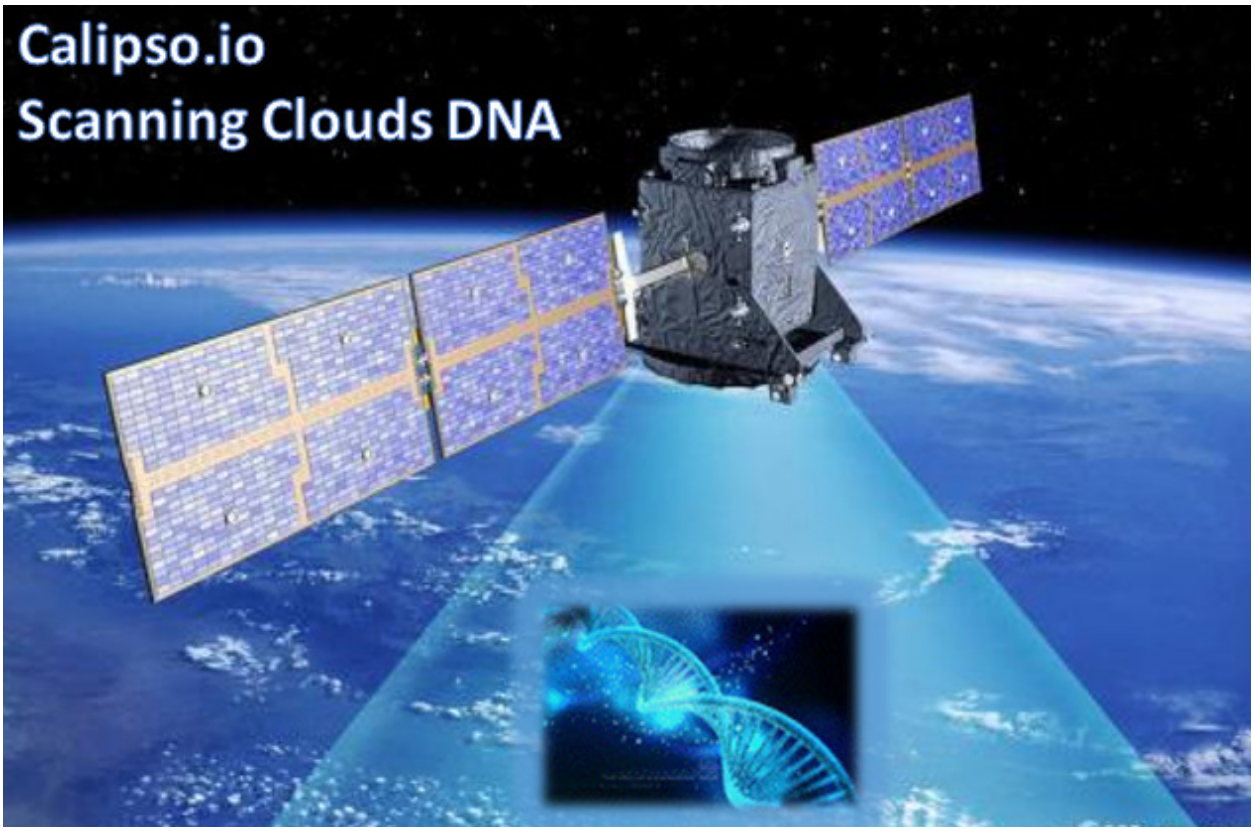
Calipso.io
Quick Start Guide



Project “Calipso” tries to illuminate complex virtual networking with real time operational state visibility for large and highly distributed Virtual Infrastructure Management (VIM).

We believe that Stability is driven by accurate Visibility.

Calipso provides visible insights using smart discovery and virtual topological representation in graphs, with monitoring per object in the graph inventory to reduce error vectors and troubleshooting, maintenance cycles for VIM operators and administrators.

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1 Getting started

1.1 Post installation tools

Calipso administrator should first complete installation as per install-guide document. After all calipso containers are running she can start examining the application using the following suggested tools:

1. MongoChef : https://studio3t.com/download/ as a useful GUI client to interact with calipso mongoDB module.
2. Web Browser to access calipso-UI at: http://server-IP
3. SSH client to access other calipso modules as needed.

