

Alveo U50 Data Center Accelerator Card Installation Guide

UG1370 (v1.7) December 9, 2020



Revision History

The following table shows the revision history for this document.

Section	Revision Summary
12/09/2020 Version 1.7	
Chapter 1: Introduction	Updated description for latest tools version.
Minimum System Requirements	Updated supported operating system.
XRT and Deployment Platform Installation Procedures on RedHat and CentOS	Updated installation procedure.
XRT and Deployment Platform Installation Procedures on Ubuntu	Updated installation procedure.
xbutil validate	Removed note about XRT installation on Ubuntu.
Known Issues	Updated to remove a known issue about XRT installation.
Appendix D: Generating the xbmgmt flash --update Command	Updated output log.
Appendix E: Regulatory and Compliance Information	Added appendix.
06/04/2020 Version 1.6	
Chapter 1: Introduction	Updated the information.
Card Features	Added new section.
Chapter 2: Card Interfaces and Details	Added a caution.
Known Issues	<ul style="list-style-type: none"> Added a known issue about installing the U50 card deployment package. Added a known issue about downgrading to a beta platform.
Downgrading Packages	Added information about downgrading to a beta platform.
Downgrading Packages	Added information about downgrading to a beta platform.
02/27/2020 Version 1.5	
XRT and Deployment Platform Installation Procedures on RedHat and CentOS	Replaced steps 4, 6, 7, 8, and 9 to document the new installation steps for U50. Replaced all mentions of zip files with <code>tar.gz</code> .
XRT and Deployment Platform Installation Procedures on Ubuntu	Replaced steps 1, 2, 3, and the log file of step 6 to document the new installation steps for U50. Replaced all mentions of zip files with <code>tar.gz</code> .
Running lspci	Revised log file in step 2.
Running xbmgmt flash --scan	Revised output, platform, and ID information in step 1.
Upgrading Packages	Updated step 1 to include a link to chapter 4; removed steps 2-6.
Upgrading Packages	Updated step 1 to include a link to chapter 4; removed steps 2-6.
01/07/2020 Version 1.4	
Installing the Card	Updated to add notes about UL Listed Servers and card handling.

Section	Revision Summary
12/18/2019 Version 1.3	
General	Updated output logs.
Qualified Servers	Updated the section and provided the web link to the qualified servers information.
XRT and Deployment Platform Installation Procedures on Ubuntu	Added a note about XRT installation.
10/31/2019 Version 1.2	
General	Updated to the Vitis™ unified software platform throughout. Updated outputs throughout the document.
Chapter 4: Installing the Deployment Software	Replaced <code>xbutil</code> command with the new <code>xbmgmt</code> command for card flashing. Updated output logs.
Running <code>xbmgmt flash --scan</code>	Replaced <code>xbutil</code> command with the new <code>xbmgmt</code> command when scanning card. Updated output logs.
Known Issues	Added a link to Xilinx Answer Record 72766. Added a known issue.
Appendix A: Changing XRT and Target Platform Versions	Replaced <code>xbutil</code> command with the new <code>xbmgmt</code> command for card flashing. Updated output logs.
09/18/2019 Version 1.1	
General updates	Updated sample outputs.
Chapter 2: Card Interfaces and Details	Added card interface related information and updated images.
Known Issues	Included a link to Xilinx Answer Record 71752. Added information about power.
08/05/2019 Version 1.0	
Initial release	N/A

Table of Contents

Revision History	2
Chapter 1: Introduction	6
Card Features.....	6
Minimum System Requirements.....	7
Qualified Servers.....	8
Chapter 2: Card Interfaces and Details	9
Chapter 3: Card Installation Procedures	11
Safety Instructions.....	11
Before You Begin.....	13
Installing the Card.....	15
Chapter 4: Installing the Deployment Software	17
XRT and Deployment Platform Installation Procedures on RedHat and CentOS.....	17
XRT and Deployment Platform Installation Procedures on Ubuntu.....	21
Chapter 5: Card Bring-Up and Validation	25
Running lspci.....	25
Running xbmgmt flash --scan.....	26
xbutil validate.....	27
Chapter 6: Next Steps	29
Chapter 7: Troubleshooting	30
Known Issues.....	31
Appendix A: Changing XRT and Target Platform Versions	34
RedHat and CentOS.....	34
Ubuntu.....	35
Appendix B: Reverting the Card to Factory Image	37

Appendix C: Creating a Vault Repository for CentOS.....	39
Appendix D: Generating the xbmgt flash --update Command.....	41
Appendix E: Regulatory and Compliance Information.....	43
Safety Compliance.....	43
EMC Compliance.....	43
CE Directives.....	44
CE Standards.....	44
Other Compliance Statements.....	45
Appendix F: Additional Resources and Legal Notices.....	49
Xilinx Resources.....	49
Documentation Navigator and Design Hubs.....	49
References.....	50
Please Read: Important Legal Notices.....	50

Introduction

This document provides hardware and software installation procedures for the half-height, half-length Xilinx[®] Alveo[™] U50 data center accelerator card and applies to 2020.1.1 tools versions and later. For installation procedures using earlier tool versions, see v1.6 of *Alveo U50 Data Center Accelerator Card Installation Guide* ([UG1370](#)).

The Alveo U50 data center accelerator cards are PCIe[®] Gen3 x16 compliant and Gen4 x8 compatible cards featuring the Xilinx 16 nm UltraScale+[™] technology. The Alveo U50 card recommends 8 GB HBM to provide high-performance, adaptable acceleration for memory-bound, compute-intensive applications including database, analytics, and machine learning inference.

Different system configurations are available for running, developing, and debugging applications on your Alveo accelerator cards:

- **Running Applications:** To configure a system to run accelerated applications, install an Alveo card into a system as described in [Chapter 3: Card Installation Procedures](#) along with the required deployment software to support running applications as described in [Chapter 4: Installing the Deployment Software](#).
- **Developing Applications:** To develop FPGA accelerated applications, it is necessary to install both the deployment software and the development software. Development software installation, described in [Chapter 6: Next Steps](#), consists of installing both a development target platform and the Vitis[™] environment. This configuration does not have an Alveo card installed and is used for development along with debugging in emulation modes.
- **Running, Developing, and Debugging Applications:** By installing the Alveo card along with both the deployment and development software on a single machine, you can configure a system for developing and running accelerated applications. With the card installed, developers can debug applications in both emulation modes and on the hardware.

Card Features

The Alveo U50 accelerator card features are as follows.

- UltraScale+[™] XCU50 FPGA

- 8 GB HBM memory - in two 4 gigabyte (GB) HBM memory stacks
 - Split into 32 256 MB channels
- One gigabit (Gb) quad SPI flash memory for configuration
- Ethernet networking interfaces
 - One QSFP28 connector supporting 100 GbE, 40 GbE, or 4x10/25 GbE
- JTAG and UART access through the maintenance connector
- 16-lane integrated Endpoint block for PCI Express connectivity
 - Gen3 x16 supporting to x1, x2, x4, x8, x16 lane configurations
 - Single or dual Gen4 x8
- Status LEDs
- I2C bus
- Power management with system management bus (SMBus) voltage, current, and temperature monitoring
- 75W PCIe slot power only

Note: The Alveo U50 card has separate power rails for FPGA fabric and HBM memory. Developers must ensure their designs do not draw too much power for each rail.

Related Information

[Known Issues](#)

Minimum System Requirements

The minimum system requirements for running the Alveo™ U50 Data Center accelerator cards are listed in the following table.

Table 1: Minimum System Requirements

Component	Requirement
Motherboard	PCI Express® 3.0-compliant with one x16 slot.
System Power Supply	75W
Operating System	Linux, 64-bit: <ul style="list-style-type: none"> • Ubuntu 16.04, 18.04, 20.04 • CentOS 7.4, 7.5, 7.6, 7.7, 7.8, 8.1, 8.2 • RHEL 7.4, 7.5, 7.6, 7.7, 7.8, 8.1, 8.2

Table 1: Minimum System Requirements (cont'd)

Component	Requirement
System Memory	For deployment installations, a minimum of 16 GB plus application memory requirements is required. For development installations, a minimum of 64 GB of system memory is required, but 80 GB is recommended.
Internet Connection	Required for downloading drivers and utilities.
Hard disk space	Satisfy the minimum system requirements for your operating system.
Licensing	None required for application deployment. For the application development environment, see <i>Vitis Unified Software Platform Documentation: Application Acceleration Development</i> (UG1393).

For details on the acceptable environmental conditions, see *Alveo U50 Data Center Accelerator Cards Data Sheet* (DS965).

Qualified Servers

A list of servers on which Alveo cards are fully qualified on can be found here:
<https://www.xilinx.com/products/boards-and-kits/alveo/qualified-servers.html>.

Card Interfaces and Details

The Alveo™ U50 accelerator card is available in a passive cooling configuration and is designed for installation into a data center server where controlled air flow provides direct cooling to the card. The card includes the following interfaces.

