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Chapter 1. Introduction

This chapter provides a brief introduction to OpenShift for DGX.

Red Hat OpenShift is an Enterprise-grade container-management solution based on Kubernetes for automating deployment, scaling, and management of containerized applications. It is developed and supported by Red Hat and includes additional security features and tooling for managing complex infrastructures on-premises as well as in hybrid cloud installations.

Red Hat OpenShift 4 is a major release upgrade from version 3 incorporating many technologies from the acquisition of CoreOS. It follows a new paradigm where systems are always reimaged with the latest version with only minimal provisioning. At its core are the immutable Red Hat CoreOS (RHCOS) system images based on Red Hat Enterprise Linux 8. All additional software, drivers, and configuration are ephemeral and provided through kubernetes primitives, such as containers, deployments, and operators. This includes the NVIDIA GPU operator for supporting NVIDIA GPUs and the NVIDIA Network Operator for the ConnectX network interfaces.

While OpenShift 4 still supports Red Hat Enterprise Linux 7 and 8 on the worker nodes, customers are advised to move to the newer Red Hat CoreOS deployments for improved supportability. Refer to the corresponding installation instructions for Red Hat Enterprise Linux on DGX and the OpenShift documentation when you are not planning to use Red Hat CoreOS on DGX.

This user guide provides additional information for installing and configuring OpenShift 4 with Red Hat CoreOS on clusters incorporating DGX worker nodes. It should be seen as a companion document to the official Red Hat OpenShift documentation. The following chapters describe additional configuration steps and best practices that are specific to NVIDIA DGX™ systems. Refer to the OpenShift Container Platform Documentation for generic information about OpenShift and installation instructions.

Customer Support

Customer support for running OpenShift on DGX systems is provided by Red Hat for OpenShift and NVIDIA for the DGX platform and drivers. For CoreOS and OpenShift support, visit the Red Hat Enterprise Support website: https://www.redhat.com/en/services/support. For DGX hardware, firmware / drivers, or NGC application issues, visit the NVIDIA Enterprise Support website: https://www.nvidia.com/en-us/support/enterprise/
Additional Documentation

Refer to the following documents for additional information:

- [Red Hat OpenShift](#) Product page
- [OpenShift Container Platform Documentation](#)
- [GPU Operator on OpenShift](#)
- [NVIDIA System Management Documentation](#)

Prerequisites

- **Red Hat Subscription**
  
  Installing and running OpenShift requires a Red Hat account and additional subscriptions. Please refer to [Red Hat OpenShift](#) for more information.

- **OpenShift 4.9.9 or later**
  
  Support for DGX has been added to the GPU operator in version 1.9. The operator requires OpenShift 4.9.9 or later.

Known Limitations

**March 8, 2022**

- OpenShift and Red Hat CoreOS do not currently support upgrading DGX component firmware using the NVIDIA Firmware Update container method.

  On the DGX A100, you can use the [DGX A100 Firmware Update ISO](#) method. For other DGX systems, you need to install Red Hat Enterprise Linux or DGX OS to upgrade the firmware before you can return the system to the OpenShift cluster.

- The current version of the [NVIDIA Network Operator](#) provides only limited support for DGX systems, and should be considered experimental.
Chapter 2. Installation

This chapter describes additional steps that are required or recommended when installing and running OpenShift and CoreOS on DGX worker nodes:

1. Installing Red Hat CoreOS
2. Installing the NFD Operator and NVIDIA GPU Operator

2.1. Installing Red Hat CoreOS

Installing OpenShift and Red Hat CoreOS on clusters with DGX worker nodes is not different from installing on other systems. Follow the instructions described in Installing a cluster on bare metal or other methods for creating an OpenShift cluster and for installing Red Hat CoreOS on the nodes.

2.2. Installing the NVIDIA GPU Operator

The NVIDIA GPU Operator is required to manage and allocate GPU resources to workloads. It uses the operator framework within Kubernetes to automate the management of all NVIDIA software components needed to provision the GPU. These components include the NVIDIA drivers (to enable CUDA), Kubernetes device plugin for GPUs, the NVIDIA Container Toolkit, and DCGM based monitoring.

Follow the instructions in the GPU Operator on OpenShift user guide for installing the Node Feature Discovery (NFD) Operator and NVIDIA GPU Operator. The NFD Operator manages the detection of hardware features and configurations in an OpenShift Container Platform cluster by labeling the nodes with hardware-specific information. These labels are required by the GPU Operator to identify machines with a valid GPU.
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