SUSE Virtualization

CloudCasa Self-Hosted with SUSE Virtualization

Data protection for isolated virtual machine environments

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Summary

This guide provides step-by-step instructions for deploying CloudCasa™ Self-Hosted to protect your air-gapped SUSE® Virtualization environment with cloud native backup, disaster recovery, migration, and replication.

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1 Key takeaways

Deploying SUSE Virtualization (https://www.suse.com/products/rancher/virtualization/) and CloudCasa Self-Hosted (https://cloudcasa.io/resources/cloudcasa-selfhosted-datasheet/) together provides:

- Full control for regulated or air-gapped environments via self-hosting.
- Business continuity for container and Kubernetes-native virtual machine workloads.
- Centralized backup and recovery for virtual machines and persistent volumes.
- Validated end-to-end backup and recovery workflows.

2 Introduction

Modern enterprises are turning to open-source, Kubernetes-based virtualization platforms such as **SUSE Virtualization** to break down infrastructure silos, lower licensing expenses, and unify the management of virtual machines (VMs) alongside cloud native containers. Maintaining a robust data protection strategy is crucial, even within isolated or air-gapped environments. **CloudCasa Self-Hosted** offers a cloud native backup and recovery solution designed to protect critical workloads, ensure operational continuity, and streamline disaster recovery.

Key objectives covered in this guide include:

- Setting up a proof-of-concept environment by deploying CloudCasa Self-Hosted alongside a SUSE Virtualization cluster.
- Verifying the backup and restoration process for virtual machines.

2.1 Scope

This guide covers the deployment of CloudCasa Self-Hosted onto a SUSE Rancher Kubernetes Engine (RKE2) cluster alongside an existing SUSE Virtualization cluster environment. Deployment includes installation and configuration of SUSE Linux Enterprise Server on a host system, deployment of RKE2 on this host, and installation of CloudCasa. After installation, the guide provides a simple validation by backing up and restoring a virtual machine.

2.2 Audience

This guide is intended for IT administrators, Kubernetes administrators, virtualization administrators, backup administrators, and solution architects responsible for deploying and managing CloudCasa Self-Hosted to protect SUSE Virtualization workloads.

2.3 Acknowledgments

The authors wish to acknowledge the contributions of the following individuals to the creation of this document:

- Jonathan Garner, Senior Platform Engineer, Catalogic Software
- Terry Smith, Partner Ecosystem Solution Innovations Director, SUSE

3 Architecture

CloudCasa Self-Hosted is cloud native and is deployed onto a Kubernetes cluster. In this architecture, the CloudCasa backup server is deployed onto a single-node SUSE Rancher Kubernetes Engine (RKE2) cluster, running on a SUSE Linux Enterprise Server virtual machine with network access to a SUSE Virtualization cluster.

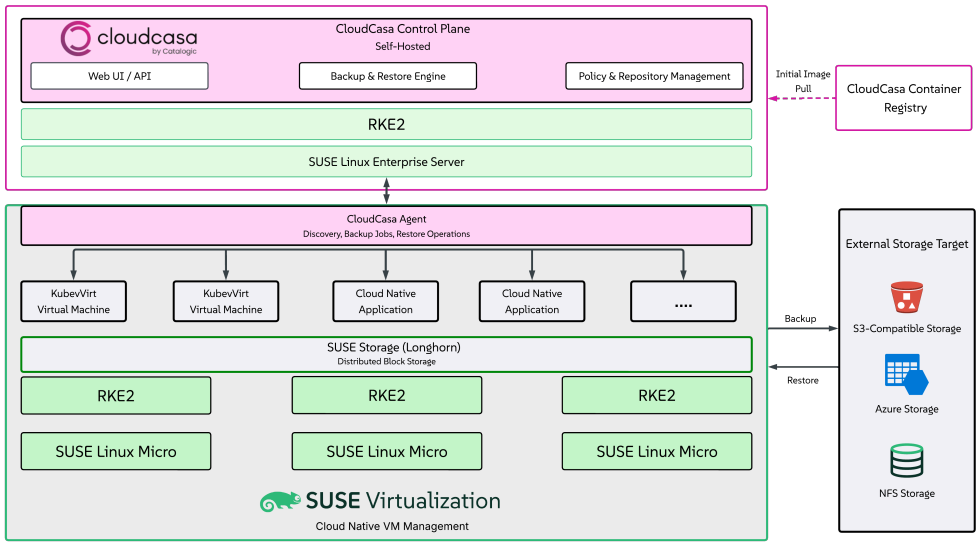


FIGURE 1: ARCHITECTURE OVERVIEW

The technical components of the solution include:

CloudCasa Self-Hosted (https://cloudcasa.io/resources/cloudcasa-selfhosted-datasheet/)

CloudCasa (v1.6.7 or later) is a data protection and mobility solution for Kubernetes and cloud native applications. It was originally developed as a SaaS-only offering, but it is also available as this self-hosted option for installation on-premises or in customer cloud environments. CloudCasa Self-Hosted consists of a server, a database, agents installed on each client cluster, and external S3-compatible or Azure object storage used to store the backup data.

SUSE Virtualization (https://www.suse.com/products/rancher/virtualization/)

SUSE Virtualization (v1.8 or later) is the open source, cloud native, hyperconverged infrastructure (HCI) solution for organizations that need to run virtual machines and containers together in the data center, public clouds, and at the edge.

