

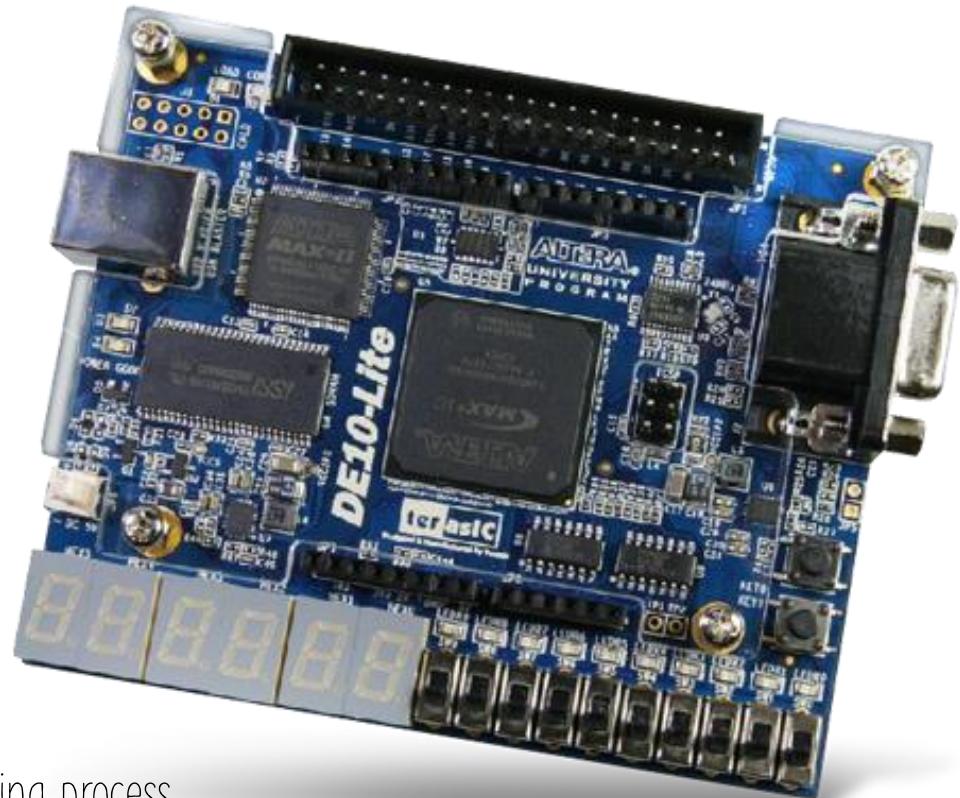


Digital Circuit Design

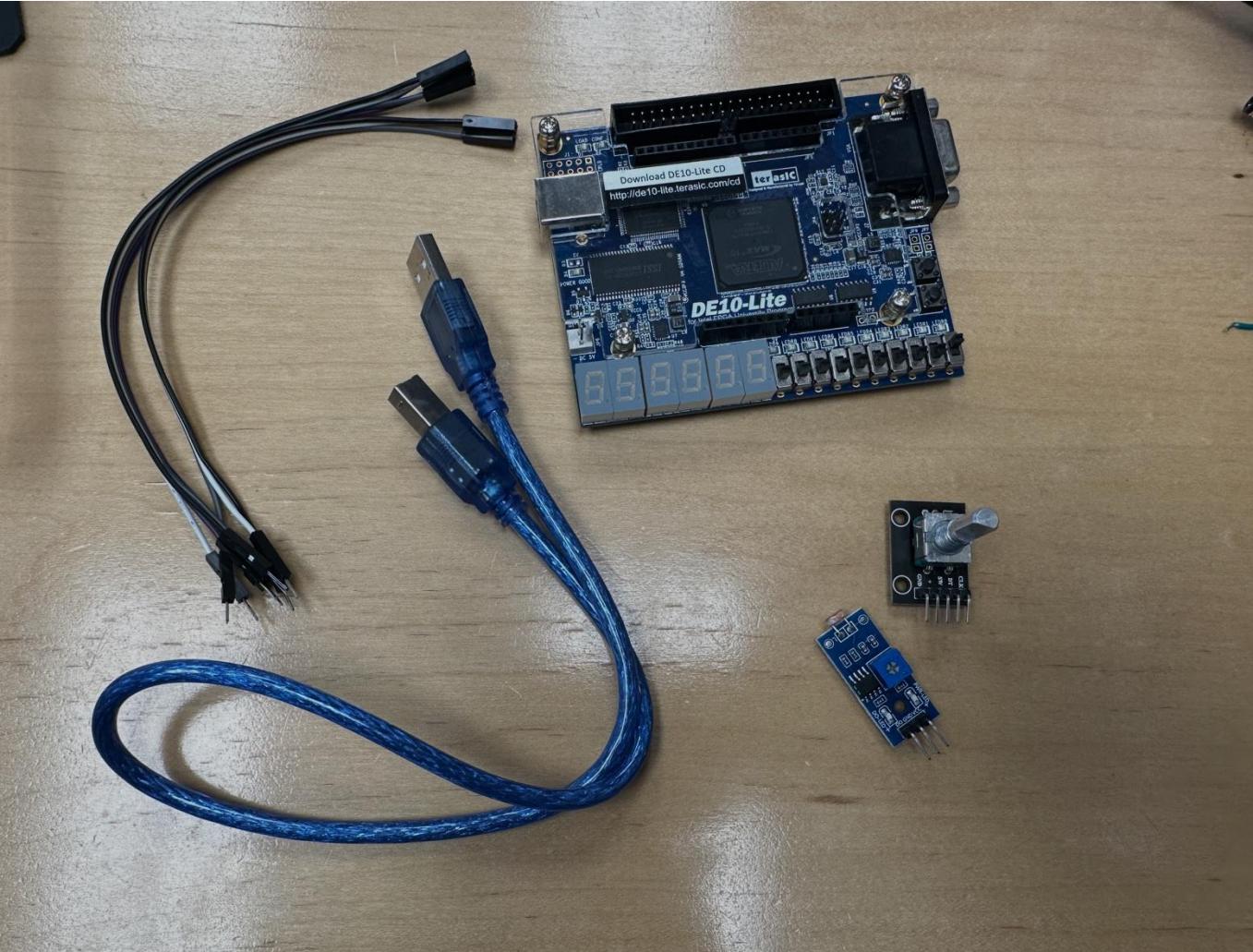
Li Bai

What we will cover...

- Digital (we will need to learn everything about the binary ...)
- We will need to design a process based on input/state to move into different output
- Difference between Arduino and DE10-Lite
 - Advantage of FPGA -> check out [here](#)
- Quartus and EDA Playground
 - Quartus will be on AWS Academy
 - <https://edaplayground.com/>
- Learn combinatory logic, sequential logic, flip-flop, block diagram, timing diagram, making process



What are inside your loaner box



Download the following files

Module 0 (week 1)

 Start Here

Install USB-blaster driver

 Computer Requirements and Software Tools

Load pof file

 QuartusProgrammerSetup-23.1std.1.993-windows.exe

Check anything is broken?

