Dell Precision Data Science Workstation
NVIDIA Data Science Software Installation Manual

Contents

Introduction

Dell has developed Data Science Workstations (DSWs), a curated set of Precision Workstations tailored for Machine Learning and Deep Learning developers.

Dell has created this step-by-step installation guide, designed to help customers easily install the "NVIDIA® Data Science Software" onto their DSW received from Dell. DSWs come with a Dell factory installed custom Ubuntu 20.04 LTS image ready to boot-up. This manual is also useful in guiding users on how to install the NVIDIA® Data Science Software onto a user-installed Ubuntu OS.

1. Dell Precision DSW - for AI/ML/DL development and deployment

Dell Precision DSWs range from mobile workstations and mid-sized towers to larger tower and rack workstations with multiple CPUs & NVIDIA GPUs.

These platforms are suitable for data preparation, all types and sizes of AI/ML/DL model training, and running the resulting inference engines. **Find more configuration information by visiting the Dell Precision Workstation Solutions webpage.**

Precisely developed for your needs

Precision 7560 DSW:
Dell's most powerful 15" mobile workstation is AI Ready, featuring the NVIDIA® RTX™ A5000 graphics card.

Precision 7760 DSW:
The most powerful 17" mobile workstation is AI Ready, featuring the NVIDIA® RTX™ A5000 graphics card.

Precision 5820 Tower DSW:
Handles AI/ML/DL model training and inference applications. Features NVIDIA professional graphics cards

Precision 7920 Tower and Rack DSW:
Handles AI/ML/DL model training and larger inference applications with maximum room to expand. Features NVIDIA professional graphics cards.

2. Getting things started - Confirming your DSW is ready for installing NVIDIA's Data Science Software

First you will need to confirm that "Secure Boot" is disabled in the system BIOS/UEFI before proceeding. The NVIDIA® Data Science Software installation requires Secure Boot to be disabled to support LINUX kernel updates.

Dell Precision DSW systems ship with Ubuntu 20.04 LTS preinstalled, ready to boot up, with "Secure Boot" disabled by default. You can skip these steps and go directly to Section 3.

If you need to recover and re-install the factory installed Ubuntu OS, follow these instructions, then proceed to Section 3.

If you choose to install a different Ubuntu OS image on your system, follow the instructions in the Appendix "Ubuntu Installation Guide", then proceed to Section 3.

2.0 Configure system BIOS.

2.0 (a) Power up or reboot system. When the Dell logo appears, immediately **tap F2** repeatedly to load the one-time boot menu.

2.0 (b) Disable Secure Boot
    1. Settings > Secure Boot > Select Disabled

3. Setup and Optimizations (optional)

We recommend the following optimizations to increase the performance and usability of the system for Machine Learning and Deep Learning workloads

3.1 Disable idle user power management configuration

To complete this action, we recommend disabling power management settings for Idle User case, since in most cases during installation and development, the machine will download the software/dataset over the internet or run ML/DL workflow unattended for an extended period of time.

Disable power management settings with the command below.

```
/usr/bin/gsettings set org.gnome.settings-daemon.plugins.power sleep-inactive-ac-timeout 0
```

3.2 Disable Hibernate settings

There is no advantage in enabling "hibernate" on Dell Data Science workstations, quite simply because it is unnecessary and consumes valuable storage space. Disable it as per below.

```
sudo systemctl mask hibernate.target
```

3.3 Remove swap file

In addition, we recommend removing the "swap file". Swap file sizes are typically 1.5x the size of installed RAM. On large RAM systems this can be a prohibitive amount of SSD storage.

3.4 Is swap active?

```
sudo swapon --show
```

If it is, it will show something similar to the below

```
NAME      TYPE    SIZE  USED PRIO
/swapfile file 215.3G    0B   -2
```

3.5 Deactivate the swap

```
sudo swapoff -v /swapfile
```

3.6 Remove it from /etc/fstab

```
sudo sed -i '/^\/swapfile/d' /etc/fstab
```

(The 'single quote' character may not cut & paste properly. If this command line is rejected, manually type in the command.)

3.7 Delete the actual file

```
sudo rm /swapfile
```

4. Installing the NVIDIA® Data Science Software

The NVIDIA® Data Science Software is a set of tools that makes it easier to set up your Dell Data Science Workstation and manage NVIDIA®'s professional software for NVIDIA GPU accelerated data science workloads.

