

# Alveo U50 Data Center Accelerator Card Installation Guide

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# Revision History

The following table shows the revision history for this document.

Section	Revision Summary
08/05/2019 Version 1.0	
Initial release	N/A

# Table of Contents

<b>Revision History</b> .....	<b>2</b>
<b>Chapter 1: Introduction</b> .....	<b>5</b>
Minimum System Requirements.....	5
Validated Servers.....	6
<b>Chapter 2: Unpacking</b> .....	<b>7</b>
Product Registration.....	7
Accelerator Card Overview.....	7
<b>Chapter 3: Card Installation Procedures</b> .....	<b>10</b>
Safety Instructions.....	10
Before You Begin.....	12
Installing the Card.....	14
<b>Chapter 4: Installing the Deployment Software</b> .....	<b>15</b>
XRT and Deployment Shell Installation Procedures on RedHat and CentOS.....	16
XRT and Deployment Shell Installation Procedures on Ubuntu.....	18
<b>Chapter 5: Card Bring-Up and Validation</b> .....	<b>22</b>
Running lspci.....	22
Running xbutil flash scan.....	23
xbutil validate.....	24
<b>Chapter 6: Next Steps</b> .....	<b>26</b>
<b>Chapter 7: Troubleshooting</b> .....	<b>27</b>
Known Issues.....	28
<b>Appendix A: Changing XRT and Shell Versions</b> .....	<b>30</b>
RedHat and CentOS.....	30
Ubuntu.....	33
<b>Appendix B: Reverting the Card to Factory Image</b> .....	<b>37</b>

<b>Appendix C: Creating a Vault Repository for CentOS.....</b>	<b>38</b>
<b>Appendix D: Generating the xbutil flash Command.....</b>	<b>40</b>
<b>Appendix E: Additional Resources and Legal Notices.....</b>	<b>42</b>
Xilinx Resources.....	42
Documentation Navigator and Design Hubs.....	42
References.....	43
Please Read: Important Legal Notices.....	43

# Introduction

This document provides hardware and software installation procedures for the Alveo™ U50 Data Center accelerator card and applies to SDAccel™ releases 2019.1 and greater.

The half-height, half-length U50 Alveo card is Gen3x16 PCI Express® (PCIe) compliant and Gen4x8 compatible. It features the Xilinx® UltraScale+™ Architecture and is used to accelerate compute-intensive applications such as database acceleration, machine learning, data analytics, financial computing, and video processing.

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

- **Running Applications:** 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](#), installs both a development shell and the SDAccel development 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.

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## Minimum System Requirements

The minimum system requirements for running an Alveo™ Data Center accelerator card are listed below:

*Table 1: Minimum System Requirements*

Component	Requirement
Motherboard	PCI Express® 3.0-compliant with one x16 slot.

Table 1: Minimum System Requirements (cont'd)

Component	Requirement
System Power Supply	75W
Operating System	Linux, 64-bit: <ul style="list-style-type: none"> <li>• Ubuntu 16.04, 18.04</li> <li>• CentOS 7.4, 7.5, 7.6</li> <li>• RHEL 7.4, 7.5, 7.6</li> </ul>
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 device 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>SDAccel Environment Release Notes, Installation, and Licensing Guide (UG1238)</i> .

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

## Validated Servers

The following is a preliminary list of servers and platforms intended to be validated for the U50.

Table 2: Validated Servers

Manufacturer	Model/Platform
Dell EMC	PowerEdge R640
Dell EMC	PowerEdge R740
HPE	ProLiant DL380 G10
SuperMicro	SYS-7049GP-TRT Workstation

# Unpacking

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## Product Registration



**IMPORTANT!** To receive updates, register your product at <https://www.xilinx.com/products/design-tools/software-zone/sdaccel.html#gettingstarted>.

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**IMPORTANT!** Pour recevoir les mises à jour, enregistrez votre produit sur <https://www.xilinx.com/products/design-tools/software-zone/sdaccel.html#gettingstarted>.

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**WICHTIG!** Um Updates zu erhalten, registrieren Sie ihr Produkt unter <https://www.xilinx.com/products/design-tools/software-zone/sdaccel.html#gettingstarted>.

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## Accelerator Card Overview

### 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:

1. A PCI Express® card connector.
2. Two SFP-DD interfaces.

**Note:** For production cards, only one QSFP interface is available.

3. Maintenance Connector.

Used to program the card in RTL flow.