 DE10_LITE_Default.pof

 Module 0 Assignment

Jan 19 | 100 pts

AWS Academy Student login

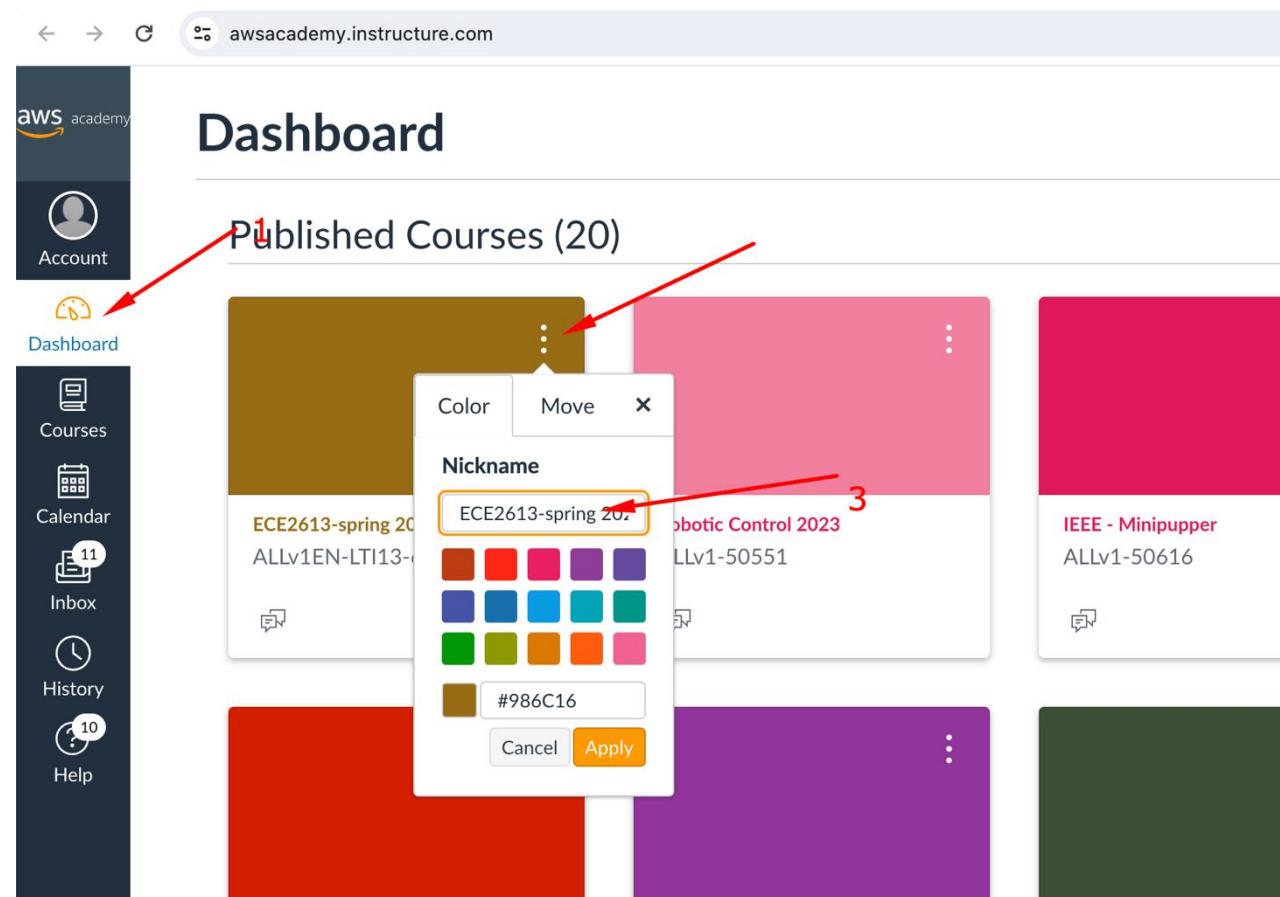
The screenshot shows a Google search results page with the query "aws academy student login" in the search bar. The results are filtered by "All". There are approximately 15,400,000 results.

1 AWS Academy Portal
https://www.awsacademy.com ...
[AWS Academy Portal](https://www.awsacademy.com)
We have launched a new login experience for all AWS Academy users. Please re ... Forgot your Password? Are you a student? information. close image. If you are ...

2 Untitled
https://awsacademy.instructure.com · Translate this page ...
Instructure
学生の方はこちらからログインしてください。已注册课程的学生请在这里登录. Educator Login. (For educators who have access to the AWS Academy Portal).

Instructure
https://awsacademy.instructure.com › login › canvas ...
[Canvas - Amazon AWS Academy Login - Instructure](https://awsacademy.instructure.com/login/canvas)
Canvas by Instructure. Log In. Forgot Password? Enter your Email and we'll send you a link to

AWS Academy Canvas



Access Learner's Lab

The screenshot shows a navigation menu from a course page. At the top left is a back arrow icon. Next to it is the URL: awsacademy.instructure.com/courses/67880/modules. Below the URL is a blue horizontal bar with three white horizontal lines on its left side. To the right of the lines is the text "ALLv1EN-LTI13-67880". To the right of that is a blue triangle icon followed by the word "Modules". A thin horizontal line separates this from the main menu items.

The main menu items are "Home", "Modules", "Discussions", and "Grades". The "Modules" item is highlighted with a thick vertical line and has a red arrow pointing to it from the top left, labeled with the number "1".

Below the menu, there are several sections represented by grey boxes with white borders:

- A section titled "Course Welcome and Overview" with a right-pointing arrow icon.
- A section titled "AWS Academy Learner Lab Compliance and Security" with a right-pointing arrow icon.
- A section titled "AWS Academy Learner Lab" with a downward-pointing arrow icon. A red arrow points to this section from the bottom left, labeled with the number "2".
- A section titled "Launch AWS Academy Learner Lab" with a link icon.
- A section titled "AWS Academy Learner Lab Resources" with a downward-pointing arrow icon.

Accept terms and conditions

-LTI... > Modules > AWS Academ... > Launch AWS Academy Learner Lab

Vocareum Home Classes Help

Please read the terms and conditions shown below and click on the "I agree" button at the bottom of this page to continue.

Terms and Conditions

Welcome to the Vocareum, Inc. ("Vocareum") website located at www.vocareum.com (the "Site"). Please read these Terms of Service (the "Terms") and our Privacy Policy (<http://www.vocareum.com/privacy-policy/>) carefully because they govern your use of our Site and our web-based education and learning platform. To make these Terms easier to read, the Site and our platform are collectively called the "Services."

1. Agreement To Terms

By using our Services, you agree to be bound by these Terms. If you don't agree to these Terms, do not use the Services. If you are accessing and using the Services on behalf of an educational institution (such as your employer or the educational institution in which you are enrolled) or other legal entity, you represent and warrant that you have the authority to bind that educational institution or other legal entity to these Terms. In that case, "you" and "your" will refer to that educational institution or other legal entity.

Vocareum Home Classes Help

transfer these Terms, without such consent, will be null. Vocareum may freely assign or transfer these Terms without restriction. Subject to the foregoing, these Terms will bind and inure to the benefit of the parties, their successors and permitted assigns.

Any notices or other communications provided by Vocareum under these Terms, including those regarding modifications to these Terms, will be given: (i) via email; or (ii) by posting to the Services. For notices made by e-mail, the date of receipt will be deemed the date on which such notice is transmitted.

Vocareum's failure to enforce any right or provision of these Terms will not be considered a waiver of such right or provision. The waiver of any such right or provision will be effective only if in writing and signed by a duly authorized representative of Vocareum. Except as expressly set forth in these Terms, the exercise by either party of any of its remedies under these Terms will be without prejudice to its other remedies under these Terms or otherwise.

