

# SAP Data Intelligence 3 on CaaS Platform 4.2

## Installation Guide

SUSE CaaS Platform 4.2  
SUSE Linux Enterprise Server for SAP Applications 15  
SAP Data Intelligence 3

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# SAP Data Intelligence 3 on CaaS Platform 4.2

## Installation Guide

**Date:** 2024-12-12

SAP Data Intelligence 3 is the tool set to govern big amount of data. SUSE CaaS Platform 4 is the Kubernetes base that makes deploying SAP Data Intelligence 3 easy. This document describes the installation and configuration of SUSE CaaS Platform 4 and SAP Data Intelligence 3.

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# Contents


- 1 Introduction 4
- 2 Prerequisites 4
- 3 Installing SUSE CaaSP 4.2 5
- 4 Adding secure private Docker Registry for container images 9
- 5 SUSE Enterprise Storage 23
- 6 Installing SAP Data Intelligence 3 on top of SUSE CaaSP 4.2 57
- 7 Legal notice 85
- 8 GNU Free Documentation License 86

# 1 Introduction

This guide describes the on-premises installation of SAP Data Intelligence 3 on SUSE CaaS Platform 4.2.

## 2 Prerequisites

### 2.1 Hardware

For **sizing** information, see in addition the SAP documentation: [Sizing Guide for SAP Data Intelligence \(https://help.sap.com/viewer/835f1e8d0dde4954ba0f451a9d4b5f10/3.0.latest/en-US\)](https://help.sap.com/viewer/835f1e8d0dde4954ba0f451a9d4b5f10/3.0.latest/en-US) 

At least eight nodes are needed for a Kubernetes cluster for production use.

- Minimal requirements:
  - three master nodes
  - four worker nodes
  - one or two loadbalancers (these can be virtual machines)

For the installation of SUSE CaaSP 4.2, additional hosts are needed:

- Management host
- Registry for storing container images

These can be virtual machines.


### 2.2 Software

- SUSE Linux Enterprise 15 SP1
- SUSE CaaSP 4.2

## 3 Installing SUSE CaaSP 4.2

### 3.1 Documentation

SUSE CaaS Platform 4.2 is documented here:

- SUSE CaaS Platform product documentation (<https://documentation.suse.com/suse-caasp/4.2/>) 

### 3.2 Preparations

On all the nodes, install SUSE Linux Enterprise 15 SP1 or higher, as per the documentation for CaaS Platform 4.2.

On each respective node, the following modules or products are required.

- Management host:
  - SUSE Linux Enterprise 15 SP1
  - SUSE Linux Enterprise 15 SP1 Containers Modules
  - SUSE Linux Enterprise 15 SP1 Public Cloud
  - SUSE CaaSP 4
- Kubernetes master nodes:
  - SUSE Linux Enterprise 15 SP1
  - SUSE Linux Enterprise 15 SP1 Public Cloud
  - SUSE CaaSP 4

- Kubernetes worker nodes:
  - SUSE Linux Enterprise 15 SP1
  - SUSE Linux Enterprise 15 SP1 Public Cloud
  - SUSE CaaSP 4
- Loadbalancer host:
  - SUSE Linux Enterprise Server for SAP Applications 15 SP1  
or
  - SUSE Linux Enterprise 15 SP1 plus High Availability Extension

### 3.3 Installing the SUSE CaaSP 4 cluster nodes

- Install SUSE Linux Enterprise 15 SP1.



#### Note

Use the "Expert Partitioner" to disable and remove any automatically-configured swap partitions on the Kubernetes nodes.

See the relevant product documentation:

- SUSE Linux Enterprise Server 15 SP1 Deployment Guide (<https://documentation.suse.com/sles/15-SP1/single-html/SLES-deployment/#book-sle-deployment>) ↗
- SUSE CaaS Platform Deployment Guide (<https://documentation.suse.com/suse-caasp/4.2/single-html/caasp-deployment/>) ↗

### 3.4 Installing the loadbalancer for the Kubernetes cluster

- Install SUSE Linux Enterprise 15 SP1
- Install ha-proxy or nginx
- Configure the loadbalancer

See the relevant product documentation:

- SUSE CaaS Platform Deployment Guide (<https://documentation.suse.com/suse-caasp/4.2/single-html/caasp-deployment/>) 

## 3.5 Installing the management workstation

- Install SUSE Linux Enterprise 15 SP1
- Add the necessary SUSE Linux Enterprise 15 SP1 modules: value

```
$ sudo SUSEConnect -r CAASP_REGISTRATION_CODE
$ sudo SUSEConnect -p sle-module-containers/15.1/x86_64
$ sudo SUSEConnect -p caasp/4.0/x86_64 -r CAASP_REGISTRATION_CODE
$ sudo SUSEConnect -p sle-module-python2/15.1/x86_64
```

## 3.6 Bootstrapping the SUSE CaaSP 4 cluster

- Run the skuba tool for initialization of the cluster.
- Make sure that ssh is working between all nodes without using passwords, and configure ssh-agent.

```
$ eval `ssh-agent`
$ ssh-add <path to key>
```

```
$ skuba cluster init --control-plane <LB IP/FQDN> my-cluster
```

- Bootstrap the cluster:

```
$ cd my-cluster
$ skuba node bootstrap --target <IP/FQDN> <NODE NAME>
```

- Add additional master nodes:

```
$ cd my-cluster
$ skuba node join --role master --target <IP/FQDN> <NODE NAME>
```

- Repeat this for all the master nodes.

- Add the worker nodes:

```
$ cd my-cluster  
$ skuba node join --role worker --target <IP/FQDN> <NODE NAME>
```

- Repeat this for all worker nodes.
- Finally, check the cluster status.

```
$ cd my-cluster  
$ skuba cluster status  
$ cp -av ~/my-cluster/admin.conf ~/.kube/config  
$ kubectl get nodes -o wide
```



## 4 Adding secure private Docker Registry for container images



### Tip

This step is optional if you already have a private secure Docker Registry. If you skip this chapter, follow the instructions in [Section 5, “SUSE Enterprise Storage”](#).

To satisfy the requirements for SAP Data Intelligence 3, you also need a Docker Registry. The easiest way to build and manage one is using the [Harbor project \(https://goharbor.io/\)](https://goharbor.io/).

To this end, you need to create a dedicated server for your Docker registry and the Harbor stack.



### Warning

As Docker only allows characters within the range [a-z],[A-Z],[0-9] and '-' for domain names, make sure that your FQDN does not contain any other characters.

In our example, the server will be connected to a local bridge which provides common services (DNS, SMT, Docker-registry) for the SAP Data Intelligence stack. The FQDN of this server will be harbor-registry.example.com.

### 4.1 Prerequisites

Find the prerequisites for Harbor here: [Harbor Installation Prerequisites \(https://goharbor.io/docs/2.1.0/install-config/installation-prereqs/\)](https://goharbor.io/docs/2.1.0/install-config/installation-prereqs/)

Before you can set up Harbor, you need to install Docker and Docker Compose.

- To install Docker, run:

```
# zypper in -y docker
```

- To install Docker Compose, you must download the executable from its [GitHub repository \(https://github.com/docker/compose\)](https://github.com/docker/compose) and save it into a directory within your \$PATH.

For example, run:

```
# curl -L "https://github.com/docker/compose/releases/download/1.25.5/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
```

```
# chmod +x /usr/local/bin/docker-compose

# ln -s /usr/local/bin/docker-compose /usr/bin/docker-compose
```

The next steps will generate the certificates used to make Harbor secure. These can also be found in the document [Configure HTTPS Access to Harbor \(https://goharbor.io/docs/2.1.0/install-config/configure-https/\)](https://goharbor.io/docs/2.1.0/install-config/configure-https/).

1. First, generate a CA certificate private key:

```
# openssl genrsa -out ca.key 4096
```

2. Then, generate a certificate with the given key for your domain.



## Note

For all further steps, replace `<FQDN>` with your fully qualified domain name. In our example, this would be `harbor-registry.example.com`.

```
# openssl req -x509 -new -nodes -sha512 -days 3650 \
-subj "/C=DE/ST=BW/O=SUSE/CN=<FQDN>" \
-key ca.key \
-out ca.crt
```

Your CA certificate is now ready for use.

3. Next, you must generate a server certificate as follows:

```
# openssl genrsa -out <FQDN>.key 4096
```

4. Generate a certificate signing request (CSR):

```
# openssl req -sha512 -new \
-subj "/C=DE/ST=BW/O=SUSE/CN=<FQDN>" \
-key <FQDN>.key \
-out <FQDN>.csr
```

5. Create an `x509 v3` extension file with the following content:

```
authorityKeyIdentifier=keyid,issuer
basicConstraints=CA:FALSE
keyUsage = digitalSignature, nonRepudiation, keyEncipherment, dataEncipherment
```

```
extendedKeyUsage = serverAuth
subjectAltName = @alt_names

[alt_names]
DNS.1=<FQDN>
DNS.2=<hostname>
```

6. Use the extension file to generate a certificate:

```
# openssl x509 -req -sha512 -days 3650 \
  -extfile v3.ext \
  -CA ca.crt -CAkey ca.key -CAcreateserial \
  -in $fqdn.csr \
  -out $fqdn.crt
```

7. Copy the `.crt` and `.key` files to the system's certificate directory:

```
# cp <FQDN>.crt /etc/pki/trust/anchors/
# cp <FQDN>.key /etc/pki/trust/anchors/
```

8. As Docker interprets `.crt` files as CA certificates and `.cert` files as clients, you must convert your `.crt` file as follows:

```
# openssl x509 -inform PEM -in <FQDN>.crt -out <FQDN>.cert
```

9. You can now copy the newly created certificates to your Docker certificate directory. If the directory `/etc/docker/certs.d` does not exist, create it.

```
# mkdir /etc/docker/certs.d/<FQDN>
# cp <FQDN>.cert /etc/docker/certs.d/<FQDN>/
# cp <FQDN>.key /etc/docker/certs.d/<FQDN>/
# cp ca.crt /etc/docker/certs.d/<FQDN>/
```



## Note

If you want to expose your registry on a port other than 443, you must create a directory `/etc/docker/certs.d/<FQDN>:<Port>` and copy the certificates to this directory instead.

10. To introduce the certificates to Docker, restart the Docker daemon:

```
# systemctl restart docker
```

## 4.2 Setting up Harbor

1. Fetch the Harbor installer and extract its contents:

```
# wget https://github.com/goharbor/harbor/releases/download/v2.1.1/harbor-online-  
installer-v2.1.1.tgz  
# tar xvf harbor-online-installer-v2.1.1.tgz
```

2. Enter the extracted directory:

```
# cd harbor
```

3. Within this directory, you should find a file called `harbor.yml.tpl`. It contains the configuration for the Harbor Registry and must be adjusted.
  - a. First, edit the `hostname` field and enter your FQDN.
  - b. Next, update the **HTTPS** configuration. The subentries `certificate` and `private_key` must be adjusted so they point to the `.cert` and `.key` files you created in [Section 4.1, "Prerequisites"](#).

This should look like the following:

If you want to expose registry on a port other than 443, you can change the port sub-entry to match your desired port.

- c. You should also change the administrator password for Harbor, which by default is defined in the field harbor\_admin\_password: Harbor12345.
  - d. The last field to mention is data\_volume: /data, which defines where all Harbor data will be stored. If you want Harbor to store the data somewhere else, enter the path to the desired directory here.
4. When done, save your changes, and rename the file by removing the .tmpl suffix:

```
# mv harbor.yml.tmpl harbor.yml
```

5. As Harbor uses nginx as a reverse proxy for all services, you must run the prepare script to configure it correctly:

```
# ./prepare
```

6. You can now start the needed containers using Docker Compose:

```
# docker-compose up -d
```

Harbor should now be up and running.

7. Distribute the CA certificate to all Kubernetes nodes, so they can access the registry. Run the following commands on all the nodes:

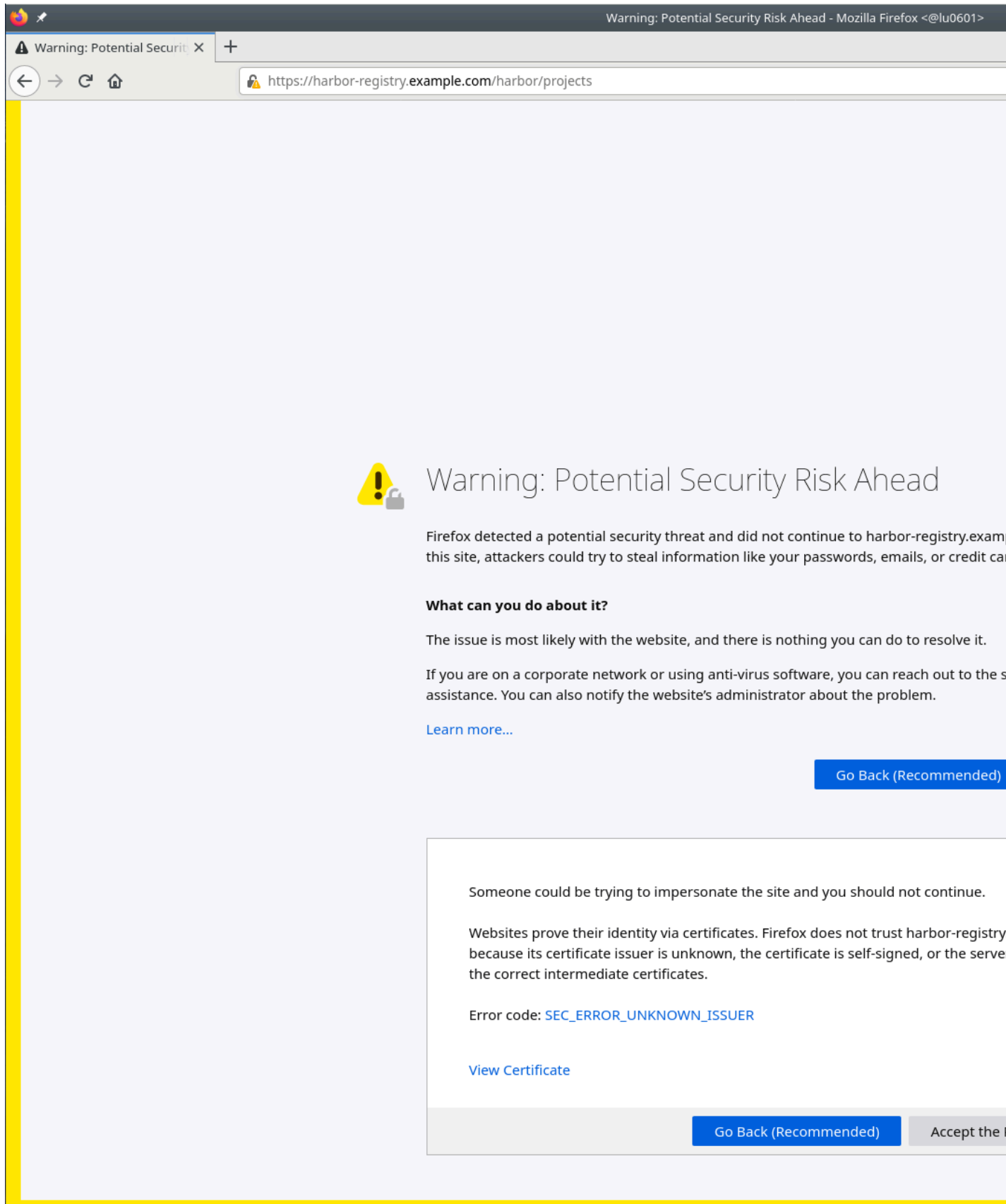
```
# scp <FQDN>:/etc/docker/certs.d/<FQDN>/ca.crt /etc/docker/certs.d/<FQDN>/<FQDN>.crt
# systemctl restart docker
```

For the example <FQDN> of harbor-registry.example.com, this looks like the following:

```
# scp harbor-registry.example.com:/etc/docker/certs.d/harbor-registry.example.com/
ca.crt /etc/docker/certs.d/harbor-registry.example.com/harbor-
registry.example.com.crt
# systemctl restart docker
```

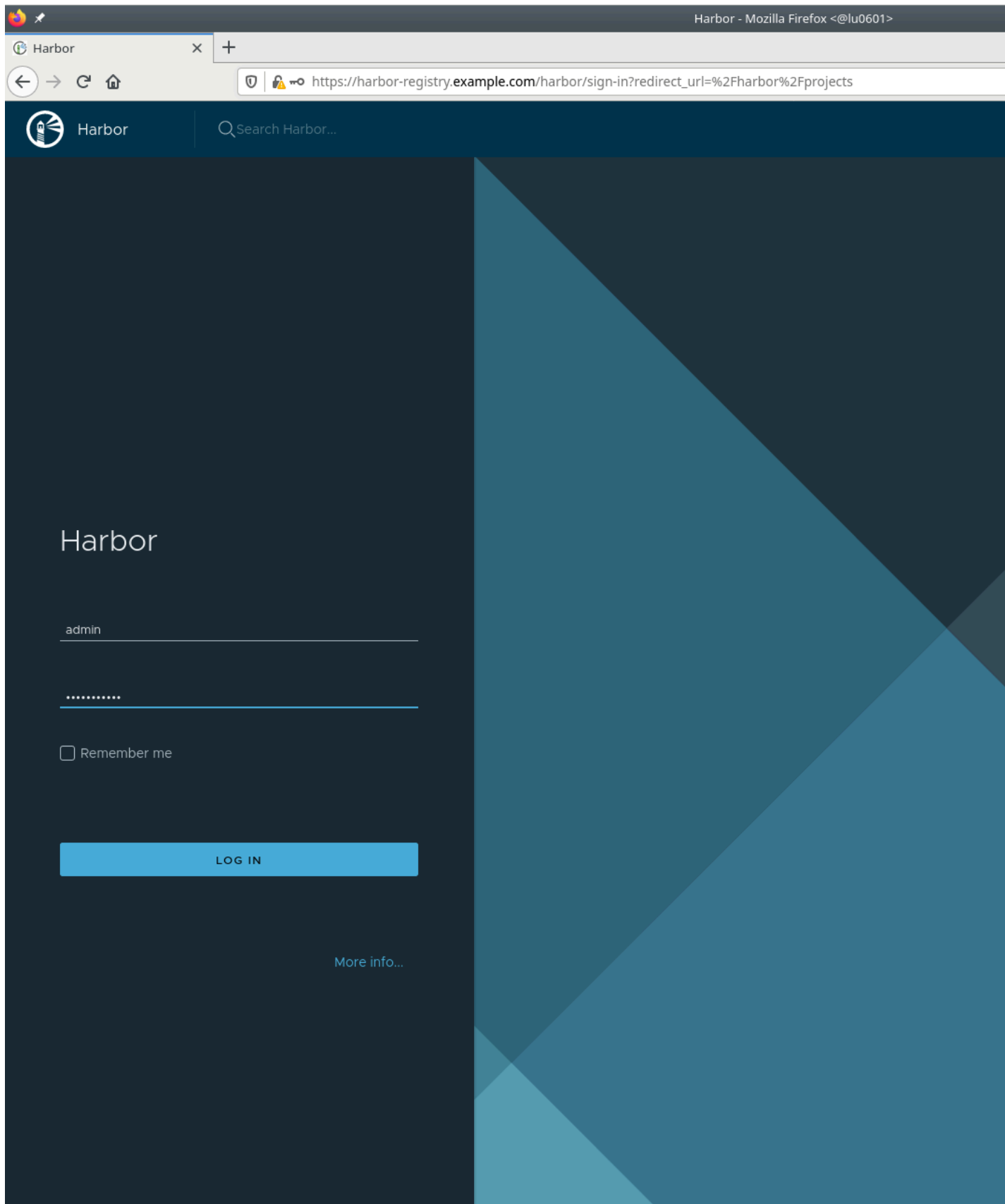
### 4.3 Verifying configuration and setting up Harbor projects

To verify Harbor is running, you may access its Web front-end by visiting `https://<FQDN>` from your browser.





