

Overview

This guide describes how to deploy a Video-on-Demand (VOD) Proof of Concept (PoC) demo on a SUSE Rancher K3s three-node cluster on Ampere® Altra® and Altra® Max platforms.

Estimated time to complete this tutorial: 30 minutes.

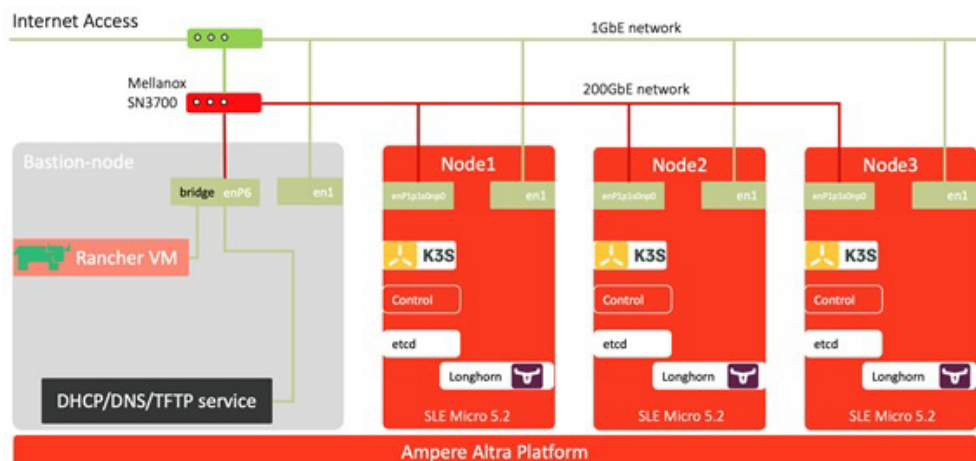
This demo showcases open source VOD services using K3s, a lightweight Kubernetes implementation, to demonstrate the cloud native characteristics of Altra and Altra Max processors for video services. The demo features:

- K3s – A Cloud Native Computing Foundation (CNCF) sandbox project that delivers a lightweight certified Kubernetes distribution with add-on functions and services.
- Three-node cluster – The fewest nodes required for a High Availability (HA) cluster.
- Longhorn – An official CNCF project that delivers a powerful cloud-native distributed storage platform for Kubernetes that can run anywhere; a key element for storing metadata, videos (mp4, mov, or avi), subtitles, for example, in Web Video Text Tracks (WebVTT) format, generated playlists, and segment files for VOD services.
- Nginx Ingress Controller – A load balancer for Kubernetes using an external load balancer; in this demo, Domain Name System (DNS). This appliance serves as a reverse proxy and distributing network for application traffic across multiple servers.
- Two pods-
 - Nginx VOD module container as the backend for streaming video in HTTP Live Streaming (HLS) and Moving Picture Experts Group-Dynamic Adaptive Streaming over HTTP (MPEG-DASH) protocols
 - Nginx WebApp container for serving HTML contents as the YouTube-like front-end

Prerequisites

- A DNS service such as Bind (named), supporting Full Qualified Domain Name (FQDN, such as k3s.hhii.amp) as the external load balancer
- A Rancher K3s cluster with Longhorn block storage service (refer to *Deploying SUSE K3s 3-Node Cluster with Rancher on Ampere Altra Platforms*).
- Executable files on your laptop or workstation:
 - kubectl version 1.23.x or later (<https://kubernetes.io/docs/tasks/tools/>)
 - git
 - tar
 - docker

