



## HES-DVM Proto CE (Cloud Edition) AMI 1.0.0

Revision 1.0.0

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Piotr Czak

Intermediate

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### **Abstract**

This document provides essential information on configuring and launching Aldec AMI and instructions of using Aldec HES-DVM Proto CE and Board Compiler.

**Meta Keywords** HES-DVM Proto, Partitioning, AWS, AMI

**Related Products** HES-DVM, HES-DVM PROTO

**Related Methodologies** ASIC Prototyping

**Related Markets** Military, Aerospace, Avionics, Medical, Nuclear, Transportation, Telecommunications, Radar, High Frequency Trading, Gaming, Embedded, Automotive, IoT, UAV, High Performance Computing

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## Introduction

Aldec provides this AMI as a fully contained Partitioning system with Aldec HES-DVM Proto CE tool to partition a design for up to four (4) FPGA chips and four (4) partitions with support for Aldec [HES](#) and custom prototyping boards. For full unlimited version of HES-DVM please contact Aldec at [sales@aldec.com](mailto:sales@aldec.com).

Aldec HES-DVM Proto CE tool available in this AMI is a **Bring Your Own License (BYOL)** product. The license can be obtain vi the [Aldec webpage](#). More information about obtaining the license file can be found in “**Obtain a license file for HES-DVM**” chapter.

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*Vivado P&R is not provided at Aldec AMI, Aldec HES-DVM Proto CE includes FPGA synthesis and partitioning engines.*

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*Instructions provided in this documentation apply for operations between a local Linux workstation and an AMI Linux host.*

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## Terms and Conditions

Prior using Aldec AMI you need to accept End User License Agreement. The AMI is provided with the root privilege and Aldec does not take any responsibility of unrestricted access to your instance.

## Installed Packages

The provided AMI contains the following preinstalled packages:

- Aldec HES-DVM Proto CE
- AWS CLI
- Python3
- X2GoServer
- Mate-desktop1
- Gedit
- Xterm
- MC
- Htop
- P7zip
- Chromium

## Prerequisites

Using the Aldec AMI with HES-DVM Proto CE requires some basic knowledge about Amazon EC2. The following list is a primary list of prerequisites:

- Go through the [Getting Started with Amazon EC2 Linux instances](#)
- Follow [Launching an instance using the Launch Instance Wizard](#)
- You need to have AWS IAM credentials that give permissions to run EC2 instances.
- A network security group that allows SSH access from your host. More information on how to modify/add new security groups can be found [here](#).

## Quickstart

To run and use the Aldec AMI perform the following main steps:

1. Subscribe and launch the Aldec AMI.
2. Connect to the Aldec AMI based instance.
3. Obtain a license file for HES-DVM.
4. Use HES-DVM.

All of these steps are described in next chapters.

## Subscribe and launch the Aldec AMI

The screenshot displays the AWS Marketplace listing for the Aldec DVM-Proto CE (Cloud Edition) AMI. The product is listed by Aldec, Inc. with the latest version being 1.0.0.2020.03. The description states it is a pre-built Amazon Linux image for FPGA prototyping. The typical total price is \$0.166 per hour. The 'Product Overview' section details the tool's capabilities, including guided partitioning and automatic conversion of gated clocks. A 'Highlights' box lists features such as guided partitioning, automatic conversion of gated clocks, and automatic insertion of Inter-Chip-Connection (ICC) buses. A metadata table at the bottom provides details on version, categories, operating system, and delivery methods.

Version	1.0.0.2020.03
By	Aldec
Video	See Product Video
Categories	Application Development
Operating System	Linux/Unix, Amazon Linux 2.0.20201126.0
Delivery Methods	Amazon Machine Image

Figure 1: Aldec HES-DVM Proto in AWS.

Launch an instance using this AMI from the AWS Marketplace using either of the following options:

- 1-Click launch
  - Launches your instance with the default instance, networking, storage and security group settings.
  - Creates a security group that allows SSH access from any IP address.
- Manual launch
  - Guides you through the steps to configure the instance, networking, storage and security groups.
  - Let's you add the EBS volume to store your project.

To connect to the instance, it will be necessary to create a key pair and use the private one.

[Documentation](#) describes all necessary steps of creating a key pair.

## Connect to the Aldec AMI based instance

It is possible to connect to the instance either by SSH console or X2Go:

- SSH as the **ec2-user** user with the key associated with your instance. More information can be found in this [instruction](#).

```
ssh -i <PRIVATE_KEY> ec2-user@<PUBLIC_IP/EXTERNAL_DNS_HOSTNAME>
```

- To connect to an Instance with the Aldec AMI use **X2GO Client** with the following configuration:
  - Host: <PUBLIC\_IP>
  - Login: **ec2-user**
  - SSH port: **22**
  - User RSA/DSA key for ssh connection: <PRIVATE\_KEY>
  - Session type: **MATE**



Figure 2: Aldec AMI desktop.

