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SINGLE-NODE OPENSHIFT (SNO)

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Objectives

- Single Node OpenShift
- Differences from HA OpenShift
- Installation Requirements and Process

Single Node OpenShift

- Cloud Native development and deployment are increasingly being adopted in the context of edge computing.
- Edge workloads and use cases cover lots of locations, requirements, restrictions and footprints
- Admins want to keep a consistent deployment and management solution across edge and datacentre locations.

Single Node OpenShift

- This means there are contexts in which a full OpenShift cluster is desired on a single node
  - Limited space, power, cooling
- Until OpenShift 4.9 a cluster had to have at least 3 nodes.
- Now SNO deploys both the control plane and worker node capabilities on a single node.
  - Small footprint, minimal to no dependence on a centralized management cluster.

Differences from High Availability Cluster Profile

- Many Operators are configured to reduce their footprint when running on SNO
- In environments requiring high availability, you need to have a failover plan.
  - Transition workloads to other sites or nodes while the impacted node is recovered.

Example: 5G mobile network

- In a 5G mobile network the 5G Distributed Units (DUs) need to be deployed very close to the Radio Units (RUs) for which they are responsible to reduce latency issues.
- In practice:
  - DUs could be run anywhere from the base of a cell tower to a more datacentre like environment serving several RUs.

https://www.redhat.com/en/blog/meet-single-node-openshift-our-smallest-openshift-footprint-edge-architectures

Example: 5G mobile network

- DUs are resource-intensive workloads
  - 6 dedicated cores per DU
  - 16-24 GB of RAM per DU (consumed as huge pages)
  - Multiple single rout I/O virtualization NICs
  - FPGA or GPU acceleration cards carrying several Gbps or traffic each.
- The workload needs to be autonomous so it can continue operating with its existing configuration even when any centralized management functionality is unavailable.

https://www.redhat.com/en/blog/meet-single-node-openshift-our-smallest-openshift-footprint-edge-architectures

Example: DNA Analysis on the ISS

- A second example is the ultimate edge computing location: space.
- The ISS has a SNO that does DNA sequencing onsite
  - Monitoring astronaut health
  - Discovering possible infections on the ISS

https://www.somagnews.com/nasa-to-do-dna-analysis-directly-from-iss-with-ibm-edge-computing/

Installing a SNO

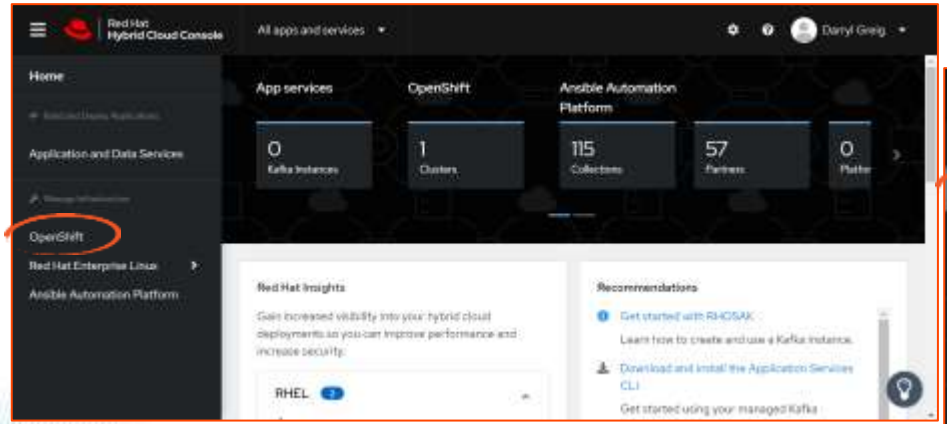
- The current set of tools are designed for installing on physical servers
  - SNO doesn’t make much sense for virtual servers, although you can do it for a VM.
- We can at least track through the steps here (there is no supported install method for AWS available just yet).