- A PCI Express® card connector
- One QSFP28 connector supporting 100 GbE, 40 GbE, or 4x10/25 GbE
- Maintenance Connector

Used to program the card in RTL flow through the programming cable. For more information see the *Alveo Programming Cable User Guide* ([UG1377](#)).

Figure 1: Alveo U50 PQ Card with Half-Height Bracket

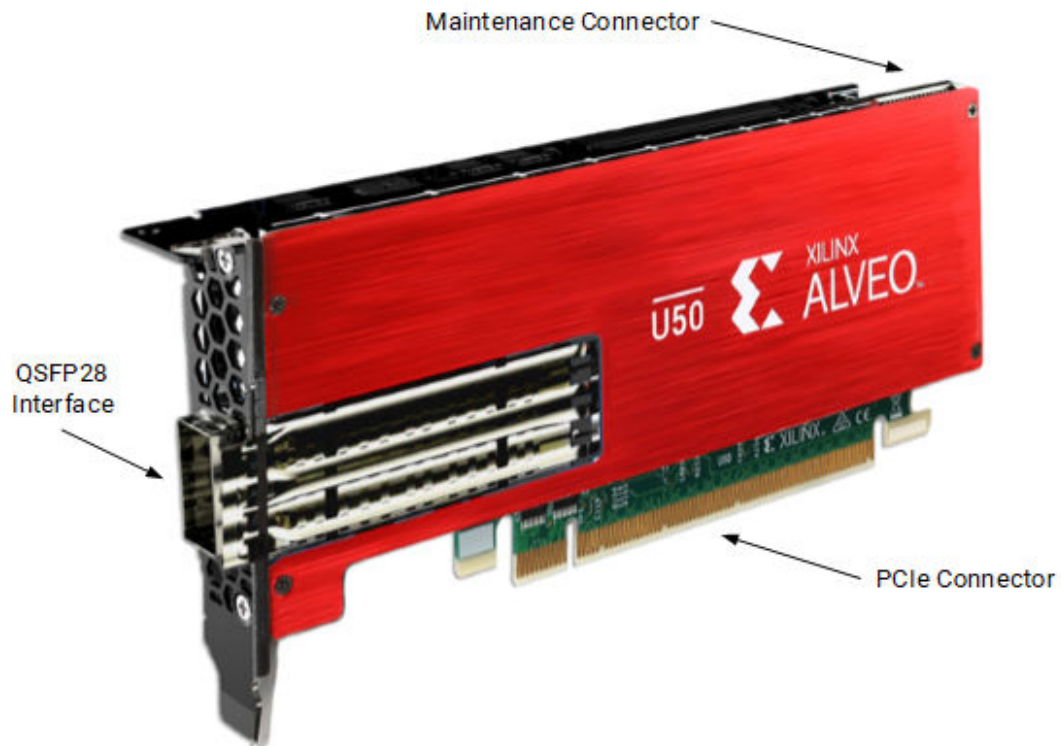
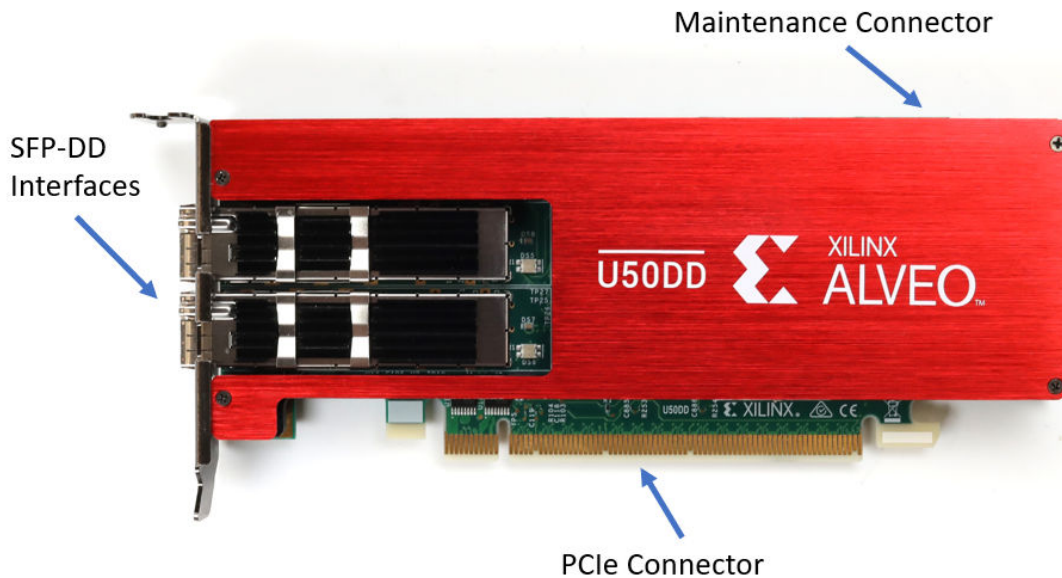


Figure 2: Alveo U50DD ES Card with Half-Height Bracket



CAUTION! Alveo accelerator cards are designed to be installed into a data center server, where controlled air flow provides direct cooling. If the cooling enclosure is removed from the card and the card is powered-up, external fan cooling airflow **MUST** be applied to prevent over-temperature shut-down and possible damage to the card electronics. Removing the cooling enclosure voids the board warranty.

For card specifications, dimensions, list of card features, and block diagram, see [Alveo U50 Data Center Accelerator Cards Data Sheet \(DS965\)](#).

Card Installation Procedures

To reduce the risk of fire, electric shock, or injury, always follow basic safety precautions.



CAUTION! *You must always use an ESD strap or other antistatic device when handling hardware.*



ATTENTION! *Il est fortement recommandé d'utiliser un bracelet ESD ou autres dispositifs antistatiques.*



VORSICHT! *Beim Umgang mit Hardware müssen sie immer ein Erdungs Armband oder ein anderes antistatisches Gerät verwenden.*

Safety Instructions

Safety Information

To ensure your personal safety and the safety of your equipment:

- Keep your work area and the computer/server clean and clear of debris.
- Before opening the computer/system cover, unplug the power cord.

Dispositif de Sécurité

Pour assurer votre sécurité personnelle et la sécurité de votre équipement:

- Maintenez votre zone de travail et l'ordinateur/serveur propre et dégagé de débris.
- Avant d'ouvrir le capot de l'ordinateur/système, débranchez le cordon d'alimentation.

Sicherheitsinformation

Um ihre persönliche Sicherheit und die Sicherheit ihrer Ausrüstung zu gewährleisten:

- Halten sie ihren Arbeitsbereich und den Computer / Server sauber und frei von Ablagerungen.
- Ziehen sie vor dem Öffnen der Computer / Systemabdeckung das Netzkabel ab.

Electrostatic Discharge Caution

Electrostatic discharge (ESD) can damage electronic components when they are improperly handled, and can result in total or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components.

To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis.
- Avoid touching the card against your clothing. The wrist strap protects components from ESD on the body only.
- Handle the card by its bracket or edges only. Avoid touching the printed circuit board or the connectors.
- Put the card down only on an antistatic surface such as the bag supplied in your kit.
- If you are returning the card to Xilinx Product Support, place it back in its antistatic bag immediately.

Attention aux Décharge Électrostatique (ESD)

L'ESD peut endommager les composants électroniques lorsqu'ils sont mal manipulés, et peut entraîner des défaillances totales ou intermittentes. Suivez toujours les procédures de prévention contre les ESD lors du retrait et remplacement des composants.

Pour prévenir les dommages dus aux ESD:

- Utilisez une sangle de poignet ou de cheville anti-ESD et assurez-vous qu'elle est en contact avec la peau. Branchez l'extrémité du câble de la sangle à une surface métallique non peinte du châssis et à la masse.
- Évitez de mettre en contact la carte de circuit imprimé ou les connecteurs avec vos vêtements. La sangle de poignet protège la carte ou connecteurs contre les ESD du corps seulement.
- Manipulez la carte uniquement par son support ou par ses bords. Évitez de toucher la carte de circuit imprimé ou les connecteurs.
- Ne posez la carte de circuit imprimé ou les connecteurs que sur une surface antistatique telle que le sac anti-statique fourni avec la carte.
- Si vous retournez la carte à Xilinx, remettez-la dans son sac antistatique immédiatement.


Vorsicht Elektrostatische Entladung


Elektrostatische Entladung (ESD) kann elektronische Bauteile beschädigen, wenn sie unsachgemäß behandelt werden, und es kann zu totalen oder zeitweiligen Ausfällen kommen. Befolgen sie beim Entfernen und Austauschen von Komponenten stets die ESD-Schutzmaßnahmen.


