

Northeastern University – Silicon Valley

CS 6620 Cloud Computing

Homework Set #1 [100 points]

INSTRUCTIONS: Please provide clear explanations in your own sentences, directly answering the question, demonstrating your understanding of the question and its solution, in depth, with sufficient detail. Submit your solutions [PDF preferred]. Include your full name. Do not email the solutions.

PART I: Concepts and Theory, Algorithms

Study Chapters 1 and 2 of Bhagga & Madisetti, and Ch. 1 from Buyya. [100 points].

Answer the below questions from **Buyya**, in your own words (1 – 2 small paras each; Diagrams as needed).

Buyya page 27

Review questions

1. What is the innovative characteristic of cloud computing?
2. Which are the technologies on which cloud computing relies?
3. Provide a brief characterization of a distributed system.
4. Define cloud computing and identify its core features.
5. What are the major distributed computing technologies that led to cloud computing?
6. What is virtualization?
7. What is the major revolution introduced by Web 2.0?
8. Give some examples of Web 2.0 applications.
9. Describe the main characteristics of a service orientation.
12. Briefly summarize the Cloud Computing Reference Model.
13. What is the major advantage of cloud computing?
14. Briefly summarize the challenges still open in cloud computing.
15. How is cloud development different from traditional software development?

PART II: LAB (Programming in AWS Cloud)

Study **Ch. 2** from this book python AWS Cookbook (O'Reilly). This is the Lab part.

Obtain your student AWS free account and confirm with screenshots. Do some basic operations. Complete the lab exercise (Ch 2 Bagga) from page 76 to page 81. this should include completing the following setup. show screenshots in your answer, and submit working code. please see instructions from tiie on how to submit code and how it will be graded. Use Consol to code.

Set up and launch an EC2 instance	(p. 76 – 80)
EC2 auto scaling	(p. 82 – 84)
Creating an application load balancer	(see from page 84 onwards)
Creating a VPC instance	

Answer (Qichen An)

Part1 Concepts and understanding

1. What is the innovative characteristic of cloud computing?

According to the content of the class and relevant book slides, the innovative characteristic of cloud computing take advantage of both cloud service consumers and cloud service providers containing On-demand self-service, broad network access, resource pooling, rapid elasticity, measured service, performance, reduced costs, outsourced management, reliability and multi-tenancy.

2. Which are the technologies on which cloud computing relies?

Basically, cloud computing relies on lots of concepts and technologies. Some of these technologies will be taught in the rest of the class such as virtualization. A well-considered answer about the full technologies which cloud computing relies are virtualization, distributed computing, load balancing, Web 2.0, service orientation, scalability and elasticity, deployment, replication, monitoring, identity and access management, service level agreements and billing.

3. Provide a brief characterization of a distributed system.

Based on my understanding, a distributed system contains a group of some independent computers. And the group of computers are considered as a single coherent system for users. In the distributed system, multiple independent computers split up the massive and complex work and coordinate to complete the full job more efficiently. In this kind of environment, the system handles massive work that a single computer cannot handle alone, and also offers additional advantages over traditional computing environments for reducing the risks involved with having a single point of failure, bolstering reliability and fault tolerance.

4. Define cloud computing and identify its core features.

Basically, cloud computing means an Internet-centric way of computing. In different institute and organizations, the definition of cloud computing is not exactly the same. For example, by Armbrust, cloud computing is defined as both applications delivered as services over the Internet and the hardware and system software in the datacenters that provide those services. In my view, a perfect definition could be as follows by the complement of NIST' definition. Cloud computing is both applications delivered as services and the hardware and system software that provide those services, enabling ubiquitous, convenient, on-demand network access that can be rapidly provisioned and released with minimal management effort or service provider interaction.

For its cloud computing, on-demand self-service, broad network access, resource-pooling, rapid elasticity, and measured service could be considered as its core features.

5. What are the major distributed computing technologies that led to cloud computing?

According to the content of the class and relevant book slides, three major milestones of distributed computing technologies have led to cloud computing. They are mainframe computing, cluster computing, and grid computing.

Mainframe computing is the first example of large computational facilities leveraging multiple processing units. And for the second technology, cluster computing start as a low-cost alternative to the use of mainframes and supercomputers. What's more, for the last one, grid computing can be considered as an evolution of cluster computing.

