

Objectives

- > After completing this module, you will be able to:
 - >> Describe AWS EC2 services
 - >> List some of the benefits of using AWS EC2 F1 instance
 - >> State application areas where acceleration is beneficial
 - >> Describe SDAccel development flow on AWS EC2 F1
 - >> Explain what are AMI and AFI
 - >> Create an account on AWS (Appendix)
 - » Create and access an instance (Appendix)







Introducing Amazon AWS EC2 F1 Amazon AWS EC2 F1 is a compute instance with Xilinx FPGAs which can be programmed to create custom hardware accelerated applications AWS EC2 F1 instances are easy to program and come with everything needed to develop, simulate, debug, and compile hardware accelerators Once a FPGA design is complete, it can be registered as an Amazon FPGA Image (AFI), and deployed to F1 instance in just a few clicks Host CPU Xilinx FPGA EXILINX.

F1 Instances



- > Up to 8 Xilinx UltraScale+ 16nm VU9P FPGA devices in a single instance
 - >> f1.16xlarge size provides:
 - 8 FPGAs, each with over 2 million customer-accessible FPGA programmable logic cells and over 5000 programmable DSP blocks
 - >> Each of the 8 FPGAs has 4 DDR-4 interfaces, with each interface accessing a 16GiB, 72-bit wide, ECC-protected memory

Instance Size	FPGAs	DDR-4 (GiB)	vCPUs	Instance Memory (GiB)	NVMe Instance Storage (GB)	Network Bandwidth
f1.2xlarge	1	4 x 16	8	122	1 x 470	Up to 10 Gbps
f1.16xlarge	8	32 x 16	64	976	4 x 940	25 Gbps

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Benefits of the AWS F1 Cloud Compute Platform

- Makes FPGA acceleration available to a large <u>community of developers</u>, and to millions of potential <u>AWS users</u>
- > Provides dedicated and large amounts of <u>FPGA logic with elasticity</u> to scale to multiple FPGAs
- Simplifies the development process by providing <u>cloud-based tools</u> for FPGA development
- Provides a <u>Marketplace</u> for FPGA applications, giving more choice, secure and easy access to millions of AWS users

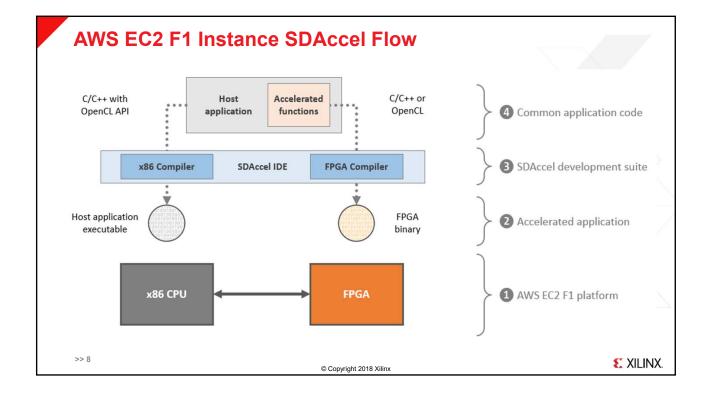
In Research and Education

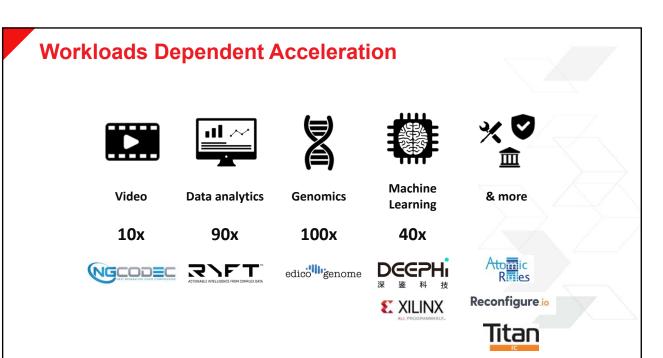
- Leading edge FPGA technology available cost-effectively for student projects and classroom teaching
- > Common platform for collaborative research
- > Build a prototype in the cloud share with partners instantly
- > Easily <u>Disseminate</u> project results globally