## Obtain a license file for HES-DVM

After connecting to the instance with X2Go press **HES-DVM CE License** button available on the desktop. It will automatically open Aldec webpage and fill fields with instance information ([Figure 3](#)).

Home > multi-fpga-partitioning

**Multi-FPGA Partitioning on AWS Cloud**

Due to the size of today's SoC designs, the prototyping boards must contain multiple, large FPGA devices that are scalable (or expandable). Selecting the appropriate FPGA, prototyping board and design partitioning solutions are among the challenges many teams are facing today. Not only the design has to be split into blocks so that each of them matches one FPGA, but also the user has to arrange interconnections between them using physical I/Os and traces available on the board.

**HES-DVM Proto Key Features & Benefits**

- Fast-track setup for multi-FPGA prototyping
- Guided partitioning using design structure model and top-down strategy
- Instance logic replication in many partitions for clocking modules
- Monitoring utilized logic resources and interconnections
- Dry run and "what if" impact analysis to simulate many partition configurations
- Automatic conversion of gated clocks and netlist optimization
- Clock domain crossing analyzer and timing constraints editor
- Support for Aldec HES and third party custom boards
- Board-level connecting resources awareness, global clocks and traces, LVDS, single-ended
- Automatic insertion of Inter-Chip-Connection (ICC) buses

**Fields are required**

First Name:\*

Last Name:\*

Organization:\*

Country:\*

Phone Number:\*

Email:\*

Platform:\*

MAC Addr:\*

M.P.C. :\*

Account ID:\*

Image ID:\*

Instance Type:\*

**Billing Information**

Name as on Card:\*

Card Number:\*

Expir. Date(MMY):\*

CVV2/CID:\*

Billing Address:\*

Billing Zip Code:\*

License Duration:\*

I authorize the above credit card to be charged in the total amount of \$1000.00.

Security code:\*

Cancel Request

**Figure 3: Aldec HES-DVM CE license request page.**

Fill rest of the fields and send a request for the license. When you receive the license file from Aldec, copy it to the AMI. One of the options to copy from a local Linux host is by the following command:

```
scp -i <PRIVATE_KEY> ./license.dat ec2-user@<PUBLIC_IP >:~/
```

SCP installation and usage is described in “[SCP Linux command](#)” chapter. “[How to download your design to AWS account](#)” chapter describes other alternative ways to upload files to an AWS instance.

Then copy it into `/opt/Aldec/license` folder, replace `this_host` with a host name in the license file. Linux `vi` or `gedit` can be used to modify the license file. Then reboot the instance. This will automatically start the license server required by HES-DVM.

To get more information about the license server visit [Aldec webpage](#).

---

*Note: A license file needs to be requested for every Aldec AMI based instances.*

---

## Use HES-DVM

To store your project data you can use either an AMI volume or add a new one while creating the instance. The simplest way to copy your project to the AMI volume is using **scp** Linux command or use FileZilla. SCP installation and usage is described in “**SCP Linux command**” chapter. “**How to download your design to AWS account**” chapter describes other alternative ways to upload files to an AWS instance.

```
scp -i <PRIVATE_KEY> <PROJECT_TO_COPY> ec2-user@<PUBLIC_IP >:~/
```

---

*Note: We recommend to use an additional EBS volume to store your project. The AMI volume will be automatically deleted due to accidental instance termination while EBS volume will not.*

---

To start HES-DVM Proto go to your project folder and call **dvm** in a Linux terminal.

Aldec HES-DVM Proto CE and the AMI include a comprehensive documentation about using HES-DVM Proto tool. The documentation can be found in the AMI desktop as **HES-DVM CE Help** or in **Help->Contents** menu of HES-DVM. Two main chapters are:

- **User’s Guide -> Board Compiler** – it describes how to import third party boards files and use it in HES-DVM,
- **User’s Guide -> DVM** – it provides an instruction of using HES-DVM for the design partitioning.

## Instance Termination and Resources Cleanup

When you terminate an instance using this AMI, the AMI volume will be automatically deleted. Therefore, you should not use it for storing your project. You should use EBS volume instead.

The EBS volumes to cleanup can be found in the **AWS Console->EC2->Elastic Block Stores ->Volumes** and can be deleted from the action button.

When you launch an instance using a 1-click launch from the Marketplace, it will create a new security group for you. You can delete unused security groups at **AWS Console->EC2->Network and Security->Security Groups** and delete them using the actions button.

