

**BHARATI VIDYAPEETH COLLEGE OF ENGINEERING, NAVI MUMBAI**  
**DEPARTMENT OF INFORMATION TECHNOLOGY**  
**ACADEMIC YEAR 2021-22**

SUB: ADVANCED DEVOPS LAB

SEM: V R2019



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**ACADEMIC YEAR: 2021-2022**



**COURSE NAME:** Advance DevOps Lab

<b>COURSE CODE</b>	ITL504					
<b>EXPERIMENT NO.</b>	02					
<b>EXPERIMENT TITLE.</b>	<b>To build your application using AWS Codebuild and deploy on S3 / SEBS using AWS Codepipeline, deploy sample application on EC2 instance using AWS CodeDeploy</b>					
<b>NAME OF STUDENT</b>	<b>SNEHAL RAI</b>					
<b>ROLL NO.</b>	<b>58</b>					
<b>CLASS</b>	<b>TE-IT</b>					
<b>SEMESTER</b>	<b>V</b>					
<b>GIVEN DATE</b>	<b>29/07/2021</b>					
<b>SUBMISSION DATE</b>	<b>4/08/2021</b>					
<b>CORRECTION DATE</b>						
<b>REMARK</b>						
<b>TIMELY SUBMISSION</b>	<b>PRESENTATION</b>		<b>UNDERSTANDING</b>		<b>TOTAL MARKS</b>	
	04		04		07	15
<b>NAME &amp; SIGN. OF FACULTY</b>	<b>Dr. S. M. Patil</b>					

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**EXPERIMENT NO. 02**

**Aim:** To build your application using AWS CodeBuild and deploy on S3 / SEBS using AWS Codepipeline, deploy sample application on EC2 instance using AWS CodeDeploy.

**Theory:**

AWS CodeBuild is a fully managed continuous integration service that compiles source code, runs tests, and produces software packages that are ready to deploy. With CodeBuild, you don't need to provision, manage, and scale your own build servers. CodeBuild scales continuously and processes multiple builds concurrently, so your builds are not left waiting in a queue. You can get started quickly by using prepackaged build environments, or you can create custom build environments that use your own build tools. With CodeBuild, you are charged by the minute for the compute resources you use.

**Benefits:**

**FULLY MANAGED BUILD SERVICE**

AWS CodeBuild eliminates the need to set up, patch, update, and manage your own build servers and software. There is no software to install or manage.

**EXTENSIBLE**

You can bring your own build tools and programming runtimes to use with AWS CodeBuild by creating customized build environments in addition to the prepackaged build tools and runtimes supported by CodeBuild.

**CONTINUOUS SCALING**

AWS CodeBuild scales up and down automatically to meet your build volume. It immediately processes each build you submit and can run separate builds concurrently, which means your builds are not left waiting in a queue.

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### **ENABLES CONTINUOUS INTEGRATION AND DELIVERY**

AWS CodeBuild belongs to a family of AWS Code Services, which you can use to create complete, automated software release workflows for continuous integration and delivery (CI/CD). You can also integrate CodeBuild into your existing CI/CD workflow. For example, you can use CodeBuild as a worker node for your existing Jenkins server setup for distributed builds.

### **PAY AS YOU GO**

With AWS CodeBuild, you are charged based on the number of minutes it takes to complete your build. This means you no longer have to worry about paying for idle build server capacity.

### **SECURE**

With AWS CodeBuild, your build artifacts are encrypted with customer-specific keys that are managed by the AWS Key Management Service (KMS). CodeBuild is integrated with AWS Identity and Access Management (IAM), so you can assign user-specific permissions to your build projects.

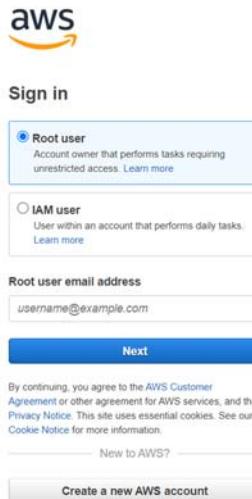
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**Steps:**

1. Login with your AWS account.



2. Navigate to Elastic Beanstalk service from Developer tools section as below:

The image shows the AWS Services dashboard. On the left, there's a sidebar with sections for 'Favorites' (Cloud9, Elastic Beanstalk, Resource Groups &amp; Tag Editor), 'Recently visited' (Console Home, Elastic Beanstalk, Cloud9, Billing, Support), and 'Storage' (S3, EFS, FSx, S3 Glacier, Storage Gateway, AWS Backup). The main area is titled 'All services' and lists various AWS services categorized into groups. Some visible categories include 'Compute' (EC2, Lightsail, Lambda, Batch), 'Machine Learning' (Amazon SageMaker, Amazon Augmented AI, Amazon CodeGuru, Amazon DevOps Guru, Amazon Comprehend), 'AWS Cost Management' (AWS Cost Explorer, AWS Budgets, AWS Marketplace Subscriptions, AWS Application Cost Profiler), 'Front-end Web &amp; Mobile' (AWS Amplify, Mobile Hub, AWS AppSync, Device Farm, Amazon Location Service), 'AR &amp; VR' (Amazon Sumerian), and 'Application Integration' (Step Functions, Amazon AppFlow, Amazon EventBridge, Amazon MQ, Simple Notification Service, Simple Queue Service, SWF). A search bar at the top is set to 'Search for services, features, marketplace products, and docs [Alt+S]'.

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**3. Click on Create Application:**

The screenshot shows the AWS Elastic Beanstalk landing page. The main heading is "Amazon Elastic Beanstalk" with the subtitle "End-to-end web application management.". Below this, there's a brief description of what Elastic Beanstalk does. To the right, there are sections for "Get started" (with a "Create Application" button) and "Pricing". At the bottom, there are links for "How it works", "Benefits and features", and "Getting Started". The navigation bar at the top includes the AWS logo, services dropdown, search bar, and user information.