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Terminology

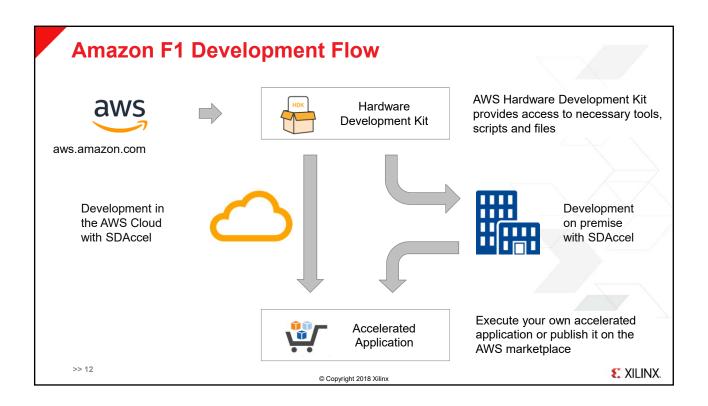
- > AMI: An Amazon Machine Image is a template that contains a software configuration (for example, an operating system, an application server, and applications)
 - >> Provides the information required to launch an instance, which is a virtual server in the cloud
 - >> Must specify a source AMI when you create an instance
 - » Multiple instances can be launched using the same source AMI
- > AFI: An Amazon FPGA Image is the compiled registered design, securely stored
 - » Secured, encrypted and dynamically loaded in the FPGA can't be copied or downloaded
 - >> Can be associated with an AMI and offered on the AWS Marketplace

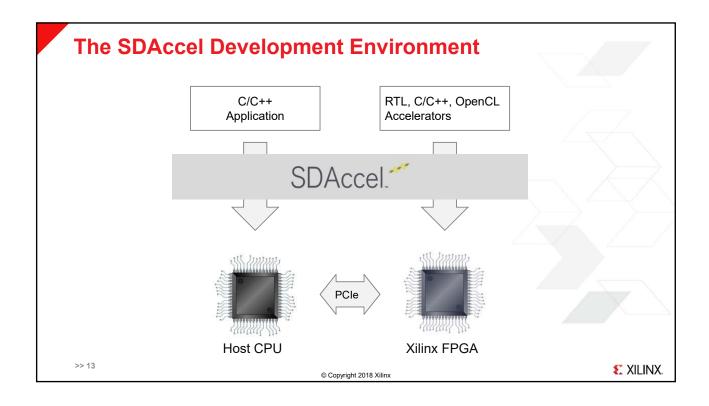
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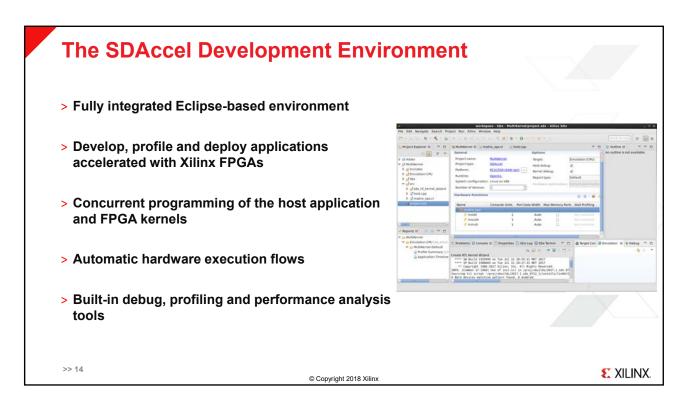
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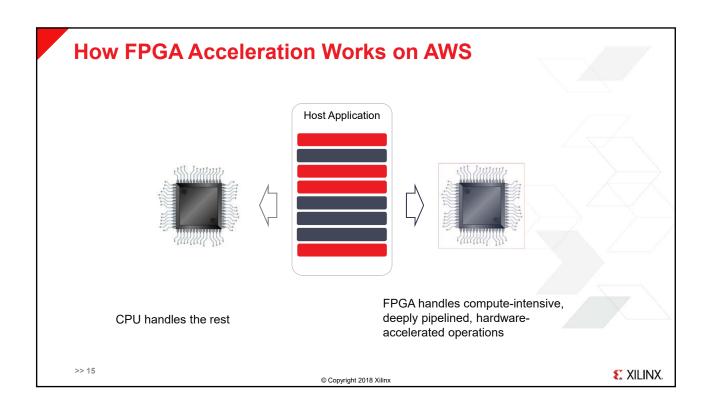