Contact Information

If you have any questions about these Terms or the Services, please contact Vocareum at info@vocareum.com

I Agree

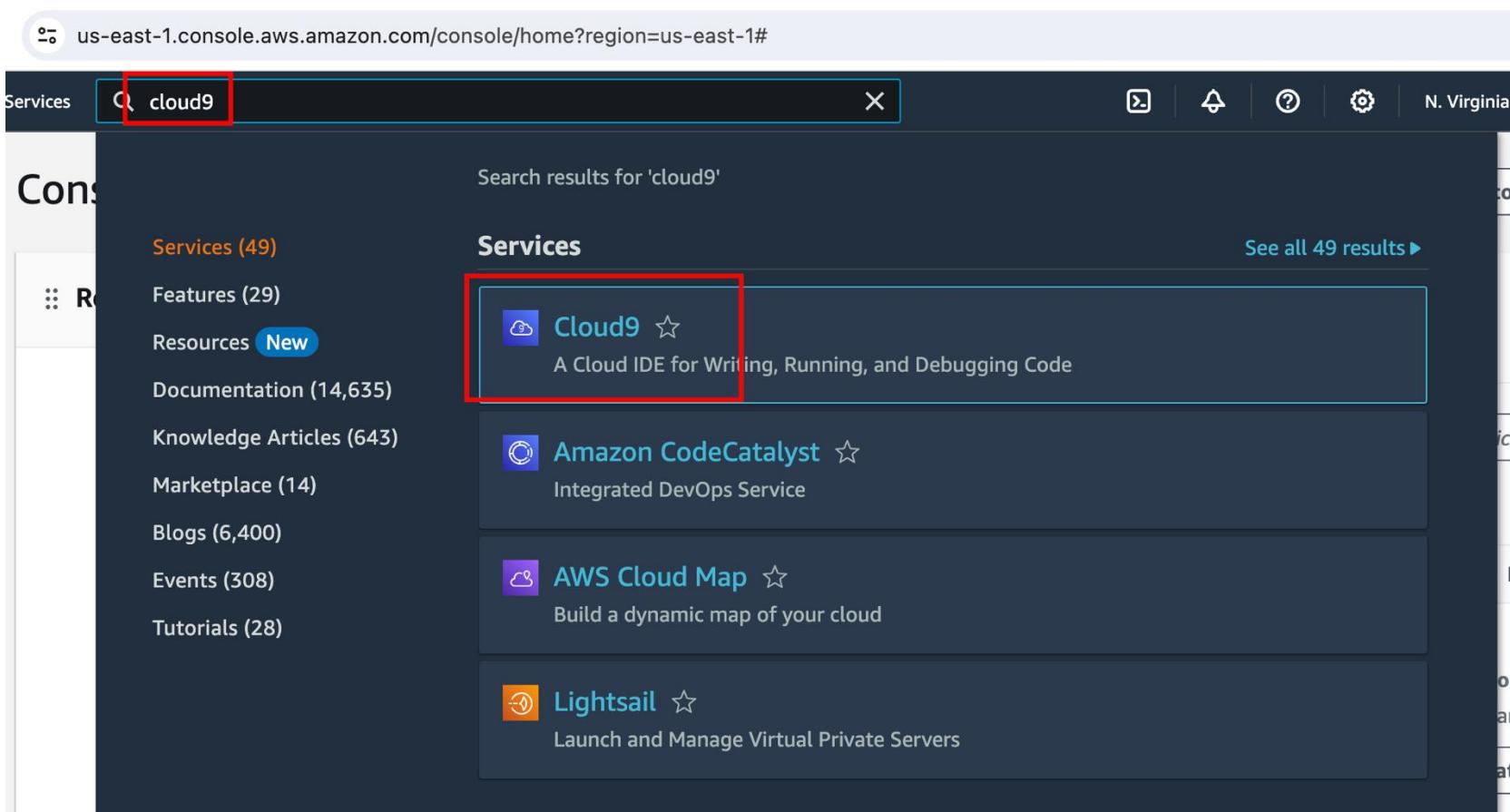
Start lab

The screenshot shows a web browser window for the AWS Academy Learner Lab. The URL in the address bar is `awsacademy.instructure.com/courses/67880/modules/items/6035341`. The page title is "ALLv1EN-LTI... > Modules > AWS Acade... > Launch AWS Academy Learner Lab". The main content area has a terminal-like interface with the prompt `eee_W_2764216@runweb109510:~$`. On the right side, there is a "Learner Lab" sidebar with links for "Environment Overview", "Environment Navigation", "Access the AWS Management Console", "Region restriction", and "Service usage and other restrictions". At the top of the main content area, there is a toolbar with buttons for "Start Lab" (highlighted with a red box and arrow), "End Lab", "AWS Details", "Readme", "Reset", and a close button.

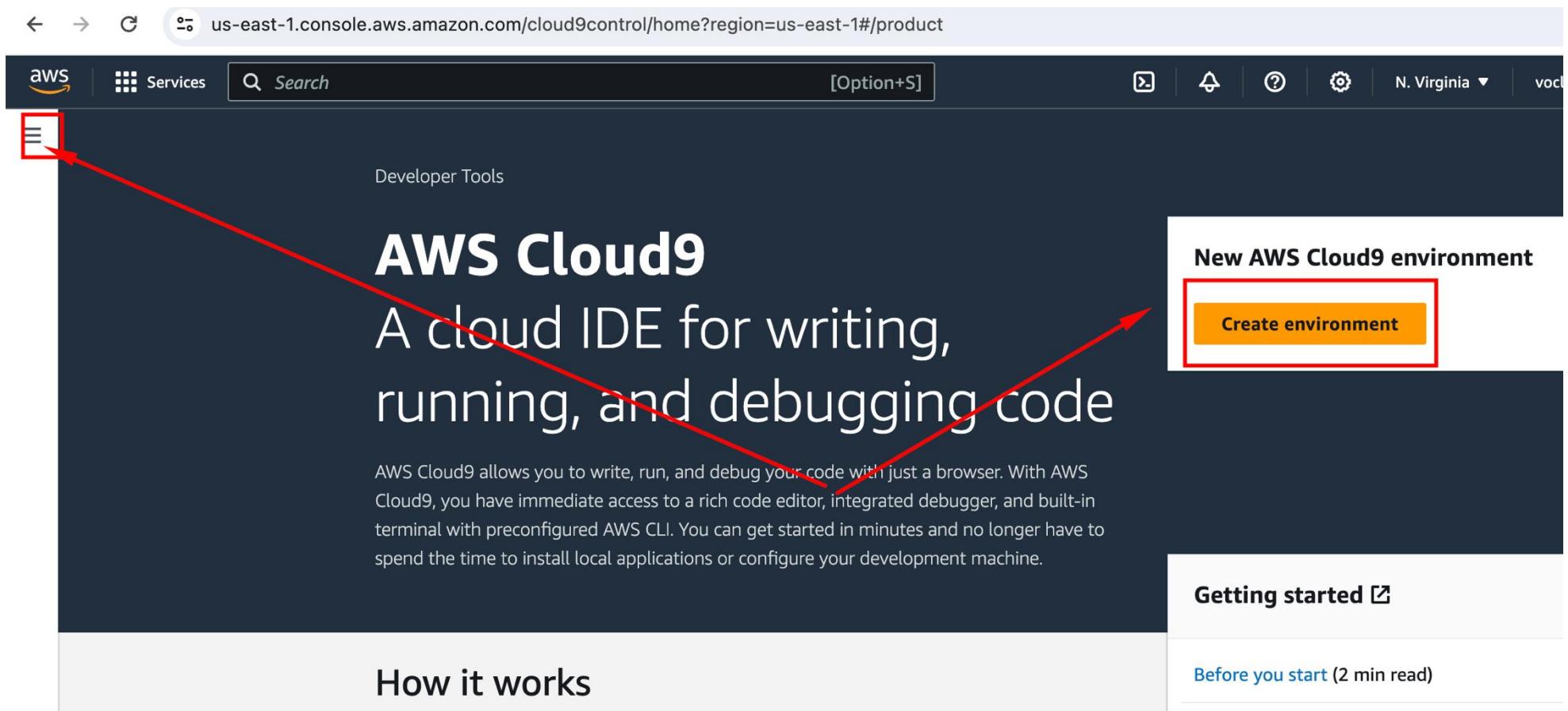
AWS green -> go to console

The screenshot shows the AWS Academy Learner Lab interface. At the top, there's a navigation bar with the path: ... > Modules > AWS Acade... > Launch AWS Academy Learner Lab. Below the navigation bar is a header section with the AWS logo (highlighted by a red box and arrow), usage information (Used \$0 of \$100), a timer (03:58), and several buttons: Start Lab, End Lab, AWS Details, and Read. The main area features a terminal window with the command "eee_W_2764216@runweb109509:~\$". To the right of the terminal is a sidebar titled "Learner La" containing links like Environment Overview, Environment Navigation, Access the AWS Manager, Region restriction, Service usage and other r, Using the terminal in the, Running AWS CLI comma, Using the AWS SDK for Py, Preserving your budget, Accessing EC2 Instances, and SSH Access to EC2 Instanti.