**4. Provide name for the web app .**

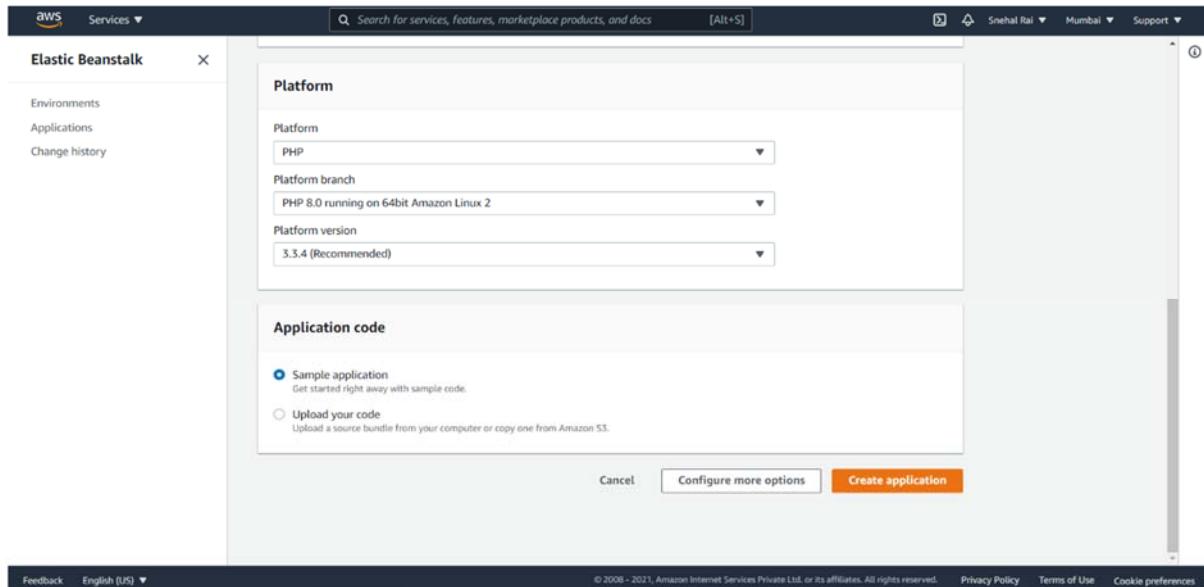
The screenshot shows the "Create a web app" wizard. The first step is "Application information". It has a field for "Application name" containing "DeploymentApp". Below it is a section for "Application tags" with a note about applying up to 50 tags. There are fields for "Key" and "Value" with a "Remove tag" button, and a "Add tag" button. The footer of the page includes standard AWS navigation links.

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**ACADEMIC YEAR 2021-22**

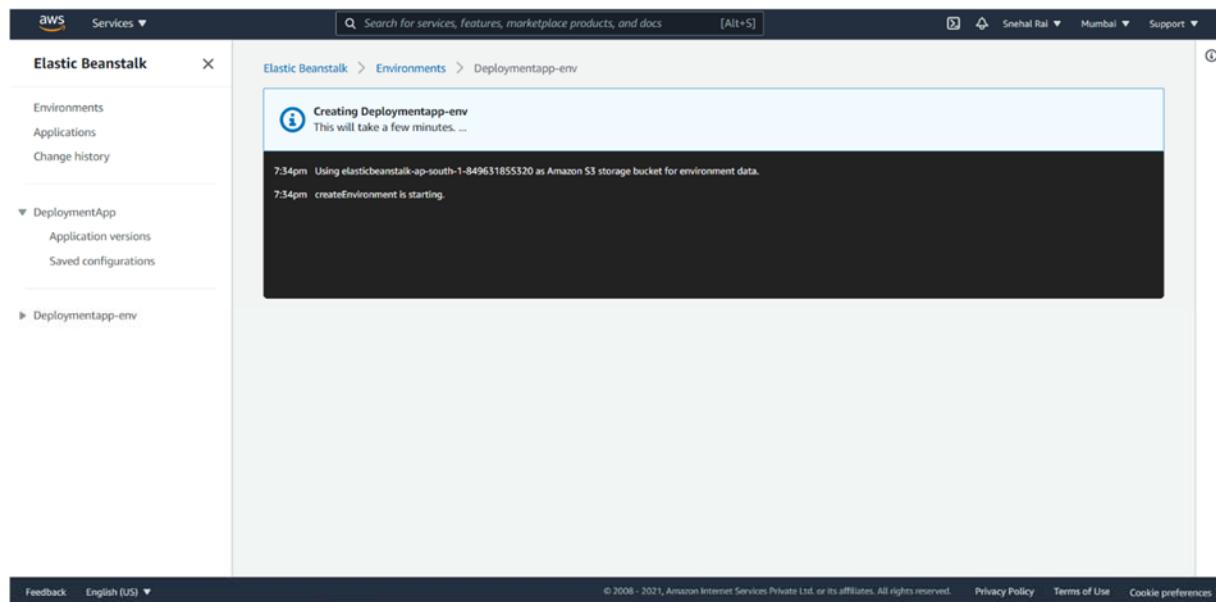
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**5. Select PHP as platform and click on create application:**



**6. It will take few minutes for the creation of web app environment, till that time open amazon console in new window:**



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ACADEMIC YEAR 2021-22

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SEM: V R2019

The screenshot shows the AWS Management Console homepage. At the top, there's a search bar and navigation links for 'Snehal Rai', 'Mumbai', and 'Support'. Below the header, the title 'AWS Management Console' is displayed. On the left, a sidebar titled 'AWS services' lists 'Recently visited services' including Elastic Beanstalk, Cloud9, Billing, and Support, along with a link to 'All services'. In the center, there's a section titled 'Build a solution' with three options: 'Launch a virtual machine' (With EC2, 2-3 minutes), 'Build a web app' (With Elastic Beanstalk, 6 minutes), and 'Build using virtual servers' (With Lightsail, 1-2 minutes). To the right, there are promotional boxes for 'Stay connected to your AWS resources on-the-go' (AWS Console Mobile App) and 'Explore AWS' (Build Apps Faster with GraphQL, Calling All Java and Python Developers). The bottom of the page includes a footer with links for 'Feedback', 'English (US)', and various AWS terms like 'Privacy Policy', 'Terms of Use', and 'Cookie preferences'.