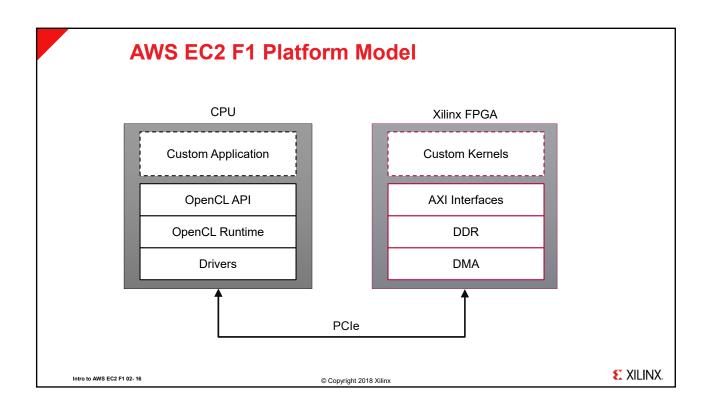


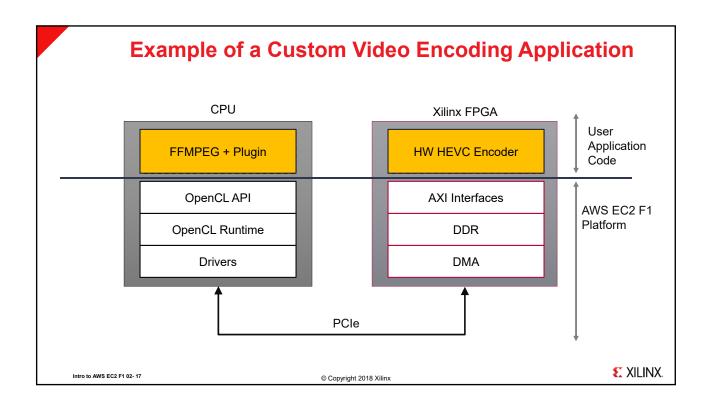






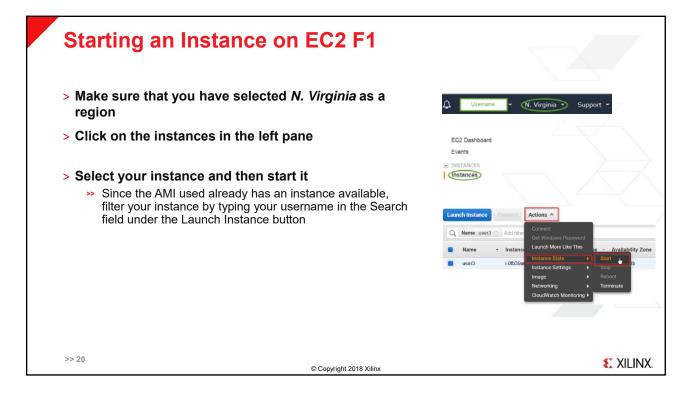


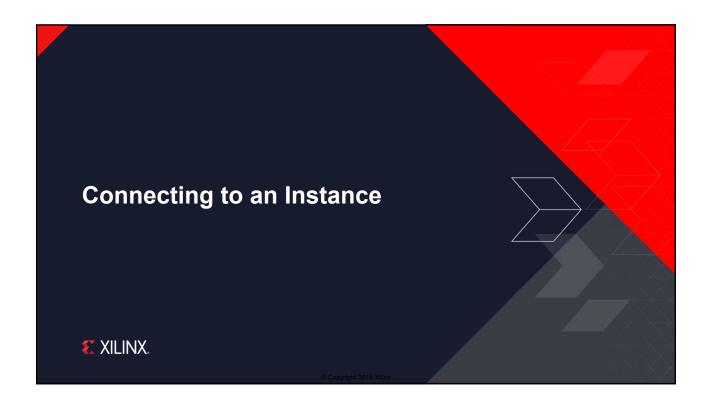


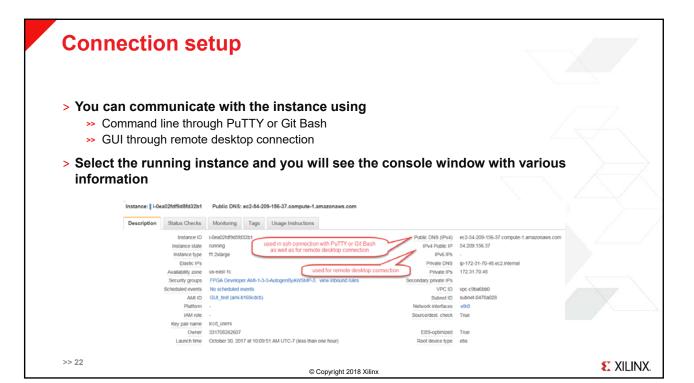




Login Procedure using Provided Instance > Click on the provided link to your preconfigured instance aws >> Otherwise go to aws.amazon.com, click on Sign In to the Console > Use the provided Account ID Account ID or alias >> xilinx-aws-f1-developer-labs xilinx-aws-f1-developer-labs IAM user name > Enter provided user name user31 >> usern Password > Enter the following password >> Given by instructor >> For centos user on RDP: Given by instructor > Precompiled FPGA binaries **E** XILINX. © Copyright 2018 Xilinx