You can toggle the lower box by clicking [Advanced...](#) Then click [Accept the Risk and Continue](#). You will be redirected to the login page of your Harbor registry.



Enter admin as the user name and enter the password specified in the harbor.yml file. By default, this is "Harbor12345".

By default, you will be redirected to the project page which holds the "libraries" project.

Harbor

Search Harbor...

Projects

Logs

Administration

Users

Registries

Replications

Distributions

Labels

Project Quotas

Interrogation Services

Garbage Collection

Configuration

LIGHT

Harbor API V2.0

Projects

+ NEW PROJECT

X DELETE

<input type="checkbox"/>	Project Name	Access Level	Role	Type
<input type="checkbox"/>	library	Public	Project Admin	Project

You should also check if the Docker clients on your Kubernetes nodes can access the registry. To do so, run:

```
# docker login <FQDN>
```

You will be prompted to enter a user name and password. Use admin for the user name, and the password you set in harbor.yml (default: "Harbor12345").

If Docker can access the registry, you will see a message displayed that states "Login Succeeded" or similar.

If your machines cannot resolve the FQDN of your registry, edit your /etc/hosts file and add a line with the following information:

```
<IP> <FQDN> <Hostname>
```

In our example, this will look as follows:

```
192.168.180.100 harbor-registry.example.com harbor-registry
```

Create the namespaces on your registry that are needed for SAP Data Intelligence 3:

- com.sap.hana.container
- com.sap.datahub.linuxx86\_64
- com.sap.datahub.linuxx86\_64.gcc6
- consul
- elasticsearch
- fabric8
- google\_containers
- grafana
- kibana
- prom
- vora
- kaniko-project
- com.sap.bds.docker



## 5 SUSE Enterprise Storage



### Tip

This step is optional if you already have a storage that provides RBD volumes and/or S3 buckets. If you skip this chapter, follow the instructions in [Section 6.4, “Installing SAP Data Intelligence 3”](#).

An on-premises installation of SAP Data Intelligence 3 requires SUSE Enterprise Storage 5.5 or higher.

If you plan to use SUSE Enterprise Storage not only for your Kubernetes dynamic storage class but also for your Kubernetes control plane (virtualized or not), you should reserve enough resources to address the `etcd` requirements specified in the [etcd Hardware recommendations \(https://etcd.io/docs/current/op-guide/hardware/\)](https://etcd.io/docs/current/op-guide/hardware/)

The following steps will deploy a minimalist, virtualized, test-oriented instance of SUSE Enterprise Storage 6. In our example, we will build a four-nodes (1 Admin + 3 OSD) Ceph cluster.

### 5.1 Before starting

- Obtain registration codes for SUSE Linux Enterprise Server 15 SP1 and SUSE Enterprise Storage from <https://scc.suse.com> , or have SMT/RMT properly set up and already mirroring these products.

- SCC (<https://scc.suse.com>) 

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INTERNAL TOOLS

Products

MY ORGANIZATIONS (2)

Connect to an organization

Manage my organizations

MY TOOLS

Support

Activate subscriptions

Packages

Patches

Container Images

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Products > SUSE Linux Enterprise Server 15 SP1 x86\_64 **released**

Available Architectures

Release schedule

aarch64

ppc64le

s390x

**x86\_64**

beta

Dec 14 2018

**released**

Jun 21 2019

Type

Product Class

Requires Regcode

EULA

Description

Still supported?

Trial product code

Download information

Installation media

Base

Module

Extension

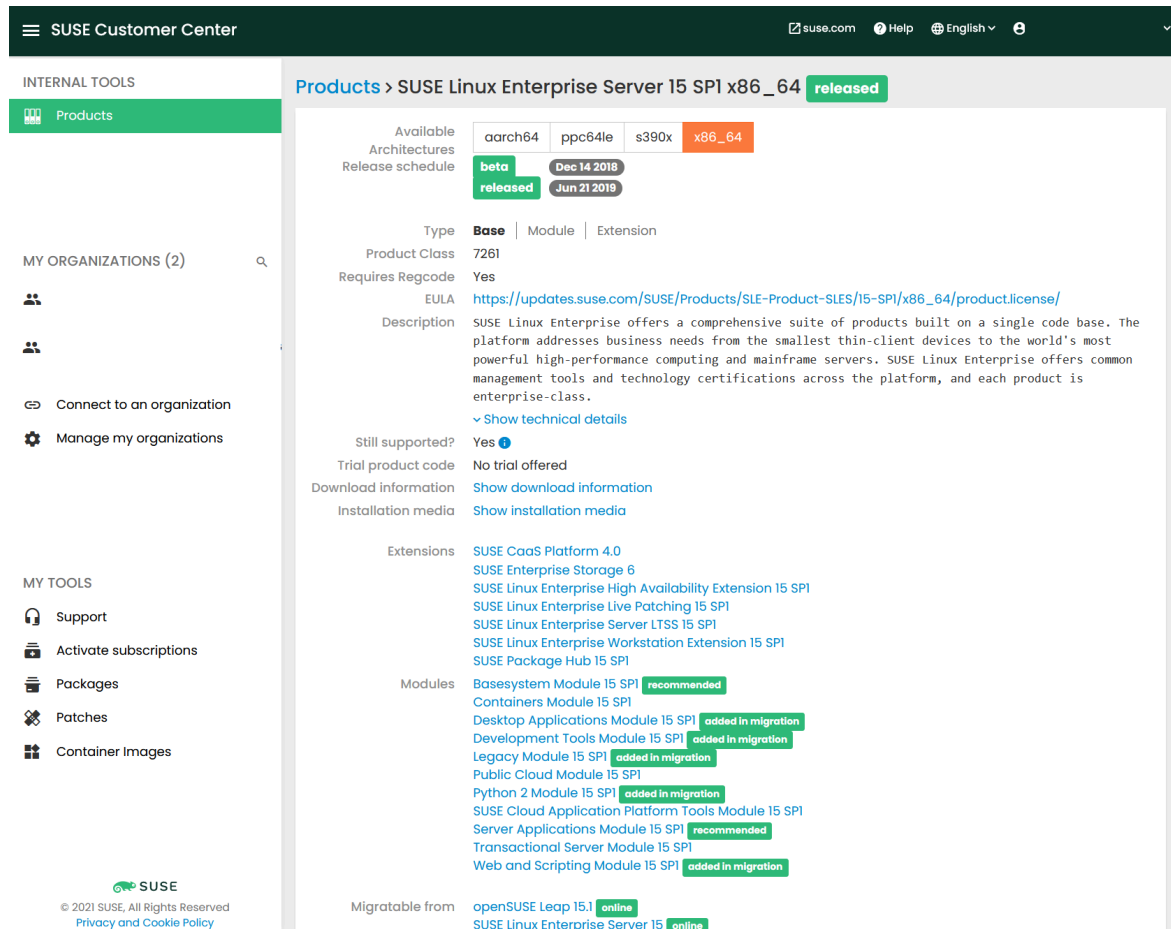
7261

Yes

[https://updates.suse.com/SUSE/Products/SLE-Product-SLES/15-SP1/x86\\_64/product.license/](https://updates.suse.com/SUSE/Products/SLE-Product-SLES/15-SP1/x86_64/product.license/)

SUSE Linux Enterprise offers a comprehensive suite of products built on a single code base. The platform addresses business needs from the smallest thin-client devices to the world's most powerful high-performance computing and mainframe servers. SUSE Linux Enterprise offers common management tools and technology certifications across the platform, and each product is enterprise-class.

▼ Show technical details

Yes 

No trial offered

[Show download information](#)

[Show installation media](#)

Extensions

SUSE CaaS Platform 4.0

SUSE Enterprise Storage 6

SUSE Linux Enterprise High Availability Extension 15 SP1

SUSE Linux Enterprise Live Patching 15 SP1

SUSE Linux Enterprise Server LTSS 15 SP1

SUSE Linux Enterprise Workstation Extension 15 SP1

SUSE Package Hub 15 SP1

Modules

Basesystem Module 15 SP1 **recommended**

Containers Module 15 SP1

Desktop Applications Module 15 SP1 **added in migration**

Development Tools Module 15 SP1 **added in migration**

Legacy Module 15 SP1 **added in migration**

Public Cloud Module 15 SP1

Python 2 Module 15 SP1 **added in migration**

SUSE Cloud Application Platform Tools Module 15 SP1

Server Applications Module 15 SP1 **recommended**

Transactional Server Module 15 SP1

Web and Scripting Module 15 SP1 **added in migration**

Migratable from

openSUSE Leap 15.1 **online**

SUSE Linux Enterprise Server 15 **online**



- SMT (<https://documentation.suse.com/smt/11.3/html/SLE-smt/index.html>) 

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Products > SUSE Linux Enterprise Server 15 SP1 x86\_64 **released**

Available Architectures

aarch64

ppc64le

s390x

**x86\_64**

Release schedule

beta

Dec 14 2018

**released**

Jun 21 2019

Type

Base | Module | Extension

Product Class

7261

Requires Regcode

Yes

EULA

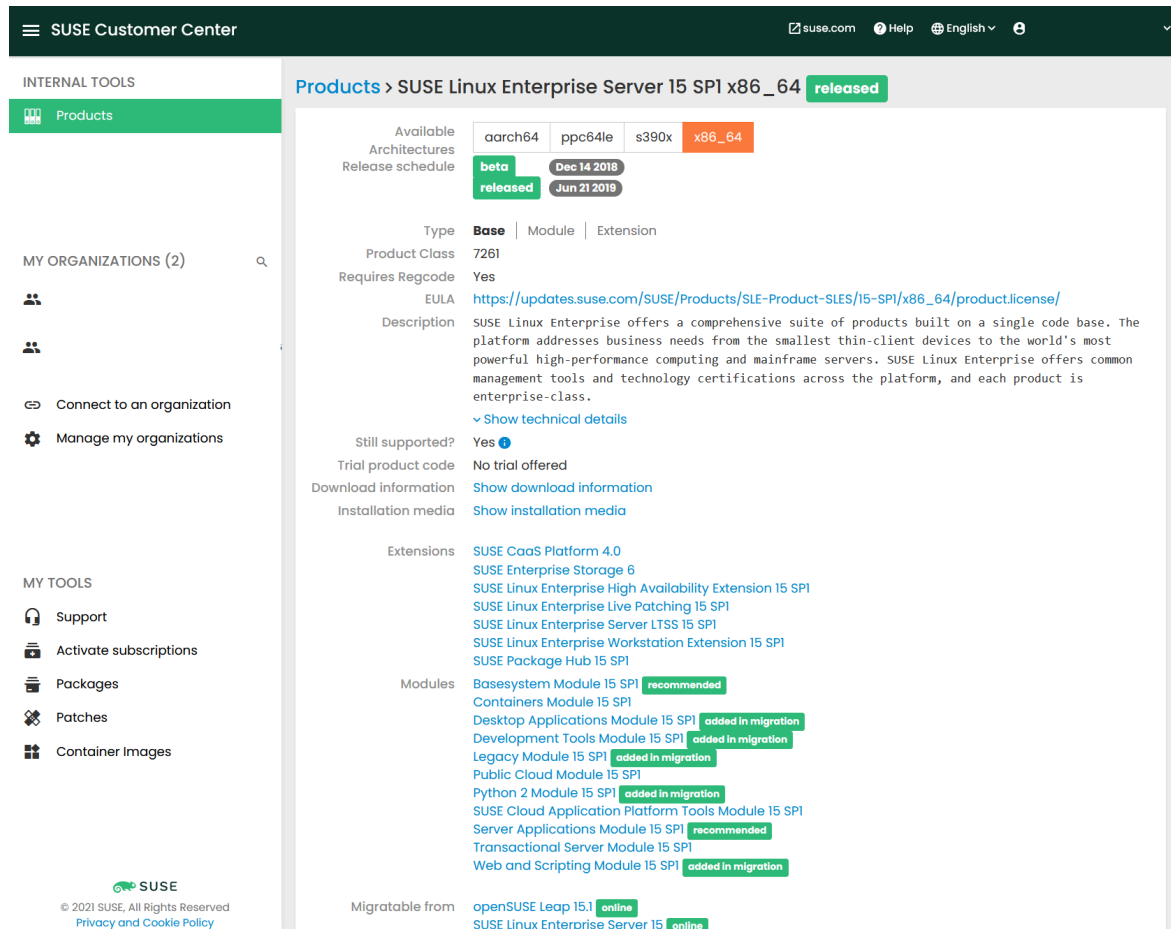
[https://updates.suse.com/SUSE/Products/SLE-Product-SLES/15-SP1/x86\\_64/product.license/](https://updates.suse.com/SUSE/Products/SLE-Product-SLES/15-SP1/x86_64/product.license/)

Description

SUSE Linux Enterprise offers a comprehensive suite of products built on a single code base. The platform addresses business needs from the smallest thin-client devices to the world's most powerful high-performance computing and mainframe servers. SUSE Linux Enterprise offers common management tools and technology certifications across the platform, and each product is enterprise-class.

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Still supported?

Yes 

Trial product code

No trial offered

Download information

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Installation media

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Extensions

SUSE CaaS Platform 4.0

SUSE Enterprise Storage 6

SUSE Linux Enterprise High Availability Extension 15 SP1

SUSE Linux Enterprise Live Patching 15 SP1

SUSE Linux Enterprise Server LTSS 15 SP1

SUSE Linux Enterprise Workstation Extension 15 SP1

SUSE Package Hub 15 SP1

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Development Tools Module 15 SP1 **added in migration**

Legacy Module 15 SP1 **added in migration**

Public Cloud Module 15 SP1

Python 2 Module 15 SP1 **added in migration**

SUSE Cloud Application Platform Tools Module 15 SP1

Server Applications Module 15 SP1 **recommended**

Transactional Server Module 15 SP1

Web and Scripting Module 15 SP1 **added in migration**

Migratable from

openSUSE Leap 15.1 **online**

SUSE Linux Enterprise Server 15 **online**

- SUSE Linux Enterprise Real Time 10 SP1
- SUSE Linux Enterprise Server for SAP App
- SUSE Linux Enterprise Desktop 15 SP1
- SUSE Manager Server 4.0
- SUSE Manager Proxy 4.0
- SUSE Manager Retail Branch Server 4.0

[Help](#)

3. Select your preferred language and keyboard layout. Then select the option "SUSE Linux Enterprise Server 15 SP1" and click the "Next" button.
4. You need to agree to the license agreement. Click "Next" again.
5. The registration screen should be displayed.



# Registration

SUSE Linux

Please select

☒ Register System

E-mail

Your

Register

Enter

☐ Register System

Local

http

☐ Skip Registration

[Help](#)

6. Now, either enter your e-mail and the registration code you collected from the SCC as described in the previous chapter, or select "Register System via local SMT Server" and enter the URL of your SMT server.
7. If required, you can use the **Network Configuration** button at the top right to configure your network settings.

## Add On Product

☐ I would like to install a

- ☐ Scan Using SLP...
- ☒ Specify URL...
- ☐ FTP...
- ☐ HTTP...
- ☐ HTTPS...
- ☐ SMB/CIFS
- ☐ NFS...
- ☐ CD...
- ☐ DVD...
- ☐ Hard Disk...
- ☐ USB Mass Storage
- ☐ Local Directory...
- ☐ Local ISO Image...

☒ Download repository

[Help](#)

8. When the system is registered, you will see the "Add On Product" page. You can skip it by clicking the "Next" button again.
9. The "Suggested Partitioning" page will be displayed. You may edit the proposed partitioning if needed. For our example, we accept the proposal and continue by clicking the "Next" button.