So verhindern sie ESD-Schäden:

- Verwenden sie einen ESD-Handgelenk-oder Knöchelriemen und stellen sie sicher, dass er Hautkontakt hat. Verbinden sie das Ende des Riemens mit einer unlackierten Metalloberfläche am Gehäuse.
- Berühren sie die Karte nicht mit ihrer Kleidung. Der Riemen schützt Komponenten nur vor ESD am Körper.
- Fassen sie die Karte nur an der Halterung oder an den Kanten an. Berühren sie nicht die Leiterplatte oder die Anschlüsse.
- Legen sie die Karte nur auf einer antistatischen Oberfläche ab, z.B. dem antistatischen Beutel der mit dem Kit mitgeliefert wurde.
- Wenn sie die Karte an den Xilinx Product Support zurücksenden, legen Sie sie bitte sofort wieder in den antistatischen Beutel.

Before You Begin

 **IMPORTANT!** *Alveo™ cards are delicate and sensitive electronic devices; equipment is to be installed by a qualified technician only. This equipment is intended for installation in a Restricted Access Location.*

 **IMPORTANT!** *Les cartes Alveo™ sont des appareils électronique sensibles et fragiles; l'équipement doit être installé par un technicien certifié seulement. Cet équipement est destiné à être installé dans un lieu d'accès restreint.*

 **WICHTIG!** *Die Karten Alveo™ sind sensible und empfindliche elektronische Geräte. Das Gerät darf nur von einem qualifizierten Techniker installiert werden. Dieses Gerät ist für die Installation an einem Ort mit begrenztem Zugang vorgesehen.*

- Verify that the minimum card space is available to install your card. Card specifications and dimensions can be found in *Alveo U50 Data Center Accelerator Cards Data Sheet (DS965)*.
- Determine if a half or full height bracket is necessary for the installation. If the bracket needs to be changed, do this before following the installation steps.
- Check for card compatibility with the system. Also check for proper system requirements such as power, bus type, and physical dimensions to support the card.

Related Information

[Minimum System Requirements](#)

[Qualified Servers](#)

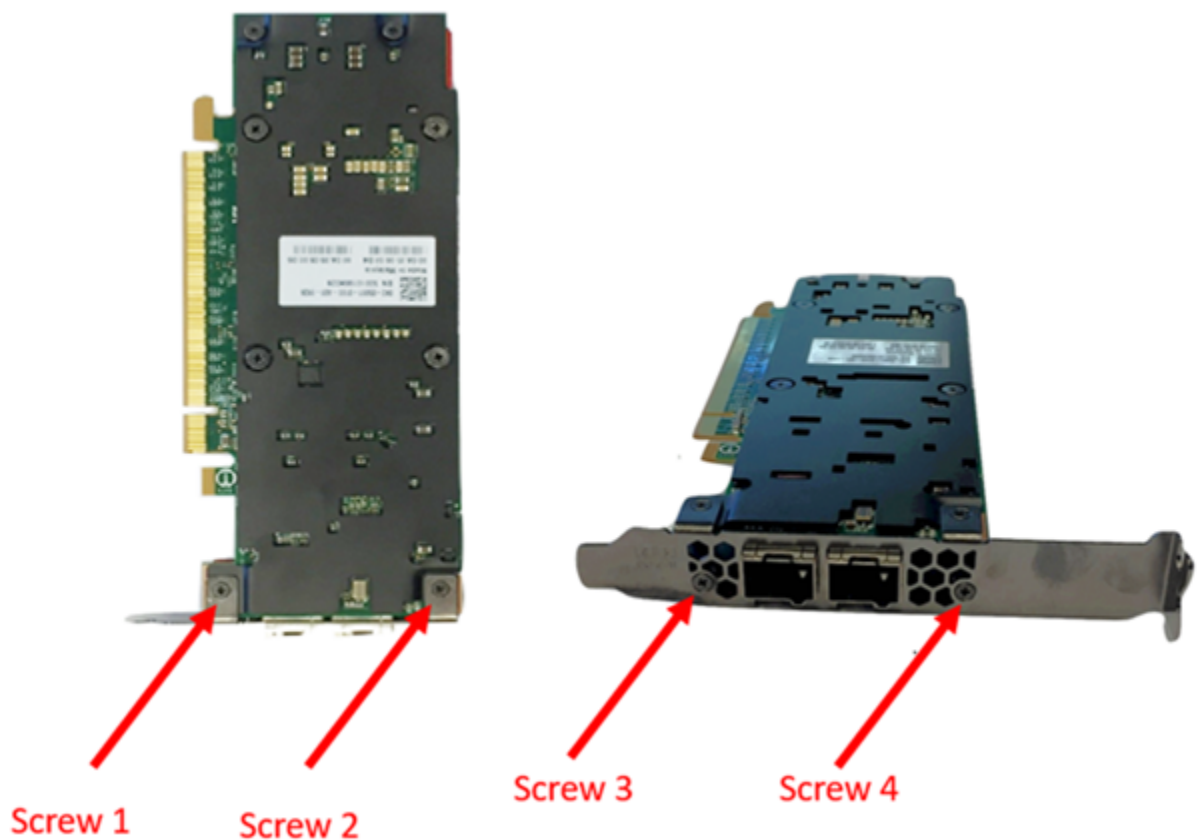
[Replacing the Bracket](#)

Replacing the Bracket

The Alveo U50 card can be used with either a full-height or half-height bracket. Depending on your system, it may be necessary to switch between the full and half-height bracket on the card. The bracket is secured to the card with four screws, as shown in the figure below. To replace the bracket, follow the instructions below.

1. Remove screws 1 and 2 from the card.
2. Remove screws 3 and 4 from the card.
3. Remove the bracket from the card.
4. Place the new bracket on the card and align it with the card's connectors and screw locations.
5. Replace screws 1 and 2 on the new bracket.
6. Replace screws 3 and 4 on the new bracket.

Figure 3: Screw Locations on Bracket



Installing the Card

The following procedure is a guide for the Xilinx® Alveo™ U50 Data Center accelerator card installation. Consult your computer documentation for additional information.

Note: For use with UL Listed Servers or ITE.

If you encounter any issues during installation, see [Chapter 7: Troubleshooting and Known Issues](#).

1. Shut down the host computer and unplug the power cord.
2. Open your computer by removing the casing.
3. If necessary, remove the adjacent PCIe® slot cover corresponding to the PCIe slot in which you are installing the Alveo card.
4. Plug the Alveo card into the PCIe x16 slot on the motherboard.
5. Re-install the computer casing.
6. Connect the power cord and turn on the computer.



WARNING! Do not power-on a passively cooled card without adequate forced airflow across the card with proper air flow direction, otherwise the card can be damaged. This card can heat up after use in the server. Use caution when handling. For more information, see [Alveo U50 Data Center Accelerator Cards Data Sheet \(DS965\)](#).

7. To verify that the device has been installed correctly, enter the following Linux command in the terminal:

```
$ sudo lspci -vd 10ee:
```

If the card is successfully installed and found by the operating system, a message similar to the one below will be displayed.

This is a sample output for an installed Alveo U50 card:

```
65:00.0 Processing accelerators: Xilinx Corporation Device 5020
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0, IRQ 135
Memory at 38bffc000000 (64-bit, prefetchable) [size=32M]
Memory at 38bffe000000 (64-bit, prefetchable) [size=128K]
Capabilities: [40] Power Management version 3
Capabilities: [48] MSI: Enable- Count=1/1 Maskable- 64bit+
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [1c0] #19
Capabilities: [1f0] Virtual Channel
Capabilities: [e00] Access Control Services
Kernel driver in use: xclmgmt
Kernel modules: xclmgmt
```

Note: If this card has previously been installed, the `lspci` output will be similar to the one shown in [Running lspci](#).

If you do not see a similar message, see [Chapter 7: Troubleshooting](#).

Installing the Deployment Software

This chapter details the procedures for installing deployment software on RedHat/CentOS and Ubuntu operating systems. All software installations use standard Linux RPM and Linux DEB packages and require root access.

The deployment software consists of the following software packages:

- **Xilinx[®] runtime (XRT):** XRT provides the libraries and drivers for an application to run on Alveo[™] cards.
- **Deployment platform:** The deployment platform provides the base firmware needed to run pre-compiled applications. It cannot be used to compile or create new applications. To create new applications, install the development software detailed in [Chapter 6: Next Steps](#). While you can also install the development software on a machine with an installed card, doing so is not necessary to run applications.

All installation packages can be downloaded from the Getting Started tab of the respective Alveo card landing page:

- [Alveo U50 Product Page](#)

If you encounter any issues during installation, see [Chapter 7: Troubleshooting](#) and [Known Issues](#).

★ **IMPORTANT!** *Root access is required for all software and firmware installations.*

★ **IMPORTANT!** *L'accès Root est requis pour toutes les installations logicielles et firmware.*

★ **WICHTIG!** *Root-Zugriff ist für alle Software- und Firmware-Installationen erforderlich.*

XRT and Deployment Platform Installation Procedures on RedHat and CentOS

Use the following steps to download and install the XRT and deployment platform using a .rpm installation package.