Starting a Remote Desktop Session

- > Start Remote Desktop Connection program
- > Enter IPv4 Public IP address available in the console
- > Click Connect
- > Click Yes
- > In the desktop session
 - >> Enter centos in the username field
 - >> Enter <user password> as you had set that in PuTTY session
 - >> Click **OK** to run the session
- > You can now execute GUI/Windows based tasks



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Remote Desktop Client

- > Before connecting, set your remote desktop client to use 24-bit for color depth
 - >> Windows client: In the bottom-left corner of connection prompt, click Options, select the Display tab and set Colors to True Colors (24 bit)
- > On Windows: press the Windows key and type "remote desktop"
 - >> You should see the "Remote Desktop Connection" in the list of programs
 - >> Alternatively you can also simply type mstsc.exe in the Windows run prompt
- > On Linux: RDP clients such a Remmina or Vinagre are suitable
- > On MacOS: use the Microsoft Remote Desktop v8.0.43 (that version offers color depth settings) from the Mac App Store

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Summary

- > AWS EC2 F1 is an elastic cloud computing instance that uses Xilinx FPGAs for custom hardware accelerated applications
- > AWS EC2 F1 development flow options
 - >> Develop in the AWS cloud with the SDAccel development environment
 - >> Develop on-premise in the SDAccel environment and execute the application on AWS
- Accelerated applications can easily be put on the AWS Marketplace, offering a rapid path to monetization

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Lab Intro

> In this lab you will start an EC2 F1 instance using the preconfigured FPGA

Developer AMI and connect to it using a remote desktop client. Once connected,
you will open a terminal window on the RDP client and source the environment
variables.

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Creating an AWS Account Solve the property of the property of

Creating an AWS Account (2) > Provide required credentials >> Enter correct phone number as it will be used to verify credentials >> You will be required to enter credit card related information >> Your identity will be verified using a telephone number Address > If everything is successful then you will be assigned a 12-digit account number City State / Province or Region Credit/Debit Card Number **Expiration Date** Postal Code 12345678901234 10 ▼ 2018 ▼ Phone Number* Enter Phone Number Cardholder's Name AWS Customer Agreement ABCD Use my contact address (1234 abcd new TX 78249 US) Use a new address >> 31 **E** XILINX. © Copyright 2018 Xilinx

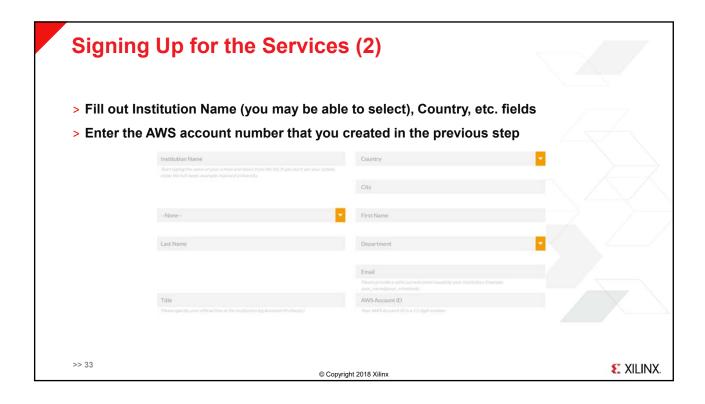
Signing Up for the Services

- > Open https://aws.amazon.com/education/awseducate/ and then click Apply for AWS Educate for Educators link under the Educators section
 - Non-academic customers may create an account visiting https://aws.amazon.com/, and then choose Create an AWS Account
- > Select the appropriate role (Educators or Students)