## Suggested Partitioning

Initial layout proposed with the default Guid

Changes to partitioning:

- Create GPT on /dev/vda
- Create partition /dev/vda1 (8.00 MiB)
- Create partition /dev/vda2 (16.40 GiB)
- Create partition /dev/vda3 (7.93 GiB)
- Create partition /dev/vda4 (15.66 GiB)
- 9 subvolume actions ([see details](#))

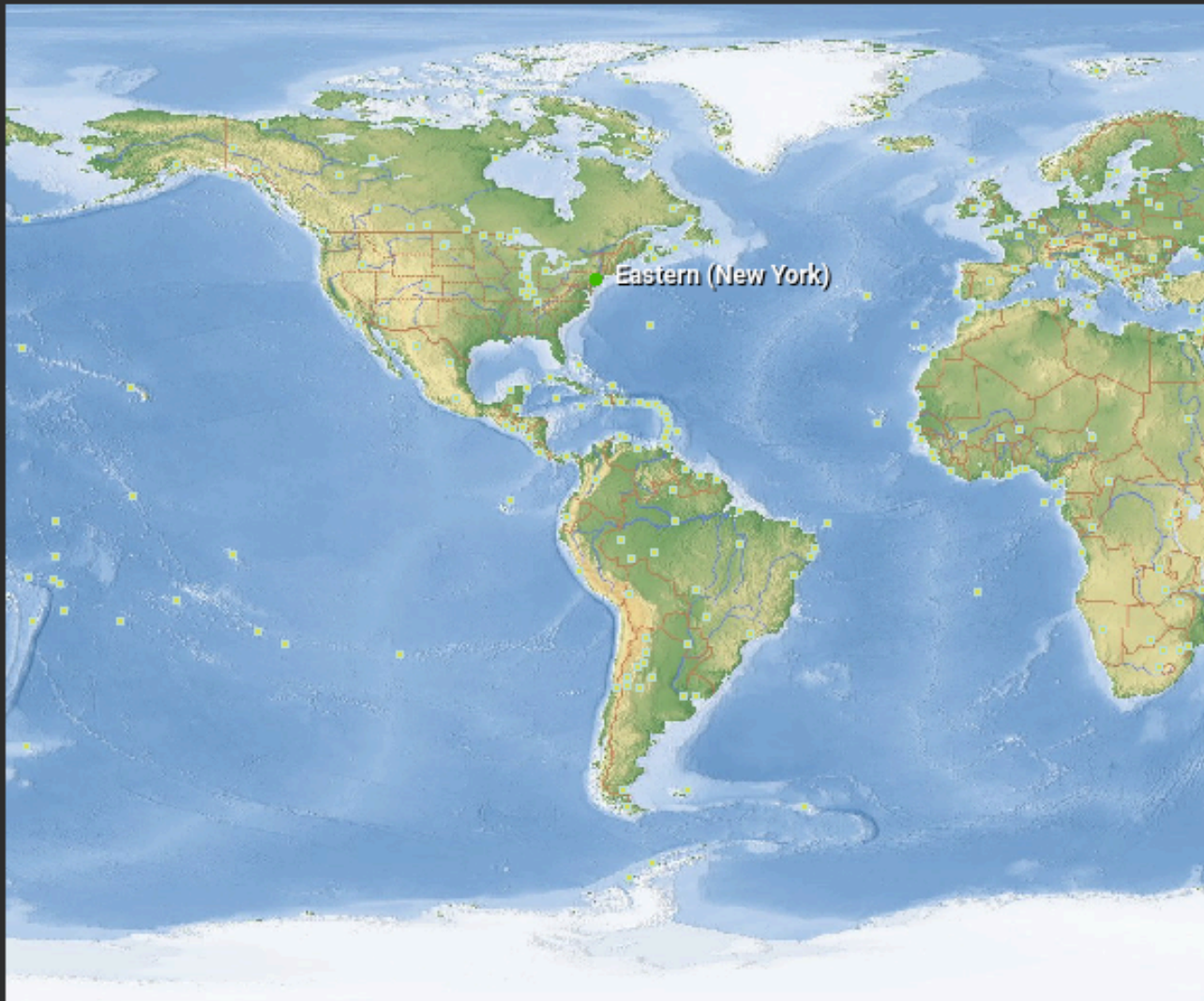
[Help](#)

[Release Notes...](#)



10. On the "Clock and Time Zone" page, you should select your preferred Region and Time Zone.

## Clock and Time Zone



Region

USA

Time Zone

Eastern (New York)

☒ Hardware Clock Set to UTC

Date and Time: 2020-09-0

[Help](#)

[Release Notes...](#)

Click "Other Settings" to open the "Change Date and Time" page. Select the "Synchronize with NTP-Server" option. Then select an NTP server and click the "Accept" button.

# Change Date and Time

## ☐ Manually

Current Time

10:57:47

Current Date

2020-09-03

☒ Change the Time Now

## ☒ Synchronize with NTP Server

NTP Server Address

us.pool.ntp.org

Synchronize

☒ Run NTP as daemon

☐ Save NTP Configuration

[Help](#)

[Release Notes...](#)



## Important

All machines in the cluster must synchronize with the same NTP Server!

11. Next, you can create a user with name and password of your choice. When done, confirm and click "Next".

# Local User

☒ Create New

User's

Username

Password

Confirm

☐ Use

☐ Auto

☐ Skip User C

[Help](#)

[Release Notes...](#)

12. Now the "Installation Settings" page is displayed. Disable the firewall. To do so, click the "disable" button located behind "Firewall will be enabled".

# Installation Settings

Click a headline to make changes.

## Software

- Product: SUSE Linux Enterprise Server
- Product: Basesystem Module
- Product: Server Applications Module
- Product: SUSE Enterprise Storage 6
- Patterns:
  - Minimal Base System
- Size of Packages to Install: 1.3 GiB
- Downloading from Remote Repositories

## Booting

- Boot Loader Type: GRUB2
- Enable Trusted Boot: no
- Status Location: /dev/vda (MBR)
- Change Location:
  - Install bootcode into MBR ([do not](#))
  - Do not install boot code into a partition
- Order of Hard Disks: /dev/vda, /dev/vdb

## Security

- CPU Mitigations: [Auto](#)
- Firewall will be disabled ([enable](#))
- SSH service will be enabled ([disable](#))

## Network Configuration

- Configured with DHCP: eth0
- Hostname: Set by DHCP

## Kdump

- Kdump status: enabled
- Value(s) of crashkernel option: 166M,high
- Dump format: lzo
- Target of dumps: /var/crash
- Number of dumps: 5

13. To finalize the installation, go to "Extension and Module Selection" and select "SUSE Enterprise Storage 6 x86\_64".

[Help](#)

[Release Notes...](#)



## Extension and Module Selection

### Available Extensions and Modules

- ☐ SUSE CaaS Platform 4.0 x86\_64
- ☒ SUSE Enterprise Storage 6 x86\_64
- ☐ SUSE Linux Enterprise High Availability Extension 15 SP1 x86\_64
- ☐ SUSE Linux Enterprise Live Patching 15 SP1 x86\_64
- ☐ SUSE Linux Enterprise Workstation Extension 15 SP1 x86\_64
- ☐ SUSE Package Hub 15 SP1 x86\_64
- ☒ Basesystem Module 15 SP1 x86\_64
- ☐ Containers Module 15 SP1 x86\_64
- ☐ Desktop Applications Module 15 SP1 x86\_64
- ☐ Development Tools Module 15 SP1 x86\_64
- ☐ Legacy Module 15 SP1 x86\_64
- ☐ Public Cloud Module 15 SP1 x86\_64
- ☐ Python 2 Module 15 SP1 x86\_64
- ☐ SUSE Cloud Application Platform Tools Module 15 SP1 x86\_64

### Details (English only)

SUSE Enterprise Storage 6 for SUSE Linux Enterprise Server 15 SP1 x86\_64

[Help](#)

Set up at least four machines the same way.

## 5.3 Setting up SUSE Enterprise Storage

Check that your machines have the correct host names:

```
# hostname -f
```

This should output the FQDN of the machine. If this is not the case, you can use the following command to set the name:

```
# hostnamectl --set-hostname <FQDN>
```

For the document at hand, we use the following machine names:

- admin.example.com
- mon1.example.com
- mon2.example.com
- mon3.example.com

To ensure that DNS resolution for these names works properly, you should edit the /etc/hosts file on the nodes as follows:

```
127.0.0.1    localhost
<Admin-IP>  admin.example.com admin
<Mon1-IP>   mon1.example.com mon1
<Mon2-IP>   mon2.example.com mon2
<Mon3-IP>   mon3.example.com mon3
```

If you do not know the IP address of a machine, run:

```
$ ip a
```

```
1: lo: <LOOPBACK
    link/loopb
    inet 127.0
        valid_1
8: eth0@if9: <
    link/ether
    inet 172.1
        valid 1
```

### 5.3.1 Preparing the nodes

1. On the OSD Nodes, install salt-minion and deepsea:

```
# zypper in -y salt-minion deepsea
```

2. On the Admin Node, install salt-minion, salt-master, and deepsea:

```
# zypper in -y salt-minion salt-master deepsea
```

3. Set the Salt master on all machines by editing the associated line:

```
# echo "master: admin.example.com" > /etc/salt/minion
```

4. On the Admin node, enable the salt-master service:

```
# systemctl enable salt-master --now
```

5. Enable the salt-minion service on all nodes:

```
# systemctl enable salt-minion --now
```

6. Now accept the Salt keys on the admin node:

```
# salt-key --accept-all -y
```



#### Tip

To check the keys, use the command salt-key -L. This should output something like:

```
Admin:~ # salt-key -L
Accepted Keys:
admin.example.com
mon1.example.com
mon2.example.com
mon3.example.com
Denied Keys:
Unaccepted Keys:
Rejected Keys:
```

7. Make all nodes DeepSea minions:

```
# echo "deepsea_minions: '*'" > /srv/pillar/ceph/deepsea_minions.sls
```

8. Synchronize your Salt minions:

```
# salt '*' saltutil.sync_all
```

9. Make sure your desired disks are all cleared. To this end, you can use:

```
# wipefs -a /dev/vdb
```



### Note

Be aware that you might need to change the device (vdb) here. Ensure you clear all disks on all nodes.

10. Apply the cleared disks by using:

```
# salt '*' state.apply ceph.subvolume
```

## 5.3.2 Deploying the cluster



### Tip

You can watch the progress of the Ceph stages in a separate terminal with the command deepsea monitor.

Now you can run the first stage of deploying the Ceph cluster.

1. First, prepare the cluster:

```
# salt-run state.orch ceph.stage.prep
```

2. The result for the preparation stage should look similar to this:

```
Parsing orchestration ceph.stage.prep steps... []
Parsing ceph.stage.prep steps... ✓

[1/17] ceph.salt.crc.master on
admin.example.com..... ✓ (0.5s)

[2/17] ceph.sync on
admin.example.com..... ✓ (0.8s)

[3/17] ceph.salt-api on
admin.example.com..... ✓ (18s)

[4/17] ceph.repo on
admin.example.com..... ✓ (0.3s)

[5/17] ceph.metapackage on
admin.example.com..... ✓ (0.5s)

[6/17] ceph.updates on
admin.example.com..... ✓ (10s)

[7/17] filequeue.remove(item=lock)..... ✓ (0.0s)

[8/17] filequeue.enqueue(item=complete)..... ✓ (0.0s)

[9/17] minions.ready(timeout=300)..... ✓ (0.3s)

[10/17] ceph.salt.crc.minion on
admin.example.com..... ✓ (1s)
mon1.example.com..... ✓ (1s)
mon3.example.com..... ✓ (1s)
mon2.example.com..... ✓ (2s)

[11/17] ceph.apparmor on
admin.example.com..... ✓ (14s)
mon1.example.com..... ✓ (12s)
mon3.example.com..... ✓ (13s)
mon2.example.com..... ✓ (13s)

[12/17] ceph.repo on
admin.example.com..... ✓ (0.4s)
mon1.example.com..... ✓ (0.5s)
mon3.example.com..... ✓ (0.4s)
mon2.example.com..... ✓ (0.4s)

[13/17] ceph.metapackage on
admin.example.com..... ✓ (0.5s)
mon1.example.com..... ✓ (0.6s)
mon3.example.com..... ✓ (0.6s)
mon2.example.com..... ✓ (0.6s)

[14/17] ceph.packages.common on
admin.example.com..... ✓ (28s)
mon1.example.com..... ✓ (65s)
mon3.example.com..... ✓ (69s)
mon2.example.com..... ✓ (69s)

[15/17] ceph.sync on
admin.example.com..... ✓ (2s)
mon1.example.com..... ✓ (3s)
mon3.example.com..... ✓ (2s)
mon2.example.com..... ✓ (2s)

[16/17] ceph.mines on
admin.example.com..... ✓ (0.7s)
mon1.example.com..... ✓ (0.8s)
mon3.example.com..... ✓ (0.8s)
mon2.example.com..... ✓ (0.7s)

[17/17] ceph.updates on
admin.example.com..... ✓ (10s)
mon1.example.com..... ✓ (13s)
mon3.example.com..... ✓ (13s)
mon2.example.com..... ✓ (13s)

Ended stage: ceph.stage.prep succeeded=17/17 time=199.7s
```

3. The next stage is collecting information about the nodes:

```
# salt-run state.orch ceph.stage.discovery
```

```
Parsing orchestration ceph.stage.discovery steps... []
Parsing ceph.stage.discovery steps... ✓

[1/3] minions.ready(timeout=300)..... ✓ (0.4s)
[2/3] ceph.refresh on
      admin.example.com..... ✓ (0.5s)
[3/3] populate.proposals..... ✓ (5s)
Ended stage: ceph.stage.discovery succeeded=3/3 time=12.7s
```

4. Before you can run the last three stages, you must provide a role configuration for the nodes. This will be stored in `/srv/pillar/ceph/proposals/policy.cfg`. This example uses the following configuration:

```
#General config
config/stack/default/global.yml
config/stack/default/ceph/cluster.yml

#CEPH Cluster members
cluster-ceph/cluster/admin.example.com.sls
cluster-ceph/cluster/mon1.example.com.sls
cluster-ceph/cluster/mon2.example.com.sls
cluster-ceph/cluster/mon3.example.com.sls

#CEPH Admin nodes
role-admin/cluster/mon1.example.com.sls
role-admin/cluster/mon2.example.com.sls
role-admin/cluster/mon3.example.com.sls

#CEPH Master node
role-master/cluster/admin.example.com.sls

#CEPH Manager nodes
role-mgr/cluster/mon1.example.com.sls
role-mgr/cluster/mon2.example.com.sls
role-mgr/cluster/mon3.example.com.sls

#CEPH Monitor nodes
role-mon/cluster/mon1.example.com.sls
role-mon/cluster/mon2.example.com.sls
role-mon/cluster/mon3.example.com.sls

#CEPH RGW nodes
role-rgw/cluster/admin.example.com.sls
```

```

role-rgw/cluster/mon1.example.com.sls
role-rgw/cluster/mon2.example.com.sls
role-rgw/cluster/mon3.example.com.sls

#CEPH Storage nodes
role-storage/cluster/admin.example.com.sls
role-storage/cluster/mon1.example.com.sls
role-storage/cluster/mon2.example.com.sls
role-storage/cluster/mon3.example.com.sls

```

## 5. You can now safely deploy your configuration:

```
# salt-run state.orch ceph.stage.configure
```

```

Parsing orchestration ceph.stage.configure steps... 
Parsing ceph.stage.configure steps... ✓

Stage initialization output:
deepsea_minions      : valid
yaml_syntax          : valid

[1/15] push.proposal..... ✓ (0.0s)
[2/15] ceph.refresh on
      mon1.example.com..... ✓ (2s)
      admin.example.com..... ✓ (1s)
      mon2.example.com..... ✓ (1s)
      mon3.example.com..... ✓ (2s)
[3/15] advise.networks..... ✓ (0.6s)
[4/15] ceph.packages on
      mon1.example.com..... ✓ (53s)
      admin.example.com..... ✓ (34s)
      mon2.example.com..... ✓ (58s)
      mon3.example.com..... ✓ (57s)
[5/15] ceph.admin.key on
      admin.example.com..... ✓ (0.6s)
[6/15] ceph.osd.key on
      admin.example.com..... ✓ (0.4s)
[7/15] ceph.mon.key on
      admin.example.com..... ✓ (0.4s)
[8/15] ceph.mgr.key on
      admin.example.com..... ✓ (2s)
[9/15] ceph.igw.key on
      admin.example.com..... ✓ (0.9s)
[10/15] ceph.mds.key on
      admin.example.com..... ✓ (0.8s)
[11/15] ceph.rgw.key on
      admin.example.com..... ✓ (2s)
[12/15] ceph.ganesha.key on
      admin.example.com..... ✓ (0.8s)
[13/15] ceph.monitoring.prometheus.exporters.node_exporter on
      mon1.example.com..... ✓ (68s)
      admin.example.com..... ✓ (41s)
      mon2.example.com..... ✓ (69s)
      mon3.example.com..... ✓ (64s)
[14/15] ceph.ssl on
      admin.example.com..... ✓ (0.7s)
[15/15] ceph.ssl.distribute_ca on
      admin.example.com..... ✓ (1s)

Ended stage: ceph.stage.configure succeeded=15/15 time=146.0s

```



6. Deploy your configuration to the cluster:

```
# salt-run state.orch ceph.stage.deploy
```

```
Parsing orchestration ceph.stage.deploy steps... ☐
Parsing ceph.stage.deploy steps... ✓

Stage initialization output:
firewall      : not installed
apparmor      : disabled
fsid          : valid
public_network : valid
public_interface : valid
cluster_network : valid
cluster_interface : valid
ip_version    : valid
monitors      : valid
subvolume     : valid
mgrs          : valid
storage       : valid
storage_role  : valid
rgw           : valid
ganesha       : valid
master_role   : valid
time_server   : valid
fqdn          : valid

[1/51] ceph.time on
mon3.example.com..... ✓ (43s)
admin.example.com..... ✓ (0.5s)
mon2.example.com..... ✓ (47s)
mon1.example.com..... ✓ (47s)

[2/51] ceph.configuration.check on
admin.example.com..... ✓ (0.3s)

[3/51] ceph.configuration.create on
admin.example.com..... ✓ (5s)

[4/51] ceph.configuration on
mon3.example.com..... ✓ (0.6s)
admin.example.com..... ✓ (0.5s)
mon2.example.com..... ✓ (0.5s)
mon1.example.com..... ✓ (0.6s)

[50/51] ceph.monitoring.prometheus.exporters.mgr_exporter on
admin.example.com..... ✓ (0.9s)

[51/51] ceph.monitoring.prometheus.exporters.rbd_exporter on
admin.example.com..... ✓ (18s)

Ended stage: ceph.stage.deploy succeeded=51/51 time=302.0s
```

7. When the deployment stage has been successfully passed, check the cluster health to insure that all is running properly.

```
# ceph -s
```

```
ses55-admin:~ # ceph -s
cluster:
  id:      520a906e-e6a3-324f-ba18-856c2e155395
  health: HEALTH_OK

services:
  mon: 3 daemons, quorum ses55-osd0,ses55-osd1,ses55-osd2
  mgr: ses55-osd0(active), standbys: ses55-osd1, ses55-osd2
  osd: 16 osds: 16 up, 16 in

data:
  pools:   0 pools, 0 pgs
  objects: 0 objects, 0B
  usage:   16.1GiB used, 302GiB / 318GiB avail
  pgs:
```