1.2 Calipso containers details

Calipso is currently made of the following 7 containers:

1. Mongo: holds and maintains calipso's data inventory.
2. LDAP: holds and maintains caliposo's user directories.
3. Scan: deals with automatic discovery of virtual networking from VIMs.
4. Listen: deals with automatic updating of virtual networking into inventory.
5. API: runs calipso's RESTful API server.
6. UI: runs calipso's GUI/web server.
7. Sensu: run calipso's monitoring server.

After successful installation Calipso containers should have been downloaded, registered and started, here are the images used:

sudo docker images

Expected results (as of Aug 2017):

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
korenlev/calipso	listen	12086aaedbc3	6 hours ago	1.05GB
korenlev/calipso	api	34c4c6c1b03e	6 hours ago	992MB
korenlev/calipso	scan	1ee60c4e61d5	6 hours ago	1.1GB
korenlev/calipso	sensu	a8a17168197a	6 hours ago	1.65GB
korenlev/calipso	mongo	17f2d62f4445	22 hours ago	1.31GB
korenlev/calipso	ui	ab37b366e812	11 days ago	270MB
korenlev/calipso	ldap	316bc94b25ad	2 months ago	269MB

Typically Calipso application is fully operational at this stage and you can jump to 'Using Calipso' section to learn how to use it, the following explains how the containers are deployed by calipso-installer.py for general reference.

Checking the running containers status and ports in use:

sudo docker ps

Expected results (as of Aug 2017):

CONTAINER ID	IMAGE	STATUS	PORTS	NAMES
ea8655b0c1b8	korenlev/calipso:sensu	Up X hours	0.0.0.0:3000->3000/tcp, 0.0.0.0:4567->4567/tcp, 0.0.0.0:5671->5671/tcp, 0.0.0.0:15672->15672/tcp, 0.0.0.0:20022->22/tcp	calipso-sensu
2a4d0f5b0006	korenlev/calipso:scan	Up X hours	0.0.0.0:30022->22/tcp	calipso-scan
ffa0649eeb9c	korenlev/calipso:api	Up X hours	0.0.0.0:8000->8000/tcp, 0.0.0.0:40022->22/tcp	calipso-api
4c83fdfc498a	korenlev/calipso:listen	Up X hours	0.0.0.0:50022->22/tcp	calipso-listen
25525bca3c7b	korenlev/calipso:ui	Up X hours	0.0.0.0:80->3000/tcp	calipso-ui
9c1be42b8efa	korenlev/calipso:ldap	Up X hours	0.0.0.0:389->389/tcp, 0.0.0.0:389->389/udp	calipso-ldap
6e971f9504c5	korenlev/calipso:mongo	Up X hours	0.0.0.0:27017->27017/tcp, 0.0.0.0:28017->28017/tcp	calipso-mongo

The above listed TCP ports are used by default on the hosts to map to each calipso container, you should be familiar with this mapping of port assignment per container.

Checking running containers entry-points (commands used inside the container):

sudo docker inspect [container-ID]

Expected results (as of Aug 2017):

