

Practical Worksheet 6

Create an EC2 instance

Create an EC2 micro instance using Ubuntu and SSH into it.

```
ubuntu@ip-172-31-45-149:~$ sudo bash
root@ip-172-31-45-149:/home/ubuntu# apt-get update
Hit:1 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease [114 kB]
Get:3 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease [99.8 kB]
Get:4 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [14.1 MB]
Get:5 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe Translation-en [5652 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:7 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 c-n-f Metadata [286 kB]
Get:8 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [217 kB]
Get:9 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/multiverse Translation-en [112 kB]
Get:10 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/multiverse amd64 c-n-f Metadata [83.72 kB]
Get:11 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [544 kB]
Get:12 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [129 kB]
Get:13 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 c-n-f Metadata [8168 kB]
Get:14 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [306 kB]
Get:15 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/restricted Translation-en [47.5 kB]
Get:16 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 c-n-f Metadata [524 kB]
Get:17 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [25.4 kB]
Get:18 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/universe Translation-en [83.3 kB]
Get:19 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 c-n-f Metadata
```

```
root@ip-172-31-45-149:/home/ubuntu# apt-get upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  linux-aws linux-headers-aws linux-image-aws
The following packages will be upgraded:
  apparmor apt apt-utils base-files cloud-init cryptsetup cryptsetup-initramfs curl
  dirmngr dmidecode git git-man gnupg gnupg-l10n gnupg-utils gpg gpg-agent gpg-wks-client
  gpg-wks-server gpgconf gpgsm gpgv intel-microcode isc-dhcp-client isc-dhcp-common libapparmor1
  libapt-pkg6.0 libc-bin libcryptsetup12 libcurl3-gnutls libcurl4 libfreetype6 libgnutls30
  libgstreamer1.0-0 libldap-2.5-0 libldap-common libnetplan0 libnftables1 libnss-systemd libnss3
  libpam-systemd libssl3 libsystemd0 libudev1 libxslt1.1 locales motd-news-config netplan.io
  nftables open-vm-tools openssl python-apt-common python3-apt python3-distupgrade python3-gi
  python3-jwt python3-software-properties python3-twisted snapd software-properties-common systemd
  systemd-sysv tzdata ubuntu-adantage-tools ubuntu-release-upgrader-core udev
67 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.
28 standard security updates
Need to get 61.8 MB of archives.
After this operation, 5456 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 motd-news-config
all 12ubuntu4.2 [4612 B]
Get:2 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 base-files amd64
12ubuntu4.2 [62.7 kB]
Get:3 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libc-bin amd64 2.
35-0ubuntu3.1 [706 kB]
Get:4 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libsystemd0 amd64
249.11-0ubuntu3.4 [316 kB]
Get:5 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libnss-systemd am
```

```
root@ip-172-31-45-149:/home/ubuntu# apt-get install python3-venv
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libpython3.10 libpython3.10-minimal libpython3.10-stdlib python3-pip-whl python3-setuptools-whl
    python3.10 python3.10-minimal python3.10-venv
Suggested packages:
  python3.10-doc binfmt-support
The following NEW packages will be installed:
  python3-pip-whl python3-setuptools-whl python3-venv python3.10-venv
The following packages will be upgraded:
  libpython3.10 libpython3.10-minimal libpython3.10-stdlib python3.10 python3.10-minimal
5 upgraded, 4 newly installed, 0 to remove and 73 not upgraded.
Need to get 9812 kB of archives.
After this operation, 2893 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10 amd64 3.10.4-3ubuntu0.1 [1952 kB]
Get:2 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3.10 amd64 3.10.4-3ubuntu0.1 [488 kB]
Get:3 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-std lib amd64 3.10.4-3ubuntu0.1 [1830 kB]
Get:4 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 python3.10-minimal amd64 3.10.4-3ubuntu0.1 [2258 kB]
Get:5 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libpython3.10-minimal amd64 3.10.4-3ubuntu0.1 [809 kB]
Get:6 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 python3-pip-whl all 2.0.2+dfsg-1 [1679 kB]
Get:7 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 python3-setuptools-whl all 59.6.0-1.2 [788 kB]
```

```
root@ip-172-31-45-149:/home/ubuntu# apt install python3-pip
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  build-essential bzip2 cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-dejavu-core g++-g++-11 gcc gcc-11 gcc-11-base javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan6 libatomic1 libc-dev-bin libc-devtools libc6 libc6-dev libcc1-0 libcrypt-dev libdeflate0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libfontconfig1 libgcc-11-dev libgd3 libgomp1 libisl23 libitm1 libjbig0 libjpeg-turbo8 libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblsan0 libmpc3 libnsl-dev libpython3-dev libpython3.10-dev libquadmath0 libstdc++-11-dev libtiff5 libtirpc-common libtirpc-dev libtirpc3 libtsan0 libubsan1 libwebp7 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev python3-dev python3-wheel python3.10-dev rpcsvc-proto zlib1g-dev
Suggested packages:
  bzip2-doc cpp-doc gcc-11-locales debian-keyring g++-multilib g++-11-multilib gcc-11-doc gcc-multilib autoconf automake libtool flex bison gdb gcc-doc gcc-11-multilib apache2 | lighttpd | httpd glibc-doc bzr libgd-tools libstdc++-11-doc make-doc
Recommended packages:
  libnss-nis libnss-nisplus
The following NEW packages will be installed:
  build-essential bzip2 cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-dejavu-core g++-g++-11 gcc gcc-11 gcc-11-base javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl libasan6 libatomic1 libc-dev-bin libc-devtools libc6 libc6-dev libcc1-0 libcrypt-dev libdeflate0 libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libfontconfig1 libgcc-11-dev libgd3 libgomp1 libisl23 libitm1 libjbig0 libjpeg-turbo8 libjpeg8 libjs-jquery libjs-sphinxdoc libjs-underscore liblsan0 libmpc3 libnsl-dev libpython3-dev libpython3.10-dev libquadmath0 libstdc++-11-dev libtiff5 libtirpc-dev libtsan0 libubsan1 libwebp7 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev python3-dev python3-pip python3-wheel python3.10-dev rpcsvc-proto zlib1g-dev
The following packages will be upgraded:
```

