Teleport Security Model

Intro

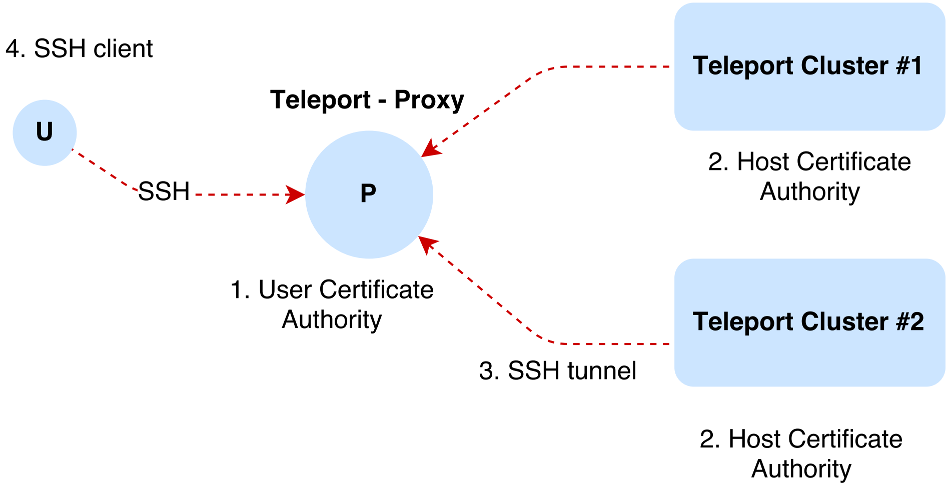
Teleport is an SSH server that supports only short lived certificates as authentication method. It provides two ways to access the cluster - via SSH or web-based access.

Components

Teleport system consists of two independent parts:

- Teleport Cluster is a set of remote SSH servers using one host certificate authority to identify the cluster.
- Teleport Proxy is a remote SSH proxy that uses user certificate authority to identify the organization and is set up remotely and indepenedently from the Teleport Cluster.

Teleport proxy and teleport cluster identify each other by trusting each other keys used as a certificate authorities:


4. SSH client
U
SSH
Teleport - Proxy
P
1. User Certificate Authority
Teleport Cluster #1
2. Host Certificate Authority
Teleport Cluster #2
3. SSH tunnel
2. Host Certificate Authority

1. Teleport-proxy uses certs signed by it's user certificate authority to identify it's users. Teleport-proxy has a list of trusted remote host certificate authorities, keys signed by these authorities ar the only keys that are allowed to connect to it.
2. Teleport-cluster uses host certs signed by it's host certificate authority to identify SSH tunnel connections mantained by some of it's tunnel servers.
3. Teleport-cluster initiates and mantains the SSH tunnel to the teleport-proxy that is used for all SSH communications between users and the remote cluster.
4. Individual SSH clients connect to Teleport-Proxy to connect to remote teleport clusters.

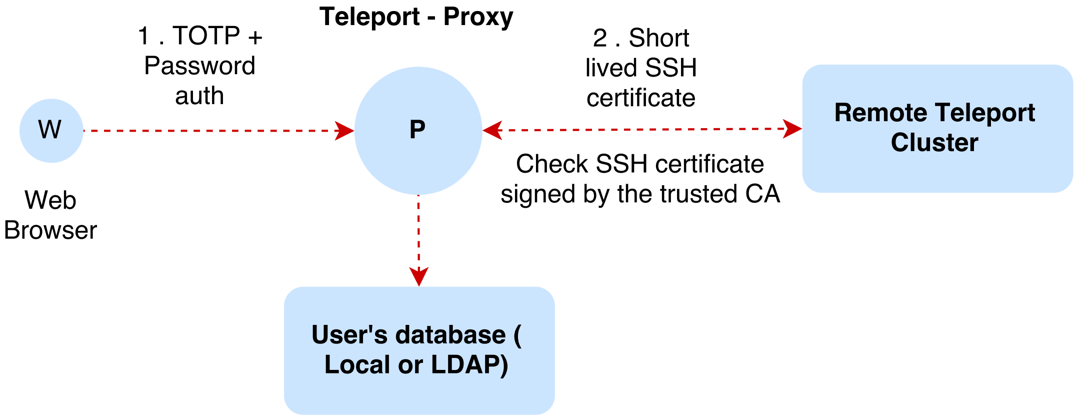
It's worth to mention that as long as teleport-cluster initiates the connection to the proxy, it does not have the listening socket, and the possible attack vector is shifted from the remote infrastructure to the teleport-proxy.

This model allows teleport-cluster not to care about the users of every organization and sub organization that has access to it's servers. Teleport-proxy can implement it's own LDAP or any other ACL rules to give/revoke access to every cluster.