The NVIDIA® Data Science Software has been tested by Dell.

4.0 The download and configuration of the NVIDIA® Data Science Software on the Dell Data Science Workstation.

Note: The NVIDIA® Data Science Software installer will update your NVIDIA GPU driver as required.

DOWNLOAD THE NVIDIA® DATA SCIENCE SOFTWARE PACKAGE

Please refer to the following link for release notes disclosing changes and enhancement details for the different releases.

Note: Unless instructed otherwise, do NOT use 'sudo'.

4.0 (a) Install git on your system using the following two commands.
1. `sudo apt update`
2. `sudo apt install git`

4.0 (b) Create the DellDSW subdirectory, download and unpack the NVIDIA® Data Science Software in the new DellDSW subdirectory using the following commands.
1. `mkdir ~/DellDSW ; cd ~/DellDSW`
2. `git clone https://github.com/NVIDIA/data-science-stack.git`

4.0 (c) Begin the configuration of the stack on the system. Remain in the DellDSW subdirectory and execute the following commands. The final step will reboot the system to apply the changes.
1. `cd data-science-stack`
2. `./data-science-stack setup-system`
   - user may be asked to select appropriate keyboard version (choose based upon your region).
   - Also, if asked about modified configuration file grub, select "keep the local version currently installed".
3. `sudo reboot 0`

4.0 (d) Upon rebooting, return to the subdirectory where you extracted the data science stack and execute the following commands to add a user to the Docker Group.
1. `cd ~/DellDSW/data-science-stack`
2. `./data-science-stack setup-user`

4.0 (e) Logout and log back into the system using the following command.
`gnome-session-quit --no-prompt`

4.0 (f) Once you have logged back in, change to the directory where the data science stack was extracted.
1. `cd ~/DellDSW/data-science-stack`

4.0 (g) Proceed to the next section of this guide.

4.1 Now either choose to create a container with the data science development environment or install it natively on your system. Alternatively, do both.
Based on your choice, follow the instructions below:

4.1 (a) Option 1: Build a container.
`./data-science-stack build-container`

4.1 (b) Option 2: Create a Conda environment for NVIDIA® data science distro:
`./data-science-stack build-conda-env`

4.1 (c) Logout and log back into the system using the following command.
`gnome-session-quit --no-prompt`

4.1 (d) Change to the directory where the data science stack was extracted.
`cd ~/DellDSW/data-science-stack`

4. Installing the NVIDIA® Data Science Software (continued)

The NVIDIA® Data Science Software is a set of tools that makes it easier to set up your Dell Data Science Workstation and manage NVIDIA®'s professional software for NVIDIA GPU accelerated Data Science workloads.

4.2 Once installation is complete, perform the following tests to verify success:

4.2 (a) To verify containerized environment, run:
```
./data-science-stack run-container
```
If the scripts run successfully creating the environment, then the installation was successful.

4.2 (b) To verify conda environment, run:
```
./data-science-stack run-jupyter
```
If the scripts run successfully, then the installation was successful.

And that is it. Your Dell Precision Data Science Workstation is ready for use.

Appendix: Ubuntu Installation Guide

This appendix contains the steps and best practice guidance for installing an Ubuntu OS onto a Dell Precision Data Science Workstation bootable storage drive. It is intended for users wanting to do their own installation of Ubuntu instead of using the Ubuntu OS pre-installed at the Dell factory. Use and adapt these steps as a best practice to install a different Ubuntu OS. Note that it would not be an Ubuntu OS already validated and optimized by Dell, NVIDIA® and Canonical. Dell recommends using Long Term Support (LTS) Ubuntu versions only.

Dell advises against reverting to older OS versions, as they won't support the most recent hardware available for DSWs.