6. What is virtualization?

For cloud computing, virtualization is a core technology. It is a fundamental element of cloud computing because it provides IT infrastructure on demand. It envelops a collection of solutions permitting the deliberation of a few of the basic components for computing. It benefits the component of hardware, runtime situations, storage, and networking.

7. What is the major revolution introduced by Web 2.0?

Web 2.0 is another core technology enabling the provisioning of cloud services. The Web is the essential interface through which cloud computing delivers its administrations.

For the major revolution, the Web envelops a set of innovations and administrations that encourage intelligently data sharing, collaboration, user-centered plan, and application composition. This advancement has changed the Web into a rich platform for application advancement.

8. Give some examples of Web 2.0 applications.

Directly for the relevant slides of the first class, examples of Web 2.0 applications are Google Documents, Google Maps, Facebook, Twitter, YouTube and Wikipedia.

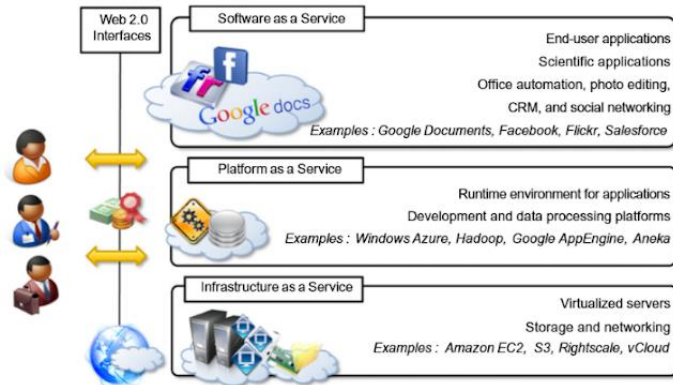
Social networking Websites take the biggest advantage of Web 2.0. The level of interaction in Websites such as Facebook or Flickr would not have been possible without the support of AJAX, Really Simple Syndication (RSS), and other tools that make the user experience incredibly interactive. Moreover, community Websites harness the collective intelligence of the community, which provides content to the applications themselves: Flickr provides advanced services for storing digital pictures and videos, Facebook is a social networking site that leverages user activity to provide content, and Blogger, like any other blogging site, provides an online diary that is fed by users

9. Describe the main characteristics of a service orientation.

Directly for the relevant slides of the first class, Service-oriented computing (SOC) supports the development of rapid, low-cost, flexible, interoperable, and evolvable applications and systems.

12. Briefly summarize the Cloud Computing Reference Model.

The reference model for cloud computing is an abstract model that characterizes and standardizes a cloud computing environment by partitioning it into abstraction layers and cross-layer functions.



In above image, Cloud Computing services can be classified into three major categories as:

a. Infrastructure-as-a-Service (IaaS)

Infrastructure-as-a-Service solutions deliver infrastructure on demand in the form of virtual hardware, storage, and networking.

b. Platform-as-a-Service (PaaS)

For PaaS, the solutions deliver scalable and elastic runtime environments on demand and host the execution of applications.

c. Software-as-a-Service (SaaS)

Software-as-a-Service solutions provide applications and services on demand.

These categories are related to each other and provide an organic view of cloud computing.

13. What is the major advantage of cloud computing?

The most evident benefit from the use of cloud computing systems and technologies is the increased economical return due to the reduced maintenance costs and operational costs related to IT software and infrastructure.

What's more, in detail, increased agility Increased agility in defining and structuring software systems is another significant benefit of cloud computing. And end users can benefit from cloud computing by having their data and the capability of operating on it always available, from anywhere, at any time, and through multiple devices. Finally, service orientation and on-demand access create new opportunities for composing systems and applications with a flexibility not possible before cloud computing.

14. Briefly summarize the challenges still open in cloud computing.

The challenges still open in cloud computing can be summarized as IT practitioners, managers, governments, and regulators.

15. How is cloud development different from traditional software development?

In my views, the main difference is that advancement of a cloud computing application happens by leveraging stages and frameworks that give distinctive sorts of administrations. It's from the bare-metal framework to customizable applications serving particular purposes.

Part 2 Lab

1. Set up and launch an EC2 instance

Step 1: choose an Amazon Machine Image (AMI)

I select the Amazon Linux 2 AMI.