## How to download your design to AWS account

There are a few ways to download a custom design to the AWS account and this chapter describes some of them.

### SCP Linux command

SCP Linux command is used to securely copy files between different workstation in this case between an AWS instance and a local workstation using the secure SSH protocol. Therefore, it provides the same authentication method, secured key, and the same level of security as SSH does.

---

*Note: SSH server is already installed in the AWS AMI and it is not necessary to install it.*

---

1. Installing SCP on a local workstation.

- **CentOS/RHEL**

```
sudo yum install -y openssh-clients
```

- **Ubuntu/Debian**

```
sudo apt install -y openssh-client
```

2. Using SCP

Requirements:

- Private key,
- AWS instance public IP

The standard format of SCP command is:

```
scp [options (optional)] source destination
```

Exemplary usage:

```
scp -i <PRIVATE_KEY> <FILE_TO_SEND> ec2-user@<PUBLIC_IP >:~/  
scp -i <PRIVATE_KEY> ec2-user@<PUBLIC_IP >:~/<FILE_TO_SEND> ./
```

---

*Note: It is possible to use -r switch in **scp** command to upload or download the whole folder.*

---

## WinSCP

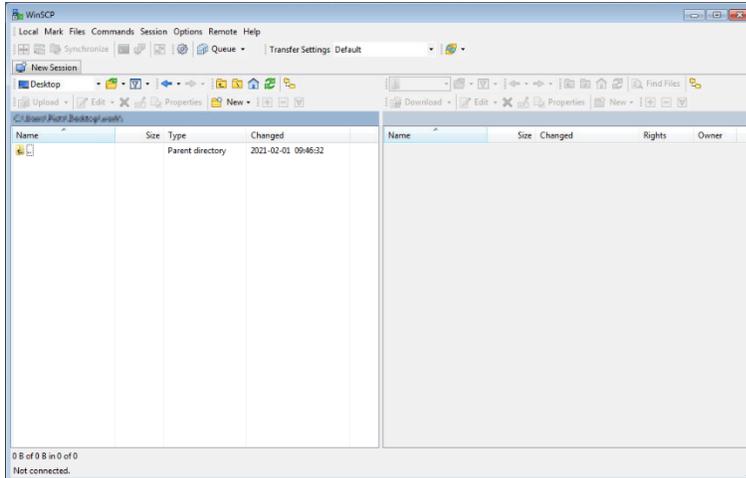
WinSCP is a free SFTP client and FTP client for Microsoft Windows and can be downloaded from the [WinSCP webpage](#).

1. Installing WinSCP

Installation process is described [here](#).

2. Configuring WinSCP

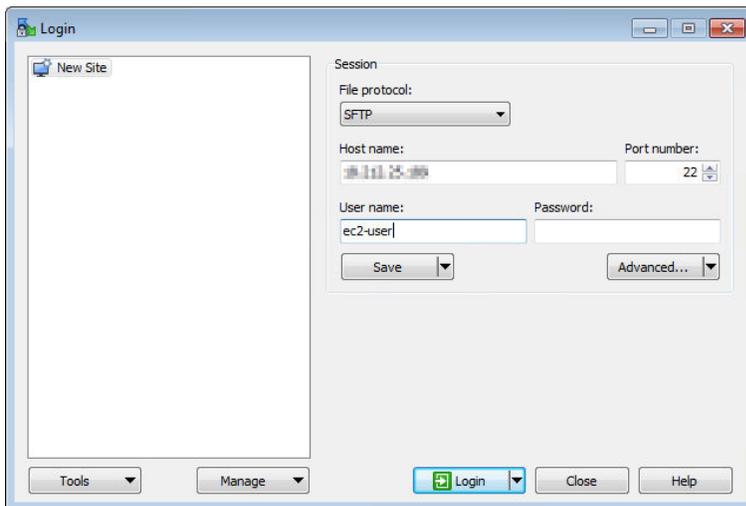
After the successful installation start WinSCP application (**Figure 4**).



**Figure 4: WinSCP window.**

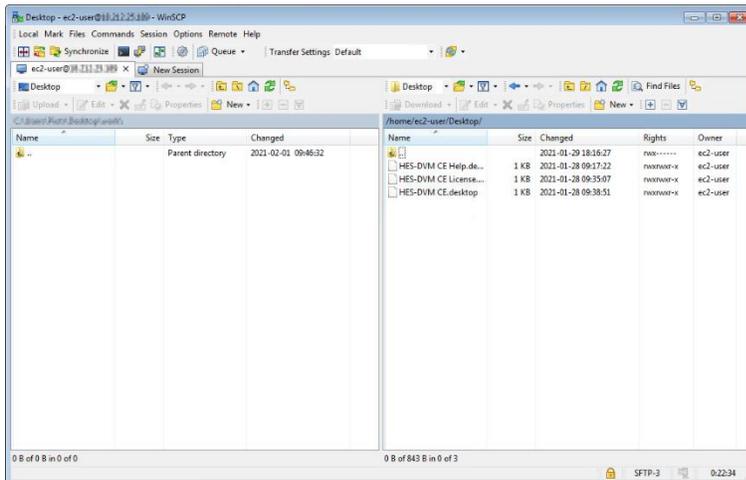
Press **Session->New Session...** to create and configure a new connection session. The following parameters should be set as presented in **Figure 5**:

- File protocol: **SFTP**
- Host name: **an AWS instance public IP**
- Port number: **22**
- User name: **ec2-user**



**Figure 5: WinSCP Login window.**

Next press **Advanced...** and go to **SSH->Authentication** and provide a path to the **Private key file**. Then Press **Login**. WinSCP should connect and display files in an AWS instance (**Figure 6**).



**Figure 6: WinSCP window after connection.**

### 3. Using WinSCP

To transfer files from a local workstation to the AWS instance follow next steps:

- Go to folder on the AWS instance,
- Select file or files on a local workstation,
- Use **Upload** button.

To download files from the AWS instance to a local workstation:

- Go to folder on a local workstation,
- Select file or files on the AWS instance,
- Use **Download** button.

## Using FileZilla

Information about installing and configuring FileZilla can be found in “[How to configure FileZilla](#)” chapter. After the connection it is possible to select files to transfer in FileZilla window.

To upload files from a local workstation to the AWS instance:

- Go to folder on the AWS instance,
- Select file or files on a local workstation,
- Use drop-down menu and then **Upload** button.

To download files from the AWS instance to a local workstation:

- Go to folder on a local workstation,
- Select file or files on the AWS instance,
- Use drop-down menu and then **Download** button.

## Using Unison

Unison is a tool to synchronize files and folders between two different workstations and can be used to simplify a project synchronization between a local workstation and an AWS instance. More information about Unison can be found [here](#).

### 1. Installation Unison on local workstation

Visit this [page](#) and download and install Unison. You can also check if the tool is available in repositories provided for an operating system used on your local workstation

### 2. Using Unison

#### a. In an AWS instance

Create a folder which will be used for your design and the synchronization.

#### b. In a local workstation

Perform the following steps in your local workstation:

- Put your private key in `~/ssh` folder and rename it to `id_rsa`.
- Create a folder which will be used for your design synchronization.
- Start Unison tool and create a new profile and set the following parameters:
  - Profile name: your profile name,
  - Synchronization kind: **Using SSH**,
  - Host: Public IP of your instance,
  - User: **ec2-user**,
  - Local directory: path to the local project directory which will be used for synchronization,
  - Remote directory: path to the remote directory in the AWS instance.
- Open the new profile.
- Unison will connect to the AWS instance and you are able to rescan for changes and if necessary synchronize both folders by using **Go** button.

### 3. Automate synchronization (Linux only)

It is possible to use Linux **crontab** to automate folder synchronization. Here are useful commands and steps to configure and use **crontab**:

- After creating a new profile a profile file should be available in `~/unison` folder.
- Test your profile by calling:  
`unison -auto -batch <PROFILE_NAME>`
- Configure **crontab** to synchronize both folders every 5 minutes:  
`crontab -e`

This command opens the crontab configuration file in Vi. Add the following line:

```
*/5 * * * * /usr/bin/unison -auto -batch <PROFILE_NAME> && /dev/null
```

Close the configuration by `:wq`

- To disable the configuration comment it by `#` in the configuration file.

## How to install and configure X2Go

X2Go and SSH are default way to connect to the Aldec AMI based instance. X2Go utilizes SSH protocol, therefore, there is no need for any more configuration. X2Go requires preinstalled X2Go server in the AMI what is already done. This chapter provides an instruction how to install and configure X2Go on a local workstation to connect to the instance.

---

*Note: More information about X2Go can be found [here](#).*

---

### 1. Installation

#### 1.1. Linux

- **Ubuntu/Debian**

```
apt-get install x2goclient
```

- **Fedora/CentOS**

```
yum install x2goclient
```

- **Redhat**

[The official EPEL repository](#) needs to be added.

#### 1.2. Windows

[X2Go for MS Windows](#) needs to be installed.

#### 1.3. Mac

Download and install [X2Go for Mac OS](#).

### 2. Configuration

When X2Go is installed it is a time to configure it and use to connect to the instance.

The following information and files are required:

- Public IP address of the instance
- Private Key generated in the Amazon. How to generate a pair keys used for connection can be found [here](#).

