



Academic Year: 2022-23
IT)

Course Code: OE053 & MC518

Semester: II & III (MCA) and Sem VII (CS &

Course Name: Cloud Computing Lab

Experiment No.14

Date:

Aim: To deploy a website with features such as autoscaling and load balancing

CO Mapping – OECS1.1 and OECS1.3

Objective:

1. To understand autoscaling and load balancing service in AWS
2. To create an architecture for dynamic website System using autoscaling and load balancing in AWS

- **Create bucket to deploy a website**

The screenshot shows the AWS S3 console with the URL s3.console.aws.amazon.com/s3/bucket/create?region=ap-south-1. The browser tab is titled "S3 bucket". The page is titled "Create bucket" with a sub-section "General configuration". Under "Bucket name", the input field contains "autoscaling-example-bucket". Below it, a note says "Bucket name must be globally unique and must not contain spaces or uppercase letters. See rules for bucket naming". Under "AWS Region", a dropdown menu is set to "Asia Pacific (Mumbai) ap-south-1". A note below says "Copy settings from existing bucket - optional" and "Only the bucket settings in the following configuration are copied". A "Choose bucket" button is present. At the bottom, there is an "Object Ownership" section and a footer with links for Feedback, Unified Settings, Privacy, Terms, and Cookie preferences, along with system status icons.

- **Upload files**

The screenshot shows the AWS S3 Management Console with the URL s3.console.aws.amazon.com/s3/upload/autoscaling-example-bucket?region=ap-south-1. The page displays the 'Upload' interface for the 'autoscaling-example-bucket'. A large central area allows users to drag and drop files or choose 'Add files' or 'Add folders'. Below this, a table lists 'Files and folders' (135 Total, 2.4 MB) with columns for Name, Folder, Type, and Size. The table includes a search bar and navigation arrows. At the bottom, there's a feedback message, copyright information (© 2022, Amazon Internet Services Private Ltd. or its affiliates.), and a footer with system icons.

- **Create a security group that has the following settings**

The screenshot shows the AWS EC2 Management Console with the URL us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1>CreateSecurityGroup. The page displays the 'Inbound rules' section of a new security group. It shows three rules: one for SSH (TCP port 22 from Anywhere), one for HTTPS (TCP port 443 from Anywhere), and one for HTTP (TCP port 80 from Anywhere). Each rule has a 'Delete' button next to it. Below the table is an 'Add rule' button. The 'Outbound rules' section is currently empty. The footer includes a feedback message, copyright information (© 2022, Amazon Internet Services Private Ltd. or its affiliates.), and a footer with system icons.

- Click on create

The screenshot shows the AWS EC2 Management Console with a success message: "Security group (sg-0c86cefa03f26c6a4 | ec2-sg) was created successfully". The main pane displays the details of the newly created security group "sg-0c86cefa03f26c6a4 - ec2-sg". The "Details" section shows the following information:

Security group name	ec2-sg	Security group ID	sg-0c86cefa03f26c6a4	Description	Autoscaling example	VPC ID	vpc-05c59ef31c933ee80
Owner	111263519228	Inbound rules count	3 Permission entries	Outbound rules count	1 Permission entry		

The "Inbound rules" tab is selected. The bottom of the screen shows the Windows taskbar with various pinned icons.

- Create a keypair to access ec2 over putty

The screenshot shows the AWS Management Console with the "Create key pair" wizard open. The first step, "Key pair", is displayed. The form fields are as follows:

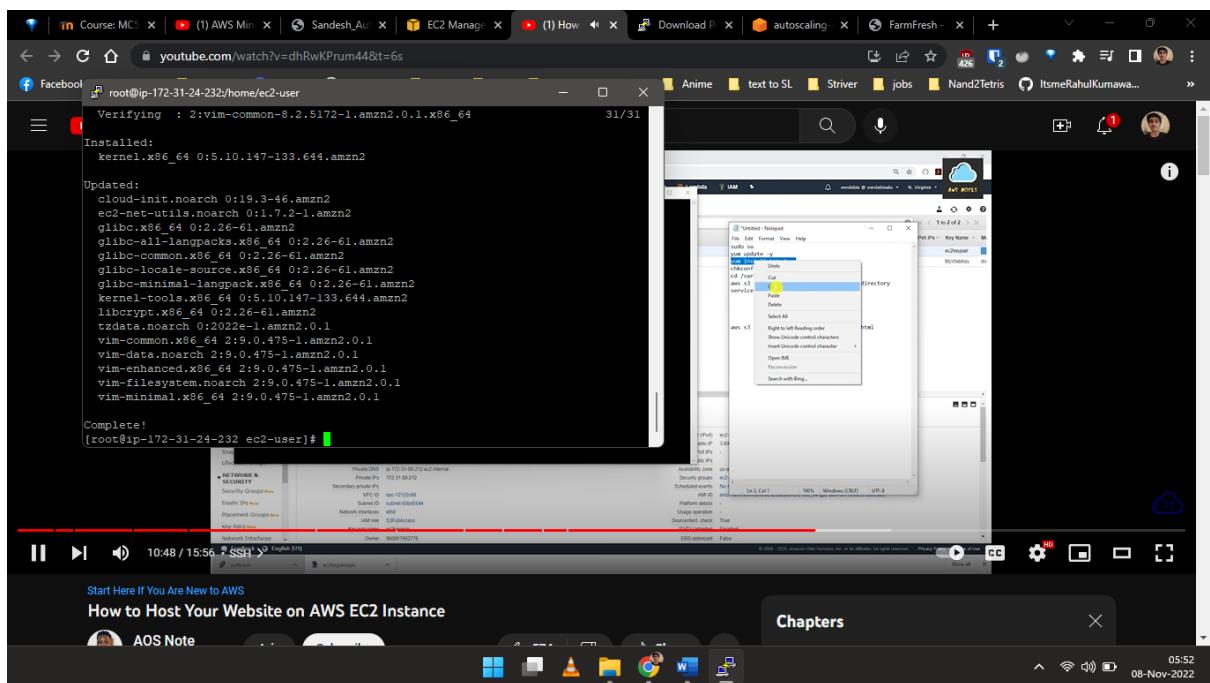
- Name:** ec2keypair
- Key pair type:** RSA (selected)
- Private key file format:** .ppk (selected)
- Tags - optional:** No tags associated with the resource.

The bottom of the screen shows the Windows taskbar with various pinned icons.