Create a directory with the path `/opt/wwc/mysites` and `cd` into that.

Set up a virtual environment and activate it.

Install `django` and use it to create a project and an app called `polls`.

```

root@ip-172-31-45-149:~# mkdir -p /opt/wwc/mysites
root@ip-172-31-45-149:~# cd $_
root@ip-172-31-45-149:/opt/wwc/mysites# python3 -m venv venv
root@ip-172-31-45-149:/opt/wwc/mysites# source venv/bin/activate
(venv) root@ip-172-31-45-149:/opt/wwc/mysites# pip install django
Collecting django
  Using cached Django-4.1.1-py3-none-any.whl (8.1 MB)
Collecting asgiref<4,>=3.5.2
  Using cached asgiref-3.5.2-py3-none-any.whl (22 kB)
Collecting sqlparse>=0.2.2
  Using cached sqlparse-0.4.2-py3-none-any.whl (42 kB)
Installing collected packages: sqlparse, asgiref, django
Successfully installed asgiref-3.5.2 django-4.1.1 sqlparse-0.4.2
(venv) root@ip-172-31-45-149:/opt/wwc/mysites# django-admin startproject lab
(venv) root@ip-172-31-45-149:/opt/wwc/mysites# cd lab/
(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# python3 manage.py startapp polls
(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# ll
total 20
drwxr-xr-x 4 root root 4096 Sep 11 10:35 .
drwxr-xr-x 4 root root 4096 Sep 11 10:35 ../
drwxr-xr-x 3 root root 4096 Sep 11 10:35 lab/
-rwxr-xr-x 1 root root 659 Sep 11 10:35 manage.py*
drwxr-xr-x 3 root root 4096 Sep 11 10:35 polls/

```

Install and configure nginx

Install **nginx**.

```

(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# apt install nginx
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  nginx
0 upgraded, 1 newly installed, 0 to remove and 3 not upgraded.
Need to get 3884 B of archives.
After this operation, 50.2 kB of additional disk space will be used.
Get:1 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 nginx amd64 1.18.0-6ubuntu14.1 [3884 B]
Fetched 3884 B in 0s (228 kB/s)
Selecting previously unselected package nginx.
(Reading database ... 70506 files and directories currently installed.)
Preparing to unpack .../nginx_1.18.0-6ubuntu14.1_amd64.deb ...
Unpacking nginx (1.18.0-6ubuntu14.1) ...
Setting up nginx (1.18.0-6ubuntu14.1) ...
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 getty@tty1.service
systemctl restart networkd-dispatcher.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service
systemctl restart user@1000.service

```

Edit `/etc/nginx/sites-enabled/default` and restart **nginx**.