7. Search for CodePipeline in services search box.

The screenshot shows the AWS Management Console search results for 'CodePipeline'. The search bar at the top contains the query 'CodePipeline'. Below the search bar, the results are categorized under 'Services' and 'Documentation'. Under 'Services', there is one result: 'CodePipeline - Release Software using Continuous Delivery'. Under 'Documentation', there are four items: 'Pipe Declarations - Amazon Kinesis Agent for Microsoft Windows User Guide', 'Code Samples for AWS CodePipeline - AWS Code Sample Catalog', 'example\_code\_legacy - AWS Code Sample Catalog', and 'Go Code Samples for Amazon Relational Database Service - AWS Code Sample Catalog'. The right side of the screen features the same promotional content as the homepage, including the 'Stay connected to your AWS resources on-the-go' box and the 'Explore AWS' section. The footer at the bottom is identical to the one on the homepage.

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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

**8. Click on create pipeline.**

The screenshot shows the AWS CodePipeline service page. On the left, there's a sidebar with links like Source, Artifacts, Build, Deploy, and Pipeline. Under Pipeline, 'Getting started' is selected, showing 'Pipelines' and 'Settings'. A central panel features the heading 'AWS CodePipeline' with the subtext 'visualize and automate the different stages of your software release process'. Below this is a description of what CodePipeline does. To the right, a large callout box says 'Create AWS CodePipeline pipeline' with a 'Create pipeline' button. At the bottom, there's a 'Pricing (US)' section showing the cost of \$1/month for each active pipeline. A note states that all pipelines are free for the first 30 days. The footer includes standard AWS links like Feedback, English (US), Privacy Policy, Terms of Use, and Cookie preferences.

**9. Provide name for Pipeline and click on next**

This screenshot shows the 'Step 1 Choose pipeline settings' screen. On the left, a sidebar lists steps: Step 1 (selected), Step 2, Step 3, Step 4, Step 5, and Review. The main area is titled 'Choose pipeline settings' and contains a 'Pipeline settings' section. It has fields for 'Pipeline name' (containing 'S8\_SnehalRai'), 'Service role' (set to 'New service role'), and 'Role name' (containing 'AWSCodePipelineServiceRole-ap-south-1-S8\_SnehalRai'). There's also a checkbox for allowing AWS CodePipeline to create a service role. At the bottom, there's an 'Advanced settings' link, a 'Cancel' button, and a prominent 'Next' button.

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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

**10. Select GitHub(Version 2) as the source provider.**

The screenshot shows the AWS CodePipeline interface. On the left, a sidebar lists steps: Step 1 (Choose pipeline settings), Step 2 (Add source stage), Step 3 (Add build stage), Step 4 (Add deploy stage), and Step 5 (Review). The main panel is titled 'Add source stage' and shows the 'Source' configuration. It includes a 'Source provider' dropdown set to 'GitHub (Version 2)', a tooltip about the new app-based action, a 'Connection' section with a search bar and 'Connect to GitHub' button, and fields for 'Repository name' and 'Branch name'.

**11. Connect your GitHub account to AWS .**

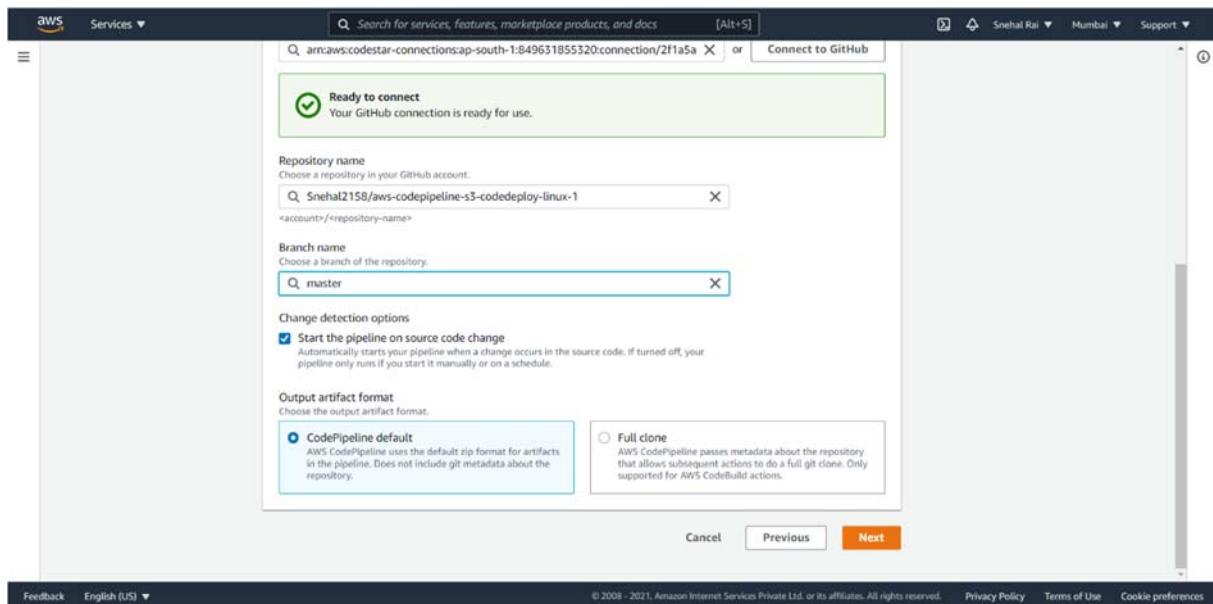
The screenshot displays two browser windows. The left window is titled 'Settings - AWS Developer Tools - Google Chrome' and shows the 'Connect to GitHub' configuration for a connection named 'Snehal2158'. It includes sections for 'GitHub connection settings', 'GitHub Apps' (with a search bar for 'Q\_18679983'), and 'Tags - optional'. The right window is titled 'Developer Tools > Pipelines > Create new pipeline' and shows the 'Connections' section of the AWS CodePipeline setup. It lists a single connection named 'Snehal2158'.