CONTAINER	ENVIRONMENT VARS	COMMAND (docker inspect 'entrypoint')	MOUNTS
korenlev/calipso:sensu	"PYTHONPATH=/home/scan/calipso_prod/app", "MONGO_CONFIG=/local_dir/calipso_mongo_access.conf",	/usr/bin/supervisord	"Source": "/home/calipso", "Destination": "/local_dir",
korenlev/calipso:scan	"PYTHONPATH=/home/scan/calipso_prod/app", "MONGO_CONFIG=/local_dir/calipso_mongo_access.conf",	/usr/sbin/sshd -D & python3 /home/scan/calipso_prod/app/discover/scan_manager.py -m $MONGO_CONFIG	"Source": "/home/calipso", "Destination": "/local_dir",
korenlev/calipso:api	"PYTHONPATH=/home/scan/calipso_prod/app", "MONGO_CONFIG=/local_dir/calipso_mongo_access.conf", "LDAP_CONFIG=/local_dir/ldap.conf" "LOG_LEVEL=DEBUG", "BIND=0.0.0.0:8000"	/usr/sbin/sshd -D & python3 /home/scan/calipso_prod/app/api/server.py -m $MONGO_CONFIG --ldap_config $LDAP_CONFIG -b $BIND -l $LOG_LEVEL"	"Source": "/home/calipso", "Destination": "/local_dir",
korenlev/calipso:listen	"PYTHONPATH=/home/scan/calipso_prod/app", "MONGO_CONFIG=/local_dir/calipso_mongo_access.conf",	/usr/sbin/sshd -D & python3 /home/scan/calipso_prod/app/discover/event_manager.py -m $MONGO_CONFIG	"Source": "/home/calipso", "Destination": "/local_dir",
korenlev/calipso:ui	"ROOT_URL=http://172.17.0.1:80" "MONGO_URL=mongodb://calipso:calipso_default@172.17.0.1:27017/calipso "LDAP_CONFIG=/local_dir/ldap.conf"	./entrypoint.sh	calipso-ui
korenlev/calipso:ldap	N/A	slapd -h 'ldap:/// ldapi:///' -g openldap -u openldap -F /etc/ldap/slapd.d -d stats	"Source": "/home/calipso", "Destination": "/local_dir",
korenlev/calipso:mongo	"MONGO_PACKAGE=mongodb-org", "MONGO_REPO=repo.mongodb.org", "MONGO_MAJOR=3.4", "MONGO_VERSION=3.4.5"	/usr/bin/mongod	"Source": "/var/lib/docker/volumes/dc840e447ab83c7d7dbfdad03a784312adc1e1f74c365477/_data", "Destination": "/data/db"

Calipso containers configuration can be listed with **docker inspect**, summarized in the table above. In a none-containerized deployment (see 'Monolithic app install option in the install-guide) these are the individual commands that are needed to run calipso manually for special development needs.
The 'calipso-sensu' is built using sensu framework customized for calipso monitoring needs, 'calipso-ui' is built using meteor framework, 'calipso-ldap' is built using pre-defined open-ldap container, and as such those three are only supported as pre-built containers.
Administrator should be aware of the following details of the containers:

1. calipso-api, calipso-sensu, calipso-scan and calipso-listen maps host directory /home/calipso as volume /local_dir inside the container.
   They use calipso_mongo_access.conf and ldap.conf files for configuration.
   They use /home/scan/calipso_prod/app as the main PYTHONPATH needed to run the different python applications per container.
2. Calipso-sensu is using supervisord process controller to control all sensu server processes needed for calipso and the calipso event handler on this container.
3. Calipso-ui and calipso-ldap are running

1.3 Calipso containers access

Calipso different containers are also accessible using SSH and pre-defined default credentials, access details:

Calipso-listen: ssh scan@localhost –p 50022 , password = scan

Calipso-scan: ssh scan@localhost –p 30022 , password = scan

Calipso-api: ssh scan@localhost –p 40022 , password = scan

Calipso-sensu: ssh scan@localhost –p 20022 , password = scan

Calipso-ui: only accessible through web browser

Calipso-ldap: only accessible through ldap tools.

Calipso-mongo: only accessible through mongo clients like MongoChef.

2 Validating Calipso app

2.1 Validating calipso-mongo module

Using MongoChef client, create a new connection pointing to the server where calipso-mongo container is running, using port 27017 and the following default credentials:

Host IP=server_IP and TCP port=27017

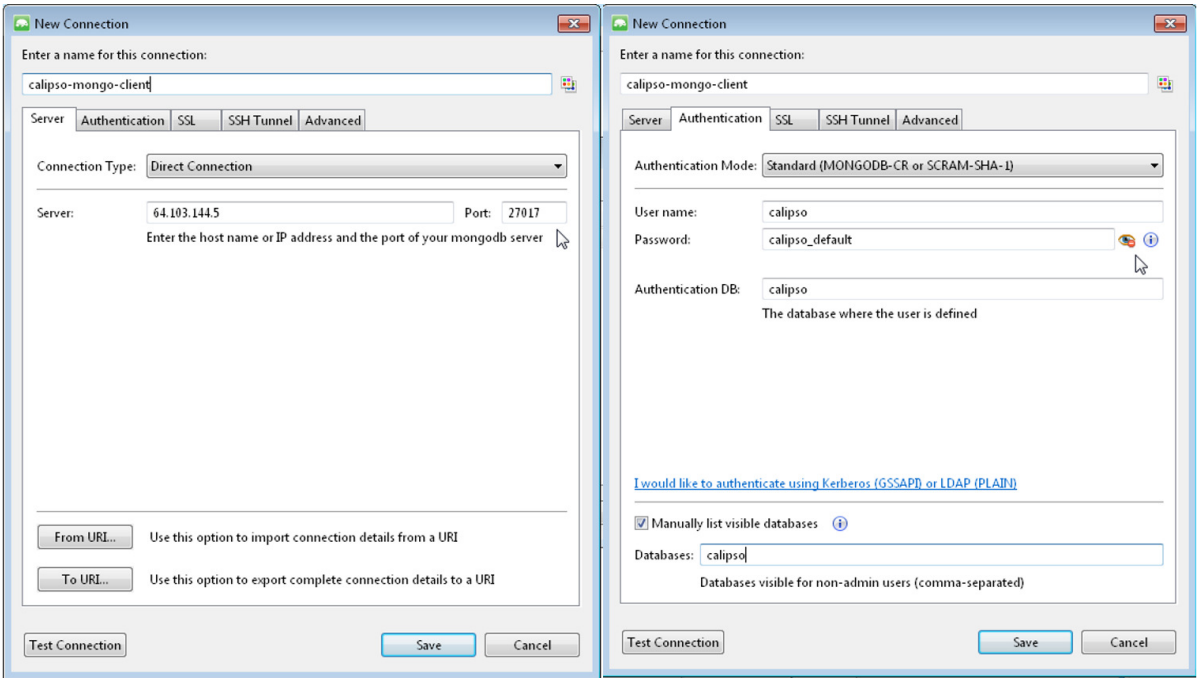
Username : calipso

Password : calipso_default

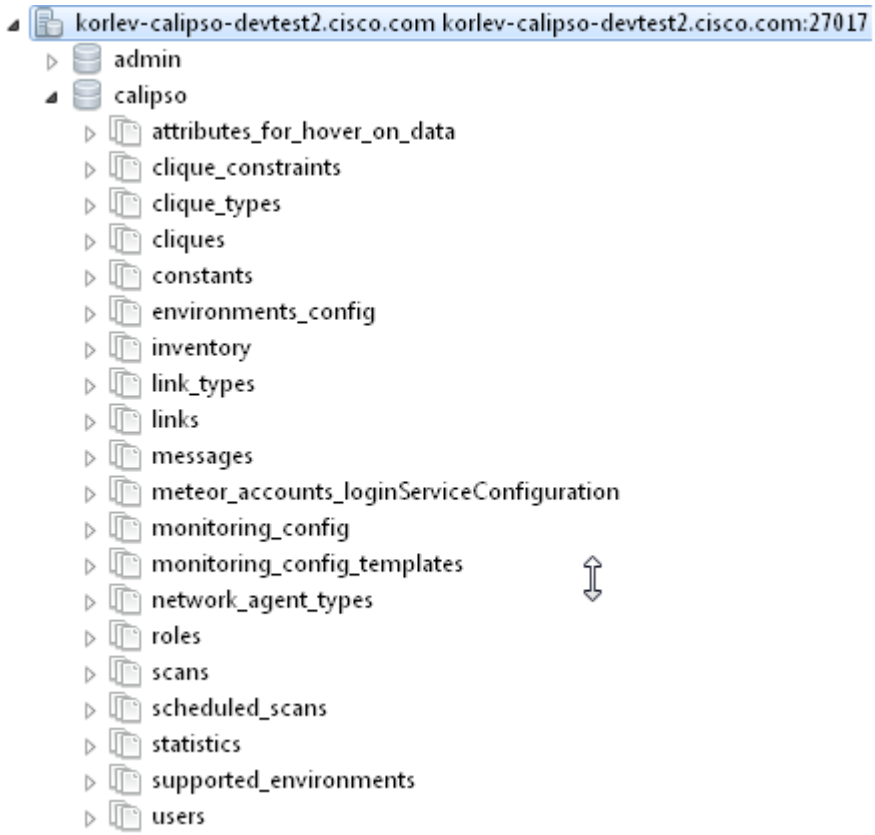
Auto-DB: calipso

Defaults are also configured into /home/calipso/calipso_mongo_access.conf.

The following is a screenshot of a correct connection setup in MongoChef:



When clicking on the new defined connection the calipso DB should be listed:



At this stage you can checkout calipso-mongo collections data and validate as needed.