Figure 1: Network Overview of SUSE Rancher K3 Three-Node Cluster



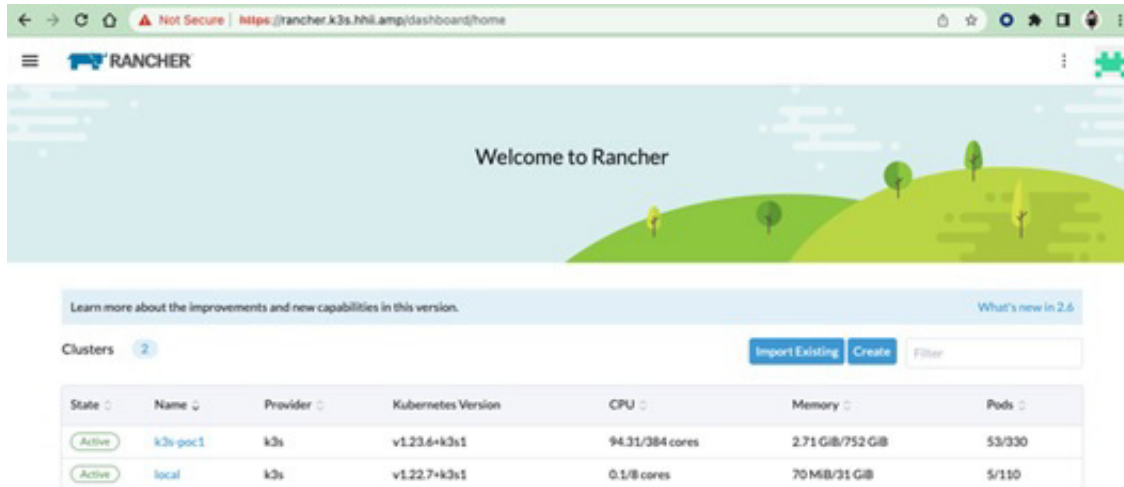


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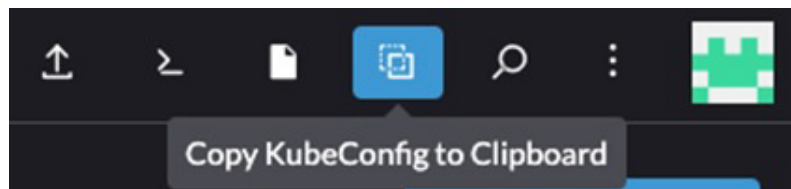
Setup Instructions

Deploy VOD PoC on Rancher K3s

1. Login to Rancher portal with your credential and choose the target k3s cluster (k3s-poc1).



2. Click **Copy KubeConfig to Clipboard** on the right top function bar for kubeconfig:



3. Save the file **config** in **~/kube** in your home directory and run `kubectl get nodes` for testing.

```
$ cd ~/.kube
$ cat << EOF > config
### paste the content here and type EOF by the end ###
EOF
$ kubectl get nodes
NAME                STATUS    ROLES                    AGE   VERSION
node1.k3s.hhi.amp   Ready    control-plane,etcd,master  12h   v1.23.6+k3s1
node2.k3s.hhi.amp   Ready    control-plane,etcd,master  12h   v1.23.6+k3s1
node3.k3s.hhi.amp   Ready    control-plane,etcd,master  12h   v1.23.6+k3s1
```



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- If you cannot save the file in `~/kube`, save it as `k3s.kubeconfig` in your working directory and export it as `KUBECONFIG` with the full file path:

```
$ cat << EOF > k3s.kubeconfig
### paste the content here and type EOF by the end ###
EOF
$ export KUBECONFIG=./k3s.kubeconfig
$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
node1.k3s.hhii.amp	Ready	control-plane,etcd,master	12h	v1.23.6+k3s1
node2.k3s.hhii.amp	Ready	control-plane,etcd,master	12h	v1.23.6+k3s1
node3.k3s.hhii.amp	Ready	control-plane,etcd,master	12h	v1.23.6+k3s1

- Obtain the source code from these GitHub repos:

- <https://github.com/AmpereComputing/nginx-hello-container>
- <https://github.com/AmpereComputing/nginx-vod-module-container>

```
$ git https://github.com/AmpereComputing/nginx-hello-container
$ git https://github.com/AmpereComputing/nginx-vod-module-container
```

- Deploy the Nginx web server container in StatefulSet with its PersistentVolumeClaim (PVC) template, service, and ingress:

```
$ kubectl create -f nginx-hello-container/SUSE-Rancher-K3s/nginx-front-app.yaml
```

- Deploy the VOD container in StatefulSet with its PVC template, service, and ingress:

```
$ kubectl create -f nginx-vod-module-container/SUSE-Rancher-K3s/nginx-vod-app.yaml
```

- Get the deployment status:

```
$ kubectl get pvc
```

NAME	CAPACITY	ACCESS MODES	STORAGECLASS	STATUS	VOLUME
nginx-front-app-pvc-nginx-front-app-0	10Gi	RWO	longhorn	Bound	pvc-698a3c95-3334-4b83-85ef-8b8f22d5a519
nginx-front-app-pvc-nginx-front-app-1	10Gi	RWO	longhorn	Bound	pvc-420f57d8-ab02-4a20-8a0b-5423376d03fa
nginx-front-app-pvc-nginx-front-app-2	10Gi	RWO	longhorn	Bound	pvc-d59a1d82-baca-4dac-a588-8a54e1b95817
nginx-vod-app-pvc-nginx-vod-app-0	10Gi	RWO	longhorn	Bound	pvc-5c8a37d9-60c5-49c1-b7dc-8e77001f51ef
nginx-vod-app-pvc-nginx-vod-app-1	10Gi	RWO	longhorn	Bound	pvc-069c663e-9fea-46f2-a438-8eb224f477e2
nginx-vod-app-pvc-nginx-vod-app-2	10Gi	RWO	longhorn	Bound	pvc-94477b6f-8290-484a-9e21-205f92115a88



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```
$ kubectl get statefulset
NAME                READY   AGE
nginx-front-app     3/3    6m57s
nginx-vod-app       3/3    5m10s
$ kubectl get service
NAME                TYPE           CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
kubernetes          ClusterIP      10.43.0.1        <none>            443/TCP          72d
nginx-front-app-svc ClusterIP      10.43.22.1       <none>            8080/TCP         12m
nginx-vod-app-svc   ClusterIP      10.43.192.145    <none>            8080/TCP         11m

$ kubectl get ingress
NAME                CLASS      HOSTS                ADDRESS                                                                 PORTS
AGE
nginx-front-app-ingress <none>    demo.k3s.hhii.amp   10.76.85.101,10.76.85.102,10.76.85.103 80 13m
nginx-vod-app-ingress  <none>    vod.k3s.hhii.amp    10.76.85.101,10.76.85.102,10.76.85.103 80 12m
```

9. Run an Nginx web server on a bastion node to host video and web bundle files for the VOD PoC demo on K3s.
10. Prepare a tarball with the pre-transcoded video files (under **vod-demo**) and subtitle file (filename extension **tvv**), and the second tarball for **nginx-front-app** with html, css, JavaScript, etc. (under **nginx-front-demo**):

```
$ tar -zcvf vod-demo.tgz vod-demo
$ tar -zcvf nginx-front-demo.tgz nginx-front-demo
```

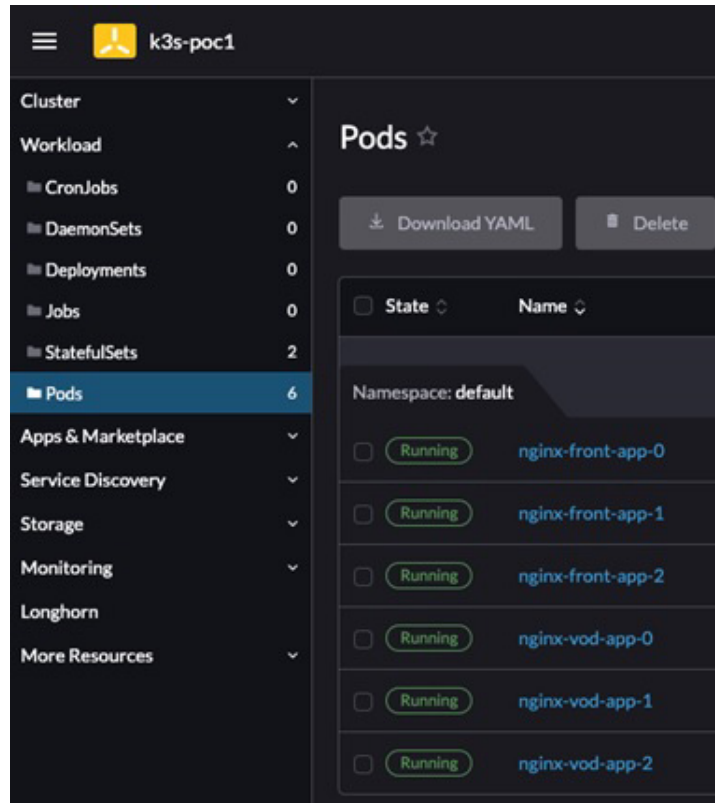
11. Create a subdirectory, such as **nginx-html**, then move **vod-demo.tgz** and **nginx-front-demo.tgz** to **nginx-html**, and run the nginx web server container with the directory:

```
% mkdir nginx-html
% mv vod-demo.tgz nginx-html
% cd nginx-html
% podman run -d --rm -p 8080:8080 --name nginx-html --user 1001 -v $PWD:/usr/share/nginx/html
docker.io/mrdojojo/nginx-hello-app:1.1-arm64
```