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ACADEMIC YEAR 2021-22

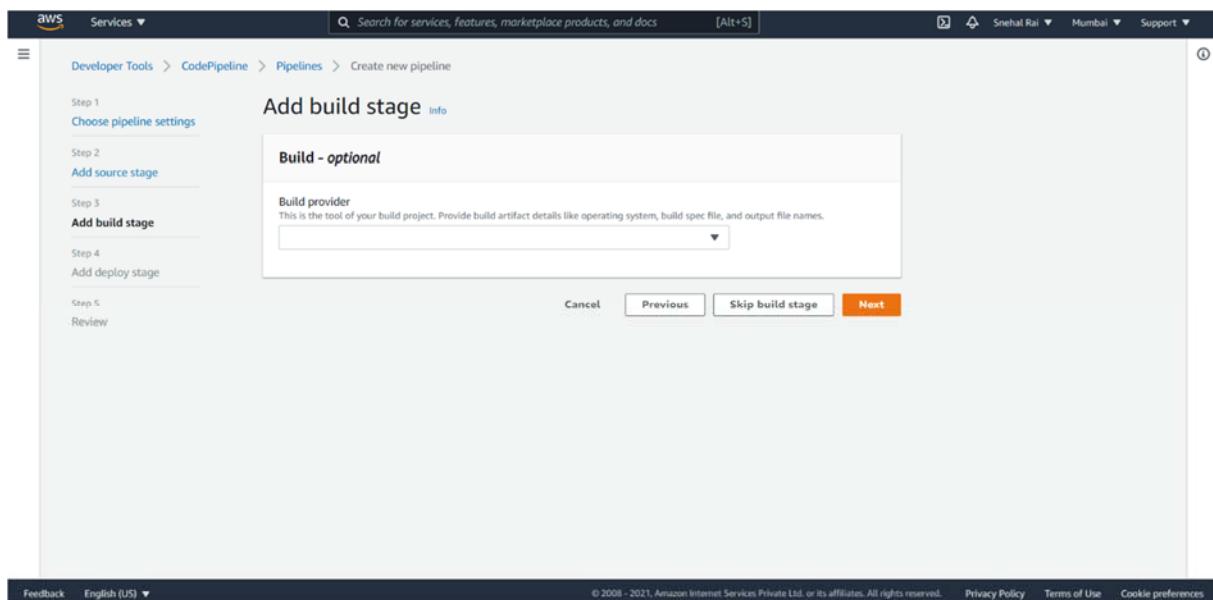
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**12. Once your GitHub connection is set-up, provide a repository name and select the default master as branch name and click on next.**



**13. Click on Skip build stage:**

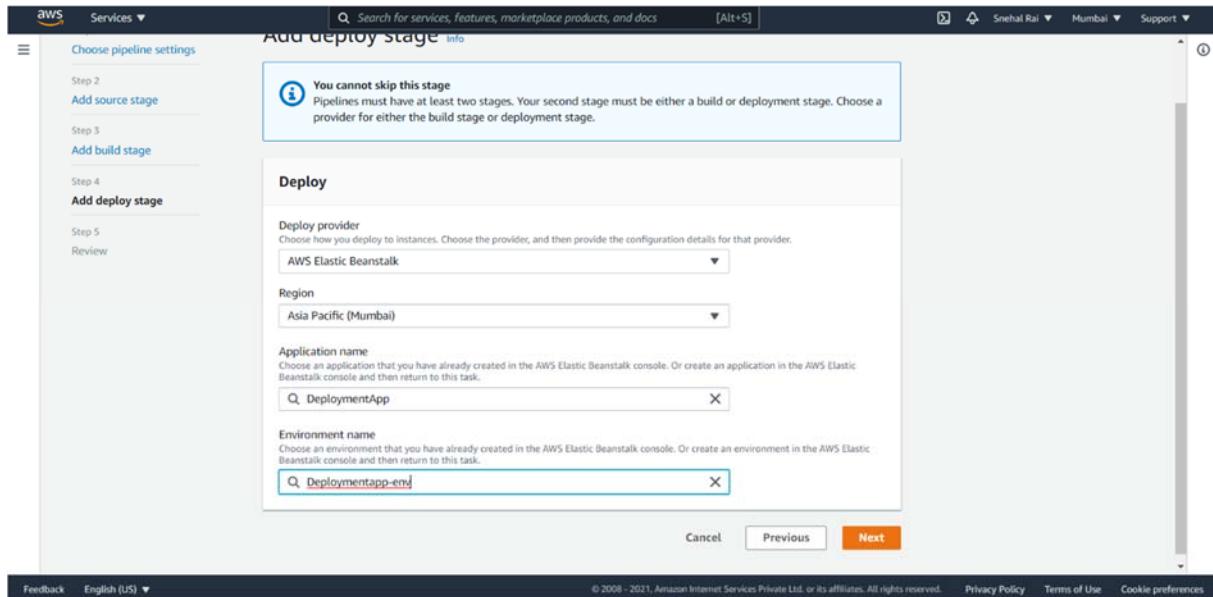


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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

- 14. Select AWS Elastic Beanstalk as deploy provider and type the application name you provided before and click on next.**



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ACADEMIC YEAR 2021-22

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SEM: V R2019

**15. Review the settings and click on create Pipeline:**

The screenshot shows the AWS CodePipeline 'Create new pipeline' wizard. The current step is 'Step 1: Choose pipeline settings'. The pipeline name is set to '58\_SnehalRai'. The artifact location is set to a new Amazon S3 bucket named 'Snehal2158/aws-codedipeline-s3-codedeploy-linux-1'. The service role name is 'AWSCodePipelineServiceRole-ap-south-1-58\_SnehalRai'. On the left sidebar, the steps are listed: Step 1 (Choose pipeline settings), Step 2 (Add source stage), Step 3 (Add build stage), Step 4 (Add deploy stage), and Step 5 (Review). The 'Review' step is highlighted.

