CSE 332: Data Structures and Parallelism

Google Compute Engine

This handout will help you set up Google Compute Engine for the Chess project.

(1) Setting up Terminal

This project, you will use Google Compute Engine to access more computing power than normal. As such, you will need to ssh to a remote instance. Google Compute Engine lets you do this by clicking a button in the browser, but you may ssh however you like.

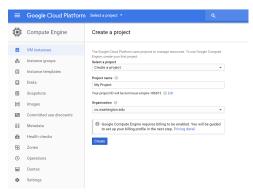
(2) Setting up Google Compute Engine

Additionally, you will need to create a project and VM Instances using Google Compute Engine.

You should begin by going to:

https://console.cloud.google.com/compute

Make sure you are in the Create a Project section.



You should use cse332-p3-<your team name> as the project name.

Create a project

The Google Cloud Platform uses projects to manage resources. To use Google Compute
Engine, create your first project.
Select a project
Create a project 👻
Project name
,
cse332-p3-teamname
Your project ID will be cse332-p3-teamname-186813 📀 Edit

Create your project. If you are prompted for a free trial, don't worry about it for now. Next, you will need to get a "coupon code". Google has provided us with one coupon code per student. This should be more than enough credits to complete the project, but if you end up needing more, send an e-mail to Ruth (rea@cs.washington.edu).

To get a coupon code, follow these steps:

- (1) Check Piazza for a link to the coupon sign-up (link is also in your email from Ruth) and fill in your name and e-mail address.
- (2) You should get a confirmation e-mail with a link. Click on the link.
- (3) You should get another e-mail with a link and a coupon code. Either click on the link in the e-mail, or go to https://console.cloud.google.com/education and fill in the coupon code. WHEN YOU CLICK ON "REDEEM LINK" THE FORM DEFAULTS TO YOUR PERSONAL EMAIL. IN ORDER FOR GCE TO BE USED CORRECTLY, <u>YOU MUST CHANGE THE PROFILE TO YOUR CSE EMAIL</u> IN THE UPPER RIGHT CORNER BEFORE ACCEPTING AND CONTINUING THE COUPON.
- (4) Chose "yes" or "no, and then click "Accept and Continue" on the webpage that comes up.

(3) Enabling Billing

Now that you have a "billing account" filled with your coupon code, you need to *apply* it to your GCE project.

- (1) Go to https://console.cloud.google.com/compute
- (2) Click the "enable billing" button:

≡	Google Cloud Platform	cse332-p3-teamname 👻	۹								
۲	Compute Engine	VM instances									
B	VM instances	You can use Compute Engine after you	ı enable billin	g							
ц <mark>П</mark> а	Instance groups	Pay only for what you use. Learn more about Compute Engine pricing.									
	Instance templates	Enable billing									
0	Disks										
0	Snapshots			Ourseast Franks							
18	Images			Compute Engine							
≣≣	Metadata			Compute Engine lets you create and run virtual machines on							
â	Health checks			Google infrastructure. Compute Engine offers scale, performance, and value that allows you to easily launch large compute clusters on Google's infrastructure.							
:::	Zones			on oogie s innustration.							
()	Operations										
	Quotas										
\$	Settings										

(3) Choose "CSE 332" in the pop-up dialog, and click "Set Account".

Your project should be set up to use the GCE coupon; you might need to wait a little bit for compute engine to get ready.

(4) Creating An Instance

Now you should be ready to go with GCE. To test this out, let's try spinning up an instance.

Go to https://console.cloud.google.com/compute, and click on the "create" button.

When creating an instance, you will have a choice of several options. You *can* choose anything you like, but we recommend the following choices. In particular, if you are creating a "test instance", we recommend you use f1-micro.

Suggested GCE Instance Choices

- Zone: us-central1-b
- Machine Type:
 - For a test instance: f1-micro
 - For a real instance: n1-highcpu-32
- Image: Debian GNU/Linux 9

If you insist on using a Windows Image, you're on your own.