Figure 1: Alveo U50 Card with Full-Height Bracket

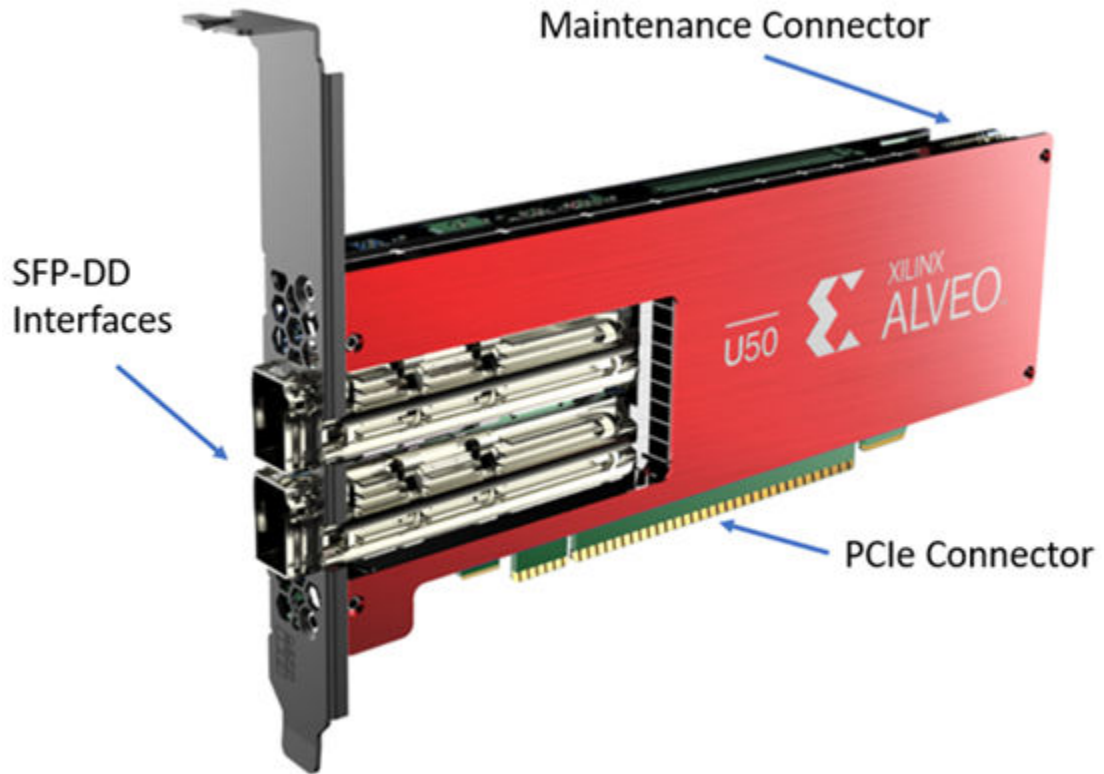
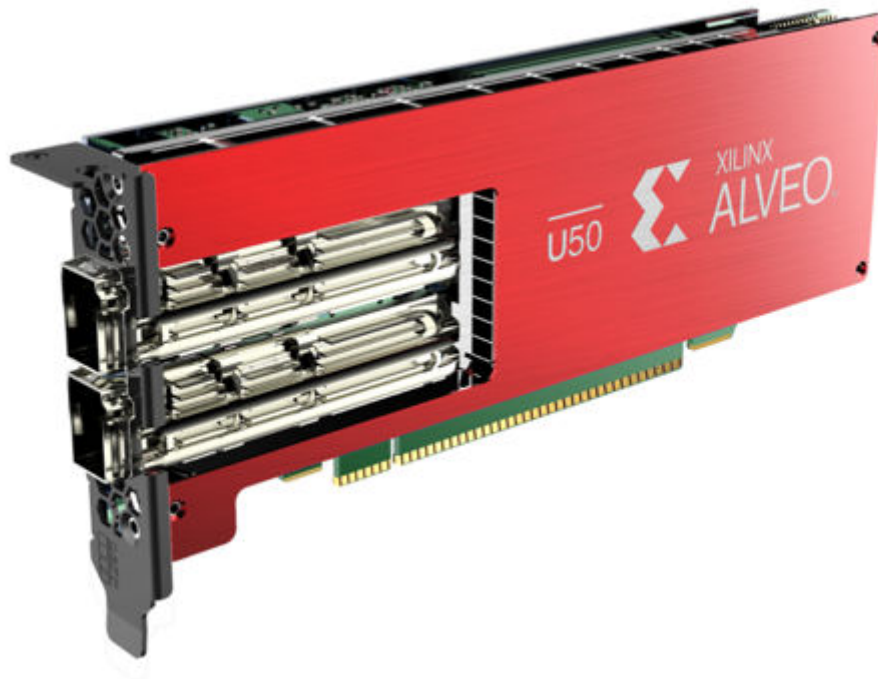


Figure 2: Alveo U50 Card with Half-Height Bracket





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. See [Replacing the Bracket](#) for more information.
- 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. See related topics below for more information.