Find cloud9



Create environment



Ubuntu server cloud9 setup

AWS Cloud9 > Environments > Create environment

Create environment Info

Details

Name Limit of 60 characters, alphanumeric, and unique per user.

Description - optional

Limit 200 characters.

Environment type Info
Determines what the Cloud9 IDE will run on.

New EC2 instance
Cloud9 creates an EC2 instance in your account. The configuration of your EC2 instance cannot be changed by Cloud9 after creation.

Existing compute
You have an existing instance or server that you'd like to use.

New EC2 instance

Services Search [Option+S] 

New EC2 instance

Instance type Info
The memory and CPU of the EC2 instance that will be created for Cloud9 to run on.

t2.micro (1 GiB RAM + 1 vCPU)
Free-tier eligible. Ideal for educational users and exploration.

t3.small (2 GiB RAM + 2 vCPU)
Recommended for small web projects.

m5.large (8 GiB RAM + 2 vCPU)
Recommended for production and most general-purpose development.

Additional instance types
Explore additional instances to fit your need.

Additional instance types

Platform Info
This will be installed on your EC2 instance. We recommend Amazon Linux 2023.

Timeout
How long Cloud9 can be inactive (no user input) before auto-hibernating. This helps prevent unnecessary charges.

Network settings Info

Finalize your cloud9 environment

Network settings [Info](#)

Connection
How your environment is accessed.

AWS Systems Manager (SSM)
Accesses environment via SSM without opening inbound ports (no ingress).

Secure Shell (SSH)
Accesses environment directly via SSH, opens inbound ports.

▶ **VPC settings** [Info](#)

▶ **Tags - optional** [Info](#)
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

i The following IAM resources will be created in your account

- **AWSServiceRoleForAWSCloud9** - AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf.
You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. [Learn more](#) 

[Cancel](#) [Create](#)

- c4.xlarge
- Ubuntu22.04
- ssh

Instruction on github

lbaitemple / ece2613

Code Issues Pull requests Action

ece2613 Public

cloud9 had recent pushes 31 seconds ago

master ▾ 9 Branches 2 Tags

Switch branches/tags

Find or create a branch...

Branches Tags

✓ master default

cloud9

de10lite

fall2021

lbaitemple Update README.md

097edc8 · n

Preview Code Blame 24 lines (20 loc) · 498 Bytes

Raw

Cloud 9 setup

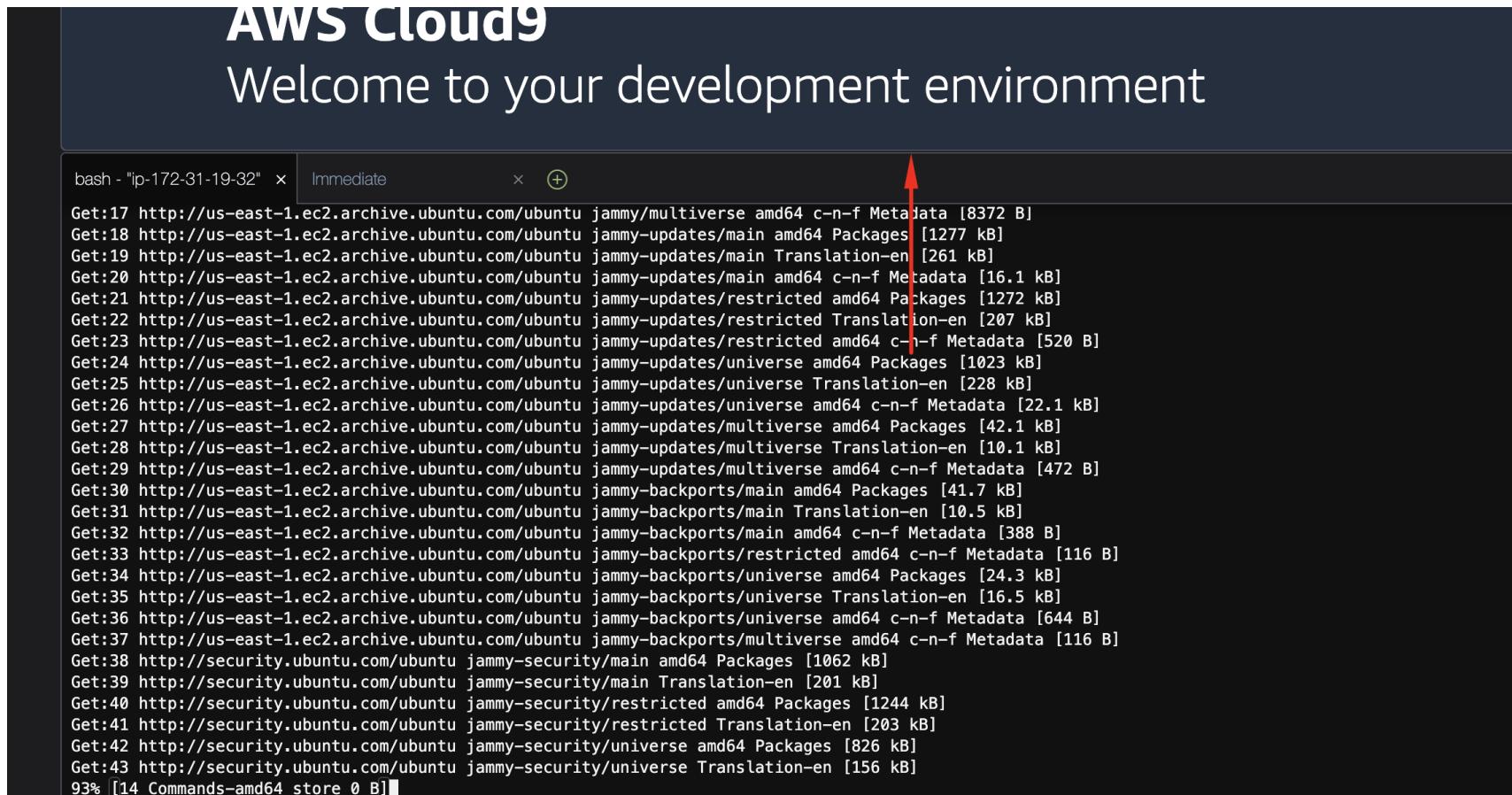
Instruction is provided at <https://sites.google.com/a/temple.edu/ece2612/home/cloud9-setup>

after you select the instance for cloud9, in the terminal

```
git clone -b cloud9 https://github.com/lbaitemple/ece2613
cd ece2613
bash ./setup.bash
sudo reboot
```