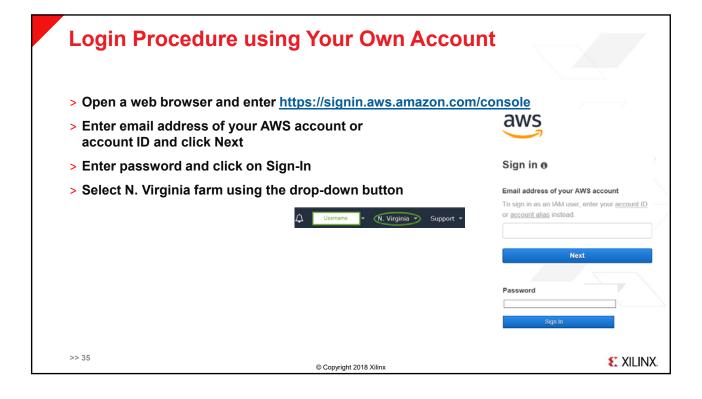
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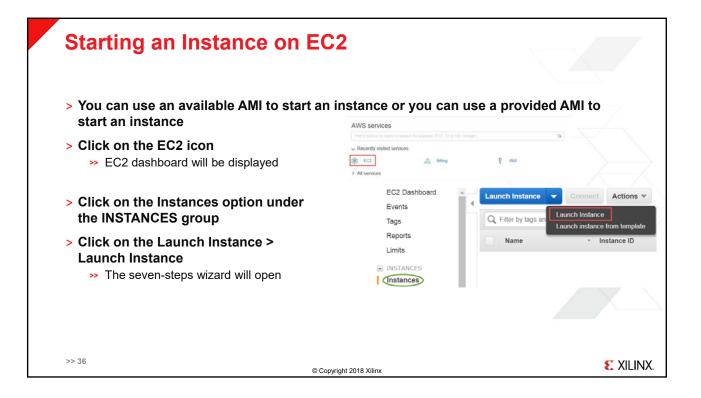
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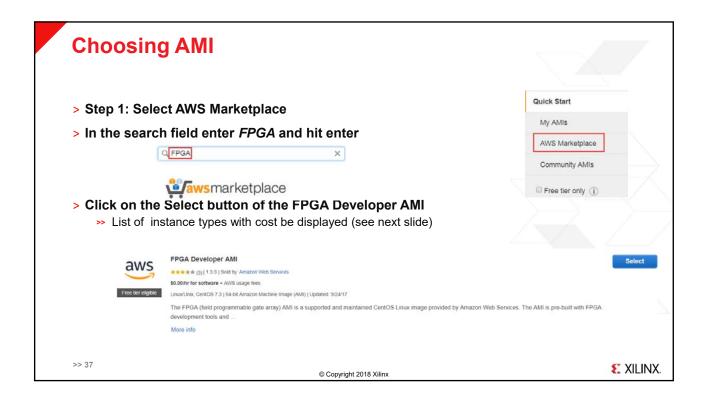