Run the server in the `/opt/wwc/mysites/lab` directory.

```
(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# vi /etc/nginx/sites-enabled/default
(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# service nginx restart
(venv) root@ip-172-31-45-149:/opt/wwc/mysites/lab# python3 manage.py runserver 8000
Watching for file changes with StatReloader
Performing system checks...

System check identified no issues (0 silenced).

You have 18 unapplied migration(s). Your project may not work properly until you apply the migration
s for app(s): admin, auth, contenttypes, sessions.
Run 'python manage.py migrate' to apply them.
September 11, 2022 - 10:40:17
Django version 4.1.1, using settings 'lab.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.
```

Go to a browser now and use the IP address of the ec2 instance.

The screenshot shows a web browser window with the following details:

- Address Bar:** Shows the URL `Not Secure — 3.26.114.79`.
- Title Bar:** Displays the word "django".
- Header:** Includes a link to "View release notes for Django 4.1".
- Content Area:** Features a central illustration of a green rocket launching from a white cloud into a light blue background.
- Middle Text:** The text "The install worked successfully! Congratulations!" is centered below the illustration.
- Bottom Text:** A smaller message states, "You are seeing this page because `DEBUG=True` is in your settings file and you have not configured any URLs."
- Footer:** Contains three links:
 - Django Documentation:** "Topics, references, & how-to's"
 - Tutorial: A Polling App:** "Get started with Django"
 - Django Community:** "Connect, get help, or contribute"

Changing the code

Following the steps outlined in the lecture, edit the following files then rerun the server.

```
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ sudo vi polls/views.py
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ cat $_
from django.http import HttpResponseRedirect

def index(request):
    return HttpResponseRedirect("Hello, world.")

(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ sudo vi polls/urls.py
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ cat $_
from django.urls import path
from . import views

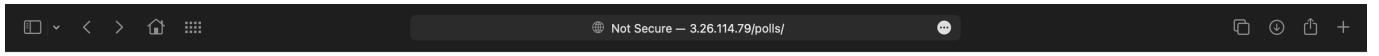
urlpatterns = [
    path('', views.index, name='index'),
]
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ sudo vi lab/urls.py
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ cat $_
from django.contrib import admin
from django.urls import path, include

urlpatterns = [
    path('polls/', include('polls.urls')),
    path('admin/', admin.site.urls),
]
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ python3 manage.py runserver 8000
Watching for file changes with StatReloader
Performing system checks...

System check identified no issues (0 silenced).

You have 18 unapplied migration(s). Your project may not work properly until you apply the migration
s for app(s): admin, auth, contenttypes, sessions.
```

Go to a browser again and add `/polls/` at the end of the URL.



Hello, world.

Adding the load balancer

Create an application load balancer.

The screenshot shows the AWS CloudFormation console with the 'Create Load Balancer' wizard open. The left sidebar shows navigation links for EC2, S3, DynamoDB, Key Management Service, IAM, and other services. The main area displays the configuration for a new load balancer:

- Load Balancer Name:** 23344153-lb
- Description:** 23344153-lb
- Listeners:** None
- Monitoring:** None
- Integrated services:** None
- Tags:** None
- Basic Configuration:**
 - Name:** 23344153-lb
 - ARN:** arn:aws:elasticloadbalancing:ap-southeast-2:523265914192:loadbalancer/app/23344153-lb/1e9379eb8055aff8
 - DNS name:** 23344153-lb-1925387054.ap-southeast-2.elb.amazonaws.com (A Record)
 - State:** Active
 - Type:** application
 - Scheme:** internet-facing
 - IP address type:** ipv4

For the target group, in the health check, specify `/polls/` for the path.

VPC
Select the VPC with the instances that you want to include in the target group.