Test the code

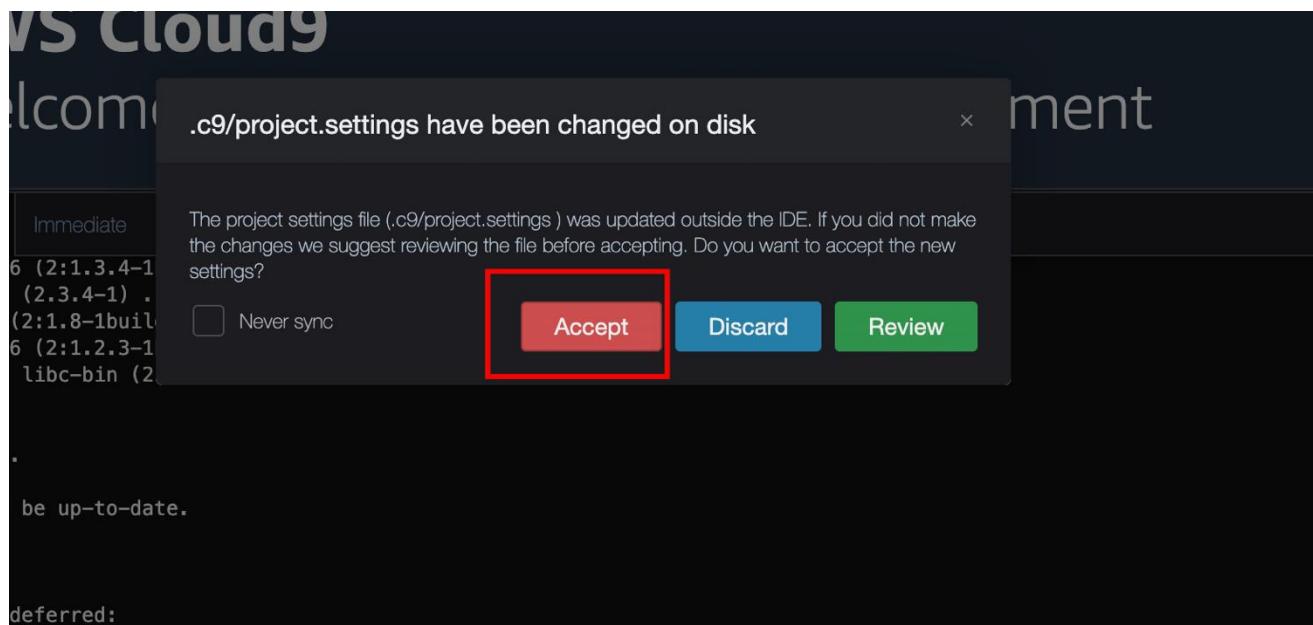
Resize cloud9 terminal windows



After about 15-20 minutes...

sudo reboot

Reboot the system

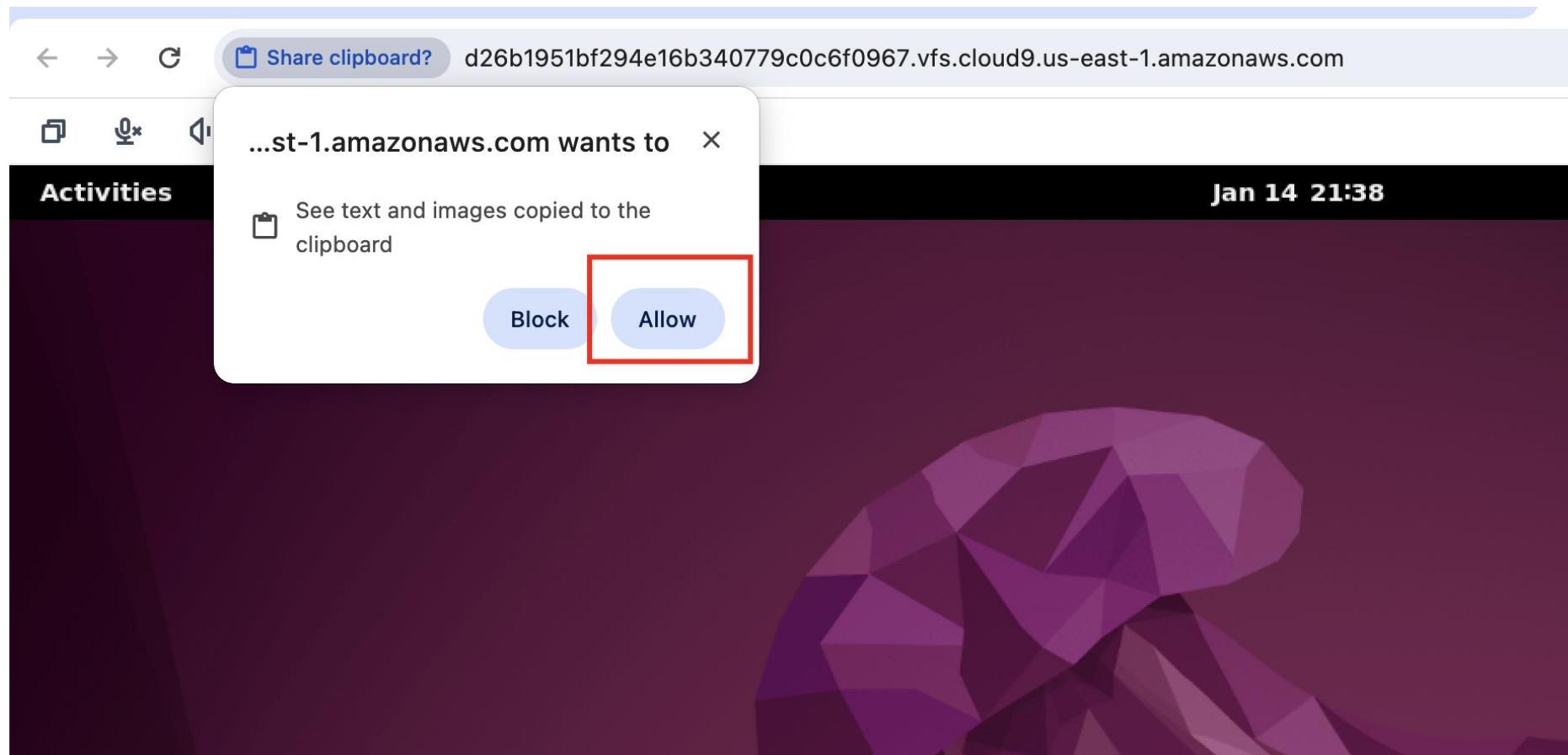


AWS Cloud9

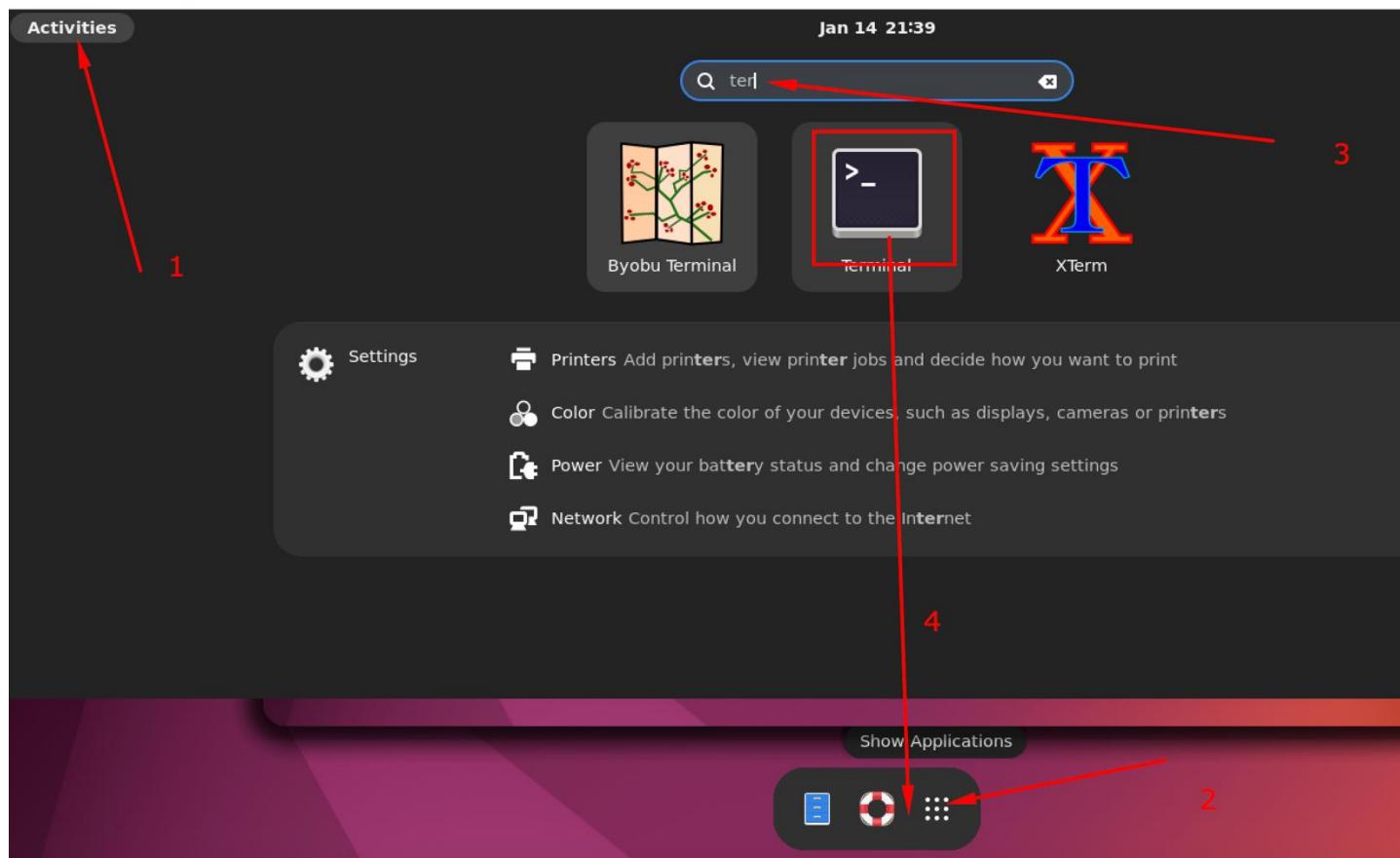
Welcome to your development environment

```
bash - "ip-172-31-19-32"  x  Immediate  x  +  
Setting up libxext6:i386 (2:1.3.4-1build1) ...  
Setting up libxft2:i386 (2.3.4-1) ...  
Setting up libxi6:i386 (2:1.8-1build1) ...  
Setting up libxtst6:i386 (2:1.2.3-1build4) ...  
Processing triggers for libc-bin (2.35-0ubuntu3.6) ...  
Scanning processes...  
Scanning candidates...  
Scanning linux images...  
  
Running kernel seems to be up-to-date.  
  
Restarting services...  
  
Service restarts being deferred:  
/etc/needrestart/restart.d/dbus.service  
systemctl restart docker.service  
systemctl restart getty@tty1.service  
systemctl restart networkd-dispatcher.service  
systemctl restart systemd-logind.service  
systemctl restart unattended-upgrades.service  
systemctl restart user@1000.service  
  
No containers need to be restarted.  
  
No user sessions are running outdated binaries.  
  
No VM guests are running outdated hypervisor (qemu) binaries on this host.  
voclabs:~/environment/ece2613 $ sudo reboot
```

