

Preparing for CS472 Labs

# Overview

Our lab environment will be using the GNS3 Network Emulator, along with the open source FRRouting software which we will be using to build our virtual routers and configure them using modern routing algorithms



GNS3 – Commercial  
Network Emulation  
Tooling

<https://www.gns3.com/>



FRRouting/frr  
Open Source Implementation of  
Many Routing Algorithms

<https://frrouting.org/>

# Prerequisites



GNS3 is complex to configure, there is a front-end component with implementations for linux, windows and MacOS, but GNS3 requires a backend component that is Linux only. Therefore to run GNS3 you can either run the entire stack on a linux VM (which is what we will be doing) or figure out how to deploy the backend on a Linux machine / VM and then connect the front end



RRRouting is an open source suite of routing algorithms with a router runtime. Its configuration tooling emulates Cisco tooling, however, it also can be a difficult piece of software to deploy and configure. To overcome this, we will be using a pre-built docker container to emulate a fully functioning router.

# Prerequisites



To simplify the configuration process, I worked with CCI – IT to create pre-built Ubuntu based VMs that are pre-configured with all of the software that we will need. Drexel CCI uses VMWare / vCenter / vSphere software



Drexel CCI's VMWare instance is deployed in such a way that in order to access it you must either be on Drexel's campus (aka connected to the DragonFly network), or connected into Drexel over Drexel CCI's VPN that uses Cisco Anywhere Connect tooling.

# Helpful Links

**<https://support.cci.drexel.edu/getting-connected/vpn/>**

This link takes you to Drexels page with information on how to download, install and configure the Anyconnect VPN tooling (if you don't already have it installed). Again, to do this lab you will need to connect to VMWare from Drexels campus network or over the VPN if you are remote

**<https://support.cci.drexel.edu/cci-virtual-lab-resources/vmware-vcenter-or-vsphere/>**

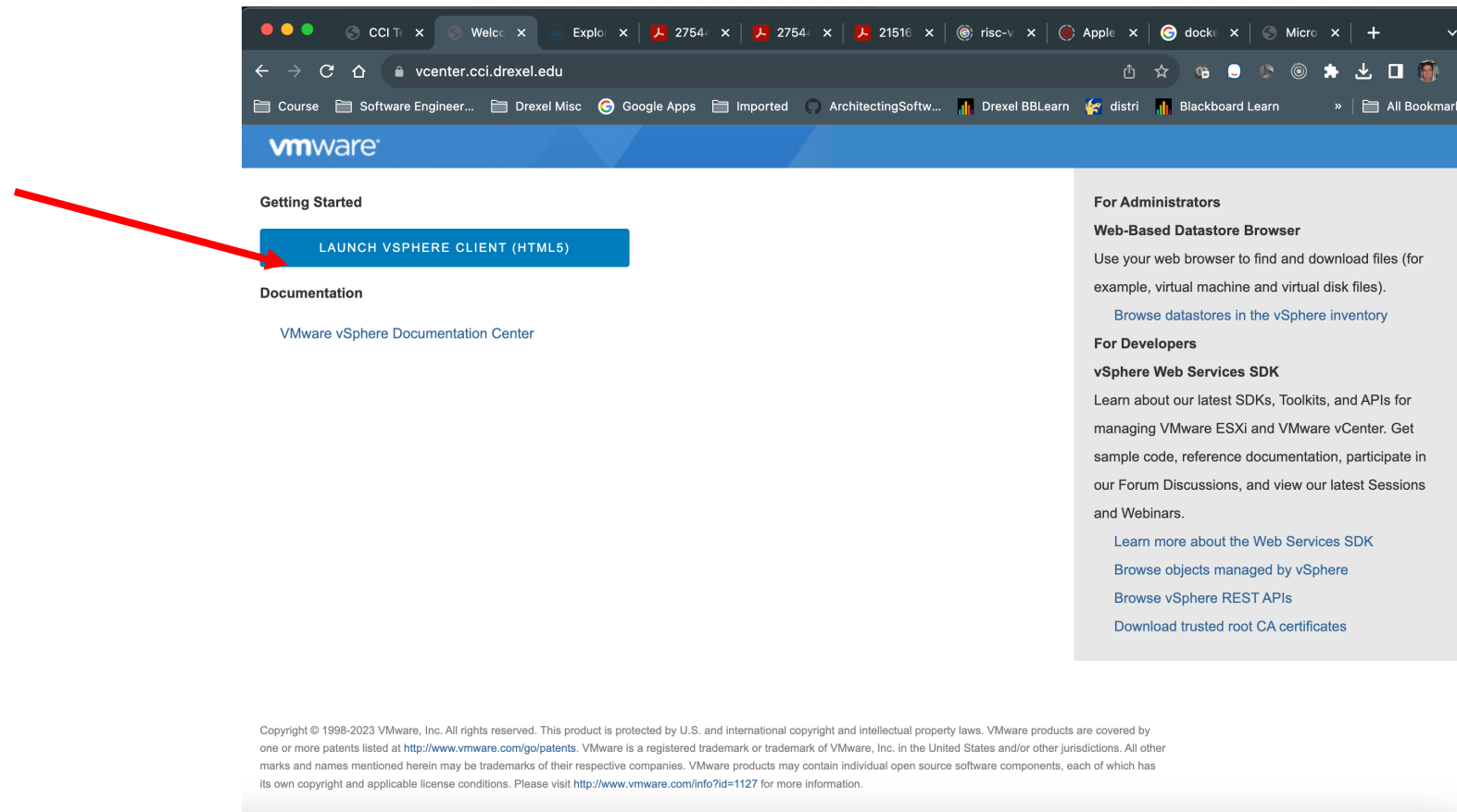
This link takes you to information on how to access Drexel CCI VMWare resources