Next step is to start X2Go client by calling **x2goclient**. **Figure 7** presents X2Go Client window.

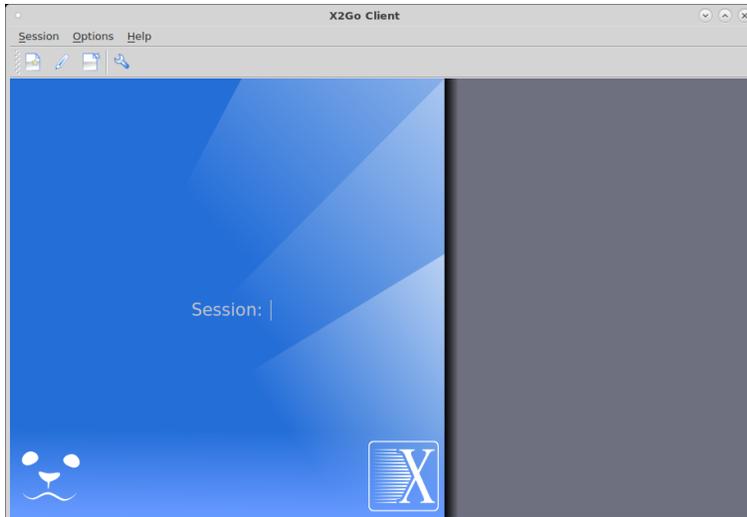


Figure 7: X2Go Client window.

Next press **Session->New session ...** (Figure 8) and fill the following parameters:

- Session name: A user session name.
- Host: The instance IP.
- Login: **ec2-user**
- SSH port: **22**
- Use RSA/DSA key for ssh connection: A path to private key.
- Session type: **MATE**.

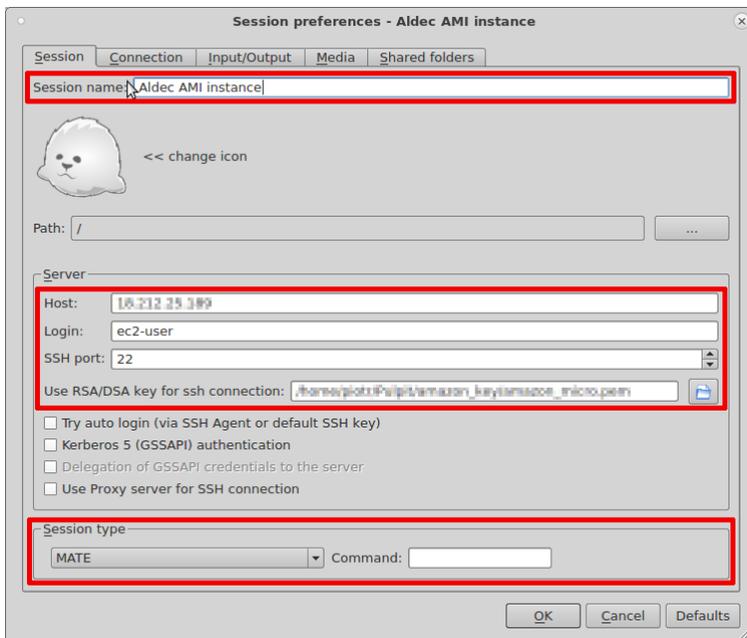


Figure 8: X2Go Client Session preferences window.

When a session is configured it will be available on X2Go Client window as shown in Figure 9.

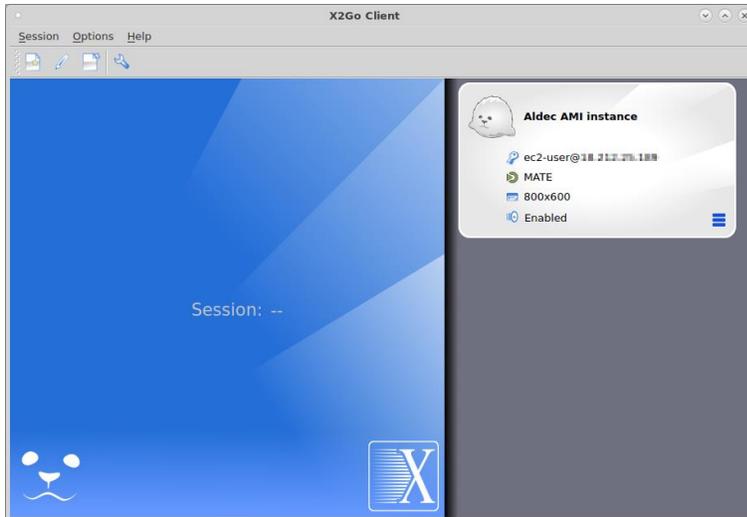


Figure 9: X2Go Client with a session.