2.2 Validating calipso-scan module

Scan container is running the main calipso scanning engine that receives requests to scan a specific VIM environment, this command will validate that the main scan_manager.py process is running and waiting for scan requests:

sudo docker ps # grab the containerID of calipso-scan

sudo docker logs bf5f2020028a #containerID for example

Expected results:

2017-08-28 06:11:39,231 INFO: Using inventory collection: inventory

2017-08-28 06:11:39,231 INFO: Using links collection: links

2017-08-28 06:11:39,231 INFO: Using link_types collection: link_types

2017-08-28 06:11:39,231 INFO: Using clique_types collection: clique_types

2017-08-28 06:11:39,231 INFO: Using clique_constraints collection: clique_constraints

2017-08-28 06:11:39,231 INFO: Using cliques collection: cliques

2017-08-28 06:11:39,232 INFO: Using monitoring_config collection: monitoring_config

2017-08-28 06:11:39,232 INFO: Using constants collection: constants

2017-08-28 06:11:39,232 INFO: Using scans collection: scans

2017-08-28 06:11:39,232 INFO: Using messages collection: messages

2017-08-28 06:11:39,232 INFO: Using monitoring_config_templates collection: monitoring_config_templates

2017-08-28 06:11:39,232 INFO: Using environments_config collection: environments_config

2017-08-28 06:11:39,232 INFO: Using supported_environments collection: supported_environments

2017-08-28 06:11:39,233 INFO: Started ScanManager with following configuration:

Mongo config file path: /local_dir/calipso_mongo_access.conf

Scans collection: scans

Environments collection: environments_config

Polling interval: 1 second(s)

The above logs basically shows that scan_manager.py is running and listening to scan requests (should they come in through into ‘scans’ collection for specific environment listed in ‘environments_config’ collection, refer to use-guide for details).

2.3 Validating calipso-listen module

Listen container is running the main calipso event_manager engine that listens for events on a specific VIM BUS environment, this command will validate that the main event_manager.py process is running and waiting for events from the BUS:

2017-08-28 06:11:35,572 INFO: Using inventory collection: inventory

2017-08-28 06:11:35,572 INFO: Using links collection: links

2017-08-28 06:11:35,572 INFO: Using link_types collection: link_types

2017-08-28 06:11:35,572 INFO: Using clique_types collection: clique_types

2017-08-28 06:11:35,572 INFO: Using clique_constraints collection: clique_constraints

2017-08-28 06:11:35,573 INFO: Using cliques collection: cliques

2017-08-28 06:11:35,573 INFO: Using monitoring_config collection: monitoring_config

2017-08-28 06:11:35,573 INFO: Using constants collection: constants

2017-08-28 06:11:35,573 INFO: Using scans collection: scans

2017-08-28 06:11:35,573 INFO: Using messages collection: messages

2017-08-28 06:11:35,573 INFO: Using monitoring_config_templates collection: monitoring_config_templates

2017-08-28 06:11:35,573 INFO: Using environments_config collection: environments_config

2017-08-28 06:11:35,574 INFO: Using supported_environments collection: supported_environments

2017-08-28 06:11:35,574 INFO: Started EventManager with following configuration:

Mongo config file path: /local_dir/calipso_mongo_access.conf

Collection: environments_config

Polling interval: 5 second(s)

The above logs basically shows that event_manager.py is running and listening to event (should they come in through from VIM BUS) and listed in 'environments_config' collection, refer to use-guide for details).

2.4 Validating calipso-api module

Scan container is running the main calipso API that allows applications to integrate with calipso inventory and functions, this command will validate it is operational:

sudo docker ps # grab the containerID of calipso-scan

sudo docker logs bf5f2020028c #containerID for example

Expected results:

2017-08-28 06:11:38,118 INFO: Using inventory collection: inventory

2017-08-28 06:11:38,119 INFO: Using links collection: links

2017-08-28 06:11:38,119 INFO: Using link_types collection: link_types

2017-08-28 06:11:38,119 INFO: Using clique_types collection: clique_types

2017-08-28 06:11:38,120 INFO: Using clique_constraints collection: clique_constraints

2017-08-28 06:11:38,120 INFO: Using cliques collection: cliques

2017-08-28 06:11:38,121 INFO: Using monitoring_config collection: monitoring_config