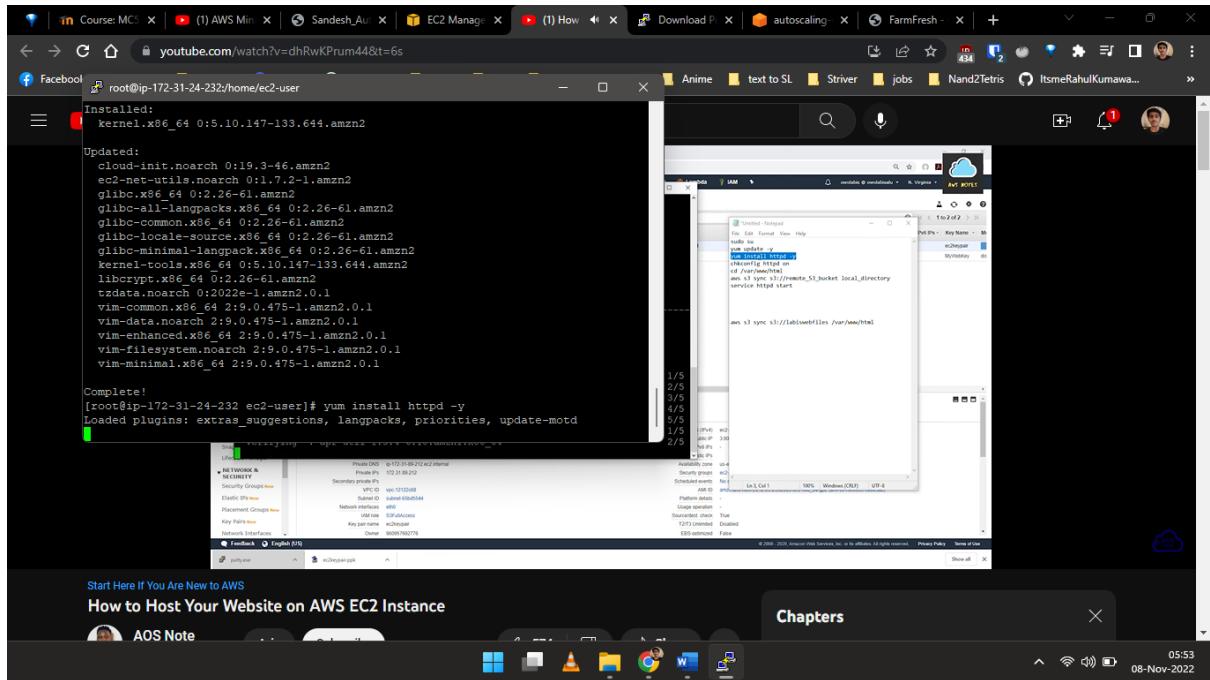
- This is deployed website on S3



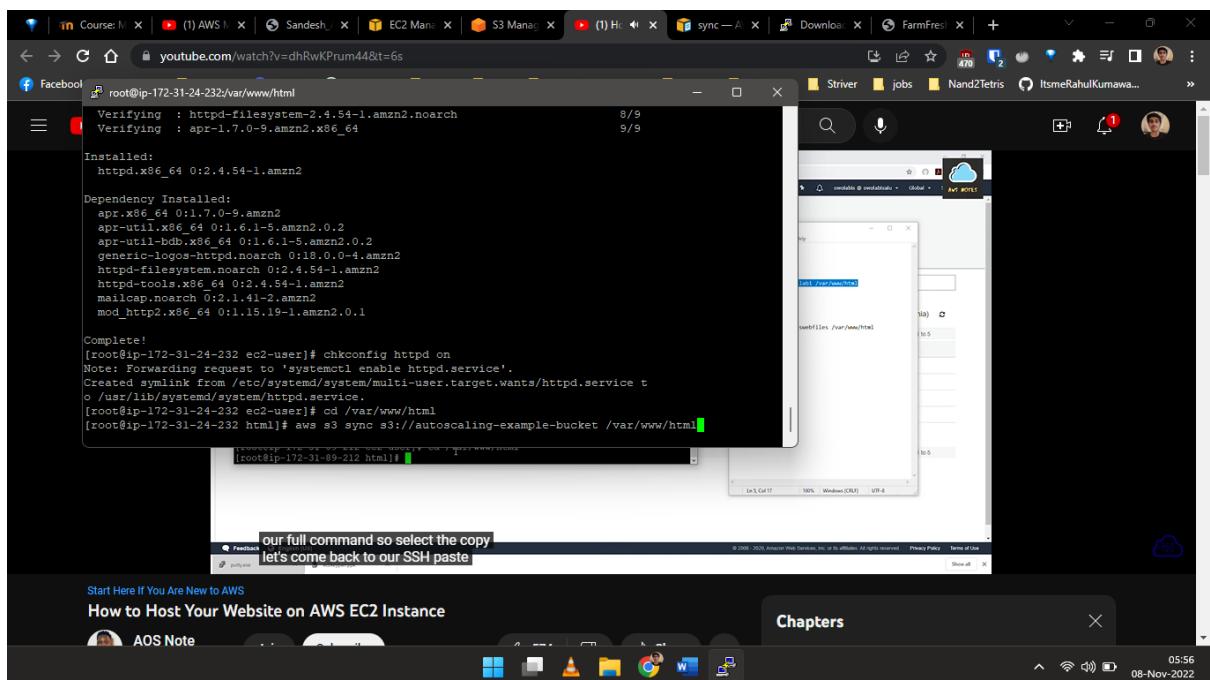
- After downloading putty connect it with ec2 instance

