Activity 5

The process focuses on making resources and outputs conditional in a CloudFormation template. It ensures the EBS volume matches the availability zone of the web server using Fn::GetAtt, removes unnecessary parameters, and makes the creation of the EBS volume and SSH access conditional. Parameters for enabling these options are added, with conditions like AWS::NoValue ensuring optional properties are excluded. Outputs for the web server instance, public DNS name, and conditional EBS volume are defined. Two stacks are tested: one with all options enabled and another with both disabled. Outputs and resources are verified, demonstrating proper conditional behavior.

What we have Done in this Activity:

1. **CloudFormation Resource Management:**
- Configured EBS volumes and their attachment to instances based on availability zones.
- Dynamically attached or skipped resources based on parameter values.
2. **Conditional Logic:**
- Used Conditions and intrinsic functions (Fn::If, Equals, AWS::NoValue) to control resource creation and property values.
- Made EBS volume creation and SSH security group attachment optional.
3. **Parameterization:**
- Defined parameters like NewVolumeOption and AllowSshAccess with validation (true/false   values).
- Enabled dynamic stack configuration based on user inputs.
4. **AWS Intrinsic Functions:**
- Leveraged Fn::GetAtt for referencing attributes like availability zones.
- Ensured seamless integration of resource attributes.

Activity

1. Find the template files in our GitHub repository under the same name as the heading for easy access and edits. Find and Save the attached template locally, open it in VS Code for edits.

2. Clear the EBS volume's current value and use Fn::GetAtt to reference the Web Server's Availability Zone.

```
112        # EBS Volume that should be created in the same AZ
113        # with the WebServerInstance
114        EbsVolume:
115          Type: AWS::EC2::Volume
116          Condition: NewVolumeOptionSelected
117          Properties:
118            AvailabilityZone: !GetAtt [ WebServerInstance, AvailabilityZone ]
119            VolumeType: gp2
```

3. Remove the EbsVolumeAZ parameter and metadata entry from the template.

```
41        EbsVolumeSize:
42          Type: Number
43          Description: Size in GiB
44          Default: 10
45        EbsVolumeAZ:
46          Type: AWS::EC2::AvailabilityZone::Name
47          Description: Availability Zone of the EBS volume
```

4. Define a new parameter NewVolumeOption for conditional EBS volume creation, allowing true or false values.

```
45        KeyPairName:
46          Type: AWS::EC2::KeyPair::KeyName
47        NewVolumeOption:
48          Type: String
49          AllowedValues: [ true, false ]
50          Description: Whether to create and attach an EBS volume
```

5. Create a condition NewVolumeOptionSelected using Equals to evaluate the NewVolumeOption parameter.

```
61          ImageId: ami-0de53d8956e8dcf80
62
63  Conditions:
64    NewVolumeOptionSelected: !Equals [ !Ref NewVolumeOption, true ]
```

6. Add the condition to the EbsVolume and VolumeAttachment resources.

```
114      EbsVolume:
115        Type: AWS::EC2::Volume
116        Condition: NewVolumeOptionSelected
117        Properties:
118          AvailabilityZone: !GetAtt [ WebServerInstance, AvailabilityZone ]
119          VolumeType: gp2
120          Size: !Ref EbsVolumeSize
121          Tags:
122            -
123              Key: Name
124              Value: !Sub '${AWS::StackName}-Volume'
125
126      VolumeAttachment:
127        Type: AWS::EC2::VolumeAttachment
128        Condition: NewVolumeOptionSelected
```

7. Define outputs for WebServerInstanceId, WebServerPublicDns, and conditional EbsVolumeId.

```
133
134   Outputs:
135    ·WebServerInstanceId:
136    · · ·Value: !Ref WebServerInstance
137    ·WebServerPublicDns:
138    · · ·Value: !GetAtt [ WebServerInstance, PublicDnsName ]
139    · · ·Description: The public DNS name of the web server
140    ·EbsVolumeId:
141    · ·Value: !Ref EbsVolume
142    · ·Condition: NewVolumeOptionSelected
```

8. Add a new parameter AllowSshAccess for SSH access, allowing true or false values.

```
50         Description: Whether to create and attach an EBS volume
51   AllowSshAccess:
52    ·Type: String
53    ·AllowedValues: [ true, false ]
54    ·Description: Whether to allow SSH access to the web server
```