### Related Information

[Minimum System Requirements](#)

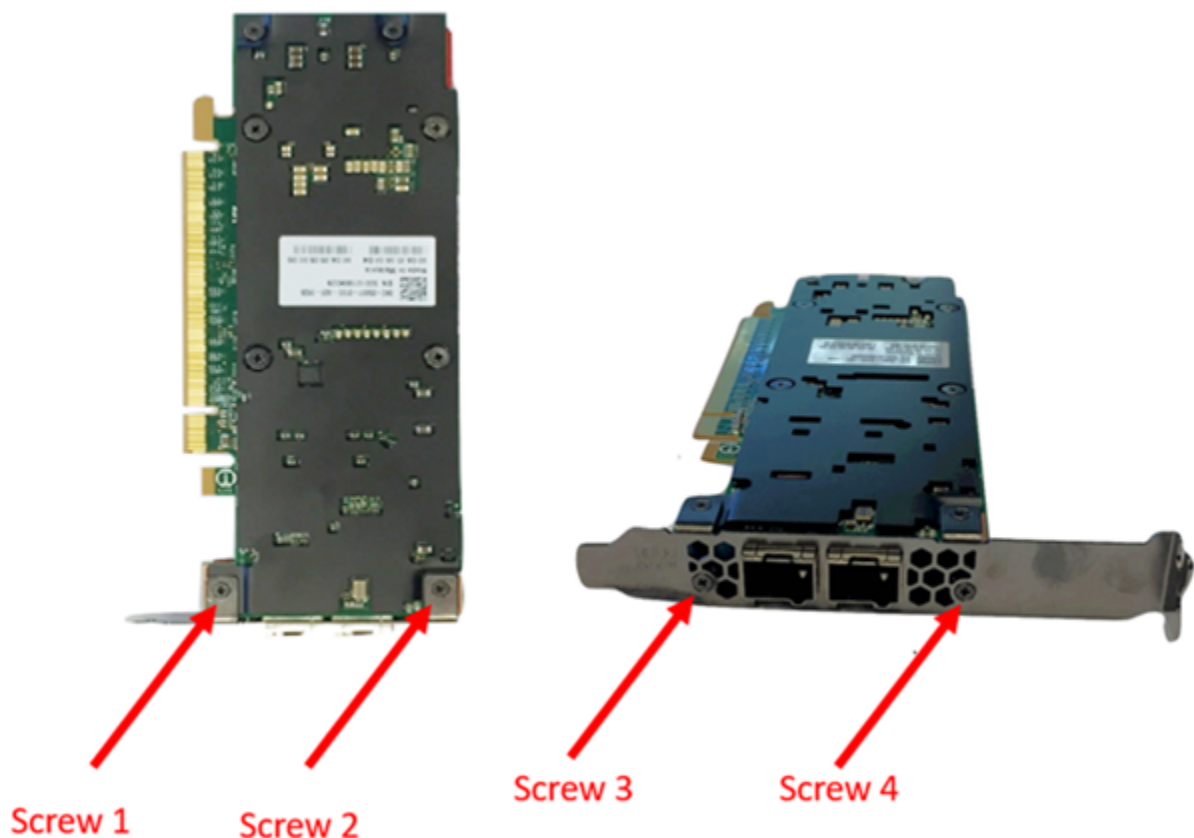
[Validated Servers](#)

## Replacing the Bracket

The Alveo U50 card can be used with either a full-height or half-height bracket, as shown in [Card Interfaces and Details](#). 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.

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.

**Note:** Do not power-on a passively cooled card without adequate forced airflow across the card, otherwise the card can be damaged. 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, NUMA node 0
Memory at 38bff2000000 (64-bit, prefetchable) [size=32M]
Memory at 38bff4000000 (64-bit, prefetchable) [size=128K]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=33 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [1c0] #19
Capabilities: [1f0] Virtual Channel
Capabilities: [e00] Access Control Services
Capabilities: [e10] #15
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 message similar to either of these, 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.

**Note:** For those using RTL flow instead of the SDAccel™ flow, see the *Alveo U50 Data Center Accelerator Card User Guide (UG1371)* for details on programming the card.

The deployment software consists of the following two software packages:

- Xilinx® runtime (XRT)

XRT provides the libraries and drivers for an application to run on Alveo™ cards.

- Deployment shell

The deployment shell 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.

Both the Xilinx runtime (XRT) and deployment shell 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](#).



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**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 Shell Installation Procedures on RedHat and CentOS

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

For details on upgrading or downgrading the XRT and deployment shell, see [Appendix A: Changing XRT and Shell Versions](#).