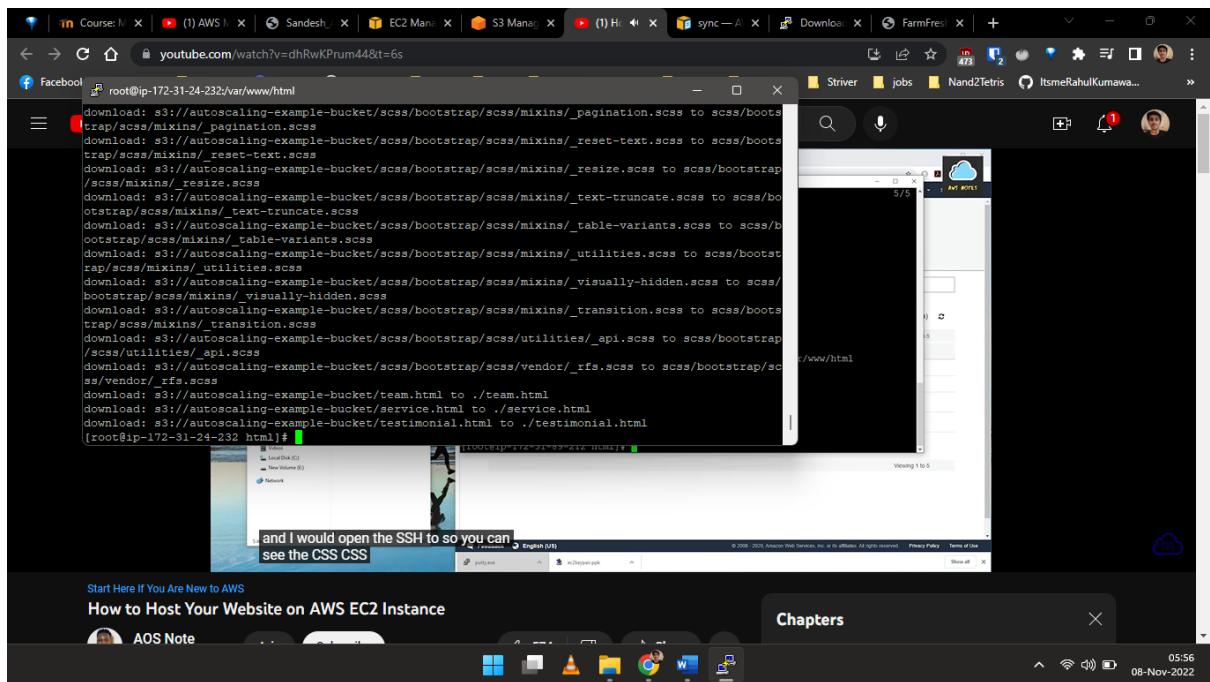


- Install apache server



- Copy files from s3 to ec2





- We can now access the site over public ip of ec2



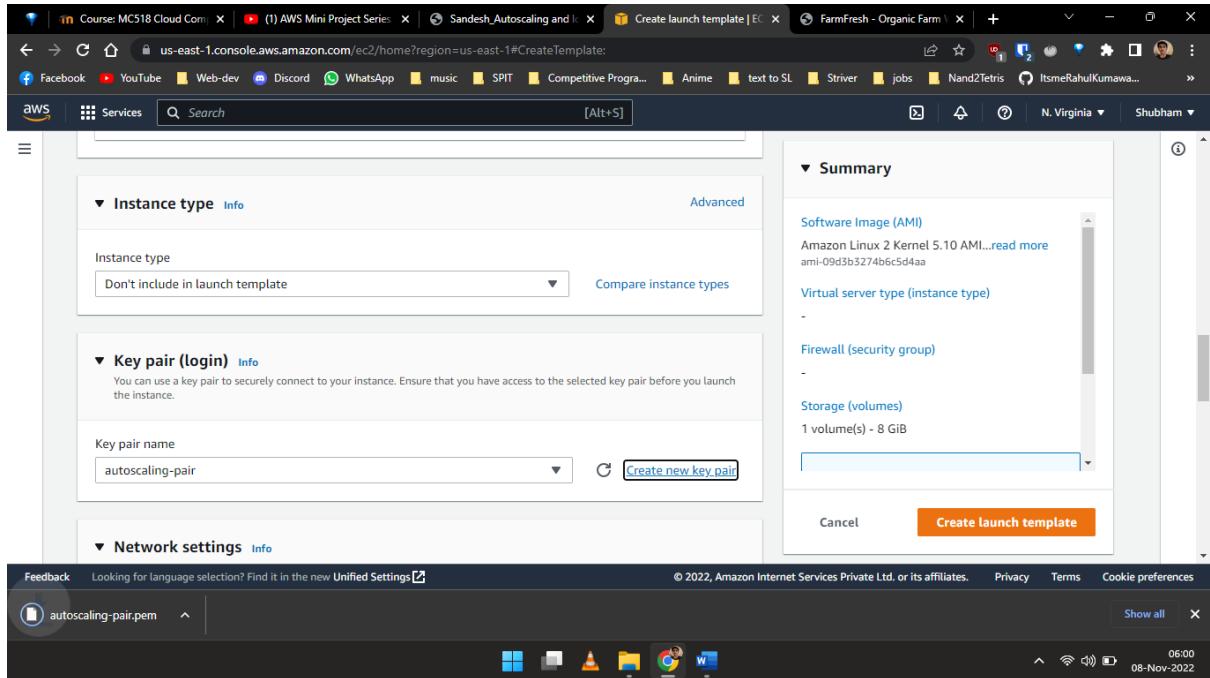
- In order to start with autoscaling group after the configuration we must create templates

The screenshot shows the 'Create launch template' wizard in the AWS CloudFormation console. The 'Template version description' field contains 'A prod webserver for MyApp'. The 'Auto Scaling guidance' section has a checked checkbox for 'Provide guidance to help me set up a template that I can use with EC2 Auto Scaling'. The 'Summary' section on the right includes sections for 'Software Image (AMI)', 'Virtual server type (instance type)', 'Firewall (security group)', and 'Storage (volumes)'. A tooltip for the 'Free tier' is displayed, stating: 'Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is available)'.

