



Deployment Requirements

Version 2.4

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Ionir Software Requirements

The following are the software requirements in a Kubernetes cluster to successfully install and operate the Ionir platform.

Kubernetes Worker Node OS

- Supported Operating systems are:
 - RHEL 8.3 / [RHCOS 3.11](#)
 - CentOS 8.3
 - Ubuntu 20.04.1 LTS (in validation)
 - SLES15SP2 (in validation)
 - Operating system must be 64-bit.
 - Additional packages are required to be installed on each Linux OS
`sudo apt install linux-modules-extra-<kernel-version>`
- Note: after applying these changes a reboot is highly recommended.

Kernel Requirements

For best performance using SR-IOV we recommend that this setting is enabled in the system grub file **on each node**:

- For Intel processors - intel_iommu must be set to on (intel_iommu=on)
- For AMD processors - amd_iommu must be set to on (amd_iommu=on)

The following modules must be loaded and working:

- NVME/TCP - nvme_tcp (modprobe nvme_tcp)
- VFIO - vfio-pci (modprobe vfio_pci)

The following parameters must be set:

- 2MB hugepages (vm.nr_hugepages) must be set to 1024 or higher
- arp_ignore must be set to 1

Kubernetes Distributions

Ionir supports Kubernetes version 1.17 and higher, and distributions such as SUSE CaaS 4.X and Rancher RKE¹ and Kubeadm based distributions.

¹ If your specific distribution is not listed, please contact support at support@ionir.com



Deleted: Introduction

Ionir is a container-native storage and data management platform for Kubernetes. Ionir virtualizes and aggregates the storage media attached to the worker nodes in a Kubernetes cluster to create a single pool of scalable resilient storage. Ionir provides a CSI (Container Storage Interface) driver that enables persistent volumes to be provisioned to stateful applications. The Ionir platform is implemented as containers and coexists with application containers in a Kubernetes cluster.

In addition to providing resilient, high-performance storage, Ionir is architected to provide a unique set of data management capabilities. The core architecture abstracts metadata from location of data, which enables unique capabilities such as instant clones, and instant data mobility between clusters and clouds. Ionir's microservices architecture provides a unified data platform that is elastic, scalable, and agile for Kubernetes based clouds.

Ionir Cluster Configurations

There is one Ionir cluster per Kubernetes cluster. Ionir, when installed in a Kubernetes cluster, aggregates the capacity and performance of local NVMe SSDs on the worker nodes of the Kubernetes cluster and provides a distributed storage layer to all nodes in the cluster. A minimal production configuration requires at least five (5) worker nodes (failure domains) in the Kubernetes cluster with at least one NVMe drive per node. Such a configuration protects against the failure in 2 separate failure domains.

Ionir supports a non-production configuration consisting of a minimum of 3 worker nodes for use as a test environment.

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Steps to add GRUB boot parameters:

Run
`sudo vi /etc/default/grub` ... [2]

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`sudo modprobe nvme_tcp`

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Run
`sudo modprobe vfio_pci`

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Steps to configure the necessary flags:

Run the following commands:
`sysctl -w vm.nr_hugepages=1024` ... [3]

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RedHat Openshift Container Platform (OCP) Support

OCP 4.6 is supported. An Operator will be installed that controls the entire lifecycle of the data platform.

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Ionir Resource Requirements

Bare-Metal Deployment

Worker Nodes

The following are the minimum resources required to run Ionir Cloud native storage solution. Additional resources and capacity is needed to run the customers apps and services on top per customer design.

CPU Type	Haswell or higher (Intel), EPYC or higher (AMD) (AVX2 instruction set required)
Number of physical Cores	8 Cores
Physical Memory	32GB
Network Interface	Ionir requires a dedicated virtual (using SR-IOV recommended) or physical NIC. <ul style="list-style-type: none">Supported NIC manufacturers:<ul style="list-style-type: none">Mellanox - connectx-5 recommendedIntelBroadcomNIC must be 10Gbe or higher (25Gbe is recommended for production environments).
Media	<ul style="list-style-type: none">Up to 20 Local NVMe SSDs on each worker nodeNVMe media device must be reported as an NVMe device by the Linux systemNo filesystem can exist on the NVMe mediaEach drive should be fully accessible by Ionir (all partitions will be deleted)NVMe Media size - 512GB<ul style="list-style-type: none">See Physical Capacity Requirements
Boot Media	The boot device must be an SSD with at least 128 GB of free space.