Your DSW came from the Dell factory with Ubuntu pre-installed and ready to boot up. If you ever need to re-install its factory installed Ubuntu image, *please refer to these instructions* to recover the factory installed Ubuntu OS image.
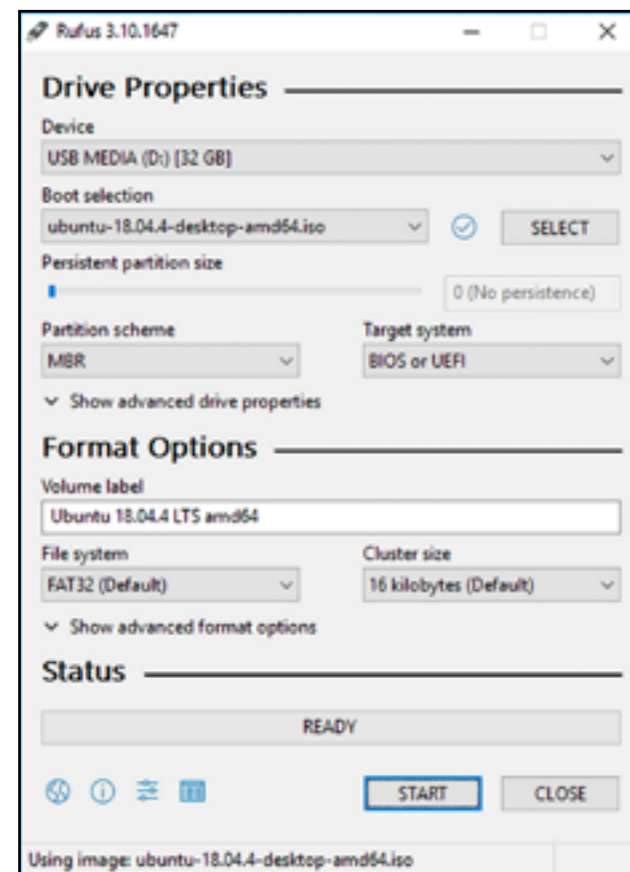
These steps require reformatting the storage drive and will wipe out any existing drive content, so be sure to save any important drive content before starting.

Unless instructed otherwise, do NOT use 'sudo', and use a standard user account in a Bash Linux shell (i.e., terminal window).
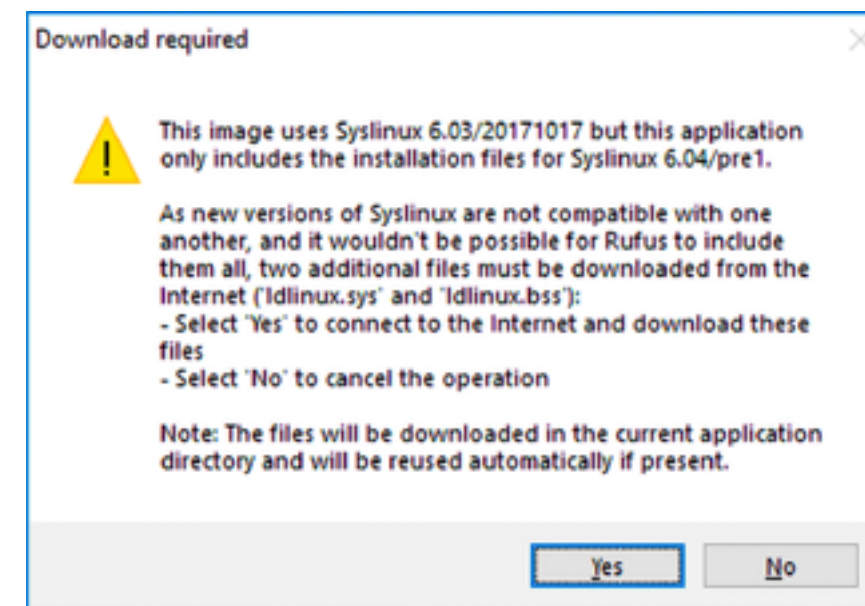
1.0 Download Ubuntu 20.04 media here.
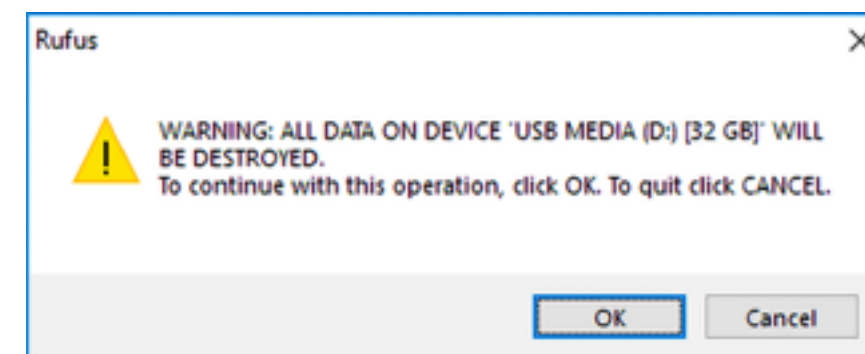
2.0 (a) Create installation media

1. Download and run Rufus.
2. Insert your USB media device.
3. Configure as shown below and click **Start.**

2.0 (b) Click Yes.

