Advanced Cloud Computing

1ST LAB SESSION

What we will do

The goal of these sessions is to prepare you for using cloud computing services in a DevOps environment and employ the concepts you'll learn in class.

We're going to go through basics of how to use these services and what you'll be doing as a member in a DevOps team.
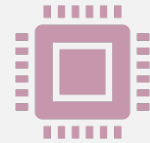
We're going to learn and review the important concepts that you need to know as a cloud practitioner and a developer.

What we will *not* do

This is not a programming class. We expect each of you to have a good understanding of programming.

This is not a DevOps class. We are going to practice the basics, but we are not going to be doing DevOps best practices.

Cloud computing providers offer a whole slew of different services. We will cover the most important concepts, but we are not going to go through everything.

3

What we will be using

- We will be using Amazon Web Services (AWS) to implement the concepts we will learn.

- The main programming language that we'll be using is Python. However, you are free to use other programming languages if you want.

- Version control plays a large part in how you do your assignments. Please refresh your knowledge about how to use it.

How your assignments are graded

- Each assignment is graded from *100*.

- *60 points* for the correctness of your implementation.
  - Implementing the concepts correctly (40 points).
  - Your solution works (20 points).

- *20 points* for your teamwork.
  - Using VC for coordination (10 points).
  - Each member contributes equally (10 points).

- *20 points* for the quality of your implementation.
  - Using VC correctly (5 points).
  - Documentation in your code (5 points).
  - The report that you turn in for your assignment (10 points).

Quality of your assignment

- Don't put your entire assignment's code in one commit.

- Commits should be atomic. Each commit must be for one change not multiple.

- Commit messages should be relevant.

- Documentation matters. I should be able to understand what's happening in your code without having to run it.

- Your report should explain what you've done, why you've chosen a particular approach, and what each member has done.
  - You will be following the Handover documentation format for your reports.

Policy on using Gen-AI

- You are allowed to use generative AI tools such as Copilot, ChatGPT, Claude, etc.

- However, understand that the code that these tools generate can be incorrect.
  - Especially when it comes to APIs.

- As the purpose of these sessions and assignments is to help you learn and understand how to do Infrastructure as Code (IaC), we prefer that you don't use these tools at all.

Policy on using Gen-AI

- Therefore, if you are going to use these tools keep the following in mind:

- *ALWAYS*, *ALWAYS*, *ALWAYS*, run the code that these tools give you.
  - You'd be surprised on how many times they can get it wrong.

- Always check the generated code against AWS's documentation.
  - What they generate may be **close** to what you intend but contain **different configurations** than what you require.
  - There is a high probability that there exists a simpler way of doing what you intend by using the correct functions than using the complicated code that these tools generate.

- Ask the tools to explain why they generated the code.
  - Have the tools **explain** their decision-making process.
  - It will help you **understand** the API and code base better
  - It will help you to **spot the mistakes** that the tool may have made.

Policy on plagiarism

- Polytechnique's policy on plagiarism is clear.

- ZERO on the assignment for all team-members

- What we consider as plagiarism:
  - Turning in code that you have copied from somewhere else.
    - GitHub, SO, etc.
  - Turning in code that you have copied from someone else.
  - Turning in code that is completely generated by Gen-AI tools.

