EVERTRUST

EverTrust Horizon documentation v2.6

Installation Guide

EVERTRUST

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1. Introduction

1.1. Description

Horizon is EverTrust Certificate lifecycle management solution. This document is an installation procedure detailing how to install and bootstrap Horizon server on your infrastructure. It does not describe how to configure and operate a Horizon instance. Please refer to the administration guide for administration related tasks.

1.2. Prerequisites

1.2.1. Choose an installation method

We offer two installation modes:

- A package-based installation on a server running **CentOS/RHEL 7.x/8.x x64**
- A cloud-native installation using Kubernetes

Depending on your needs, you'll have to choose the solution that fits your use cases the best. Reach out to our support team to get suggestions on how to deploy on your infrastructure.

1.2.2. Gathering your credentials

Both methods require that you download the binaries of the Horizon software from our software repository. The access to this repository is protected by username and password, which you should have got from our tech team. If you don't, you won't be able to continue with the installation. Email us to get your credentials, and come back to this step.

2. Installing on CentOS/RHEL

2.1. Pre-requisites

This section describes the system and software pre-requisites to install Horizon.

2.1.1. System pre-requisites

The following elements are considered as system pre-requisites:

- A server running EL [7.x-8.x] x64 (CentOS / RHEL) with the network configured and **SELinux** as well as **FIPS mode** disabled;
- Base and EPEL CentOS / RHEL [7.x-8.x] x64 repositories activated;
- An access with administrative privileges (root) to the server mentioned above;
- The IP address / DNS Name of an SMTP relay;
- The email address of the Horizon server administrator.

2.1.2. Software pre-requisites

The following elements are considered as software pre-requisites:

- The Horizon installation package: `horizon-2.6.X-1.noarch.rpm`;
- The MongoDB Community Edition package available from the MongoDB web site;
- EPEL repository activated.

NOTE

As a reminder, EPEL can be activated on CentOS / RHEL by doing the following:

```
$ yum install epel-release
```

2.2. Installation

2.2.1. Install MongoDB

NOTE Mongo DB version 5.0 to 7.0 are supported by Horizon

Download the latest version of the following Mongo DB 5.x RPMs from the MongoDB web site:

- mongodb-org
- mongodb-org-mongos
- mongodb-org-server
- mongodb-org-shell

- mongodb-org-tools

Download the latest version of the Mongosh RPM from the mongosh github.

- mongodb-mongosh

Upload the downloaded RPMs through SCP on the server under `/root`.

Using an account with privileges, install the RPMs using 'yum'. For example, to install MongoDB version 5.0.1, run the following command from the folder containing the RPMs:

```
$ yum install mongodb-org*
$ yum install mongodb-mongosh
```

Enable the service at startup with the following command:

```
$ systemctl enable mongod
```

Start the mongod service with the following command:

```
$ systemctl start mongod
```

Verify that you can connect to the Mongo instance by running the mongo shell:

```
$ mongo
```

NOTE You can disconnect from the shell with ^D

2.2.2. Install NGINX

1. Access the server through SSH with an account with administrative privileges;
2. Install the NGINX web server using the following command:

   ```
   $ yum install nginx
   ```

3. Enable NGINX to start at boot using the following command:

   ```
   $ systemctl enable nginx
   ```

4. Stop the NGINX service with the following command:

```
$ systemctl stop nginx
```

2.2.3. Install Horizon

Installation from the EverTrust repository

Create a `/etc/yum.repos.d/horizon.repo` file containing the EverTrust repository info:

```
[horizon]
enabled=1
name=Horizon Repository
baseurl=https://repo.evertrust.io/repository/horizon-rpm/
gpgcheck=0
username=<username>
password=<password>
```

Replace `<username>` and `<password>` with the credentials you were provided.

You can then run the following to install the latest Horizon version:

```
$ yum install horizon
```

To prevent unattended upgrades when running yum update, you should pin the Horizon version by adding

```
exclude=horizon
```

at the end of the `/etc/yum.repos.d/horizon.repo` file after installing Horizon.

After installing, services must be reloaded to take the change into account

```
$ systemctl daemon-reload
```

Installing from RPM

Upload the file `horizon-2.6.X-1.noarch.rpm` through SCP under `/root`.

Access the server through SSH with an account with administrative privileges;

Install the Horizon package with the following command:

```
$ yum localinstall /root/horizon-2.6.X-1.noarch.rpm
```

NOTE

Installing the Horizon package will install the following dependencies:

- `dialog`
- `java-17-openjdk-headless`

Please note that these packages may have their own dependencies.

After installing, services must be reloaded to take the change into account

```
$ systemctl daemon-reload
```

2.2.4. Configure the Firewall

Access the server through SSH with an account with administrative privileges;

Open port TCP/443 on the local firewall with the following command:

```
$ firewall-cmd --permanent --add-service=https
```

Reload the firewall configuration with:

```
$ systemctl restart firewalld
```

2.3. Configuration

2.3.1. Initial Configuration

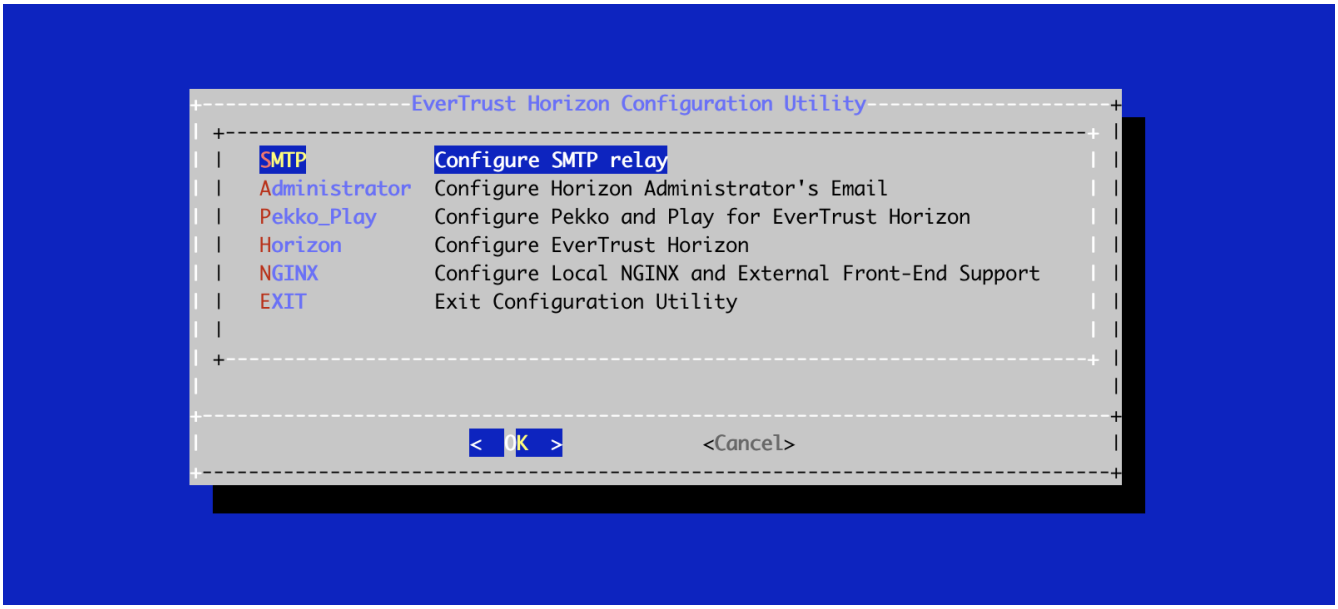
Configuring the SMTP Relay

Access the server through SSH with an account with administrative privileges;

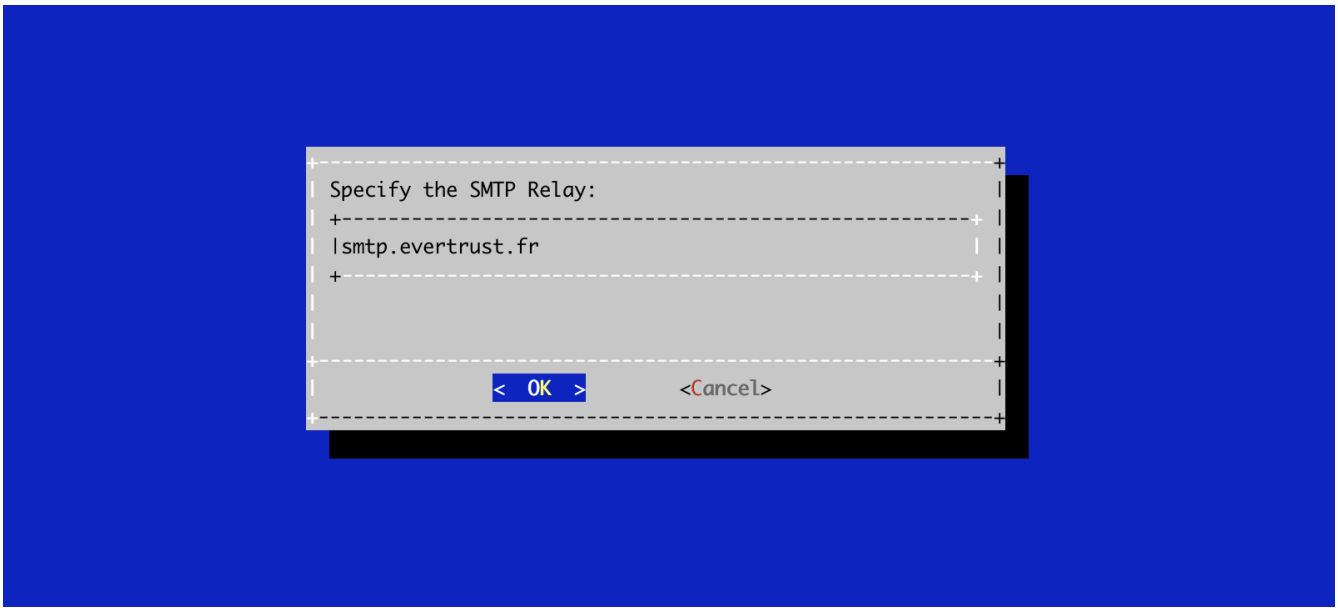
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

In the main menu, select '**SMTP**':



Specify IP address or the DNS name of the SMTP relay and validate:



The Postfix configuration is updated:

Exit the configuration utility and restart the Postfix service with the following command:

```
$ systemctl restart postfix
```

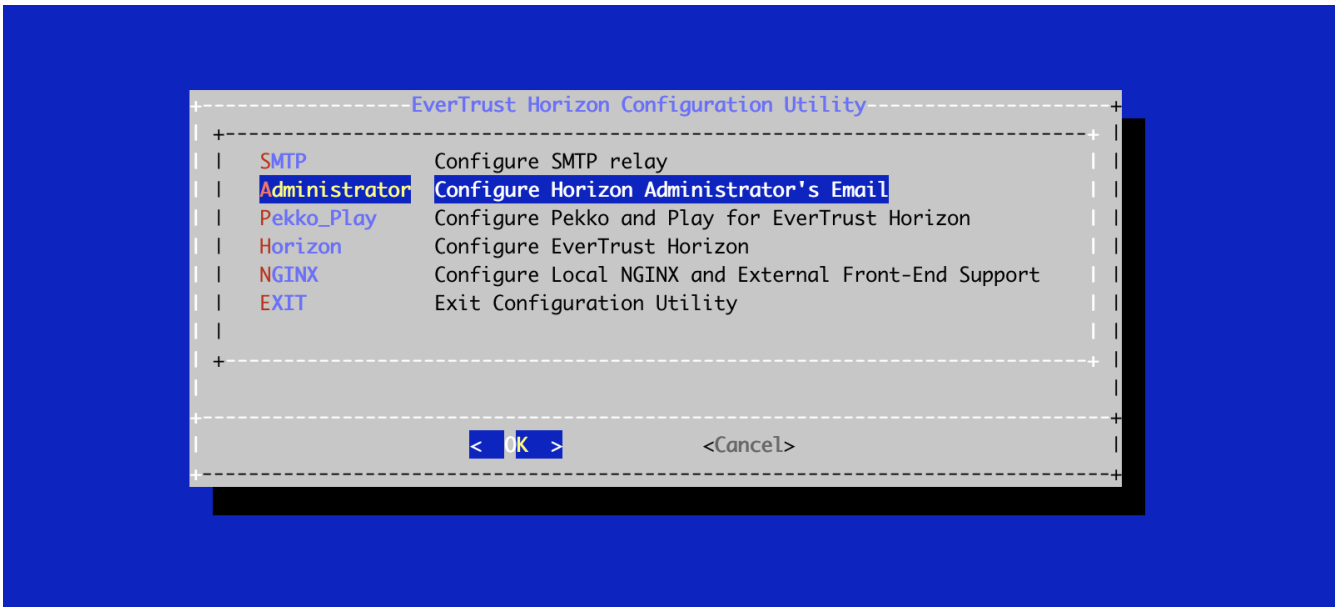
Configuring the Horizon Administrator's Email Address

Access the server through SSH with an account with administrative privileges;

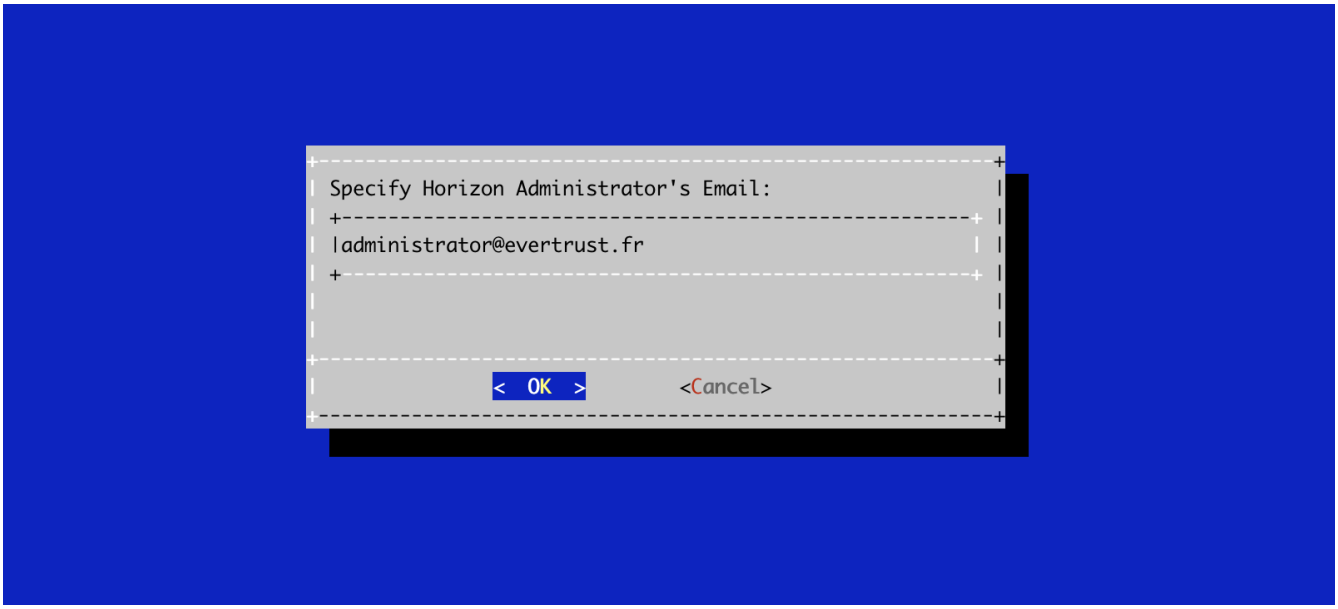
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

In the main menu, select **Administrator**:



Specify the email address of the Horizon Administrator and validate:



Exit the Configuration Utility;

Validate the SMTP relay and Administrator Email Address with the following commands:

```
$ yum install mailx
$ mail -s "Hello Horizon root"
  > Hello From Horizon
  .
```

Ensure that the email receives the test email.

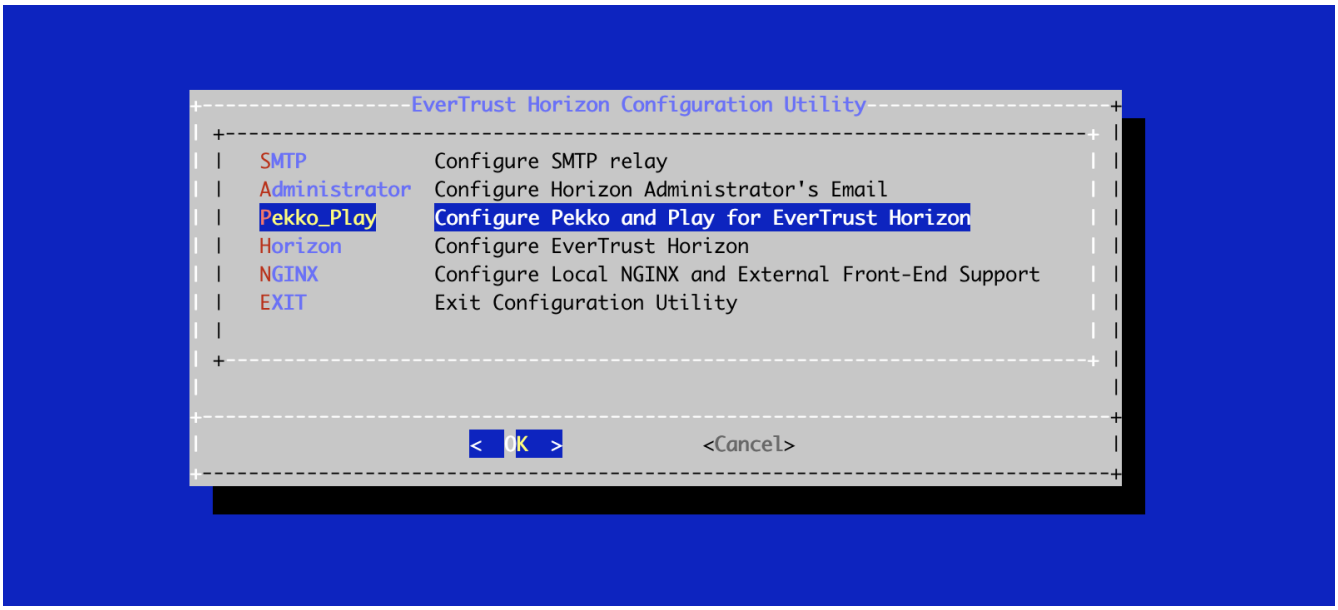
Generating a new Horizon Application Secret

Access the server through SSH with an account with administrative privileges;

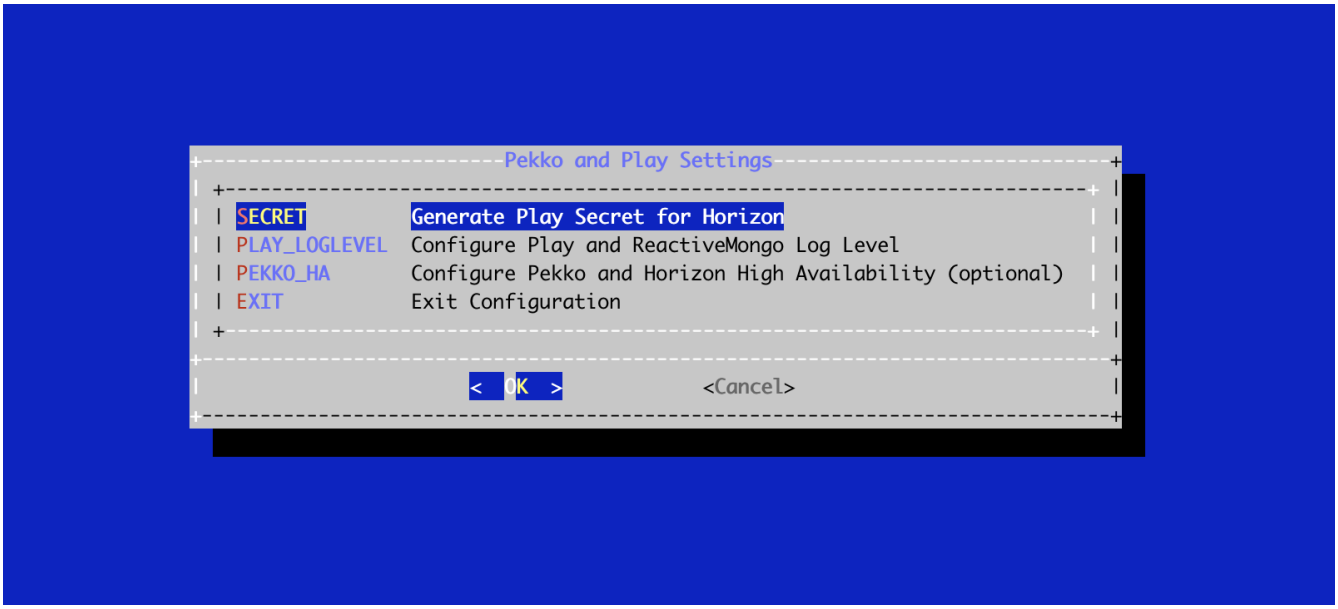
Run the Horizon Configuration Utility with the following command:

```
$/opt/horizon/sbin/horizon-config
```

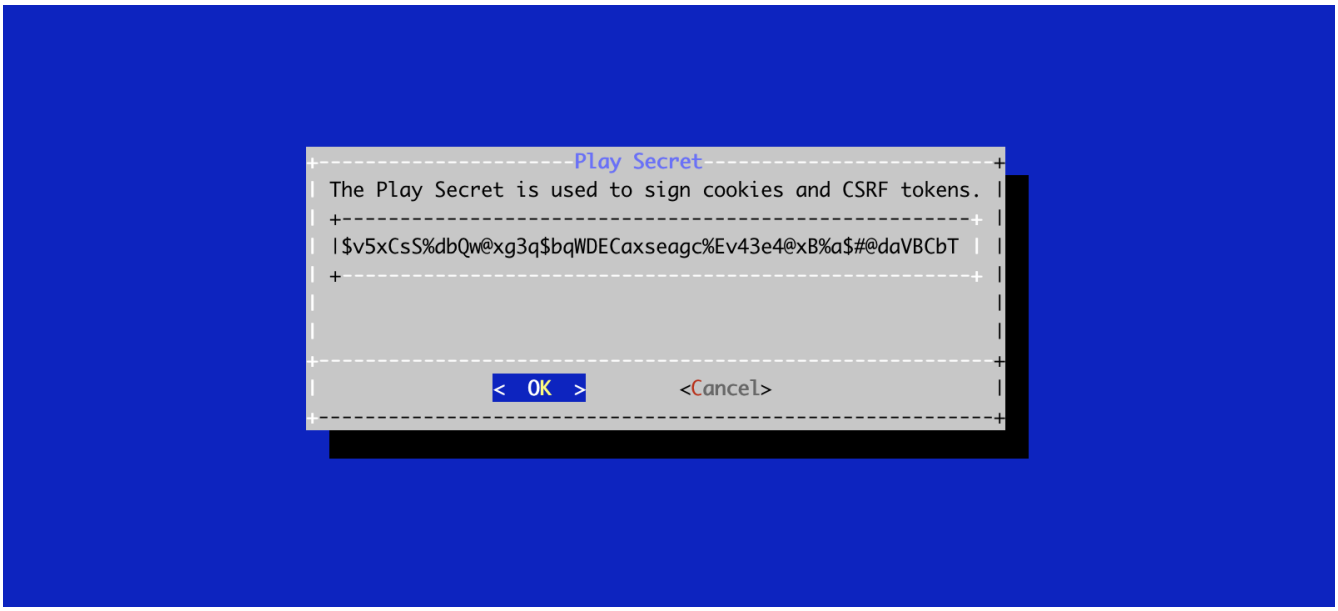
In the main menu, select '**Pekko_Play**':