Press the session and it will automatically connect to the instance.

## How to use PuTTY to connect to the instance

PuTTY is an SSH and telnet client tool allows connect to other workstation by SSH protocol. This chapter demonstrates how to configure PuTTY and use to connect to an Aldec AMI based AWS instance.

All necessary steps and information are available in [AWS documentation](#).

## How to configure FileZilla

FileZilla is the free FTP solution with support for FTP, FTPS and SFTP. This chapter presents how to install and configure it on a local workstation to use with the Aldec AMI bases AWS instance.

---

*Note: More information about FileZilla can be found [here](#).*

---

### 1. Installation

#### 1.1. Linux

- **Ubuntu/Debian**

```
apt-get install filezilla
```

- **Fedora**

```
yum install filezilla
```

#### 1.2. Windows

[FileZilla for MS Windows](#) needs to be installed.

#### 1.3. Mac

[FileZilla for Mac OS](#) needs to be installed.

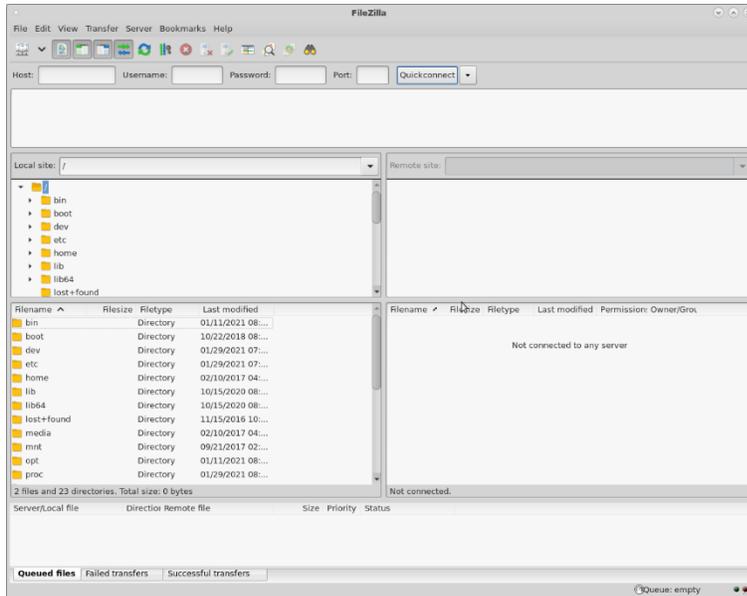
## 2. Configuration

When FileZilla is installed it is a time to configure it and use to transfer files between a local workstation and the AWS instance.

The following information and files are required:

- Public IP address of the instance
- Private Key generated in the Amazon. How to generate a pair keys used for connection can be found [here](#).

Next step is to start FileZilla. **Figure 10** presents FileZilla window.



**Figure 10: FileZilla window.**

Next to establish a connection with the AWS AMI press **File->Site Manager ...** (**Figure 11**) press **New Site** in **Site Manger** window and fill the following parameters:

- Site name: A user site name.
- Host: The instance IP.
- Port: **22**
- Logon Type: **Key file**
- User: **ec2-user**
- Use RSA/DSA key for ssh connection: A path to private key.
- Session type: **MATE**.

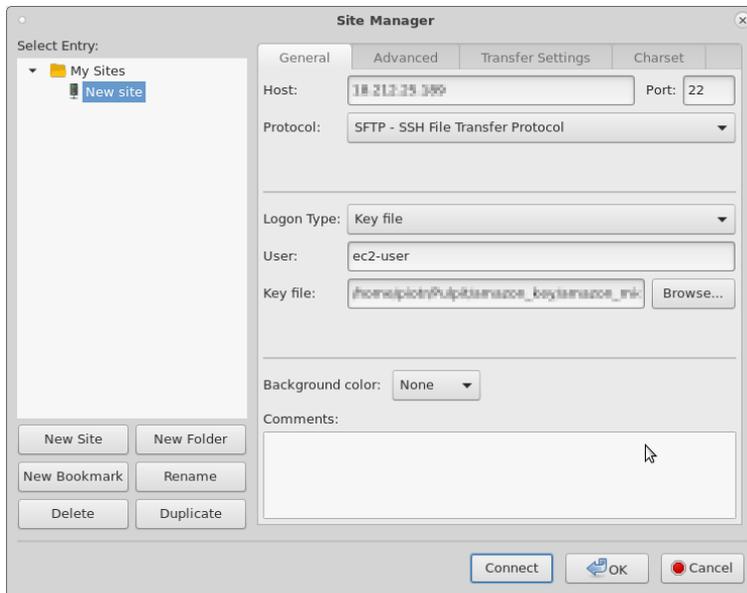


Figure 11: FileZilla Site Manager window.