- Choose the ID of the AMI for your instances. For our case click on aws

The screenshot shows the 'Search our full catalog including 1000s of application and OS images' search bar. Below it, the 'Quick Start' section lists several AMIs: Amazon Linux, macOS, Ubuntu, Windows, and Red Hat. The 'Amazon Machine Image (AMI)' section displays the 'Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type' AMI, with details: ami-09d3b5274b6c5d4aa (64-bit (x86)) / ami-081dc070789c2daf (64-bit (Arm)). It also shows 'Free tier eligible'. The 'Summary' section on the right remains the same as in the previous screenshot.

- For instance type, choose t2.micro (free type eligible)
- For Key pair name, choose an existing key pair, or choose Create new key pair to create a new one. (We create a new one named mca-key)



- Everything keep as it is and click on create launch template

The screenshot shows a browser window with multiple tabs open. The active tab is titled 'Create launch template | EC2'. The main content area displays a green success message: 'Successfully created autoscaling-example (lt-00685661c344c4541)'. Below this message is a link to 'Actions log'. The navigation bar indicates the user is in the 'Launch templates' section under 'EC2'. A sidebar on the left lists 'Next steps' with options like 'Launch an instance', 'Create an Auto Scaling group from your template', and 'Create Auto Scaling group'. The bottom of the screen shows the Windows taskbar and system tray.

- For Auto Scaling group name, enter a name for your Auto Scaling group.

The screenshot shows a browser window with multiple tabs open. The active tab is titled 'Create Auto Scaling group'. The main content area is titled 'Choose launch template or configuration' with a 'Info' link. It instructs the user to specify a launch template for all EC2 instances. A 'Name' input field is present. Below it, an 'Auto Scaling group name' input field is shown with the placeholder 'Enter a name to identify the group.' and a note: 'Must be unique to this account in the current Region and no more than 255 characters.' To the right of the input fields are two buttons: 'Launch template' with an 'Info' link and 'Switch to launch configuration'. On the left, a vertical sidebar lists steps: Step 1 (Choose launch template or configuration), Step 2 (Choose instance launch options), Step 3 (optional) Configure advanced options, Step 4 (optional) Configure group size and scaling policies, Step 5 (optional) Add notifications, and Step 6 (optional) Add tags. The bottom of the screen shows the Windows taskbar and system tray.

- For Launch template, choose an existing launch template and select the latest version.

Step 1
Choose launch template or configuration

Step 2
Choose instance launch options

Step 3 (optional)
Configure advanced options

Step 4 (optional)
Configure group size and scaling policies

Step 5 (optional)
Add notifications

Step 6 (optional)

- . For Availability Zones and subnets, choose one or more subnets in the specified VPC. Use subnets in multiple Availability Zones for high availability
- Everything keep as it is and click on next

172.31.0.0/20 Default

us-east-1e | subnet-0882daab52fc885de X
172.31.48.0/20 Default

us-east-1f | subnet-0350531f5ffd1edb5 X
172.31.64.0/20 Default

Create a subnet

Instance type requirements Info

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Launch template Version Description

autoscaling-template X Default -

lt-0f9f0378fe1edac1f

Instance type

t1.micro

Cancel Previous Skip to review Next

- We will create load balancer separately so for now click on no load balancer

The screenshot shows the 'Configure advanced options' step of creating an Auto Scaling group. On the left, a sidebar lists steps from 2 to 7. Step 2 is 'Choose instance launch options', Step 3 is 'Configure advanced options' (which is currently selected), Step 4 is 'Configure group size and scaling policies', Step 5 is 'Add notifications', Step 6 is 'Add tags', and Step 7 is 'Review'. The main content area is titled 'Load balancing - optional'. It contains three options: 'No load balancer' (selected), 'Attach to an existing load balancer', and 'Attach to a new load balancer'. Below this is a 'Health checks - optional' section with a note about EC2 Auto Scaling automatically replacing instances that fail health checks. It shows 'EC2' checked and 'ELB' unchecked. At the bottom, there's a 'Health check grace period' input field.