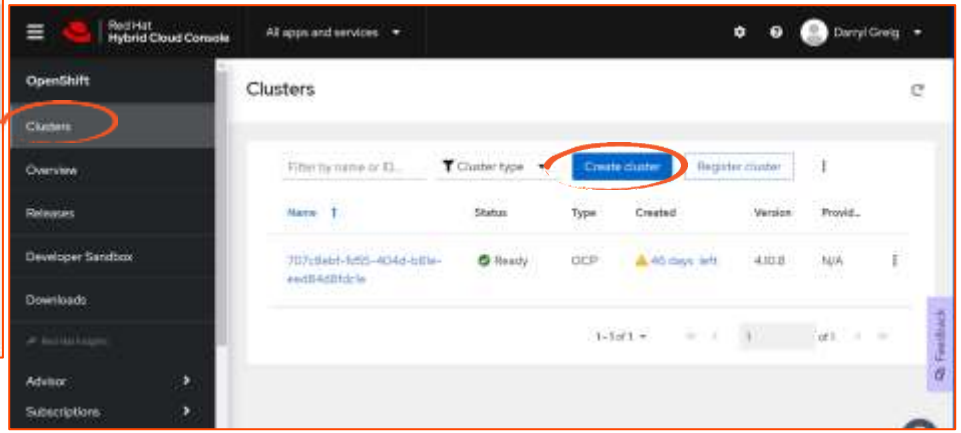
SNO Requirements

- CPU: 8 cores (or 4 cores with hyperthreading enabled)
  - If you want to install with virtualization you need 12 cores
- RAM: 32 GB
- HDD: 120 GB
- Internet access