**Step 1: Choose pipeline settings**

**Pipeline settings**

- Pipeline name: 58\_SnehalRai
- Artifact location: A new Amazon S3 bucket will be created as the default artifact store for your pipeline
- Service role name: AWSCodePipelineServiceRole-ap-south-1-58\_SnehalRai

**Step 2: Add source stage**

**Source action provider**

- Source action provider: GitHub (Version 2)
- OutputArtifactFormat: CODE\_ZIP
- ConnectionArn: arn:aws:codestar-connections:ap-south-1:849631855320:connection/2f1a5ab4-5dca-40e7-9802-0bedfea856bb
- FullRepositoryId: Snehal2158/aws-codedipeline-s3-codedeploy-linux-1
- BranchName: master

**Step 3: Add build stage**

**Build action provider**

- Build stage: No build

**Step 4: Add deploy stage**

**Deploy action provider**

- Deploy action provider: AWS Elastic Beanstalk
- ApplicationName: DeploymentApp
- DeploymentApp: EnvironmentName
- DeploymentApp: Deploymentapp-env

Buttons at the bottom: Cancel, Previous, Create pipeline.

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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

16. After the successful creation of pipeline, go back to the environment window to check it's status.

The screenshot shows the AWS CodePipeline console. On the left, the navigation pane is visible with sections like Source, Artifacts, Build, Deploy, Pipeline, and Settings. The main area displays a pipeline named '58\_SnehalRai' with a green success status bar at the top. It shows a single step named 'Source' which has succeeded. Below the source step, there is a 'Deploy' step which is currently in progress. A button labeled 'Disable transition' is present between the two steps. The pipeline execution ID is listed as 58159bd0-beed-431d-a0b6-4e263a960d1a.

The screenshot shows the AWS Elastic Beanstalk console. The left sidebar includes sections for Environments, Applications, Change history, DeploymentApp (with Application versions and Saved configurations), and Deploymentapp-env. The main content area shows the status of a deployment environment named 'Deploymentapp-env'. A modal window titled 'Creating Deploymentapp-env' indicates that the process will take a few minutes. The log output below shows the deployment process, including the creation of Auto Scaling groups, security groups, and target groups, along with the use of an Amazon S3 storage bucket for environment data. The log ends with the message 'createEnvironment is starting.' at 7:34pm.

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ACADEMIC YEAR 2021-22

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SEM: V R2019

17. Click on beanstalk and and check it's running version and recent events.

The screenshot shows the AWS Elastic Beanstalk console interface. On the left, there is a navigation sidebar with sections for Environments, Applications, Change history, DeploymentApp (with Application versions and Saved configurations), and Deploymentapp-env (with Go to environment, Configuration, Logs, Health, Monitoring, Alarms, Managed updates, Events, and Tags). The main content area displays the 'Deploymentapp-env' environment details. It includes a 'Health' section with a green circle containing a checkmark and the status 'Ok'. A 'Running version' section shows 'Sample Application' and a 'Upload and deploy' button. A 'Platform' section indicates 'PHP 8.0 running on 64bit Amazon Linux 2/3.3.4' with a 'Change' button. Below this is a 'Recent events' table:

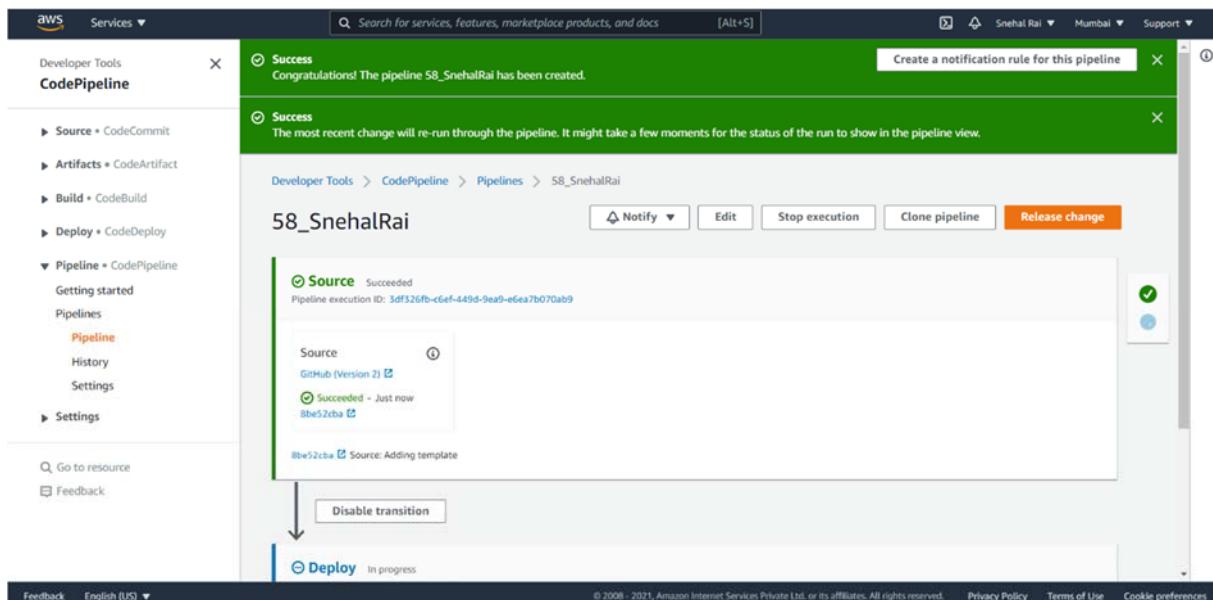
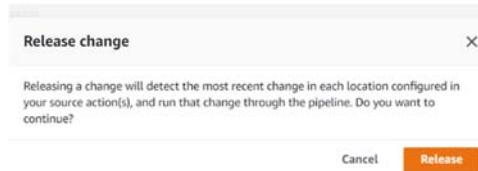
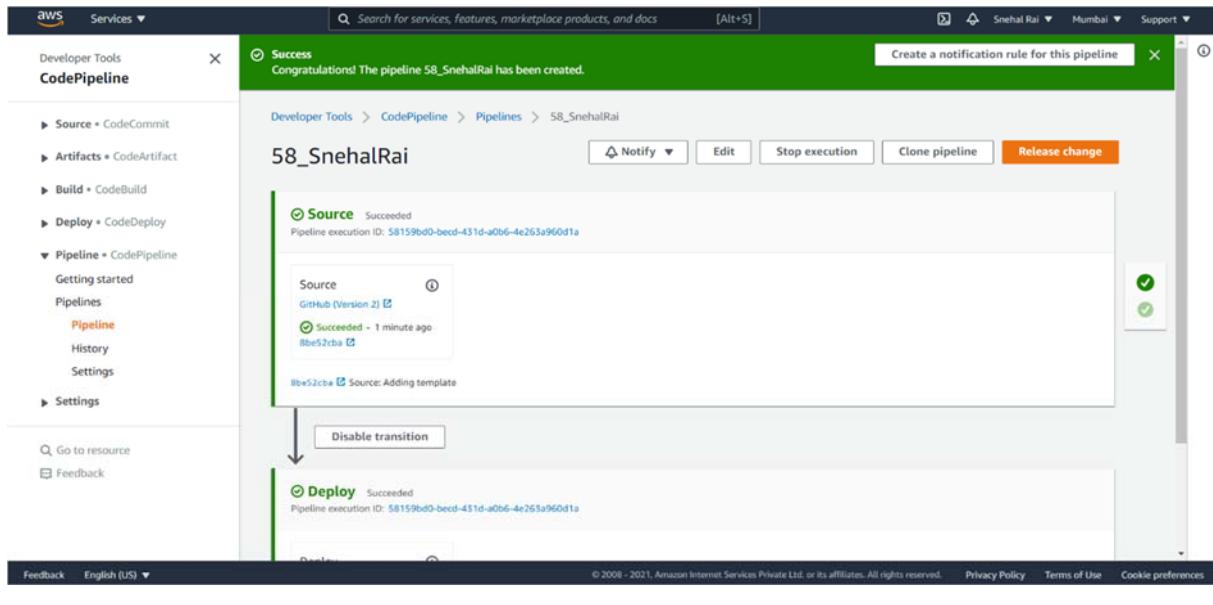
Time	Type	Details
2021-08-04 19:39:08 UTC+0530	INFO	Environment health has transitioned from Pending to Ok. Initialization completed 11 seconds ago and took 4 minutes.
2021-08-04 19:38:27 UTC+0530	INFO	Successfully launched environment: Deploymentapp-env
2021-08-04 19:38:27 UTC+0530	INFO	Application available at Deploymentapp-env.eba-m2rwpzpx.ap-south-1.elasticbeanstalk.com.
2021-08-04 19:38:14 UTC+0530	INFO	Instance deployment completed successfully.
2021-08-04 19:38:12 UTC+0530	INFO	Instance deployment: You didn't include a 'composer.json' file in your source bundle. The deployment didn't install Composer dependencies.

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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

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18. Come back to CodePipeline window and click on release change.