**IMPORTANT!** *The installation packages referenced here are updated regularly and the file names frequently change. If you copy and paste any commands from this user guide, be sure to update the placeholders in those commands to match the downloaded packages.*



**IMPORTANT!** *Les packages d'installation référencés ici sont mis à jour régulièrement et les noms de fichier changent fréquemment. Si vous copiez et collez des commandes de ce guide, veuillez à mettre à jour les espaces réservés dans ces commandes pour qu'ils correspondent aux packages téléchargés.*



**WICHTIG!** *Die hier genannten Installationspakete werden regelmäßig aktualisiert und die Dateinamen ändern sich häufig. Wenn Sie Befehle aus diesem Benutzerhandbuch kopieren und einfügen, müssen Sie die Platzhalter in diesen Befehlen entsprechend den heruntergeladenen Paketen aktualisieren.*

1. Xilinx® runtime (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 [Appendix C: Creating a Vault Repository for CentOS](#)

3. After the above command completes, reboot your machine.
4. Download both the Xilinx® runtime (XRT) and deployment shell installation packages from the [Alveo U50 Product Page](#).
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. Install the deployment shell installation package:

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

The deployment software sources are now installed on the system. The installation of the drivers, runtime software, and utilities are in the `/opt/xilinx/` directory and contains the `xrt` and `dsa` sub-directories. The `dsa` folder contains the deployment shell installation.

After installing the deployment shell you will see the following message:

```
Shell package installed successfully.
Please flash card manually by running below command:
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

7. 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/xbutil flash -a <shell_name>
```

If you have multiple cards installed or need to regenerate the command, follow the steps given in [Appendix D: Generating the xbutil flash Command](#).

8. You will be asked to confirm the update, as shown below. Type **y** and **enter**.

```
Probing card[0]: Shell on FPGA needs updating
Shell on below card(s) will be updated:
Card [0]
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 [Chapter 7: Troubleshooting](#).

```
INFO: ***Found 485 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
1 Card(s) flashed successfully.

Cold reboot machine to load new image on FPGA
```

If you have previously upgraded the card, you will see a message similar to the following:

```
Probing card[0]: Shell on FPGA is up-to-date
0 Card(s) flashed successfully.
```

9. 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.

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

## XRT and Deployment Shell Installation Procedures on Ubuntu

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

For details on upgrading or downgrading the XRT and deployment shell, see [Appendix A: Changing XRT and Shell Versions](#).



**IMPORTANT!** *The installation packages referenced here are updated regularly and the file names frequently change. If you copy and paste any commands from this user guide, be sure to update the placeholders in those commands to match the downloaded packages.*



**IMPORTANT!** *Les packages d'installation référencés ici sont mis à jour régulièrement et les noms de fichier changent fréquemment. Si vous copiez et collez des commandes de ce guide, veuillez à mettre à jour les espaces réservés dans ces commandes pour qu'ils correspondent aux packages téléchargés.*



**WICHTIG!** *Die hier genannten Installationspakete werden regelmäßig aktualisiert und die Dateinamen ändern sich häufig. Wenn Sie Befehle aus diesem Benutzerhandbuch kopieren und einfügen, müssen Sie die Platzhalter in diesen Befehlen entsprechend den heruntergeladenen Paketen aktualisieren.*

1. Download both the Xilinx® runtime (XRT) and deployment shell installation packages from the **Getting Started** tab of the [Alveo U50 Product Page](#).
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.

3. Install the deployment shell installation packages required for the card:

```
$ sudo apt install ./xilinx-<card>-<version>.deb
```

The deployment software sources are now installed and deployed on the system. The installation of the drivers, runtime software, and utilities are in the `/opt/xilinx/` directory and contains the `xrt` and `dsa` sub-directories. Note that the `dsa` folder contains the deployment shell installation.

After installing the deployment shell you will see the following message:

```
Shell package installed successfully.
Please flash card manually by running below command:
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

4. 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/xbutil flash -a <shell_name>
```

If you have multiple cards installed or need to regenerate the command, follow the steps given in [Appendix D: Generating the xbutil flash Command](#).

5. You will be asked to confirm the update, as shown below. Type **y** and **enter**.

```
Probing card[0]: Shell on FPGA needs updating
Shell on below card(s) will be updated:
Card [0]
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 [Chapter 7: Troubleshooting](#).

If you have previously upgraded the card, you will see a message similar to the following:

```
Probing card[0]: Shell on FPGA is up-to-date
0 Card(s) flashed successfully.
```

6. You will be asked to confirm the update, as shown below. Type **y** and **enter**.

```
Probing card[0]: Shell on FPGA needs updating
Shell on below card(s) will be updated:
Card [0]
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 [Chapter 7: Troubleshooting](#).