SNO Install

- Log on at https://console.redhat.com with your Red Hat account.





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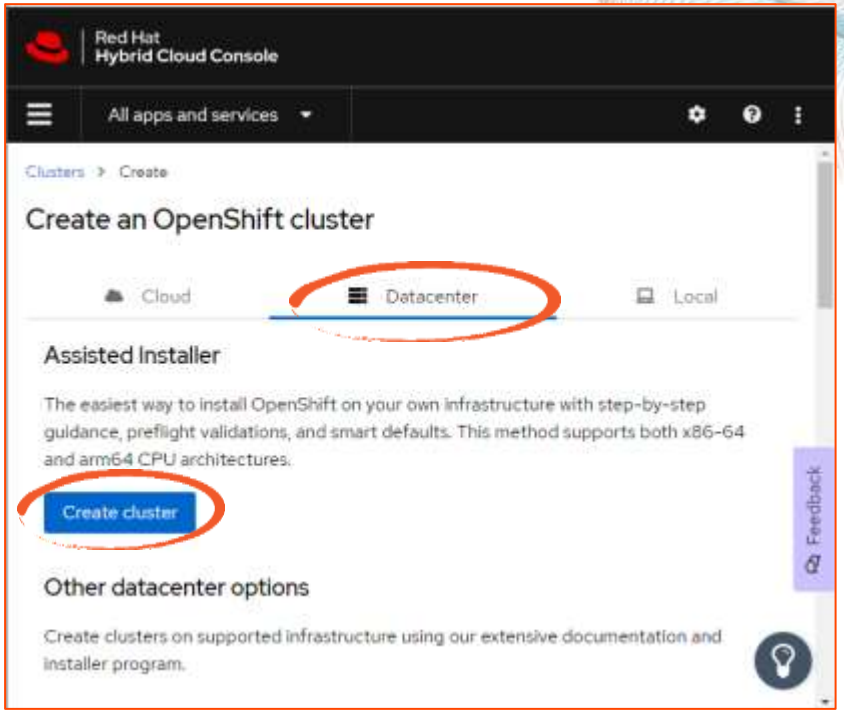
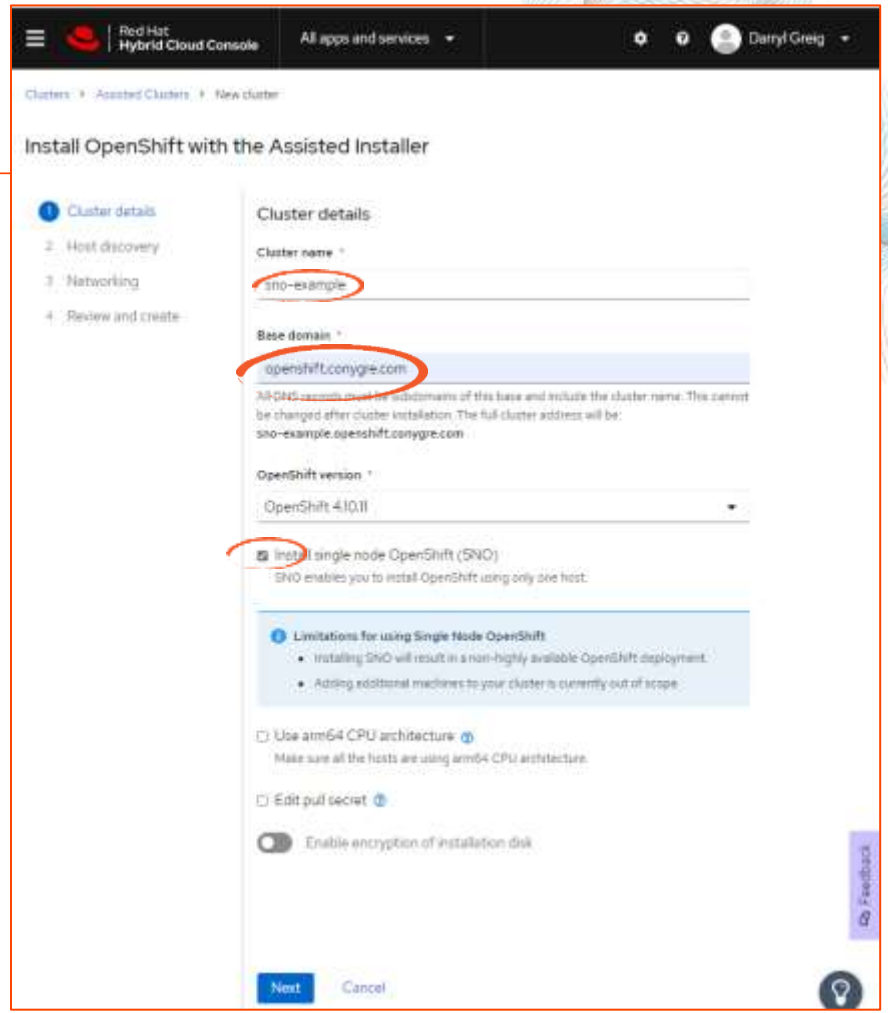
SNO Install