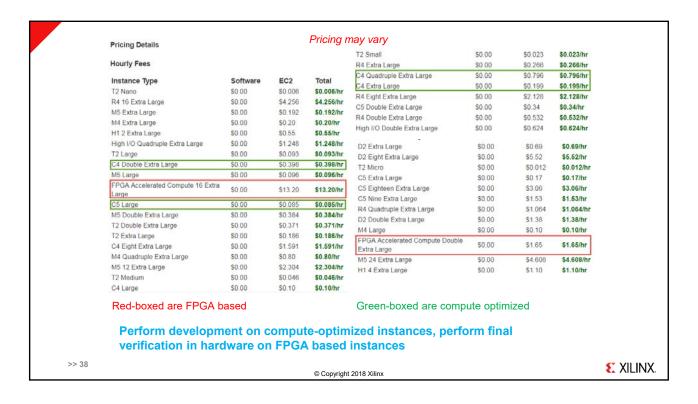


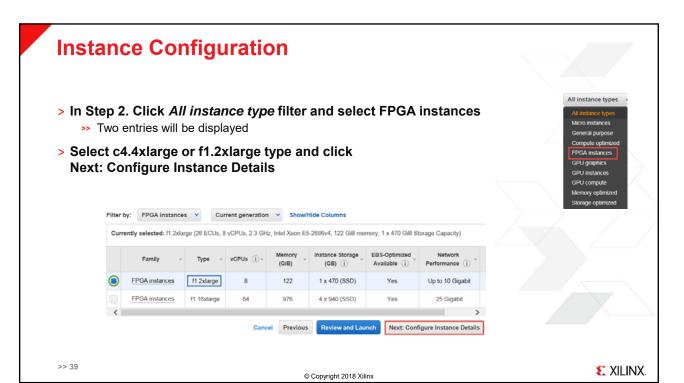


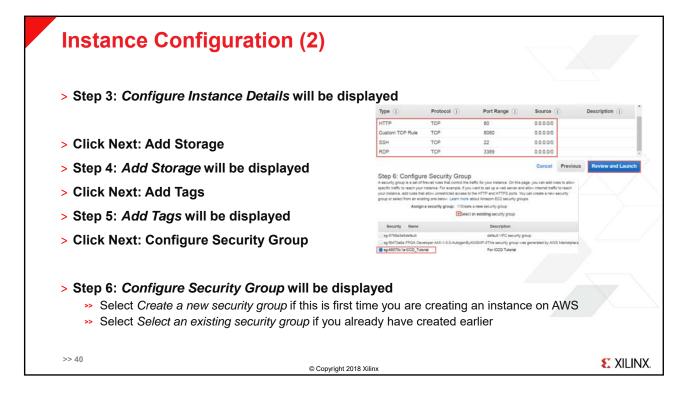


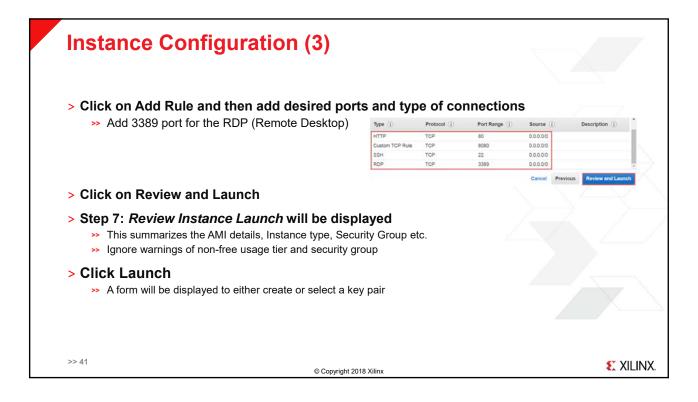


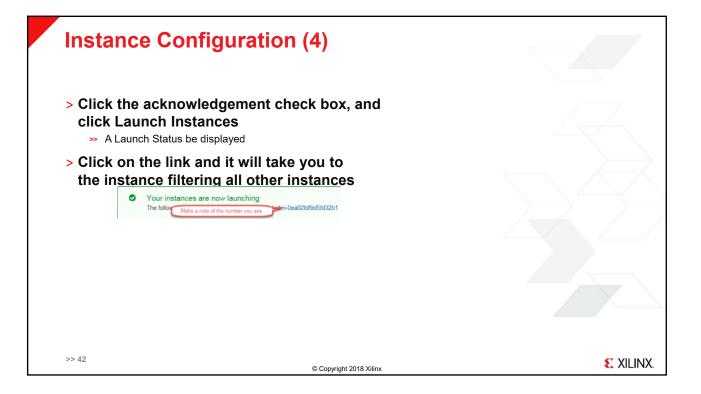










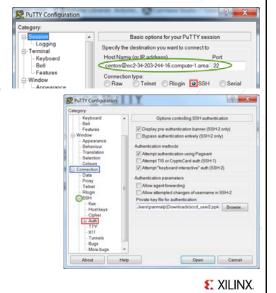


Naming the Instance - You can name the instance by moving the mouse under the Name column until you see a pencil tool - Click on the pencil tool and a field will open - Enter a meaningful name and hit enter



Connecting using PuTTY (Windows)

- > Start PuTTY program
- > Enter centos@<public_dns entry> in the *Host Name* field and 22 in the *Port* field
- > Make sure SSH is selected as the Connection Type
- > Expand SSH under the Connection and click Auth
- > Click on the Browse button and browse to the location where you were provided the private key
- > Click Open
- > Click Yes



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Connecting using PuTTY on VPN (Windows)

- > Start PuTTY program
- > Enter centos@<public_dns entry> in the *Host Name* field and 22 in the *Port* field
- > Make sure SSH is selected as the Connection Type
- > Select Proxy under the Connection
- > Select HTTP as the *Proxy type*, proxy as the *Proxy hostname* and 80 as the *Port* number
- > Expand SSH under the Connection and click Auth
- > Click on the Browse button and browse to the location of the private key
- > Click Open and then click Yes



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Connecting using Terminal (MAC)

- > Start a Terminal program
 - » Click on Finder, select Applications on left
 - Enter Terminal in the Search bar and double-click on the entry
- Make sure that the access mode to the *.pem file is 400
- > Enter the ssh command

ssh -i <pem file> centos@<public_dns entry>

- > At the centos prompt set the password if not already done
 - >> This is needed to enable remote desktop connection: sudo passwd centos
 - >> Enter user password as the centos password
- > At this stage you can execute command line tasks

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