```
INFO: ***Found 485 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
```

```
Programming flash.....
Cleared bitstream guard. Bitstream now active.
1 Card(s) flashed successfully.
```

```
Cold reboot machine to load new image on FPGA
```

If you have previously updated the card, you will see a message similar to the following:

```
Probing card[0]: Shell on FPGA is up-to-date
0 Card(s) flashed successfully.
```

7. Cold boot the 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.*

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

# Card Bring-Up and Validation

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

- `lspci`
- `xbutil flash scan`
- `xbutil validate`

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

The second and third commands use the Xilinx® `xbutil` utility, which is included during the XRT package installation. This utility includes multiple commands to validate and identify the installed card(s) and report additional card details including DDR, PCIe®, shell name, and system information. This guide uses two, `xbutil flash scan` and `xbutil validate`. See *SDx Command and Utility Reference Guide (UG1279)*, or run `xbutil help`, for a complete list of `xbutil` command options and definitions along with debug information.

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

Use the following command in `cs` 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 one below. Note that for each card, there will be two different devices found: one for management and one for user.

```
65:00.0 Processing accelerators: Xilinx Corporation Device 5020
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0, NUMA node 0
Memory at 38bff2000000 (64-bit, prefetchable) [size=32M]
Memory at 38bff4000000 (64-bit, prefetchable) [size=128K]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=33 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [1c0] #19
Capabilities: [1f0] Virtual Channel
Capabilities: [e00] Access Control Services
Capabilities: [e10] #15
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 206, NUMA node 0
Memory at 38bff0000000 (64-bit, prefetchable) [size=32M]
Memory at 38bff4020000 (64-bit, prefetchable) [size=64K]
Memory at 38bfe0000000 (64-bit, prefetchable) [size=256M]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=33 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [e00] Access Control Services
Capabilities: [e10] #15
Kernel driver in use: xocl
Kernel modules: xocl
```

---

## Running xbutil flash scan

Use the `xbutil flash scan` command to view and validate the card's current firmware version, as well as display the installed card details, including card ID, shell name, and timestamp.

1. Enter the following command:

```
$ sudo /opt/xilinx/xrt/bin/xbutil flash scan
```

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

```
Card [0]
Card BDF:          0000:65:00.0
Card type:         u50
Flash type:        SPI
Shell running on FPGA:
    xilinx_u50_xdma_201910_1, [TS=0x000000005d313d3b], [SC=5.0.5]
Shell package installed in system:
    xilinx_u50_xdma_201910_1, [TS=0x000000005d313d3b], [SC=5.0.5]
```

In this example, the card ID is 0.

The name of the shell and associated timestamp, along with the SC firmware version, running on the FPGA are found under `Shell package installed in FPGA` while the ones installed in the system are found under `Shell package installed in system`.

In the above output example, the shell on the FPGA and system are identical; the deployment shell name is named `xilinx_u50_xdma_201910_1`, the timestamp is `0x000000005d1c8229` and the SC version is `5.0.4`. Note in these outputs, `TS` is the timestamp and `SC` is referring to the Satellite Controller.

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

If these shell versions do not match, see [Chapter 7: Troubleshooting](#).

## xbutil validate



**IMPORTANT!** *The `xbutil validate` utility is currently not functioning on the Alveo U50 card. The output log below is an example only.*

The `xbutil validate` command generates a high-level, easy to read summary of the installed card. It 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 bandwidth tests:
  - a. DMA test - Data transfer between host and FPGA DDR through PCIe.
  - b. DDR test - Data transfer between kernels and FPGA DDR.

The `validate` command has the format:

```
xbutil validate -d <card_id>
```



where `card_id` is optional.

Run the `validate` command shown below to validate card 0:

```
$ sudo /opt/xilinx/xrt/bin/xbutil validate -d 0
```

If the card was installed correctly, you will see a message 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_xdma_201910_1
INFO: Checking PCIE link status: PASSED
INFO: Starting verify kernel test:
INFO: verify kernel test PASSED
INFO: Starting DMA test
Host -> PCIe -> FPGA write bandwidth = 11346.1 MB/s
Host <- PCIe <- FPGA read bandwidth = 11333.6 MB/s
INFO: DMA test PASSED
INFO: Starting DDR bandwidth test: .....
Maximum throughput: 45374.042969 MB/s
INFO: DDR bandwidth test PASSED
INFO: Starting P2P test
P2P BAR is not enabled. Skipping validation
INFO: P2P test PASSED
INFO: Starting M2M test
bank0 -> bank1 M2M bandwidth: 12117.8 MB/s
bank0 -> bank2 M2M bandwidth: 12118.9 MB/s
bank0 -> bank3 M2M bandwidth: 12113.8 MB/s
bank1 -> bank2 M2M bandwidth: 12150 MB/s
bank1 -> bank3 M2M bandwidth: 12118.3 MB/s
bank2 -> bank3 M2M bandwidth: 12111.5 MB/s
INFO: M2M test PASSED
INFO: Card[0] validated successfully.
INFO: All cards validated successfully.
```

## 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.

For additional information on the Alveo U50 card, see *Alveo U50 Data Center Accelerator Card User Guide* ([UG1371](#)).