For details on upgrading or downgrading the XRT and deployment platform, see [Changing XRT and Target Platform Versions](#).

1. XRT installation requires Extra Packages for Enterprise Linux (EPEL) and a related repository. The initial setup depends on whether you are using RedHat or CentOS.

For Redhat:

- a. Open a terminal window and enter the following command:

```
$ sudo yum-config-manager --enable rhel-7-server-optional-rpms
```

This enables an additional repository on your system.

- b. Enter the following command to install EPEL:

```
$ sudo yum install -y https://dl.fedoraproject.org/pub/epel/epel-release-latest-7.noarch.rpm
```

For CentOS:

- Enter the following command in a terminal window:

```
$ sudo yum install epel-release
```

This installs and enables the repository for Extra Packages for Enterprise Linux (EPEL).

2. Run the following two commands to install kernel headers and kernel development packages. Ensure that `uname` is surrounded by backticks (```) and not single quotes (`'`):

```
$ sudo yum install kernel-headers-`uname -r`
$ sudo yum install kernel-devel-`uname -r`
```

Note: If these yum commands fail because they cannot find packages matching your kernel version, set up a Vault repository. For more information, see [Creating a Vault Repository for CentOS](#).

3. After the above command completes, reboot your machine.
4. From the [Getting Started tab of the Alveo U50 Product page](#), use the selection tool to display the desired Xilinx® runtime (XRT) and deployment target installation packages.

Download the Xilinx runtime (XRT) installation package file by clicking on the displayed XRT installation package.

5. Install the XRT installation package by running the following command from within the directory where the installation packages reside. `<version>` is the latter part of the installation package file name.

```
$ sudo yum install ./xrt-<version>.rpm
```

This will install the XRT and its necessary dependencies. Follow the instructions when prompted throughout the installation.

6. From the [Getting Started tab of the Alveo U50 Product Page](#), download the deployment target installation `tar.gz` file by clicking on the displayed filename.

Unpack the `tar.gz` file into a single directory. The location of the directory is not important, however the directory should not contain any other files.

7. Install the deployment packages. From within the directory where the installation packages were unpacked, run the following command. This will install all deployment packages.

```
sudo yum install ./*.rpm
```

The installation of the deployment partition and firmware are located in the `/opt/xilinx/firmware` directory and contains the named partition and firmware sub-directories. After installing the deployment packages you will see the following message:

```
Partition package installed successfully.
Please flash card manually by running below command:
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

8. Flash the firmware to the Alveo card using the command displayed in the output of the previous step. It has the following format:

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

If the card has been upgraded, you will see a message similar to the following and no additional installation steps are necessary.


```
Status: shell is up-to-date
Card(s) up-to-date and do not need to be flashed.
```


If you have multiple cards installed or need to regenerate the command, follow the steps given in [Generating the `xbmgmt flash --update` Command](#) section.


9. You will be asked to confirm the update, as shown below. Type **y** and press the **Enter** key.

```
Status: shell needs updating
Current shell: <current_platform_name>
Shell to be flashed: <platform_to_be_flashed>
Are you sure you wish to proceed? [y/n]:
```

Flashing will take up to 10 minutes.

 **IMPORTANT!** Do not enter **Ctrl + c** in the terminal while the firmware is flashing as this can cause the card to become inoperable.

 **IMPORTANT!** N'entrez pas **Ctrl + c** dans le terminal lorsque le micrologiciel clignote, car cela pourrait rendre la carte inutilisable.


 **WICHTIG!** Geben Sie im Terminal nicht **Strg + c** ein, während die Firmware blinkt, da dies dazu führen kann, dass die Karte nicht mehr funktioniert.


Successfully flashing a new card results in a message similar to the one shown below. If the command returns `Card Not Found`, perform a cold reboot, and retry. Otherwise, see the [Troubleshooting](#) section.


```
Updating shell on card[0000:73:00.0]
INFO: ***Found 351 ELA Records
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Preparing flash chip 0
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
Successfully flashed Card[0000:73:00.0]

1 Card(s) flashed successfully.
Cold reboot machine to load the new image on card(s).
```

10. Cold boot your machine to load the new firmware image on the FPGA.

 **IMPORTANT!** *Be sure to fully power off the machine and then power it on again. The image will not boot from flash if the machine is only rebooted.*

 **IMPORTANT!** *Assurez-vous d'éteindre complètement la machine, puis de la rallumer. L'image flash ne démarrera pas si la machine n'est pas redémarrée.*

 **WICHTIG!** *Schalten Sie das Gerät vollständig aus und wieder ein. Das Image startet nicht von Flash, wenn der Computer nur neu gestartet wird.*

11. Update the SC firmware by re-running the update command in the previous update step.

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

To regenerate the command, follow the steps given in [Generating the xbmgmt flash --update command](#).

If the SC is up to date, you will see the following message and no additional upgrade steps are necessary.

```
Status: shell is up-to-date
Card(s) up-to-date and do not need to be flashed.
```

If the SC needs updating it will report the following message.

```
Status: SC needs updating
Current SC: <current_sc_version>
SC to be flashed: <new_sc_version>
Are you sure you wish to proceed? [y/n]: y
```

Updating the SC firmware will take up to 2 minutes. Successful SC firmware update will result in a message similar to the one shown below. The SC firmware will be updated and no cold boot is required.

```
Updating SC firmware on card[0000:65:00.0]
Stopping user function...
INFO: found 4 sections
.....
INFO: Loading new firmware on SC
.....
Successfully flashed Card[0000:65:00.0]

1 Card(s) flashed successfully.
```

The installation for deployment is now complete. You can refer to [Chapter 5: Card Bring-Up and Validation](#) for information on how to validate the installation.

Related Information

[Generating the xbmgmt flash --update Command](#)

[Creating a Vault Repository for CentOS](#)

[Troubleshooting](#)

[Changing XRT and Target Platform Versions](#)

XRT and Deployment Platform Installation Procedures on Ubuntu

Use the following steps to download and install the XRT and deployment platform using a .deb installation package.

For details on upgrading or downgrading the XRT and deployment platform, see [Changing XRT and Target Platform Versions](#).

1. From the [Getting Started tab of the Alveo U50 Product Page](#), use the selection tool to display the desired Xilinx runtime (XRT) and deployment target installation package.

Download the Xilinx[®] runtime (XRT) installation package by clicking on the displayed XRT installation package.

2. Install the XRT installation package by running the following command from within the directory where the installation packages reside. <version> is the latter part of the installation package file name.

```
$ sudo apt install ./xrt_<version>.deb
```

This will install the XRT along with any necessary dependencies. Follow the instructions when prompted throughout the installation.

- From the [Getting Started tab of the Alveo U50 Product Page](#), download the deployment target installation `tar.gz` file by clicking on the displayed filename.

Download the `tar.gz` file by first selecting your OS and version, then clicking on the displayed filename.

Extract the `tar.gz` file into a single directory. The location of the directory is not important, however the directory should not contain any other files.

- Install the deployment packages. From within the directory where the installation packages were unpacked, run the following command. This will install all deployment packages.

```
sudo apt install ./*.deb
```

The installation of the deployment partition and firmware are located in the `/opt/xilinx/firmware` directory and contain the named partition and firmware sub-directories. After installing the deployment packages you will see the following message:

```
Partition package installed successfully.
Please flash card manually by running below command:
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

- Flash the firmware to the Alveo card using the command displayed in the output of the previous step. It has the following format:

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

If the card has been upgraded, you will see a message similar to the following and no additional installation steps are necessary.


```
Status: shell is up-to-date
Card(s) up-to-date and do not need to be flashed.
```


If you have multiple cards installed or need to regenerate the command, follow the steps given in the [Generating the `xbmgmt flash --update` Command](#) section.


- You will be asked to confirm the update, as shown below. Type **y** and press the **Enter** key.

```
Status: shell needs updating
Current shell: <current_platform_name>
Shell to be flashed: <platform_to_be_flashed>
Are you sure you wish to proceed? [y/n]:
```

Flashing will take up to 10 minutes.

 **IMPORTANT!** Do not enter **Ctrl + c** in the terminal while the firmware is flashing as this can cause the card to become inoperable.

 **IMPORTANT!** N'entrez pas **Ctrl + c** dans le terminal lorsque le micrologiciel clignote, car cela pourrait rendre la carte inutilisable.


 **WICHTIG!** Geben Sie im Terminal nicht **Strg + c** ein, während die Firmware blinkt, da dies dazu führen kann, dass die Karte nicht mehr funktioniert.