SUSE Rancher Kubernetes Engine (RKE2) (https://documentation.suse.com/cloudnative/rke2/latest/en/introduction.html)

RKE2 (v1.34 or later) is SUSE's enterprise-ready next-generation Kubernetes distribution. It is a fully conformant Kubernetes distribution that focuses on security and compliance within the U.S. Federal Government sector. To meet these goals, RKE2 provides defaults and configuration options that allow clusters to pass CIS Kubernetes Benchmarks with minimal operator intervention, enables FIPS 140-3 compliance, is regularly scanned for CVEs using trivy in SUSE's build pipeline.

SUSE Linux Enterprise Server (https://www.suse.com/products/server/)

SUSE Linux Enterprise Server (15 SP7 or later) is a modern, modular Linux operating system that provides a secure and stable platform for mission-critical workloads.

4 Preparing your environment

Before you begin the deployment, ensure that the required infrastructure, software access, and credentials are available. This guide assumes that a SUSE Virtualization environment is available as the target platform for backup and restore validation.

4.1 Sizing and configuration guidance

Deploy a virtual machine with the following minimum specifications:

- **vCPU**: 4 minimum
- **RAM**: 8GB minimum, 16GB recommended
- **OS disk**: 100 GB
- **Network**: static IP (recommended) with access to the SUSE Virtualization cluster management network.

4.2 Ensuring network access

1. Make sure your firewall is configured to allow communication between the CloudCasa backup server and the SUSE Virtualization cluster nodes on port 443/tcp.
2. Defining a local A DNS record to for the VM that will host the CloudCasa backup server, such as 'local.cloudcasa.io'.



Note

The DNS record for local.cloudcasa.io must resolve to the SLES VM IP address across all client machines accessing the CloudCasa UI and any target Kubernetes cluster nodes. The local Envoy ingress server handles internal routing and TLS termination for CloudCasa traffic.

4.3 Setting up the SUSE Virtualization environment

Deploy and configure a SUSE Virtualization cluster (if you do not already have one). For detailed installation and configuration steps, refer to the SUSE Virtualization Documentation (https://documentation.suse.com/cloudnative/virtualization/).

After deployment, verify that the SUSE Virtualization cluster is operational and that you can access its management interface.

4.4 Preparing CloudCasa access and credentials

Before installing CloudCasa Self-Hosted, ensure that you have the required credentials and license information. Do this by completing the following steps:

1. Obtain access to the CloudCasa Support Portal (https://support.cloudcasa.io/) using your email address and one-time login code.
2. Download the CloudCasa license file from the Support Portal.
3. Obtain the following credentials from the CloudCasa team:
    - Helm repository credentials.
    - Azure Container Registry (ACR) credentials required to pull CloudCasa container images.

Important

Treat the Helm repository and container registry credentials as sensitive information. Follow your organization's security practices and rotate credentials after completing the proof-of-concept evaluation.

4.5 Air-gapped environment considerations

For deployments in strict air-gapped or restricted network environments where direct access to external repositories (such as Helm and Azure Container Registry) is not permitted, perform the following preparation steps on an internet-connected host prior to installation:

1. **Download Helm charts and images**: Pre-pull the CloudCasa Helm chart and required container images from cloudcasa.azurecr.io on an internet-connected system using tools such as helm pull and docker pull or crane.
2. **Transfer assets to the air-gapped environment**: Export container images to archive files using docker save or bundle them with crane export, then transfer the archives and chart packages into the isolated network environment using approved media or secure transfer jump hosts.
3. **Populate local registry and mirror**: Import the container images into an internal container registry (for example, Harbor or an internal OCI registry) and host the Helm chart in an internal repository. Update your `cloudcasa-values.yaml` configuration file to reference the internal registry mirrors and credentials.

5 Installing SUSE Linux Enterprise Server and RKE2

This section describes how to prepare the operating system and deploy a single-node RKE2 cluster that will host the CloudCasa Self-Hosted services.

For additional product information, refer to the following documentation:

- SUSE Linux Enterprise Server Documentation (https://documentation.suse.com/sles/)
- SUSE Rancher Kubernetes Engine (RKE2) Documentation (https://documentation.suse.com/cloudnative/rke2/)

1. Register the SLES system using SUSEConnect and enable the required modules.

```
SUSEConnect -r <YOUR_SUSE_REGISTRATION_CODE> -e <YOUR_EMAIL_ADDRESS>
SUSEConnect -p sle-module-basesystem/<15.7>/x86_64
SUSEConnect -p sle-module-server-applications/15.7/x86_64
```



Note

This example illustrates registering the required modules for SUSE Linux Enterprise Server 15 SP7. If you are using a later version, be sure to adjust the module names accordingly.

2. Install the required base packages.

```
sudo zypper install -y curl wget tar nfs-client jq
```

3. Install and enable the iSCSI daemon for CSI/PV support.

```
sudo zypper install -y open-iscsi
sudo systemctl enable --now iscsid
```

4. Install and start the RKE2 Kubernetes cluster.

```
curl -sfL https://get.rke2.io | INSTALL_RKE2_VERSION="<RKE2_VERSION>" sh -
sudo systemctl enable rke2-server.service
sudo systemctl start rke2-server.service
```



Note

Replace `<RKE2_VERSION>` with the appropriate value, such as `v1.34.2+rke2r1`.