8. The last stage to run is deploying the service roles, which were specified in the policy.cfg file:

```
# salt-run state.orch ceph.stage.services
```

```

Parsing orchestration ceph.stage.services steps... []
Parsing ceph.stage.services steps... ✓

Stage initialization output:
No minions matched the target. No command was sent, no jid was assigned.
kernel_module      : valid
openattic-disabled  : valid

[1/17] ceph.rgw.auth on
      admin.example.com..... ✓ (4s)

[2/17] ceph.rgw.users on
      admin.example.com..... ✓ (34s)

[3/17] ceph.rgw.dashboard on
      admin.example.com..... ✓ (5s)

[4/17] ceph.rgw on
      mon3.example.com..... ✓ (79s)
      admin.example.com..... ✓ (23s)
      mon2.example.com..... ✓ (78s)
      mon1.example.com..... ✓ (69s)

[5/17] ceph.monitoring.prometheus.exporters.ceph_rgw_exporter on
      admin.example.com..... ✓ (31s)

[6/17] ceph.wait on
      admin.example.com..... ✓ (7s)

[7/17] ceph.processes.rgw on
      mon3.example.com..... ✓ (0.5s)
      admin.example.com..... ✓ (0.5s)
      mon2.example.com..... ✓ (0.5s)
      mon1.example.com..... ✓ (0.4s)

[8/17] ceph.rgw.restart on
      admin.example.com..... ✓ (3s)

[9/17] ceph.wait on
      admin.example.com..... ✓ (6s)

[10/17] ceph.processes.rgw on
      mon3.example.com..... ✓ (0.4s)
      admin.example.com..... ✓ (0.4s)
      mon2.example.com..... ✓ (0.5s)
      mon1.example.com..... ✓ (0.4s)

[11/17] ceph.rgw.restart on
      mon1.example.com..... ✓ (3s)

[12/17] ceph.wait on
      admin.example.com..... ✓ (7s)

[13/17] ceph.processes.rgw on
      mon3.example.com..... ✓ (0.4s)
      admin.example.com..... ✓ (0.5s)
      mon2.example.com..... ✓ (0.4s)
      mon1.example.com..... ✓ (0.5s)

[14/17] ceph.rgw.restart on
      mon2.example.com..... ✓ (3s)

[15/17] ceph.wait on
      admin.example.com..... ✓ (7s)

[16/17] ceph.processes.rgw on
      mon3.example.com..... ✓ (0.8s)
      admin.example.com..... ✓ (0.6s)
      mon2.example.com..... ✓ (0.7s)
      mon1.example.com..... ✓ (0.7s)

[17/17] ceph.rgw.restart on
      mon3.example.com..... ✓ (3s)

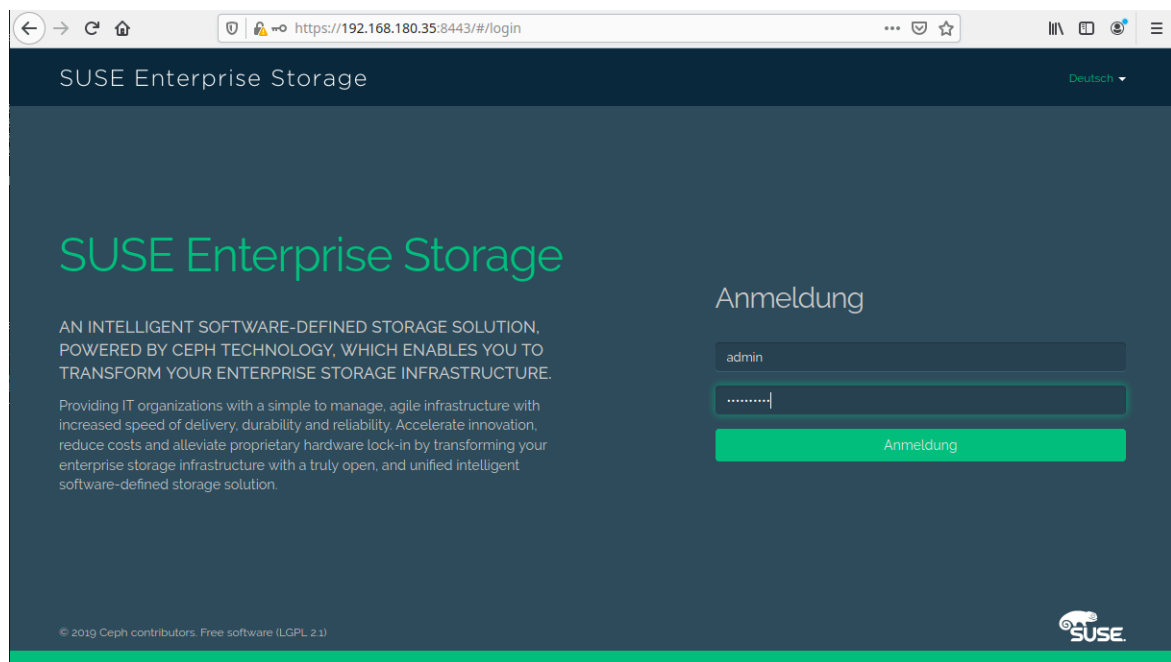
Ended stage: ceph.stage.services succeeded=17/17 time=206.8s

```

## 5.4 Access the dashboard and create a new pool

After the Ceph cluster is up and running, you must create a pool for SAP Data Intelligence 3. In our example, we will use the dashboard for this purpose.

1. The dashboard is published by any of the monitor nodes. To access it, use a Web browser:



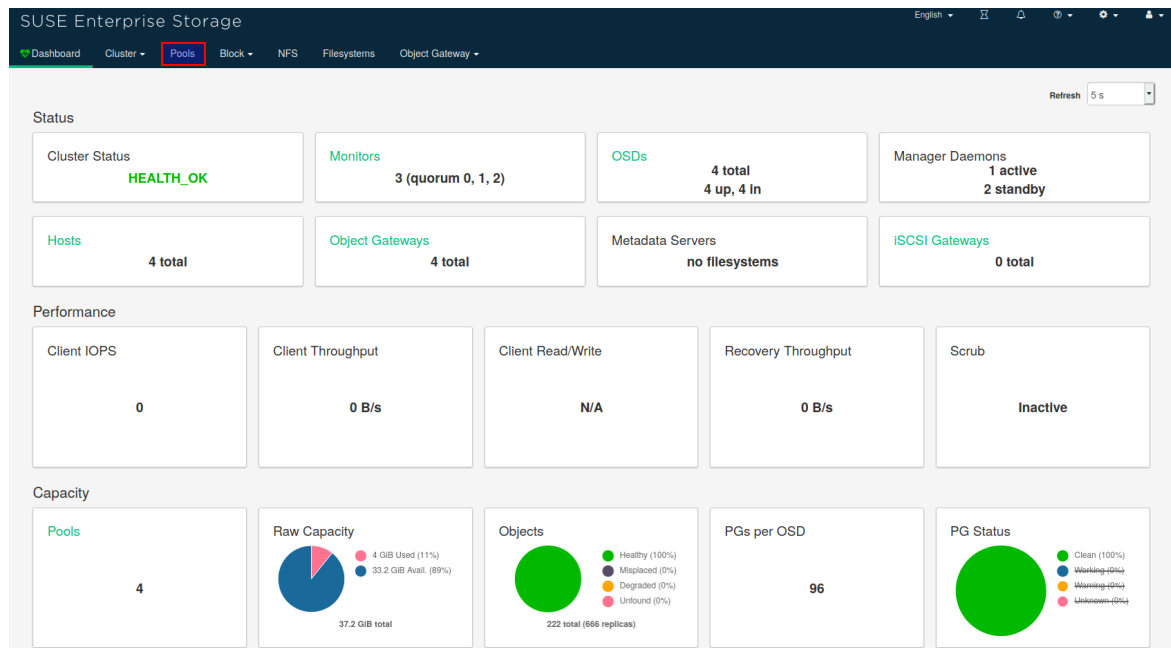
Get the credentials to log in by running the following command on the Admin Node:

```
# salt-call grains.get dashboard_creds
```

```
Admin:~ # salt-call grains.get dashboard_creds
local:
  -----
  admin:
    G1WBCQApXG
```

After logging in, the landing page should appear.

2. Select the "Pools" tab at the top of the page:



The Pools page gives an overview of the currently defined pools.

3. Click the "Create" button at the top of the table to create a new pool:

The screenshot shows the SUSE Enterprise Storage dashboard with the 'Pools' tab selected. The 'Pools List' section is visible, showing a table of existing pools. The 'Create' button is highlighted with a red box.

Name	Type	Applications	PG Status	Replica Size	Last Change	Erasure Coded Profile	Crush Ruleset	Usage	Read bytes	Write bytes	Read ops	Write ops
rgw.root	replicated	rgw	32 active+clean	3	12		replicated_rule	0%	0 B	0 B	0/s	0/s
default.rgw.control	replicated	rgw	32 active+clean	3	14		replicated_rule	0%	0 B	0 B	0/s	0/s
default.rgw.log	replicated	rgw	32 active+clean	3	18		replicated_rule	0%	0 B	0 B	0/s	0/s
default.rgw.meta	replicated	rgw	32 active+clean	3	16		replicated_rule	0%	0 B	0 B	0/s	0/s

4. Enter the name of the pool. As "Pool type", select replicated.
5. On the left side of "Applications", click the pencil symbol and select rbd.
6. Confirm the creation of the pool by clicking the "CreatePool" button at the bottom.

SUSE Enterprise Storage

Dashboard

Cluster

Pools

Block

NFS

Filesystems

Object Gateway

Pools » Create

CreatePool

Name \*

datahub

Pool type \*

replicated

Placement groups \*

64

Calculation help

Crush ruleset

replicated rule

Replicated size \*

3

Applications

rd

bd

Compression

Mode

none

RBD Configuration

Quality of Service

CreatePool

Cancel



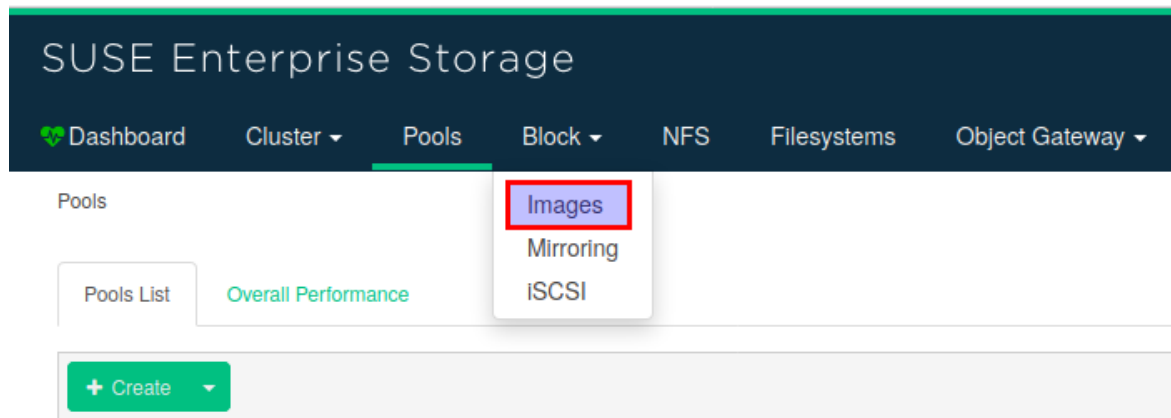
## Important

Make note of the name of the pool. It will be needed in [Section 6.4.1.2, “Creating Storage Class”](#).

- After this, the pools page is displayed again, and the newly created pool is shown in the table of pools.

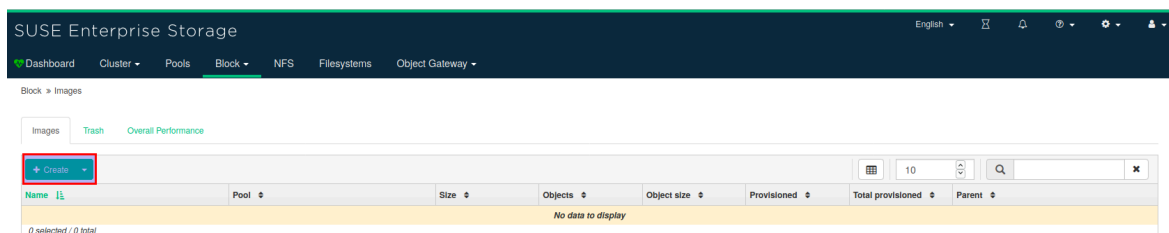
+ Create												
Name	Type	Applications	PG Status	Replica Size	Last Change	Erasure Coded Profile	Crush Ruleset	Usage	Read bytes	Write bytes	Read ops	Write ops
rgw.root	replicated	rgw	32 active+clean	3	12		replicated_rule	0%			0/s	0/s
datahub	replicated	rd	64 active+clean	3	32		replicated_rule	0%			0/s	0/s
default.rgw.control	replicated	rgw	32 active+clean	3	14		replicated_rule	0%			0/s	0/s
default.rgw.log	replicated	rgw	32 active+clean	3	18		replicated_rule	0%			0/s	0/s
default.rgw.meta	replicated	rgw	32 active+clean	3	16		replicated_rule	0%			0/s	0/s

- Now provide access to this pool through an RBD device. Go to the RDB overview page by selecting "Block→Images"



An overview of the configured RDBs is displayed.

- Click the **Create** button.



- Enter the name, and if it is not already selected, select the previously created pool. Select the size of the RBD and confirm the creation by clicking the "CreateRBD" button.

CreateRBD

Name \*

datahubRBD

Pool \*

datahub

☐ Use a dedicated data pool

Size \*

10 GiB

Features

☐ Deep flatten
☒ Layering
☐ Exclusive lock
☐ Object map (requires exclusive-lock)
☐ Journaling (requires exclusive-lock)
☐ Fast diff (interlocked with object-map)

[Advanced...](#)

CreateRBD

Cancel

The overview page of the RBDs is shown again. It now contains your newly created RBD.

SUSE Enterprise Storage

English

Dashboard Cluster Pools **Block** NFS Filesystems Object Gateway

Block > Images

Images Trash Overall Performance

+ Create

Name	Pool	Size	Objects	Object size	Provisioned	Total provisioned	Parent
datahubRBD	datahub	10 GiB	2.6 k	4 MB	0 B	0 B	-

0 selected / 1 total

At this point, the SUSE Enterprise Storage cluster is ready for usage with SAP Data Intelligence.



## 6 Installing SAP Data Intelligence 3 on top of SUSE CaaSP 4.2

### 6.1 Documentation

- SAP Notes:
  - Release Notes for SAP Data Intelligence 3 (<https://launchpad.support.sap.com/#/notes/2871970>) ↗
  - Installation Guide for SAP Data Intelligence 3 (<https://help.sap.com/viewer/a8d90a56d61a49718ebcb5f65014bbe7/3.0.latest/en-US>) ↗

### 6.2 Planning the installation with the SAP Maintenance Planner

For the installation of SAP Data Intelligence, you should start here: [SAP Maintenance Planner \(https://support.sap.com/en/alm/solution-manager/processes-72/maintenance-planner.html\)](https://support.sap.com/en/alm/solution-manager/processes-72/maintenance-planner.html) ↗



#### Note

You need to have your SAP S-User available.

- The landing page of the SAP Maintenance Planner looks as follows:

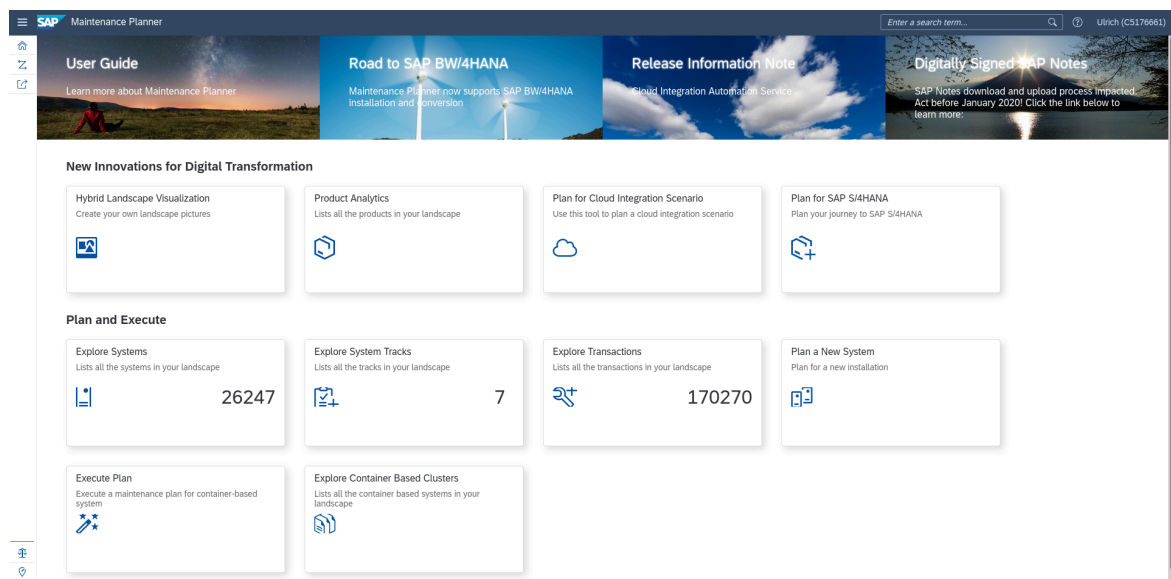


FIGURE 1: SAP MAINTENANCE PLANNER START PAGE

Click "Plan a New System" on the right.

- The next page displayed looks as follows:

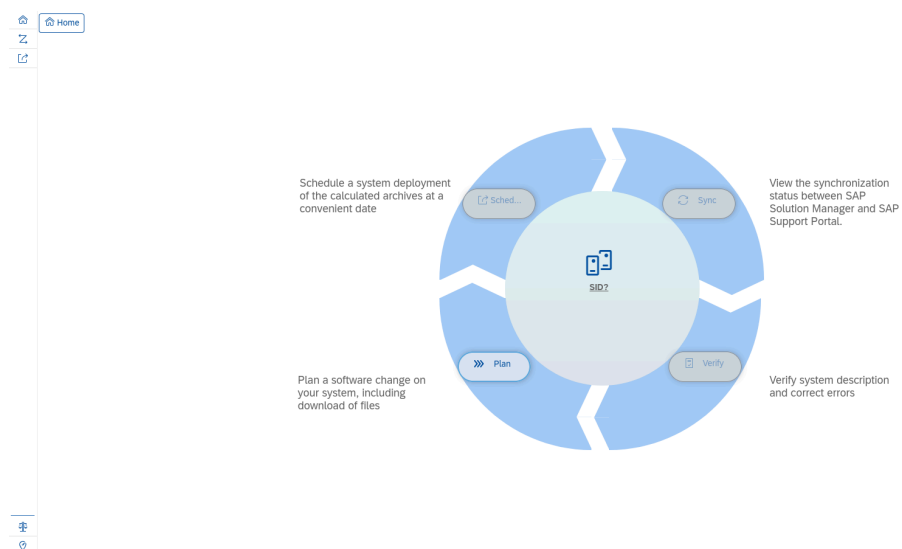


FIGURE 2: SAP MAINTENANCE PLANNER: SELECT PLAN

You will see a circle where all options except the option "Plan" are greyed out. Click the "Plan" option.