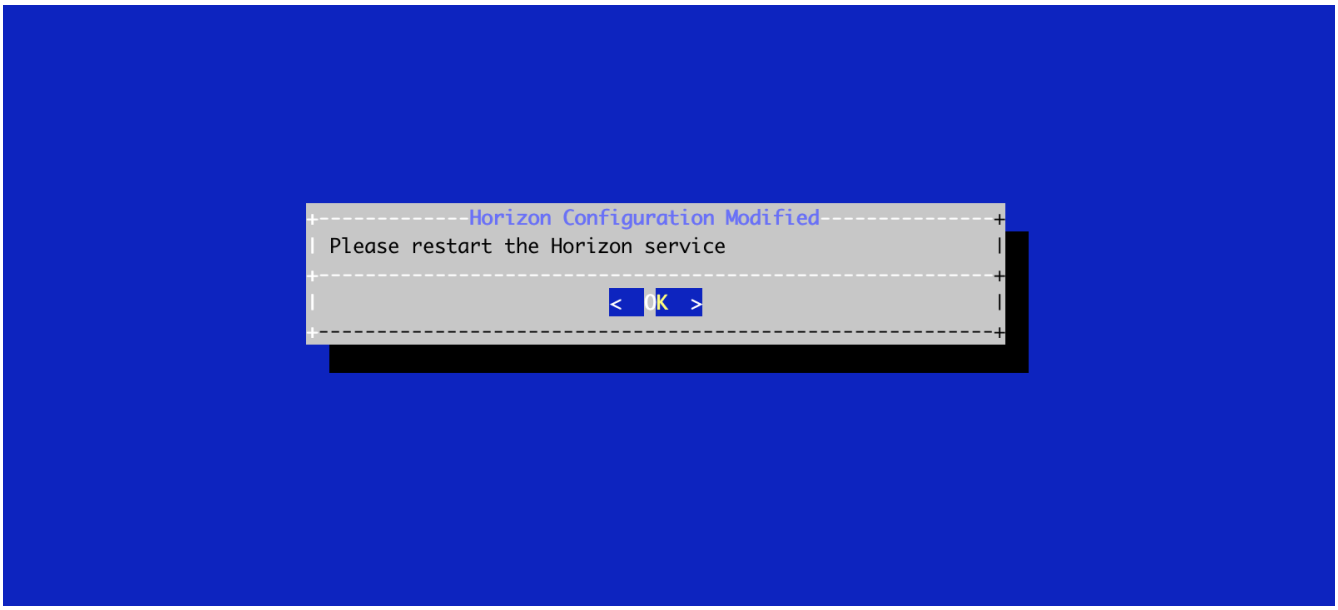
In the Pekko_Play menu, select '**SECRET**':



Validate the new Horizon Application Secret:



The Horizon configuration is updated:



JVM Configuration

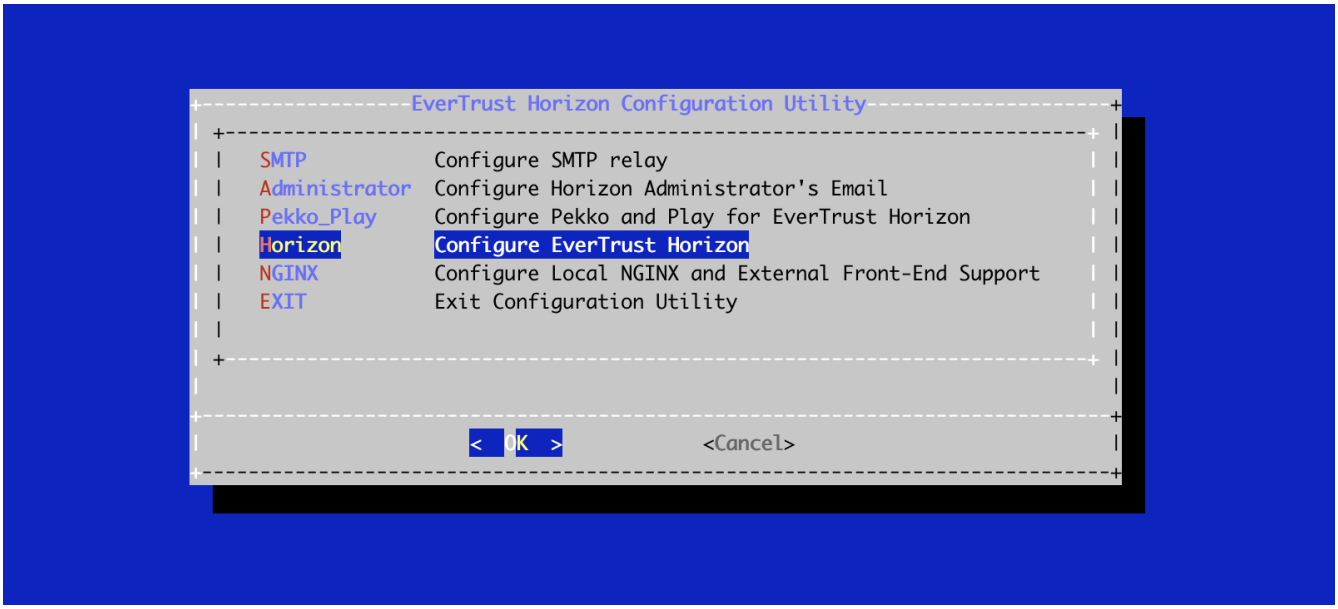
Horizon allows you to configure the ***xms*** (minimum memory allocation pool) and ***xmx*** (maximum memory allocation pool) parameters of the JVM running Horizon using the configuration tool.

Access the server through SSH with an account with administrative privileges;

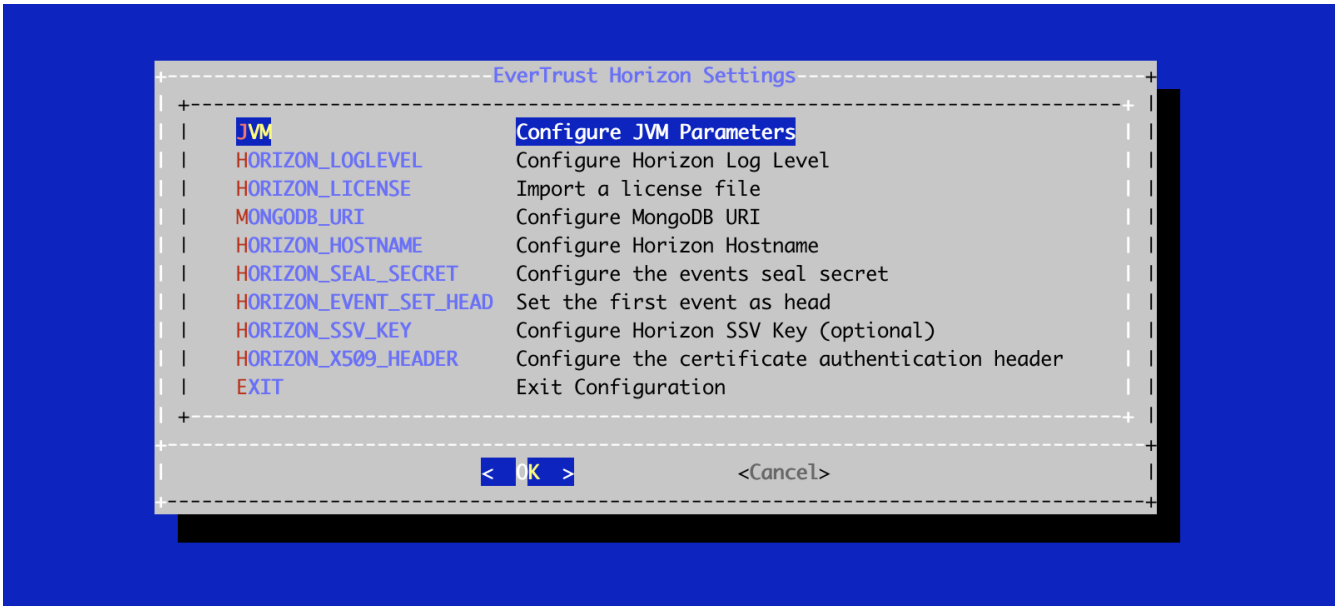
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

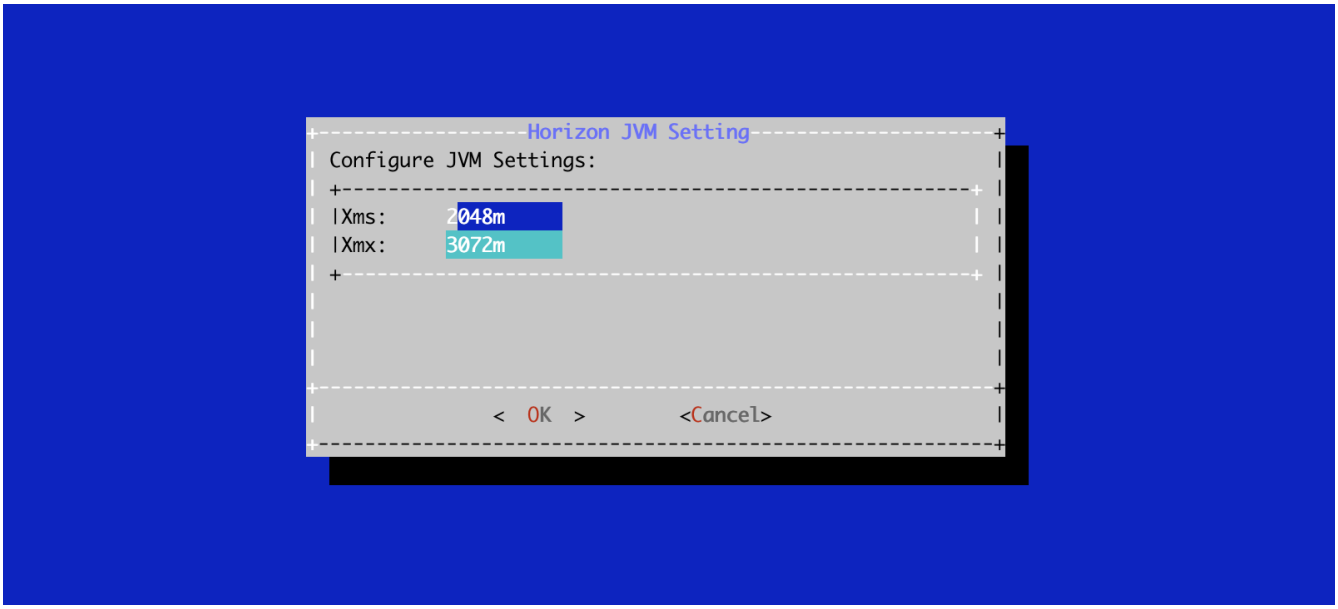
In the configuration menu, select '**Horizon**':



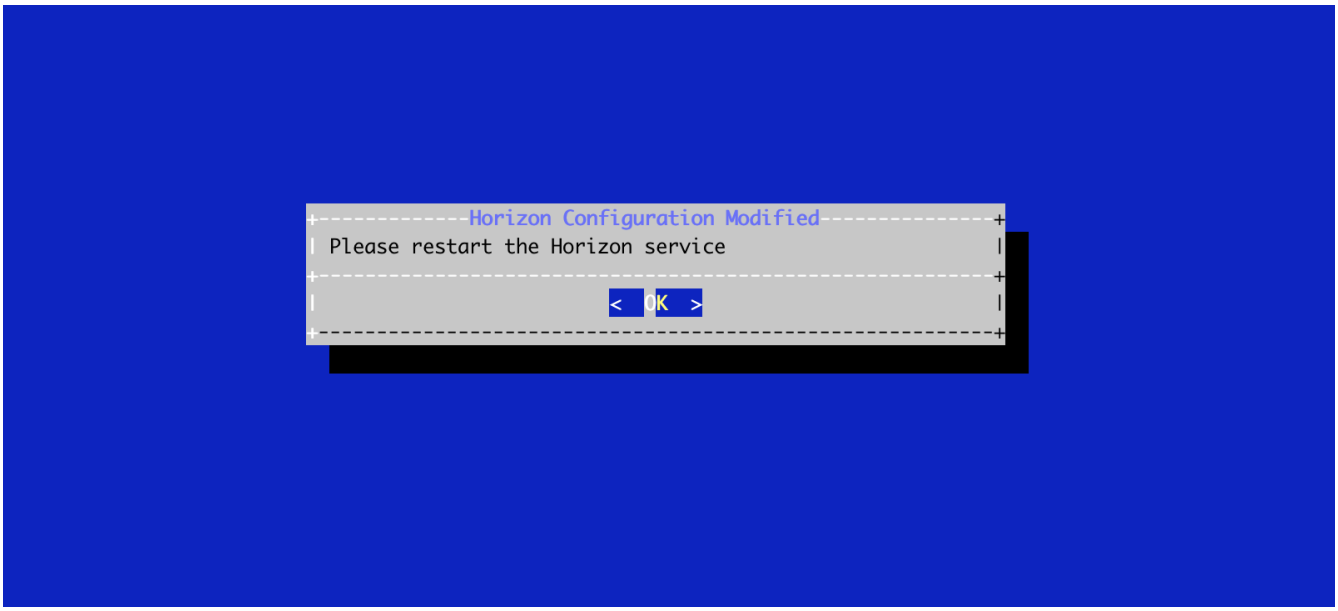
In the Horizon configuration menu, Select '**JVM**':



Specify the 2048 for ***xms*** and 3072 for ***xmx*** parameters and select '**OK**':



The new JVM parameters are configured:



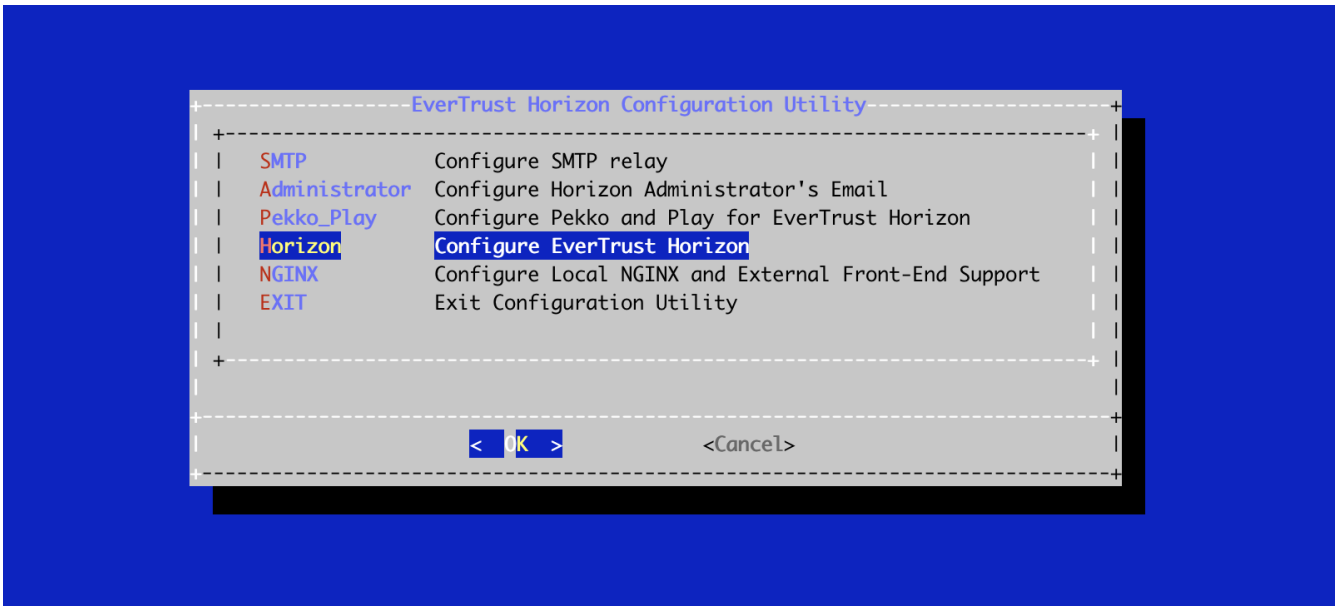
MongoDB URI Configuration

Access the server through SSH with an account with administrative privileges;

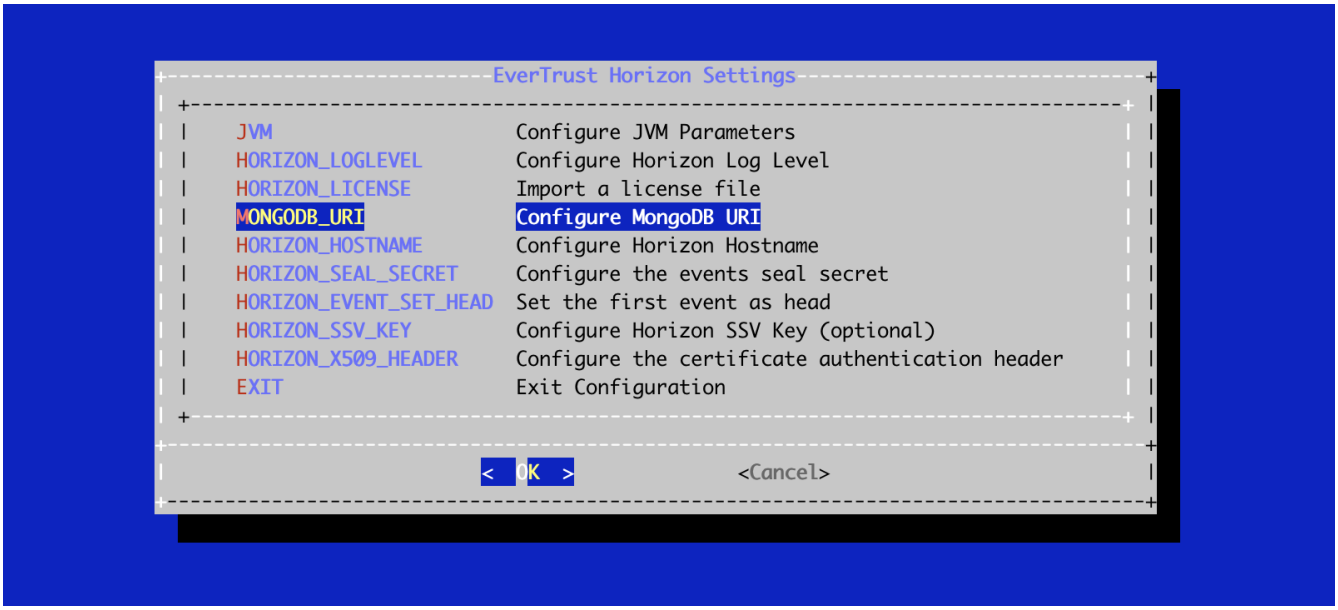
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

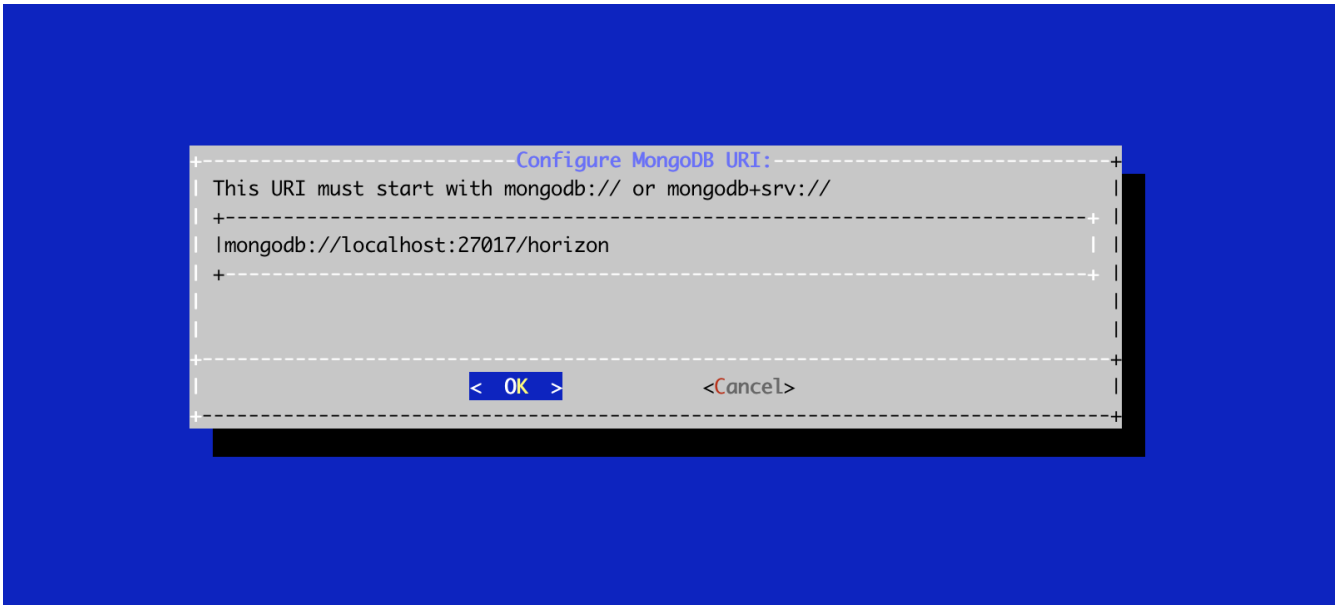
In the main menu, select **Horizon**:



In the Horizon configuration menu, Select **MONGODB_URI**:



Specify the MongoDB URI to target your MongoDB instance:



NOTE

Horizon is installed to target a local MongoDB instance by default.

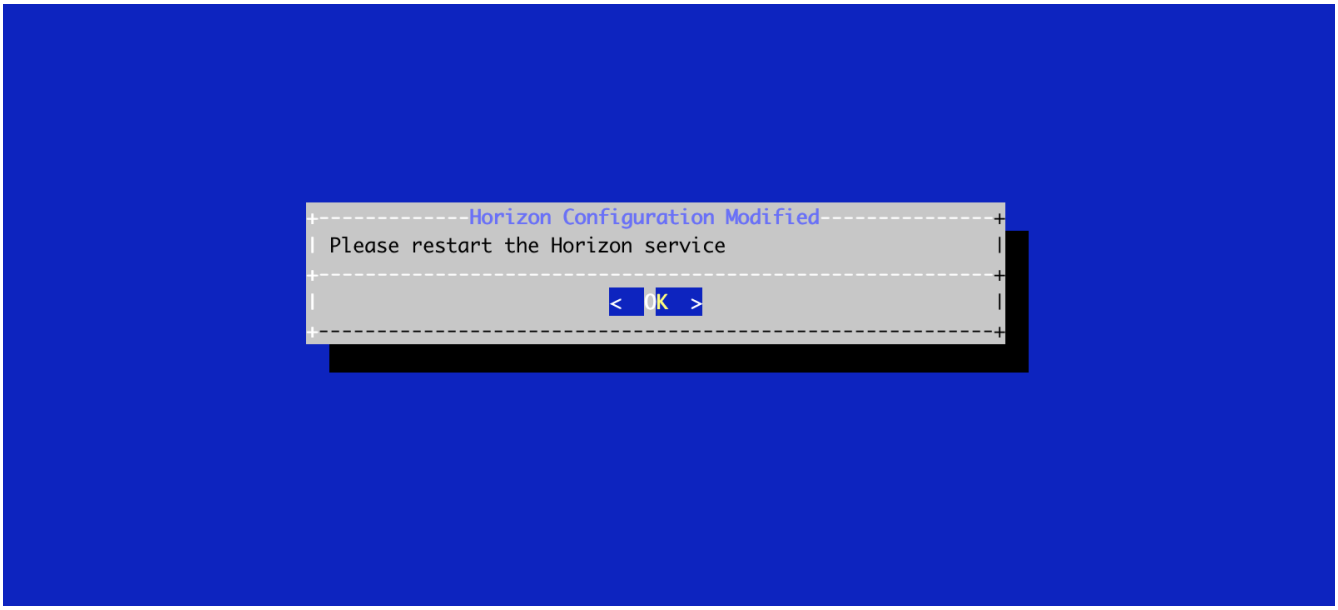
If you use an external MongoDB (such as MongoDB Atlas Database or dedicated On-premises database) instance:

- Create a user with "read/write" permissions on your MongoDB instance;
- Create a replicaSet if using a MongoDB cluster;
- Specify a MongoDB URI that does match your context.