- For Desired capacity, enter the initial number of instances to launch. Also enter the minimum threshold and maximum threshold of the instances to be running at once.
- To automatically scale the size of the Auto Scaling group, choose Target tracking scaling policy and keep everything default

The screenshot shows the 'Configure group size and scaling policies' step. The sidebar shows steps 4 through 7. The main content area has fields for 'Desired capacity' (set to 2), 'Minimum capacity' (set to 2), and 'Maximum capacity' (set to 3). Below this is a 'Scaling policies - optional' section. It shows 'Target tracking scaling policy' selected (with a note about choosing a desired outcome) and 'None' as an option. A 'Scaling policy name' input field is also present.

- Review all the details and click on create autoscaling groups

The screenshot shows the AWS CloudFormation Create Stack Wizard. The current step is Step 5: Add notifications. The interface includes a sidebar with navigation links for Step 1 through Step 6. The main area displays a 'Notifications' section with the message 'No notifications'. At the bottom right, there is a 'Create Stack' button.

Feedback Looking for language selection? Find it in the new Unified Settings

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06:13 08-Nov-2022

- Auto scaling groups successfully created.

The screenshot shows the AWS Auto Scaling Groups page. At the top, there is a banner with the text "Auto Scale your Amazon EC2 Instances Ahead of Demand" and a link to "Learn More". Below the banner, a green notification bar says "autoscaling-group-name, 1 Scaling policy created successfully". The main table lists one Auto Scaling group named "autoscaling-group-name" with a status of "Updating capacity...". The table includes columns for Name, Launch template/configuration, Instances, Status, Desired capacity, Min, Max, and Health check. At the bottom, it says "0 Auto Scaling groups selected".

- You can see there are three instances, one was already created and other two are initialized by auto scaling groups

The screenshot shows the AWS Instances page. A green notification bar at the top says "Successfully terminated i-0d7af112dfa7cbf76, i-0303728ccd042978f". The main table lists three instances:

- Instance ID: i-0d7af112dfa7cbf76, State: Running, Type: t1.micro, Status: No alarms, Availability Zone: us-east-1c
- Instance ID: i-0303728ccd042978f, State: Pending, Type: t1.micro, Status: No alarms, Availability Zone: us-east-1f
- Instance ID: i-07d2f1c8ce21ba441, State: Running, Type: t2.micro, Status: 2/2 checks passed, No alarms, Availability Zone: us-east-1b

Below the table, there is a section titled "Instances: i-0d7af112dfa7cbf76, i-0303728ccd042978f" with a "Monitoring" tab. The monitoring section displays four line charts for CPU utilization (%), Status check failed (any...), Status check failed (inst...), and Status check failed (syst...). The charts show data over the last hour.

- Terminate these instances and you will see auto scaling group will again create instances equal to the minimum threshold assigned to the autoscaling group

The screenshot shows the AWS EC2 Instances page with the following details:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
-	i-0d7af112dfa7cbf76	Shutting-down	t1.micro	-	No alarms	us-east-1c
-	i-0303728cccd042978f	Shutting-down	t1.micro	-	No alarms	us-east-1f
ec2	i-07d2f1c8ce21ba441	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b

A modal window titled "Select an instance" is open at the bottom of the page.

The screenshot shows the AWS EC2 Instances page with the following details:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
-	i-0d7af112dfa7cbf76	Shutting-down	t1.micro	-	No alarms	us-east-1c
-	i-0303728cccd042978f	Terminated	t1.micro	-	No alarms	us-east-1f
ec2	i-07d2f1c8ce21ba441	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b
-	i-0862a85070cc9ff63	Pending	t1.micro	-	No alarms	us-east-1b
-	i-0f76ef94ae56bf8c3	Pending	t1.micro	-	No alarms	us-east-1a

A modal window titled "Select an instance" is open at the bottom of the page.

- **Attach EC2 instances to your Auto Scaling group. Choose Actions, Instance settings, Attach to Auto Scaling Group**

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with various EC2-related options like Dashboard, Global View, Events, Tags, Limits, and Instances. Under Instances, 'Instances' is selected. In the main area, a table lists five instances. The second instance from the top, named 'ec2', has a checkmark next to it. A context menu is open over this instance, with 'Actions' expanded. The 'Attach to Auto Scaling Group' option is highlighted. Other visible actions include Connect, View details, Manage instance state, Change termination protection, Change stop protection, Change shutdown behavior, Change auto-recovery behavior, Change instance type, Change Nitro Enclaves, Change credit specification, Change resource based naming options, Modify instance placement, and Modify Capacity Reservation settings. At the bottom of the instance table, there's a section for 'Instance summary' showing the instance ID and public IP address.