- Select the **Datacenter** tab
- Click on **Create Cluster** under the **Assisted Installer** section.

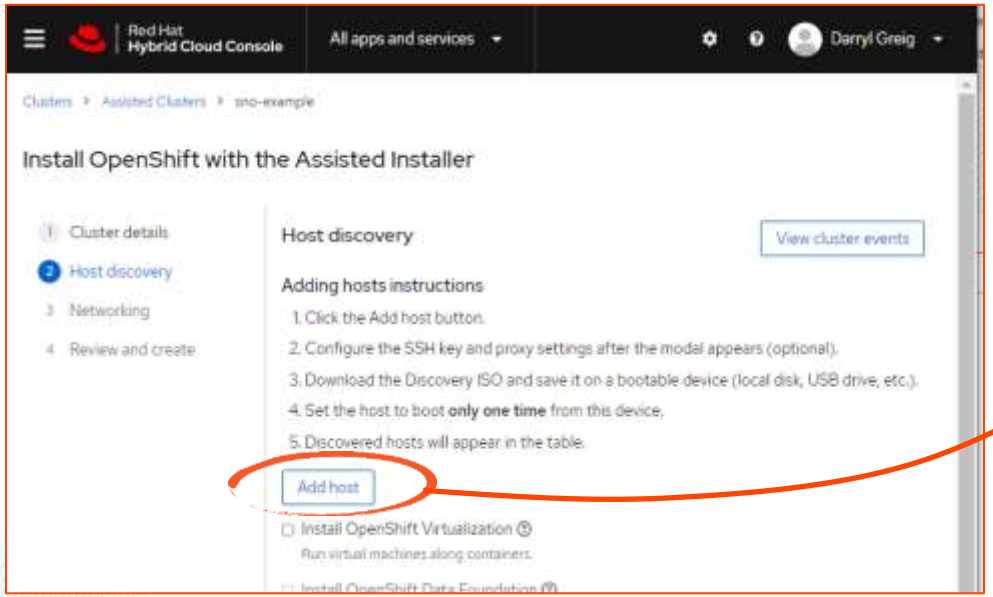


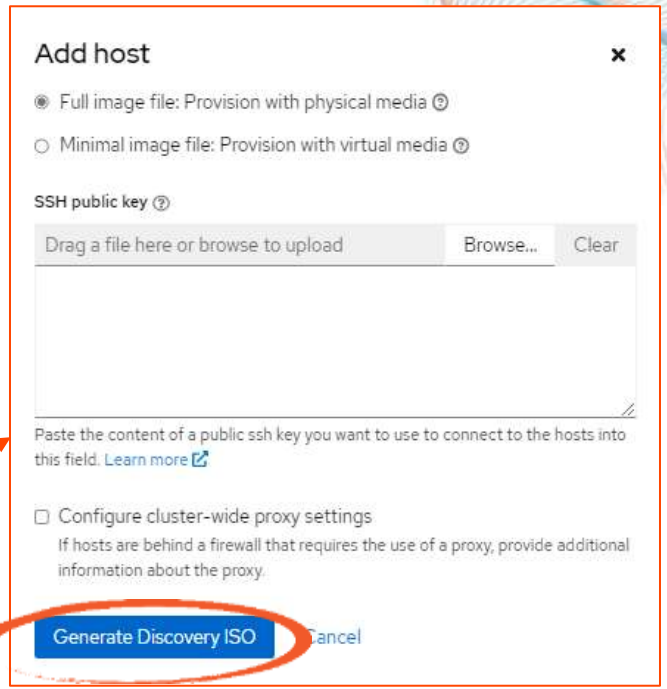
SNO Install: Cluster Details

- You need to enter a cluster name and a cluster base domain (which you need to have access privileges to).
- Then click the Install single node OpenShift (SNO) checkbox.