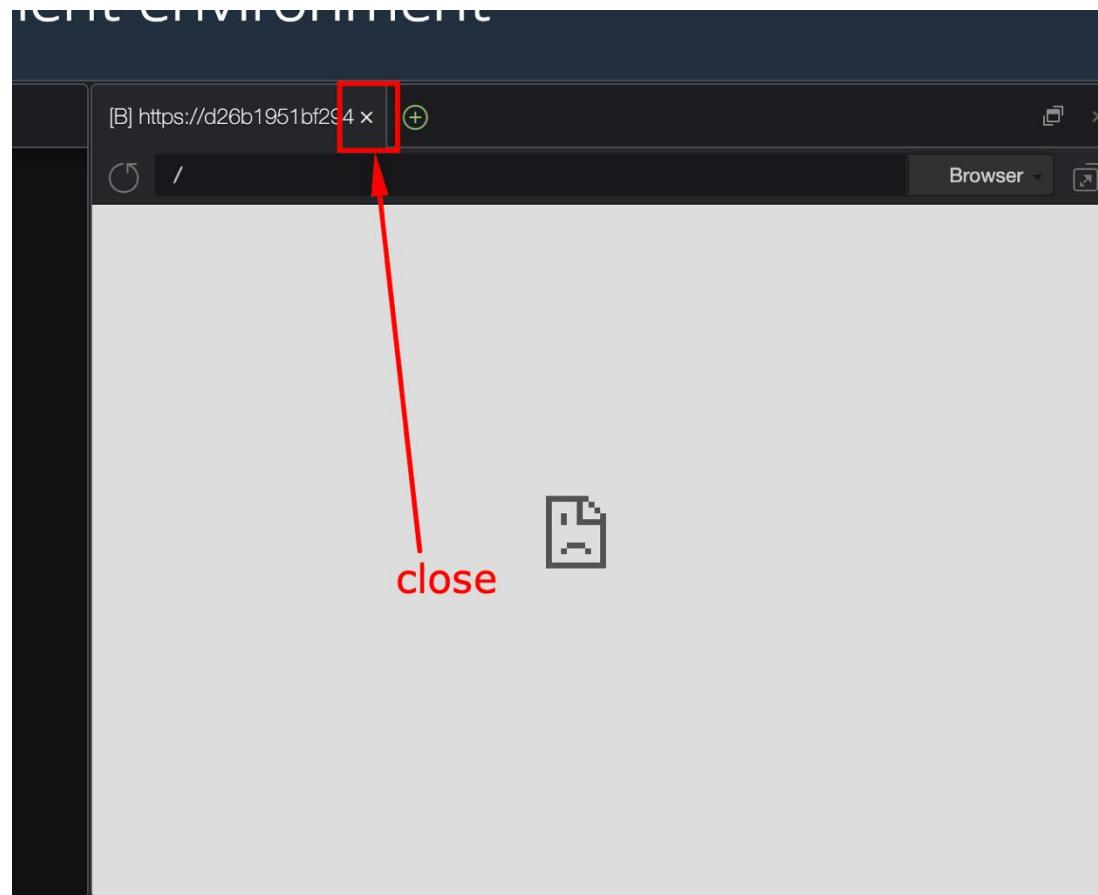
Allow xwindow



Place terminal in task bar



Close access to xwindow



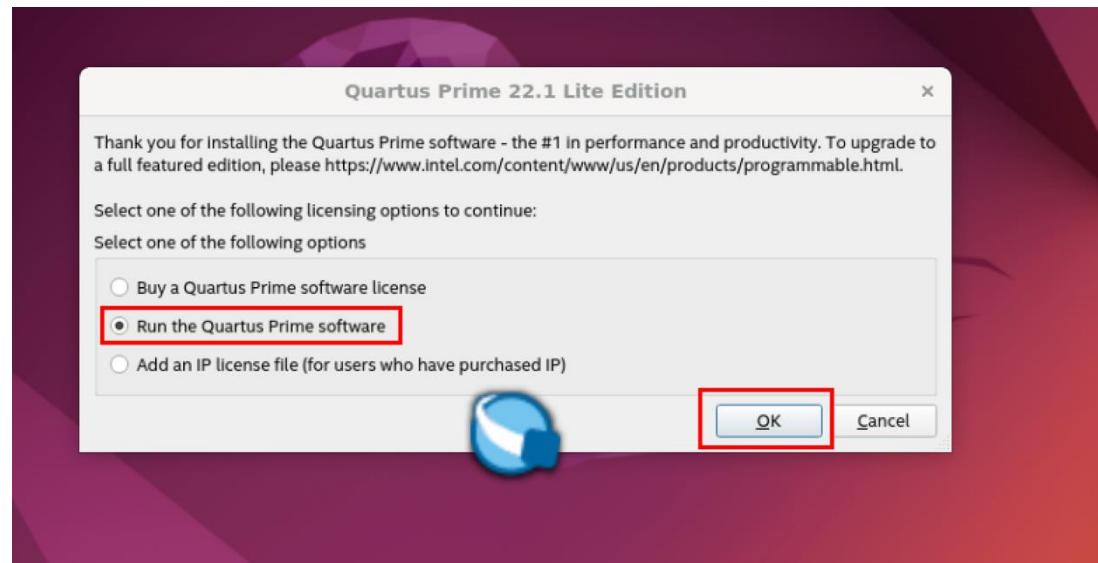
Open quartus in cloud 9 terminal

```
bash ip-172-31-19-32 ~ immediate

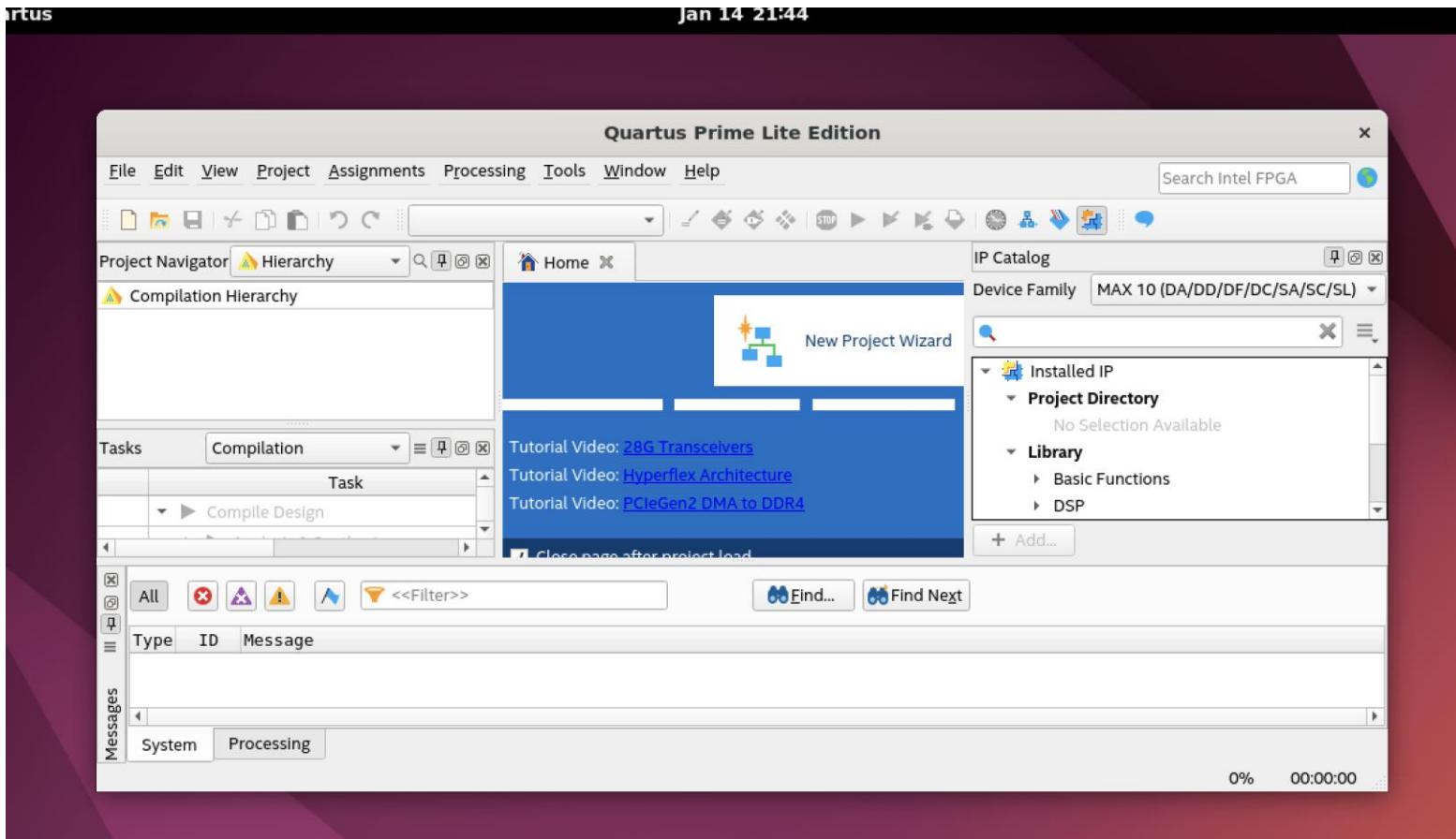