External MongoDB database URI syntax: `mongodb+srv://<user>:<password>@<Mongo-DB-hostname>:<Mongo-DB-Port>/horizon`

External MongoDB cluster of databases URI syntax: `mongodb+srv://<user>:<password>@<Mongo-DB-hostname-1>,<Mongo-DB-hostname-2>:<Mongo-DB-Port>/horizon?replicaSet=<Horizon-ReplicaSet-Name>&authSource=admin`

The MongoURI is configured:



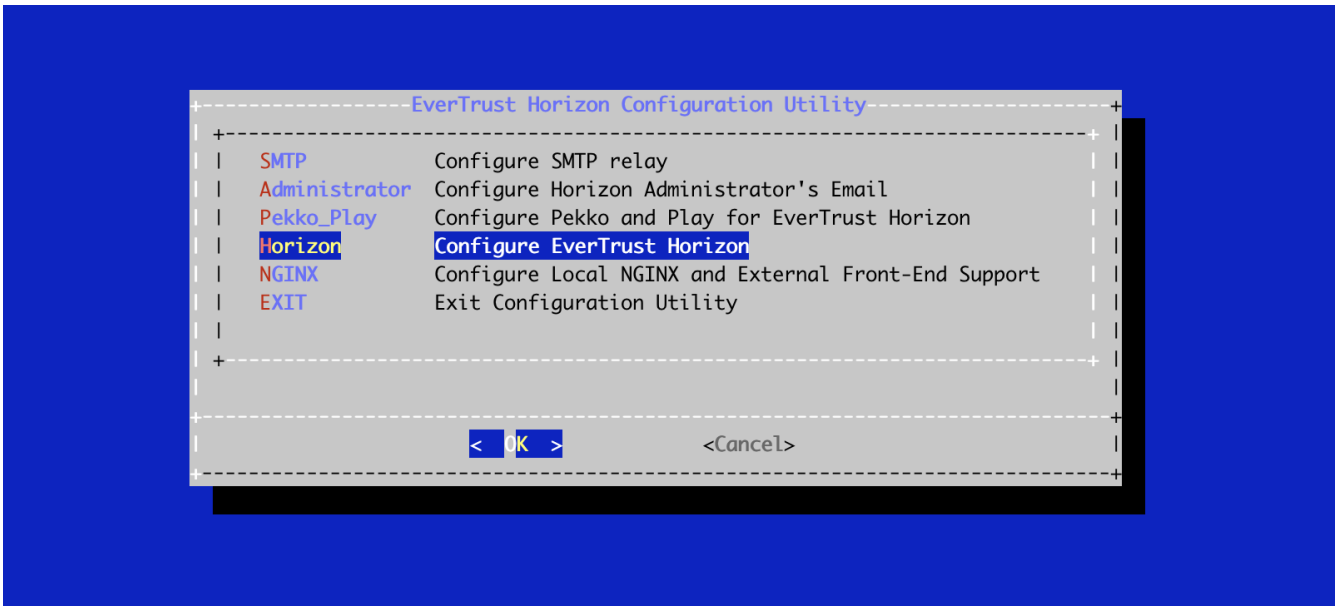
Horizon Hostname Configuration

Access the server through SSH with an account with administrative privileges;

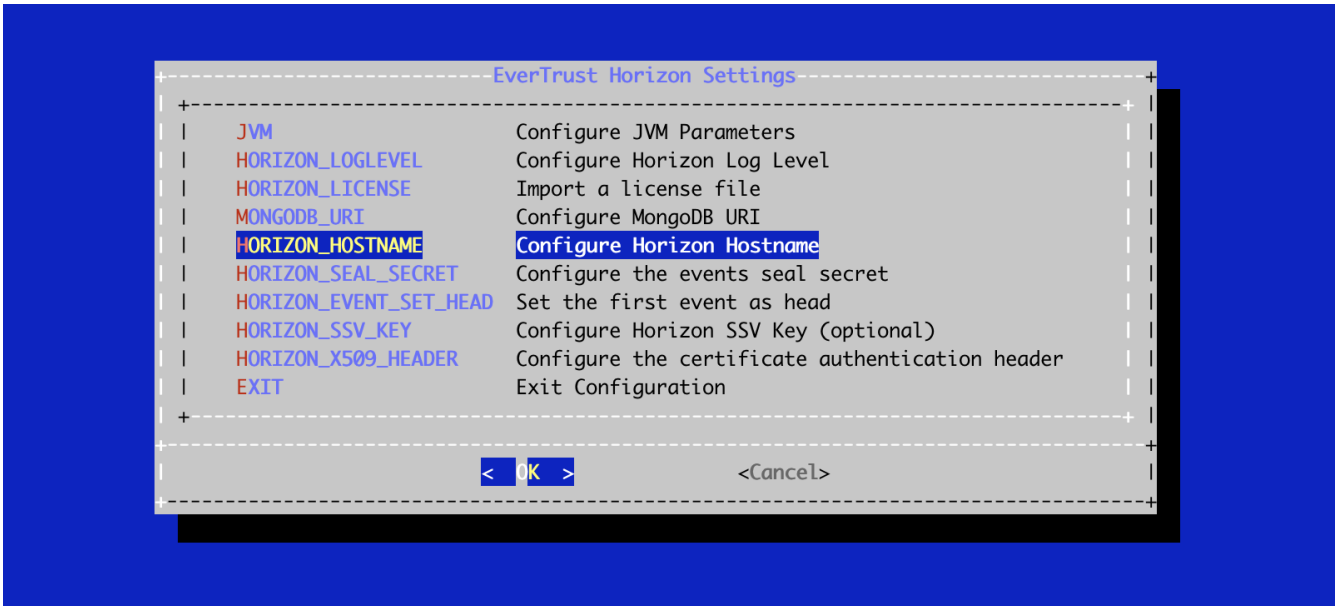
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

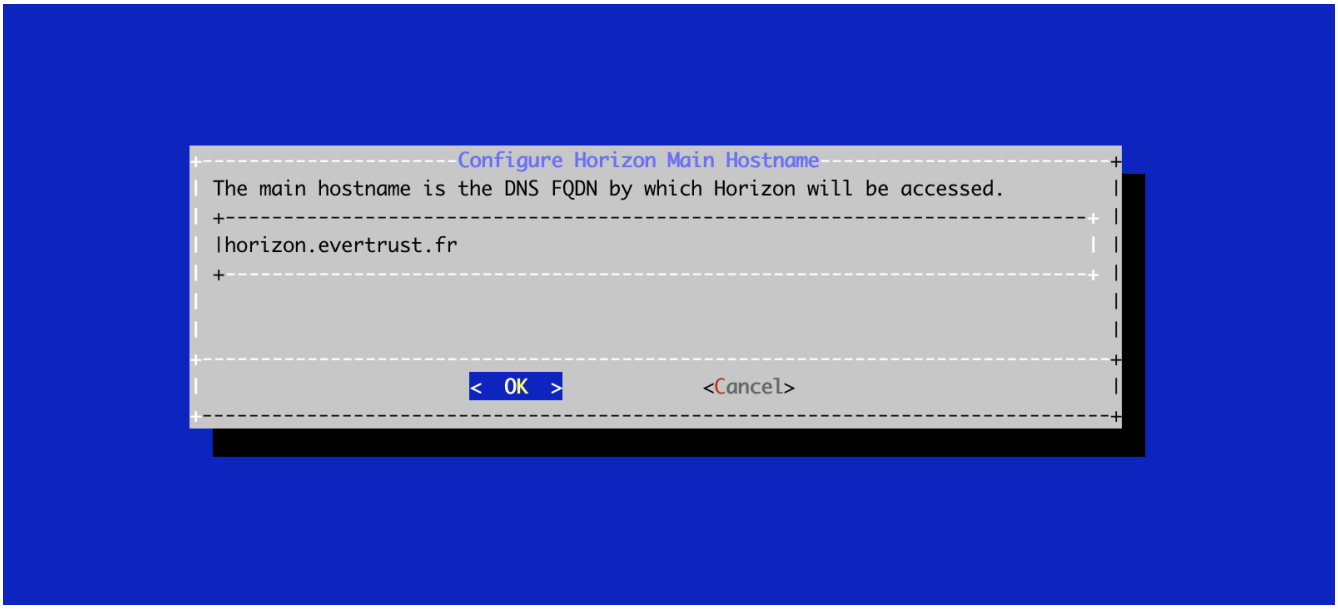
In the main menu, select '**Horizon**':



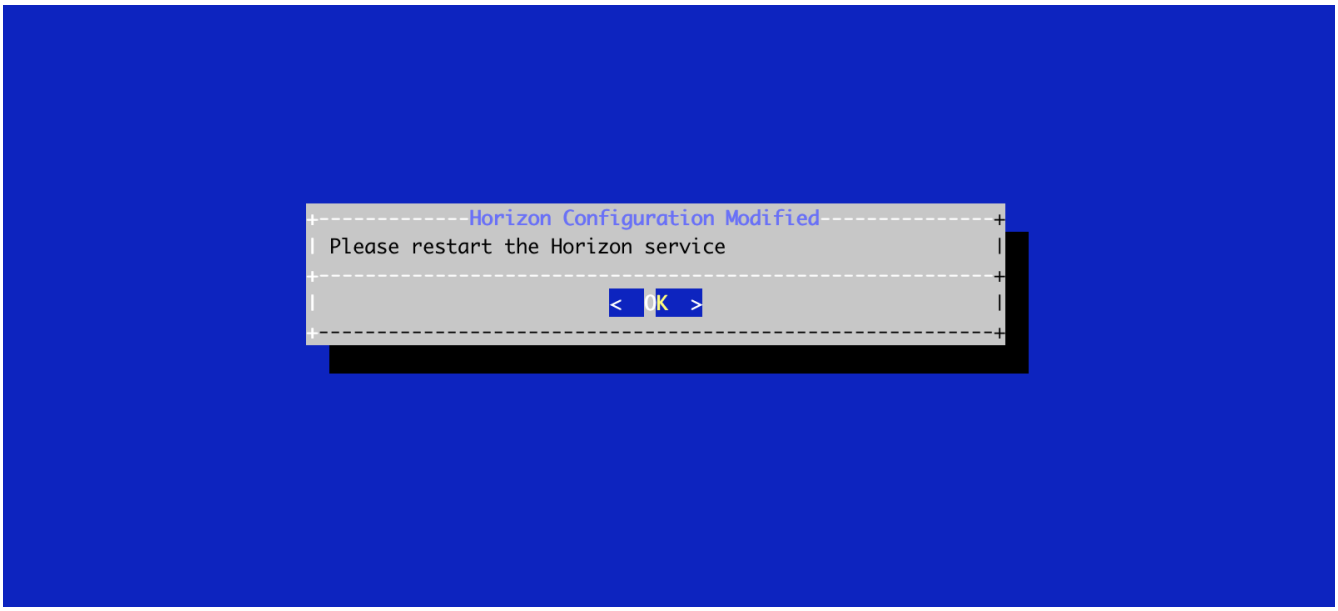
In the Horizon configuration menu, select **HORIZON_HOSTNAME**:



Specify the DNS FQDN by which Horizon will be accessed:



The Horizon Hostname is configured:



Generating an event seal secret

Horizon will generate functional events when using the software.

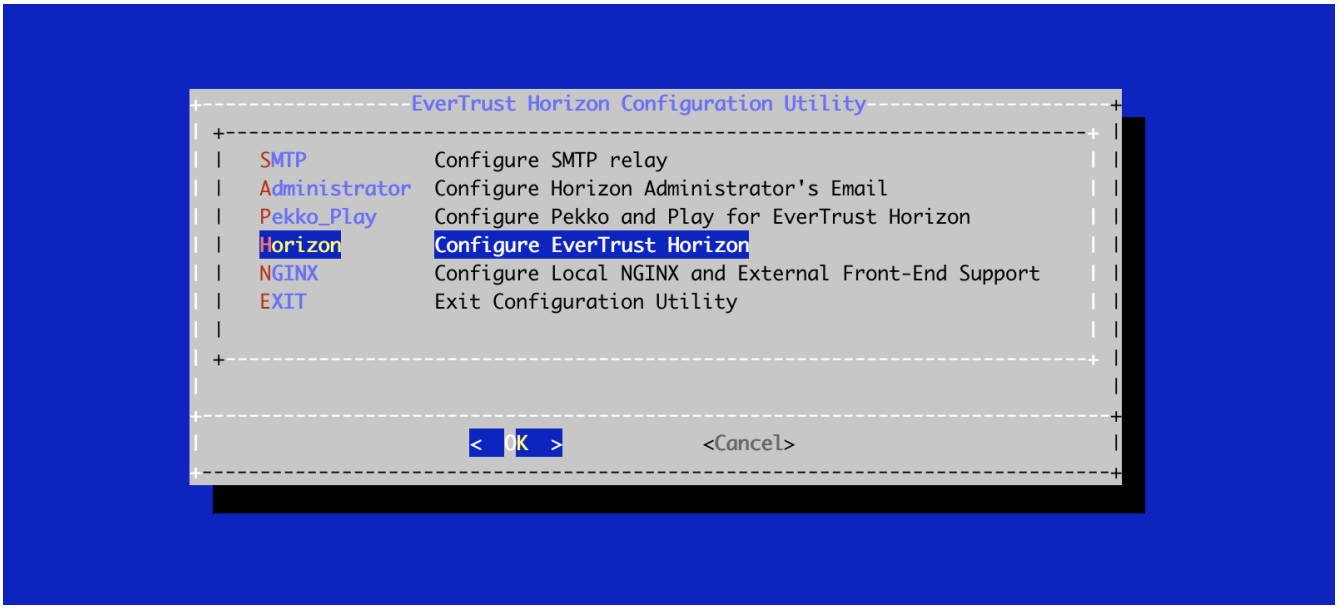
These events are typically signed and chained to ensure their integrity. Therefore, you must specify a sealing secret for this feature to work correctly.

Access the server through SSH with an account with administrative privileges;

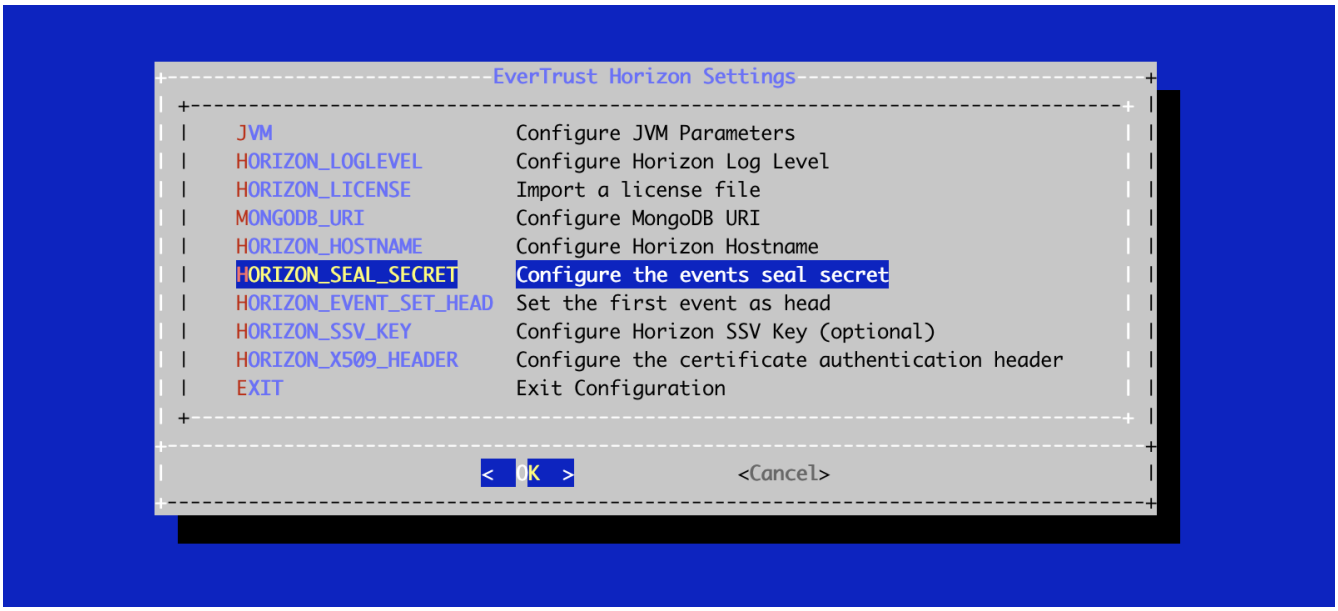
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

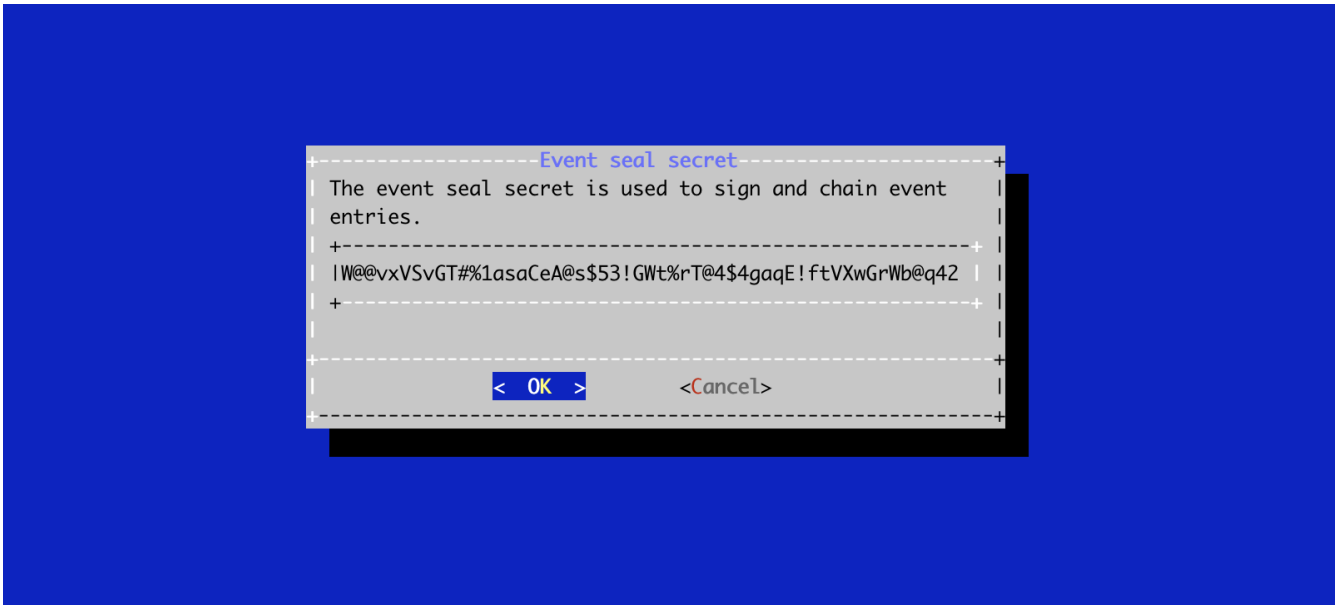
In the main menu, select '**Horizon**':



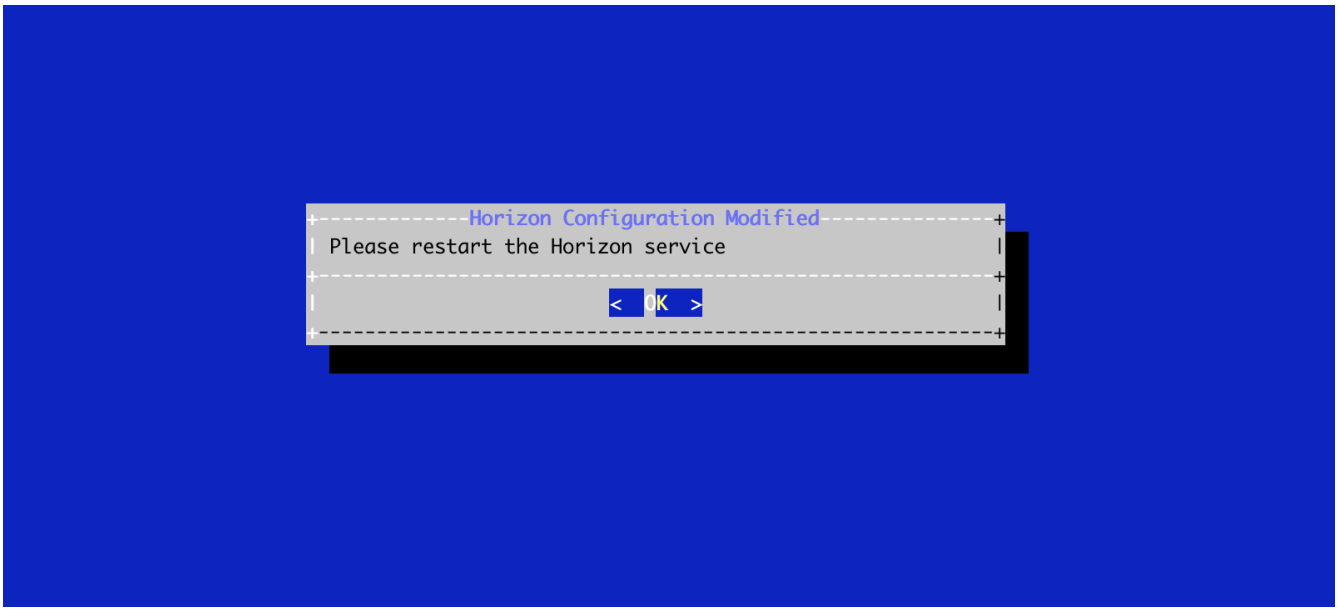
In the Horizon menu, select '**HORIZON_SEAL_SECRET**':



Validate the new event seal secret:



The event seal secret is now configured:



Installing the Horizon license

NOTE

You should have been provided with a '***horizon.lic***' file. This file is a license file and indicates:

- The horizon entitled module(s)
- The limitation in terms of holder per module if any
- A end of support date