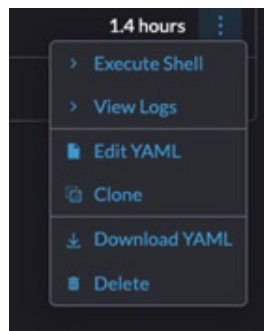


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12. Go back to the Rancher portal to deploy those bundle files to VOD pods.
 - a. Access the Rancher portal, click the K3s cluster, click **Workload** > **Pods**, and change to the corresponding namespace.



- b. Click the three-dot icon at the right of the **nginx-front-app-[0-2]** pod and choose **Execute Shell**. The portal displays a console for accessing the container.



- c. When the console is ready, run these commands:

```
$ cd /usr/share/nginx/html/  
$ wget http://[Bastion node's IP address]:8080/nginx-front-demo.tgz  
$ tar zxvf nginx-front-demo.tgz  
$ mv nginx-front-demo/* .  
$ rm -rf nginx-front-demo
```

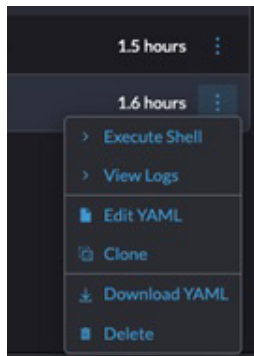


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d. Update the URL in each video player HTML file:

```
sed -i "s,http://\[vod-demo\],http://vod.k3s.hhi.amp/,g" *.html
```

e. Click the three-dot icon at the right of the **nginx-vod-app-[0-2]** pod and chose Execute Shell. The portal displays a console for accessing the container.

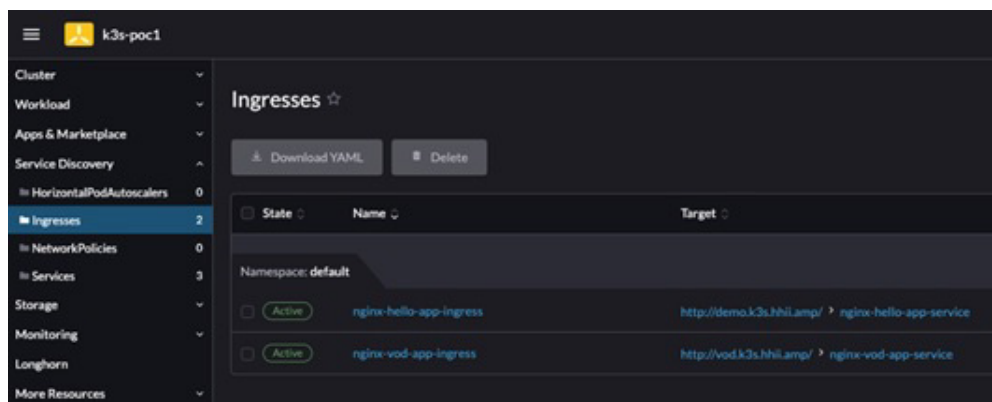


f. When the VOD container console is ready, execute these commands:

```
cd /opt/static/videos/  
$ wget http://[Bastion node's IP address]:8080/vod-demo.tgz  
$ tar zxvf vod-demo.tgz  
$ mv vod-demo/* .  
$ rm -rf vod-demo
```