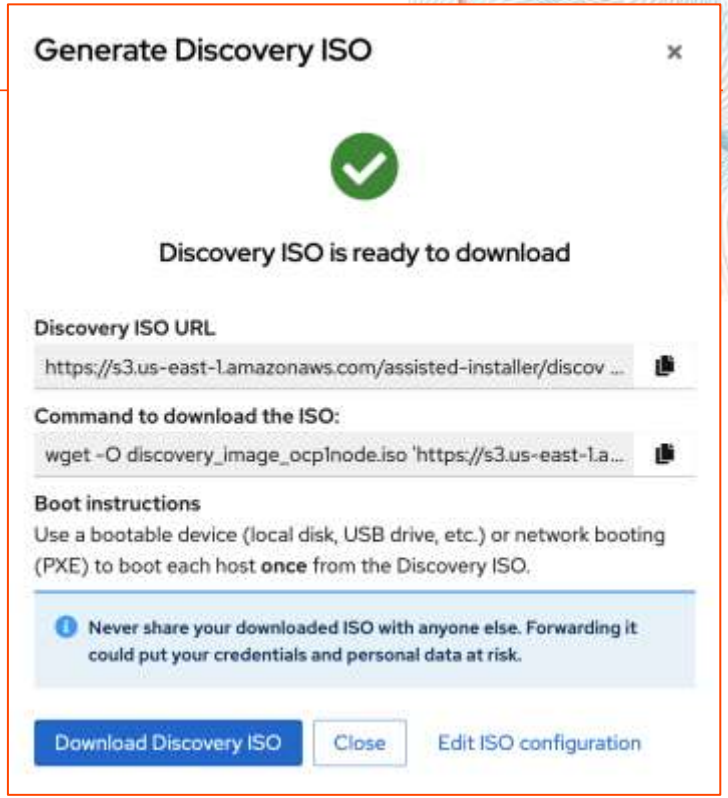
SNO Install: Add host





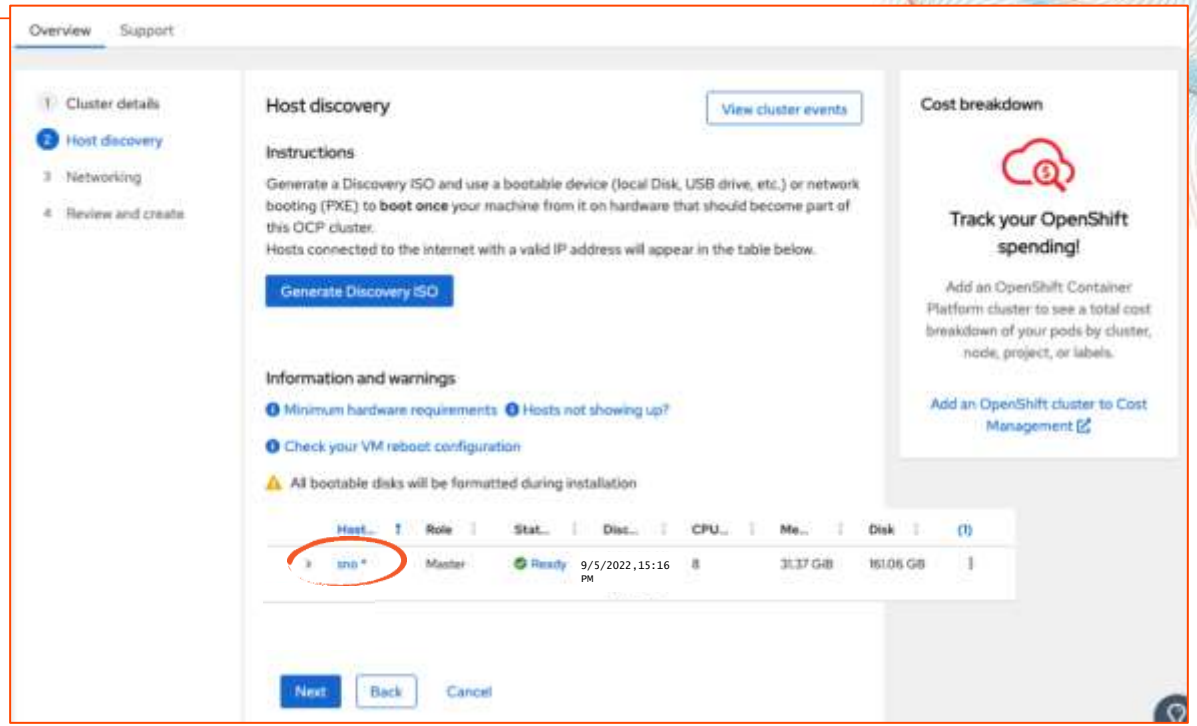
SNO Install: ISO image

- Once you have the ISO you need to copy it to media from which your machine can boot (bootable USB etc)



SNO Install

- After the target has booted successfully it will show up in the host list of your browser as “localhost”.
- Give it a more suitable name like **sno**.