5. Configure kubectl access for your environment, matching the installed Kubernetes version, and confirm the node is ready.

```
mkdir -p ~/.kube
sudo ln -s /var/lib/rancher/rke2/bin/kubectl /usr/local/bin/kubectl
export KUBECONFIG=/etc/rancher/rke2/rke2.yaml
echo 'export KUBECONFIG=/etc/rancher/rke2/rke2.yaml' >> ~/.bashrc
echo 'export PATH=$PATH:/var/lib/rancher/rke2/bin' >> ~/.bashrc
```

6. Deploy the local-path-provisioner as the default storage class.

```
kubectl apply -f https://raw.githubusercontent.com/rancher/local-path-
provisioner/<LPP-VERSION>/deploy/local-path-storage.yaml
kubectl patch storageclass local-path -p '{"metadata": {"annotations":
{"storageclass.kubernetes.io/is-default-class":"true"}}}'
```



Note

Be sure to specify the appropriate stable release version of the local-path-provisioner in place of `<LPP_VERSION>`



Important

The local-path provisioner is used here for simplicity. For production environments, it is best practice **not** to use local-path storage, as data may be lost if the pod is rescheduled.

6 Installing CloudCasa

This section describes how to deploy CloudCasa Self-Hosted on the RKE2 cluster using Helm. The deployment includes configuring the required Kubernetes resources, creating the image pull secret, deploying the CloudCasa server, and configuring ingress to access the CloudCasa Web interface.

For detailed product information and the latest deployment guidance, refer CloudCasa Self-Hosted Documentation (https://docs.cloudcasa.io/help/self-hosted/)

1. Install Helm 3 to manage Kubernetes packages.

```
curl https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3 |
 DESIRED_VERSION="<HELM_VERSION>" bash
```



Note

Replace `<HELM_VERSION>` with the appropriate version, such as `v3.12.3` or later.

2. Install cert-manager and create a self-signed issuer for the proof-of-concept.

```
helm repo add jetstack https://charts.jetstack.io
helm repo update

helm install cert-manager jetstack/cert-manager \
  --namespace cert-manager \
  --create-namespace \
  --version <CERT_MANAGER_VERSION> \
  --set installCRDs=true

kubectl create ns cloudcasa-server

kubectl -n cloudcasa-server apply -f - <<EOF
apiVersion: cert-manager.io/v1
kind: Issuer
metadata:
   name: selfsigned-issuer
spec:
   selfSigned: {}
EOF
```



Note

Be sure to replace <CERT_MANAGER_VERSION> with the desired version (v1.12.4 or later).

3. Create the image pull secret using the ACR credentials provided by the CloudCasa team. These allow Kubernetes to pull container images from cloudcasa.azurecr.io.

```
kubectl create secret docker-registry myregistrykey \
   --docker-server=https://cloudcasa.azurecr.io \
   --docker-username='<YOUR_ACR_USERNAME>' \
   --docker-password='<YOUR_ACR_PASSWORD>' \
   --namespace=cloudcasa-server
```

4. Add the CloudCasa Helm repository using the Helm credentials provided by the CloudCasa team. These are separate from the ACR credentials above and are used only to download the Helm chart.

```
helm repo add cloudcasa https://helm.cloudcasa.io \
   --username '<YOUR_CLOUDCASA_USERNAME>' --password '<YOUR_HELM_PASSWORD>'
helm repo update
```

5. Create `cloudcasa-values.yaml` with your configuration. The credentials under `auth.local.users` are new credentials you define yourself for logging in to the CloudCasa UI and are not related to the ACR or Helm credentials above.

```
storageClassName: local-path
licenseKey: <YOUR_DOWNLOADED_LICENSE_KEY>
auth:
  local:
    enabled: true
    users:
      - email: "<YOUR_EMAIL_ADDRESS>"
        username: "<YOUR_USERNAME>"
        password: "<YOUR_PASSWORD>"
  ldap:
    enabled: false
  oidc:
    enabled: false
  cognito:
    enabled: false
  microsoft:
    enabled: false
  google:
    enabled: false
  allowedUsers: "<YOUR_EMAIL_ADDRESS>"
  siteadminUsers: "<YOUR_EMAIL_ADDRESS>"

serviceType: NodePort

amdsEnvoyUrl: local.cloudcasa.io
amdsEnvoyPort: 443
```

6. Install the CloudCasa server using Helm.

```
helm install cloudcasa-server cloudcasa/cloudcasa-server --create-namespace \
   --namespace cloudcasa-server --wait --timeout 15m0s \
   --values cloudcasa-values.yaml
```

7. Set the external URL, upgrade the deployment, and restart the Envoy TLS services.

```
helm upgrade cloudcasa-server cloudcasa/cloudcasa-server --wait \
  --namespace cloudcasa-server --values cloudcasa-values.yaml
kubectl -n cloudcasa-server delete secret amds-envoy.tls
kubectl -n cloudcasa-server rollout restart deployments/amds-envoy
```

8. Create and apply the Ingress manifest to expose the Envoy gRPC/HTTP API service externally on port 443.

```
kubectl apply -f - <<EOF
apiVersion: networking.k8s.io/v1
kind: Ingress
metadata:
  name: amds-envoy-grpcapi
  namespace: cloudcasa-server
  annotations:
    kubernetes.io/ingress.class: nginx
    nginx.ingress.kubernetes.io/backend-protocol: "GRPCS"
    nginx.ingress.kubernetes.io/ssl-redirect: "true"
    nginx.ingress.kubernetes.io/proxy-body-size: "0"
  labels:
    amds-app: envoy
    amds.component: envoy
spec:
  ingressClassName: nginx
  rules:
  - host: local.cloudcasa.io
    http:
      paths:
      - pathType: ImplementationSpecific
        backend:
          service:
            name: amds-envoy-grpcapi
            port:
              number: 443
EOF
```



Note

It is best practice for production environments to configure a catalog backup (https://docs.cloudcasa.io/self-hosted-admin-guide/catalog.html) to ensure metadata protection.