Successfully flashing a new card results in a message similar to the one shown below. If the command returns `Card Not Found`, perform a cold reboot, and retry. Otherwise, see the [Troubleshooting](#) section.


```
Updating shell on card[0000:73:00.0]
INFO: ***Found 351 ELA Records
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
Successfully flashed Card[0000:65:00.0]

1 Card(s) flashed successfully.
Cold reboot machine to load the new image on card(s)
```

7. Cold boot the machine to load the new firmware image on the FPGA.

 **IMPORTANT!** *Be sure to perform a cold boot to fully power off the machine and then power it on again. The image will not boot from flash if the machine is only rebooted.*

 **IMPORTANT!** *Initier un démarrage a froid en appuyant sur le bouton d'alimentation de la machine, puis rallumer la machine. L'image flash ne démarrera pas sans un démarrage a froid.*

 **WICHTIG!** *Führen Sie einen Kaltstart aus, indem Sie das Gerät vollständig aus und wieder einschalten. Das Image startet nicht von Flash, wenn der Computer nur neu gestartet wird.*

8. Update the SC firmware by re-running the update command in the previous update step.

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name>
```

To regenerate the command, follow the steps given in the related topic, [Generating the xbmgmt flash --update Command](#).

If the SC is up to date, you will see the following message and no additional upgrade steps are necessary.

```
Status: shell is up-to-date
Card(s) up-to-date and do not need to be flashed.
```

If the SC needs updating it will report the following message.

```
Status: SC needs updating
Current SC: <current_sc_version>
SC to be flashed: <new_sc_version>
Are you sure you wish to proceed? [y/n]: y
```

Updating the SC firmware will take up to 2 minutes. A successful SC firmware update will result in a message similar to the one shown below. The SC firmware will be updated and no cold boot is required.

```
Updating SC firmware on card[0000:65:00.0]
Stopping user function...
INFO: found 4 sections
.....
INFO: Loading new firmware on SC
.....
Successfully flashed Card[0000:65:00.0]

1 Card(s) flashed successfully.
```

The installation for deployment is now complete. You can refer to [Chapter 5: Card Bring-Up and Validation](#) for information on how to validate the installation.

Related Information

[Generating the xbmgmt flash --update Command](#)

[Troubleshooting](#)

[Changing XRT and Target Platform Versions](#)

Card Bring-Up and Validation

After installing the XRT and deployment platform, the card installation can be verified using the following commands, which are explained in more detail below.

- `lspci`
- `xbmgmt flash`
- `xbutil validate`

The `lspci` Linux command is used to confirm the card, is seen by the OS, as was done when installing the card.

The additional commands use the `xbmgmt` and `xbutil` utilities included during the XRT package installation. These utilities include multiple commands to validate and identify the installed card(s) and report additional card details including memory, PCIe®, platform name, and system information. See *Vitis Unified Software Platform Documentation: Application Acceleration Development (UG1393)* for a detailed list of commands.

Set the environment to use the utilities by running the following command. Note that the command is dependent on the command shell you are using.

Use the following command in `csh` shell:

```
$ source /opt/xilinx/xrt/setup.csh
```

Use the following command in `bash` shell:

```
$ source /opt/xilinx/xrt/setup.sh
```

Related Information

[Installing the Card](#)

Running `lspci`

1. Enter the following command:

```
$ sudo lspci -vd 10ee:
```

2. If the card is successfully installed and found by the operating system, you will see a message similar to the following. Note that for each card, there will be two physical functions found: one for management and one for user. See <https://xilinx.github.io/XRT/master/html/platforms.html> for additional details.

```
65:00.0 Processing accelerators: Xilinx Corporation Device 5020
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0
Memory at 38bff2000000 (64-bit, prefetchable) [size=32M]
Memory at 38bff4020000 (64-bit, prefetchable) [size=128K]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=32 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [1c0] #19
Capabilities: [e00] Access Control Services
Capabilities: [e10] #15
Capabilities: [e80] Vendor Specific Information: ID=0020 Rev=0
Len=010 <?>
Kernel driver in use: xclmgmt
Kernel modules: xclmgmt
65:00.1 Processing accelerators: Xilinx Corporation Device 5021
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0, IRQ 183
Memory at 38bff0000000 (64-bit, prefetchable) [size=32M]
Memory at 38bff4000000 (64-bit, prefetchable) [size=128K]
Memory at 38bfe0000000 (64-bit, prefetchable) [size=256M]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=32 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [e00] Access Control Services
Capabilities: [e10] #15
Capabilities: [e80] Vendor Specific Information: ID=0020 Rev=0
Len=010 <?>
Kernel driver in use: xocl
Kernel modules: xocl
```

Running xbmgmt flash --scan

Use the `xbmgmt flash --scan` command to display and confirm the card's flashed firmware version and the installed card details, including the card Bus:Device:Function (BDF), platform name, and ID.

1. Enter the following command:

```
$ sudo /opt/xilinx/xrt/bin/xbmgmt flash --scan
```

For each card in the server, you will see an output similar to the following example.

```
Card [0000:65:00.0]
Card type: u50
Flash type: SPI
Flashable partition running on FPGA:
xilinx_u50_gen3x16_xdma_201920_3, [ID=0xf465b0a3ae8c64f6], [SC=5.0.27]
Flashable partitions installed in system:
xilinx_u50_gen3x16_xdma_201920_3, [ID=0xf465b0a3ae8c64f6], [SC=5.0.27]
```

In this example, the BDF is 0000:65:00.0.

The name of the platform and associated ID, along with the SC firmware version, running on the FPGA are found under `Flashable partition running on FPGA` while the ones installed in the system are found under `Flashable partitions installed in system`.

In the previous output example, the platform on the FPGA and system are identical; the deployment platform is named `xilinx_u50_gen3x16_xdma_201920_3`, the ID is `0xf465b0a3ae8c64f6`, and the SC version is `5.0.27`. Note in these outputs, ID is the timestamp and SC refers to the satellite controller.

2. Verify that the deployment platform version installed on the FPGA is identical to that installed on the system. You can do this by making sure the lines under `Flashable partition running on FPGA` and `Flashable partitions installed in system` are identical.

If these versions do not match, perform a cold reboot, and retry.

xbutil validate

The `xbutil validate` command validates the correct installation by performing the following set of tests:

1. Validates the device found.
2. Checks PCIe link status.
3. Runs a verify kernel on the card.
4. Performs the following data transfer tests:
 - a. DMA test - Data transfer between host and card memory through PCIe.
 - b. Memory test - Data transfer between kernels and card memory.

Run the validate command as follows:

```
$ /opt/xilinx/xrt/bin/xbutil validate -d <card_bdf>
```

where `card_bdf` is the BDF of the card to be validated. If `-d` is not specified, the command will validate all cards in the system.

If the card was installed correctly, you will see a high-level summary of the tests performed similar to the following output. If the output is not similar to the one shown below, see [Chapter 7: Troubleshooting](#).