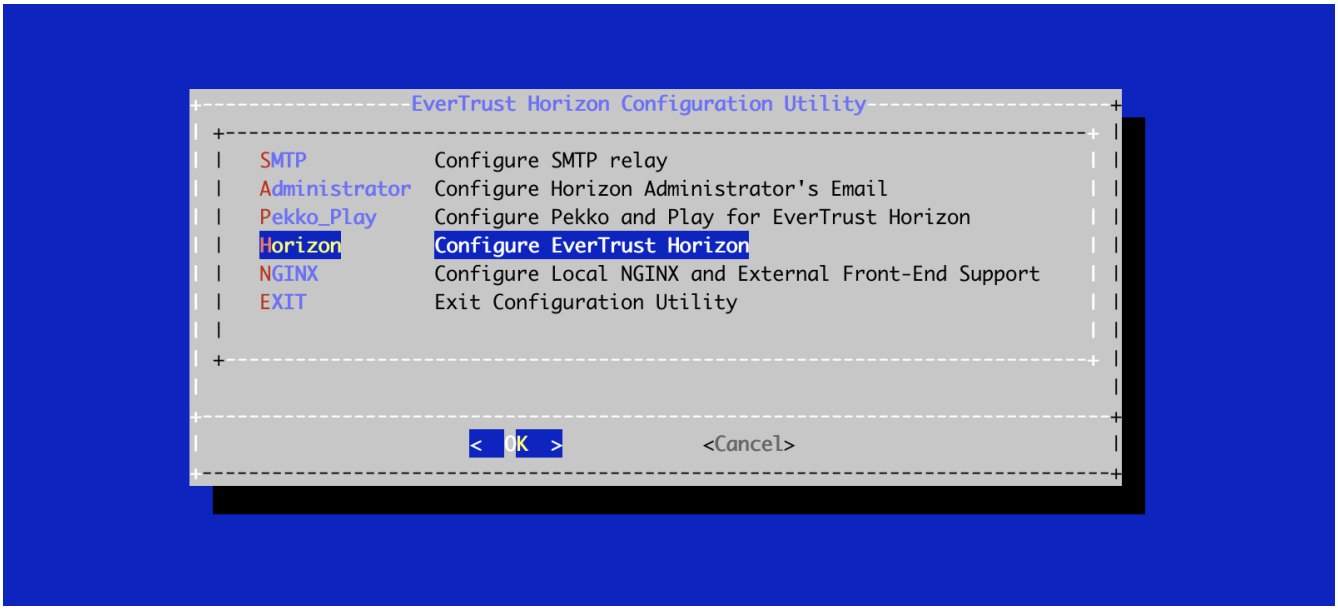
Upload the `horizon.lic` file through SCP under `/tmp/horizon.lic`;

Access the server through SSH with an account with administrative privileges;

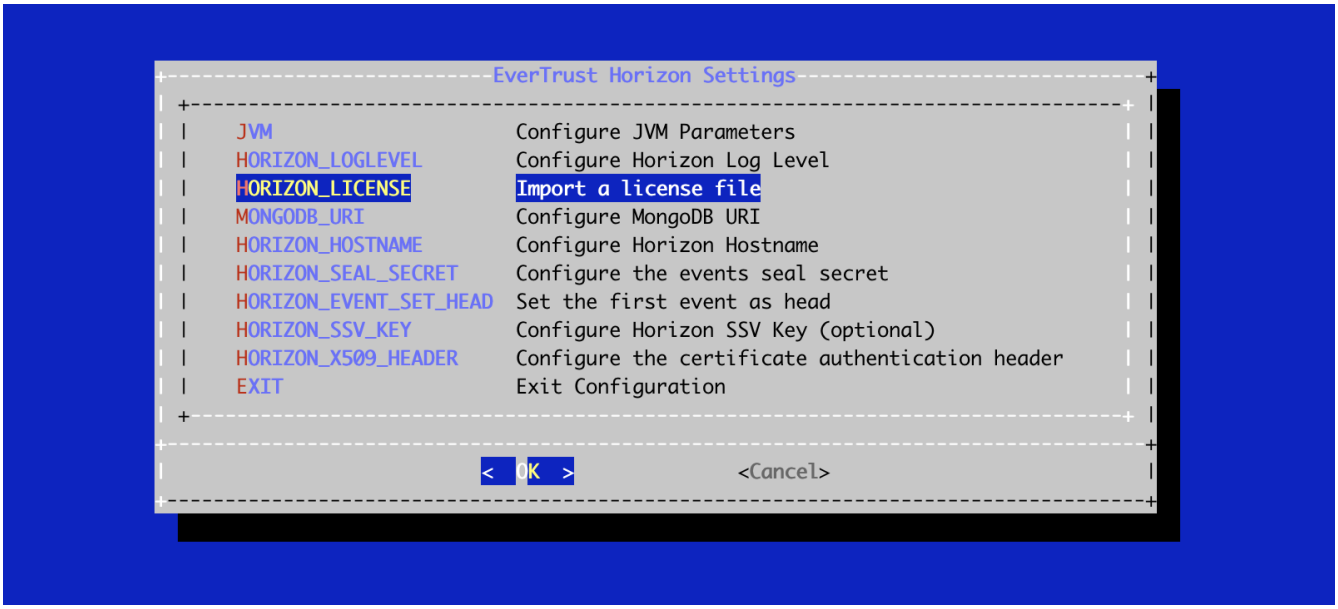
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

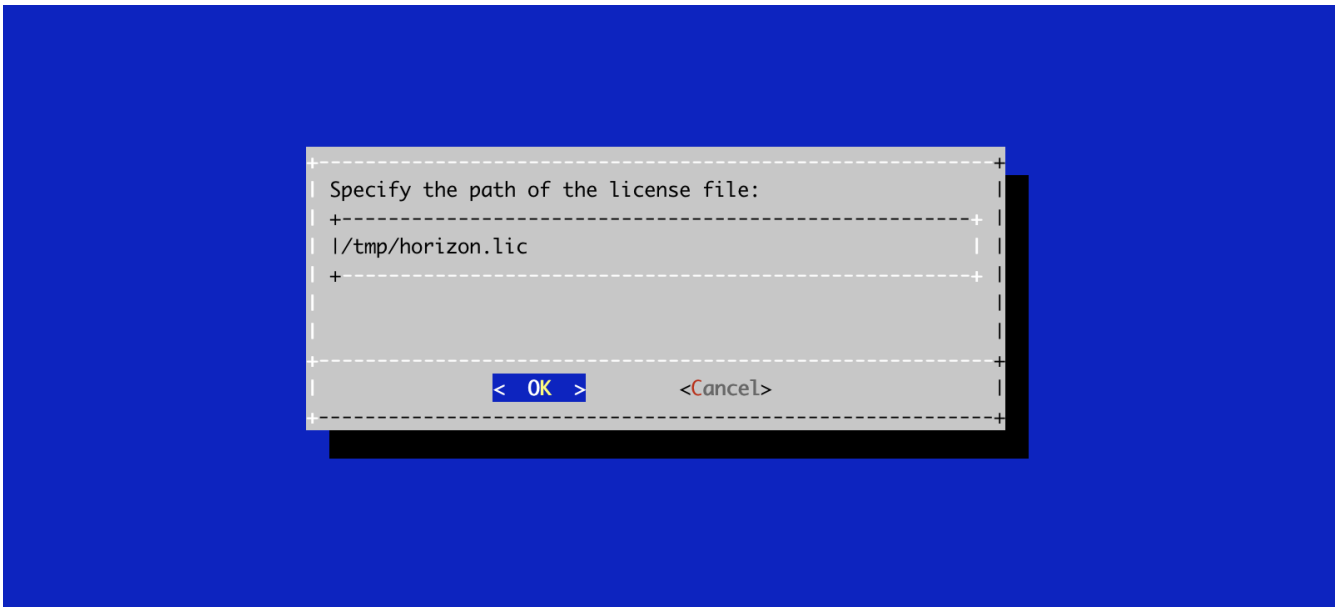
In the main menu, select '**Horizon**':



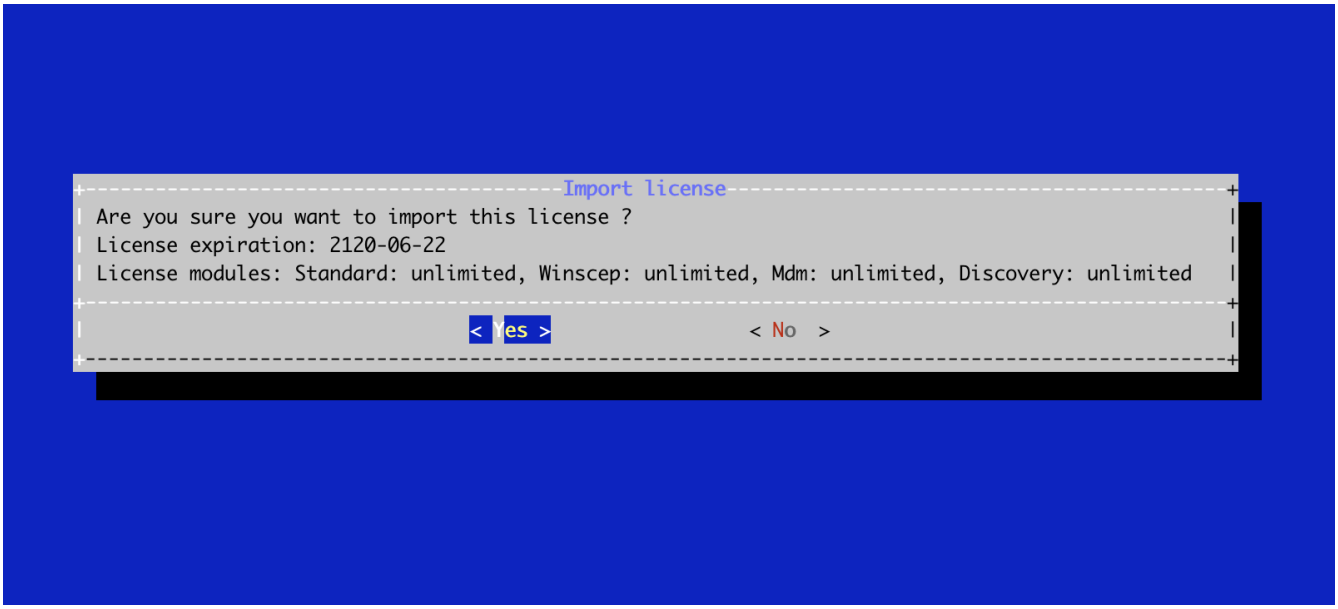
In the Horizon configuration menu, Select '**HORIZON_LICENSE**':



Specify the path `/tmp/horizon.lic` and validate:



The information of the license should be prompted. If everything is good, import the license:



The Horizon License is configured:

Restart the horizon service using the following command:

```
$ systemctl restart horizon
```

Horizon Vault Key configuration

NOTE

Horizon stored sensitive data in a secure way using encryption.

Horizon masterkey can be derived from:

- Software key;
- HSM stored key using (PKCS#11 compatible HSMs are supported);
- Azure Key Vault stored key;
- Hashicorp vault stored key;
- FCMS vault stored key.

Please refer to the proper section according to your setup.

Horizon SSV key Configuration (Software)

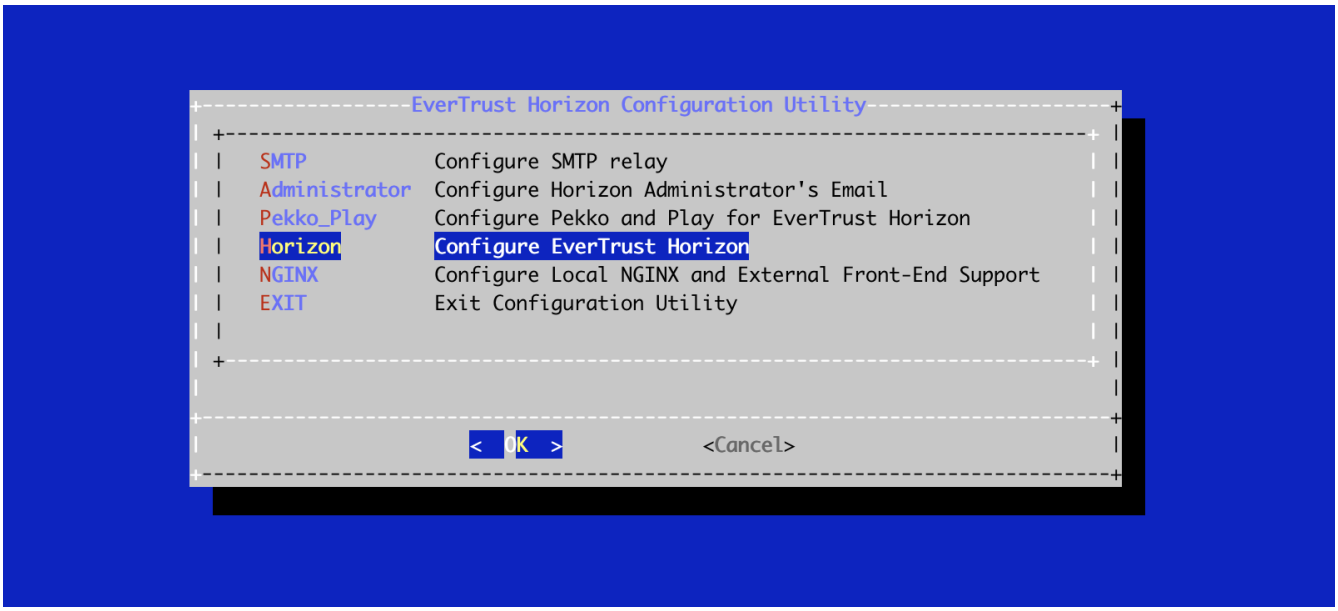
WARNING This section must not be followed if you use another vault than the default one.

Access the server through SSH with an account with administrative privileges;

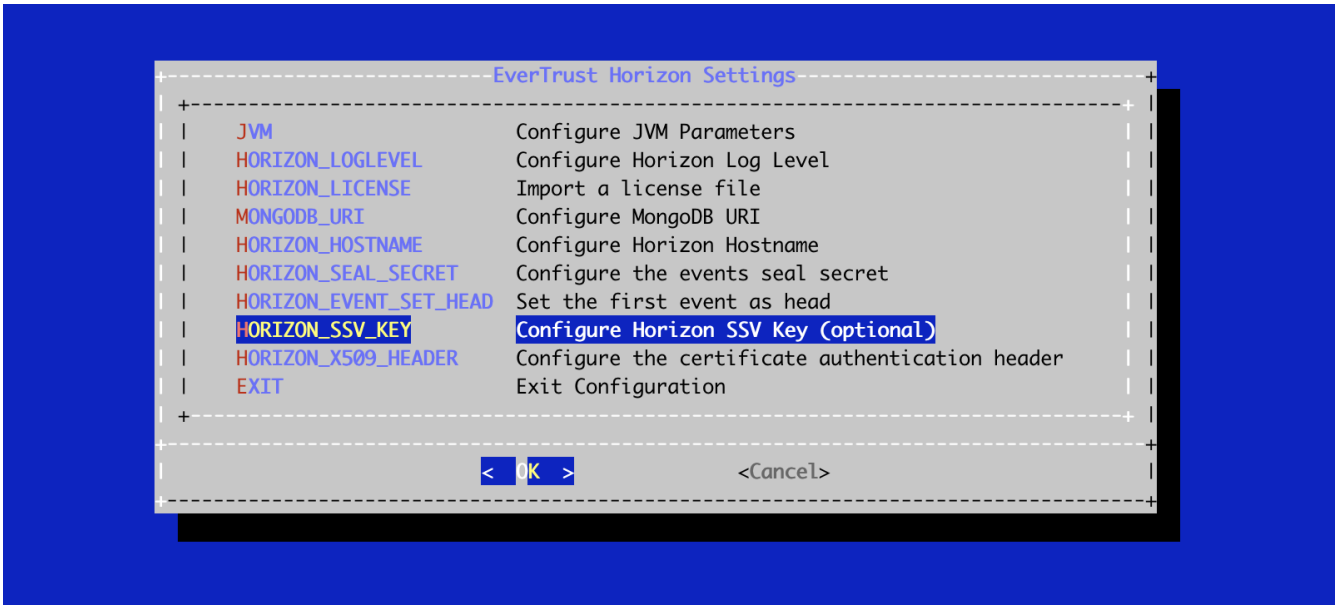
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

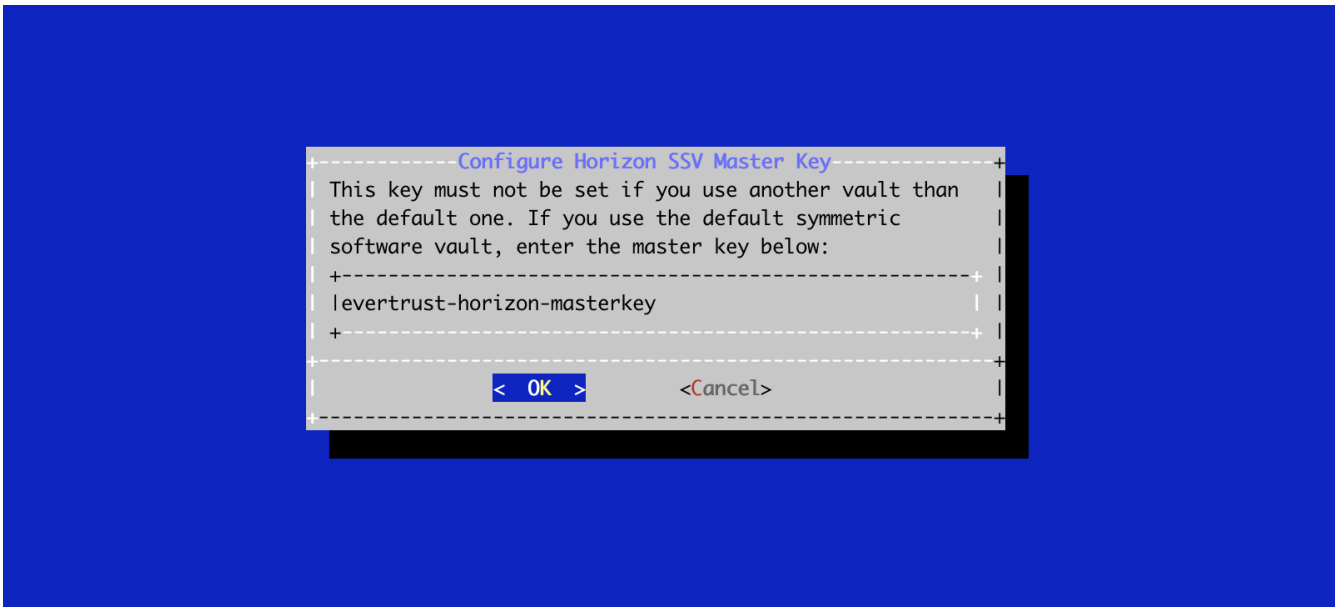
In the main menu, select '**Horizon**':



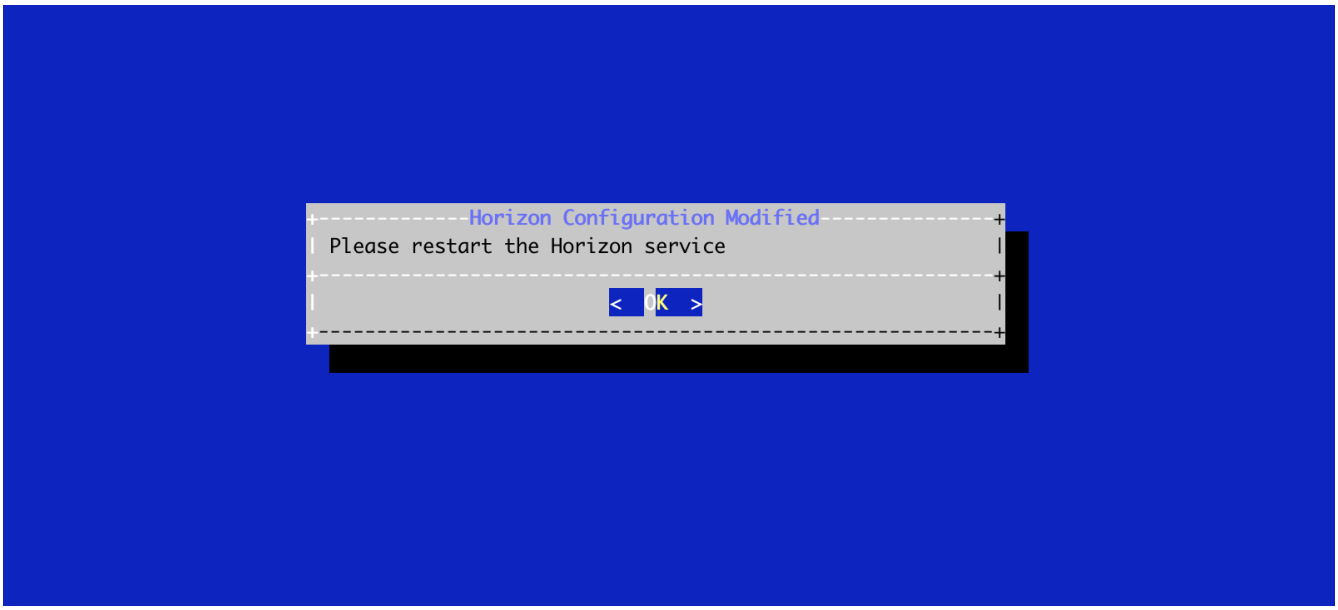
In the Horizon configuration menu, Select '**HORIZON_SSV_KEY**':



Specify the master key that will be used:



Horizon masterkey is configured:



Restart the horizon service using the following command:

```
$ systemctl restart horizon
```

HSM vault Configuration

Horizon supports **PKCS#11 compatible HSM vaults**.

WARNING	This section must not be followed if you use another vault than the HSM vault.

NOTE	HSM middleware should be properly installed and HSM slot initialization should be done using the tools provided by the HSM provider. "horizon" linux user should be member of the proper HSM linux management group to perform cryptographic operations ('nfast' for nCipher nShield HSM or 'hsmusers' for Luna HSM for example).

Access the server through SSH with an account with administrative privileges;

Create a `vaults.conf` configuration file in `/opt/horizon/etc/conf.d` directory with the following content to configure the HSM vault:

```
default {
  module_path = ""
  slot_id = ""
  pin = ""
  label = ""
  allow_master_key_gen = true
}
```

- `module_path`: The path to the PKCS#11 library (string between double quotes);
- `slot_id`: ID of the Slot on the PKCS#11 Module (string between double quotes);
- `pin`: The PIN used to authenticate to your HSM slot (string between double quotes);
- `label`: Label of key (string between double quotes);
- `allow_master_key_gen`: Allow the masterkey to be generated by Horizon if not found in the slot.

Set the permissions using the following commands:

```
$ chown horizon:horizon /opt/horizon/etc/conf.d/vaults.conf
```

Restart the horizon service using the following command:

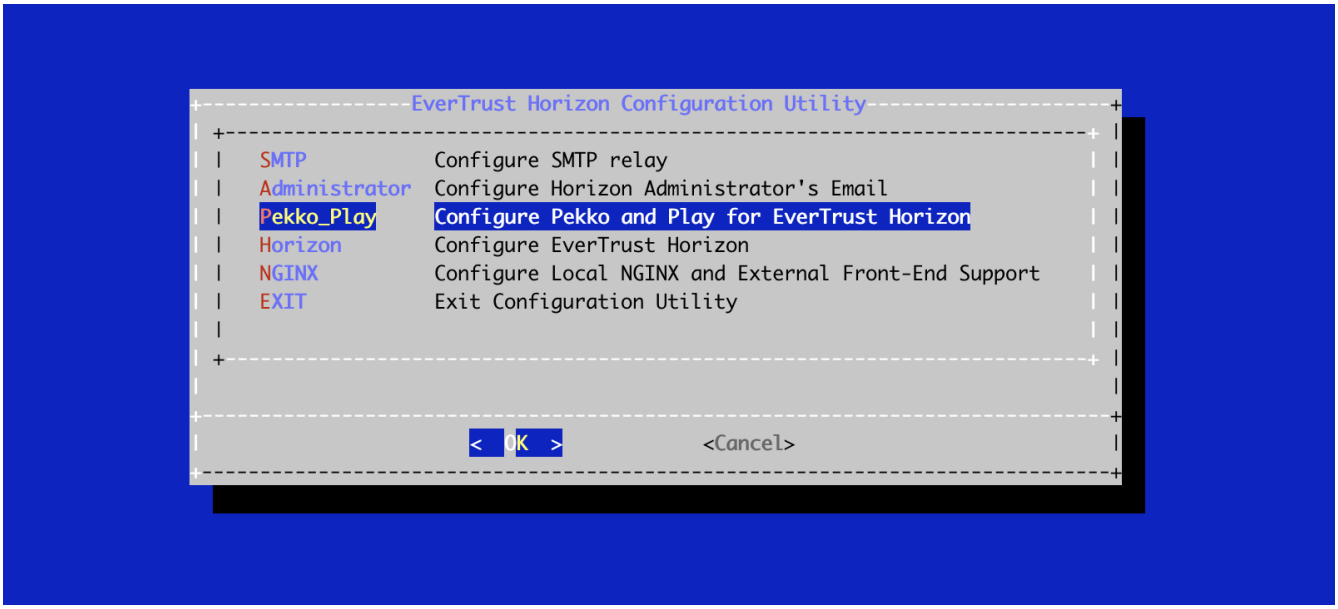
```
$ systemctl restart horizon
```

WARNING	At the end of the installation procedure: • Set `allow_master_key_gen` value to `false`. • Restart the horizon service.