The screenshot shows the AWS Management Console interface for the 'Choose an Amazon Machine Image (AMI)' step. The top navigation bar includes the AWS logo, 'Services' dropdown, a search bar, and user information (scyq1, N. California, Support). The progress bar shows seven steps: 1. Choose AMI (active), 2. Choose Instance Type, 3. Configure Instance, 4. Add Storage, 5. Add Tags, 6. Configure Security Group, and 7. Review. The main heading is 'Step 1: Choose an Amazon Machine Image (AMI)' with a 'Cancel and Exit' link. Below the heading is a search bar and a 'Search by Systems Manager parameter' link. A 'Quick Start' sidebar on the left lists 'My AMIs', 'AWS Marketplace', 'Community AMIs', and a 'Free tier only' filter. The main content area displays a list of AMIs. The first AMI, 'Amazon Linux 2 AMI (HVM), SSD Volume Type', is highlighted. It includes details like the AMI ID (ami-011996ff98de391d1), architecture (64-bit x86), and a 'Select' button. Other AMIs shown include Red Hat Enterprise Linux 8 and SUSE Linux Enterprise Server 15 SP2.

Step 2: choose an instance type

I select the type 't2.micro'.

The screenshot shows the AWS Management Console interface for the 'Choose an Instance Type' step. The top navigation bar is identical to the previous screenshot. The progress bar shows the same seven steps, with '2. Choose Instance Type' now active. The main heading is 'Step 2: Choose an Instance Type' with a 'Learn more' link. Below the heading is a filter section with 'All instance families', 'Current generation', and 'Show/Hide Columns' options. A message states 'Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, ~, 1 GiB memory, EBS only)'. A table lists various instance types. The 't2.micro' instance type is selected and highlighted with a green 'Free tier eligible' tag. The table columns are: Family, Type, vCPUs, Memory (GiB), Instance Storage (GB), EBS-Optimized Available, Network Performance, and IPv6 Support. At the bottom, there are buttons for 'Cancel', 'Previous', 'Review and Launch', and 'Next: Configure Instance Details'.

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	t2	t2.2xlarge	8	32	EBS only	-	Moderate	Yes

Step 3: configure instance details.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances

1

Launch into Auto Scaling Group

Purchasing option

☐ Request Spot instances

Network

vpc-c57ad0a3 (default)

Create new VPC

Subnet

No preference (default subnet in any Availability Zone)

Create new subnet

Auto-assign Public IP

Use subnet setting (Enable)

Placement group

☐ Add instance to placement group

Capacity Reservation

Open

Domain join directory

No directory

Create new directory

IAM role

None

Create new IAM role

Shutdown behavior

Stop

Stop - Hibernate behavior

☐ Enable hibernation as an additional stop behavior

Cancel

Previous

Review and Launch

Next: Add Storage

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Step 4: add storage.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/xvda	snap-0a28026ce52366baa	8	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel

Previous

Review and Launch

Next: Add Tags

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Step 5: add tags

Services

[Alt+S]

scyqa1
N. California
Support

1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. A copy of a tag can be applied to volumes, instances or both. Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key (128 characters maximum)	Value (256 characters maximum)	Instances	Volumes	Network Interfaces
MyFirst		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Add another tag (Up to 50 tags maximum)

Cancel Previous **Review and Launch** Next: Configure Security Group

Feedback English (US)
© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

Step 6: configure security group

Services

[Alt+S]

scyqa1
N. California
Support

1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☒ Create a new security group
☐ Select an existing security group

Security group name:

Description:

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

Add Rule

Warning

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel Previous **Review and Launch**

Feedback English (US)
© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

Final result

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

New EC2 Experience

EC2 Dashboard

Events

Tags

Limits

Instances

Instances New

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances New

Dedicated Hosts

Capacity Reservations

Images

AMIs

Elastic Block Store

Volumes

Snapshots

Instances (1/3) Info

Filter instances

Connect

Instance state

Actions

Launch instances

1

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
<input checked="" type="checkbox"/>	MyfirstEC2	i-04174bd90577cccd4	Running	t2.micro	2/2 checks passed	No alarms	us-west-1b	ec2-3-101-56-22
<input type="checkbox"/>	-	i-0ec19f73a4c80ab17	Running	t2.micro	2/2 checks passed	No alarms	us-west-1a	ec2-52-53-169-2
<input type="checkbox"/>	-	i-01e3b6ad82b196afb	Running	t2.micro	2/2 checks passed	No alarms	us-west-1a	ec2-54-241-59-1

Instance: i-04174bd90577cccd4

Details

Security

Networking

Storage

Status checks

Monitoring

Tags

Instance summary Info

Instance ID

i-04174bd90577cccd4

Public IPv4 address

3.101.56.221 | open address

Private IPv4 addresses

172.31.31.61

IPV6 address

-

Instance state

Running

Public IPv4 DNS

ec2-3-101-56-221.us-west-1.compute.amazonaws.com

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

2.EC2 auto scaling

Step 1: create a launch template

The screenshot shows the AWS Management Console interface. The top navigation bar includes the AWS logo, 'Services', a search bar, and user information. The breadcrumb trail indicates the path: EC2 > Launch templates > Create launch template.