- **On the Attach to Auto Scaling group page, for Auto Scaling Group, select the Auto Scaling group, and then choose Attach**

The screenshot shows the 'Attach to Auto Scaling group' dialog box. At the top, it says 'Attach to Auto Scaling group' and provides instructions: 'Enable automatic scaling for an instance by attaching it to an Auto Scaling group.' Below this, the 'Instance ID' field is populated with 'i-07d2f1c8ce21ba441 (ec2)'. Under 'Public IPv4 DNS', it shows 'ec2-54-167-14-236.compute-1.amazonaws.com'. The 'Auto Scaling Group' field has the placeholder text 'Choose an existing Auto Scaling group or enter a name to create a new Auto Scaling group.' A search bar contains 'autoscaling-group-name'. A note at the bottom of the dialog box states: 'When you attach an instance to a new Auto Scaling group, we create a new launch configuration and associate it with the Auto Scaling group.' At the bottom right of the dialog are 'Cancel' and 'Attach' buttons. The status bar at the bottom of the browser window shows the date and time as '08-Nov-2022'.

Screenshot of the AWS Management Console showing the EC2 Instances page. A modal window titled "Attached i-07d2f1c8ce21ba441 to auto scaling group autoscaling-group-name" is open, displaying a table of instances. The table has columns: Name, Instance ID, Instance state, Instance type, Status check, Alarm status, and Availability Zone. The instances listed are:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
-	i-0d7af112dfa7cbf76	Terminated	t1.micro	-	-	us-east-1c
-	i-0303728cccd042978f	Terminated	t1.micro	-	-	us-east-1f
ec2	i-07d2f1c8ce21ba441	Running	t2.micro	2/2 checks passed	-	us-east-1b
-	i-0862a85070cc9ff63	Running	t1.micro	-	-	us-east-1b
-	i-0f76ef94ae56bf8c3	Running	t1.micro	-	-	us-east-1a

The modal also contains a "Select an instance" section with a dropdown menu.

Screenshot of a web browser displaying a website for "FarmFresh". The URL is "Not secure | 54.167.14.236". The header navigation bar includes links for HOME, ABOUT, SERVICE, PRODUCT, PAGES, and CONTACT. The main content features a large image of a smiling man in a straw hat holding a basket of fresh vegetables (tomatoes, cucumbers, lettuce). To the right, the text "we PRODUCE Organic Food For Your Family" is displayed in a large, bold font. Below this, there are two sections: "100% Organic" with a green leaf icon and "Award Winning" with a gold ribbon icon. Both sections contain placeholder text: "Tempor erat elit at rebum at at clita. Diam dolor diam ipsum et tempor sit. Clita erat ipsum et lorem et sit, sed stet no labore lorem sit. Sanctus clita duo justo et tempor eirmod magna dolore erat amet magna" for the organic section and "Labore justo vero ipsum sit clita erat lorem magna clita nonumy dolor magna dolor vero" for the award section.

- Click on create load balancer
- For load balancer type, click on application load balancer.

The screenshot shows the AWS Lambda console with the URL <https://us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#SelectCreateELBWizard>. The page title is "Select load balancer type". Below the title, it says "A complete feature-by-feature comparison along with detailed highlights is also available. [Learn more](#)".

Load balancer types		
Application Load Balancer Info	Network Load Balancer Info	Gateway Load Balancer Info
Choose an Application Load Balancer when you need a flexible feature set for your applications with HTTP and HTTPS traffic. Operating at the request level, Application Load Balancers provide advanced routing and visibility features targeted at application architectures, including microservices and containers.	Choose a Network Load Balancer when you need ultra-high performance, TLS offloading at scale, centralized certificate deployment, support for UDP, and static IP addresses for your applications. Operating at the connection level, Network Load Balancers are capable of handling millions of requests per second securely while maintaining ultra-low latencies.	Choose a Gateway Load Balancer when you need to deploy and manage a fleet of third-party virtual appliances that support GENEVE. These appliances enable you to improve security, compliance, and policy controls.
Create		

At the bottom, there is a status bar with the text "Waiting for us-east-1.prod.pr.analytics.console.aws.az2.com..." and a timestamp "06:16 08-Nov-2022".