**<https://vcenter.cci.drexel.edu>**

This link takes you Vcenter to launch and manage your virtual machine

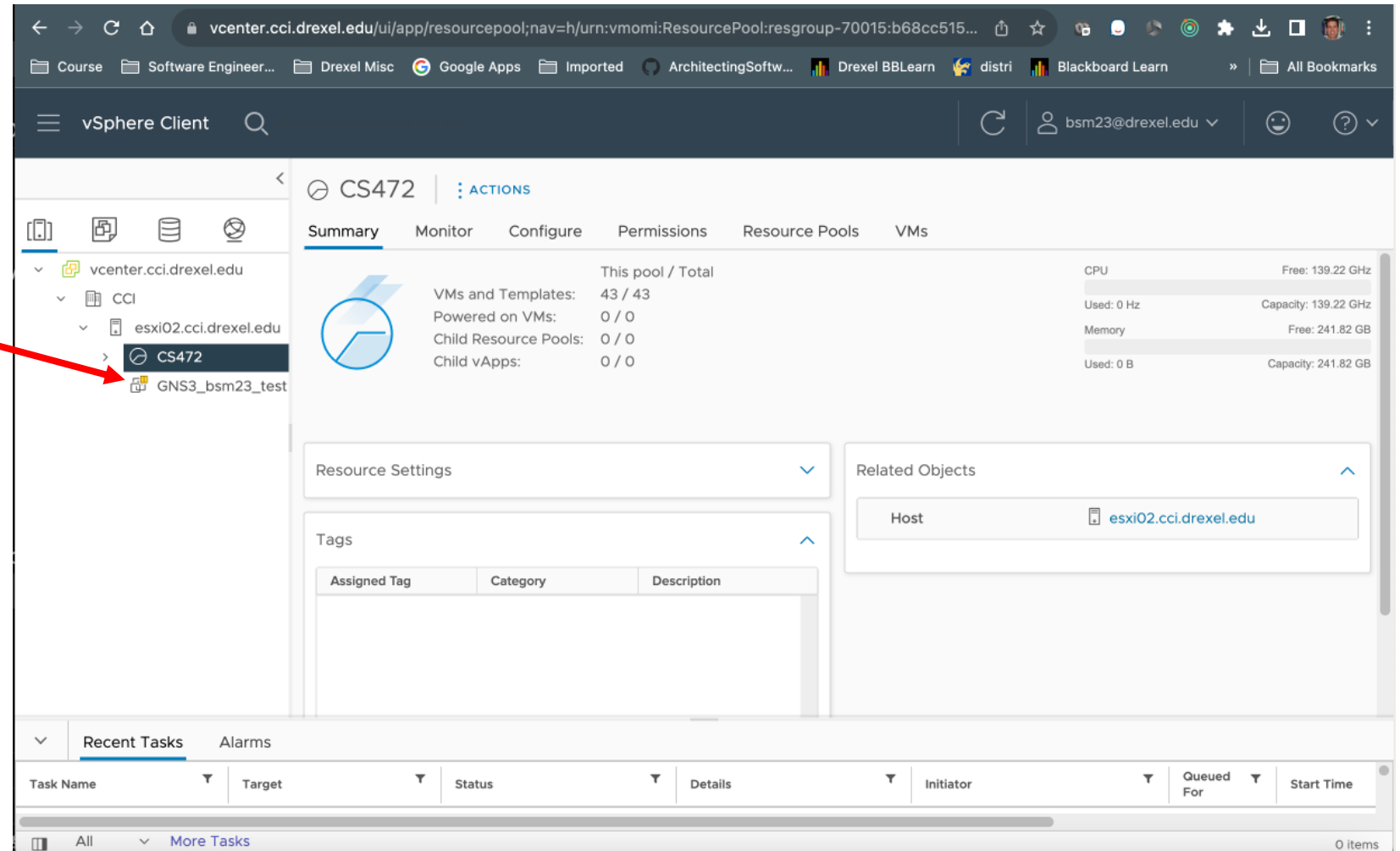
# Connecting to your VM

<https://vcenter.cci.drexel.edu>



# Connecting to your VM

Your VM Should Be Here  
(Click)



The screenshot displays the vSphere Client interface for a resource pool named CS472. The left-hand navigation pane shows a tree structure with the following items:

- vcenter.cci.drexel.edu
  - CCI
    - esxi02.cci.drexel.edu
      - CS472** (highlighted with a red arrow)
      - GNS3\_bsm23\_test

The main content area shows the summary for CS472, including a pie chart and the following statistics:

This pool / Total	
VMs and Templates:	43 / 43
Powered on VMs:	0 / 0
Child Resource Pools:	0 / 0
Child vApps:	0 / 0

Resource Settings and Tags are also visible. The bottom section shows a table for Recent Tasks, which is currently empty.

Task Name	Target	Status	Details	Initiator	Queued For	Start Time
-----------	--------	--------	---------	-----------	------------	------------

# Connecting to your VM – VM Start Page

Start your VM  
(click)

The screenshot shows the vSphere Client interface for a VM named 'GNS3\_bsm23\_test'. The VM is currently in a 'Suspended' state. A red arrow points to the green play button icon in the top toolbar, which is used to start the VM. The interface includes a left sidebar with a tree view of the vCenter hierarchy, a main content area with tabs for Summary, Monitor, Configure, Permissions, Datastores, Networks, Snapshots, and Updates. The Summary tab is active, displaying details about the VM's Guest OS (Ubuntu Linux), Compatibility, VMware Tools, DNS Name, IP Addresses, and Host. A 'LAUNCH REMOTE CONSOLE' button is visible. On the right, there are gauges for CPU Usage (0 Hz), Memory Usage (0 B), and Storage Usage (20.45 GB). At the bottom, there is a 'Recent Tasks' table.