7 Configuring SUSE Virtualization

After deploying CloudCasa Self-Hosted, configure the SUSE Virtualization environment as the protected environment. CloudCasa Self-Hosted runs independently on the RKE2 cluster and connects to SUSE Virtualization to discover and protect workloads.

1. Ensure local.cloudcasa.io is resolvable by adding an A record in your internal DNS server pointing to the IP address of your CloudCasa host.
2. Log in to the CloudCasa UI at https://local.cloudcasa.io.
3. Open the Add cluster Wizard.
4. From the Dashboard, navigate to Clusters from the top navigation bar and select Add cluster.

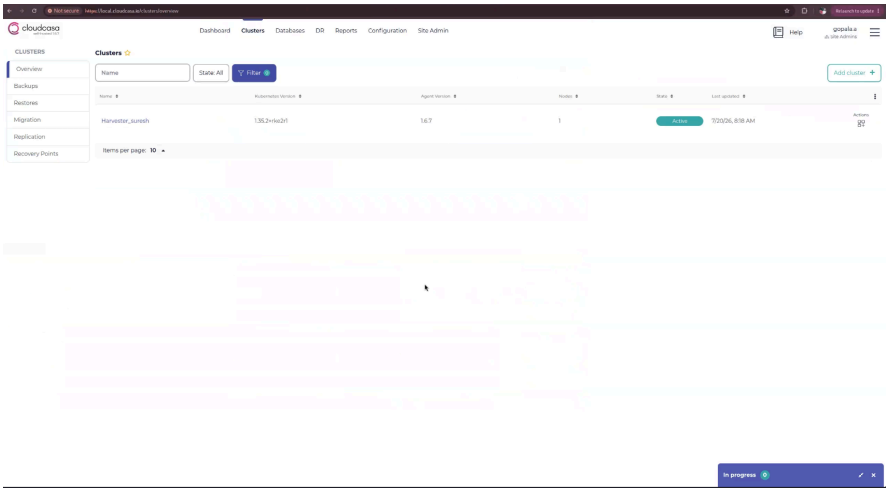


FIGURE 2: DASHBOARD SHORTCUTS AND ADD CLUSTER



Note

A browser certificate warning is expected if using a self-signed certificate. For production, replace the self-signed certificate with one issued by your internal CA.

5. In the *Add cluster* dialog, enter the following information:
   - **Name**: Enter the name of your SUSE Virtualization cluster (for example, `SUSE Virt`).
   - **Description (Optional)**: Provide a description for the cluster.

- **Tags (Optional)**: Add tags in the format `key:value` if required.
- **Enable CloudCasa DR (Optional)**: Toggle if disaster recovery is required.

6. Expand *Advanced options* only if additional configuration is needed.
7. Click *Register* to register the cluster with CloudCasa.

7.1 Installing the CloudCasa agent

After clicking *Register*, the *Install Agent* dialog appears.

1. Ensure the *Manual (kubectl)* tab is selected.

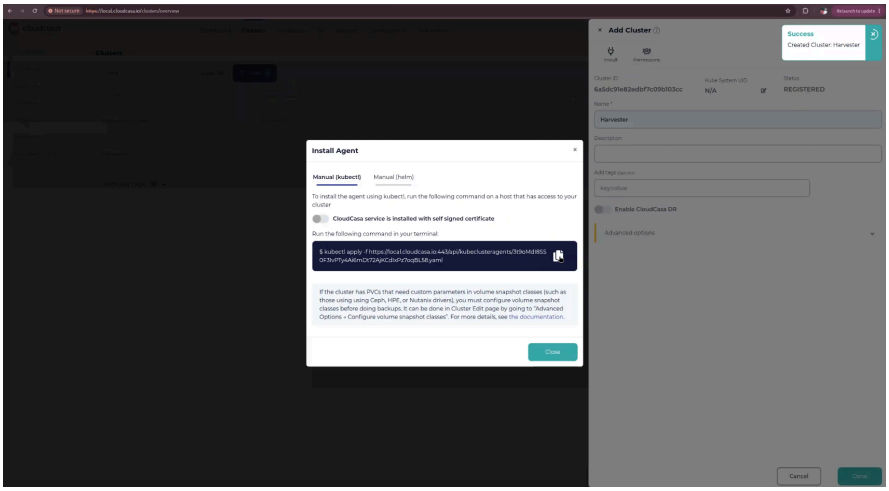


FIGURE 3: CLOUDCASA AGENT INSTALLATION COMMAND

2. Click the *Copy* icon to copy the generated `kubectl apply` command.
3. Log in to the SUSE Virtualization CLI (or a management host) that has:
   - `kubectl` installed.
   - Access to the SUSE Virtualization Kubernetes cluster.
   - The `kubeconfig` for the target cluster.
4. Paste and execute the copied command in the terminal.
   Example:

```
kubectl apply -f https://<cloudcasa-server>/api/kubeclusteragents/<agent-id>.yaml
```



Note

For CloudCasa Self-Hosted deployments using a self-signed certificate, enable the *CloudCasa service is installed with self-signed certificate* option before copying the command, if applicable.

7.2 Verify CloudCasa agent installation

1. Wait a few minutes for the agent to start.
2. Verify that the CloudCasa agent pods are running.

```
kubectl get pods -n cloudcasa-io
```

3. You should see the CloudCasa agent pods in the `Running` state.

7.3 Confirm the cluster is active

1. Return to the CloudCasa UI.
2. Click *Close* on the *Install Agent* dialog.
3. Click *Done* in the *Add Cluster* pane.
4. Navigate to *Clusters* > *Overview*.
5. Wait for the cluster status to change from `REGISTERED` to `ACTIVE`.