- For Load Balancer name, type a name for your load balancer.

The screenshot shows the AWS Lambda console with the URL <https://us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#CreateALBWizard>. The page title is "Create Application Load Balancer" [Info](#).

The page content includes:

- How Application Load Balancers work**
- Basic configuration**
 - Load balancer name**: A text input field with placeholder text "Name must be unique within your AWS account and cannot be changed after the load balancer is created." Below it, a note says "A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen."
 - Scheme**: A dropdown menu with "Internet-facing" selected. A note below says "An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet." [Learn more](#)
- Advanced settings**
- Summary**

At the bottom, there is a status bar with the text "Feedback Looking for language selection? Find it in the new Unified Settings" and a timestamp "06:17 08-Nov-2022".

- For security groups, select the earlier created security group

The screenshot shows the AWS Lambda console with the URL <https://us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#CreateALBWizard>. The page is titled 'Create an ALB' and shows the 'Security groups' step. A security group named 'ec2-sg' is selected from a dropdown menu. The 'Listeners and routing' section is visible below.

- Now for the target group, we have to create new target group. Click on create target Group (you will be directed to new tab)
- Choose instance for the target type and everything keep as default.

The screenshot shows the AWS Lambda console with the URL <https://us-east-1.console.aws.amazon.com/lambda/home?region=us-east-1#CreateTargetGroup;protocol=HTTP;vpc=vpc-05c59ef31c933ee80>. The page is titled 'Create target group' and shows the 'Specify group details' step. Under 'Basic configuration', the 'Instances' option is selected. The 'IP addresses' option is also shown with its benefits listed.

- You will see available instances. Select instances on which you want to apply load balancer
- Click on create target group
- Target group successfully created

The screenshot shows the AWS EC2 Target Groups page. A green success message at the top says "Successfully created target group: example-load-balancer-target". Below it, the "Target groups (1) Info" section displays a table with one row for the target group. The table has columns for Name, ARN, Port, Protocol, and Target type. The "Name" column shows "example-load-balancer-target". The "Protocol" column is set to "HTTP". The "Port" column is set to "80". The "Target type" column is set to "Instance, IPv4". An orange "Create target group" button is visible at the top right of the table area.

- Come back to previous tab and select the created target group

The screenshot shows the AWS Load Balancer Wizard. On the left, there's a sidebar with sections like "Protocol" (set to "HTTP"), "Port" (set to "80"), "Default action" (set to "example-load-balancer-target"), and "Listener tags - optional". Below these, there's a "Create target group" button. On the right, there's a section titled "Add-on services - optional" with a note about integrating with AWS Global Accelerator. At the bottom, there's a "Create an accelerator" checkbox and a "Feedback" bar.

- Load balancer is successfully created and connected to the instance

The screenshot shows two consecutive pages from the AWS EC2 Create Application Load Balancer wizard.

Top Screenshot (Success Message):

- The URL is <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#CreateLBWizardSuccess:loadBalancerArn=arn:aws:elasticloadbalancing:us-east-1:123456789012:loadbalancer/example-load-balancer>
- The title is "Successfully created load balancer: example-load-balancer".
- A note says: "Note: It might take a few minutes for your load balancer to be fully set up and ready to route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks."
- The breadcrumb is "EC2 > Load balancers > Create Application Load Balancer".
- A "Suggested next steps" box lists:
 - Review, customize, or enable attributes for your load balancer and listeners using the **Description** and **Listeners** tabs within `example-load-balancer`.
 - Discover other services that you can integrate with your load balancer. Visit the **Integrated services** tab within `example-load-balancer`.
- A "View load balancer" button is at the bottom right.

Bottom Screenshot (Load Balancer Configuration):

- The URL is <https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LoadBalancers:search=example-load-balancer&sort=loadBalancerName>
- The title is "Create Load Balancer".
- The sidebar shows the "Instances" section with "Instances" selected.
- The main pane displays a table of load balancers:

Name	DNS name	State	VPC ID	Availability Zones	Type
example-load-balancer	example-load-balancer-8247...	Provisioning	vpc-05c59ef31c933ee80	us-east-1c, us-east-1a, ...	application
- A detailed view of the "example-load-balancer" load balancer is shown on the right, including tabs for Description, Listeners, Monitoring, Integrated services, and Tags.
- The "Basic Configuration" section shows the Name as "example-load-balancer".
- The footer includes standard browser controls and a timestamp: 06:20 08-Nov-2022.