```
INFO: Found 1 cards
INFO: Validating card[0]: xilinx_u50_gen3x16_xdma_201920_3
INFO: == Starting AUX power connector check:
AUX power connector not available. Skipping validation
INFO: == AUX power connector check SKIPPED
INFO: == Starting PCIE link check:
INFO: == PCIE link check PASSED
INFO: == Starting SC firmware version check:
INFO: == SC firmware version check PASSED
INFO: == Starting verify kernel test:
INFO: == verify kernel test PASSED
INFO: == Starting DMA test:
Host -> PCIe -> FPGA write bandwidth = 11933.1 MB/s
Host <- PCIe <- FPGA read bandwidth = 11966.5 MB/s
INFO: == DMA test PASSED
INFO: == Starting device memory bandwidth test:
.....
Maximum throughput: 52428 MB/s
INFO: == device memory bandwidth test PASSED
INFO: == Starting PCIE peer-to-peer test:
P2P BAR is not enabled. Skipping validation
INFO: == PCIE peer-to-peer test SKIPPED
INFO: == Starting memory-to-memory DMA test:
M2M is not available. Skipping validation
INFO: == memory-to-memory DMA test SKIPPED
INFO: Card[0] validated successfully.
INFO: All cards validated successfully.
```

Note: The DMA bandwidth can vary depending upon NUMA/CPU affinity.

Next Steps

What you have done so far allows you to deploy and run accelerated applications on your system. Alveo™ [Accelerated Solutions page](#) provides information and links to available Xilinx and third-party accelerated applications. These include video processing, financial computing, machine learning, and data analytics.

If you are an application developer who wants to develop and deliver accelerated applications, install the Vitis™ software platform. It allows you to develop, debug, and optimize accelerated applications for Alveo cards. Installation instructions can be found in *Vitis Unified Software Platform Documentation: Application Acceleration Development* ([UG1393](#)).

For an overview of developing accelerated applications with Alveo™ with accompanying guided examples, see <https://developer.xilinx.com/en/articles/acceleration-basics.html>.

For complete details on the development flow and getting started in Vitis, see *Vitis Unified Software Platform Documentation: Embedded Software Development* ([UG1400](#)). For an introduction to Vitis methodology, see *Vitis Unified Software Platform Documentation* ([UG1416](#)).

Troubleshooting

The following table lists potential issues, causes, and fixes related to card installation.

Table 2: Card Troubleshooting

Issue	Potential Cause	Fix
Card not found.	Card not correctly installed.	Reinstall the card following the installation instructions. Check if the card shows up by typing the following Linux command: <code>lspci -vd 10ee:</code>
	Card not compatible with server.	Use qualified server. For system capabilities, see Alveo U50 Data Center Accelerator Cards Data Sheet (DS965) .
	Kernel version is incompatible.	Run <code>uname -r</code> to check the kernel version. Ensure that the kernel version matches the version listed for your OS in Chapter 4: Installing the Deployment Software .
lspci no longer recognizes the card.	Card is overheating.	Ensure that operating ambient conditions do not exceed specifications and passive cards are in a system that provides adequate airflow. For more information about airflow requirements, see Alveo U50 Data Center Accelerator Cards Data Sheet (DS965) .
XRT installation incomplete or unsuccessful.	Missing dependent packages.	Contact your Linux administrator.
Deployment platform installation incomplete or unsuccessful.	Missing dependent packages.	Contact your Linux administrator.
<pre>xbmgmt --flash returns the error: Specified DSA is not applicable</pre>	Correct type of deployment platform package not installed.	Install the correct type of deployment platform package.
Unable to install packages on RedHat and CentOS.	Incorrect permissions for download directory, for example, a <code>/home/</code> directory.	Download the packages to a directory where root has read access (for example, <code>/tmp</code>). Use the full path to the RPM package when installing. yum will fail with a relative path to RPM package.

Table 2: Card Troubleshooting (cont'd)

Issue	Potential Cause	Fix
When running <code>xbutil</code> the following message is displayed: <pre>Failed to open device: 0000:3b:00.0 INFO: Found total 1 card(s); 0 are usable.</pre>	Driver has not loaded successfully or the card is not flashed successfully.	Perform a cold reboot.
XRT package fails to install on a supported CentOS release.	Kernel development headers are missing. The XRT package is missing a dependency on <code>kernel-devel</code> and <code>kernel-headers</code> .	Manually install <code>kernel-devel</code> and <code>kernel-headers</code> with <code>yum</code> install: <pre>\$ sudo yum install kernel-headers-`uname -r` \$ sudo yum install kernel-devel-`uname -r`</pre> <p>Note: Do not run <code>sudo yum upgrade</code>. This will update the kernel-headers to an incompatible version.</p>
Flashing the card does not complete after 20 minutes.	The flash operation has failed.	Perform cold-reboot and then re-flash the card.
Run time fails with following message: <pre>Error: Failed to find Xilinx platform</pre>	Failed to source the <code>setup.sh</code> script.	Source <code>/opt/xilinx/xrt/setup.sh</code>
When installing the XRT, you see the following message: <pre>N: Can't drop privileges for downloading as file '/root/xrt_201802.2.1.79_16.04.deb' couldn't be accessed by user '_apt'. - pkgAcquire::Run (13: Permission denied)</pre>	This is caused by running <code>sudo apt install</code> as root.	The XRT will install correctly, despite the error. You can find more information about this error on AskUbuntu .

Known Issues

The following table lists known issues. See [Xilinx Answer Record 71752](#) and [Xilinx Answer Record 71975](#) for additional known issues.

Table 3: Known Issues

Area	Description	Comments/Recommendations
<code>xbmgmt</code>	<code>xbmgmt</code> commands do not work. There are no errors indicating this in output.	Reinstall the XRT package.

Table 3: Known Issues (cont'd)

Area	Description	Comments/Recommendations
General	Driver may not be loaded properly after boot up (or reboot).	After boot up (or reboot), run these two commands to load the device driver: <pre>\$ sudo rmmod xclmgmt</pre> <pre>\$ sudo modprobe xclmgmt</pre>
Power	The Alveo U50 card limits HBM power to 7.8W and FPGA fabric power to 58W. Exceeding these power limits can cause system instability.	To manage power consumption, review design power usage and ensure that it is within the power limits. Design power estimates can be obtained using the <code>report_power</code> Tcl command. After implementing a design in the Vivado® tools or in the Vitis™ environment, open the implementation result, add the <code>set_operating_conditions - design_power_budget 63</code> constraint, and run <code>report power</code> . See <i>Vivado Design Suite User Guide: Power Analysis and Optimization (UG907)</i> for setting up power analysis. Actual application power consumption can be obtained by monitoring the 12V/3V PEX and 12V/3V PEX current measurements provided by the <code>xbutil</code> query—which reports power consumption at the input to the power regulator. For Vivado designs include the CMC IP so that the system controller can communicate with the device.
General	The Alveo card has not trained to the full expected PCI Express link width or link speed. The output from <code>xbutil validate</code> will look like the following: <pre>\$ INFO: Validating device[0]:</pre> <pre>INFO: Checking PCIE link</pre> <pre>status: FAILED WARNING: Device</pre> <pre>trained to lower spec. Expect:</pre> <pre>Gen3 x16, Current: Gen2x16</pre>	Ensure that the Alveo card is plugged into a Gen 3x16 or 4x8 capable slot. Then cold reboot and see if the card trains to the correct settings.
General	The card is not present when running <code>xbutil</code> or <code>lspci</code> . The card may not have been ready when the server enumerated PCI Express.	Potential Fix: Warm Reboot the server, Disable Fast Boot.
General	Card does not show up when running <code>lspci</code> and the red LED on the card is illuminated.	When card is first installed in server, BIOS may not recognize the card correctly and red LED on card is illuminated, indicating an error. Cold boot the server four times until the blue LED on the card is illuminated, indicating the card is successfully running. If the red LED is still illuminated, disconnect the power to the sever for 5 minutes and repeat the step above.

Table 3: Known Issues (cont'd)

Area	Description	Comments/Recommendations
Installation	When installing the U50 deployment package, the following message is received: <pre data-bbox="657 443 971 489">Failed to create xsabin, install is incomplete</pre>	This error can occur if XRT is built from GitHub sources without Vitis software platform installed and <code>XILINX_VITIS</code> set. Prior to building XRT from GitHub sources, install the Vitis software platform and set up the Vitis Environment to resolve this issue. See Vitis Unified Software Platform Documentation (UG1416) .
Installation	Unexpected card behavior when downgrading to beta package.	When downgrading to a beta package, it is necessary to factory reset all U50 cards installed on the system. Downgrading to a beta package without first factory resetting all U50 cards installed on the system can result in unexpected behavior. For beta package installation, follow the installation steps in version 1.4 of the Alveo U50 Data Center Accelerator Card Installation Guide (UG1370) .

Changing XRT and Target Platform Versions

The Alveo™ Data Center Accelerator card target platform revisions can change significantly between releases. To ensure a successful upgrade (or downgrade) of the Alveo card XRT and platform, carefully follow the instructions. Failure to adhere to these procedures can result in an unstable installation or other issues.

RedHat and CentOS

During upgrading, downgrading, or uninstalling, it can be useful to list the currently installed Alveo packages. To list the currently installed deployment platform package, run the following command in a Linux terminal:

```
$ yum list installed | grep xilinx
```

To list the currently installed XRT package, run the following command:

```
$ yum list installed | grep xrt
```

Upgrading Packages

You can upgrade the XRT and deployment platform on your Alveo card by following these steps. Currently, both packages must be upgraded concurrently.

1. Download the desired XRT and deployment platform packages and follow installation steps 5 through 10 in [XRT and Deployment Platform Installation Procedures on RedHat and CentOS](#).

Downgrading Packages

Perform the following steps to downgrade platforms.

1. Restore the card to the original manufacturing state by running the following command.

```
$ sudo /opt/xilinx/xrt/bin/xbmgmt flash --factory_reset
```

- Remove the current XRT and shell versions.

```
$ sudo yum remove xrt
```

- Cold reboot the system.
- Follow the installation procedures outlined in [Chapter 4: Installing the Deployment Software](#).

It is not recommended to downgrade to a beta version. However, if you must downgrade to a beta package, it is necessary to first factory reset all the U50 cards installed on the system. Downgrading to a beta package without first factory resetting all the U50 cards installed on the system can result in unexpected behavior. For beta package installation, follow the installation steps in version 1.4 of the [Alveo U50 Data Center Accelerator Card Installation Guide \(UG1370\)](#).

Related Information

[Reverting the Card to Factory Image](#)

Uninstalling Packages

To completely uninstall the Alveo XRT and deployment platform packages, run the following command in a Linux terminal. Uninstalling XRT also uninstalls the deployment platform.