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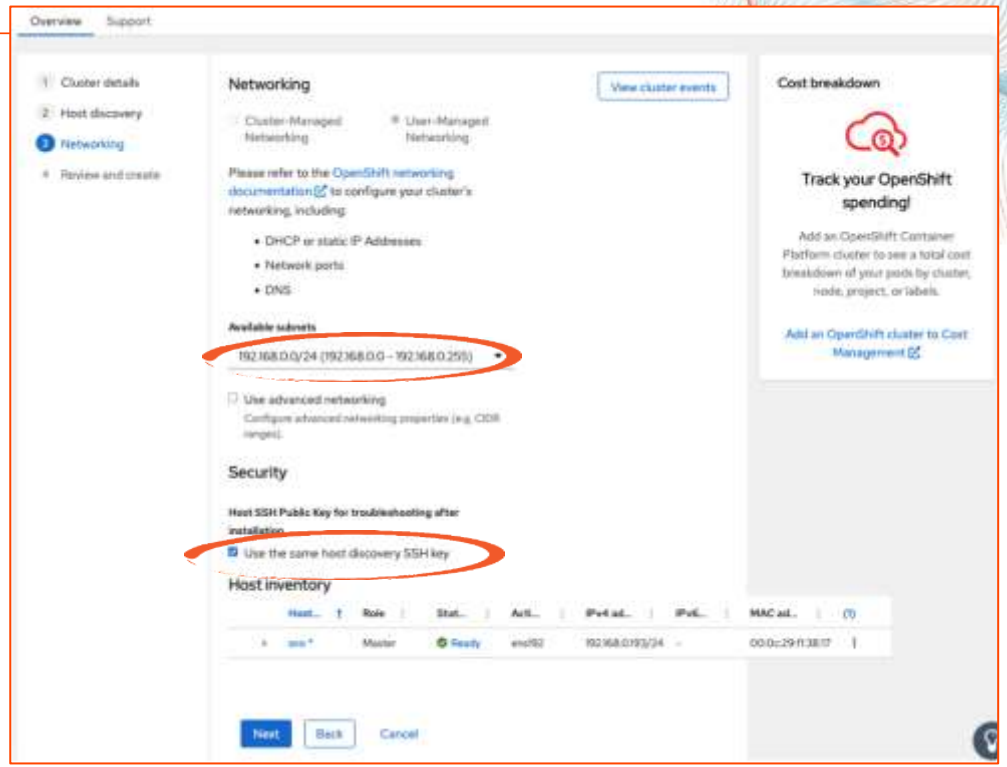
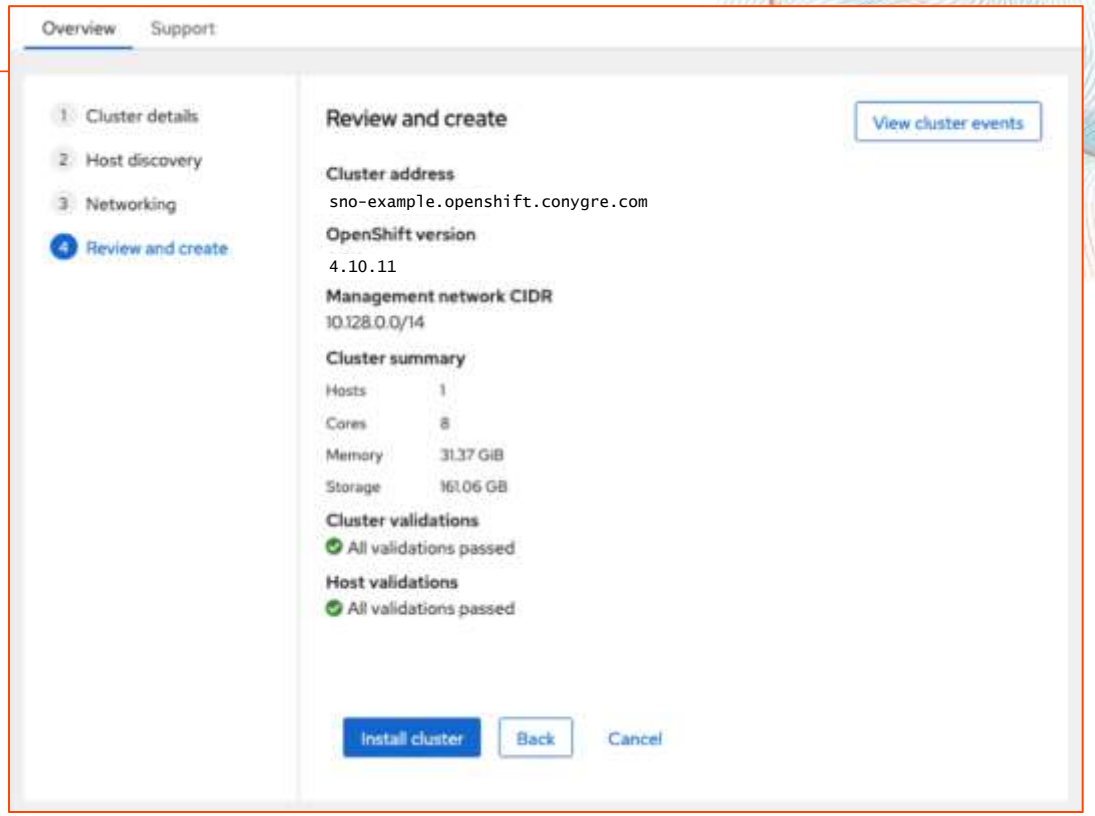
SNO Install: Networking