2017-08-28 06:11:38,121 INFO: Using constants collection: constants

2017-08-28 06:11:38,121 INFO: Using scans collection: scans

2017-08-28 06:11:38,121 INFO: Using messages collection: messages

2017-08-28 06:11:38,121 INFO: Using monitoring_config_templates collection: monitoring_config_templates

2017-08-28 06:11:38,122 INFO: Using environments_config collection: environments_config

2017-08-28 06:11:38,122 INFO: Using supported_environments collection: supported_environments

[2017-08-28 06:11:38 +0000] [6] [INFO] Starting gunicorn 19.4.5

[2017-08-28 06:11:38 +0000] [6] [INFO] Listening at: http://0.0.0.0:8000 (6)

[2017-08-28 06:11:38 +0000] [6] [INFO] Using worker: sync

[2017-08-28 06:11:38 +0000] [12] [INFO] Booting worker with pid: 12

The above logs basically shows that the calipso api is running and listening on port 8000 for requests.

2.5 Validating calipso-sensu module

Sensu container is running several servers (currently unified into one for simplicity) and the calipso event handler (refer to use-guide for details), here is how to validate it is operational:

ssh scan@localhost -p 20022 # default password = scan

sudo /etc/init.d/sensu-client status

sudo /etc/init.d/sensu-server status

sudo /etc/init.d/sensu-api status

sudo /etc/init.d/uchiwa status

sudo /etc/init.d/rabbitmq-server status

Expected results:

Each of the above should return a pid and a 'running' state +

ls /home/scan/calipso_prod/app/monitoring/handlers # should list monitor.py module.

The above logs basically shows that calipso-sensu is running and listening to monitoring events from sensu-clients on VIM hosts, refer to use-guide for details).

2.6 Validating calipso-ui module

UI container is running several JS process with the back-end mongoDB, it needs data to run and it will not run if any connection with DB is lost, this is per design. To validate operational state of the UI simply point a Web Browser to : http://server-IP:80 and expect a login page. Use admin/123456 as default credentials to login:

2.7 Validating calipso-ldap module

LDAP container is running a common user directory for integration with UI and API modules, it is placed with calipso to validate interaction with LDAP. The main configuration needed for communication with it is stored by calipso installer in /home/calipso/ldap.conf and accessed by the API module. We assume in production

use-cases a corporate LDAP server might be used instead, in that case ldap.conf needs to be changed and point to the corporate server.

To validate LDAP container, you will need to install openldap-clients, using:

yum -y install openldap-clients / apt-get install openldap-clients

Search all LDAP users inside that ldap server:

ldapsearch -H ldap://localhost -LL -b ou=Users,dc=openstack,dc=org x

Admin user details on this container (user=admin, pass=password):

LDAP username : cn=admin,dc=openstack,dc=org
cn=admin,dc=openstack,dc=org's password : password
Account BaseDN [DC=168,DC=56,DC=153:49154]:
ou=Users,dc=openstack,dc=org
Group BaseDN [ou=Users,dc=openstack,dc=org]:

Add a new user (admin credentials needed to bind to ldap and add users):

Create a **/tmp/adduser.ldif** file, use this example:

dn: cn=Myname,ou=Users,dc=openstack,dc=org // which org, which ou etc ...
objectclass: inetOrgPerson
cn: Myname // match the dn details !
sn: Koren
uid: korlev
userpassword: mypassword // the password
carlicense: MYCAR123
homephone: 555-111-2222
mail: korlev@cisco.com
description: koren guy
ou: calipso Department

Run this command to add the above user attributes into the ldap server:

ldapadd -x -D cn=admin,dc=openstack,dc=org -w password -c -f /tmp/adduser.ldif
// for example, the above file is used and the admin bind credentials who is, by default, authorized to add users.

You should see **"user added"** message if successful

Validate users against this LDAP container:

Wrong credentials:

ldapwhoami -x -D cn=Koren,ou=Users,dc=openstack,dc=org -w korlevwrong
Response: ldap_bind: Invalid credentials (49)

Correct credentials:

ldapwhoami -x -D cn=Koren,ou=Users,dc=openstack,dc=org -w korlev
Response: dn:cn=Koren,ou=Users,dc=openstack,dc=org

The reply ou/dc details can be used by any application (UI and API etc) for mapping users to some application specific group…