https://awsacademy.instructure.com/?login_success=1

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1 2

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ddd_v1_w_vTA_1409627@runweb61823:~$ []
```

◀ Previous

Next ▶

1 3

https://us-east-1.console.aws.amazon.com/console/home?region=us-east-1#

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EC2

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Welcome to AWS

Getting started with AWS ↗
Learn the fundamentals and find valuable information to get the most out of AWS.

Training and certification ↗
Learn from AWS experts and advance your skills and knowledge.

What's new with AWS? ↗
Discover new AWS services, features, and Regions.

AWS Health Info

Open issues

0
Past 7 days

Scheduled changes

0
Upcoming and past 7 days

Other notifications

0
Past 7 days

Cost and usage Info

ⓘ **No cost and usage data to show**
This could be because we are preparing your cost and usage data, or you don't have enough usage across AWS.

1 4

What is EC2

- EC2 stands for Elastic Compute Cloud.

- They are VMs hosted on AWS' servers. You can customize them based on your needs.
  - Which OS you need.
  - How much compute, memory, and storage you need.
  - Who can access it.
  - Security policies.

What is ELB
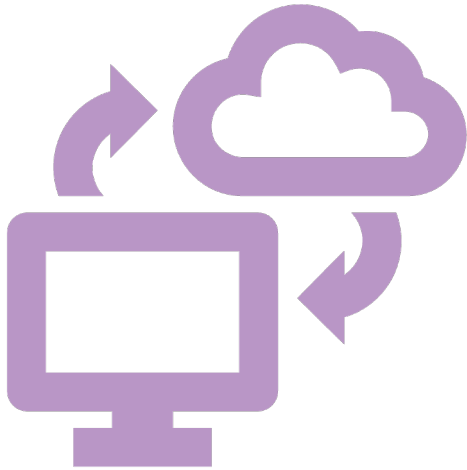
- It stands for Elastic Load Balancer.

- As the name suggests, it acts as a load balancer for VMs.
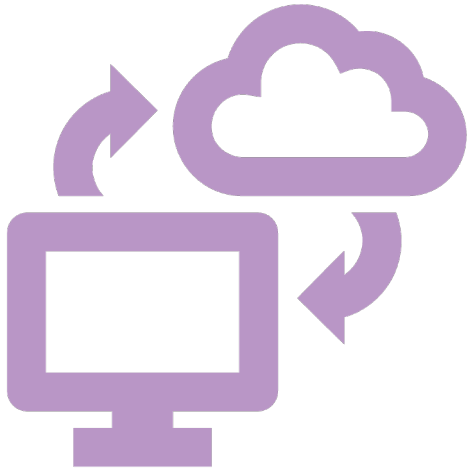
- Based on how you define it, it can re-route incoming requests to VMs that can handle it.

- They come in multiple flavors:

  - Network load balancers makes routing decision based on incoming traffic on transport layers (TCP/SSL).

  - Application load balancers make routing decisions based on incoming traffic on at the application layer (HTTP/HTTPS).

  - Classic load balancers make routing decisions make decision at either the transport layer or the application layer.

What is CloudWatch

- It provides several metrics to monitor how your instances and load balancers are doing.

- You can use these metrics to verify that your system is performing as expected.

- Look at all the available metrics here:
  - https://docs.aws.amazon.com/elasticload balancing/latest/application/load-balancer-cloudwatch-metrics.html

Your 1st Assignment
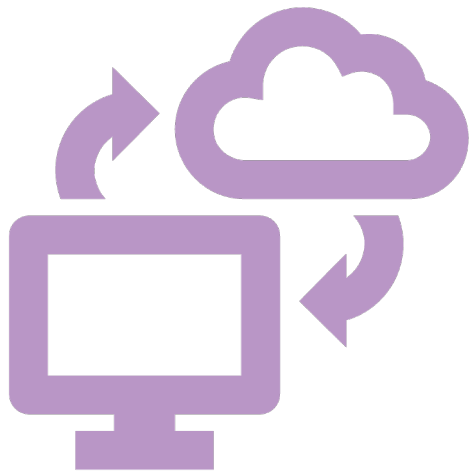
- You will be doing what we just did (creating an EC2 instance, creating a load balancer) using code.

- You'll do this by using boto3.

- You will implement a client–server scenario in which the client will send requests to your VMs with VMs responding accordingly.

- A simple flask application.
- Sends multiple requests at the same time.

Client sends requests to LoadBalancer

LoadBalancer decides which instance should handle the request

- LoadBalancer is defined in code.
- The rules and groups are defined in code.

- Instances are defined in code.
- Necessary software and libraries are installed through code.

Instance returns a request received response to the client