If you are an application developer who wants to develop and deliver accelerated applications, install the SDAccel™ development software. It allows you to develop, debug, and optimize accelerated applications for Alveo cards. Installation instructions can be found in *SDAccel Environment Release Notes, Installation, and Licensing Guide* ([UG1238](#)).

For an overview of developing accelerated applications with Alveo™ with accompanying guided examples, see *Get Moving with Alveo* ([UG1352](#)).

For complete details on the development flow and getting started in SDAccel, see *SDAccel Environment User Guide* ([UG1023](#)). For an introduction to SDAccel methodology, see *SDAccel Methodology Guide* ([UG1346](#)).

## Troubleshooting

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

**Table 3: 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 <a href="#">Alveo U50 Data Center Accelerator Cards Data Sheet (DS965)</a> .
	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 <a href="#">Chapter 4: Installing the Deployment Software</a> .
lspci no longer recognizes the card.	Card is overheating.	Ensure that operating ambient conditions do not exceed specifications.
XRT installation incomplete or unsuccessful.	Missing dependent packages.	Contact your Linux administrator.
Deployment shell installation incomplete or unsuccessful.	Missing dependent packages.	Contact your Linux administrator.
xbutil flash returns the error:  Specified DSA is not applicable	Correct type of deployment shell package not installed.	Install the correct type of deployment shell package.
Unable to install the packages.	Incorrect permissions for download directory.	Download the packages to a directory where root has read access (for example /tmp).
When running xbutil the following message is displayed:  Failed to open device: 0000:3b:00.0 INFO: Found total 1 card(s); 0 are usable.	Driver has not loaded successfully or the card is not flashed successfully.	Perform a cold reboot.

Table 3: Card Troubleshooting (cont'd)

Issue	Potential Cause	Fix
XRT package fails to install on CentOS7.4, CentOS7.5, or CentOS7.6	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><b>Note:</b> 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:  Error: Failed to find Xilinx platform	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:  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)	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 <a href="#">AskUbuntu</a> .

## Known Issues

The following table lists known issues.

Table 4: Known Issues

Area	Description	Comments/Recommendations
General	On CentOS 7.5, 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 \$ sudo modprobe xclmgmt</pre>
General	The card is not present in when running <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.

Table 4: **Known Issues** (cont'd)

Area	Description	Comments/Recommendations
General	The 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]: INFO: Checking PCIE link status: FAILED WARNING: Device trained to lower spec. Expect: Gen3x16, 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 in 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
xbutil	<code>xbutil</code> commands do not work. There are no errors indicating this in output.	Reinstall the XRT package.

# Changing XRT and Shell Versions

The Alveo™ Data Center Accelerator card shell revisions can change significantly between releases. To ensure a successful upgrade (or downgrade) of the Alveo card XRT and shell, 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 shell 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 shell on your Alveo card by following these steps. Currently, both packages must be upgraded concurrently.

1. Download the desired XRT and deployment shell packages.
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 yum install ./xrt-<version>.rpm
```

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

3. Install the deployment shell installation packages required for the card.

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

After the deployment shell is installed on the system, you will see the following message:

```
DSA package installed successfully.
Please flash card manually by running below command:
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

- Flash the firmware to the Alveo card with the following command where `<shell_name>` is the name of the deployment shell being installed. To display the `shell_name`, see [Appendix D: Generating the xbutil flash Command](#) for details.

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

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

```
Probing board[0]: DSA on FPGA needs updating
DSA on below cards will be updated:
Card [0]
Are you sure you wish to proceed? [y/n]
```

Flashing will take up to 10 minutes. Successfully flashing a new card results in a message similar to the one shown below. If you do not see one, refer to [Chapter 7: Troubleshooting](#).

```
Updating SC firmware on card[0]
INFO: found 5 sections
.....
INFO: Loading new firmware on SC
.
Updating shell on card[0]
INFO: ***Found 500 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
1 Card(s) flashed successfully.
Cold reboot machine to load the new image on FPGA.
```

If you have previously upgraded the card, you will see a message similar to the following:

```
Probing card[0]: DSA on FPGA is up-to-date
0 Card(s) flashed successfully.
```

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

## Downgrading Packages

You can downgrade the XRT and deployment shell on your Alveo card by following these steps. Both packages must be downgraded concurrently. Note that the deployment shell package must be downgraded prior to the XRT package.