When the configuration is done press **Connect**. FileZilla should connect to the AWS AMI and shows files and folders there as presented in [Figure 12](#).

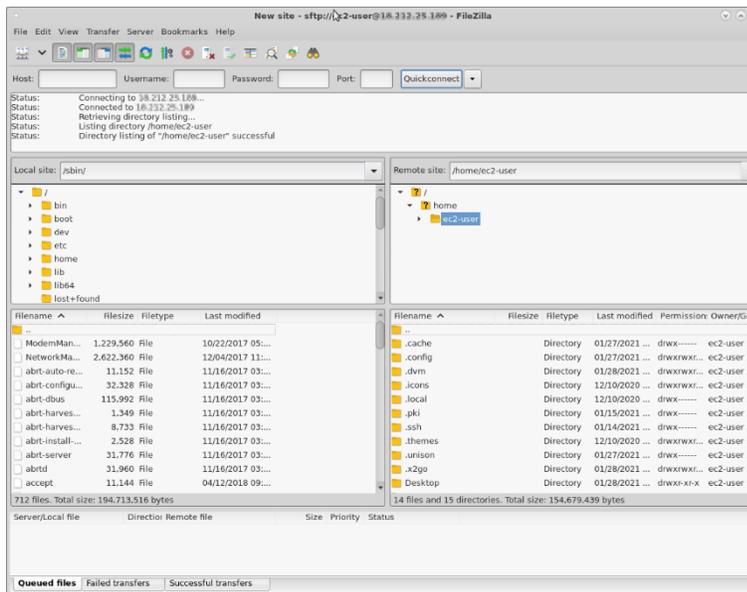


Figure 12: FileZilla window after the connection.

## How to use AWS S3 bucket with Aldec AMI

[AWS S3](#) bucket is an Amazon Simple Storage Service which can be used with the Aldec AMI for storing a design. This chapter will presents an exemplary configuration and usage of the AWS S3 bucket with the AMI.

---

*Note: More comprehensive documentation and instruction can be found at [AWS webpage](#).*

---

1. Create and configure S3 bucket

AWS provides a comprehensive instruction of creating and configuring S3 bucket. Please follow the [instruction](#).

2. Using S3 bucket

[AWS documentation](#) provides a detail instruction of using S3 bucket.

## How to update HES-DVM Proto CE

It is possible to update HES-DVM Proto CE installed in the Aldec AMI when there is a newer version. The Aldec AMI contains a special script to automate this process and it can be executed by using **HES-DVM Proto CE Update** button on the desktop and then follow the flow. A new HES-DVM CE version will be installed in `/opt/Aldec` folder. The script can also automatically update a default version used in the scripts by updating HES-DVM-CE symbolic link.

---

*Note: New installation versions will be in `/opt/Aldec` folder and will reduce available disc space. If necessary, delete older and not used versions.*

---

Using the script requires that AWS is configured. Prior using the script call **aws configure** and set your credential.

---

*Note: The script utilizes Aldec S3 bucket located in `us-east-1` region and this regions has to be set.*

---

## FAQ

### General

- Q 1. Is it possible to use Windows based AMI with Aldec HES-DVM Proto CE?  
No, currently only Linux based AMI is available and provided.
- Q 2. How can I synchronize my design between my local workstation and an AWS instance?  
One of the ways to have a design synchronization between a local workstation and an AWS instance is using Unison tool. More information can be found in “Using Unison” chapter.
- Q 3. I cannot find root password for the Linux.  
A provided user has root privilege, so password is not necessary. To execute a Linux command as a root use **sudo** command. Note: One of the Marketplace requirements it to disable logging as a root with password.
- Q 4. How to get a host name required by license.dat file.  
The host name value can be obtained by calling **hostname** Linux command.
- Q 5. Which text editor can be used in the AMI?  
The AMI is provided with two text editors: vi and gedit. A user has a root privilege and can install other necessary tools.

### AWS Access

- Q 1. I cannot connect to my instance.  
Please follow the [Amazon EC2 Troubleshooting](#).
- Q 2. Can I connect to the Aldec AMI based instance from a Mac computer?  
Yes, it is possible to use a Mac computer to connect to the AMI. However, a Mac computer may require the following modifications in the SSH configuration:
1. Find and open `sshd_config` file.
  2. Add or modify next two lines:  
`ForwardX11Trusted yes`  
`ForwardX11 yes`
- Q 3. How to create a key pair used to connect to the instance?  
A key pair can be created following [AWS documentation](#).
- Q 4. My public IP has changed how to modify or update a firewall?  
It is necessary to update AWS Security group associated with the instance. How to configure a security group is described in [AWS documentation](#).
- Q 5. How to check which AWS security group is used by my instance?  
[AWS documentation](#) describes where to find this information and how to update which security group is used.