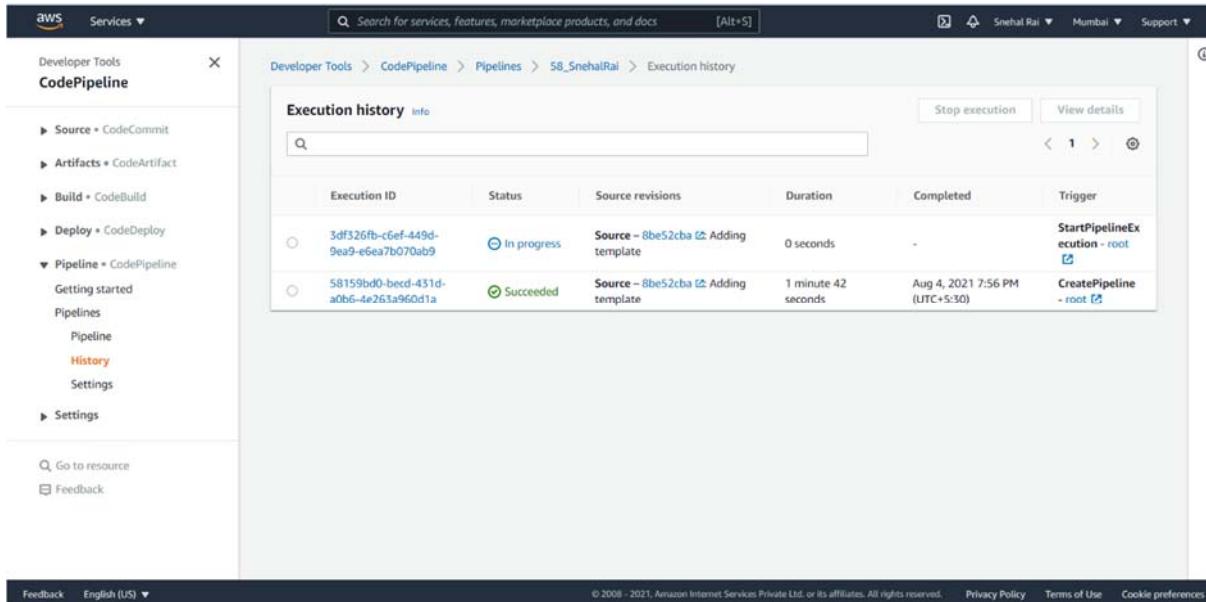


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**ACADEMIC YEAR 2021-22**

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

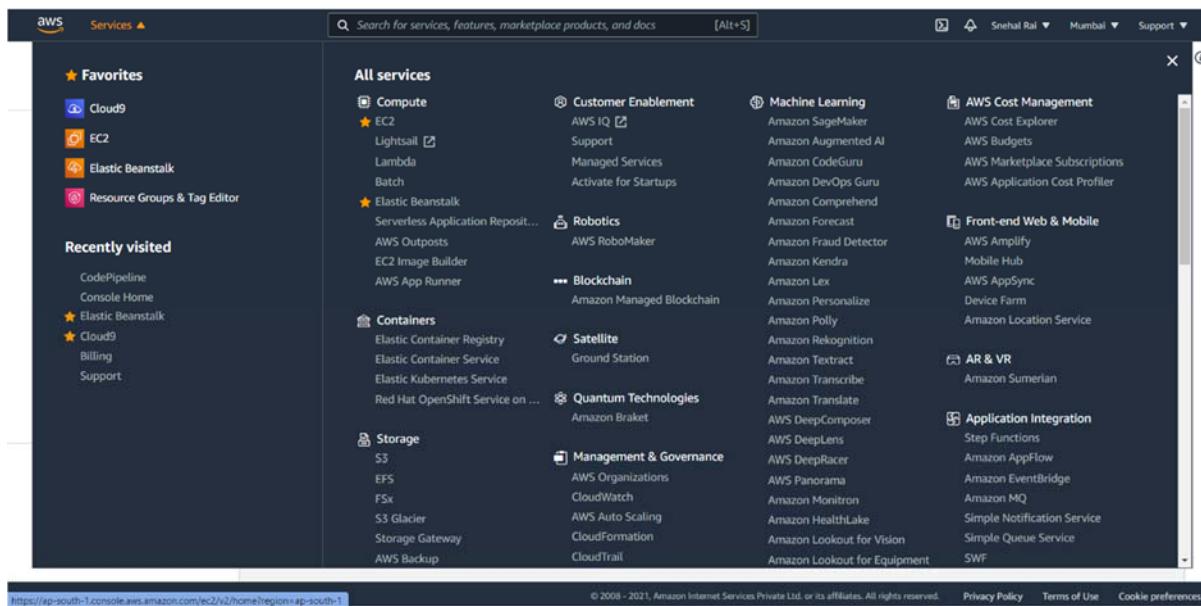
**19. Click on History and view the execution history.**



The screenshot shows the AWS CodePipeline console. On the left, there's a navigation sidebar with options like Source, Artifacts, Build, Deploy, Pipeline, History, Settings, and Settings. The History option is highlighted. The main area is titled 'Execution history' and shows a table with columns: Execution ID, Status, Source revisions, Duration, Completed, and Trigger. There are two entries:

Execution ID	Status	Source revisions	Duration	Completed	Trigger
3df326fb-c6ef-449d-9ear-6ea7b070ab9	In progress	Source - 8be52cba Adding template	0 seconds	-	StartPipelineExecution - root
58159bd0-beed-431d-a0b6-4e263a960d1a	Succeeded	Source - 8be52cba Adding template	1 minute 42 seconds	Aug 4, 2021 7:56 PM (UTC+5:30)	CreatePipeline - root

**20. Click on Services and select EC2.**



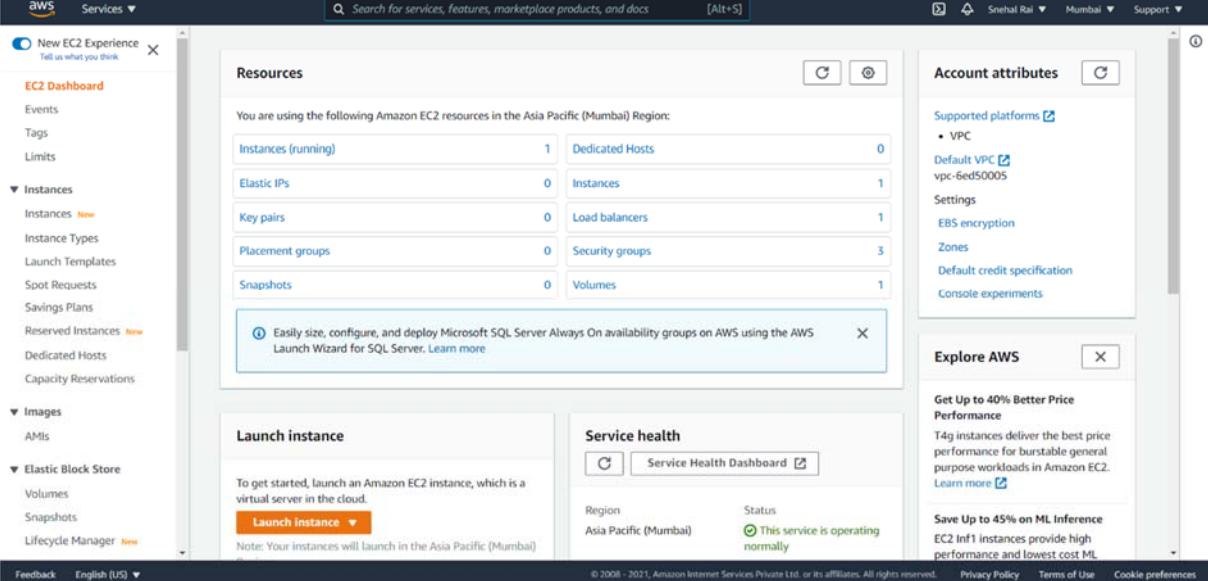
The screenshot shows the AWS Services console. On the left, there's a sidebar with 'Favorites' (Cloud9, EC2, Elastic Beanstalk, Resource Groups & Tag Editor) and 'Recently visited' (CodePipeline, Console Home, Elastic Beanstalk, Cloud9, Billing, Support). The main area is titled 'All services' and lists various AWS services in categories. The EC2 service is selected, indicated by a blue icon and a red star. Other services listed include Compute, Customer Enablement, Machine Learning, AWS Cost Management, Front-end Web & Mobile, AR & VR, Application Integration, and many more.