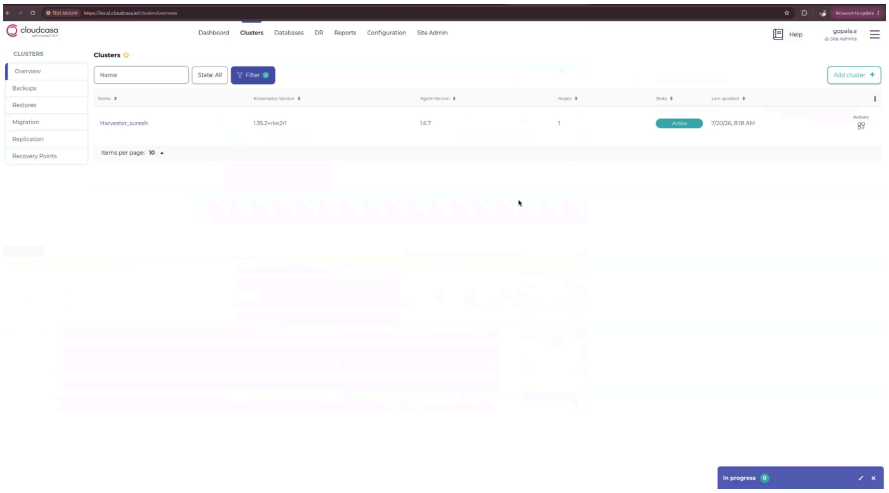


FIGURE 4: SUSE VIRTUALIZATION CLUSTER ACTIVE IN CLOUDCASA

6. In the CloudCasa UI, navigate to *Configuration* > *Storage*.
7. Add your target backup storage location, such as object storage (for example, AWS S3 or Azure Blob) or file storage (for example, NFS or CIFS).
8. Ensure that the storage status is validated and active before proceeding to define and run backup jobs.



Note

Only after the cluster becomes `ACTIVE` can you perform backup, restore, replication, or migration operations.

8 Validating the solution

To demonstrate that CloudCasa correctly protects and recovers a VM in your SUSE Virtualization cluster:

1. Define and run a VM backup.
2. Simulate data loss by deleting the VM.
3. Restore the VM from backup.
4. Verify VM data has survived.

8.1 Defining and running a backup

1. Log in to the CloudCasa UI. From the top menu, navigate to *Clusters*.
2. Select the *Backups* tab, then click *Define Backup+*.
3. In the *Define Cluster Backup* wizard, select the target cluster and click *Next*.

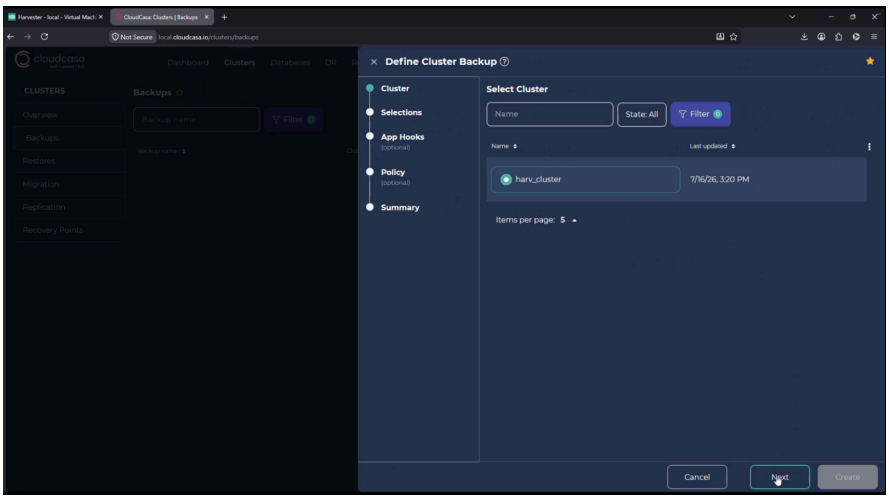


FIGURE 5: SELECT CLUSTER IN BACKUP WIZARD

4. On the *VMs/PVCs* tab, enable *Copy to backup storage* to ensure persistent volumes are copied, then click *Select resources*.
5. In the *Browse cluster resources* window, select the namespace and virtual machine to protect. Click *Confirm*, then *Next*.

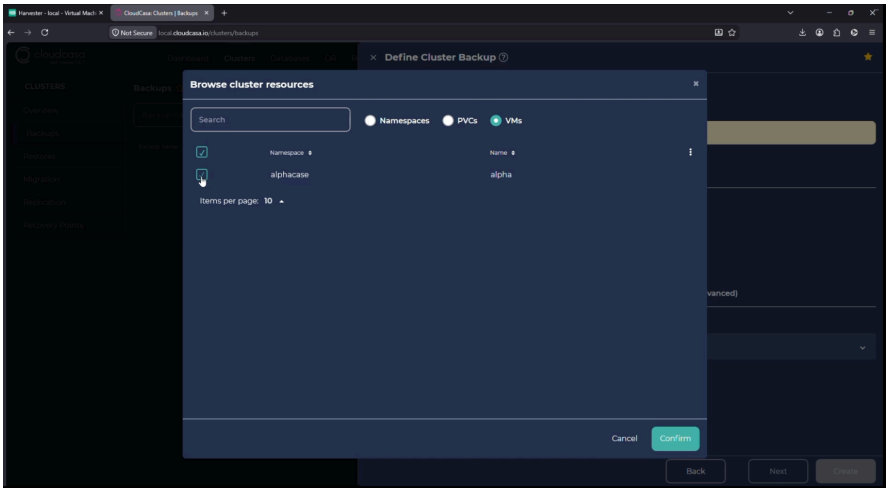


FIGURE 6: BROWSE CLUSTER RESOURCES TO PROTECT

6. On the *Summary* screen, provide a name for the backup job, set the retention period (for example, 7 days), enable *Run now*, and click *Create*.