```
$ sudo yum remove ./<xrt_package_name>
```

Note: Make sure that all of the platform packages are displayed in the output terminal after running the command. If not, manually list the packages using the `list` command at the beginning of this section, then delete the remaining packages using the `remove` command.

Ubuntu

During upgrading, downgrading, or uninstalling, it can be useful to list the currently installed Alveo packages. To list the currently installed deployment platform package, run the following command in a Linux terminal:

```
$ apt list --installed | grep xilinx
```

To list the currently installed XRT package, run the following command:

```
$ apt list --installed | grep xrt
```

Upgrading Packages

You can upgrade the XRT and deployment platform on your Alveo card by following these steps. Currently, both packages must be upgraded concurrently.

1. Download the desired XRT and deployment platform packages. Follow installation steps 5 through 10 in [XRT and Deployment Platform Installation Procedures on Ubuntu](#).

Downgrading Packages

1. Restore the card to the original manufacturing state by running the following command.

```
$ sudo /opt/xilinx/xrt/bin/xbmgmt flash --factory_reset
```

2. Remove the current XRT and shell versions.

```
$ sudo apt remove xrt
```

3. Cold reboot the system.
4. Follow the installation procedures outlined in [Chapter 4: Installing the Deployment Software](#).

It is not recommended to downgrade to a beta version. However, if you must downgrade to a beta package, it is necessary to first factory reset all the U50 cards installed on the system. Downgrading to a beta package without first factory resetting all U50 cards installed on the system can result in unexpected behavior. For beta package installation, follow the installation steps in version 1.4 of the [Alveo U50 Data Center Accelerator Card Installation Guide \(UG1370\)](#).

Related Information

[Reverting the Card to Factory Image](#)

Uninstalling Packages

To completely uninstall the Alveo XRT and deployment platform packages, run the following command in a Linux terminal. Uninstalling XRT also uninstalls the deployment platform.

```
$ sudo apt remove ./<xrt_package_name>
```

Note: Make sure that all of the target platform packages are displayed in the output terminal after running the command. If not, manually list the packages using the `list` command at the beginning of this section, then delete the remaining packages using the `remove` command.

Reverting the Card to Factory Image

The Alveo™ card can be reverted to the factory image, also known as golden. This requires that XRT 2019.2 release or later is installed on the same system as the Alveo accelerator card. The steps to revert the card using this method are listed below.

1. Open a terminal window.
2. Run the following command, where `card_bdf` is the BDF of the card to revert to golden.

```
$ sudo /opt/xilinx/xrt/bin/xbmgmt flash --factory_reset --card  
<card_bdf>
```

3. Enter `y` to continue. The following message is displayed on completion.

```
Shell is reset successfully  
Cold reboot machine to load new shell on card
```

4. Cold boot the system so the card FPGA uses the new image.
5. Confirm the card has been reverted to factory image by running the following command.

```
$ sudo /opt/xilinx/xrt/bin/xbmgmt flash --scan
```

An output similar to the following is displayed.

```
Card [0000:65:00.0]  
Card type: uxx  
Flash type: SPI  
Flashable partition running on FPGA:  
xilinx_uxx_GOLDEN_x, [SC=x.x]  
Flashable partitions installed in system: (None)
```

In this output, under `Flashable partition running on FPGA`, note `GOLDEN` in the name. This indicates that the card has successfully been reverted to factory image.

★ **IMPORTANT!** *If the `GOLDEN_2` image is running on the FPGA, carefully review the design advisory for Alveo data center accelerator card golden corruption, found in the Xilinx Answer Record [AR-71915](#). Complete the repair instructions associated with the Xilinx Answer prior to proceeding.*

★ **IMPORTANT!** *Si l'image `GOLDEN_2` est en cours d'exécution sur la FPGA, consultez attentivement l'avis de conception relatif à la corruption dorée de la carte accélératrice de centre de données Alveo, disponible dans l'enregistrement de réponse Xilinx [AR-71915](#). Suivez les instructions de réparation associées à Xilinx Answer avant de poursuivre.*



WICHTIG! Wenn das GOLDEN_2-Image auf dem FPGA ausgeführt wird, lesen Sie die Designempfehlung zur Goldenen Beschädigung der Alveo Data Center-Beschleunigerkarte unter Xilinx Answer Record [AR-71915](#). Führen Sie die mit der Xilinx Answer verbundenen Reparaturanweisungen aus, bevor Sie fortfahren.

Creating a Vault Repository for CentOS

On CentOS, `yum install kernel-headers` always installs the latest version of the headers, but might not match your kernel version. This causes the installation of XRT to skip compilation of the driver modules and will silently fail. To correctly install XRT, you must create a vault repository file that points to versions matching the kernel.

The following is an example repository for CentOS 7.4 created in the following file:

```
/etc/yum.repos.d/centos74.repo
```

```
# CentOS-Base-7.4.repo
#
# This repo is locked to 7.4.1708 version
#
# C7.4.1708
[C7.4.1708-base]
name=CentOS-7.4.1708 - Base
baseurl=http://vault.centos.org/7.4.1708/os/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
[C7.4.1708-updates]
name=CentOS-7.4.1708 - Updates
baseurl=http://vault.centos.org/7.4.1708/updates/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
[C7.4.1708-extras]
name=CentOS-7.4.1708 - Extras
baseurl=http://vault.centos.org/7.4.1708/extras/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
[C7.4.1708-centosplus]
name=CentOS-7.4.1708 - CentOSPlus
baseurl=http://vault.centos.org/7.4.1708/centosplus/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
[C7.4.1708-fasttrack]
```

```
name=CentOS-7.4.1708 - CentOSPlus
baseurl=http://vault.centos.org/7.4.1708/fasttrack/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
```

Note: For CentOS 7.5, create the repo file `/etc/yum.repos.d/centos75.repo` and add the above content, replacing "7.4.1708" with "7.5.1804". Similarly, for CentOS 7.6, create the repo file `/etc/yum.repos.d/centos76.repo` and add the above content, replacing "7.4.1708" with "7.6.1810".

Generating the `xbmgmt flash --update` Command

To flash the firmware installed in the system to the Alveo™ card, use the following command syntax..

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell <shell_name> --card <card_bdf>
```

To obtain the necessary `card_bdf` and `shell_name` options, run the following `xbmgmt flash --scan` command. For more information, see [Running `xbmgmt flash --scan`](#).

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --scan
```

You will see an output similar to the output below. In this example, the Flashable partition running on FPGA does not match Flashable partitions installed in system, implying that the Flashable partition running on FPGA needs to be updated using the `xbmgmt flash --update` command.

```
Card [0000:65:00.0]
Card type:          u50
Flash type:         SPI
Flashable partition running on FPGA:
  xilinx_u50_GOLDEN_9, [SC=INACTIVE]
Flashable partitions installed in system:
  xilinx_u50_gen3x16_xdma_201920_3, [ID=0xf465b0a3ae8c64f6], [SC=5.0.27]
  Logic UUID:
  f465b0a3ae8c64f619bc150384ace69b
```

- `card_bdf`: Specifies the BDF of the card to flash and is given on the output of the first line `Card [card_bdf]`. In the above example, the BDF is `0000:65:00.0`. This option is only required if you have multiple cards installed on the server.
- `shell_name`: Specifies the partition that is used to flash the card. The `shell_name` for flashing is provided under `Flashable partitions installed in system`. In the above example, the `shell_name` is `xilinx_u50_gen3x16_xdma_201920_3`.

For the example output above, the `xbmgmt flash` command is:

```
sudo /opt/xilinx/xrt/bin/xbmgmt flash --update --shell
xilinx_u50_gen3x16_xdma_201920_3 --card 0000:65:00.0
```

When the Alveo card is successfully flashed and cold rebooted, the `xbmgmt flash --scan` output will show the same package information for both `Flashable partition` running on `FPGA` and `Flashable partitions` installed in system.

If you have multiple cards installed on the server, you must run the `xbmgmt flash` command separately for each card.



IMPORTANT! Use a separate `xbmgmt flash` command to flash each card in the system.



IMPORTANT! Utilisez une commande `xbmgmt flash` distincte pour faire flasher chaque carte du système.



WICHTIG! Verwenden Sie einen separaten `xbmgmt flash`-Befehl, um jede Karte im System zu flashen.

Regulatory and Compliance Information

This product is designed and tested to conform to the European Union directives and standards described in this section.

Safety Compliance

The following table shows the safety standards that apply to the Alveo U50 card.

Table 4: Safety Standards

Safety Standard	Alveo U50
UL 60950-1, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements)	✓
CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements)	✓
EN 60950-1:2006+A11:2009+A1:2012+A12:2011+A2:2013 (European Union)	✓
IEC 60950-1:2005 (2nd Edition); Am 1:2009 (International)	✓
EU LVD Directive 2014/35/EC	✓
IEC 62368-1:2014 (Second Edition)	✓

EMC Compliance

The following tables show the EMC standards that apply to the Alveo U50 card.

Class A Products

Table 5: EMC Standards

Standard	Alveo U50
FCC Part 15 - Radiated & Conducted Emissions (USA)	✓
CAN ICES-3(A)/NMB-3(A) - Radiated & Conducted Emissions (Canada)	✓

Table 5: EMC Standards (cont'd)

Standard	Alveo U50
CISPR 32 – Radiated & Conducted Emissions (International)	✓
EN55032: 2015 – Radiated & Conducted Emissions (European Union)	✓
EN55024: 2010 +A1:2001+A2:2003 – Immunity (European Union)	✓
EMC Directive 2014/30/EC	✓
VCCI (Class A)– Radiated & Conducted Emissions (Japan)	✓
CNS13438 – Radiated & Conducted Emissions (Taiwan)	✓
CNS 15663 - RoHS (Taiwan)	✓
AS/NZS CISPR 32 – Radiated and Conducted Emissions (Australia/New Zealand)	✓
Article 58-2 of Radio Waves Act, Clause 3 (Korea)	✓

Regulatory Compliance Markings

The following table shows the product certification markings that are provided, when required, with the Alveo U50 card.

Table 6: Product Certification Markings

Product Certification Markings	Alveo U50
UL Listed Accessories Mark for the USA and Canada	✓
CE mark	✓
FCC markings	✓
VCCI marking	✓
Australian C-Tick mark	✓
Korea MSIP mark	✓
Taiwan BSMI mark	✓

CE Directives

2014/35/EC, *Low Voltage Directive (LVD)*

2014/30/EC, *Electromagnetic Compatibility (EMC) Directive*

CE Standards

EN standards are maintained by the European Committee for Electrotechnical Standardization (CENELEC). IEC standards are maintained by the International Electrotechnical Commission (IEC).

Electromagnetic Compatibility

EN:55032:2015, *Information Technology Equipment Radio Disturbance Characteristics – Limits and Methods of Measurement*

EN:55024:2015, *Information Technology Equipment Immunity Characteristics – Limits and Methods of Measurement*

This is a Class A product. In a domestic environment, this product can cause radio interference, in which case the user might be required to take adequate measures.


Other Compliance Statements


The following sections only apply to Alveo U50 cards.

FCC Class A User Information

The Class A products listed above comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

 **IMPORTANT!** *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.*

 **IMPORTANT!** *Cet équipement a été testé et jugé conforme à la Class A digital device, conformément à la règle 15 du standard FCC. Ces limites sont conçues pour fournir des protections contre des interférences nuisibles lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre des énergies de radio-fréquence et, s'il n'est pas installé et utilisé conformément aux instructions, peut nuire aux communications radio. L'exploitation de cet équipement dans une zone résidentielle est susceptible de causer des interférences nuisibles, auquel cas l'utilisateur peut être tenu de prendre des mesures adéquates à ses propres frais.*

WICHTIG! Dieses Gerät wurde getestet und entspricht den Grenzwerten für digitale Geräte der Klasse A gemäß Teil 15 der FCC-Bestimmungen. Diese Grenzwerte bieten einen angemessenen Schutz gegen schädliche Interferenzen, wenn das Gerät in einer gewerblichen Umgebung betrieben wird. Dieses Gerät erzeugt und verwendet Hochfrequenzenergie und kann diese abstrahlen. Wenn es nicht gemäß den Anweisungen installiert und verwendet wird, kann dies Funkstörungen verursachen. Der Betrieb dieses Geräts in einem Wohngebiet kann schädliche Interferenzen verursachen. In diesem Fall muss der Benutzer die Interferenz auf eigene Kosten beheben.

CAUTION! If the device is changed or modified without permission from Xilinx, the user may void his or her authority to operate the equipment.

ATTENTION! Si l'appareil est modifié sans l'autorisation de Xilinx, l'utilisateur peut annuler son ability à utiliser l'équipement.

VORSICHT! Wenn das Gerät ohne Erlaubnis von Xilinx geändert wird, kann der Benutzer seine Berechtigung zum Betrieb des Geräts verlieren.

Canadian Compliance (Industry Canada)

CAN ICES-3(A)/NMB-3(A)

VCCI Class A Statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を構ずるよう要求されることがあります。

VCCI-A

KCC Notice Class A (Republic of Korea Only)

<p>A급 기기 (업무용 방송통신기기)</p> <p>CLASS A device (commercial broadcasting and communication equipment)</p>	<p>이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.</p> <p>This device has been approved by EMC registration. Distributors or users pay attention to this point. This device is usually aimed to be used in other area except at home</p>
--	---

BSMI Class A Notice (Taiwan)

警告使用者:

此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適對的對策。

Manufacturer Declaration European Community



Manufacturer Declaration

Xilinx declares that the equipment described in this document is in conformance with the requirements of the European Council Directive listed below:

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- RoHS 3 Directive 2011/65/EU, 2015/863

These products follow the provisions of the European Directive 2014/53/EU.

Dette produkt er i overensstemmelse med det europæiske direktiv 2014/53/EU.

Dit product is in navolging van de bepalingen van Europees Directief 2014/53/EU.

Tämä tuote noudattaa EU-direktiivin 2014/53/EU määräyksiä.

Ce produit est conforme aux exigences de la Directive Européenne 2014/53/EU.

Dieses Produkt entspricht den Bestimmungen der Europäischen Richtlinie 2014/53/EU.

Þessi vara stenst reglugerð Evrópska Efnahags Bandalagsins númer 2014/53/EU.

Questo prodotto è conforme alla Direttiva Europea 2014/53/EU.

Dette produktet er i henhold til bestemmelsene i det europeiske direktivet 2014/53/EU.

Este produto cumpre com as normas da Diretiva Européia 2014/53/EU.

Este producto cumple con las normas del Directivo Europeo 2014/53/EU.

Denna produkt har tillverkats i enlighet med EG-direktiv 2014/53/EU.

This declaration is based upon compliance of the Class A products listed above to the following standards:

EN 55032 (CISPR 32 Class A) RF Emissions Control.

EN 55024:2010 (CISPR 24) Immunity to Electromagnetic Disturbance.

EN 60950-1:2006/A11:2009A1:2010/A12:2011 Information Technology Equipment- Safety- Part 1: General Requirements.

EN 50581:2012 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.



CAUTION! *In a domestic environment, Class A products may cause radio interference, in which case the user may be required to take adequate measures.*



ATTENTION! *Dans un environnement domestique, les produits de Classe A peuvent causer des interférences radio, auquel cas l'utilisateur peut être tenu de prendre des mesures adéquates.*



VORSICHT! *In einer häuslichen Umgebung können Produkte der Klasse A Funkstörungen verursachen. In diesem Fall muss der Benutzer möglicherweise geeignete Maßnahmen ergreifen.*

Responsible Party

Xilinx, Inc.
2100 Logic Drive, San Jose, CA 95124
United States of America
Phone: (408) 559-7778

Additional Resources and Legal Notices

Xilinx Resources

For support resources such as Answers, Documentation, Downloads, and Forums, see [Xilinx Support](#).

Documentation Navigator and Design Hubs

Xilinx[®] Documentation Navigator (DocNav) provides access to Xilinx documents, videos, and support resources, which you can filter and search to find information. To open DocNav:

- From the Vivado[®] IDE, select **Help** → **Documentation and Tutorials**.
- On Windows, select **Start** → **All Programs** → **Xilinx Design Tools** → **DocNav**.
- At the Linux command prompt, enter `docnav`.

Xilinx Design Hubs provide links to documentation organized by design tasks and other topics, which you can use to learn key concepts and address frequently asked questions. To access the Design Hubs:

- In DocNav, click the **Design Hubs View** tab.
- On the Xilinx website, see the [Design Hubs](#) page.

Note: For more information on DocNav, see the [Documentation Navigator](#) page on the Xilinx website.

References

Vitis Documents

These documents provide supplemental material useful with this guide:

1. *Vitis Unified Software Platform Documentation: Application Acceleration Development* ([UG1393](#))
2. *Vitis Unified Software Platform Documentation* ([UG1416](#))
3. *Vitis Unified Software Platform Documentation: Embedded Software Development* ([UG1400](#))
4. *Vitis Application Acceleration Development Flow Tutorials* ([GitHub](#))

Alveo Documents

1. *Alveo U50 Data Center Accelerator Cards Data Sheet* ([DS965](#))
2. *Alveo Data Center Accelerator Card Platforms User Guide* ([UG1120](#))
3. *Alveo Programming Cable User Guide* ([UG1377](#))

Additional Xilinx Resources

1. Alveo Data Center Accelerator Card - Known Issues and General Information ([Xilinx Answer Record 71752](#))
2. Alveo Data Center Accelerator Card - U50DD ES3 Known Issues ([Xilinx Answer Record 72766](#))
3. Xilinx licensing website: <https://www.xilinx.com/getproduct>
4. Vitis Developer Zone: <https://www.xilinx.com/products/design-tools/vitis/vitis-platform.html>
5. Xilinx Community Forums: <https://forums.xilinx.com>
6. [Xilinx Third-Party End User License Agreement](#)
7. [End-User License Agreement](#)

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