- The next page shows the "Define Change" step of your planning:

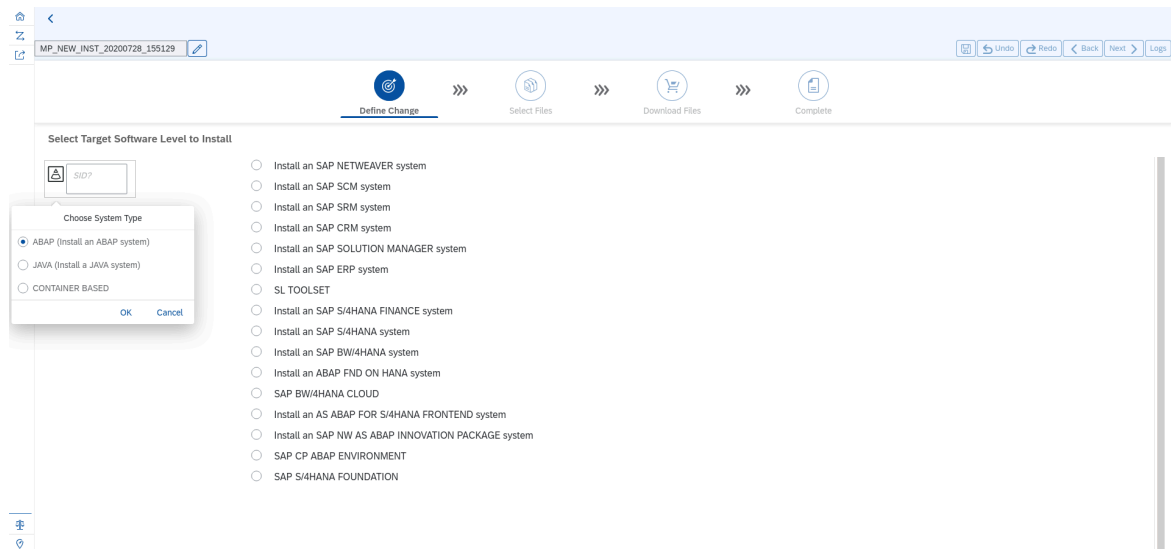


FIGURE 3: SAP MAINTENANCE PLANNER: SELECT CONTAINER BASED PRODUCT

- On the left, there is a window with three toggle buttons. Select "CONTAINER BASED" and click "OK":

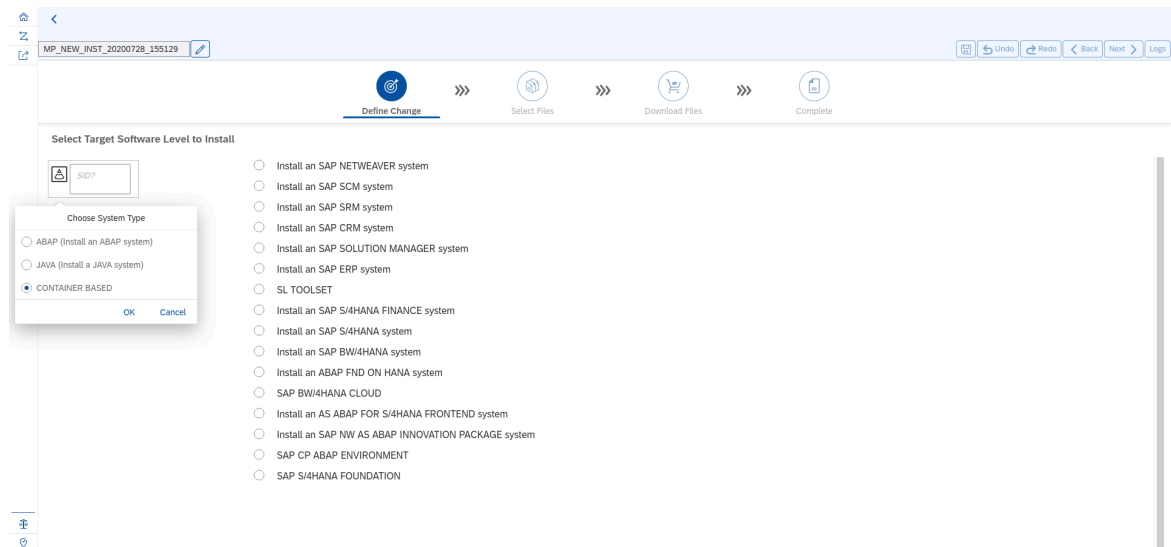


FIGURE 4: SAP MAINTENANCE PLANNER: SELECT CONTAINER BASED PRODUCT #2

- To the right, the option "SAP DATA INTELLIGENCE" should appear. When you select it, a sub-selection should open with choices for "SAP DATA INTELLIGENCE 3" and "SAP DATA HUB 2". Select "SAP DATA INTELLIGENCE 3":

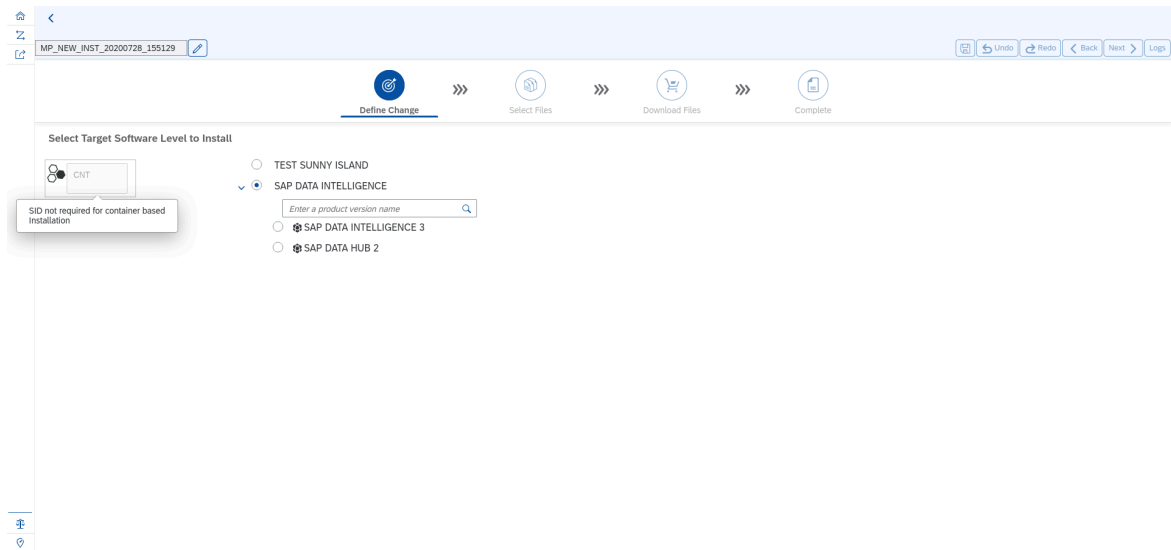


FIGURE 5: SAP MAINTENANCE PLANNER: SELECT DATA INTELLIGENCE 3

- A pop-up window will appear to inform you about the related SAP note. Click "Continue" to proceed:

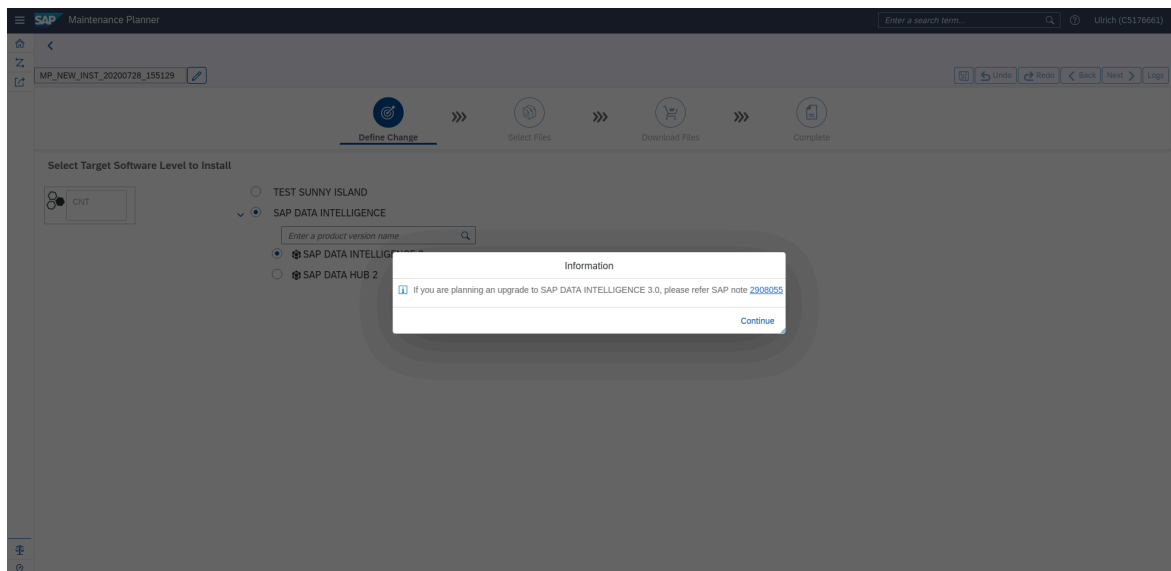


FIGURE 6: SAP MAINTENANCE PLANNER: SELECT CONTINUE

- On the right hand side, a drop-down box is shown with "Select Support Package Stack". Click this, and select from the available patch levels as needed:

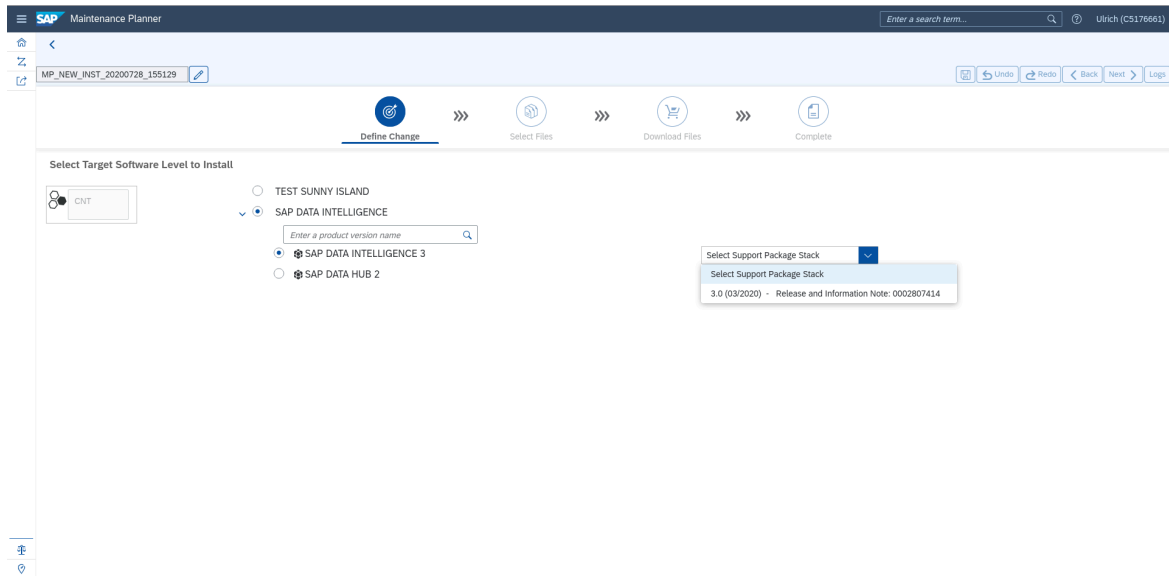


FIGURE 7: SAP MAINTENANCE PLANNER: SELECT FROM AVAILABLE PATCH LEVELS AS YOU NEED.

- To the left, the sub-selection for "SAP DATA INTELLIGENCE 3" will need changes. Select what you need and click the "Confirm Selection" at the very right:

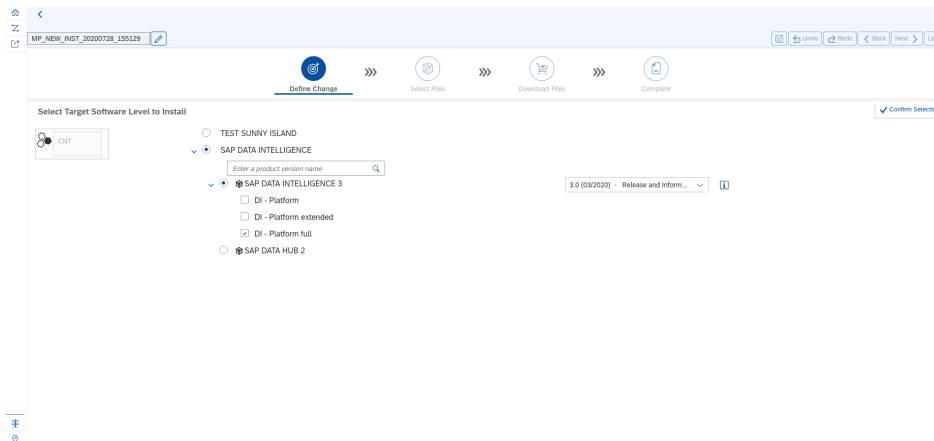


FIGURE 8: SAP MAINTENANCE PLANNER: SELECT ACCORDING YOUR NEEDS AND CONFIRM.

- An overview of your selection is shown. If this fits your needs, click the "Next" button at the upper right corner:

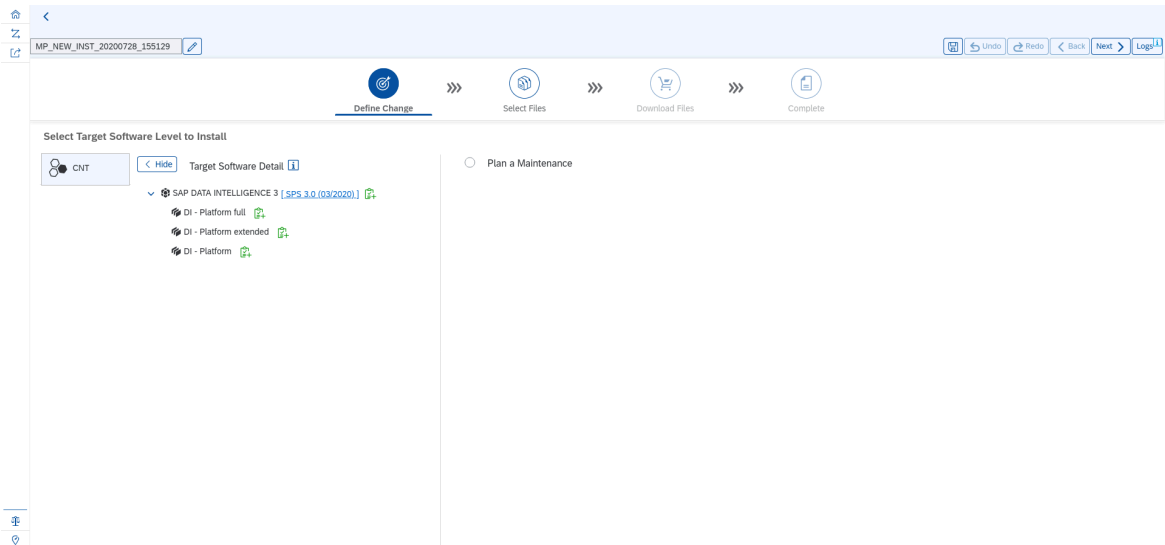


FIGURE 9: SAP MAINTENANCE PLANNER: SELECT NEXT IF SATISFIED

- Next, select the operating system upon which SAP Data Intelligence will be installed. Select "Linux on x86\_64 64bit" and click "Confirm Selection":

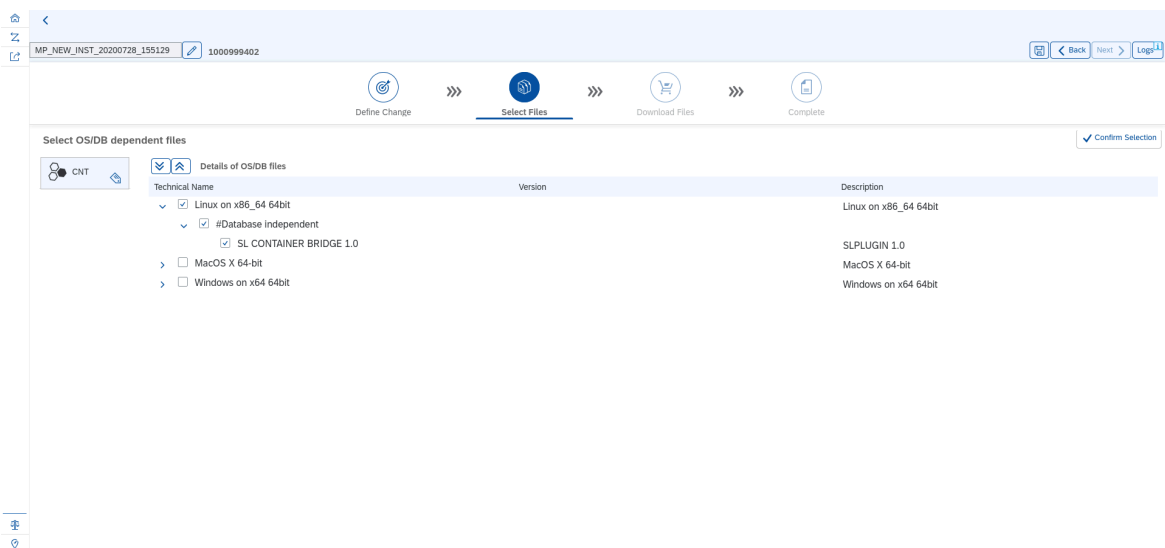


FIGURE 10: SAP MAINTENANCE PLANNER: SELECT LINUX AND CONFIRM

- The next page shows the preselected files to use and download. Again, click the "Next" button on the upper right:

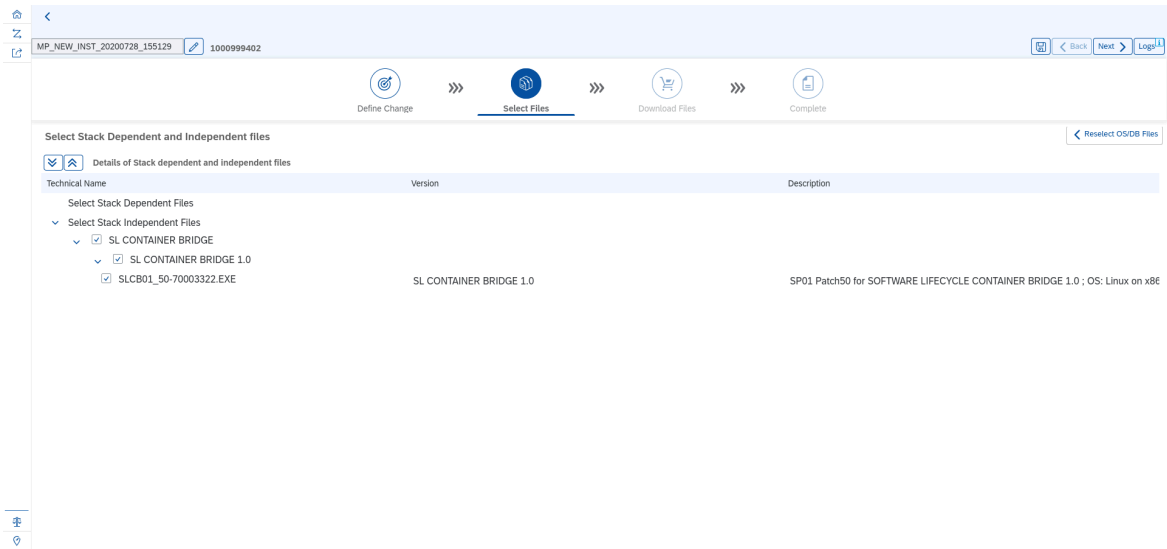


FIGURE 11: SAP MAINTENANCE PLANNER: CONFIRM

- You should now arrive at the "Download Files" page. The required **SLC bridge** is already preselected. Click "Next" to proceed:

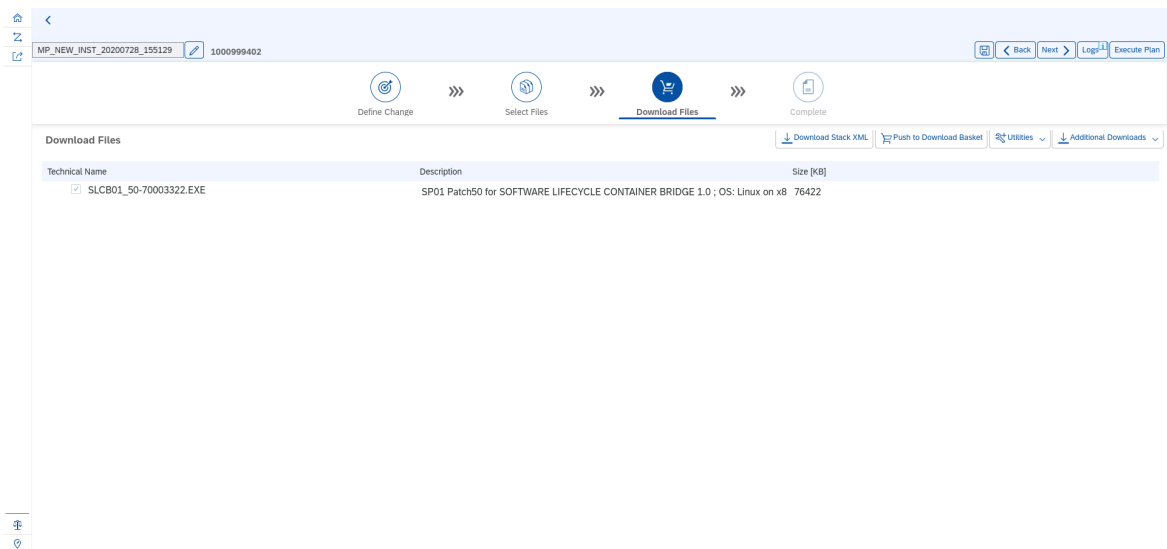


FIGURE 12: SAP MAINTENANCE PLANNER: EXECUTE PLAN

- Your maintenance plan is shown as PDF. Confirm everything by clicking the "Execute Plan" button on the upper right side:

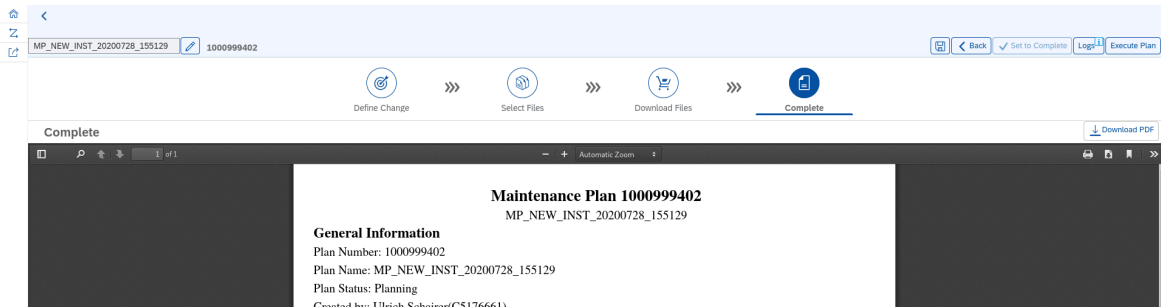


FIGURE 13: SAP MAINTENANCE PLANNER: DOWNLOAD STACK.XML AND SLC BRIDGE INSTALLER

- Download the **SLC Bridge Installer** and copy it to your management workstation. You will need this file in *Section 6.3, "Installing the SAP SLC Bridge"*.



- You will be prompted to enter the FQDN and the port of the machine your SLC bridge will run on:

Home

MP\_EP\_20200728\_160349

Next > Logs

Overview >>> Deploy >>> Complete

**Execute plan overview**

Enter Transaction ID  
1000999402 X

Please enter the details of the host where the container bridge is already installed, or is to be installed:

Fully Qualified Domain Name

Port

If not already downloaded, please download the below files:

Click [here](#) to download Stack XML

Click [here](#) to download SL CONTAINER BRIDGE 1.0.Linux on x86\_64 64bit Database independent [SLCB01\_50-70003322.EXE ,76422 KB]

FIGURE 14: SAP MAINTENANCE PLANNER: ENTER FQDN OF HOST WHERE THE SLC BRIDGE WILL RUN

- Fill in the values. An example looks as follows:

Home

MP\_EP\_20200728\_160349

Next > Logs

Overview >>> Deploy >>> Complete

**Execute plan overview**

Enter Transaction ID  
1000999402 X

Please enter the details of the host where the container bridge is already installed, or is to be installed:

Fully Qualified Domain Name

Port

If not already downloaded, please download the below files:

Click [here](#) to download Stack XML

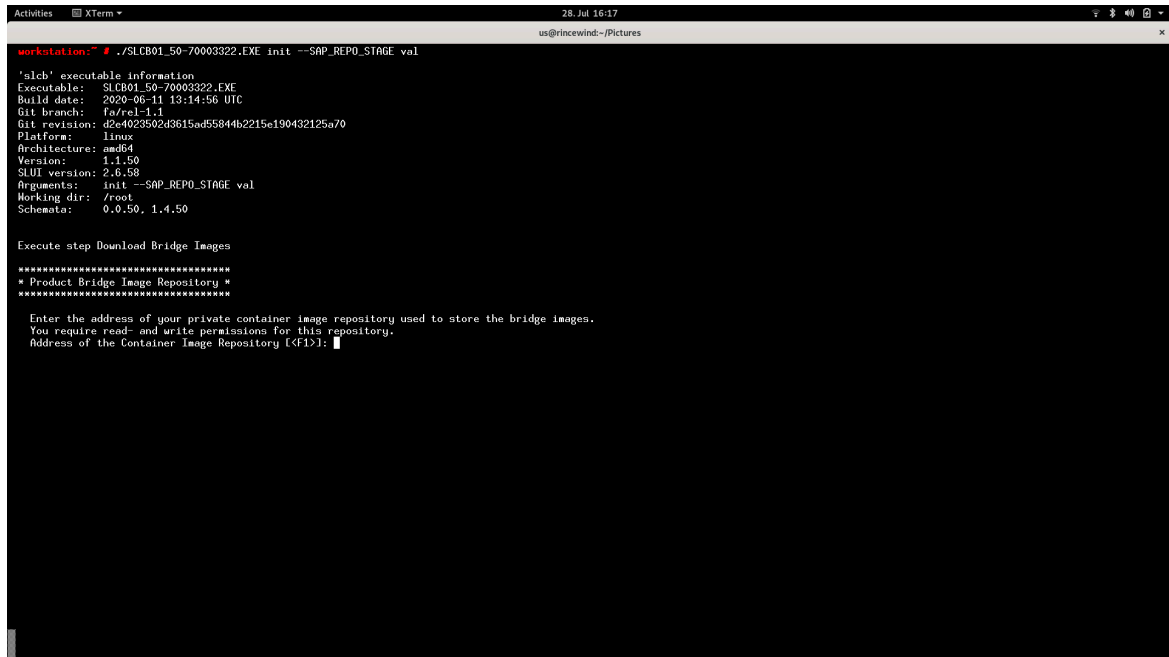
Click [here](#) to download SL CONTAINER BRIDGE 1.0.Linux on x86\_64 64bit Database independent [SLCB01\_50-70003322.EXE ,76422 KB]

FIGURE 15: SAP MAINTENANCE PLANNER: EXAMPLE FOR HOST AND PORT

## 6.3 Installing the SAP SLC Bridge

- Download the file containing the SLC Bridge Installer.
- If you have not already done so, copy this file to the management workstation.
- Run the **SLC Bridge Installer** on the management workstation.

```
$ ./SLCB01_<YOUR DOWNLOADED VERSION>.EXE init
```



```
workstation:~ # ./SLCB01_50-70003322.EXE init --SAP_REPO_STAGE val
'slcb' executable information
Executable: SLCB01_50-70003322.EXE
Build date: 2020-06-11 13:14:56 UTC
Git branch: fa/rel-1.1
Git revision: d2e4023502d3615ad55844b2215e190432125a70
Platform: linux
Architecture: amd64
Version: 1.4.50
SLUI version: 2.6.58
Arguments: init --SAP_REPO_STAGE val
Working dir: /root
Schemata: 0.0.50, 1.4.50

Execute step Download Bridge Images
*****
* Product Bridge Image Repository *
*****

Enter the address of your private container image repository used to store the bridge images.
You require read- and write permissions for this repository.
Address of the Container Image Repository [<F1>]:
```

FIGURE 16: SAP SLC BRIDGE

- This interactive script gathers all the necessary information to run the SAP SLC Bridge, and at the end, deploys it into the CaaSP cluster.

```

Activities  XTerm  28. Jul 16:25  us@rincewind:~/Pictures
Execute step Wait for Kubernetes Object SLCBridgeRoleBindingDeployment
Execute step Wait for Kubernetes Object DefaultsMap
Execute step Wait for Kubernetes Object ProductHistory
Execute step Wait for Kubernetes Object MasterSecret
Execute step Wait for Kubernetes Object NginxConf
Execute step Wait for Kubernetes Object NginxSecret
Execute step Wait for Kubernetes Object SLCBridgePod
Execute step Show availability of SLC Bridge Base deployment and ip address of SLC Bridge Base service
Execute step SL Container Bridge
*****
*      Message      *
*****

Deployment "slcbridgebase" has 1 available replicas in namespace "sap-slcbridge"
Service slcbridgebase-service is listening on any of the kubernetes nodes on "https://node:30616/docs/index.html"

Choose action Next In[<F1>]: n
*****
* Provide feedback to SAP SE *
*****

Dear user, please help us improve our software by providing your feedback (press <F1> for more information).

> 1. Fill out questionnaire
> 2. Send analytics data only
> 3. No feedback
possible values {1,2,3} [<F1>]: 3

Execute step Show availability of SLC Bridge Base deployment and ip address of SLC Bridge Base service
*****
*      Information   *
*****

Execution finished successfully

Choose action Exit [e]: e

```

FIGURE 17: SAP SLC BRIDGE

- Identify the service port for the SLC Bridge:

```

# kubectl -n sap-slcbridge get pods
NAME                                READY   STATUS    RESTARTS   AGE
di-platform-full-product-bridge    2/2     Running   0           3d23h
slcbridgebase-858f895bd6-74gps      2/2     Running   1           10d
# kubectl -n sap-slcbridge get svc
NAME                                TYPE           CLUSTER-IP   EXTERNAL-IP
PORT(S)          AGE
di-platform-full-product-bridge-service  ClusterIP      10.101.2.224  <none>
9000/TCP          3d23h
slcbridgebase-service                    NodePort        10.97.79.26   <none>
9000:30778/TCP    10d

```

In our example, the port number on which the SLC Bridge listens is 30778.

- Make a note of this information. It is needed for the installation process via SAP Maintenance Planner.

```
Activities XTerm 28. Jul 16:27 us@rincewind:~/Pictures
Execute step Wait for Kubernetes Object MasterSecret
Execute step Wait for Kubernetes Object NginxConf
Execute step Wait for Kubernetes Object NginxSecret
Execute step Wait for Kubernetes Object SLCBridgePod
Execute step Show availability of SLC Bridge Base deployment and ip address of SLC Bridge Base service
Execute step SL Container Bridge
*****
* Message *
*****

Deployment "slcbridgebase" has 1 available replicas in namespace "sap-slcbridge"
Service slcbridgebase-service is listening on any of the kubernetes nodes on "https://node:30616/docs/index.html"

Choose action Next [n/<F1>]: n
*****
* Provide feedback to SAP SE *
*****

Dear user, please help us improve our software by providing your feedback (press <F1> for more information).

> 1. Fill out questionnaire
> 2. Send analytics data only
> 3. No feedback
possible values {1,2,3} [<F1>]: 3

Execute step Show availability of SLC Bridge Base deployment and ip address of SLC Bridge Base service
*****
* Information *
*****

Execution finished successfully

Choose action Exit [e]: e
workstation: # kubectl get pod -n sap-slcbridge
NAME                                READY STATUS RESTARTS AGE
slcbridgebase-858f895bd6-nj56b      2/2    Running    0        2m3s
workstation: # kubectl get svc -n sap-slcbridge
NAME                                TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
slcbridgebase-service               NodePort 10.100.207.95 <none> 9000:30616/TCP 2m43s
workstation: #
```

FIGURE 18: SAP SLC BRIDGE

## 6.4 Installing SAP Data Intelligence 3

This section describes the installation of SAP Data Intelligence 3 on top of SUSE CaaSP 4.2.

### 6.4.1 Preparations

Before the installation of SAP DI 3 can start, some preparation work must be done:

- Create a namespace on the Kubernetes cluster.
- Define a (default) storage class on the Kubernetes cluster.
- Adapt PodSecurityPolicies.
- Create the necessary ClusterRoleBindings.
- If you use self-signed certificates for the private registry, a special secret must be created.



#### Note

Unless otherwise specified, all these tasks are run from the management workstation.

### 6.4.1.1 Creating namespace for SAP Data Intelligence 3 on Kubernetes

Define the namespace into which SAP Data Intelligence 3 will be installed:

```
$ kubectl create namespace <YOUR NAMESPACE>
```

### 6.4.1.2 Creating Storage Class

- Create the storage class to provide volumes for SAP Data Intelligence 3 on SUSE Enterprise Storage.
- Make sure that you have:
  - the connection data for your SUSE Enterprise Storage at hand
  - the IP addresses and port number (default: 6789) of the monitor nodes of your SES cluster
  - created a data pool on your SES cluster for use with SAP Data Intelligence 3
  - the name of this pool (datahub in this example) available
- Edit the example below to fit your environment.

```
$ cat > storageClass.yaml <<EOF
apiVersion: storage.kubernetes.io/v1
kind: StorageClass
metadata:
  annotations:
    storageclass.kubernetes.io/is-default-class: "true"
  name: datahub
  namespace: default
parameters:
  adminId: admin
  adminSecretName: ceph-admin-secret
  adminSecretNamespace: default
  imageFeatures: layering
  imageFormat: "2"
  monitors: <IP ADDRESS OF MONITOR 1>:6789, <IP ADDRESS OF MONITOR 2>:6789, <IP
ADDRESS OF MONITOR 3 >:6789
  pool: datahub
  userId: admin
  userSecretName: ceph-user-secret
provisioner: kubernetes.io/rbd
reclaimPolicy: Delete
```

```
volumeBindingMode: Immediate
EOF

$ kubectl create -f storageClass.yaml
```

- Create secrets for the StorageClass.
  - Create the secrets needed to access the storage.
  - Obtain the keys from your SES cluster. These are located in ceph.admin.keyring and ceph.user.keyring.  
You must encode the keys with base64.

```
$ echo <YOUR KEY HERE> | base64
```

```
$ cat > ceph-admin-secret.yaml <<EOF
apiVersion: v1
kind: Secret
metadata:
  name: ceph-admin-secret
type: "kubernetes.io/rbd"
data:
  key: <YOUR BASE64 ENCODED KEY HERE>
EOF
```

```
$ cat > ceph-user-secret.yaml <<EOF
apiVersion: v1
kind: Secret
metadata:
  name: ceph-user-secret
type: "kubernetes.io/rbd"
data:
  key: <YOUR BASE64 ENCODED KEY HERE>
EOF

$ kubectl apply -f ceph-admin-secret.yaml
$ kubectl apply -f ceph-user-secret.yaml
```

- Create the credentials for accessing the StorageClass from the namespace where DI 3 will be installed into.

```
$ kubectl -n <YOUR NAMESPACE FOR DI 3> create -f ceph-admin-secret.yaml
$ kubectl -n <YOUR NAMESPACE FOR DI 3> create -f ceph-user-secret.yaml
```

### 6.4.1.3 Creating PodSecurityPolicies and ClusterRoleBindings

- PodSecurityPolicies

```
$ kubectl edit psp suse.caasp.psp.privileged
```

Change the `pathPrefix` in `allowedHostPaths` to `/`

- ClusterRoleBindings

```
$ cat > clusterrolebinding.yaml << EOF
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRoleBinding
metadata:
  name: suse:caasp:psp:privileged:default
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: suse:caasp:psp:privileged
subjects:
- kind: ServiceAccount
  name: default
  namespace: XXX
- kind: ServiceAccount
  name: vora-vsystem-XXX
  namespace: XXX
- kind: ServiceAccount
  name: vora-vsystem-XXX-vrep
  namespace: XXX
- kind: ServiceAccount
  name: XXX-elasticsearch
  namespace: XXX
- kind: ServiceAccount
  name: XXX-fluentd
  namespace: XXX
- kind: ServiceAccount
  name: XXX-nodeexporter
  namespace: XXX
- kind: ServiceAccount
  name: vora-vflow-server
  namespace: XXX
- kind: ServiceAccount
  name: mlf-deployment-api
  namespace: XXX
EOF
$ sed -i s/XXX/<your-di-namespace>/g clusterrolebinding.yaml
$ kubectl apply -f clusterrolebinding.yaml
```

- Additional changes

```
$ kubectl edit clusterrolebinding system:node
```

Insert the following at the end of the file:

```
subjects:
- apiGroup: rbac.authorization.k8s.io
  kind: Group
  name: system:nodes
```

- If you use self-signed SSL certificates for the secure private registry, create a secret for accessing this registry.