Task Name	Target	Status	Details	Initiator	Queued For	Start Time
0 items						



# Connecting to your VM – VM Start Page

Start the console  
(click)

The screenshot displays the vSphere Client interface for a specific virtual machine (VM) named 'GNS3\_bsm23\_test'. The interface is organized into several sections:

- Left Sidebar:** Shows the navigation tree with the path: vcenter.cci.drexel.edu > CCI > esxi02.cci.drexel.edu > CS472 > GNS3\_bsm23\_test. The VM is highlighted.
- Top Bar:** Displays the vSphere Client logo, a search bar, and the user's email address (bsm23@drexel.edu).
- VM Summary:** The main section shows the VM's status as 'Powered On' with a green play button icon. Below this, there are links to 'LAUNCH WEB CONSOLE' and 'LAUNCH REMOTE CONSOLE'. The VM's specifications are listed: Guest OS: Ubuntu Linux (64-bit), Compatibility: ESXi 7.0 U2 and later (VM version 19), VMware Tools: Running, version:12320 (Guest Managed), DNS Name, IP Addresses, and Host: esxi02.cci.drexel.edu.
- VM Hardware:** A section showing the VM's configuration: 2 CPU(s), 2 GB, 0 GB memory active, and Hard disk 1 (20 GB).
- Right Panel:** Displays resource usage statistics: CPU USAGE (0 Hz), MEMORY USAGE (0 B), and STORAGE USAGE (20.52 GB). There is also a 'Notes' section with an 'Edit Notes...' link and a 'Custom Attributes' section.
- Bottom Panel:** Shows a table for 'Recent Tasks' with columns for Task Name, Target, Status, Details, Initiator, Queued For, and Start Time. The table currently shows 1 item.