		Select a machine type
← Create an instance		Machine types determine the specifications of your machines, such as the amount of memory, virtual cores, and persistent disk limits an instance will have. Learn more about machine types
Name 😨		Shared-core machines
instance-1 Zone 🔞		f1-micro 1 vCPU, 0.6 GB Memory
us-central1-b 👻	\$4.28 per month estimated Effective hourly rate \$0.006 (730 hours per month)	q1-small
Machine type	Your first 720 hours of f1-micro instance usage are free this	1 vCPU, 1.7 GB Memory
micro (1 shared 👻 0.6 GB memory Customize	☆ Details	Standard machines
Container		 n1-standard-1 1 vCPU, 3.75 GB Memory
Boot disk @		n1-standard-2 2 vCPU, 7.5 GB Memory
New 10 GB standard persistent disk		n1-standard-4 4 vCPU, 15 GB Memory
Debian GNU/Linux 9 (stretch) Change		n1-standard-8 8 vCPU, 30 GB Memory
Identity and API access 📀		n1-standard-16
Service account Compute Engine default service account		16 vCPU, 60 GB Memory
Access scopes		 n1-standard-32 32 vCPU, 120 GB Memory
Allow default access Allow full access to all Cloud APIs Set access for each API		High CPU machines
		n1-highcpu-2 2 vCPU, 1.8 GB Memory
Firewall Add tags and firewall rules to allow specific network traffic from the Internet C Allow HTTP traffic		n1-highcpu-4 4 vCPU, 3.6 GB Memory
Allow HTTPS traffic	n1-highcpu-8 8 vCPU, 7.2 GB Memory	
X Management, disks, networking, SSH keys		n1-highcpu-16 16 vCPU, 14.4 GB Memory
You will be billed for this instance. Learn more		n1-highcpu-32 32 vCPU, 28.8 GB Memory
Create Cancel		SZ YOF 0, 20.0 GD IVIETIOLY
Equivalent REST or command line		High memory machines
		Select Cancel

Once your instance boots, you will be able to ssh into it by clicking the "ssh" button next to it in the list:

Name ^	Zone	Disk	Network	In use by	External IP	Connect
🛛 🔮 chessbots	us-central1-f	chessbots	default		104.197.134.107 🖾	SSH
🔤 🔮 umessage	us-central1-f	umessage	default		104.197.67.89	SSH

Don't forget to stop your instance when you are not using it!! This will keep you from running out of money and resources. You can do this by selecting the checkbox and clicking the stop button. You can resume later by clicking the start button.

VN	l instances	P	CREATE INSTANCE		/M C REFF	RESH	STA	RT STOP	ڻ ا	RESET	TELETE
=	Filter VM instar	nces							0	Columns	•
~	Name 🔿	Zone	Recommendation	Internal IP	External IP	Connect					
	🥑 instance-1	us-central1	-b	10.128.0.2	35.188.195.69	SSH 🗸	:				

(5) Connecting To An Instance

Now that you've created your instance, you are ready to ssh to it. To do this, click the button in the GCE interface labeled "ssh" in the row of the instance you just created.

You're now connected to your instance!

Once you connect to your instance, you should copy/paste the following command into the terminal:

source <(curl -s https://courses.cs.washington.edu/courses/cse332/gce/setup-instance.sh)</pre>

Make sure you read the instructions that the script prints out. You will need to copy another key to gitlab, and, when you do, if it errors, make sure your key does not have any spaces in it.

(6) Running A Bot On A GCE Instance

When you are running one of your bots on a GCE instance, you **should not** use EasyChess, because you do not want to access it with a GUI. Instead, you will use CloudClient.java.

In preparation for running your bot on the server, edit the configuration of CloudClient.java to be set to your Chess Server Login and the bot you want to run. Then, after you've run the command (above), you should run CloudClient on the VM. Finally, to see your bot play the game, you should do the following:

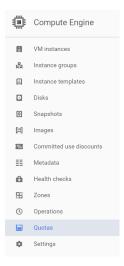
- Run EasyChess on your local machine
- Type "games" to see the list of currently running games
- Type "watch #<game number here>"

(7) GCE Won't Allow Me To Use More Cores!

If you have multiple instances running, the *total* you are allowed is 32 cores. Sometimes, for reasons that I haven't figured out, GCE doesn't let you use 32 cores like it should.

If this happens, follow these instructions and it should start working within a few hours:

• Go to the quotas page in your account.



• Select the checkbox for CPUs and type '32' into the form for the us-central1 region as shown:

Quotas 🛨 EDIT (QUOTAS	× 1 quota selected			
Quota type All quotas	Service Google Compute Engine API	Metric All metrics	Region Image: All regions Image: Cl	Google Compute Engine API	€ ×
Service		Region	Used Y	CPUs - us-central1	
Google Compute Engine API Networks		Global	1 / 5	Change to Your request requires approval.	
Google Compute Engine API Subnetworks		Global	13 / 100	32	
Google Compute Engine API In-use IP addresses		us-central1	1/8	Justification Required @	
Google Compute Engine API Routes		Global	14 / 200	We are supposed to have 32 <u>CPUs</u> in our class	8
Google Compute Engine API CPUs		us-central1	1/24	Next Cancel	
Google Compute Engine API Firewall rules		Global	4 / 100	Submit Request Back	
Google Compute Engine API CPUs (all regions)		Global	1 / 64		

• Check back periodically to see if the quota changes to 32. You should get an email from google when this happens.