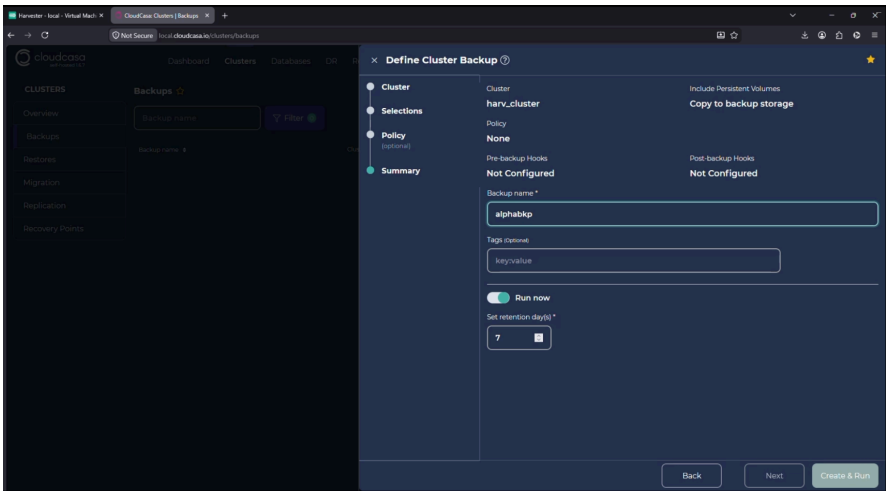


FIGURE 7: DEFINE CLUSTER BACKUP SUMMARY

7. Monitor the job from the Backups list. Open the *Activity details* to track progress. The job type displays as `K8S COPY`, and the *PV Details* tab shows persistent volumes as they are copied, mounted, and snapshotted.

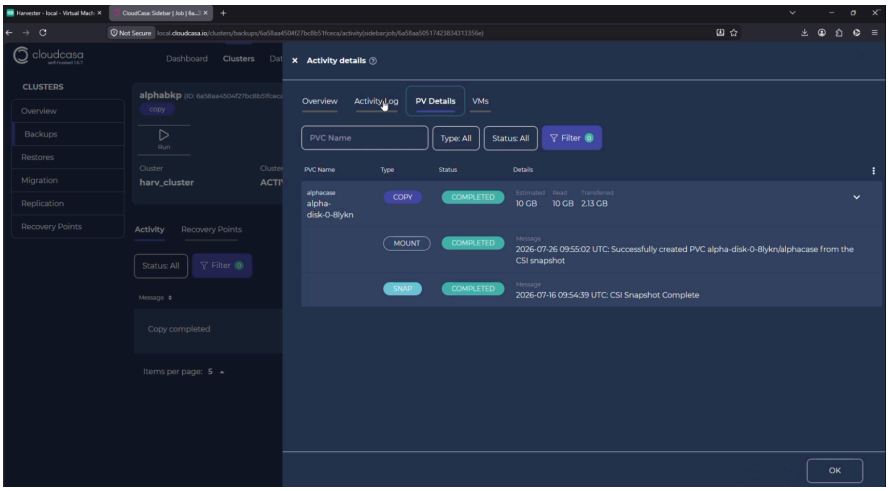


FIGURE 8: BACKUP JOB ACTIVITY DETAILS

8. Wait until the job status changes to `COMPLETED` before proceeding.



Important

Do not proceed to the next step until the backup status shows `COMPLETED`. Restoring from an in-progress backup produces inconsistent results.

8.2 Simulating data loss

To simulate a genuine loss scenario, delete the VM along with its underlying data volumes.

1. Switch to the SUSE Virtualization (Harvester) UI.
2. Locate the virtual machine backed up in the previous procedure.
3. Select the virtual machine and delete it, acknowledging the warning that associated snapshots and volumes are also removed.

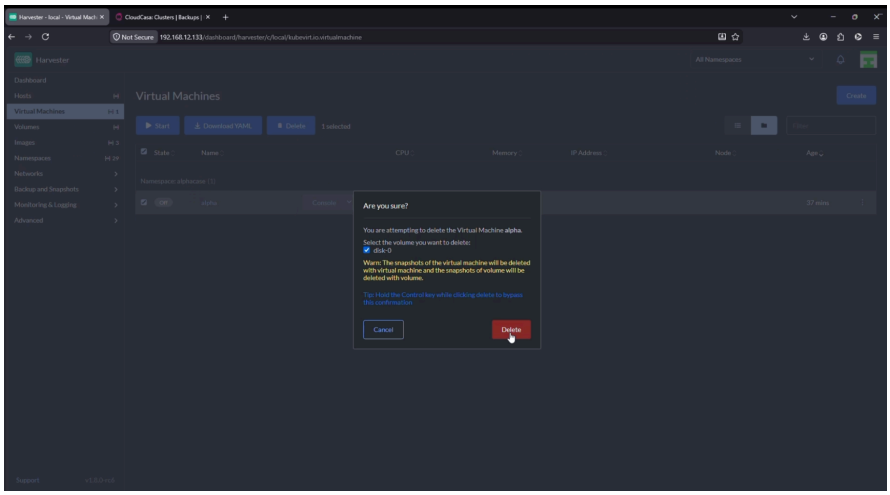


FIGURE 9: CONFIRM VM DELETION IN HARVESTER

8.3 Restoring the virtual machine

1. Return to the CloudCasa UI and navigate to *Clusters* > *Restores*.
2. Click *Define Restore+*.
3. Select the source cluster and click *Next*.