The 'Create launch template' page has the following sections:

- Launch template name and description:**
 - Launch template name - required:** A text input field containing 'MyFirstTemplate'. Below it, a note states: 'Must be unique to this account. Max 128 chars. No spaces or special characters like '&', ''', '@'.'
 - Template version description:** A text input field containing 'A prod webserver for MyApp'. Below it, a note states: 'Max 255 chars'.
 - Auto Scaling guidance:** A link to 'Info' and a checkbox labeled 'Provide guidance to help me set up a template that I can use with EC2 Auto Scaling', which is checked.
 - Template tags:** A section with a plus icon and the text 'Source template'.

The bottom section of the console shows the 'Launch templates' list:

- Launch templates (1) Info:** A header with a refresh icon, an 'Actions' dropdown, and a 'Create launch template' button.
- Filter:** A search bar with the placeholder text 'Filter by tags or properties or search by keyword'.
- Table:** A table with the following columns: Launch template ID, Launch template name, Default version, and Latest version. It contains one row:

Launch template ID	Launch template name	Default version	Latest version
lt-0b0831ed0a7580f4c	FirstTemp	1	2
- Select a launch template above:** A section with three icons (a list, a single item, and a grid) for selecting a template.

The footer of the console includes 'Feedback', 'English (US)', and copyright information: '© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.' along with links to 'Privacy Policy', 'Terms of Use', and 'Cookie preferences'.

Step 2: create auto scaling group

Launch the template that first step created.

The screenshot shows the AWS console interface for creating an Auto Scaling group. The breadcrumb navigation indicates the path: EC2 > Auto Scaling groups > Create Auto Scaling group. On the left, a sidebar lists the steps: Step 1 (selected), Step 2, Step 3 (optional), Step 4 (optional), Step 5 (optional), Step 6 (optional), and Step 7. The main content area is titled 'Choose launch template or configuration' with an 'Info' link. Below the title, a paragraph explains that a launch template must be chosen. The form contains two sections: 'Name' and 'Launch template'. The 'Name' section has a text input for 'Auto Scaling group name' with the value 'MyFirstGroup' and a note that it must be unique and under 255 characters. The 'Launch template' section has a dropdown menu with 'FirstTemp' selected and a 'Switch to launch configuration' link. There are also links for 'Create a launch template' and 'Switch to launch configuration'. The footer includes 'Feedback', 'English (US)', copyright information, and links for 'Privacy Policy', 'Terms of Use', and 'Cookie preferences'.

Configure settings.

The screenshot shows the AWS console interface for the 'Configure settings' step of creating an Auto Scaling group. The breadcrumb navigation is the same as the previous step. The sidebar shows Step 2 as the active step. The main content area is titled 'Configure settings' with an 'Info' link. A paragraph explains that settings may include options to help make optimal use of EC2 resources. The form contains two sections: 'Instance purchase options' and 'Network'. The 'Instance purchase options' section has two radio buttons: 'Adhere to launch template' (selected) and 'Combine purchase options and instance types'. The 'Network' section has a heading and a paragraph explaining that multiple Availability Zones can be used. The footer is identical to the previous screenshot.

Configure advanced options and add tags.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template or configuration

Step 2
Configure settings

Step 3 (optional)
Configure advanced options

Step 4 (optional)
Configure group size and scaling policies

Step 5 (optional)
Add notifications

Step 6 (optional)
Add tags

Step 7
Review

Configure advanced options

Choose a load balancer to distribute incoming traffic for your application across instances to make it more reliable and easily scalable. You can also set options that give you more control over health check replacements and monitoring.

Load balancing - optional

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

☒ No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.

☐ Attach to an existing load balancer
Choose from your existing load balancers.

☐ Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.

Health checks - optional

Health check type

EC2 Auto Scaling automatically replaces instances that fail health checks. If you enabled load balancing, you can enable ELB health checks in addition to the EC2 health checks that are always enabled.