2.0 (c) Click OK.

3.0 Configure system BIOS.

3.0 (a) Power up or reboot system. When the Dell logo appears, immediately **tap F2** repeatedly to load the one-time boot menu.

3.0 (b) Disable Secure Boot

    1. Settings > Secure Boot > Select Disabled

3.0 (c) Change SATA setting to AHCI

    1. Settings > System Configuration > SATA Operation > Select AHCI

3.0 (d) If yours is a Precision Mobile Workstation, skip this step and go to step 3.0 (e).

    1. Settings > Advanced Boot Options > Check Enable Legacy Option ROMs

    2. Settings > Boot Sequence > Select Legacy

    3. *Note: This will cause systems equipped with NVMe hard disk carriages to produce a flashing yellow disk health light. This is normal and is the result of using the Legacy boot option.*

    4. *Note: If this is a Precision Mobile Workstation please keep UEFI selected.*

3.0 (e) Click **Apply, OK, Exit.**

4.0 Install Ubuntu 20.04.

4.0 (a) Insert USB installation media device created in Appendix Step 2.

4.0 (b) Power up or reboot system. When the Dell logo appears, immediately tap **F12** repeatedly to load the one-time boot menu.

4.0 (c) Under UEFI Boot, select your USB installation media device and press <Enter>.

4.0 (d) After the installer loads, select preferred language and click **Install Ubuntu.**

4.0 (e) If you boot into Ubuntu, you will need to double click on the Install Ubuntu 20.04.4 icon.

4.0 (f) Select keyboard layout and click **Continue.**

4.0 (g) If asked about WIFI, select **I don't want to connect to a WIFI network right now.**

4.0 (h) If asked about updates and other software, select **Minimal Installation.**

4.0 (i) Uncheck **"Download updates while installing Ubuntu."**

4.0 (j) Uncheck **"Install third-party software for graphics and Wi-Fi hardware and additional media formats."**

Note: The compatible NVIDIA® driver gets installed during the later step when the NVIDIA® Data Science stack is installed.

4.0 (k) Click **Continue.**

4.0 (l) Select **"Erase disk and install Ubuntu."**

4.0 (m) Click **Install Now.**

4.0 (n) Confirm writing changes to disk by clicking **Continue.**

4.0 (o) Select **time zone** and click **Continue.**

4.0 (p) Enter name, computer name, username, password and click **Continue.**

4.0 (q) Ubuntu will install for the next several minutes. When it finishes, click **Restart Now.**

4.0 (r) Remove USB installation media device.

4.0 (s) Log into the system with username and password entered during installation.

5.0 Configure Dell repositories and update all packages.

5.0 (a) Open a Terminal Window and enter the following commands:

1. sudo apt-key adv --recv-keys --keyserver hkp://keyserver.ubuntu.com:80 F9FDA6BED73CDC22
2. sudo apt update
3. sudo apt upgrade -y
4. sudo add-apt-repository 'deb http://dell.archive.canonical.com/updates/ focal-dell public'
5. sudo add-apt-repository 'deb http://dell.archive.canonical.com/updates/ focal-oem public'
6. sudo add-apt-repository 'deb http://dell.archive.canonical.com/updates/ focal-somerville public'
7. sudo add-apt-repository 'deb http://dell.archive.canonical.com/updates/ focal-somerville-melisa public'
8. sudo apt update
9. sudo apt upgrade -y
10. reboot

(The 'single quote' character in steps 5a.4 through 5a.7 may not cut & paste properly. If any command line with single quote characters is rejected, manually type in the command.)

5.0 (b) The system will restart.

6.0 Proceed with instructions in Dell Data Science Workstation Installation Guide, Section 3 to install the NVIDIA® Data Science Software stack.

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