4. On the *Recovery Point* screen, select the backup job created in the previous procedure from the list of available snapshots and copies.

5. Click *Select resources*. In the *Recovery Point Browser*, expand *Virtual Machines* and select the virtual machine to restore. Click *Confirm*.

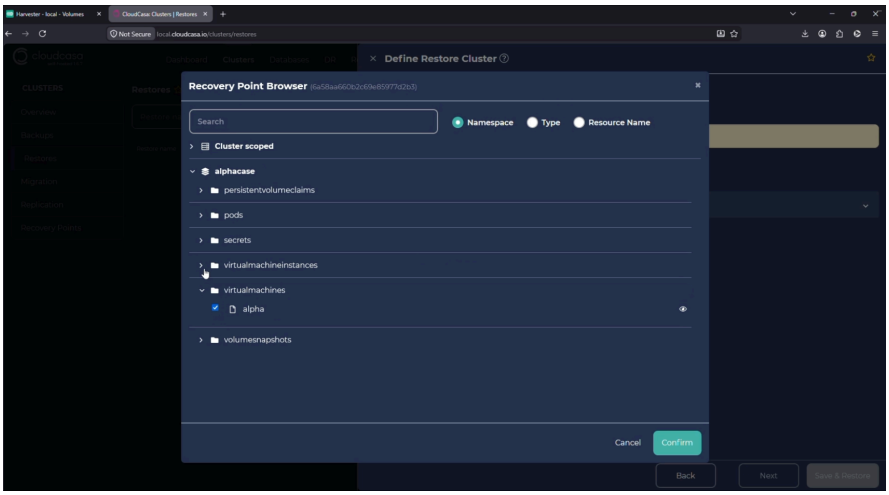


FIGURE 10: SELECT VM IN RECOVERY POINT BROWSER

6. For *Destination*, select *Use existing cluster* and choose the original source cluster. Review the *Restore Transforms* options and click *Next*.

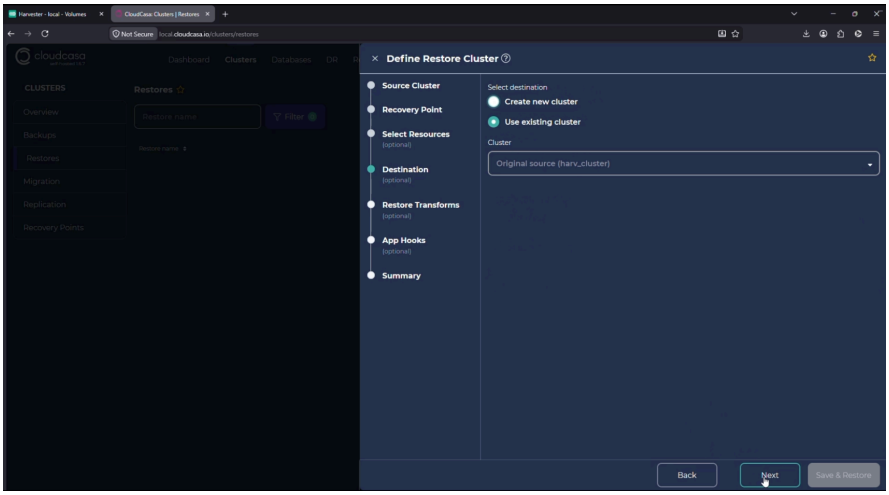


FIGURE 11: SELECT RESTORE DESTINATION CLUSTER

7. On the *Summary* page, provide a name for the restore job and click *Save & Restore* to start the process.

8. Monitor the restore job until it completes successfully.

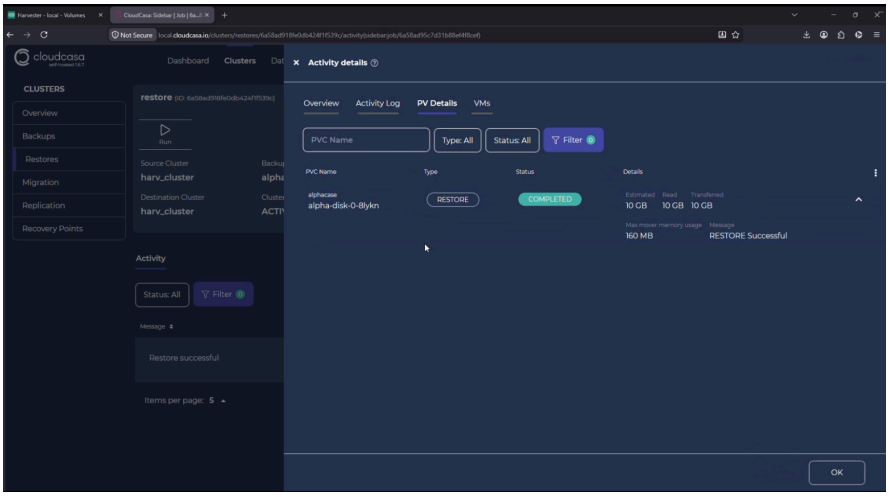


FIGURE 12: RESTORE JOB ACTIVITY DETAILS

8.4 Validating the restoration

1. Return to the SUSE Virtualization UI and navigate to *Virtual Machines*.
2. Confirm that the restored virtual machine appears in its original namespace. It starts in an `Off` state.