Q 6. How to connect to my AWS instance from Windows by PuTTY?

How to use PuTTY on Windows is described in "How to use PuTTY to connect to the instance" chapter.

Q 7. What is the password for ec2-user? I cannot login without the password.

A password is not used while login to the Aldec AMI based instance. To be able to login a special key pair needs to be generated and used.

Q 8. Is it possible to set a password for ec2-user?

A user has full root privilege in the AMI and can install and configure it his way. A user password can be set based on [AWS instruction](#).

## License Setup

Q 1. I cannot start and use the license server.

Please follow instruction on [Aldec License information](#).

Q 2. How do I buy a HES-DVM license for AWS?

To buy HES-DVM license for AWS login to the Aldec AMI based instance with X2Go and press **HES-DVM CE License** button. It will automatically open Aldec landing page and fill some necessary fields with data read from the AMI. Fill the rest of the fields and request a license file.

Q 3. I followed the instruction but still cannot use the DVM. It shows me that license server has not been started yet.

Please got to /opt/Aldec/license folder and check debug.log file. It will inform what is the issue and what needs to be updated. If problem cannot be fixed, please share the log with us by the [Aldec Customer Portal](#).

Q 4. The license server has not started because a host name is wrong.

Obtain the host name by calling hostname Linux command and update license.dat file by replacing **this\_host** or any other host name with the valid one.

Q 5. I have started two separate instances which based on the Aldec AMI. Do I have to obtain 2 license files?

Yes, every instance required a separate license file.

Q 6. I have terminated my instance and started a new one. Do I have to request a new license file?

Yes, the license file is generated for the instance and a new instance required a new license file.

## DVM Setup

Q 1. Do I need an FPGA synthesis tool?

No, FPGA synthesis tool is not necessary in this flow. HES-DVM tool includes synthesis tool.

Q 2. Do I need the FPGA P&R tool?

Yes, FPGA P&R tool is necessary to implement partitioned project. The tool can be obtained from a FPGA vendor. You can use your P&R in the AMI instance or at your local workstation after downloading the files generated by HES-DVM.

Q 3. Can I use the HES-DVM for partitioning a project for my own FPGA based board or HES-DVM supports only Aldec HES Boards?

Yes, HES-DVM can be used for partitioning a project for a custom FPGA based board. HES-DVM tool contains Board Compiler tool which is used to import third party board files and convert them to HES-DVM format. To get more information about the Board Compiler open HES-DVM help and go to **User's Guide->Board Compiler**.

Q 4. How do I buy the standard HES-DVM version?

To buy the standard HES-DVM version please contact Aldec at [sales@aldec.com](mailto:sales@aldec.com).

Q 5. I'd like to use HES-DVM Proto but I'm not familiar with the tool. Is there any video I can watch to learn the tool?

Yes you can get more information about HES-DVM Proto from [Aldec webpage](#).

Q 6. Is there any documentation for HES-DVM which I can use to learn how to use the tool?

Yes, there is a documentation which can be used to learn how to use the tool. The documentation is available in the AMI desktop or in HES-DVM help.

Q 7. Can I use HES-DVM Proto CE version to partition my design to more than 4 FPGA chips?

No, HES-DVM Proto CE version only allows partitioning for up to 4 FPGA chips or partitions. If you need partitioning tool for more FPGA chips or partitions, you need to buy a standard HES-DVM version. For full unlimited version of HES-DVM please contact Aldec at [sales@aldec.com](mailto:sales@aldec.com).

## References

### Aldec References:2

- [Aldec Website](#)
- [Aldec Customer Portal](#)
- [Aldec FPGA Partitioning](#)

### AWS EC2 References:

- [Getting Started with Amazon EC2](#)
- [Amazon EC2 Instance Types](#)
- [Amazon EC2 User Guide](#)
- [Amazon EC2 Networking and Security](#)
- [Amazon EC2 Key Pairs](#)
- [Amazon EC2 Attach EBS Volume](#)
- [Amazon EC2 Troubleshooting](#)

## About Aldec, Inc.

Aldec Inc., an industry leader in Electronic Design Verification, provides a patented verification technology tool suite including: RTL Design, RTL Simulation, Hardware-Assisted Verification, SoC/ASIC Emulation & Prototyping, Design Rule Checking, CDC/RDC Analysis, IP Cores, Requirements Lifecycle Management, DO-254 Functional Verification, Embedded Solutions, High-Performance Computing and Military/Aerospace solutions. [www.aldec.com](http://www.aldec.com)