1. Download the desired version of the deployment shell and XRT package files. Both must be from the same release (i.e., both are 2019.1 package releases).
2. Run the following command in a Linux terminal. The shell package name is the name of the package file downloaded in step 1.

```
$ sudo yum downgrade ./xilinx_<desired_depl_shell_version>.rpm
```

3. Cold boot your machine by fully powering it off and then on.
4. Manually generate the `xbutil flash` command by following the instructions in [Appendix D: Generating the xbutil flash Command](#).

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name> -d <card_ID>
```

**Note:** Not specifying the card ID within the `xbutil flash` command through the `-d` option can result in damage to the card.

5. Run the manually generated `xbutil flash` command.

If you have multiple cards installed on the server, you **MUST** run the `xbutil flash` command separately for each card.

6. You will be asked to confirm the update, as shown below. Type **y** and **enter**.

```
Probing board[0]: DSA on FPGA needs updating
DSA on below cards will be updated:
Card [0]
Are you sure you wish to proceed? [y/n]
```

Flashing will take up to 10 minutes. Successfully flashing a new card results in a message similar to the one shown below. If you do not see one, refer to [Chapter 7: Troubleshooting](#).

```
INFO: ***Found 880 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
DSA image flashed succesfully
Cold reboot machine to load the new image on FPGA
```

7. Cold boot the machine to load the new firmware image on the FPGA. The deployment shell package has now successfully been downgraded.
8. Downgrade the XRT package by running the following command in a Linux terminal. The XRT package name is the name of the package file downloaded in step 1.

```
$ sudo yum downgrade ./<desired_xrt_version>.rpm
```

9. Reboot your machine. The XRT has now successfully been downgraded.



## Uninstalling Packages

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

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

**Note:** Make sure that all of the shell 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 shell 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 shell on your Alveo card by following these steps. Currently, both packages must be upgraded concurrently.

1. Download the desired XRT and deployment shell packages.
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.

3. Install the deployment shell installation packages required for the card.

```
$ sudo apt install ./xilinx-<card>-<version>.deb
```

After the deployment shell is installed on the system, you will see the following message:

```
DSA package installed successfully.  
Please flash card manually by running below command:  
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

- Flash the firmware to the Alveo card with the following command where `<shell_name>` is the name of the deployment shell being installed. To display the `shell_name`, see [Appendix D: Generating the `xbutil flash` Command](#) for details.

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name>
```

- You will be asked to confirm the update, as shown below. Type `y` and `enter`.

```
Probing board[0]: DSA on FPGA needs updating
DSA on below cards will be updated:
Card [0]
Are you sure you wish to proceed? [y/n]
```

Flashing will take up to 10 minutes. Successfully flashing a new card results in a message similar to the one shown below. If you do not see one, refer to [Chapter 7: Troubleshooting](#).

```
Updating SC firmware on card[0]
INFO: found 5 sections
.....
INFO: Loading new firmware on SC
.
Updating shell on card[0]
INFO: ***Found 500 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
1 Card(s) flashed successfully.
Cold reboot machine to load the new image on FPGA.
```

If you have previously upgraded the card, you will see a message similar to the following:

```
Probing card[0]: DSA on FPGA is up-to-date
0 Card(s) flashed successfully.
```

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

## Downgrading Packages

You can downgrade the XRT and deployment shell on your Alveo card by following these steps. Both packages must be downgraded concurrently. Note that the deployment shell package must be downgraded prior to the XRT package.

- Download the desired version of the deployment shell and XRT package files. Both must be from the same release (i.e., both are 2019.1 package releases).
- Run the following command in a Linux terminal. The shell package name is the name of the package file downloaded in step 1.

```
$ sudo apt install ./xilinx_<desired_depl_shell_version>.deb
```

3. Cold boot your machine by fully powering it off and then on.
4. Manually generate the `xbutil flash` command by following the instructions in [Appendix D: Generating the xbutil flash Command](#).

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name> -d <card_ID>
```

**Note:** Not specifying the card ID within the `xbutil flash` command via the `-d` option can result in damage to the card.

5. Run the manually generated `xbutil flash` command.

If you have multiple cards installed on the server, you **MUST** run the `xbutil flash` command separately for each card.

6. You will be asked to confirm the update, as shown below. Type `y` and `enter`.

```
Probing board[0]: DSA on FPGA needs updating
DSA on below cards will be updated:
Card [0]
Are you sure you wish to proceed? [y/n]
```

Flashing will take up to 10 minutes. Successfully flashing a new card results in a message similar to the one shown below. If you do not see one, refer to [Chapter 7: Troubleshooting](#).

```
INFO: ***Found 880 ELA Records
Idcode byte[0] ff
Idcode byte[1] 20
Idcode byte[2] bb
Idcode byte[3] 21
Idcode byte[4] 10
Enabled bitstream guard. Bitstream will not be loaded until flashing is
finished.
Erasing flash.....
Programming flash.....
Cleared bitstream guard. Bitstream now active.
DSA image flashed succesfully
Cold reboot machine to load the new image on FPGA
```

7. Cold boot the machine to load the new firmware image on the FPGA.  
The deployment shell package has now successfully been downgraded.
8. Downgrade the XRT package by running the following command in a Linux terminal. The XRT package name is the name of the package file downloaded in step 1.

```
$ sudo apt install ./xrt-<desired_xrt_version>.deb
```

9. Reboot your machine.

The XRT has now successfully been downgraded.