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**ACADEMIC YEAR 2021-22**

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SEM: V R2019

**21. From the Resources, click on instances(running).**

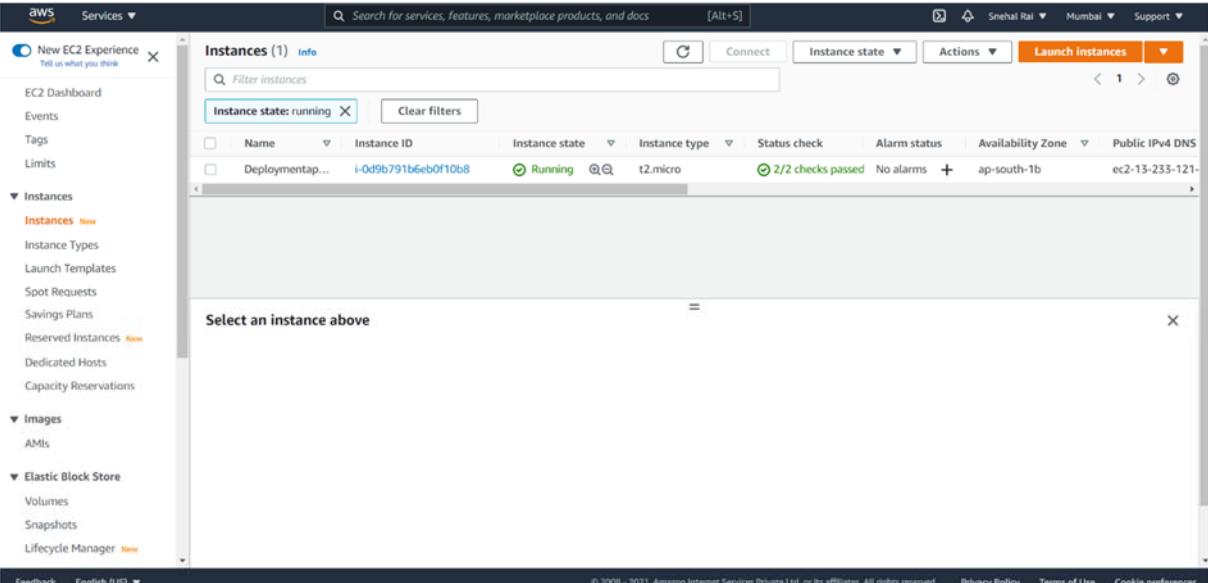


The screenshot shows the AWS EC2 Resources page. On the left, there's a navigation sidebar with options like EC2 Dashboard, Instances, Images, and Elastic Block Store. The main area displays a summary of resources in the Asia Pacific (Mumbai) Region:

Instances (running)	1	Dedicated Hosts	0
Elastic IPs	0	Instances	1
Key pairs	0	Load balancers	1
Placement groups	0	Security groups	3
Snapshots	0	Volumes	1

Below this, there's a callout box with the text: "Easily size, configure, and deploy Microsoft SQL Server Always On availability groups on AWS using the AWS Launch Wizard for SQL Server. Learn more". To the right, there's an "Account attributes" section with links to VPC, Default VPC, Settings, EBS encryption, Zones, and Default credit specification. At the bottom, there's an "Explore AWS" section with links to Get Up to 40% Better Price Performance and Save Up to 45% on ML Inference.

**22. Select the running instance.**



The screenshot shows the AWS EC2 Instances page. The sidebar is identical to the previous screenshot. The main area shows a table of instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Deploymentap...	i-0d9b791b6eb0f10b8	Running	t2.micro	2/2 checks passed	No alarms	ap-south-1b	ec2-13-233-121-

Below the table, a modal window titled "Select an instance above" is open, indicating that an instance has been selected for further action.

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ACADEMIC YEAR 2021-22

SUB: ADVANCED DEVOPS LAB

SEM: V R2019

**23. Copy the Public IPv4 address:**

The screenshot shows the AWS EC2 Instances page. A single instance is listed in the table, which includes columns for State, Instance type, Status check, Alarm status, Availability Zone, Public IPv4 DNS, Public IPv4 IP, Elastic IP, and IPv6 IPs. The instance is a t2.micro type, running, with a Public IPv4 IP of 13.233.121.211. A detailed view of this instance is open, showing the Details tab with the Public IPv4 address listed as 13.233.121.211.

**24. Paste the copied IPv4 address in new window.**

The screenshot shows a web browser window with the Google homepage loaded. The address bar contains the copied Public IPv4 address, 13.233.121.211. The browser interface includes tabs for 'Deploymentapp-env - Dashboard' and 'Instances | EC2 Management Con...', and a search bar at the top.

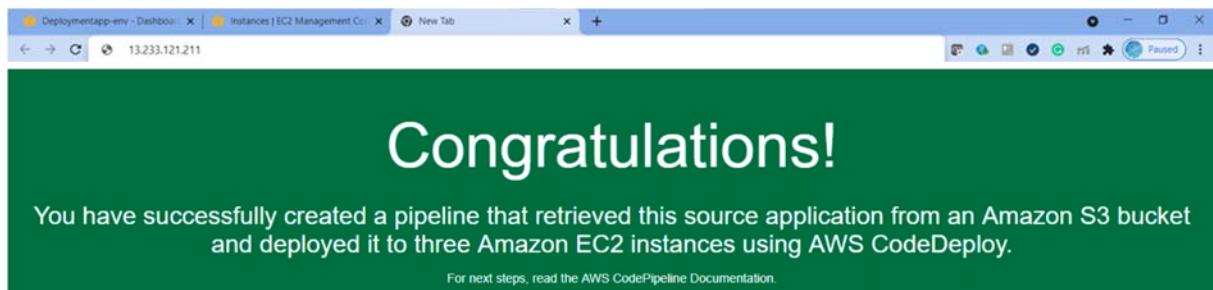
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ACADEMIC YEAR 2021-22

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SEM: V R2019

**25. Successful creation of an automated software release pipeline using AWS CodePipeline**



**Conclusion:** There was successful creation of an automated software release pipeline using AWS CodePipeline. Using CodePipeline, I created a pipeline that uses GitHub, Amazon S3, or AWS CodeCommit as the source location for application code and then deploys the code to an Amazon EC2 instance managed by AWS Elastic Beanstalk. The pipeline will automatically deploy my code every time there is a code change. Continuous deployment allows me to deploy revisions to a production environment automatically without explicit approval from a developer, making the entire software release process automated.