g. The VOD PoC demo is ready for testing

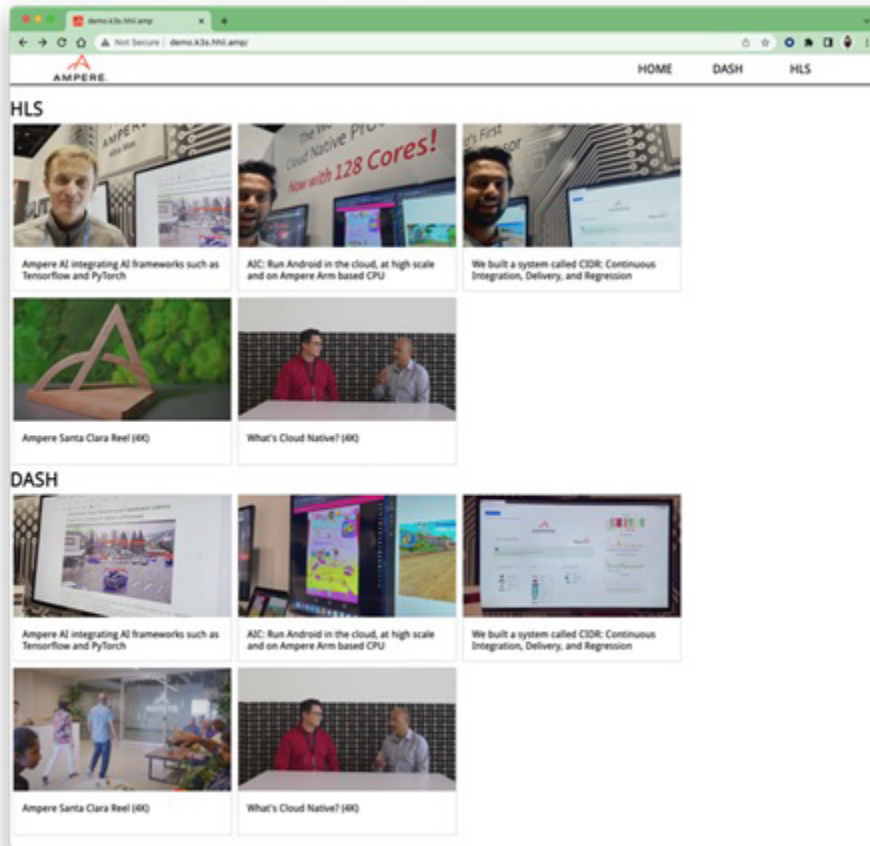
13. You can access the demo webapp through the ingress page (**K3s cluster > Service Discovery > Ingress**) and click the URL for **nginx-front-app-ingress** in the **Target** column. This displays a new tab for accessing the demo.





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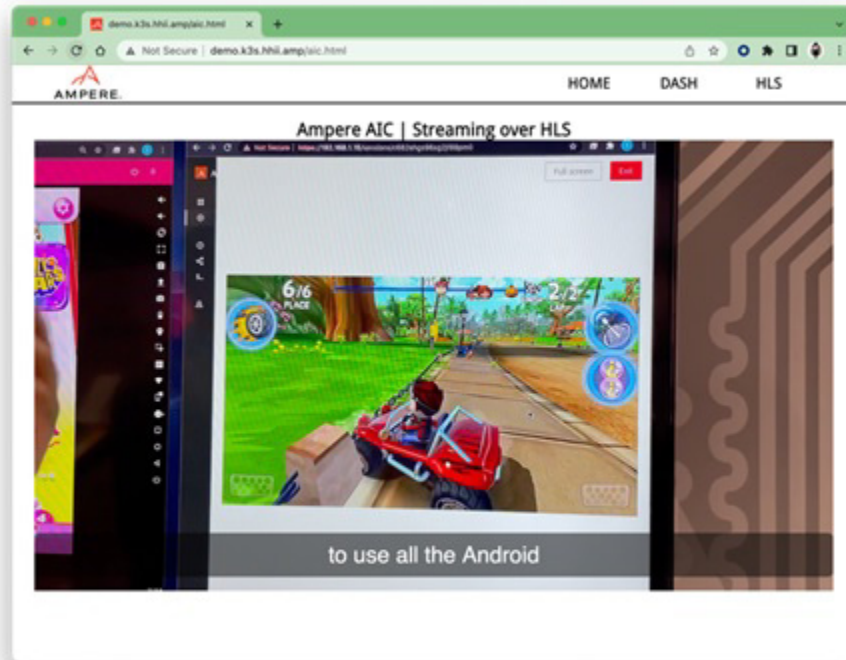
14. Open a browser to access the Nginx WebApp to test the VOD PoC demo.





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15. Click one of rectangles. The browser opens the HTML5 video player for streaming video.



16. The VOD PoC demo on the SUSE K3s three-node cluster is ready!

Revision History

ISSUE	DATE	DESCRIPTION
0.50	November 7, 2022	Initial release.



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November 7, 2022

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