- This is a simple networking example, you can enter advanced settings if you want to customize further.
- It’s a good idea to reuse the same SSH key you used before (default)

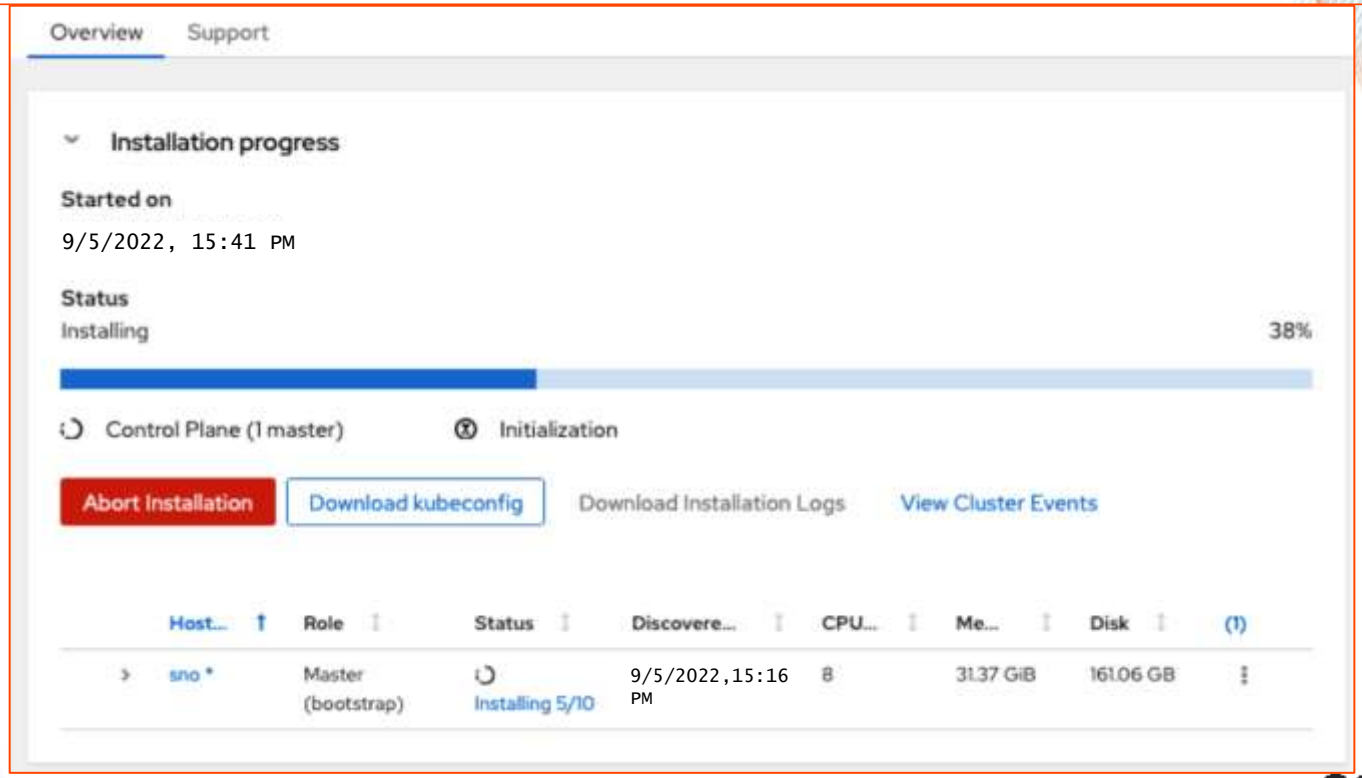


SNO Install: Review

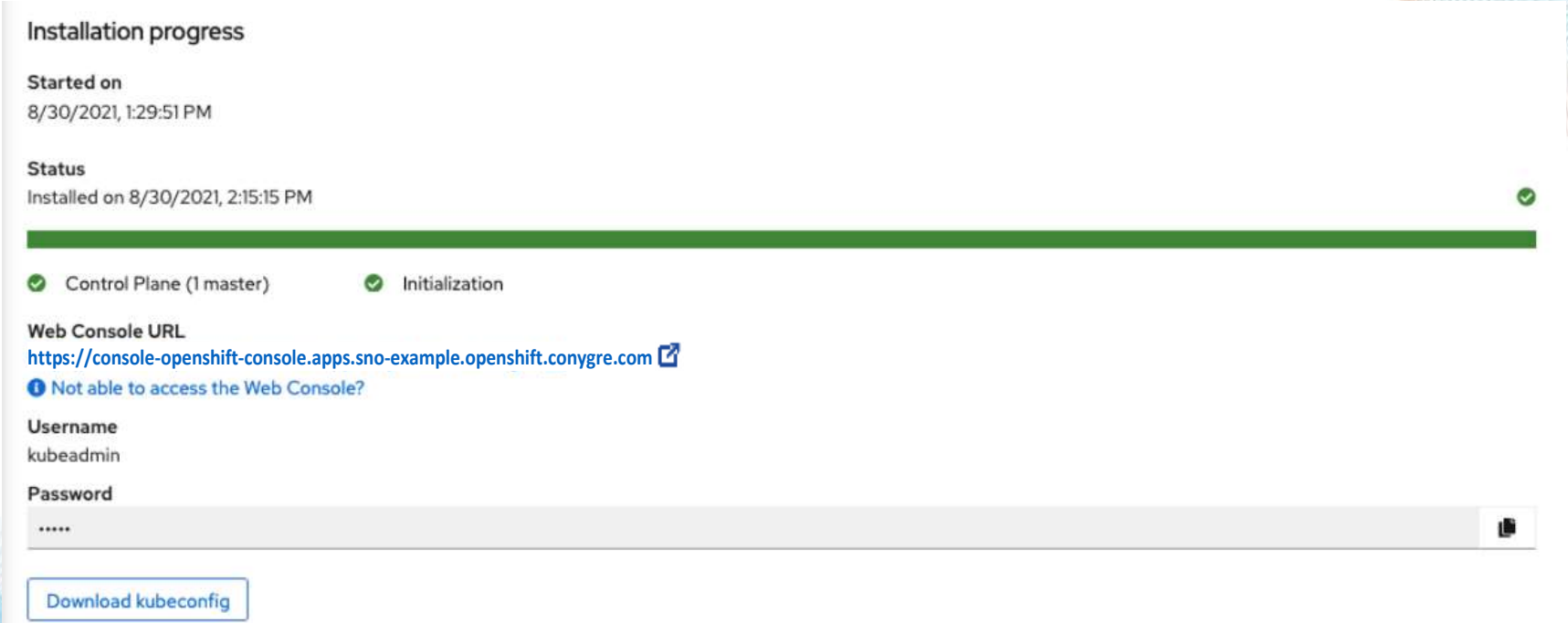
- Press Install Cluster when you are ready
- It will normally take around 45mins



SNO Install Progress



SNO Install Complete



Before you Login

- Do you have a working DNS resolving to the host?
- The simplest solution is to just add this to your local hosts file:

```
192.168.0.193    api.sno-example.openshift.conygre.com
192.168.0.193    oauth-openshift.apps.sno-example.openshift.conygre.com
192.168.0.193    console-openshift-console.apps.sno-example.openshift.conygre.com
192.168.0.193    grafana-openshift-monitoring.apps.sno-example.openshift.conygre.com
192.168.0.193    thanos-querier-openshift-monitoring.apps.sno-example.openshift.conygre.com
192.168.0.193    prometheus-k8s-openshift-monitoring.apps.sno-example.openshift.conygre.com
192.168.0.193    alertmanager-main-openshift-monitoring.apps.sno-example.openshift.conygre.com
```

- Then you can login just as we have done all week!

Conclusions

- SNO is usually the best solution where it is the only solution.
- You trade High Availability for proximity.
- You may find some Operators also have diminished functionality.

Summary

- Single Node OpenShift
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Questions and Comments?