☒ EC2 ☐ ELB

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template or configuration

Step 2
Configure settings

Step 3 (optional)
Configure advanced options

Step 4 (optional)
Configure group size and scaling policies

Step 5 (optional)
Add notifications

Step 6 (optional)
Add tags

Step 7
Review

Add tags

Add tags to help you search, filter, and track your Auto Scaling group across AWS. You can also choose to automatically add these tags to instances when they are launched.

You can optionally choose to add tags to instances (and their attached EBS volumes) by specifying tags in your launch template. We recommend caution, however, because the tag values for instances from your launch template will be overridden if there are any duplicate keys specified for the Auto Scaling group.

Tags (1)

Key	Value - optional	Tag new instances	
myfirstgroup	Enter value	<input checked="" type="checkbox"/>	Remove

Add tag

49 remaining

Cancel

Previous

Next

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Final result

aws Services Search for services, features, marketplace products, and docs [Alt+S] scyqa1 N. California Support

New EC2 Experience Tell us what you think

EC2 Dashboard **New**
Events **New**
Tags
Limits

▼ INSTANCES
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts **New**
Scheduled Instances
Capacity Reservations

▼ IMAGES
AMIs

▼ ELASTIC BLOCK STORE
Volumes
Snapshots

FirstAutoScale created successfully

EC2 > Auto Scaling groups

Auto Scaling groups (0) [Refresh] [Edit] [Delete] [Create an Auto Scaling group]

Search your Auto Scaling groups

	Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Max	Availability Zones
<input type="checkbox"/>	FirstAutoScale...	FirstTemp Version Default	0	Updating capacity	1	1	1	US-WE

Feedback English (US) © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

3. Creating an application load balancer

Step 1: create target group

Configure settings.

The screenshot shows the 'Specify group details' page in the AWS Management Console. The left sidebar indicates 'Step 1: Specify group details' and 'Step 2: Register targets'. The main content area is titled 'Specify group details' and includes a sub-header 'Basic configuration' with a note: 'Settings in this section cannot be changed after the target group is created.' Below this, there is a section 'Choose a target type' with three radio button options: 'Instances' (selected), 'IP addresses', and 'Lambda function'. Each option has a list of bullet points describing its capabilities. The 'Instances' option is highlighted with a blue border. The bottom of the page shows a dark navigation bar with 'Feedback', 'English (US)', and copyright information.

aws Services Search for services, features, marketplace products, and docs [Alt+S] scyqa1 N. California Support

EC2 > Target groups > Create target group

Step 1
Specify group details

Step 2
Register targets

Specify group details

Your load balancer routes requests to the targets in a target group and performs health checks on the targets.

Basic configuration

Settings in this section cannot be changed after the target group is created.

Choose a target type

- ☒ **Instances**
 - Supports load balancing to instances within a specific VPC.
- ☐ **IP addresses**
 - Supports load balancing to VPC and on-premises resources.
 - Facilitates routing to multiple IP addresses and network interfaces on the same instance.
 - Offers flexibility with microservice based architectures, simplifying inter-application communication.
- ☐ **Lambda function**
 - Facilitates routing to a single Lambda function.
 - Accessible to Application Load Balancers only.

Target group name

Feedback English (US) © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

Register targets.

The screenshot shows the 'Register targets' page in the AWS Management Console. The left sidebar indicates 'Step 1: Specify group details' and 'Step 2: Register targets'. The main content area is titled 'Register targets' and includes a sub-header 'Available instances (3/3)'. Below this is a search bar 'Filter resources by property or value' and a table of available instances. The table has columns: Instance ID, Name, State, Security groups, Zone, and Subnet ID. Three instances are listed, all with a 'running' state. Below the table, it says '3 selected'. There is a section 'Ports for the selected instances' with a text input field containing '80' and a button 'Include as pending below'. The bottom of the page shows a dark navigation bar with 'Feedback', 'English (US)', and copyright information.

aws Services Search for services, features, marketplace products, and docs [Alt+S] scyqa1 N. California Support

EC2 > Target groups > Create target group

Step 1
Specify group details

Step 2
Register targets

Register targets

Available instances (3/3)