Setting up libxft2:i386 (2.3.4-1) ...

Warning: PATH set to RVM ruby but GEM_HOME and/or GEM_PATH not set, see:
https://github.com/rvm/rvm/issues/3212

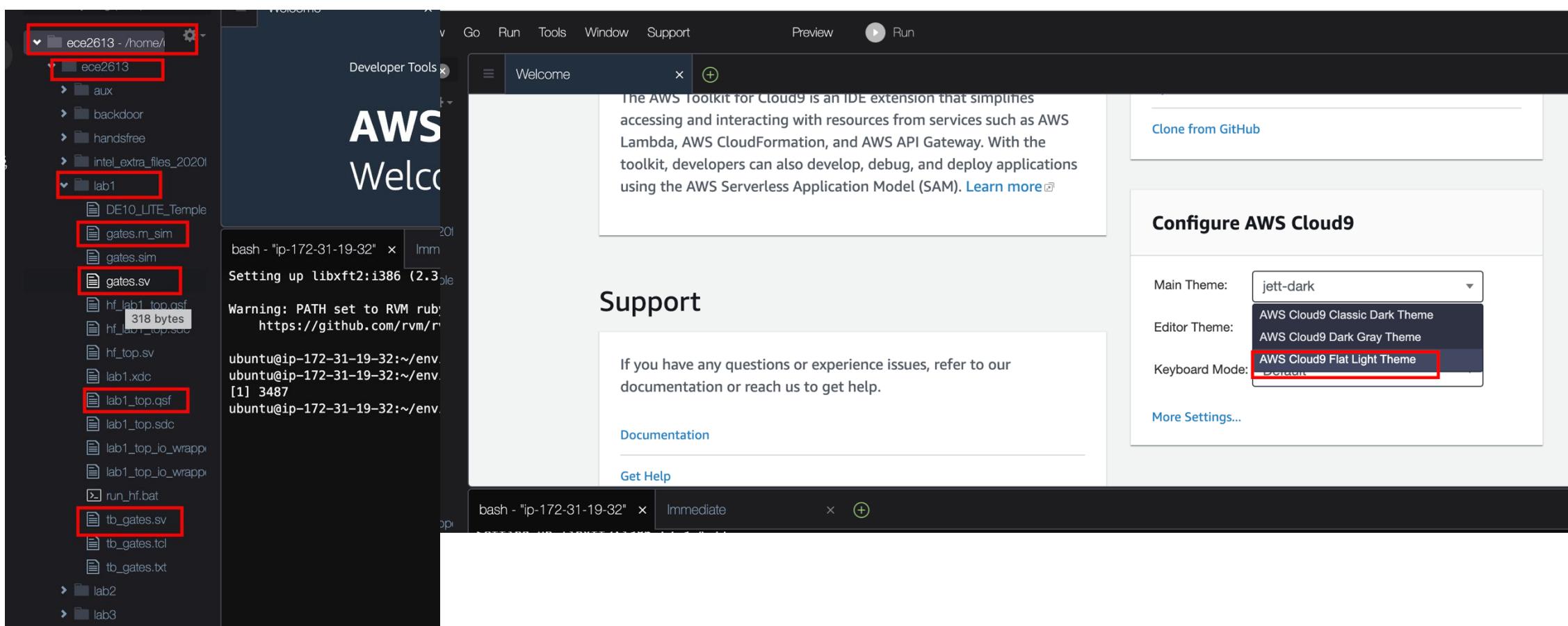
ubuntu@ip-172-31-19-32:~/environment$ export DISPLAY=:0
ubuntu@ip-172-31-19-32:~/environment$ quartus &
```