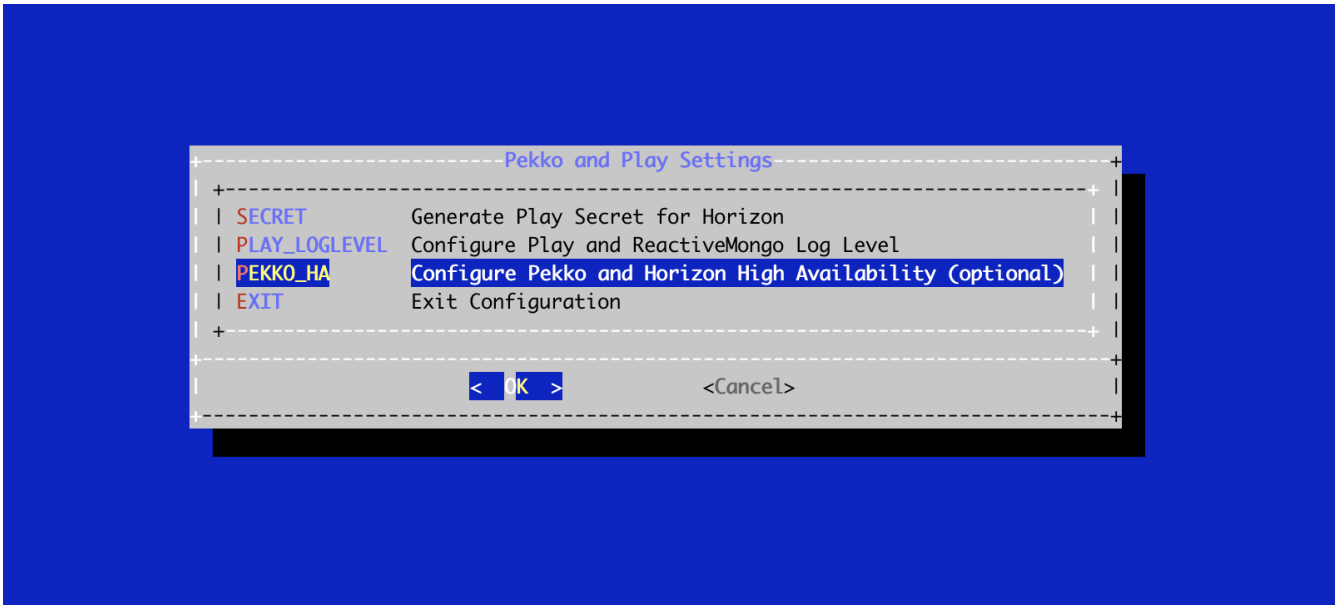
Installing Horizon on a cluster of servers

WARNING	This section must not be followed if you plan on deploying Horizon in standalone mode (vs cluster mode). WARNING: This section does not explain how to install Horizon on a Kubernetes cluster. Please refer to the dedicated section.

In the main menu, select '**Pekko_Play**':

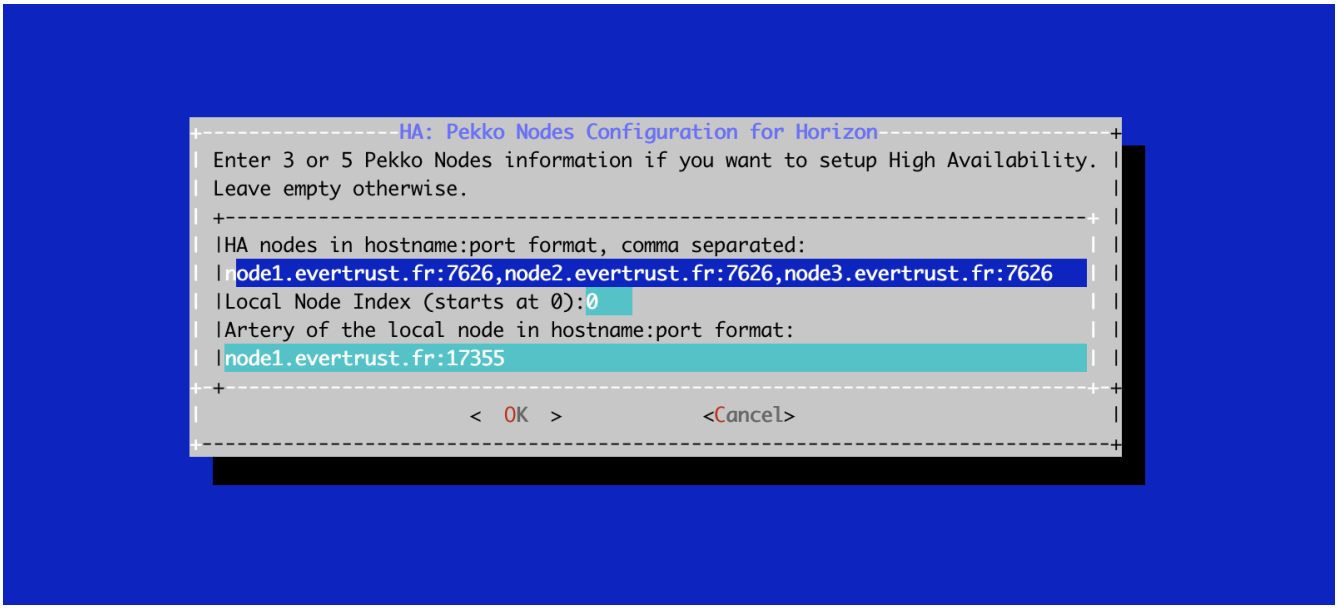


In the Pekko_Play menu, select '**PEKKO_HA**':



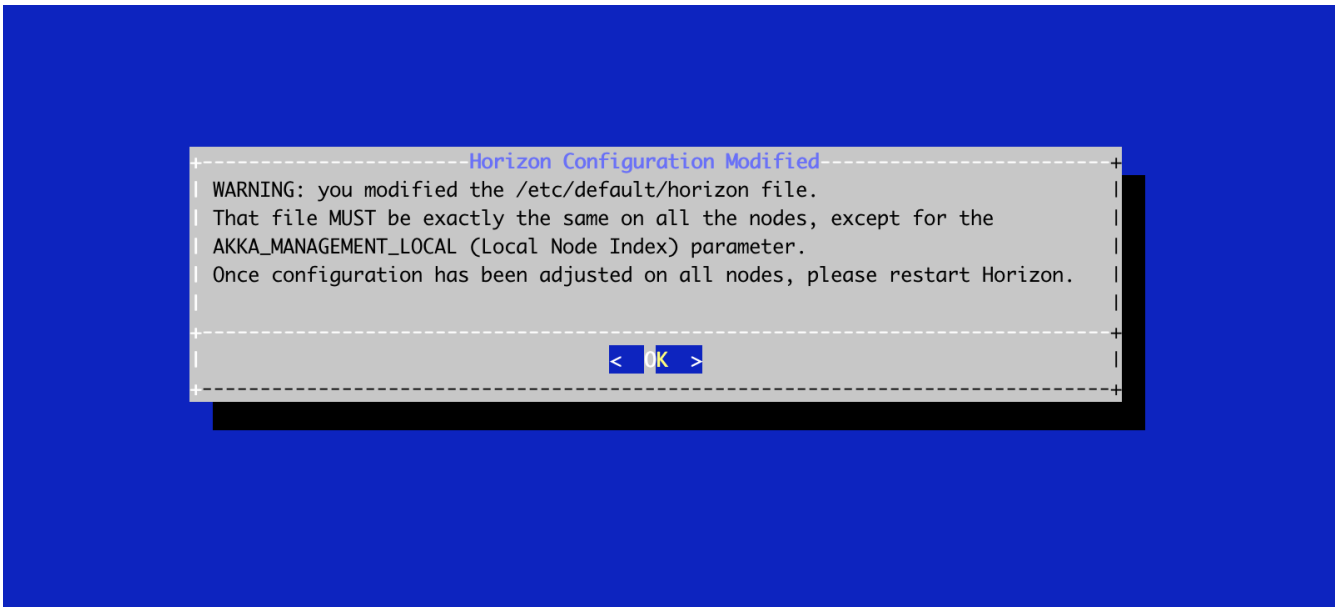
In this menu, specify either the IP address or the DNS name for each server that will be running Horizon on this cluster, as well as the local node index (the number of the node that you are configuring at that moment). You must also specify where the port Artery is hosted, usually it should be on the same node with a different port.

NOTE	Note that the local node index must match the Node Hostname parameter:



Save your changes from the menu.

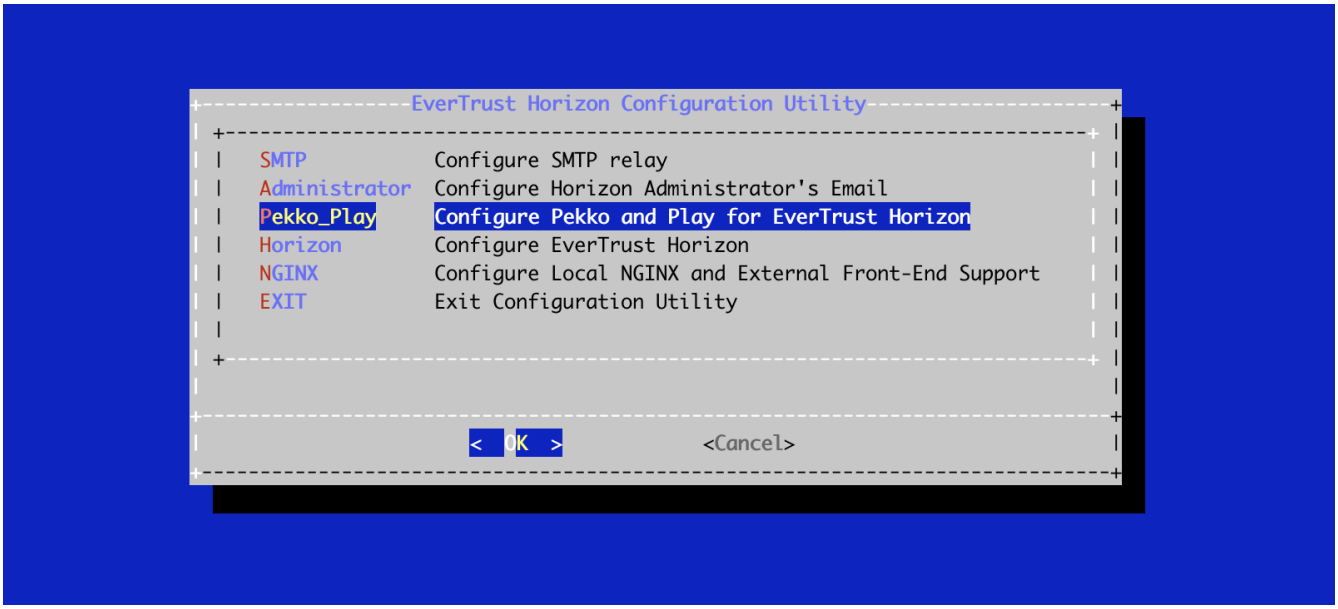
The High Availability mode is now configured on the current node:



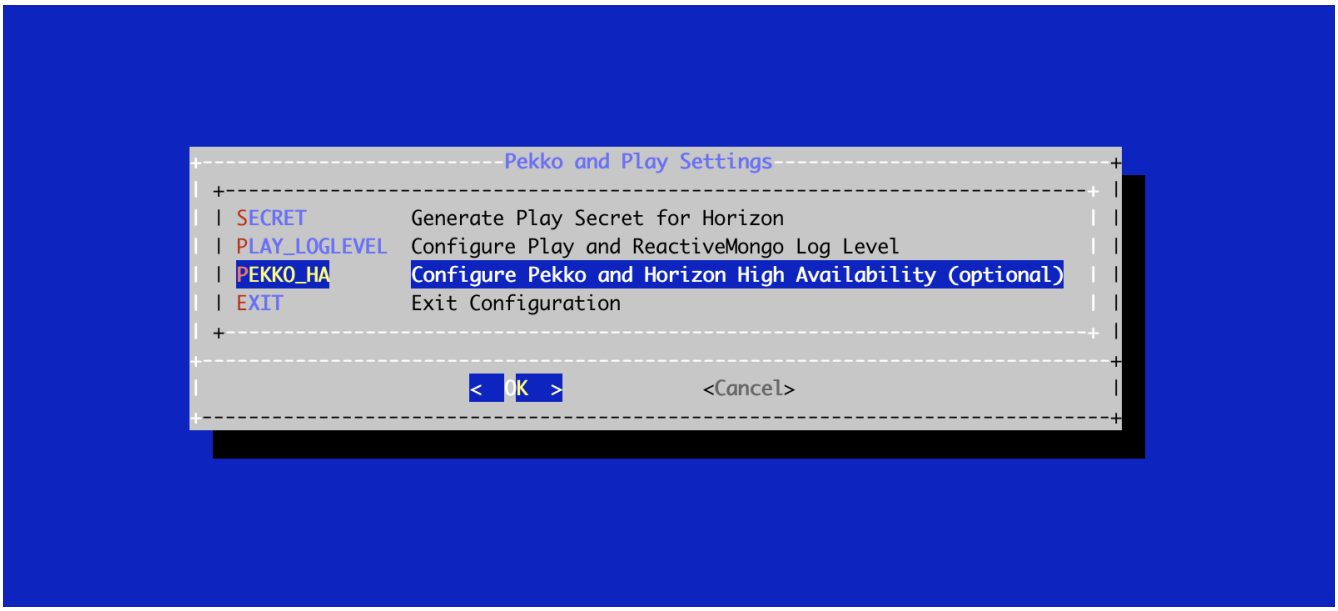
You must now configure your other nodes, but because they belong to the same cluster they need to share the **same secret, the same secret seal event, the same hostname and the same database**. In order to be able to do that, you need to copy the configuration file that was generated by the horizon-config app, named `/etc/default/horizon` and paste it on each one of your nodes;

Then on each other node, run the Horizon Configuration utility with the following command:

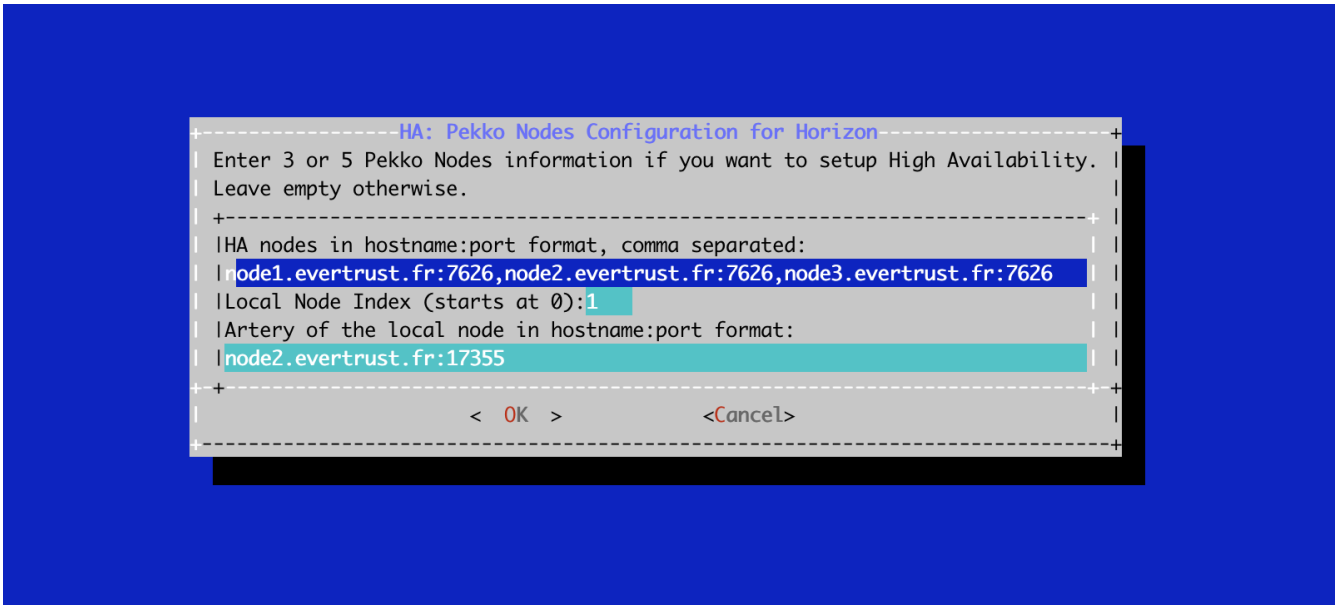
```
$ /opt/horizon/sbin/horizon-config
```



In the Pekko_Play menu, select '**PEKKO_HA**':



Here, you need to change the local node index to match the hostname of the node that you are configuring:



WARNING	You will need to import the Horizon license file on each node manually, following the guidelines of section Installing the Horizon license.

Additionally, on each node, you will need to open the ports used for Pekko_HA and Pekko_MGMT, which are by default 17355 and 7626:

```
$ firewall-cmd --permanent --add-port=17355/tcp
$ firewall-cmd --permanent --add-port=7626/tcp
```

Reload the firewall configuration with:

```
$ systemctl restart firewalld
```

Restart the Horizon service on each one of the nodes:

```
$ systemctl restart horizon
```

2.3.2. Server Authentication Certificate

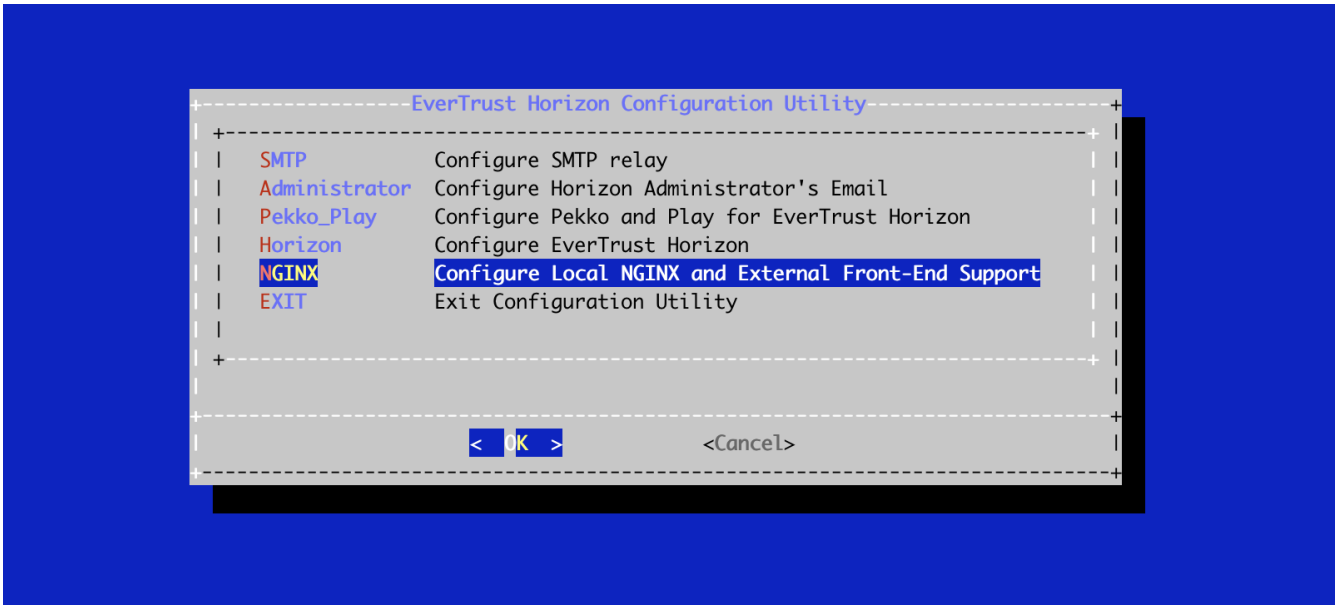
Issuing a Certificate Request (PKCS#10)

Access the server through SSH with an account with administrative privileges.