- vpc-0b754f714cd1af245
IPv4: 172.31.0.0/16

Protocol version

- HTTP1**
Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.
- HTTP2**
Send requests to targets using HTTP/2. Supported when the request protocol is HTTP/2 or gRPC, but gRPC-specific features are not available.
- gRPC**
Send requests to targets using gRPC. Supported when the request protocol is gRPC.

Health checks
The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

HTTP

Health check path

/polls/
Up to 1024 characters allowed.

Add the instance as a registered target.

Target type	Protocol : Port	Protocol version	VPC
Instance	HTTP: 80	HTTP1	vpc-0b754f714cd1af245
IP address type	Load balancer		
IPv4	23344153-lb		

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
1	1	0	0	0	0

Targets **Monitoring** **Health checks** **Attributes** **Tags**

Registered targets (1)

Instance ID	Name	Port	Zone	Health status	Health status details
i-002c9545dd99a8310		80	ap-southeast-2c	healthy	

Go to the browser again and change the instance public IP address in the URL to the load balancer DNS name.

Hello, world.

Health check is fetching the **/polls/** page every 30 seconds.

```
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ python manage.py runserver 8000
Watching for file changes with StatReloader
Performing system checks...

System check identified no issues (0 silenced).

You have 18 unapplied migration(s). Your project may not work properly until you apply the migration
s for app(s): admin, auth, contenttypes, sessions.
Run 'python manage.py migrate' to apply them.

September 20, 2022 - 12:57:32
Django version 4.1.1, using settings 'lab.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.

[20/Sep/2022 12:58:09] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:58:23] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:58:53] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:59:09] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:59:23] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:59:39] "GET /polls/ HTTP/1.0" 200 11
[20/Sep/2022 12:59:53] "GET /polls/ HTTP/1.0" 200 11
```

Web interface for CloudStorage application

Set up aws cli in the instance.

```
ubuntu@ip-172-31-17-179:~$ sudo apt install awscli
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
awscli
0 upgraded, 1 newly installed, 0 to remove and 3 not upgraded.
Need to get 1172 kB of archives.
After this operation, 10.4 MB of additional disk space will be used.
Get:1 http://ap-southeast-2.ec2.archive.ubuntu.com/ubuntu jammy/universe amd64 awscli all 1.22.34-1 [1172 kB]
Fetched 1172 kB in 0s (27.0 MB/s)
Selecting previously unselected package awscli.
(Reading database ... 77483 files and directories currently installed.)
Preparing to unpack .../awscli_1.22.34-1_all.deb ...
Unpacking awscli (1.22.34-1) ...
Setting up awscli (1.22.34-1) ...
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 getty@tty1.service
systemctl restart networkd-dispatcher.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.service
```

```
Running kernel seems to be up-to-date.

Restarting services...
Service restarts being deferred:
/etc/needrestart/restart.d/dbus.service
systemctl restart getty@tty1.service
systemctl restart networkd-dispatcher.service
systemctl restart systemd-logind.service
systemctl restart unattended-upgrades.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.

```
ubuntu@ip-172-31-17-179:~$ aws configure
AWS Access Key ID [None]: AKIAXTVIUGVIPOXCNOPV
AWS Secret Access Key [None]: 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
Default region name [None]: ap-southeast-2
Default output format [None]: json
```

Create a local version of DynamoDB.

```

>_ lab3/dynamodb $ scp dynamodb_local_latest.zip ubuntu@3.26.114.79:
dynamodb_local_latest.zip                                         100%   42MB   9.4MB/s   00:04
>_ lab3/dynamodb $ ssh ubuntu@3.26.114.79
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-1011-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

System information as of Sun Sep 18 14:02:11 UTC 2022

System load:  0.080078125      Processes:          103
Usage of /:   31.3% of 7.58GB   Users logged in:    1
Memory usage: 29%              IPv4 address for eth0: 172.31.17.179
Swap usage:   0%

* Ubuntu Pro delivers the most comprehensive open source security and
  compliance features.

  https://ubuntu.com/aws/pro

7 updates can be applied immediately.
7 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

```

