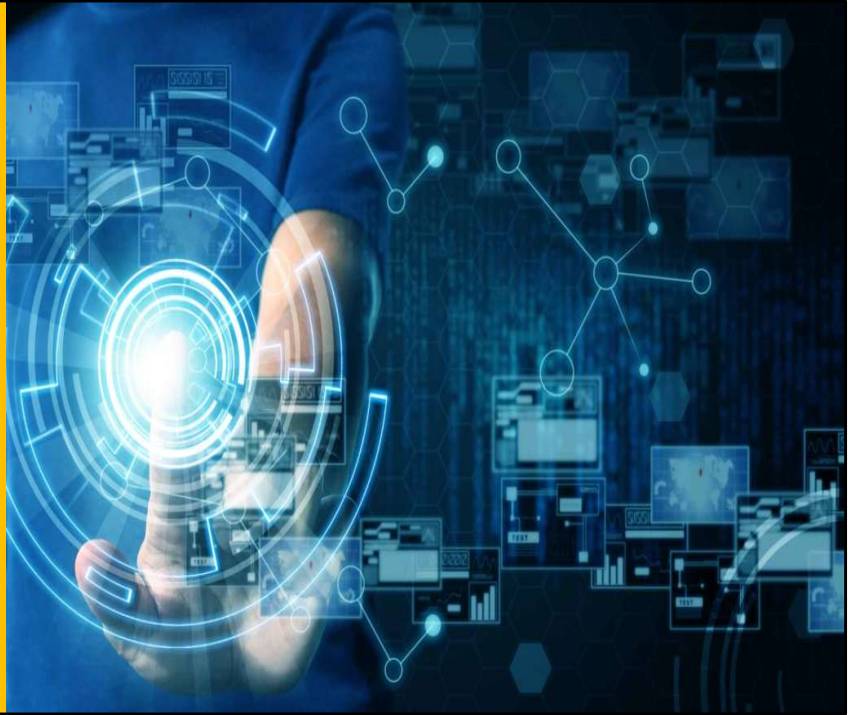


CS221
C and Systems
Programming



vlab: a new Development Environment

The **vlab** computers are virtual computers operated by USF's CS department

- All have same operating system, software tools, capabilities, etc.
- They have some capabilities that we will need for several remaining labs

How do we access them?

Like CS dept's own public cloud

ssh

ssh (secure shell) is a program that lets us "log into" a different computer from our own. It is secure, so we need to set up security first. Follow these steps!

- In a BASH terminal window on your computer, run
ssh-keygen -t rsa -b 4096
 - Store key in default location. Do NOT enter a passphrase
- On campus, copy key to **stargate** computer:
scp ~/.ssh/id_rsa.pub YOURUSERID@stargate.cs.usfca.edu:/home/YOURUSERID/id_rsa.pub

Continued...

ssh setup, continued

- Log into stargate using your USF password:
ssh YOURUSERID@stargate.cs.usfca.edu
- On **stargate**, run:
mkdir .ssh
mv id_rsa.pub .ssh/authorized_keys
ssh-keygen -t rsa -b 4096
 - Store key in default location. No passphrase
- Edit the **authorized_keys** file on **stargate**, adding the new **id_rsa.pub** key to the end of the file, and save the file.
 - Use **nano** text editor if you like

vlab usage

Now from anywhere on campus, you can log into **stargate** using **ssh**

The CS department doesn't want us doing work on **stargate**. Run:
rusers

This gives a list of all the **vlab** machines and who is logged into them. Just pick an empty **vlab** machine and run:

ssh vlab02 (or vlab00 or vlab07...)

Got it?

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stargate and vlab machines all share the same disk drive, so have same files.

Can set up VLAN ("virtual local area network") and then can access stargate from home.

vlab usage

What tools do we have on the vlabs?

- **Bash** – set up your environment as you like
- **gcc**
- **git**
- Text editors such as **vim** and **nano**
- A capable Linux operating system
- Some other features that we will need in upcoming labs

We do not have **Eclipse, Sublime, Notepad++, etc**

We can copy files to/from stargate using "scp"

Tell me more
about
virtualization

Virtualization is...

...having more than one **Environment** running on the same computer hardware.

- This is often done for "independence" reasons, e.g when AWS sells different companies compute power on the same physical server
- Independent Operating Systems, installed SW, etc
- Independent networking, memory, CPU power, etc

Also can be done to offer different environments on the same physical server

- I have Ubuntu and Windows running on my laptop

Saves money

- 16 "virtual machines" on 1 big server costs << than 16 smaller computers

AWS = Amazon Web Services

Today's Lab

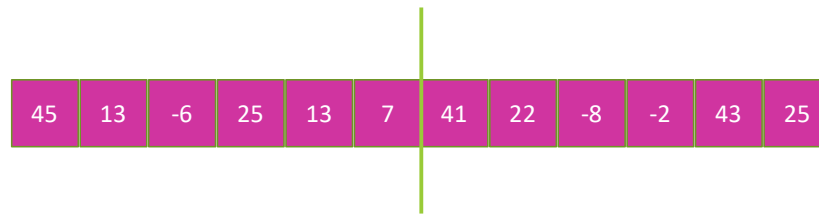


`merge.c`

I will give you a program that does mergesort

You will parallelize it!

Use multi threads to speed up the sorting



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Not much code to change. Find a place in the code you can parallelize, create a new thread to run one of the places.

Where must you `join()` the two threads again?