## Note

The certificate chain should be saved in pem format into a single file called cert.

```
export NAMESPACE=<your namespace>
mv cert cert_with_carriage_return
tr -d '\r' < cert_with_carriage_return > cert
kubectl create secret generic cmcertificates --from-file=cert -n $NAMESPACE
```

### 6.4.2 Installing SAP Data Intelligence 3

After you successfully finished the preparation stages, proceed with the installation of SAP Data Intelligence 3. To do so, several steps must be executed.

#### 6.4.2.1 Connecting to the SLC Bridge

- Point your browser to the SLC Bridge service:
  - <https://<yournode>:<yourport>/docs/index.html> 
- Fill in your credentials you created during the deployment of the SLC Bridge.



### 6.4.2.2 Installing the workflow

- Connect and authenticate to the SLC Bridge service created above. Use the credentials created during the setup of the SLC Bridge:

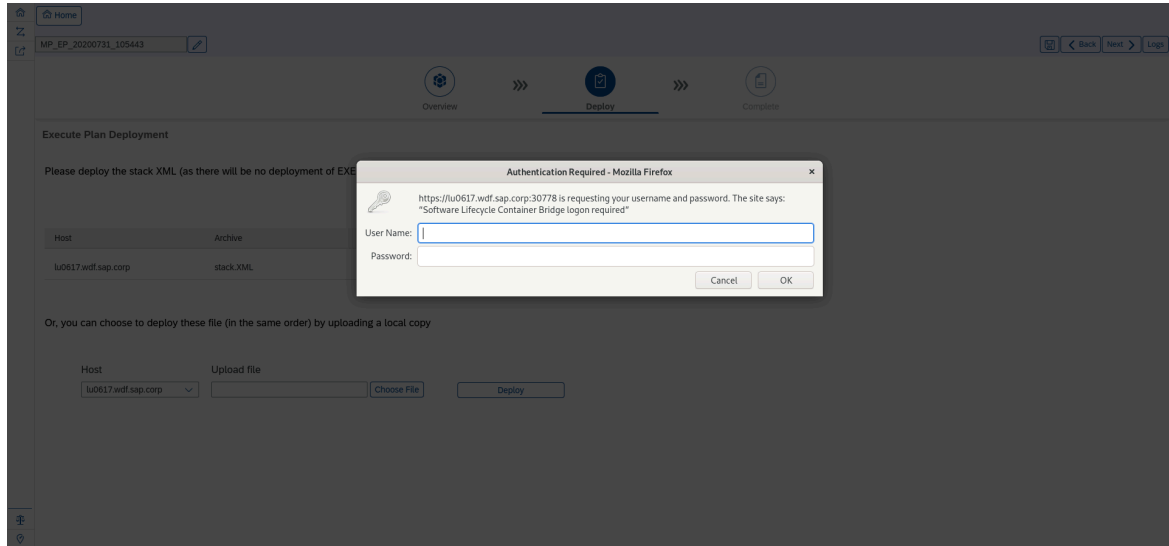


FIGURE 19: CONNECT AND AUTHENTICATE TO THE SLCB SERVICE

- Select "Planned software Changes":

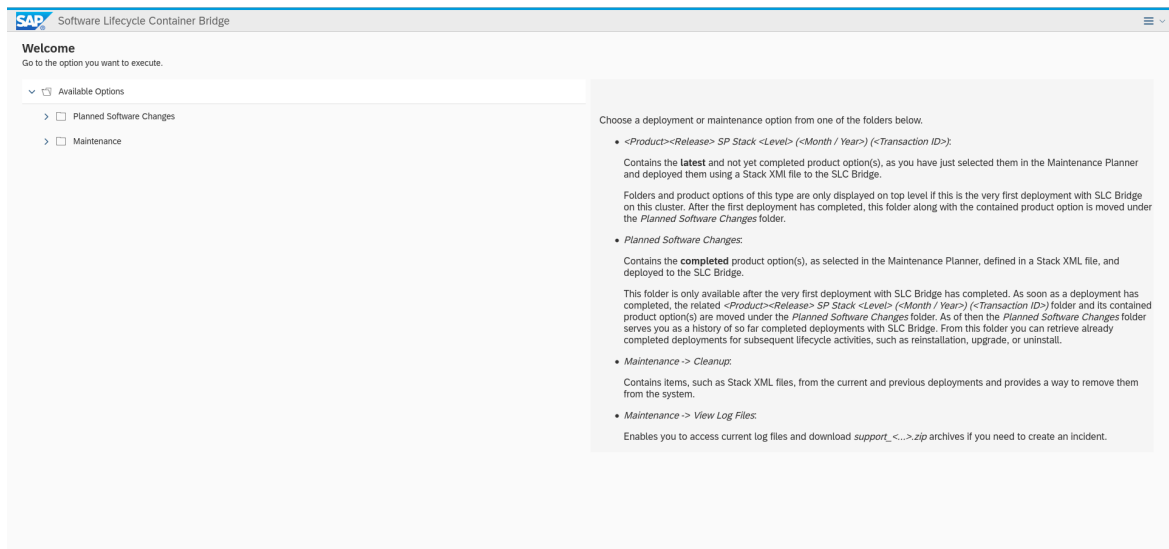


FIGURE 20: INSTALLATION SELECT PLANNED SOFTWARE CHANGES

- Select the SAP Data Intelligence deployment required by your needs. Click "Next":

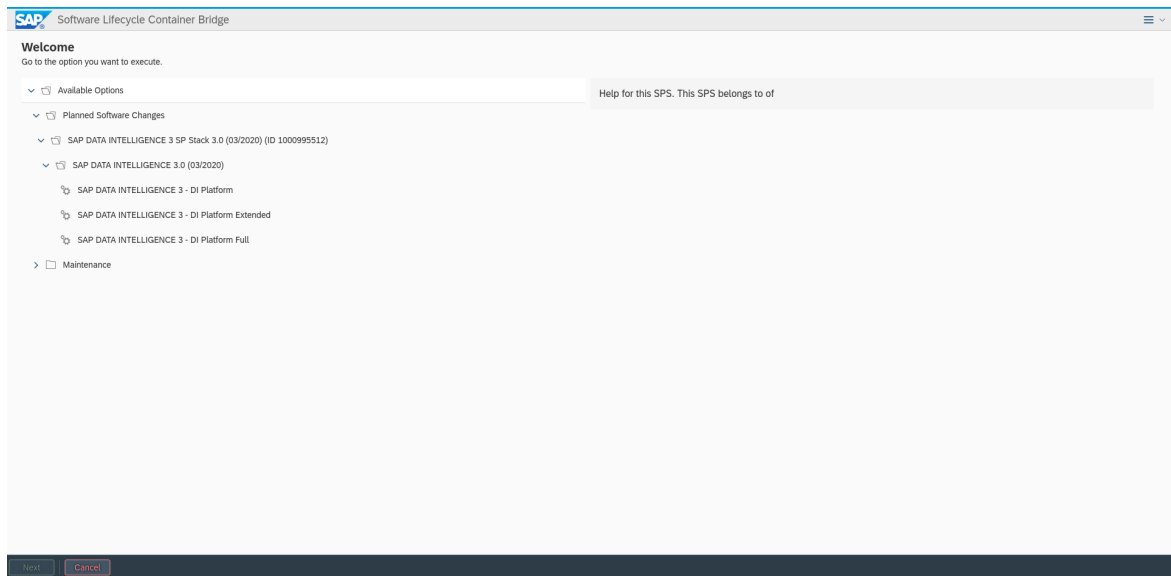


FIGURE 21: INSTALLATION SELECT THE SAP DI DEPLOYMENT YOU WANT TO INSTALL, FOR EXAMPLE SAP DI PLATFORM FULL

- Enter the Kubernetes namespace created beforehand, for example di310. Click "Next":

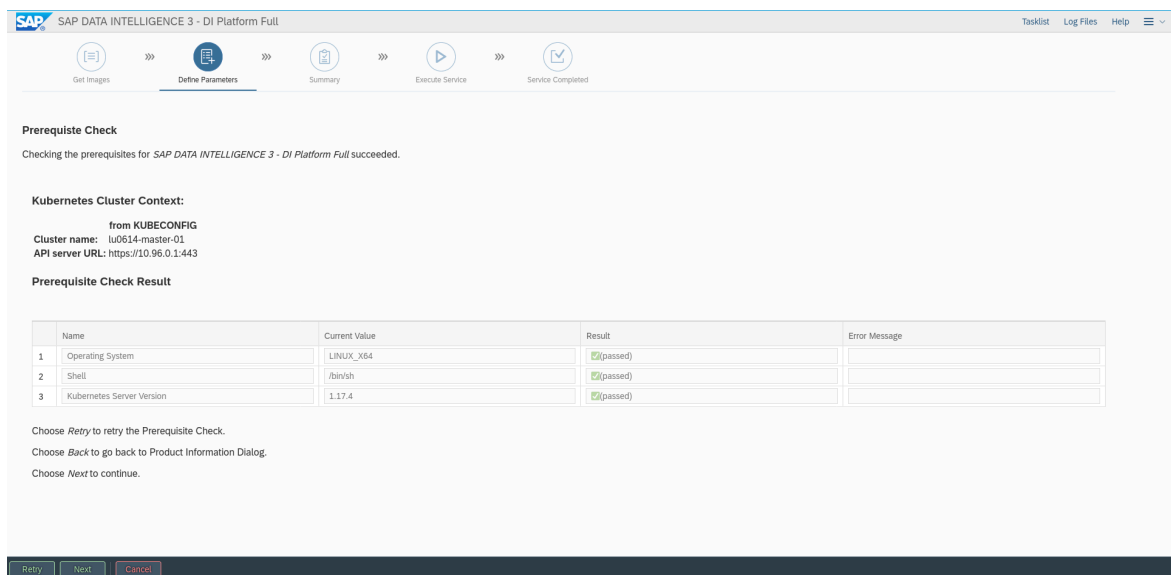


FIGURE 22: INSTALLATION PRE-REQUISITES CHECK

**Kubernetes Namespace**

Specify the Kubernetes namespace in which the actions will be taken.

- The namespace cannot be formed by only digits.
- The namespace must consist of one or more hyphen-separated groups. Each group must contain only lower case letters or only numbers. In the case of only one group, it may contain a mix of lower case letters and digits.
- It must follow the regular expression: `^[a-z]([0-9]?)?([a-z]([0-9]?)?)?([a-z]([0-9]?)?)?([a-z]([0-9]?)?)?([a-z]([0-9]?)?)?)$`
- Examples of a valid namespace: valid-namespace, valid-2-namespace, 2-3-117
- Examples of an invalid namespace: 00, 01e-example, invalid-name2, invalid-namespace2-example

\*Kubernetes Namespace:

Back Next Cancel

FIGURE 23: INSTALLATION ENTER KUBERNETES NAMESPACE

- Select "Advanced Installation":

**Installation Type**

Choose one of the installation types.

- Basic Installation:** You are only prompted for a small selection of installation parameters. For the other installation parameters, default values are used.
- Advanced Installation (recommended):** You are prompted for all parameters. In case of specific installation requirements, this installation option is recommended.

☐ Basic Installation

☒ Advanced Installation

Back Next Cancel

FIGURE 24: INSTALLATION SELECT ADVANCED INSTALLATION

- Enter the URI of your Private secure registry. Click "Next":

The screenshot shows the 'Define Parameters' step of the SAP Data Intelligence 3 - DI Platform Full installation wizard. The 'Container Image Repository' section is active, showing a text input field with the value 'lu0591.wdf.sap.corp:5000'. The wizard's progress bar at the top indicates the current step. The bottom navigation bar includes 'Back', 'Next', and 'Cancel' buttons.

**Container Image Repository**

Specify the container image repository to push the SAP Data Intelligence images. This container image repository will be used by Kubernetes and by SAP Data Intelligence Modeler. The container image repository must be accessible from the installation host including the necessary authentication.

- **Examples:** 012345678910.dkr.ecr.us-east-1.amazonaws.com, eu.gcr.io/my-project-name, myregistry.azurecr.io, myhost:5000

Container Image Repository:

Back Next Cancel

FIGURE 25: INSTALLATION PRIVATE CONTAINER REGISTRY

- Enter a password for the system tenant in SAP DI 3.0:

The screenshot shows the 'Define Parameters' step of the SAP Data Intelligence 3 - DI Platform Full installation wizard. The 'SAP Data Intelligence System Tenant Administrator Password' section is active, showing two text input fields for 'Password' and 'Confirm'. The wizard's progress bar at the top indicates the current step. The bottom navigation bar includes 'Back', 'Next', and 'Cancel' buttons.

**SAP Data Intelligence System Tenant Administrator Password**

Specify a password for the "system" user of "system" tenant.

- It must contain between 8 and 255 characters.
- It must contain at least one lower case, one upper case, one numerical and one special character.
- The allowed special characters are . @ # \$ % \* + \_ ? !.
- It cannot contain spaces.

\*Password:

\*Confirm:

Back Next Cancel

FIGURE 26: INSTALLATION SYSTEM TENANT PASSWORD

- Assign a name to the initially created tenant, for example "default":

**SAP Data Intelligence Initial Tenant Name**

Specify a name for the SAP Data Intelligence initial tenant that is going to be created automatically.

- It must contain between 4 and 60 characters.
- It must consist of lower case letters, digits or hyphens.
- It must not begin or end with hyphens and must not contain multiple consecutive hyphens.
- It must follow the regular expression: "[a-z0-9]+(-[a-z0-9]+)\*\$"

\*Tenant Name

Back

FIGURE 27: INSTALLATION CREATE DEFAULT TENANT

- Create the administrator user for the default tenant in SAP DI 3.0:

**SAP Data Intelligence Initial Tenant Administrator Username**

Specify a name for administrator user of "default" tenant.

- It must contain between 4 and 60 characters.
- It must consist of lower case letters, digits or hyphens.
- It must not begin or end with hyphens and must not contain multiple consecutive hyphens.
- It must follow the regular expression: "[a-z0-9]+(-[a-z0-9]+)\*\$"

\*Username

Back

FIGURE 28: INSTALLATION ADMIN USER NAME OF DEFAULT TENANT

- Set the password for the administrator user of the default tenant:

The screenshot shows the 'Define Parameters' step of the SAP Data Intelligence 3 - DI Platform Full installation wizard. The title is 'SAP Data Intelligence Initial Tenant Administrator Password'. The instruction is 'Specify a password for "admin" user of "default" tenant.' Below this, there are three bullet points: 'It must contain between 8 and 255 characters.', 'It must contain at least one lower case, one upper case, one numerical and one special character.', and 'The allowed special characters are . @ # \$ % ^ + \_ ? ! . It cannot contain spaces.' There are two input fields: '\*Password' and '\*Confirm'. At the bottom, there are 'Back', 'Next', and 'Cancel' buttons.

FIGURE 29: INSTALLATION SET ADMIN USER PASSWORD

- If you need a proxy to connect to the Internet, set the proxy settings accordingly:

The screenshot shows the 'Define Parameters' step of the SAP Data Intelligence 3 - DI Platform Full installation wizard. The title is 'Cluster Proxy Settings'. The instruction is 'Choose if you want to configure proxy settings. It is necessary when the Kubernetes cluster is running behind a proxy.' Below this, there is a checkbox labeled 'Choose if you want to configure proxy settings on the cluster'. At the bottom, there are 'Back', 'Next', and 'Cancel' buttons.

FIGURE 30: INSTALLATION PROXY SETTINGS

- Select if you want to use a checkpoint storage:

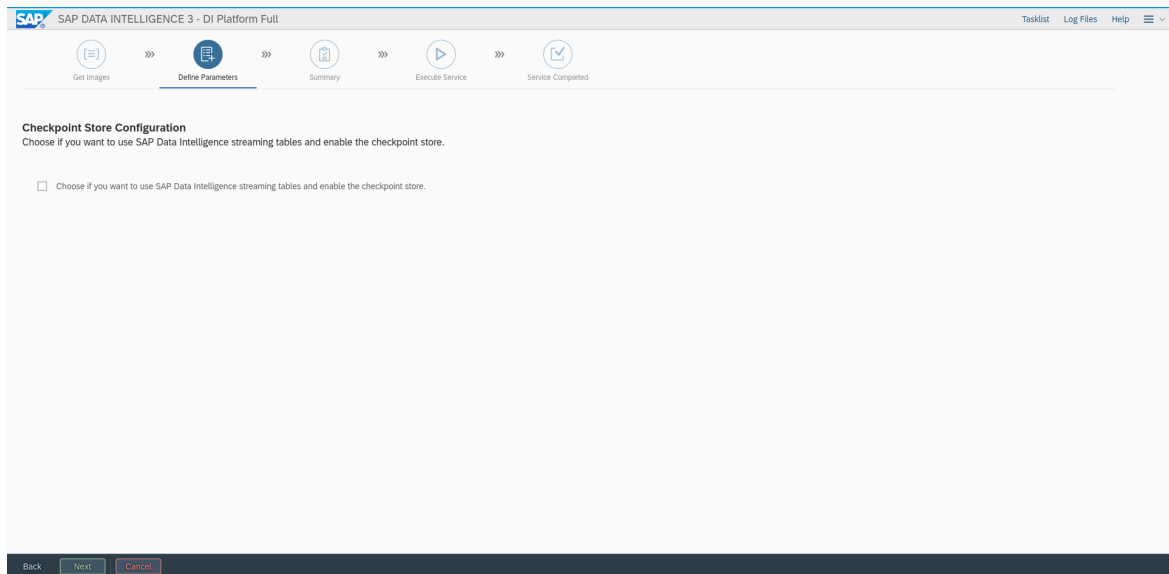


FIGURE 31: INSTALLATION CONFIGURE CHECKPOINT STORAGE

- Define the storage class that should be used by SAP DI 3.0. Enter the name of the storage class you created previously:

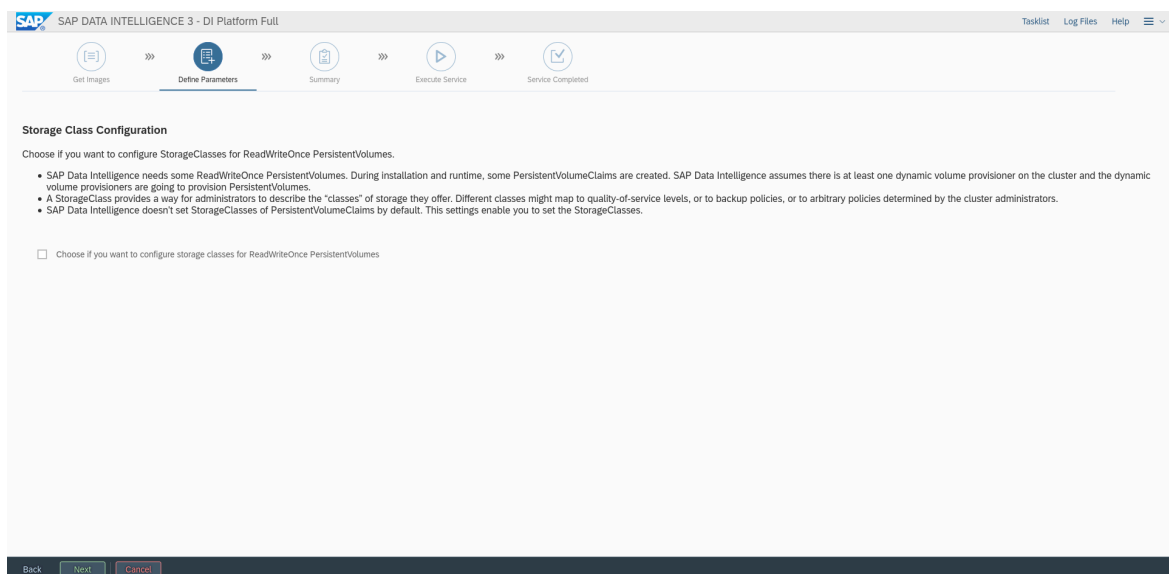


FIGURE 32: INSTALLATION DEFINE STORAGE CLASS TO BE USED

- For the SAP DI 3 installation on SUSE CaaSP 4.2 the docker log path needs to be adapted. Check the check box and click "Next":

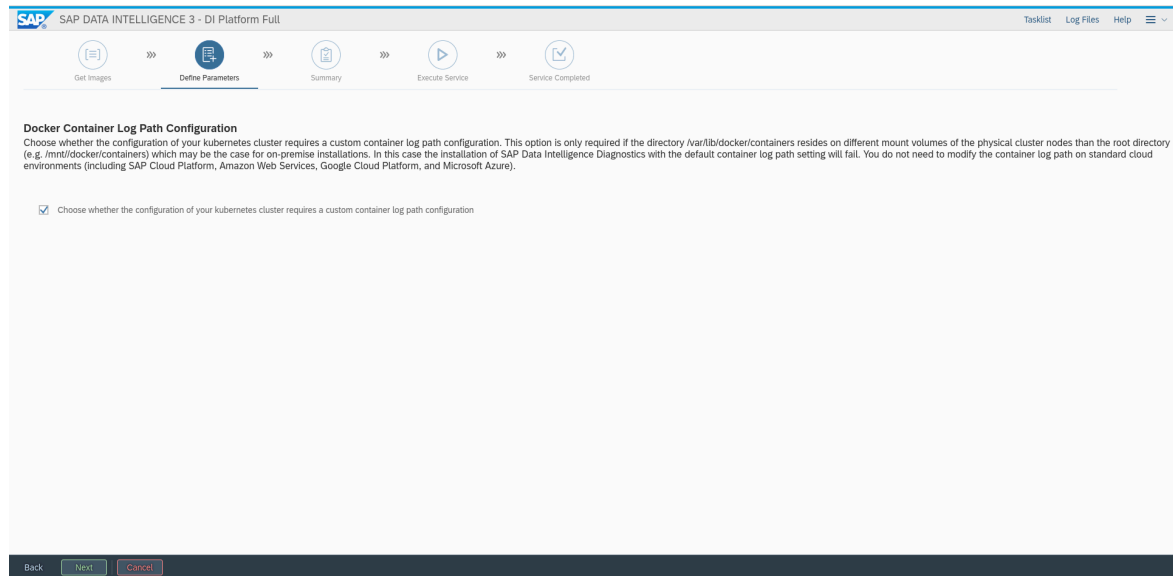


FIGURE 33: INSTALLATION DOCKER LOG PATH

- Enter the docker log path: `"/var/log/containers"`

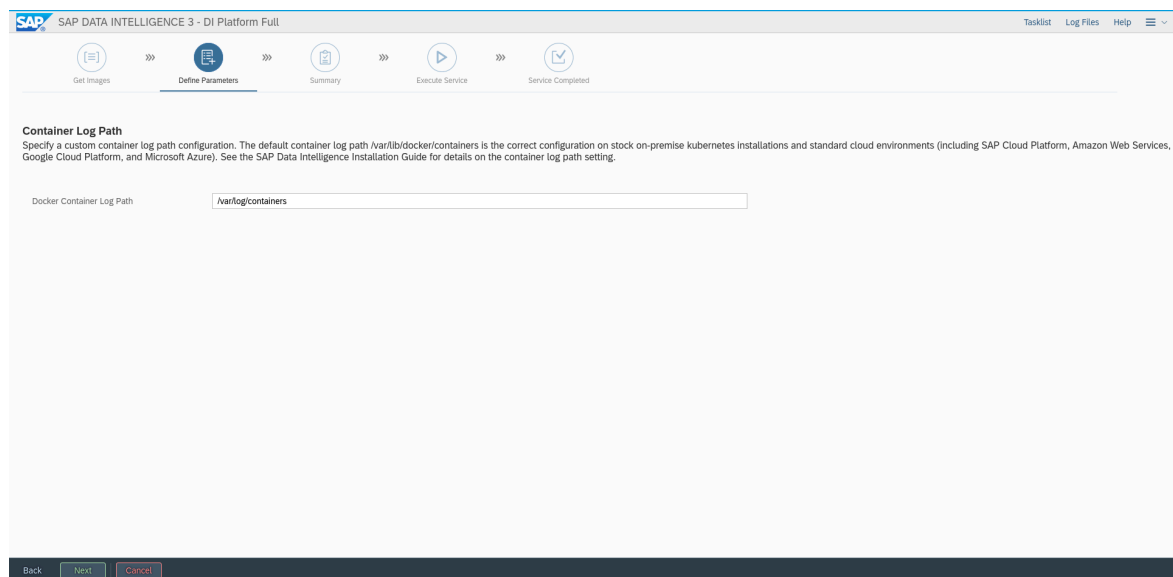


FIGURE 34: INSTALLATION DOCKER LOG PATH



- Enable Kaniko:

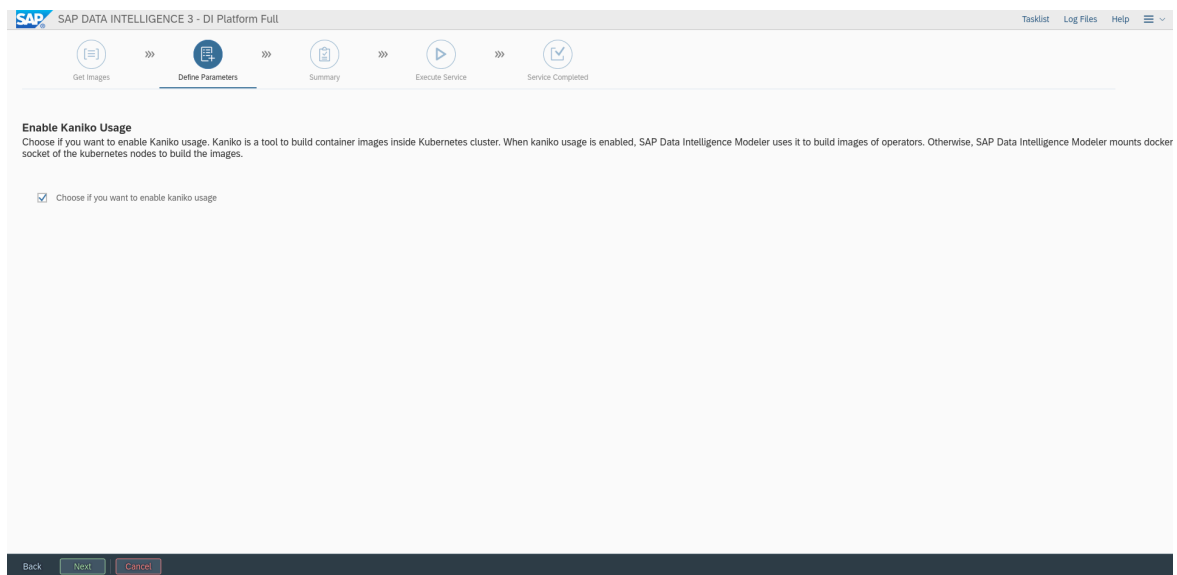


FIGURE 35: INSTALLATION ENABLE USAGE OF KANIKO

- Here, a different private registry can be configured if needed. To proceed, click "Next":

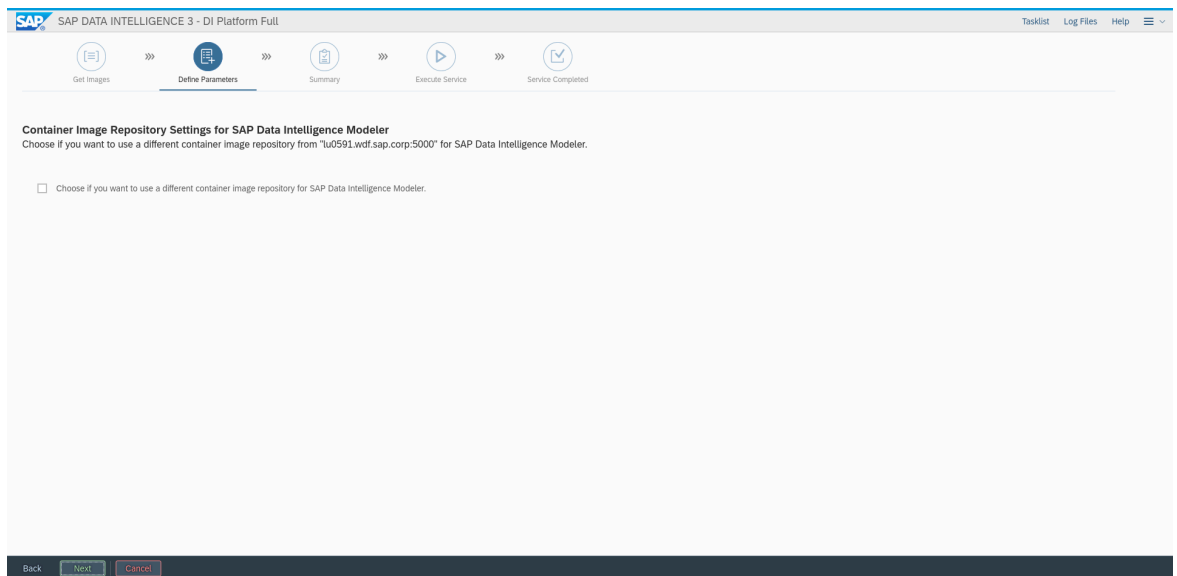


FIGURE 36: INSTALLATION DOCKER REGISTRY FOR SAP DI MODELER IMAGES

- Enable the loading of NFS kernel modules. This ensures that the NFS kernel modules are loaded on all Kubernetes nodes. Check the check box and click "Next":

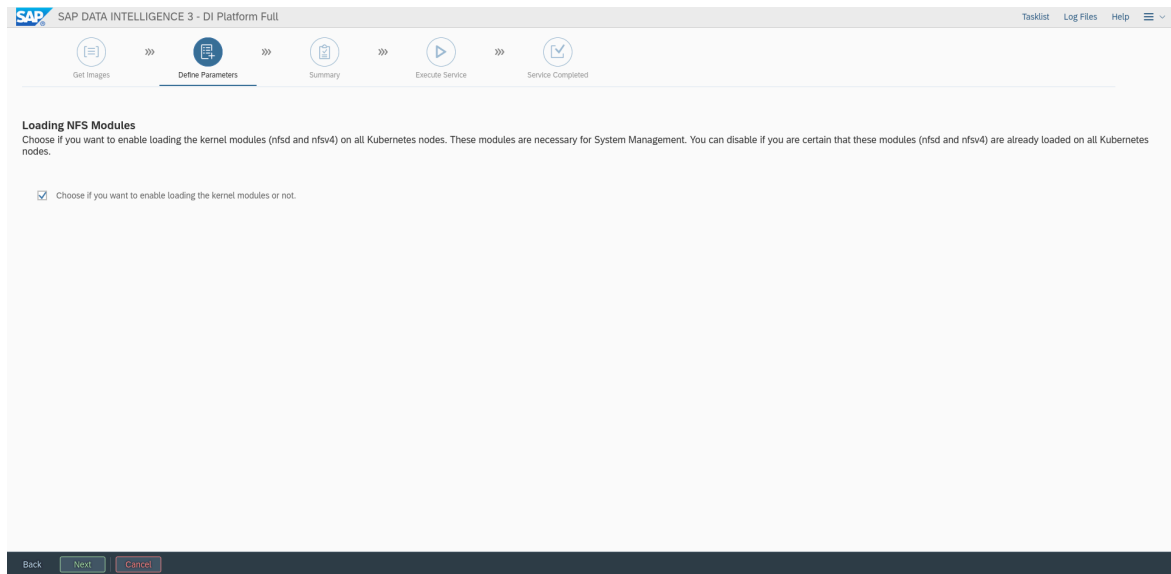


FIGURE 37: INSTALLATION LOAD NFS KERNEL MODULES

- If needed, enable Network policies. Click "Next":

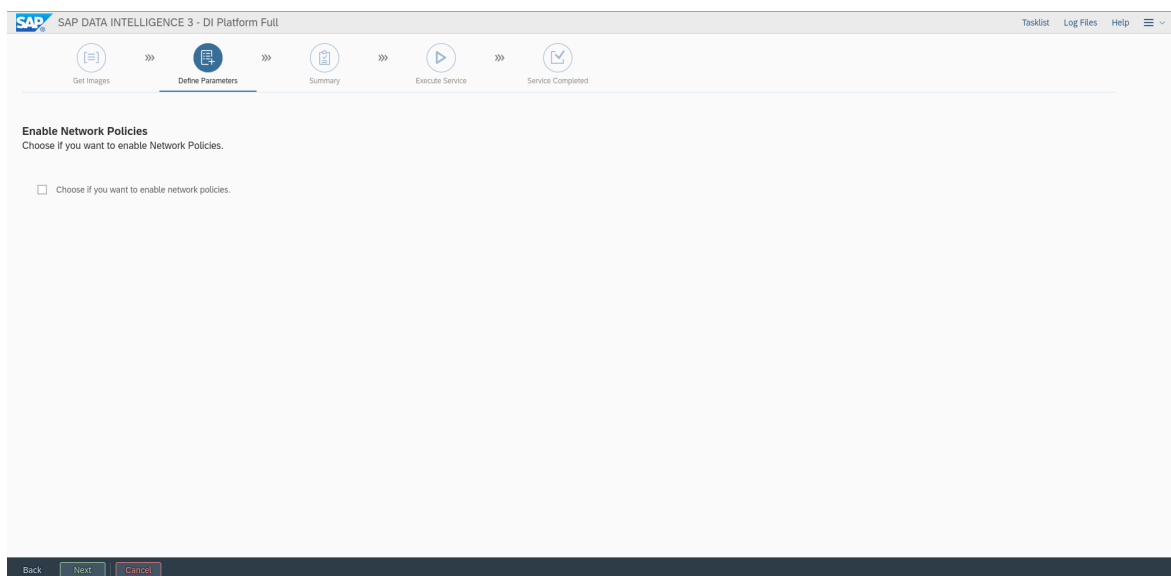


FIGURE 38: INSTALLATION ENABLE NETWORK POLICIES

- Configure timeout during installation, leave the default and click "Next":

**SAP DATA INTELLIGENCE 3 - DI Platform Full**

Tasklist Log Files Help

Get Images Define Parameters Summary Execute Service Service Completed

**Timeout**  
Timeout in seconds for DataHub installation. The default duration is enough for most of the environments. Increasing the value is necessary when the network or volume provisioner is so slow that deployments of components fail because of timeouts without any other issues.

\*Timeout in seconds 3600

Back Next Cancel

FIGURE 39: INSTALLATION CONFIGURE TIMEOUT DURING INSTALLATION OF SAP DI 3

- In the field "Additional Installation Parameters", enter:  
`-e diagnostic.fluentd.logDriverFormat=regex -e vsystem.vRep.exportsMask=true`

**SAP DATA INTELLIGENCE 3 - DI Platform Full**

Tasklist Log Files Help

Get Images Define Parameters Summary Execute Service Service Completed

**Additional Installation Parameters**  
You can specify additional installation parameters. The parameters are documented in the section "Configuration Parameters for Kubernetes Deployment" in the official SAP Data Intelligence documentation. Use -e flag for each additional parameter that you give and use spaces between them.

• Example: -e hana.memoryRequest=7Gi -e storageGateway.replicas=1

Additional Installation Parameters -e diagnostic.fluentd.logDriverFormat=regex -e vsystem.vRep.exportsMask=true

Back Next Cancel

FIGURE 40: INSTALLATION ADDITIONAL INSTALLATION PARAMETERS

**SAP DATA INTELLIGENCE 3 - DI Platform Full** Tasklist Log Files Help

Get Images » Define Parameters » Summary » Execute Service » Service Completed

**Enter Logon Information for SAP Support Portal Access**

Enter S-User credentials to log on to the SAP Support Portal and upload system identity information.  
If there is no Internet connectivity to the SAP Support Portal, leave the Username empty. In this case you can download the *systemidentity.xml* file from the *Log Files* menu and upload it manually to the Maintenance Planner.

User Name

Password

Back Next Cancel

FIGURE 41: INSTALLATION #24

- Check the Summary page. Check if the settings are correct:

**SAP DATA INTELLIGENCE 3 - DI Platform Full** Tasklist Log Files Help

Get Images » Define Parameters » Summary » Execute Service » Service Completed

**Parameter Summary**

Choose Next to start the deployment with the displayed parameter values or choose Back to revise the parameters.

**Kubernetes Namespace**

Kubernetes Namespace

**Installation Type**

☐ Basic Installation  
☒ Advanced Installation

**Container Image Repository**

Container Image Repository

**SAP Data Intelligence System Tenant Administrator Password**

Password   
Confirm

Back Next Cancel

FIGURE 42: SUMMARY OF INSTALLATION PARAMETERS

- Click "Next" to start the deployment of SAP DI 3.0.

Your installation should now be finished.

## 7 Legal notice

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