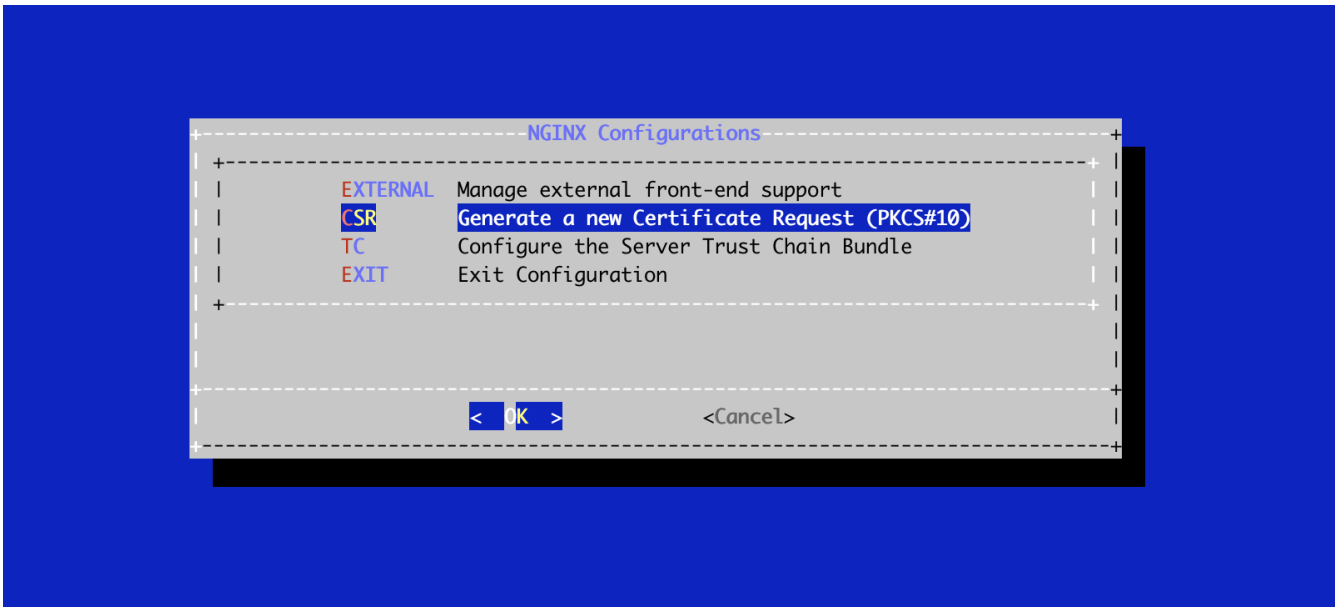
Run the Horizon Configuration Utility with the following command:

```
$ /opt/horizon/sbin/horizon-config
```

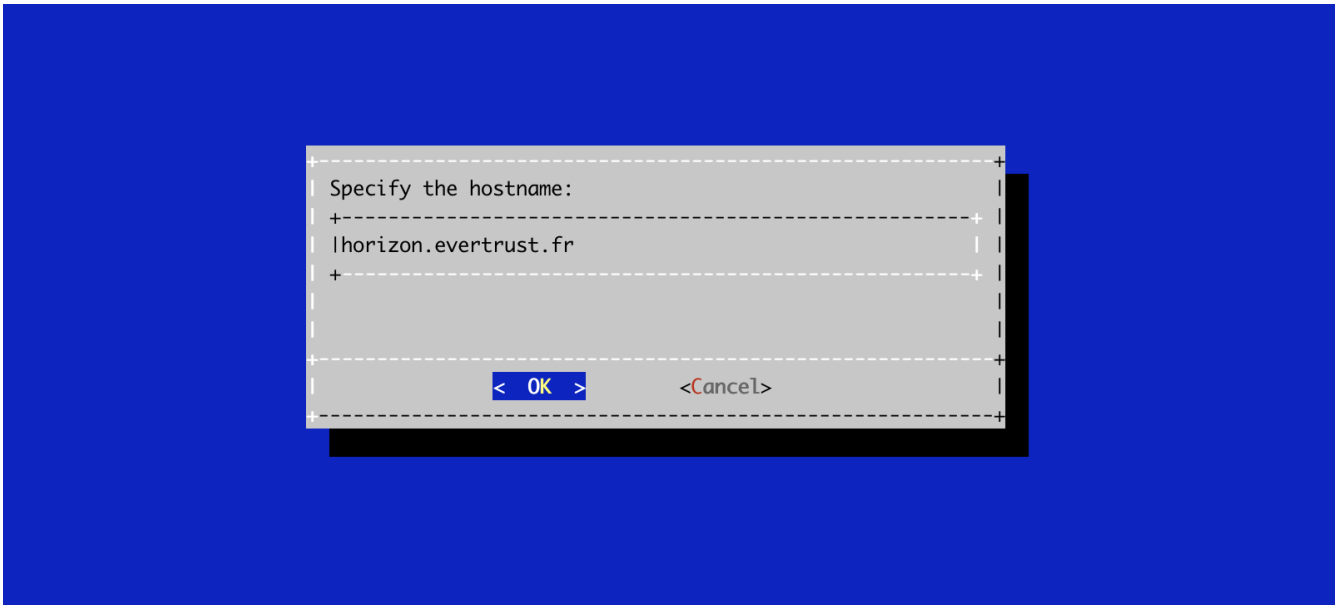
In the main menu, select '**NGINX**':



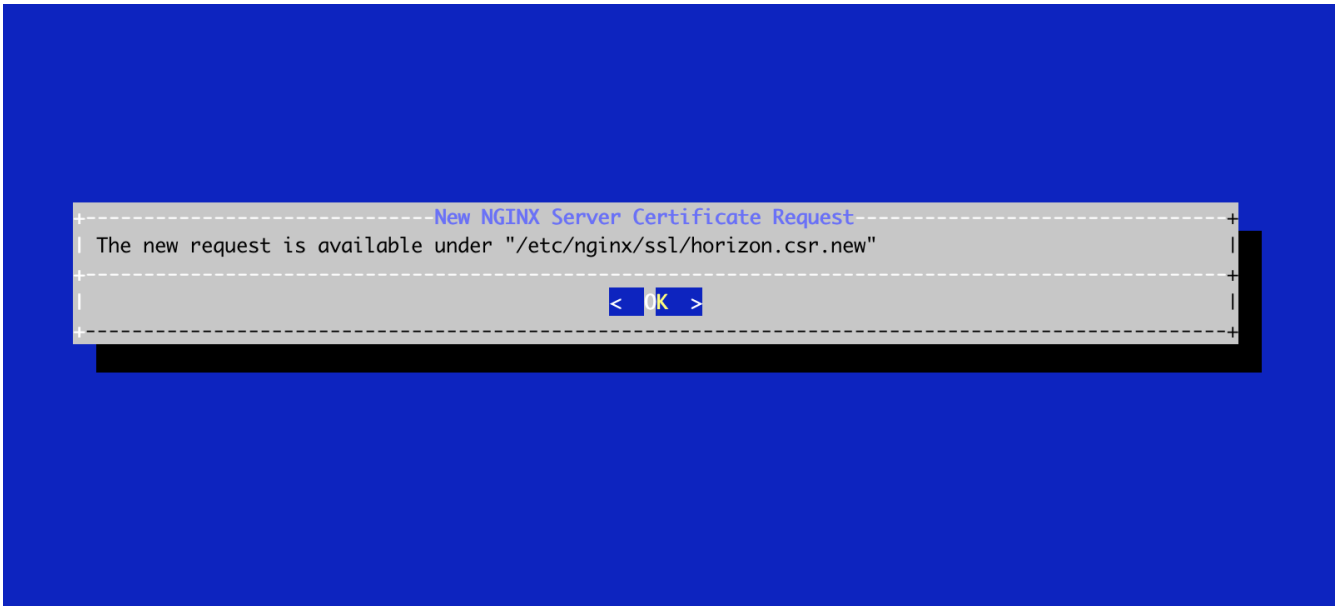
In the NGINX menu, select '**CSR**':



Specify the DNS Name of the Horizon server (by default, the config script takes the Horizon hostname if defined or the local machine hostname otherwise):



The certificate request is generated and available under `/etc/nginx/ssl/horizon.csr.new`:

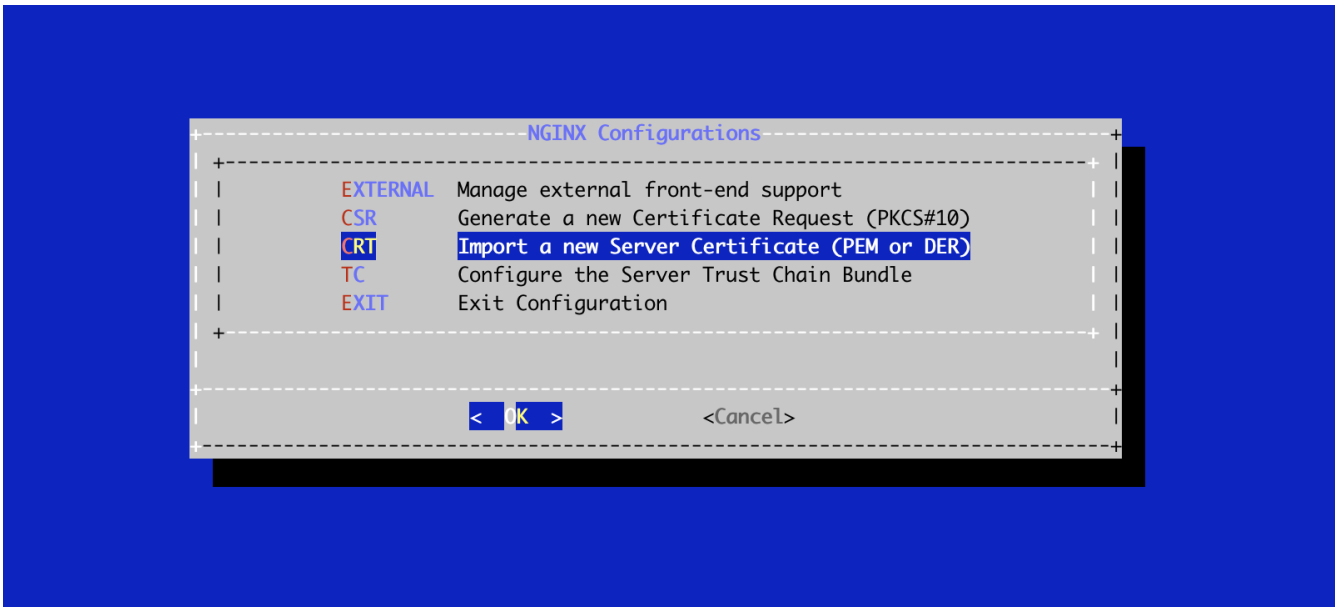


Sign the certificate request using your PKI.

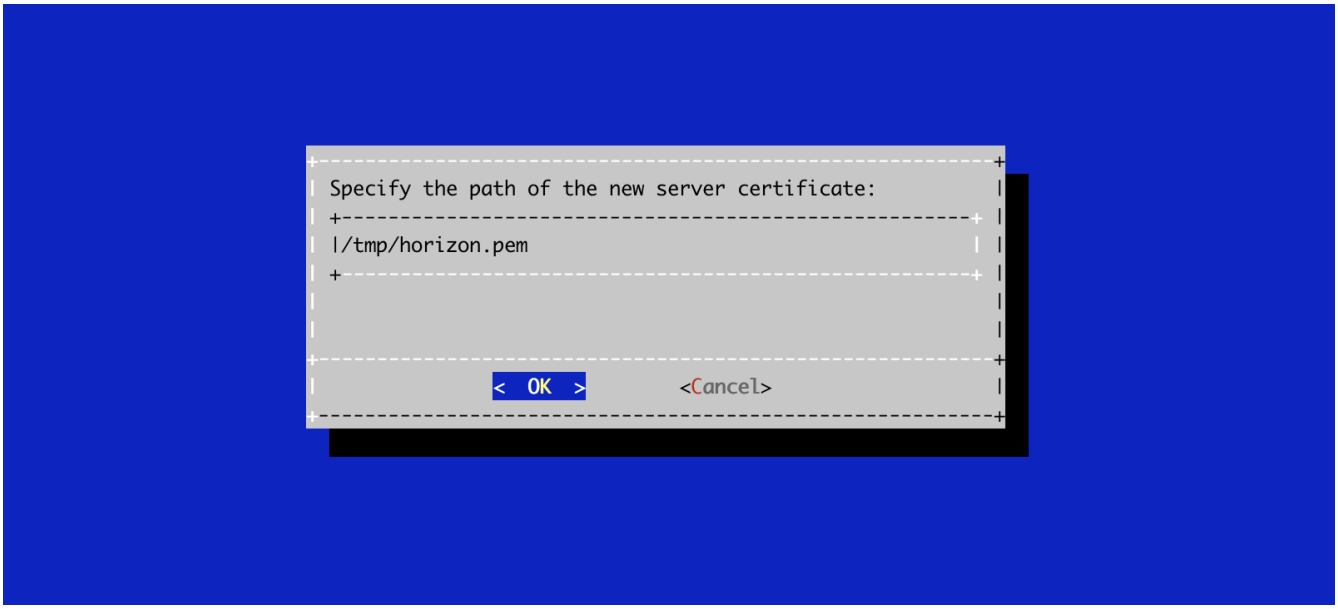
Installing a Server Certificate

Upload the generated server certificate on the Horizon server under `/tmp/horizon.pem` through SCP;

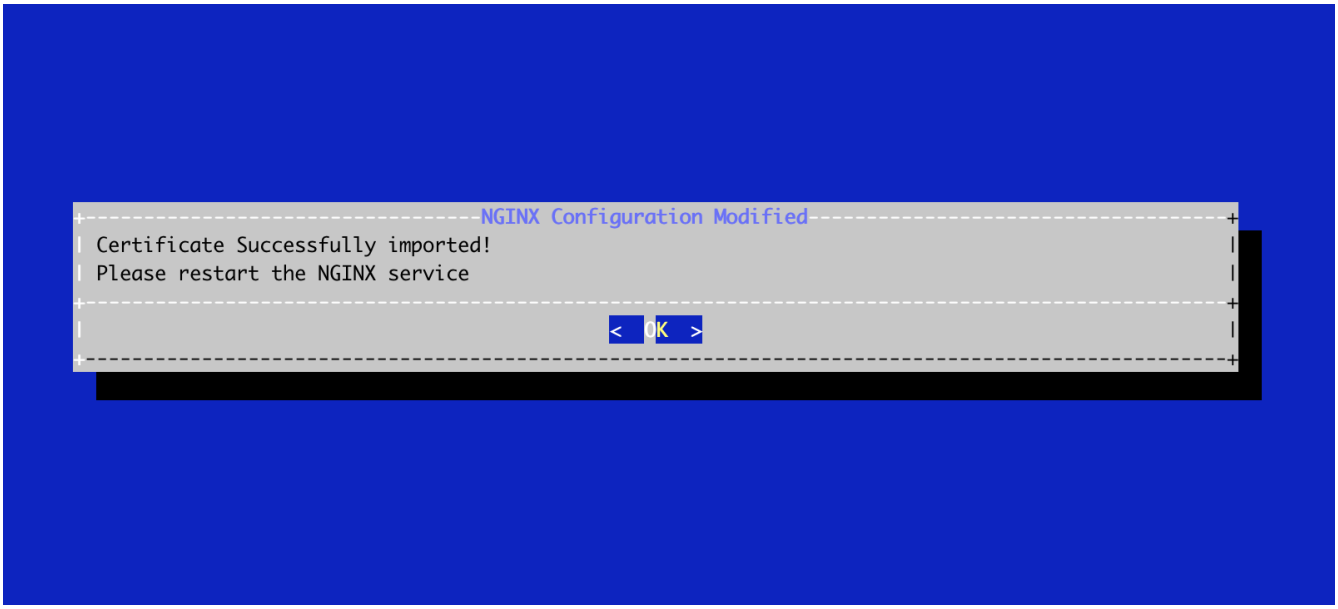
In the NGINX configuration menu, select '**CRT**':



Specify the path `/tmp/horizon.pem` and validate:



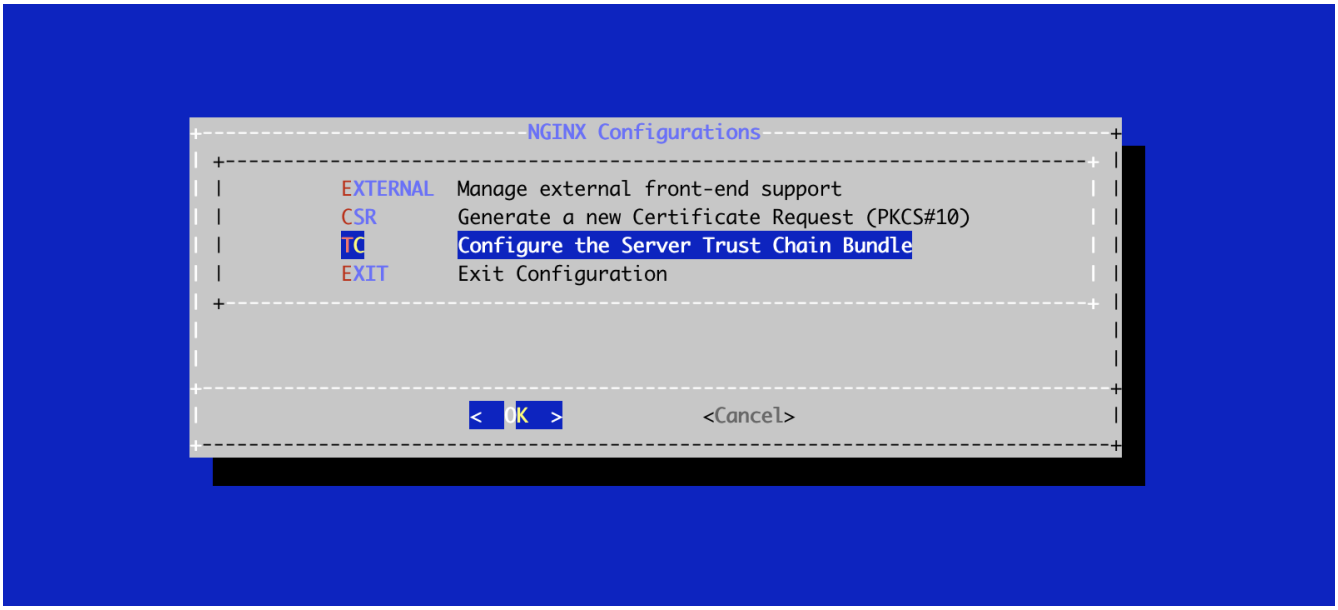
The server certificate is successfully installed:



Installing the Server Certificate Trust Chain

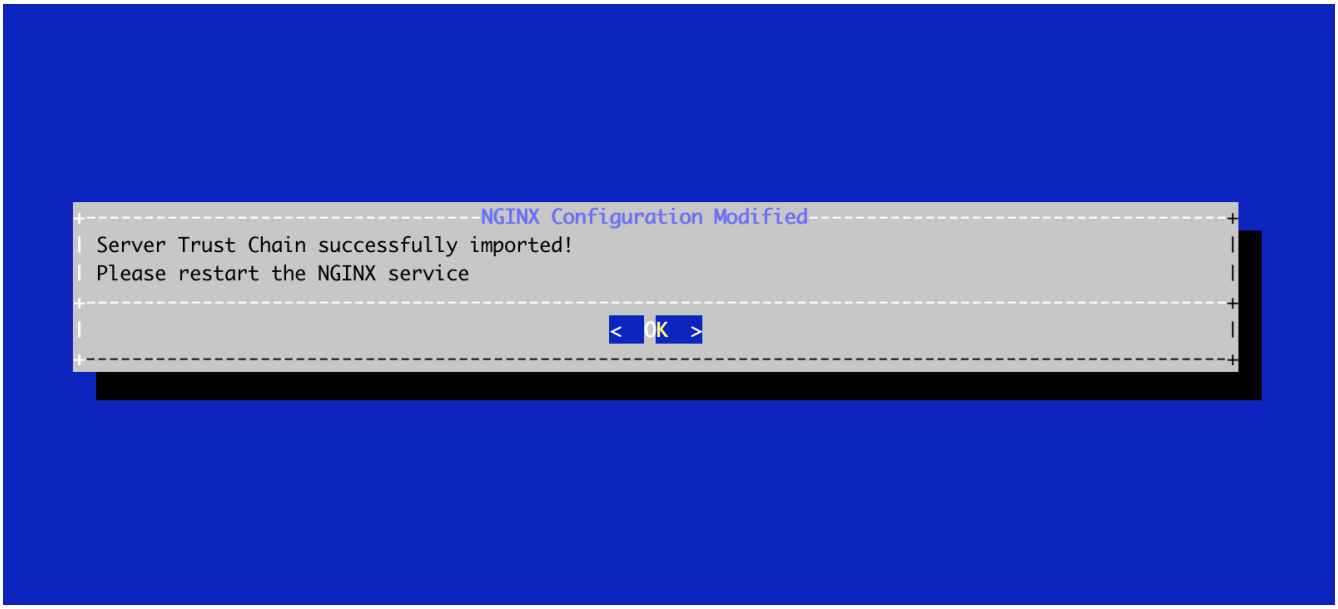
Upload the server certificate trust chain (the concatenation of the Certificate Authority certificates in PEM format) on the Horizon server under `/tmp/server.bundle` through SCP;

In the NGINX configuration menu, select '**TC**':



Specify the path `/tmp/server.bundle` and validate:

The server bundle is successfully installed:



Verify the NGINX configuration with the following command:

```
$ nginx -t
```

Restart the NGINX service with the following command:

```
$ systemctl restart nginx
```

2.4. Startup & login

2.4.1. Starting the Horizon services

1. Access the server through SSH with an account with administrative privileges;
2. Start the horizon service with the following command:

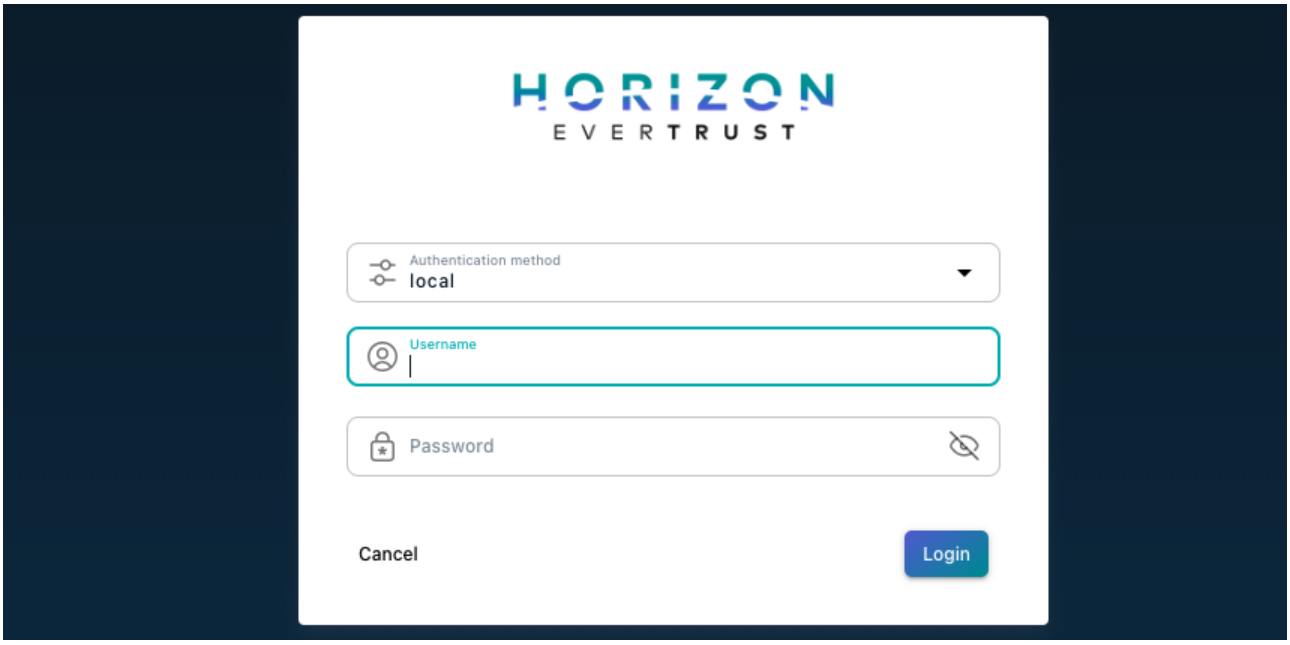
   ```
   $ systemctl start horizon
   ```

3. Start the nginx service with the following command:

   ```
   $ systemctl start nginx
   ```

2.4.2. Accessing the web UI

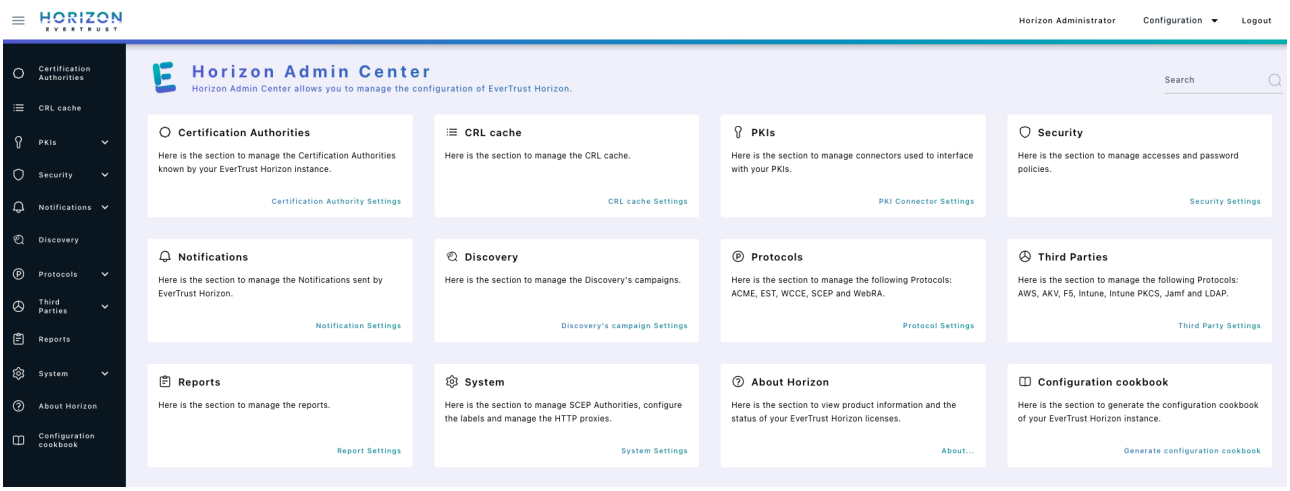
1. Launch a web browser;
2. Browse to `https://[Horizon IP or FQDN]`:



NOTE

Upon first boot, a random administrator password will be generated. To retrieve it, open the `/opt/horizon/var/run/adminPassword` file. The default administration login is `administrator`.