Filter resources by property or value

<input checked="" type="checkbox"/>	Instance ID	Name	State	Security groups	Zone	Subnet ID
<input checked="" type="checkbox"/>	i-04174bd90577cccd4	MyfirstEC2	running	launch-wizard-2	us-west-1b	subnet-6ec1a408
<input checked="" type="checkbox"/>	i-0ec19f73a4c80ab17		running	default	us-west-1a	subnet-9d6cddc7
<input checked="" type="checkbox"/>	i-01e3b6ad82b196afb		running	launch-wizard-1	us-west-1a	subnet-9d6cddc7

3 selected

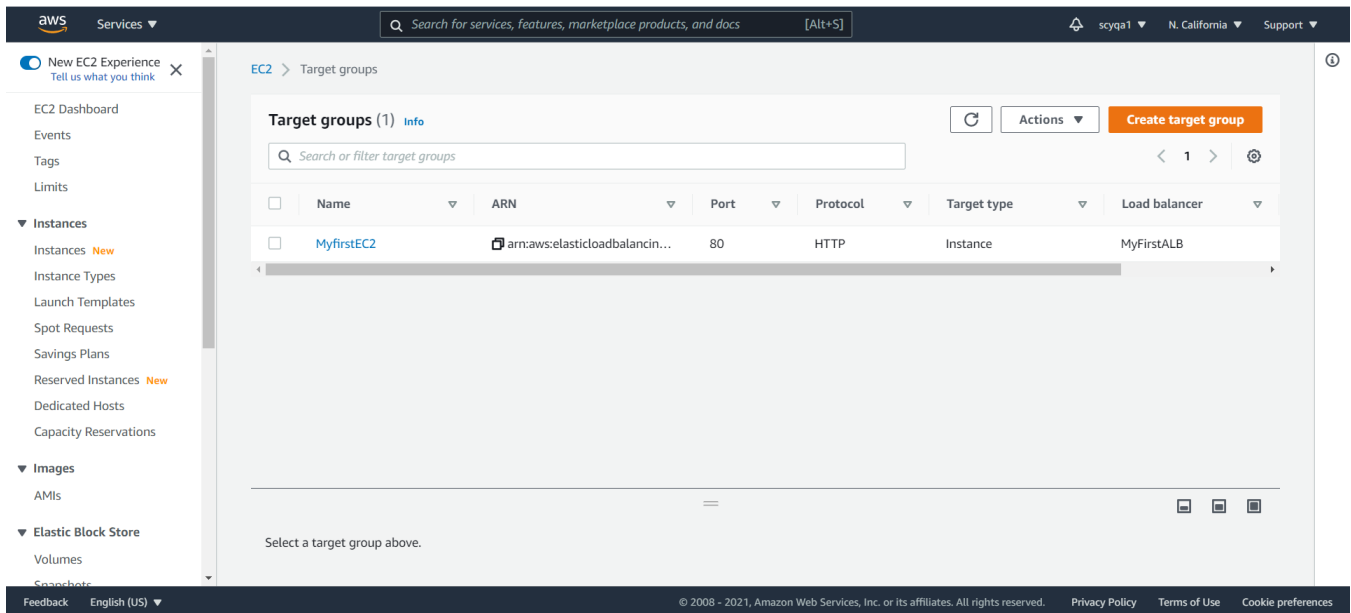
Ports for the selected instances
Ports for routing traffic to the selected instances (separate multiple ports with commas):