```

*** System restart required ***
Last login: Sun Sep 18 12:28:34 2022 from 125.63.25.149
ubuntu@ip-172-31-17-179:~$ unzip dynamodb_local_latest.zip
Archive: dynamodb_local_latest.zip
  creating: DynamoDBLocal_lib/
  inflating: DynamoDBLocal.jar
  inflating: DynamoDBLocal_lib/Apache-HttpComponents-HttpClient-4.5.x.jar
  inflating: DynamoDBLocal_lib/Apache-HttpComponents-HttpCore-4.4.x.jar
  inflating: DynamoDBLocal_lib/AwsFlowJava-1.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-Annotations-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-Auth-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-AwsCore-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-AwsJsonProtocol-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-JsonUtils-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-MetricsSpi-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-Profiles-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-ProtocolCore-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-Regions-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-Core-Utils-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-DynamoDb-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-DynamoDb-Enhanced-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-HttpClient-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-HttpClient-ApacheClient-2.0.jar
  inflating: DynamoDBLocal_lib/AwsJavaSdk-HttpClient-NettyNioClient-2.0.jar
  inflating: DynamoDBLocal_lib/DynamoDBPartiQLShared-1.0.jar
  inflating: DynamoDBLocal_lib/GoogleGuava-20.x.jar
  inflating: DynamoDBLocal_lib/IonJava.jar
  inflating: DynamoDBLocal_lib/JMESPathJava-1.12.x.jar
  inflating: DynamoDBLocal_lib/JakartaCommons-logging-1.2.jar
  inflating: DynamoDBLocal_lib/Log4j-api-2.x.jar
  inflating: DynamoDBLocal_lib/Log4j-core-2.x.jar
  inflating: DynamoDBLocal_lib/Log4j-slf4j-2.x.jar

```

Run DynamoDB locally on port 5000.

```

ubuntu@ip-172-31-17-179:~$ java -Djava.library.path=./DynamoDBLocal_lib -jar DynamoDBLocal.jar -sharedb -port 5000
Initializing DynamoDB Local with the following configuration:
Port: 5000
InMemory: false
DbPath: null
SharedDb: false
shouldDelayTransientStatuses: false
CorsParams: *

```

Open another terminal and scp `lab3.py` into the instance then `pip install boto3` so that `lab3.py` can be run to populate the DynamoDB that runs running in the same instance.

```

>_ Labs/lab3 $ scp lab3.py ubuntu@3.26.114.79:
lab3.py                                         100% 2433     48.4KB/s   00:00
>_ Labs/lab3 $ ssh ubuntu@3.26.114.79
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 5.15.0-1011-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

 System information as of Sun Sep 18 15:07:48 UTC 2022

System load:  0.00537109375      Processes:          102
Usage of /:   35.9% of 7.58GB    Users logged in:    0
Memory usage: 28%                IPv4 address for eth0: 172.31.17.179
Swap usage:   0%

* Ubuntu Pro delivers the most comprehensive open source security and
  compliance features.

  https://ubuntu.com/aws/pro

7 updates can be applied immediately.
7 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

*** System restart required ***
Last login: Sun Sep 18 15:07:49 2022 from 125.63.25.149
ubuntu@ip-172-31-17-179:~$ pip install boto3
Defaulting to user installation because normal site-packages is not writeable
Collecting boto3
  Using cached boto3-1.24.75-py3-none-any.whl (132 kB)
Requirement already satisfied: s3transfer<0.7.0,>=0.6.0 in /usr/local/lib/python3.10/dist-packages (from boto3) (0.6.0)
Requirement already satisfied: botocore<1.28.0,>=1.27.75 in /usr/local/lib/python3.10/dist-packages (from boto3) (1.27.75)
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from boto3) (1.0.1)
Requirement already satisfied: urllib3<1.27,>=1.25.4 in /usr/lib/python3/dist-packages (from botocore<1.28.0,>=1.27.75->boto3) (1.26.5)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /usr/local/lib/python3.10/dist-packages (from botocore<1.28.0,>=1.27.75->boto3) (2.8.2)
Requirement already satisfied: six>=1.5 in /usr/lib/python3/dist-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.28.0,>=1.27.75->boto3) (1.16.0)
Installing collected packages: boto3
Successfully installed boto3-1.24.75
ubuntu@ip-172-31-17-179:~$ python3 lab3.py

```

Scan the table to check that data has been populated successfully.