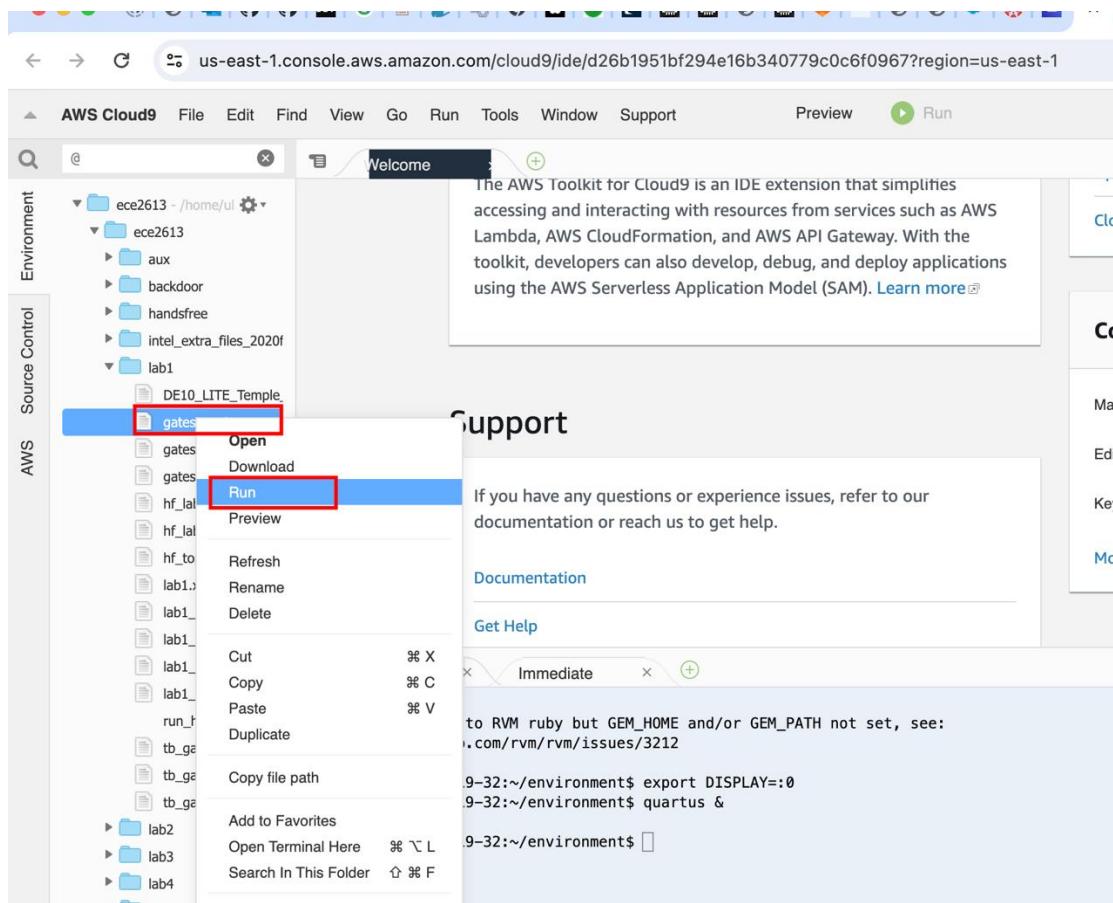
Quartus in xwindow



Cloud 9 file listing



Check m_sim file



```
# Loading work.gates
# do gates.m_sim
# Mismatch--loop index i: 0; input: 00, expected: 1000, received: xxx
# Mismatch--loop index i: 1; input: 01, expected: 1110, received: xxx
# Mismatch--loop index i: 2; input: 10, expected: 1110, received: xxx
# Mismatch--loop index i: 3; input: 11, expected: 0011, received: xxx
# Simulation complete - 4 mismatches!!!
# ** Note: $finish : tb_gates.sv(64)
#   Time: 80 ns Iteration: 0 Instance: /tb_gates
# End time: 21:48:13 on Jan 14, 2024, Elapsed time: 0:00:00
# Errors: 0, Warnings: 0
```

Process exited with code: 0

Check qsf file ...

The screenshot shows a terminal window with the following output:

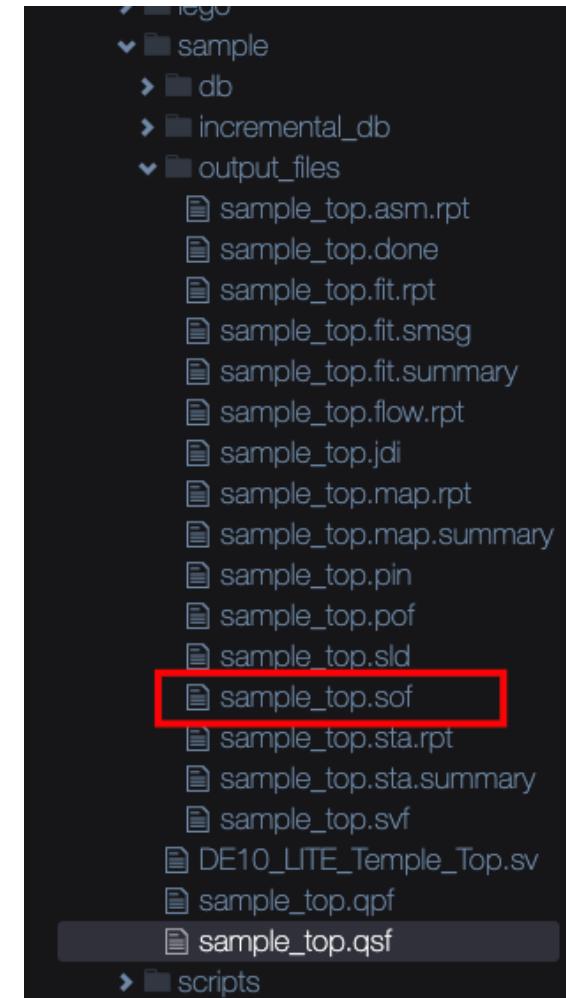
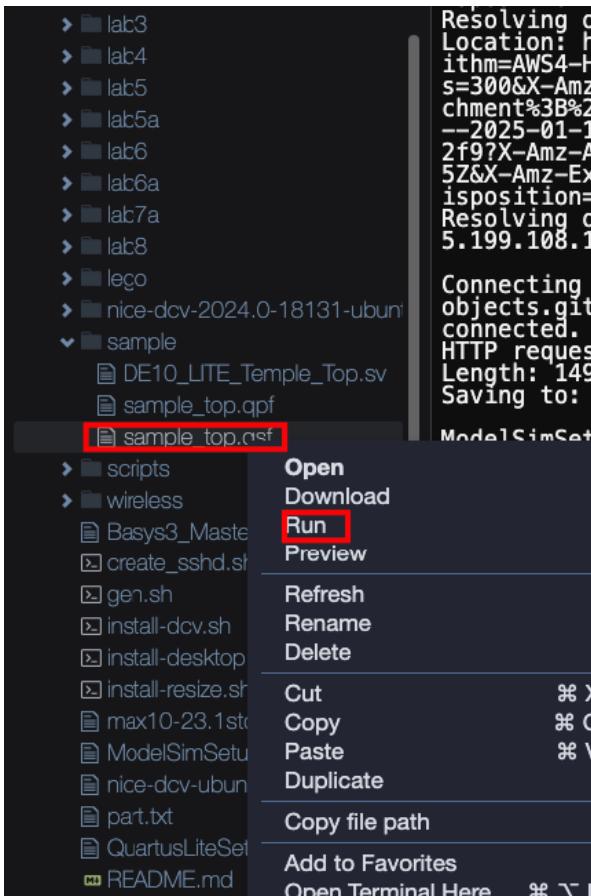
```
bash - "ip-172-31" * Immediate * ece2613/lab1/ga * ece2613/lab1/lab *
Run Command: ece2613/lab1/lab1_top.qsf

INFO: The Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details, at
Info: https://fpgasoftware.intel.com/eula.
Info: Processing started: Sun Jan 14 21:49:26 2024
Info: Command: quartus_cpf -c -q 1MHz -g 3.3 -n p output_files/lab1_top.sof output_files/lab1_top.svf
Info: Quartus Prime Convert_programming_file was successful. 0 errors, 0 warnings
Info: Peak virtual memory: 323 megabytes
Info: Processing ended: Sun Jan 14 21:49:26 2024
Info: Elapsed time: 00:00:00
Info: Total CPU time (on all processors): 00:00:01
```

Annotations highlight several key steps and results:

- A red box highlights the file path `ece2613/lab1/lab1_top.qsf` in the terminal command.
- A red box highlights the output file `lab1_top.sof` in the directory tree.
- A red box highlights the success message in the terminal output: "Quartus Prime Convert_programming_file was successful. 0 errors, 0 warnings".

Let us try a sample synthesis



For the next class...

- Think about programming in blocks with IOs
- We will try draw.io
- During the lab, we will do the WSL installation if you can have more than 10GB free space