3. Specify the default administration credentials and hit the '**Login**' button:



CAUTION

It is **highly recommended** to create a dedicated administration account and delete the default one, or at least modify the default administrator password.

2.5. Upgrade

2.5.1. Standard Upgrade

NOTE

The current instructions refer to the standard upgrade procedure. Additional steps might be required, please refer to release notes.

Upgrade the horizon installation

You must retrieve the latest Horizon RPM from the EverTrust repository manually using the user credentials you were provided.

Access the server through SSH with an account with administrative privileges.

Install the Horizon package with the following command:

```
$ yum install horizon-2.6.X-1.noarch.rpm
```

After installing, services must be reloaded to take the change into account

```
$ systemctl daemon-reload
```

Upgrade the database schema

Some Horizon versions require that you run migration scripts against your database. Since version 2.1.0, Horizon comes bundled with an `horizon-upgrade` script that handles this migration logic.

Therefore, after each upgrade, you should run `horizon-upgrade` to check whether new migrations should be run.

Access the server through SSH with an account with administrative privileges.

Run the following command:

```
$ /opt/horizon/sbin/horizon-upgrade -t <target version>
```

In most cases, `horizon-upgrade` can detect the version you're upgrading from by checking the database. However, when upgrading from version prior to 2.1.0, you will encounter the following error:

```
*** Unable to infer the source version from your database. Specify it explicitly with
the -s flag. ***
```

You'll have to explicitly tell `horizon-upgrade` which version you are upgrading from. To do that, simply set the source version explicitly with the -s flag:

```
$ /opt/horizon/sbin/horizon-upgrade -t <target version> -s <source version>
```

Similarly, `horizon-upgrade` will try to use the MongoDB URI that was configured by the Horizon configuration utility. If it fails to auto-detect your database URI or you wish to migrate another database, specify the URI explicitly using the `-m` flag:

```
$ /opt/horizon/sbin/horizon-upgrade -t <target version> -m "<mongo uri>"
```

NOTE	The upgrade script requires a MongoDB client to connect to your database (either `mongo` or `mongosh`). If no client is installed on the host where Horizon is running, consider installing the standalone `mongosh` client or running the upgrade script from another host that has access to the database.

2.5.2. Upgrading from a version prior to 2.1.0

These instructions are specific to the 2.1.0 version, and should be followed if you upgrade from a version prior to 2.1.0 to any version greater or equal to 2.1.0.

These steps should be followed in addition to the common upgrade procedure found in the standard upgrade protocol. None of these steps are automated by `horizon-upgrade`.

Setting an event seal secret

You must manually create an entry to pass an event seal secret to Horizon in the `/etc/default/horizon` file. `horizon-config` won't do that automatically.

To do so, open the `/etc/default/horizon` file with a text editor:

$ vi /etc/default/horizon

And add a new line under the `Horizon variables` section:

```
# Horizon variables
HORIZON_NOTIFICATION_SMTP_HOST=127.0.0.1
HORIZON_HOSTNAME=
HORIZON_DEFAULT_SSV_KEY=
HORIZON_EVENT_SEAL_SECRET=changeme # <- this one
```

Then, near the end of the file, after the `# Setting Horizon Mongo DB uri` section, create a new section for the event seal secret:

```
# Setting the Horizon event seal secret
JAVA_OPTS="$JAVA_OPTS -Dhorizon.event.seal.secret=${HORIZON_EVENT_SEAL_SECRET}"
```

Horizon won't boot if the `HORIZON_EVENT_SEAL_SECRET` is set to `changeme`. Therefore, you should set your secret to something hard to guess. Refer to the Initial Configuration guide to learn how to generate a seal secret with `horizon-config`.

2.6. Backup and Restore

This section details how to back-up and restore Horizon. Back-up and restore operation can be

performed using the back-up and restore tool available under `/opt/horizon/sbin/horizon-backup`. It is designed to be used only in RPM-Based deployments.

For Docker or Kubernetes based deployments, the configuration should be managed by the Docker/Kubernetes management platform, and the database should be backed-up using MongoDB tools.

2.6.1. Backup Procedure

This section details how to back up Horizon configuration elements.

Several elements can be backed up:

- The Horizon configuration files.
- The Horizon MongoDB.

The backup tool allows backing up these elements independently.

```
$ /opt/horizon/sbin/horizon-backup --help
 usage: horizon-backup [-cdho:qs]
    -c | --conf          Backup the configuration files
    -d | --db            Backup the MongoDB database
    -h | --help          Display the 'horizon-backup' help
    -o | --output [path] Specify the backup output folder (default:
'/opt/horizon/var/backup')
    -q | --quiet         Quiet mode
```

To back up the configuration files, run the following command:

```
$ /opt/horizon/sbin/horizon-backup -c
```

The configuration files backup consists of a compressed archive (`.tar.gz`) located under `/opt/horizon/var/backup/`.

To back up the MongoDB database, run the following command:

```
$ /opt/horizon/sbin/horizon-backup -d
```

The MongoDB database backup consists of a compress file (`.gz`) located under `/opt/horizon/var/backup/`.

To run a complete backup, execute the following command:

```
$ /opt/horizon/sbin/horizon-backup -c -d
```

NOTE

- The backup output folder can be overridden using the `-o | --output` parameter
- The backup tool can operate in quiet mode (when scheduled in a cron job) using the `-q | --quiet` parameter

2.6.2. Restoration Procedure

This section details how to restore horizon configuration elements.

WARNING	This restore procedure only applies to the exact same application version as the backup file.

Restoration operation should be performed while the Horizon service is not running. Stop the Horizon service with the following command:

```
$ systemctl stop horizon
```

To restore a configuration backup, run the following command:

```
$ tar xzpvf [horizon configuration backup archive path] -C/
```

To restore the MongoDB database, run the following command:

```
$ mongorestore --uri="[MongoDB URI]" --drop --gzip --archive=[horizon MongoDB backup
archive path]
```

NOTE	The MongoDB URI can be retrieved from the `/etc/default/horizon/_*` configuration file, as `MONGODB_URI` parameter.

The Horizon service can now be started with the following command:

```
$ systemctl start horizon
```

2.7. Uninstallation

WARNING	Before uninstalling, please make sure that you have a **proper backup of the Horizon component**. Once uninstalled, all the Horizon data will be **irremediably lost**!

NOTE	Uninstalling Horizon consists in uninstalling: • The Horizon service; • The MongoDB service; • The NGINX service.

2.7.1. Uninstalling Horizon

Access the server through SSH with an account with administrative privileges.

Uninstall Horizon with the following commands:

```
$ systemctl stop horizon
$ yum remove horizon
$ rm -rf /opt/horizon
$ rm -rf /var/log/horizon
$ rm -f /etc/default/horizon
```

2.7.2. Uninstalling NGINX

Access the server through SSH with an account with administrative privileges.

Uninstall NGINX with the following commands:

```
$ systemctl stop nginx
$ yum remove nginx
$ rm -rf /etc/nginx
$ rm -rf /var/log/nginx
```

2.7.3. Uninstalling MongoDB

Access the server through SSH with an account with administrative privileges.

Uninstall MongoDB with the following commands:

```
$ systemctl stop mongod
$ rpm -qa | grep -i mongo | xargs rpm -e
$ rm -rf /var/log/mongodb
$ rm -rf /var/lib/mongodb
```

3. Installing on Kubernetes

3.1. Installation

3.1.1. Concepts overview

In Kubernetes, applications are deployed onto **Pods**, which represents a running version of a containerized application.Pods are grouped by **Deployments**, which represent a set of Pods running the same application.For instance, should you need to run Horizon in high availability mode, your deployment will contain 3 pods or more.Applications running in Pods are made accessible by a **Service**, which grants a set of Pods an IP address (which can either be internal to the cluster or accessible on the public Internet through a Load Balancer).

The recommended way of installing on Horizon is through the Horizon's Helm Chart.Helm is a package manager for Kubernetes that will generate Kubernetes resources necessary to deploy Horizon onto your cluster.The official Helm Chart will generate a deployment of one or more Pods running Horizon on your cluster.

3.1.2. Setting up Helm repository

Now that the application secrets are configured, add the **EverTrust Helm repository** to your machine:

```
$ helm repo add evertrust https://repo.evertrust.io/repository/charts
```

Verify that you have access to the Chart:

```
$ helm search repo evertrust/horizon
NAME                    CHART VERSION   APP VERSION DESCRIPTION
evertrust/horizon       0.9.1           2.6.0       EverTrust Horizon Helm chart
```

3.1.3. Configuring the namespace

For isolation purposes, we strongly recommend that you create a dedicated namespace for **Horizon**:

```
$ kubectl create namespace horizon
```

The namespace should be empty. In order to run Horizon, you'll need to create two secrets in that namespace:

- A license secret containing your Horizon license file
- An image pull secret, allowing Kubernetes to authenticate to the EverTrust's container

repository

Creating the license secret

You should have a license file for your Horizon installation, most probably named `horizon.lic`. To convert this file to a Kubernetes secret, run:

```
$ kubectl create secret generic horizon-license \
 --from-file=license="<path to your license file>" \
 --namespace horizon
```

Creating the image pull secret

Next, you should configure Kubernetes to authenticate to the EverTrust repository using your credentials. They are necessary to pull the Horizon docker image, you should have received them upon purchase. Get your username and password and create the secret:

```
$ kubectl create secret docker-registry evertrust-registry \
 --docker-server=registry.evertrust.io \
 --docker-username="<your username>" \
 --docker-password="<your password>" \
 --namespace horizon
```

3.1.4. Configuring the chart

You'll next need to override the defaults `values.yaml` file of the Helm Chart to reference the secrets that we've created. We'll provide a minimal configuration for demonstration purposes, but please do follow our production setup guide before deploying for production.

Create a `override-values.yaml` file somewhere and paste this into the file:

```
image:
  pullSecrets:
    - evertrust-registry

license:
  secretName: horizon-license
  secretKey: license
```

To finish Horizon's installation, simply run the following command:

```
$ helm install horizon evertrust/horizon -f override-values.yaml -n horizon
```

Please allow a few minutes for the Horizon instance to boot up. You are now ready to go on with the Startup & Login. This instance will allow you to test out if Horizon is working correctly on your

cluster. However, this installation is not production-ready. Follow our Production Checklist to make sure your instance is fit to run in your production environment.

3.2. Production checklist

Even though the Helm Chart makes installing Horizon a breeze, you'll still have to set up a few things to make Horizon resilient enough to operate in a production environment.

3.2.1. Operating the database

All persistant data used by Horizon is stored in the underlying MongoDB database. Therefore, the database should be operated securely and backed up regularly.

When installing the chart, you face multiple options regarding your database:

- By default, a local MongoDB standalone instance will be spawned in your cluster, using the bitnami/mongodb chart. No additional configuration is required but it is not production ready out of the box. You can configure the chart as you would normally below the `mongodb` key:

```
mongodb:
  architecture: replicaset
  # Any other YAML value from the chart docs
```

- If you want to use an existing MongoDB instance, provide the `externalDatabase.uri` value. The URI should be treated as a secret as it must include credentials:

```
externalDatabase:
  uri:
    valueFrom:
      secretKeyRef:
        name: <secret name>
        key: <secret key>
```

The chart doesn't manage the database. You are still in charge of making sure that the database is correctly backed up. You could either back up manually using `mongodump` or use a managed service such as MongoDB Atlas, which will take care of the backups for you.

3.2.2. Managing secrets

Storing secrets is a crucial part of your Horizon installation. On cloud-native installations like on Kubernetes, we recommend using SSV (Secure Software Vault) to encrypt sensitive data: a master passphrase will be used to encrypt and decrypt data before they enter the database. Alongside with other application secrets like your MongoDB URI (containing your credentials or certificate). We recommend that you create Kubernetes secrets beforehand or inject them directly into the pod.

Values that should be treated as secrets in this chart are:

Name	Description	Impact on loss
`vaults.*.master_password`	SSV password used to encrypt sensitive data in database.	Highest impact: database would be unusable
`events.secret`	Secret used to sign and chain events.	Moderate impact: events integrity would be unverifiable
`externalDatabase.uri`	External database URI, containing a username and password.	Low impact: reset the MongoDB password
`appSecret`	Application secret use to encrypt session data.	Low impact: sessions would be reset
`mailer.password`	SMTP server password	Low impact: reset the SMTP password

For each of these values, either:

- leave the field empty, so that a secret will be automatically generated.
- derive the secret value from an existing Kubernetes secret:

```
appSecret:
  valueFrom:
    secretKeyRef:
      name: <secret name>
      key: <secret key>
```

WARNING Always store auto-generated secrets in a safe place after they're generated. If you ever uninstall your Helm chart, the deletion of the SSV secret will lead to the impossibility of recovering most of your data.

3.2.3. High availability

By default, the chart will configure a single-pod deployment. This deployment method is fine for testing but not ready for production as a single failure could take down the entire application. Instead, we recommend that you set up a Horizon cluster using at least 3 pods.

In order to do that, configure an `horizontalAutoscaler` in your `override-values.yaml` file:

```
horizontalAutoscaler:
  enabled: true
  minReplicas: 3
  maxReplicas: 3
```

NOTE Use `nodeAffinity` to spread your Horizon cluster Pods among multiple nodes in different availability zones to reduce the risk of Single Point of Failure.

If your cluster setup requires specific configurations (that could be due to network or configuration constraints), we encourage you to check out the Networking overview section of the documentation.

3.2.4. Configuring ingresses

The recommended way to access Horizon is behind a reverse proxy, known in the Kubernetes world as "ingress controllers". However, Horizon requires that the reverse proxy in front of it (that also terminates the TLS connection) requests certificate client authentication (also known as mTLS).

To create an ingress upon installation, simply set the following keys in your `override-values.yaml` file:

```
ingress:
  enabled: true
  hostname: horizon.lab
  tls: true
```

Identify CAs which will require certificate authentication

You'll need to gather a list of CAs that will emit certificates which will be able to authenticate to Horizon. To identify them, ask yourself whether the certificates signed by these CAs will:

- renew using the EST protocol (used by the Horizon Client)
- be used to authenticate users to Horizon (either through API or via the UI)
- be used to authenticate the WinHorizon component (in an Active Directory environment)

Other use-cases might also require you to authenticate with a client certificate.

Configure your ingress to require a client certificate

Configuration for mTLS depends on the ingress controller that you use. The following ingress controllers are officially supported by EVERTRUST, and we strongly advise to use one of them with Horizon. However, almost any ingress controller can be configured to correctly request client certificates manually.

ingress-nginx

The Horizon Helm Chart supports autoconfiguring `ingress-nginx`. To enable client certificate authentication, simply set the following values in the `values-override.yaml` file:

```
ingress:
  enabled: true
  type: nginx
  clientCertificateAuth: true
  hostname: horizon.lab
```

```
  tls: true
```

Skip to the Ensure certificate authentication is effective section to test your configuration.

NOTE	`ingress-nginx` doesn't require a list of CAs trusted for client authentication, so any certificate may be submitted by a connecting client. If you wish to specify a list of CAs, disable autoconfiguration and manually configure your ingress using annotations following the ingress-nginx documentation.

Traefik

The Horizon Helm Chart supports autoconfiguring Traefik. To enable client certificate authentication, simply set the following values in the `values-override.yaml` file:

```
ingress:
  enabled: true
  type: traefik
  clientCertificateAuth: true
  hostname: horizon.lab
  tls: true
```

Skip to the Ensure certificate authentication is effective section to test your configuration.

NOTE	Traefik doesn't require a list of CAs trusted for client authentication, so any certificate may be submitted by a connecting client. If you wish to specify a list of CAs, disable autoconfiguration and manually configure your ingress using annotations following the Traefik documentation.

Other ingress controllers

If you do not wish or cannot use autoconfiguration, you should ensure your ingress controller is correctly configured to enable all Horizon features.

- When requiring client certificates for authentication, the web server should not perform checks to validate that the certificate is signed by a trusted CA. Instead, the certificate should be sent to Horizon through a request header, base64-encoded. The header name used can be controlled using the `clientCertificateHeader`.
- Some endpoints should not be server over HTTPS, in particular those used for SCEP enrollment. You may want to create an HTTP-only ingress for serving paths prefixed by `/scep` and `/certsrv`, and prevent those from redirecting to HTTPS.

NOTE	The cert-auth-proxy component, maintained by EverTrust, can be used to add client certificate authentication to any ingress controller which supports passthrough TLS.

Ensure certificate authentication is effective

To ensure that Horizon can properly decode certificates being sent by clients, get a certificate from a CA configured for client authentication in a `cert.pem` file and its associated key in a `key.pem` file.

Then, run the following `curl` command :

```
$ curl -k --cert cert.pem --key key.pem https://<Horizon
URL>/api/v1/security/principals/self
```

If Horizon returns an error, or states that the principal is not authenticated (through a 204 HTTP code), then certificate authentication is incorrectly configured.

Instead, information about the certificate should be returned in the principal key :

```
{
  "identity": {
    "identifier": "CN=User, O=EVERTRUST, C=FR", ①
    "name": "User",
    "identityProviderType": "X509", ②
    "identityProviderName": "EVERTRUST CA"
  },
  "permissions": [],
  "roles": null,
  "teams": null,
  "preferences": null,
  "customDashboards": null
}
```

① The DN of the certificate is used as the principal identifier.

② The identity provider is of type X509.

3.3. Startup & login

3.3.1. Accessing Horizon

Once the Horizon deployment is up and running, you can expose it to access the web UI and start configuring the instance.

NOTE	By default, Horizon will expose a plain HTTP endpoint on port 9000 and an HTTPS endpoint on port 9443 (serving a self-signed certificate, unless configured otherwise).

Expose locally with a port forward

Recommended for testing and debugging, this is the fastest way to connect to your Horizon

instance. The idea is to map a local port of your host computer to the remote port of the Horizon container.

To do so, run:

```
kubectl port-forward <horizon pod name> 9000:9000
```

Horizon will then be available on `http://localhost:9000`. A more in-depth tutorial on port forwarding can be found here.

Expose through an ingress controller

When an ingress controller is configured in your cluster, this is the proper way to access Horizon. To deploy an ingress alongside Horizon, set the `ingress.enabled` key to true in the Helm Chart's values override.

3.3.2. Logging in for the first time

Upon the first startup, an administrator account will be generated for you to log in. This account has the `administrator` username and a random password stored on disk, on the master Horizon pod.

To find out the randomly generated password, run:

```
kubectl exec $(kubectl get pods -n <namespace> -l "app.kubernetes.io/name=horizon"
--sort-by={.status.podIP} -o jsonpath="{.items[0].metadata.name}") -n <namespace> --
/bin/sh -c "cat /tmp/tmp.*/adminPassword"
```

CAUTION	It is **highly recommended** to create a dedicated administration account and delete the default one, or at least modify the default administrator password.

3.4. Upgrade

We recommended that you only change values you need to customize in your `values.yml` file to ensure smooth upgrading. Always check the upgrading instructions between chart versions.

3.4.1. Upgrading the chart

When upgrading Horizon, you'll need to pull the latest version of the chart:

```
$ helm repo update evertrust
```

Verify that you now have the latest version of Horizon (through the App version column):

```
$ helm search repo evertrust/horizon
NAME                        CHART VERSION   APP VERSION DESCRIPTION
evertrust/horizon           0.9.3           2.6.0       EverTrust Horizon Helm chart
```

Launch an upgrade by specifying the new version of the chart through the `--version` flag in your command:

```
$ helm upgrade <horizon> evertrust/horizon \
 --values override-values.yaml \
 --version 0.9.3
```

3.4.2. Upgrading the database

Horizon requires that you run a script called `horizon-upgrade` before installing a newer version of Horizon. This script will migrate the database schemas for compatibility with the new version. You have two options for running that script : either let Helm do it automatically or run the script manually from any computer that has Docker.

Automatic database upgrade

By default, the chart will automatically create a `Job` that runs an upgrade script when it detects that the Horizon version has changed between two releases. If the upgrade job fails to run, check the job's pod logs. When upgrading from an old version of Horizon, you may need to explicitly specify the version you're upgrading from using the `upgrade.from` key. The created pod will pull an image named `horizon-upgrade:2.6.x`, so make sure this image will be available to the cluster when upgrading.

Should you wish to disable the automatic upgrade mechanism, just set the `upgrade.enabled` key to `false`.

WARNING	Before upgrading to specific chart version, thoroughly read any Specific chart upgrade instructions for your version.

Manual database upgrade

If for some reason, you need to manually run the upgrade script, you can use the dockerized version of the script provided that your host device has access to the Horizon's MongoDB database.

You can then run the script through Docker:

```
$ docker run -it --rm registry.evertrust.io/horizon-upgrade:2.6.x \
   -m <mongo uri> \
   -t <target version> \
   -s <source version> # This is required when upgrading from an older version of
Horizon
```

Or as a Kubernetes job, inside the Horizon cluster:

```
apiVersion: batch/v1
kind: Job
metadata:
  name: horizon-upgrade
spec:
  template:
    spec:
      containers:
        - name: horizon-upgrade
          image: registry.evertrust.io/horizon-upgrade:2.6.x
          imagePullPolicy: IfNotPresent
          args: [
              "-y",
              "-m", "$(MONGODB_URI)",
              "-s", "<source version>", ①
              "-t", "<target version>"
          ]
          env:
            - name: MONGODB_URI
              valueFrom:
                secretKeyRef:
                  name: horizon ②
                  key: mongoUri
      restartPolicy: Never
  backoffLimit: 0
```

① The source and target values should be updated to match the desired upgrade path

② The secret name and key should match where you store the Horizon MongoDB URI, so it will be injected as an environment variable to the Pod.

3.4.3. Specific chart upgrade instructions

Upgrading to 0.3.0

- Loggers are now configured with an array instead of a dictionary. Check the `values.yaml` format and update your override `values.yaml` accordingly.
- The init dabatabase parameters (`initDatabase`, `initUsername` and `initPassword`) have been renamed and moved to `mongodb.horizon`.

Upgrading to 0.5.0

- The ingress definition has changed. The `rules` and `tls` keys have been removed in favor of a more user-friendly `hostname` that will autoconfigure the ingress rules, and a boolean `tls` key that will enable TLS on that ingress. Check the Ingress section.

Upgrading to 0.9.0

- `clientCertificateDefaultParsingType` has been removed and is no longer supported by Horizon. Explicitly set the `clientCertificateHeader` or use ingress autoconfiguration to continue using client certificate authentication.
- `ingress.type` will now be strictly validated. It may fail if you use an unsupported value.
- `mailer.port`, `mailer.tls` and `mailer.ssl` are no longer set by default. You must now explicitly set if you want to use them.

Upgrading to 0.11.0

- New Lease CRD is added.
- `akka.conf` has been replaced with `pekko.conf`. It may fail if you use custom configuration otherwise it will be handled by the helm chart.

3.5. Uninstallation

To uninstall Horizon from your cluster, simply run:

```
$ helm uninstall horizon -n horizon
```

This will uninstall Horizon. If you installed a local MongoDB instance through the Horizon's chart, it will also be uninstalled, meaning you'll lose all data from the instance.