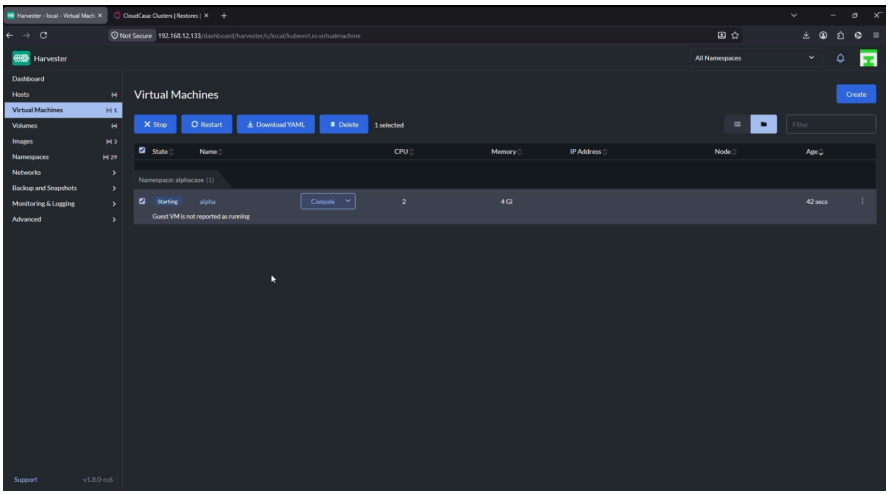


FIGURE 13: RESTORED VM IN HARVESTER UI

3. Power on the virtual machine and open the console.
4. Log in and verify that data created before the backup is still present (for example, read back a test file written before the backup procedure).

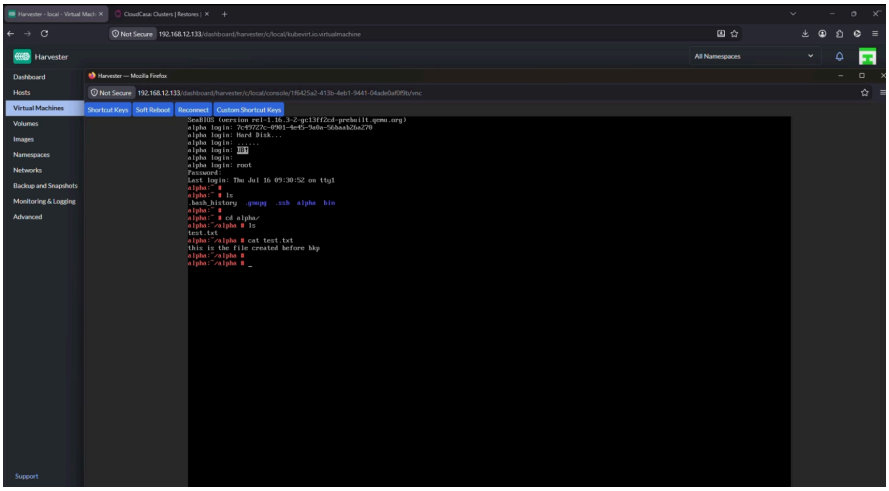


FIGURE 14: VM CONSOLE SHOWING RESTORED DATA VERIFICATION

This successfully demonstrates that CloudCasa correctly restored both the virtual machine definition and its persistent data.

Important

This does not validate Longhorn DR replication or the CloudCasa DR plan workflow.

9 Transitioning to production

The deployment described in this guide is intended as a proof-of-concept (POC) environment. For production environments, it is recommended to deploy a multi-node cluster with adequate memory resources and proper persistent volume (PV) storage rather than local-path storage. Additionally, authentication should be integrated with your organization's authentication scheme, such as LDAP or OIDC. For further details, refer to the CloudCasa Self-Hosted Admin Guide (https://docs.cloudcasa.io/self-hosted-admin-guide/).

10 Summary

This guide provides a reference design and guidance for a proof-of-concept deployment of CloudCasa Self-Hosted to provide data protection for virtual machines in an isolated SUSE Virtualization environment. Contact SUSE or Catalogic Software to explore production options to meet your unique business and technical requirements.

11 Frequently asked questions

1. **What is CloudCasa Self-Hosted?**
   CloudCasa Self-Hosted provides you with the ability to deploy CloudCasa data protection in your own Kubernetes environment instead of using the CloudCasa SaaS platform. This approach addresses the data protection needs for isolated and air-gapped environments, where external network access is not possible.

2. **Can I use an identity provider like LDAP or OIDC?**
   Yes, CloudCasa supports LDAP and OIDC integration.

3. **Is Docker required?**
   No, CloudCasa Self-Hosted is runtime-agnostic and SUSE Rancher Kubernetes Engine (RKE2) uses the industry-standard container runtime, containerd.

4. **Do I need a valid CloudCasa license to deploy this proof-of-concept?**
   Yes. A valid CloudCasa Self-Hosted license is required to deploy and evaluate the proof-of-concept described in this guide. Before you begin, obtain a license file and the required deployment credentials (such as the Helm repository and container registry credentials) from the CloudCasa Support Team. If you do not have access, contact Catalogic Software Support to request the necessary evaluation resources.

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