## Uninstalling Packages

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

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

**Note:** Make sure that all of the shell 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 factory (Golden) image using the supplied Xilinx® runtime (XRT) utility `xbutil`. This requires that XRT (2019.1 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.

```
$ sudo /opt/xilinx/xrt/bin/xbutil flash -r
```

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

```
Cold reboot machine to revert board to MFG mode
```

4. Cold- reboot by power cycling the system to complete the reverting process.
5. Validate that the card has been reverted to factory image by running the following command.

```
$ sudo /opt/xilinx/xrt/bin/xbutil flash scan
```

An output similar to the following is displayed.

```
XBFLASH -- Xilinx Card Flash Utility
Card [0]
Card BDF:    0000:d8:00.0
Card type:   u50
Flash type:  SPI
Shell running on FPGA:
  xilinx_u50_GOLDEN_4294967295, [SC=5.0]
Shell package installed in system:
  xilinx_u50_xdma_201910_1, [TS=0x000000005d313d3b], [SC=5.0.5]
```

**Note:** In the output above, under Shell running on FPGA, note GOLDEN in the name. This indicates that the card has successfully been reverted to factory image.

# 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".

# Generating the xbutil flash Command

To flash the firmware installed in the system to the Alveo™ card, use the `xbutil flash` command.

The format of the `xbutil flash` command is:

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a <shell_name> -d <card_ID>
```

To obtain the necessary card ID (-d) and shell name (-a) command options, run the following `xbutil flash scan` command. For more information, see [Running xbutil flash scan](#).

```
sudo /opt/xilinx/xrt/bin/xbutil flash scan
```

For each card in the server, you will see an output similar to the example below. In this example, the Shell running on FPGA does not match Shell package installed in system, implying that the Shell running on FPGA needs to be updated using the `xbutil flash` command.

```
Card [0]
Card BDF:                0000:02:00.0
Card type:               u200
Flash type:              SPI
Shell running on FPGA:
  xilinx_u200_xdma_201830_1, [TS=0x000000005bece8e1], [SC=3.1]
Shell package installed in system:
  xilinx_u200_xdma_201830_2, [TS=0x000000005cdb19fa], [SC=4.1.0]
```

The shell name value needs to be taken from Shell package installed in system. In this output, the `xbutil flash` command options are:

- **Card ID (-d):**

```
Card [0]
```

The card ID is 0. The card ID will change if any cards are installed or uninstalled. Do not assume that the card ID will remain static.



- **Shell name (-a):**

```
Shell package installed in system:  
xilinx_u200_xdma_201830_2,[TS=0x00000005cdb19fa],[SC=4.1.0]
```

The shell name is `xilinx_u200_xdma_201830_2`.

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

```
sudo /opt/xilinx/xrt/bin/xbutil flash -a xilinx_u200_xdma_201830_2 -d 0
```

When the Alveo card is successfully flashed, the `xbutil flash scan` output will show the same package information for both `Shell package installed in FPGA:` and `Shell package installed in system:`.

If you have multiple cards installed on the server, you **MUST** run the `xbutil flash` command separately for each card.



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

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

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

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# Additional Resources and Legal Notices

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## Xilinx Resources

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

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## Documentation Navigator and Design Hubs

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- 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.

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## References

### SDAccel Documents

These documents provide supplemental material useful with this guide:

1. *SDAccel Environment User Guide* ([UG1023](#))
2. *SDx Command and Utility Reference Guide* ([UG1279](#))
3. *SDAccel Environment Debugging Guide* ([UG1281](#))
4. *SDAccel Environment Profiling and Optimization Guide* ([UG1207](#))
5. *SDAccel Development Environment Tutorials* ([GitHub](#))

### Alveo Documents

1. *Alveo U50 Data Center Accelerator Card User Guide* ([UG1371](#))
2. *Alveo U50 Debug and Maintenance Board User Guide* ([UG1377](#))

### Additional Resources

1. Xilinx® licensing website: <https://www.xilinx.com/getproduct>
2. SDAccel Developer Zone: <https://www.xilinx.com/products/design-tools/software-zone/sdaccel.html>
3. Xilinx Community Forums: <https://forums.xilinx.com>
4. *Xilinx End-User License Agreement* ([UG763](#))
5. *Third Party End-User License Agreement* ([UG1254](#))

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