Not every server has to connect to the teleport-proxy. Teleport cluster is capable of proxying the connection to any server in the cluster using agent-forwarding if it's allowed by the SSH client.

Web access

Teleport-proxy users can use Web access that uses 2-Factor auth to grant access to the remote clusters:

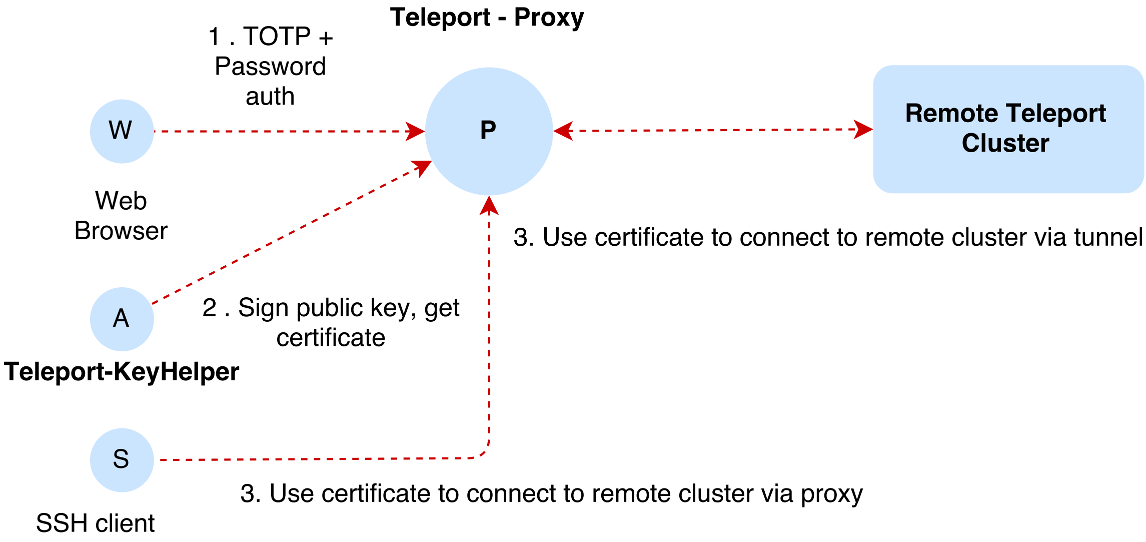

Teleport - Proxy
1 . TOTP + Password auth
W
Web Browser
P
2 . Short lived SSH certificate
Check SSH certificate signed by the trusted CA
Remote Teleport Cluster
User's database (Local or LDAP)

1. Teleport-proxy uses 2-Factor auth (password and TOTP keys as a second factor) to authenticate user.
2. Teleport-proxy generates a short-lived key-pair signed by it's certificate authority and associates this key pair with user's web session. Later on it acts as SSH agent on behalf of user session to authenticate within the remote cluster. It uses web sockets to proxy terminal interaction with the remote cluster and initiates the connecton to the remote teleport cluster.
3. Teleport-cluster checks the certificate just as any other SSH connection.

As long as web session expires in about an hour, the key-pair get's deleted.

SSH access

Teleport-proxy users can use standard SSH client access that uses teleport-proxy as a proxying SSH server to connect to the remote clusters:


Teleport - Proxy
1 . TOTP + Password auth
W
Web Browser
P
Remote Teleport Cluster
3. Use certificate to connect to remote cluster via tunnel
A
2 . Sign public key, get certificate
Teleport-KeyHelper
S
SSH client
3. Use certificate to connect to remote cluster via proxy

1. Users use the same 2-factor auth to gain access to the cluster.
2. Teleport-Keyhelper is a small utility program that mantains a persistent TLS connection to the teleport-proxy. It uses private key over TLS to identify itself. Once it detects that the user has signed in, it sends a user's public key for teleport-proxy to sign. Once the key is signed it writes the certificate to the desired destination.
3. SSH client uses the new key to connect to the teleport-proxy.

A bit more on the teleport-keyhelper. This is a small utility program that helps to get a signed certificate fromt he teleport-proxy and update it on the host, to reduce friction for the end user, user does not have to copy-paste the new certificate each time after sign-on was successful:

```
teleport-key-helper\
    --server=https://example.com/teleport-proxy
    --auth=username --token=token\    # token is used to grant access to this key-helper
    --key-path=/path-to-pubkey.pub\   # path to a public key to sign
    --cert-path=/path-to-cert.cert    # path to a key to overwrite
```

This model will allow to use short-lived keys that are valid for a working day, so user will need to authorize only once a day and use both web and ssh access to the cluster.

As long as certs are no longer valid after a short period of time, no revocation is necessary.

If it's needed to terminate user access to the cluster, it's ACL entry in teleport can be deleted and regardless of the certificate user won't be able to access any teleport cluster.