80

Include as pending below

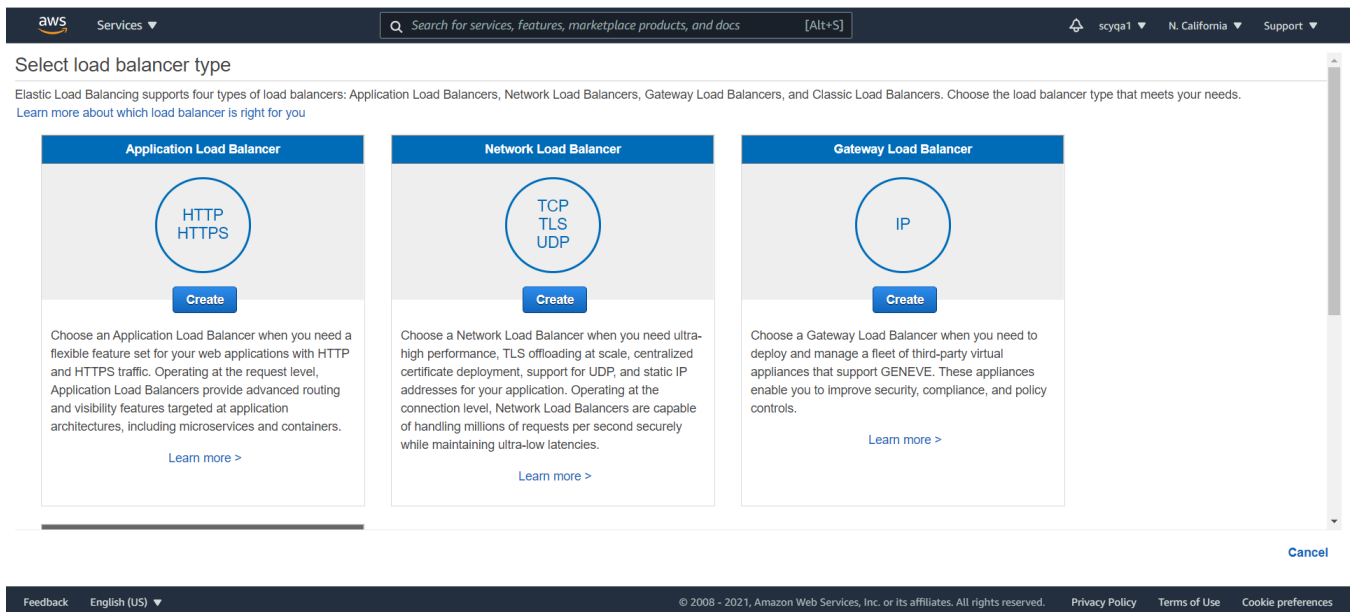
Feedback English (US) © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences

Result



Step 2: create load balancer

Create load balancer type. I select the application load balancer.



Configure.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

EC2 > Load balancers > Create Application Load Balancer

Create Application Load Balancer

Info

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

► How Application Load Balancers work

Basic configuration

Load balancer name

Name must be unique within your AWS account and cannot be changed after the load balancer is created.

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme

Info

Scheme cannot be changed after the load balancer is created.

Internet-facing

An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet. [Learn more](#)

Internal

An internal load balancer routes requests from clients to targets using private IP addresses.

IP address type

Info

Select the type of IP addresses that your subnets use.

IPv4

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Final result

The screenshot displays the AWS Management Console interface. On the left, a navigation sidebar lists various services including EC2 Dashboard, Events, Tags, Limits, Instances, Images, and Elastic Block Store. The main content area is titled 'Create Load Balancer' and shows a table with one entry, 'MyFirstALB'. Below this, a detailed view of the 'MyFirstALB' load balancer is shown, including its basic configuration details.

Name	DNS name	State	VPC ID	Availability Zones	Type	Created
MyFirstALB	MyFirstALB-1322200524 us-...	Provisioning	vpc-c57ad0a3	us-west-1b, us-west-1a	application	September

Load balancer: MyFirstALB

Description | Listeners | Monitoring | Integrated services | Tags

Basic Configuration

Name	MyFirstALB
ARN	arn:aws:elasticloadbalancing:us-west-1:008889205193:loadbalancer/app/MyFirstALB/2c6191b303779579

4. Creating a VPC instance

The screenshot shows the AWS VPC Dashboard. On the left, there's a navigation menu with options like 'New VPC Experience', 'VPC Dashboard', 'EC2 Global View', and 'VIRTUAL PRIVATE CLOUD'. The main area is titled 'Resources by Region' and shows a list of VPC resources for the 'N. California' region. The resources include VPCs (2), NAT Gateways (0), Subnets (3), VPC Peering Connections (0), Route Tables (3), Network ACLs (2), Internet Gateways (2), Security Groups (4), Egress-only Internet Gateways (0), Customer Gateways (0), DHCP options sets (1), Virtual Private Gateways (0), Elastic IPs (0), and Site-to-Site VPN Connections (0). On the right, there's a 'Service Health' section showing 'Amazon EC2 - US West (N. California)' with a status of 'Service is operating normally'. Below that is a 'Settings' section with 'Zones' and 'Console Experiments'. Further down is 'Additional Information' with links to 'VPC Documentation', 'All VPC Resources', 'Forums', and 'Report an Issue'. At the bottom is the 'Transit Gateway Network Manager' section.

Launch EC2 instances

Step 1: choose AMI

Similarly, I choose Amazon Linux 2 AMI.