```
ubuntu@ip-172-31-17-179:~$ aws dynamodb scan --table-name CloudFiles --endpoint-url=http://localhost:5000
{
    "Items": [
        {
            "owner": {
                "S": "mdanwarulkaium.patwary"
            },
            "path": {
                "S": "rootdir/rootfile.txt"
            },
            "lastUpdated": {
                "S": "2022-09-18 14:08:06+00:00"
            },
            "fileName": {
                "S": "rootfile.txt"
            },
            "userId": {
                "S": "1"
            },
            "permissions": {
                "L": [
                    {
                        "S": "FULL_CONTROL"
                    }
                ]
            }
        },
        {
            "owner": {
                "S": "mdanwarulkaium.patwary"
            },
            "path": {
                "S": "rootdir/subdir/subfile.txt"
            },
            "lastUpdated": {
                "S": "2022-09-18 14:08:06+00:00"
            },
            "fileName": {
                "S": "subfile.txt"
            },
            "userId": {
                "S": "2"
            },
            "permissions": {
                "L": [
                    {
                        "S": "FULL_CONTROL"
                    }
                ]
            }
        }
    ],
    "Count": 2,
    "ScannedCount": 2,
    "ConsumedCapacity": null
}
```

Create a `templates` directory under `polls` and then add to the `TEMPLATES` section of `lab/settings.py`.

```

ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ mkdir -p polls/templates/
ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ vi lab/settings.py
ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ cat $_ | tail -70
TEMPLATES = [
    {
        'BACKEND': 'django.template.backends.django.DjangoTemplates',
        'DIRS': ['polls/templates/'],
        'APP_DIRS': True,
        'OPTIONS': {
            'context_processors': [
                'django.template.context_processors.debug',
                'django.template.context_processors.request',
                'django.contrib.auth.context_processors.auth',
                'django.contrib.messages.context_processors.messages',
            ],
        },
    },
]

```

In the templates directory, add a file `files.html`.

```

(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab/polls/templates$ sudo vi files.html
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab/polls/templates$ cat $_
<html>
<head>
    <title>Files</title>
</head>
<body>
    <h1>Files </h1>

    <ul>
        {% for item in items %}
            <li>{{ item.fileName }}</li>
        {% endfor %}
    </ul>
</body>
</html>

```

Render the template in `views.py`.

```

(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ sudo vi polls/views.py
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ cat $_
from django.shortcuts import render
from django.template import loader
from django.http import HttpResponseRedirect
import boto3
import json
from boto3.dynamodb.conditions import Key, Attr
from botocore.exceptions import ClientError

def index(request):
    template = loader.get_template('files.html')

    dynamodb = boto3.resource('dynamodb', endpoint_url='http://localhost:5000')

    table = dynamodb.Table("CloudFiles")

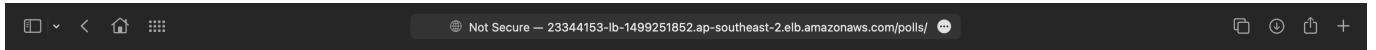
    items = []
    try:
        response = table.scan()
        print(response)

    except ClientError as e:
        print(e.response['Error']['Message'])
    else:
        context = {'items': response['Items'] }

    return HttpResponseRedirect(template.render(context, request))
(venv) ubuntu@ip-172-31-17-179:/opt/www/mysites/lab$ python3 manage.py runserver 8000
Watching for file changes with StatReloader
Performing system checks...

```

Refresh the load balancer page on the browser.



Files

- rootfile.txt
- subfile.txt

Delete the load balancer.

A screenshot of the AWS EC2 Dashboard. On the left, there is a sidebar with various navigation options: New EC2 Experience (selected), EC2 Dashboard, EC2 Global View, Events, Tags, Limits, Instances, Images, Elastic Block Store, Network & Security, Load Balancing (selected), and Load Balancers (highlighted in orange). The main content area has a search bar at the top with the placeholder "search : 23344153-lb" and a "Create Load Balancer" button. Below the search bar is a table header with columns: Name, DNS name, State, VPC ID, Availability Zones, and Type. A message "No results found. Please alter your search." is displayed below the table.