WARNING	Before uninstalling Horizon, if you wish to keep your database, please back up your application secrets (in particular the SSV secret). Without it, you won't be able to decrypt your database and it will become useless.

3.6. Advanced usage

Some edge use-cases might not have been included in the previous installation documentation, for clarity purposes. You may find some of them below.

3.6.1. Running behind a Docker registry proxy

If your installation environment requires you to whitelist images that can be pulled by the Kubernetes cluster, you must whitelist the `registry.evertrust.io/horizon` and `registry.evertrust.io/horizon-upgrade` images.

3.6.2. Leases

To ensure clustering issues get resolved as fast as possible, Horizon can use a CRD (Custom Resource Definition) named `Lease` (`akka.io/v1/leases`). We strongly recommend that you use this mechanism, however it implies that you have the necessary permissions to install CRDs onto your server. In case you don't, the feature can be disabled by passing the `--skip-crds` flag to the Helm

command when installing the chart, and setting the `leases.enabled` key to `false`. If you want to manually install the CRD, you can check the `crds/leases.yml` file.

3.6.3. Injecting extra configuration

Extra Horizon configuration can be injected to the bundled `application.conf` file to modify low-level behavior of Horizon. This should be used carefully as it may cause things to break. To do so, use the `extraConfig` value in your `values.yaml` file:

This can be done with the following edits to your `values.yaml` file:

```
extraConfig: |
    play.server.http.port = 9999
    horizon {
      notification.mail.attachment.extension.der = "der"
    }
```

Extra configurations are included at the end of the config file, overriding any previously set config value.

NOTE	An exhaustive list of configuration options can be found on the Administration Guide page.

3.6.4. Custom startup scripts

Sometimes, you'll want to run scripts each time the container starts up in order to configure files in the container or set environment variables. To do so, you'll need to mount shell scripts into the `/docker-entrypoint.d/` directory in the container. Using the Helm chart, this can be achieved easily using the following `values.yaml` overrides:

```
extraVolumes:
  - name: horizon-entrypoint-scripts
    configMap:
      name: horizon-entrypoint-scripts

extraVolumeMounts:
  - name: horizon-entrypoint-scripts
    mountPath: /docker-entrypoint.d/
```

Given you've previously create a `ConfigMap` called `horizon-entrypoint-scripts`:

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: horizon-entrypoint-scripts
data:
```

```
  run-on-startup.sh: |
    echo "Hello World !"
```

NOTE	By design, Horizon is configured to run as an unprivileged user inside the container to follow industry best practices. This means that your scripts won't be able to perform privileged operations on the container, such as trusting custom CAs. If you do want to overcome this problem, you can run the container as `root`, even though it is generally discouraged.

3.6.5. Networking overview

When installed in HA, Horizon sends messages to other running instances in its cluster. To form the cluster and set up networking between nodes, Horizon is relying on Pekko, a framework for building clusterized applications. Understanding how clustering works is important when building deployments with highly specific needs or when preparing a disaster recovery plan.

When deployed on multiple nodes inside a Kubernetes cluster, the following steps are followed:

1. **Discovery**: the discovery process locates all nodes that will be used to form a cluster. It relies on a third-party to give that information, such as a DNS record or the Kubernetes API (which is the default when deploying using the Helm Chart). For documentation, see Pekko Discovery.
2. **Bootstrap**: once each node in the cluster has the address of every other node, nodes start to contact each other. This is done though Pekko Management, a tool for helping nodes coordinate. For documentation, see Pekko Management.
3. **Remoting**: the cluster is now formed, nodes can communicate with each other. This uses Pekko Remoting, a higher level protocol for serializing data over multiple transports. Typically, TCP is used. For documentation, see Pekko Remoting.

This clustering process can be summarized by the below diagram:

Sequence diagram of the cluster management of Horizon

```
sequenceDiagram
    autonumber
    rect rgb(191, 223, 255)
    Pod1 ->> Kubernetes API: Discovery request
    destroy Kubernetes API
    Kubernetes API ->> Pod1: Returns other pods addresses
    end
    Note right of Pod2: 1-2: Discovery process


    rect rgb(156, 250, 152)
    Pod1 ->> Pod2: Contact Pekko Management
    Pod2 ->> Pod1: Returns already contacted nodes

    break when an existing cluster is found
    Pod1 ->> Pod2: Joins the existing cluster
```

```
    end

    break when no existing cluster is found
    Pod1 ->> Pod1: Self-joins and create cluster
    Pod2 ->> Pod1: Joins the created cluster
    end
    end

    Note over Pod1,Pod2: Leader election is performed at this point

    Note right of Pod2: 3-7: Bootstrap process

    rect rgb(250, 148, 142)
    Pod1 ->> Pod2: Exchanges actor messages
    Pod2 ->> Pod1: Exchanges actor messages
    end

    Note right of Pod2: 8-9: Remoting
```

Traffic between different nodes is described in the below table:

Table 1. Traffic detail for Horizon clustering

Traffic type	**Diagram color**	**Protocol**	**Port**
Kubernetes API	Blue	HTTP	443
Pekko Management	Green	HTTP	7626 (by default)
Pekko Remote	Red	TCP (by default)	17355

4. Installing on Openshift

Installing Horizon on Openshift is very similar to installing on Kubernetes. The main difference is that you need to use the `oc` command instead of `kubectl`. For that reason, you should follow the Kubernetes installation procedure.

This page details the differences expected betwen Kubernetes and Openshift.

4.1. Security contexts

The default Horizon Helm chart uses the `1001` user to avoid running as root inside the container. However, on OpenShift, this results in the `anyuid` SCC being required to run the container. Since a random non-root UID will be assigned by OpenShift to the container upon startup, this security measure is unnecessary. It can be safely disabled by adding the following YAML to your `values-override.yaml` file:

```
podSecurityContext:
  enabled: false

containerSecurityContext:
  enabled: false
```

If you're using the built-in database for test purposes, you'll also need to disable the security context for the database container:

```
mongodb:
  podSecurityContext:
    enabled: false

  containerSecurityContext:
    enabled: false
```

WARNING	On OpenShift, you might have to manage volume permissions for the MongoDB PVC using the Bitnami's guide.

4.2. Leases

In a large cluster, chances are that CRDs cannot be installed by a regular user. However, Horizon can be configured to rely on leases that are CRDs for clustering. See the dedicated documentation section for more information on how leases work.

Leases can be safely disabled without having a large impact on Horizon reliability. They mostly help in case of a network partition across multiple datacenters or availability zones.

To disable leases, add the following YAML to your `values-override.yaml` file:

```
leases:
  enabled: false
```

Then, when installing the helm chart, add the `--skip-crds` option to ensure that the leases CRD is not installed.

4.3. Router configuration

When exposing Horizon through the OpenShift router, you need to provide Horizon with a way to authenticate client certificates. You have two options to do so:

- Install the `cert-auth-proxy` component as a sidecar of the Horizon pod and use a passthrough route to forward traffic to Horizon. (**recommended**)
- Configure the router to ask for client certificates and forward traffic to Horizon.

4.3.1. Using `cert-auth-proxy`

The `cert-auth-proxy` component is a small proxy that can be used to authenticate client certificates. It is installed as a sidecar container to Horizon, and then referenced in place of Horizon in the OpenShift route or ingress. To install it, add the following YAML to your `values-override.yaml` file:

```
clientCertificateHeader: "X-Forwarded-Tls-Client-Cert"

sidecars:
  - name: cert-auth-proxy
    image: registry.evertrust.io/cert-auth-proxy:latest
    imagePullPolicy: Never
    ports:
      - name: https-proxy
        containerPort: 8443
    env:
      - name: UPSTREAM
        value: localhost:9000
    volumeMounts:
      - name: horizon-local-tls
        # This mountPath will enable the certificate for the "horizon.local" route
        mountPath: /var/cert-auth-proxy/certificates/horizon.local

extraVolumes:
  - name: horizon-local-tls
    secret:
      # This secret must contain a valid TLS certificate for route hostname.
      secretName: horizon.local-tls

service:
  extraPorts:
    - name: https-proxy
```

```
      protocol: TCP
      port: 8443
      targetPort: https-proxy
```

Then, you can either use the following extra values to `override-values.yaml` to generate an ingress with a passthrough route:

```
ingress:
  enabled: true
  annotations:
    route.openshift.io/termination: "passthrough"
  extraRules:
    - host: "horizon.local"
      http:
        paths:
          - path: /
            pathType: Prefix
            backend:
              service:
                name: horizon
                port:
                  name: https-proxy
  extraTls:
    - hosts:
        - "horizon.local"
      secretName: horizon.local-tls
```

If you wish to use the `Route` resource instead, disable the ingress by setting `ingress.enabled` to `false` and manually create the route:

```
$ oc create route passthrough horizon --service=horizon --port=https-proxy
--hostname=horizon.local
```

4.3.2. Using the router mTLS configuration

WARNING	This method is no longer recommended since it requires deploying a specific ingress controller for Horizon purposes. Changing mTLS settings on an ingress controller affects all routes served by this ingress controller.

Follow the Kubernetes ingress controller configuration procedure. Gather all ACs identified in the previous step and create a bundle file containing all of them, called `ca-bundle.pem`.

Then, follow the Openshift documentation to configure the ingress controller serving Horizon requests to ask for client certificates signed by any of these ACs:

Upload the ACs to the OpenShift cluster in a configmap

```
$ oc create configmap router-ca-certs-default --from-file=ca-bundle.pem=ca-bundle.pem
-n openshift-config
```

Tell the ingress controller to ask for client certificates

```
$ oc edit IngressController default -n openshift-ingress-operator
```

And set the following values:

```
apiVersion: operator.openshift.io/v1
kind: IngressController
metadata:
    name: default
namespace: openshift-ingress-operator
spec:
    clientTLS:
      clientCertificatePolicy: Optional
      clientCA:
        name: router-ca-certs-default
```

Then, when installing Horizon through the Chart, set the `clientCertificateDefaultParsingType` key to the value `haproxy` (which is what the Openshift ingress controller is based on).

NOTE

As of 4.14, Openshift will only download CRLs from the certificates in the `ca-bundle.pem` chain (inferred from their CRLDPs). This can lead to a TLS handshake failure when authenticating using a client certificate. Introducing a dummy entity certificate in the chain might be required to ensure that the operational CAs CRLs are downloaded by the Openshift ingress controller. See this issue for more information.

Skip to the Ensure certificate authentication is effective section to test your configuration.

5. Running with Docker/Compose

If you just want to try out Horizon, one way of doing so could be to directly run Horizon from Docker. For resiliency reasons, this is obviously not recommended for production usage.

We provide a Docker image that's entirely configurable through environment variables. All Docker examples require that you login to our Docker repository beforehand :

```
$ docker login registry.evertrust.io
```

NOTE	If you're looking to try out Horizon's features, take a look at the EVERTRUST Playground. It is a Docker Compose project bundled with demo values to get you started swiftly.

5.1. Docker Compose example

The simplest way to spin up an Horizon instance is to let Docker Compose manage the required components :

- the database,
- the Horizon instance
- and (optionally) the reverse proxy.

Copy the following `docker-compose.yaml` file and tweak it to match your needs :

```yaml
version: "3.1"
services:
  horizon:
    image: registry.evertrust.io/horizon:2.6.x
    ports:
      - "9000:9000"
    networks:
      - horizon
    environment:
      LICENSE: MI...
      APPLICATION_SECRET: tobechanged
      EVENT_SEAL_SECRET: tobechanged
      VAULT_TYPE: ssv
      VAULT_MASTER_PASSWORD: tobechanged
      HOSTS_ALLOWED.0: .
      MONGODB_URI: mongodb://mongo:27017/horizon
    depends_on:
      - mongo
    healthcheck:
      test: [ "CMD", "curl", "-f", "http://localhost:7626/ready" ]
      interval: 10s
```

```
      timeout: 60s
      retries: 10
  mongo:
    image: mongo:5
    restart: always
    volumes:
      - database:/data/db
    networks:
      - horizon
volumes:
  database: {}
networks:
  horizon: {}
```

You then only need to run the following in the directory where you created the previous file :

```
$ docker compose up
```

Horizon should quickly become available on `http://localhost:9000`.

5.2. Vanilla Docker example

Pull the latest Horizon image:

$ docker pull registry.evertrust.io/horizon:{page-version}.x

The Horizon Docker image ships with sensible configuration defaults. Most can be configured by injecting environment variables when running the container, like so:

$ docker run \ -e LICENSE="MI..." -e APPLICATION_SECRET="tobechanged" -e EVENT_SEAL_SECRET="tobechanged" -e VAULT_TYPE="ssv" -e VAULT_MASTER_PASSWORD="tobechanged" -e HOSTS_ALLOWED.0="." -e MONGODB_URI="" -p [port]:9000 \ registry.evertrust.io/horizon:{page-version}.x

5.3. Environment variables

5.3.1. General configuration

Variable	Type	Description	Default
LICENSE	`string`	A valid Horizon license string, base64-encoded. Can be used if `LICENSE_PATH` is empty.	

Variable	Type	Description	Default
LICENSE_PATH	`path`	Path where an Horizon license file is mounted inside the container. Can be used if the license is not passed directly through `LICENSE`.	
APPLICATION_SECRET	`string`	Application secret used by Horizon	
MONGODB_URI	`string`	A valid MongoDB URI. See mongo_uri_config.	
HOSTS_ALLOWED	`array`	Array of hosts. Append the array index after a dot (the nth allowed host variable name would be HOSTS_ALLOWED.n).	

WARNING Your license usually contains newline characters, that you must replace by '\n' when setting it through the environment.

5.3.2. Configure the secrets vault

Variable	Type	Description	Default
VAULT_TYPE	`string`	Vault backend. `ssv` for a software encrypted vault. `shv` for a PKCS#11 HSM.	
VAULT_MASTER_PASSWORD	`string`	When using an `ssv` vault, this encryption key backs all secrets encrypted in database.	
VAULT_MODULE_PATH	`string`	Used to connect to an HSM.	
VAULT_SLOT_ID	`string`	Used to connect to an HSM.	
VAULT_PIN	`string`	Used to connect to an HSM.	
VAULT_LABEL	`string`	Used to connect to an HSM.	

Variable	Type	Description	Default
VAULT_ALLOW_MASTER_KEY_GEN	`string`	Allow key generation on PKCS#11 devices when no existing is found.	

5.3.3. Configuring HTTPS

In production, it is strongly recommended to ensure all requests go through a layer of encryption. Configuring TLS for Horizon will allow your reverse proxy to request Horizon data using TLS.

NOTE If all settings are left empty, Horizon will generate a self-signed certificate upon startup and still expose its HTTPS endpoint on

Variable	Type	Description	Default
HTTP_PORT	`port`	Port of the HTTP server	`9000`
HTTPS_PORT	`port`	Port of the HTTPS server	`9443`
HTTPS_KEYSTORE_PATH	`string`	Location where the keystore containing a server certificate is located.	
HTTPS_KEYSTORE_PASSWORD	`string`	Password for the given keystore, if required by the keystore type	
HTTPS_KEYSTORE_TYPE	`string`	Format in which the keystore is. Can be either `pkcs12`, `jks` or `pem` (a base64-encoded DER certificate)	`pkcs12`
HTTPS_KEYSTORE_ALGORITHM	`string`	The key store algorithm	Platform default algorithm

5.3.4. Mailer configuration

Variable	Type	Description	Default
SMTP_HOST	`string`	SMTP host	
SMTP_PORT	`string`	SMTP port	
SMTP_SSL	`boolean`	Whether SSL should be used	
SMTP_TLS	`boolean`	Whether TLS should be used	

Variable	Type	Description	Default
SMTP_USER	`string`	SMTP user	
SMTP_PASSWORD	`string`	SMTP password	

5.3.5. Events configuration

Variable	Type	Description	Default
EVENT_CHAINSIGN	`boolean`	Whether to sign events to verify their integrity	`true`
EVENT_TTL	`duration`	Event time to live in database	
EVENT_DISCOVERY_TTL	`duration`	Discovery events time to live. Can be shorter in case a large number of discovery events are logged.	

5.3.6. Advanced parameters

Variable	Type	Description	Default
AKKA_ACTOR_SYSTEM	`string`	Name of the actor system used by Pekko. Useful if you need to run multiple instances of Horizon in the same Kubernetes namespace. Due to compatibility reasons, the variable is still called Akka.	`horizon`
SESSION_MAXAGE	`string`	Log in session duration.	`15 minutes`
HTTP_CERTIFICATE_HEADER	`string`	Header name in which the client certificate should be sent when using mTLS.	

5.4. Injecting extra configuration

The Docker image comes with a simple enough configuration to get started and test the software. However, it doesn't include any way to cluster the software with other instances or to edit other specific configurations. If you need to do so, you can mount custom configuration files, giving you full control over how Horizon behaves.

The mounted folder :

- MUST contain an `pekko.conf` file configuring the Pekko cluster. See the reference config to get an idea over what's configurable.
- CAN contain a `application.conf` file containing any extra config options unrelated to clustering.

A typical Docker command would then be :

```
$ docker run \
   -v [configurationPath]:/opt/horizon/etc/:rw \
   ...
   registry.evertrust.io/horizon:2.6.x
```

5.5. Custom startup scripts

Sometimes, you'll want to run scripts each time the container starts up in order to configure files in the container or set environment variables. To do so, you'll need to mount shell scripts into the `/docker-entrypoint.d/` directory in the container :

```
$ docker run \ -v [scriptsPath]:/docker-entrypoint.d/ \
   ...
   registry.evertrust.io/horizon:2.6.x
```

Where `scriptsPath` is a directory containing one or multiple shell scripts that will be sourced before running Horizon.

6. Troubleshooting

6.1. Horizon Doctor

NOTE	Horizon Doctor is currently only available for deployments on CentOS/RHEL. To troubleshoot deployments on Kubernetes, use built-in tools like events and logs.

Horizon doctor is a tool that performs checks on your Horizon installation as well as its required dependencies to ensure that everything is configured properly. The tool is targeted towards troubleshooting during installation or update procedures. Note that the tool requires root permissions to run.

6.1.1. Performed checks

At the moment, Horizon Doctor checks for:

OS checks

- Checks for installed Horizon version, MongoDB version, Java version, Nginx version, OS Version.
  - If the OS is a RedHat distribution, checks if the RedHat subscription is active
  - If Mongo is not installed locally, it notices it as an information log
- Checks for **SELinux**'s configuration: throws a warning if it is enabled, says ok if it is on permissive or disabled
- Checks for the status of the necessary services: **postfix**, **mongod**, **nginx** and **horizon**.
  - If the **postfix** service is running, tries to connect via a TCP SYN on the port 25 of the **relayhost** specified in the */etc/postfix/main.cf* file and throws an error if it can't.
- Checks how long the **Horizon** service has been running for.
- Checks if there is an **NTP service** active on the machine and checks if the system clock is synchronized with the NTP service.

Config checks

- Checks for existence and permissions of the **configuration** file: the permissions are expected to be at least 640 and the file is supposed to belong to horizon:horizon
- Checks for existence and permissions of the **licence** file: the permissions are expected to be at least 640 and the file is supposed to belong to horizon:horizon.
- Checks for existence and permissions of the **vault** file: the permissions are expected to be at least 640 and the file is supposed to belong to horizon:horizon.
- Checks for the permission of the Horizon directory (default: /opt/horizon): the permission is expected to be at least 755.
- Checks for the existence of the **symbolic link** for **nginx configuration** and runs an **nginx -t**

test.

- Retrieves the **Java heap size parameters** that were set for Horizon and throws a warning if the default ones are used (min = 2048 and max = 3072).
- Retrieves the **Horizon DNS hostname** and stores it for a later test (throws an error if it has not been set).
- Checks for the **Horizon Play Secret** and **Horizon Event Seal Secret**: these are the Horizon application secrets and should be different from default value thus Horizon Doctor throws an error if either of them is equal to the default value (*changeme*).
- Retrieves the **MongoDB URI** (throws a warning if MongoDB is running on localhost; throws an error if MongoDB is running on an external instance but the *authSource=admin* parameter is missing from the URI).
- Parses the **Horizon license file** to retrieve its expiration date as well as the license details (number of holders per category).

Network checks

- Runs a **MongoDB ping** on the URI, then checks for the database used in the URI (throws a warning if the database used is not called *horizon*; throws an error if no database is specified in the URI).
- Checks for **PEKKO High Availability** settings: if no node hostname is set up, skips the remaining HA checks. If 2 nodes are set up, retrieves which node is running the doctor and checks for the other node. If 3 nodes are set up, retrieves which node is running the doctor and checks for the other 2 nodes. The check runs as:
  - if *curl* is installed, runs a *curl* request on the Node hostname at *alive* on the management port (default is 7626), and if alive runs another *curl* request on the Node hostname at */ready* on the management port. Both requests should return HTTP/200 if ok, 000 otherwise.
  - if *curl* is not installed, uses the built-in Linux TCP socket to run TCP SYN checks on both the HA communication port (default is 17355) and the management port (default is 7626) on the Node hostname.
- Checks for **firewall configuration**. Currently only supports *firewalld* (RHEL) and a netstat test.
  - The **netstat part** will run a *netstat* command to check if the JVM listening socket is active (listening on port 9000). If *netstat* is not installed, it will skip this test.
  - The **firewalld part** will check if the HTTP and HTTPS services are opened in the firewall and if it detected a HA configuration, it will check if the HA ports (both of them) are allowed through the firewalld. If *firewalld* is not installed or not active, it will skip this test.
- Checks if **IPv6** is active in every network interface and throws a warning if it is the case (specifying the interface with IPv6 turned on).

TLS checks

- Checks for existence and permissions of the **Horizon server certificate** file: the permissions are expected to be at least 640 and the file is supposed to belong to the nginx group.
- Parses the **Horizon server certificate** file: it should be constituted of the actual TLS server

certificate first, then of every certificate of the trust chain (order being leaf to root). It throws a warning if the certificate is self-signed or raises an error if the trust chain has not been imported. It otherwise tries to reconstitute the certificate trust chain via the *openssl verify* command, and throws an error if it cannot.

- Parses the **Horizon server certificate** file and checks if the **Horizon hostname** is present in the **SAN DNS names** of the certificate, throws an error if it is not there.

6.1.2. Log packing option

If the Horizon doctor is launched with the *-l option*, it will pack the logs of the last 7 days (in */opt/horizon/var/log*) as well as the startup logs (the */var/log/horizon/horizon.log* file) and create a tar archive.

The *-l option* accepts an optional parameter that should be an integer (1-99) and will pack the logs of the last n days instead, as well as the startup logs.

Note that the **Horizon doctor** will still perform all of its check; the log packing is done at the very end of the program.

Example of call to pack the logs of the last 7 days:

```
$  horizon-doctor -l
```

Example of call to pack the logs of the last 30 days:

```
$ horizon-doctor -l 30
```

6.1.3. Saving the doctor's output

If the Horizon doctor is launched with the *-o option*, it will perform all of its checks and save the output in the specified file instead of displaying it into the stdout (default is the command line interface).

If you use the option, you must provide a filepath in a writable directory.

Example of call to save the output in a file named `horizon-doctor.out` instead of the stdout:

```
$ horizon-doctor -o horizon-doctor.out
```

6.1.4. Help menu

To display Horizon doctor's help menu, use the `-h` option.

6.2. Additional checks

- Ensure that you are using an up-to-date web browser when trying to access the Horizon web interface.
- Ensure that Javascript in turned on in your web browser.
- Ensure that your user machine can access the server where Horizon was installed.
- If several hostnames have been set up for the Horizon interface, ensure that every single one of them is present in the TLS certificate SAN DNS names.