The screenshot shows the AWS EC2 console 'Choose AMI' step. The top navigation bar includes '1. Choose AMI', '2. Choose Instance Type', '3. Configure Instance', '4. Add Storage', '5. Add Tags', '6. Configure Security Group', and '7. Review'. The main content area is titled 'Step 1: Choose an Amazon Machine Image (AMI)' and includes a search bar and a list of AMIs. The list includes 'Amazon Linux 2 AMI (HVM), SSD Volume Type', 'Red Hat Enterprise Linux 8 (HVM), SSD Volume Type', and 'SUSE Linux Enterprise Server 15 SP2 (HVM), SSD Volume Type'. Each AMI entry shows its name, description, root device type, virtualization type, and ENA status. The 'Amazon Linux 2 AMI' is highlighted as the selected option.

Step 2: choose an instance type

Similarly, I select t2.micro.

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by:

All instance families

Current generation

Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, ~, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	t2	t2.xlarge	4	16	EBS only	-	Moderate	Yes
<input type="checkbox"/>	t2	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
<input type="checkbox"/>	t3	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes

Cancel

Previous

Review and Launch

Next: Configure Instance Details

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Step 3: configure

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances1Launch into Auto Scaling Group

Purchasing option

☐ Request Spot instances

Network

vpc-c57ad0a3 (default)Create new VPC

Subnet

No preference (default subnet in any Availability Zone)Create new subnet

Auto-assign Public IP

Use subnet setting (Enable)

Placement group

☐ Add instance to placement group

Capacity Reservation

Open

Domain join directory

No directoryCreate new directory

IAM role

NoneCreate new IAM role

Shutdown behavior

Stop

Stop - Hibernate behavior

☐ Enable hibernation as an additional stop behavior

Enable termination protection

☐ Protect against accidental termination

Monitoring

☐ Enable CloudWatch detailed monitoring

Cancel

Previous

Review and Launch

Next: Add Storage

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Step 4: add storage

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type ⓘ	Device ⓘ	Snapshot ⓘ	Size (GiB) ⓘ	Volume Type ⓘ	IOPS ⓘ	Throughput (MB/s) ⓘ	Delete on Termination ⓘ	Encryption ⓘ
Root	/dev/xvda	snap-0a28026ce52366baa	<input type="text" value="8"/>	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel
Previous
Review and Launch
Next: Add Tags

Step 5: add tags

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. A copy of a tag can be applied to volumes, instances or both. Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key ⓘ (128 characters maximum)	Value ⓘ (256 characters maximum)	Instances ⓘ	Volumes ⓘ	Network Interfaces ⓘ
-----------------------------------	-------------------------------------	-------------	-----------	----------------------

This resource currently has no tags

Choose the Add tag button or [click to add a Name tag](#).
Make sure your [IAM policy](#) includes permissions to create tags.

Add Tag (Up to 50 tags maximum)

Cancel
Previous
Review and Launch
Next: Configure Security Group

Step 6: configure security group

aws

Services

Search for services, features, marketplace products, and docs

[Alt+S]

scyqa1

N. California

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☒ Create a **new** security group


☐ Select an **existing** security group

Security group name:

Description:

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

Add Rule

 **Warning**

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Cancel

Previous

Review and Launch

Feedback

English (US)

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Privacy Policy

Terms of Use

Cookie preferences

Final result

The screenshot displays the AWS Management Console interface for the 'Your VPCs' section. The top navigation bar includes the AWS logo, a search bar, and user information. The left sidebar shows the 'VIRTUAL PRIVATE CLOUD' section with 'Your VPCs' selected. The main content area shows a list of VPCs with columns for Name, VPC ID, State, IPv4 CIDR, IPv6 CIDR, and IPv6 pool. Two VPCs are listed: 'vpc-c57ad0a3' and 'vpc-0ef7df9a77d00bbb2', both in an 'Available' state. Below the list, the details for 'vpc-c57ad0a3' are shown, including its VPC ID, State (Available), DNS hostnames (Enabled), and DNS resolution (Enabled).

Your VPCs (1/2) info

Filter VPCs

	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	IPv6 pool
<input checked="" type="checkbox"/>	-	vpc-c57ad0a3	Available	172.31.0.0/16	-	-
<input type="checkbox"/>	-	vpc-0ef7df9a77d00bbb2	Available	10.0.0.0/16	-	-

vpc-c57ad0a3

Details | CIDRs | Flow logs | Tags

Details

VPC ID	State	DNS hostnames	DNS resolution
vpc-c57ad0a3	Available	Enabled	Enabled

© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use Cookie preferences