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If SR-IOV is used, VFS must be enabled using the NIC management software to provide a second network interface

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Physical Capacity Requirements

The minimum cluster size is determined by the minimum number of Lonir nodes that have media **installed locally**.

- For a 3 node deployment - 3.6 TB **in total**
- For a 5 node deployment and higher - 6TB **in total**

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Networking Requirements

Lonir creates a high performance dedicated virtual network for storage traffic, and hence requires that the underlying network infrastructure provide sufficient performance:

- For production environments network speed must be 25 Gb or higher. 10 Gb may be used in non-production environments.
- Full IP connectivity is required between all nodes in the cluster.
- SR-IOV must be enabled on the NIC as best practice. Optionally use multiple physical adapters if applicable.
 - If SR-IOV is used, VFS must be enabled using the NIC management software to provide a second network interface
- Full IP connectivity is required between all nodes **between clusters for mobility**.

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Pre-Install Node Network Configuration

Lonir creates a dedicated high-speed data network between all worker nodes in the cluster. This network is used for communication between the Lonir pods and provides a high performance datapath. This network can be virtual using the same physical interface as that used by Kubernetes by enabling SR-IOV on the network adapters, or it can be configured using dedicated NICs.

- **Note:** Lonir datapath network must be configured with a unique subnet. This network does not require a default gateway and is internal only.

The following configuration is required for each worker node in the cluster:

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- Set a second **static IP** for the node on the interface for the data path network (physical or virtual function). This datapath IP must be part of the datapath subnet.
- MTU must be set to 9000 or higher (Jumbo frames).
- A Kubernetes label must be set that states the datapath IP of the node must be added to **each worker node**. To set the label run the following command for each worker node:

```
kubectl label node <workerNodeName> datapath_ni=<NodeDatapathIP>
```



Cloud Deployments

Amazon Web services

On AWS any EC2 instance types that meet the requirements listed in this document are optional to deployments. CPU, Memory and NVME based disks are required.

Instance types for example i3.8XL / i3en.6xl / m5d.8xl / m5ad.8xl, r5d.8xl ; all support these metrics. Note also the requirements for an external facing load-balancer.

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Google Cloud Platform

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Other Requirements

Load Balancer

An external load balancer (such as [MetalLB](#)) is required on the Kubernetes cluster to provide an external accessible IP address for the Ionir platform. This loadbalancer resource should be configurable at the Kubernetes level using standard services.

- **Note:** When working with multiple clusters load balancers of different clusters must not overlap

Access to Registry

Prior to installation contact sales support to get [quay.io/ionir](#) username and password.

All nodes require direct access to an image registry (either private or public) to be able to pull the Ionir images and other 3rd party images.

Additional public repositories are required as follows:

- quay.io
- Docker.elastic.co
- Docker.io
- K8s.gcr.io

- **Note:** Full image list can be supplied per request.

Air gapped environments (no internet connectivity)

- A private registry is expected to be found and configured in the customer environment.
- Docker runtime is required proxy endpoint to successfully run import/export script




On an internet connected endpoint run the following script: *images_pull_push.sh*

- *.images_pull_push.sh pull <image list file> <ionir public registry username> <ionir public registry password>*
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Once connected to the private network and validated connectivity to the private registry, run the following:

- *.images_pull_push.sh push image_list.txt <local registry IP> <local registry username> <local registry password>*

 **Note:** If no private registry exists please contact support.

NTP Requirements

It is highly recommended that the time on all nodes be synchronized using NTP.

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Ionir Compatibility Check Tool
The compatibility check tool can run on any Linux machine that has kubectl installed and has a directory with the compatibility tool script and yaml files.
To run the compatibility check tool follow these steps:
Open the compatibility check directory in a Linux console.
Make sure kubectl is installed and that KUBECONFIG is configured to the kubernetes cluster.
The compatibility check script expects to get the following parameters:
-i : Install compatibility tool
-r : [optional] image registry to pull the images from (default: quay.io/ionir)
-u : username for the image registry
-p : image registry password
-t : [optional] image tag name
-s : [installation type] Ionir's installation type, may be either 'minimal', for up to 4 nodes or 'scale', for a larger cluster
Run the ionir-compatibility-check.sh script to install the tool:
ionir-compatibility-check.sh -i -r <registry> -u <user> -p <password> -s [installation type] ... [4]

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