9. Create a condition SshAccessAllowed to evaluate AllowSshAccess.

```
63   Conditions:
64     NewVolumeOptionSelected: !Equals [ !Ref NewVolumeOption, true ]
65     SshAccessAllowed: !Equals [ !Ref AllowSshAccess, true ]
66
```

10. Use Fn::If to conditionally attach SshSecurityGroup and KeyPairName.

```
75       KeyName: !If [ SshAccessAllowed, !Ref KeyPairName, !Ref 'AWS::NoValue' ]
76       SecurityGroupIds:
77         - !Ref HttpSecurityGroup
78         - !If [ SshAccessAllowed, !Ref SshSecurityGroup, !Ref 'AWS::NoValue' ]
79       Tags:
```

11. Associate the SshSecurityGroup resource with the SshAccessAllowed condition.

```
72       InstanceType: t2.micro
73       SubnetId: !Ref WebServerSubnet
74       ImageId: !FindInMap [ RegionImages, !Ref 'AWS::Region', ImageId ]
75       KeyName: !If [ SshAccessAllowed, !Ref KeyPairName, !Ref 'AWS::NoValue' ]
76       SecurityGroupIds:
```

```
98    SshSecurityGroup:
99      Type: AWS::EC2::SecurityGroup
100     Condition: SshAccessAllowed
101     Properties:
```

12. Save the template, create a stack enabling both options, and verify resources and outputs.

Specify stack details

Provide a stack name

Stack name

```
solution5Stack
```

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 14/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

VPC Settings

Select a VPC

```
vpc-0b0c8badfef0024a4                                          ▼
```

Select a subnet for the web server

It should be in the same VPC.

```
subnet-0619479663b4084af                                       ▼
```

Web Server Settings

Select an EC2 key pair

```
key-1                                                          ▼
```

Web Server Settings
Select an EC2 key pair

key-1 ▼

EBS Volume Settings
EbsVolumeSize
Size in GiB

10

AllowSshAccess
Whether to allow SSH access to the web server

true ▼

NewVolumeOption
Whether to create and attach an EBS volume

true ▼

---

solution5Stack   ⚙ | >

[Delete] [Update] [Stack actions ▼] [Create stack ▼]

Stack info | **Events - updated** | Resources | Outputs | Parameters | Template | Change sets | Git sync

[**Table view** | Timeline view - new]

Events (20)   [Detect root cause] ↻

🔍 Search events   ⚙

Timestamp ▽	Logical ID	Status	Detailed status	Status reason
2024-12-07 19:22:34 UTC+0530	solution5Stack	⊘ CREATE_COMPLETE	-	-
2024-12-07 19:22:32 UTC+0530	VolumeAttachment	⊘ CREATE_COMPLETE	-	-
2024-12-07 19:22:27 UTC+0530	solution5Stack	ⓘ CREATE_IN_PROGRESS	⊘ CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-12-07 19:22:27 UTC+0530	VolumeAttachment	ⓘ CREATE_IN_PROGRESS	⊘ CONFIGURATION_COMPLETE	Eventual consistency check initiated
2024-12-07 19:22:27 UTC+0530	VolumeAttachment	ⓘ CREATE_IN_PROGRESS	-	Resource creation Initiated

---

solution5Stack   ⚙ | >

[Delete] [Update] [Stack actions ▼] [Create stack ▼]

Stack info | Events - updated | **Resources** | Outputs | Parameters | Template | Change sets | Git sync

Resources (5)   ↻

🔍 Search resources   < 1 >   ⚙

Logical ID ▲	Physical ID ▽	Type	Status ▽	Module ▽
EbsVolume	vol-07eb88c16eb0ddc4f ↗	AWS::EC2::Volume	⊘ CREATE_COMPLETE	-
HttpSecurityGroup	sg-0cbdaddff0cc7d7e1 ↗	AWS::EC2::SecurityGroup	⊘ CREATE_COMPLETE	-
SshSecurityGroup	sg-0749750634417385a ↗	AWS::EC2::SecurityGroup	⊘ CREATE_COMPLETE	-
VolumeAttachment	vol-07eb88c16eb0ddc4f|i-02cd9c836a26abafb	AWS::EC2::VolumeAttachment	⊘ CREATE_COMPLETE	-
WebServerInstance	i-02cd9c836a26abafb ↗	AWS::EC2::Instance	⊘ CREATE_COMPLETE	-

---

solution5Stack   ⚙ | >

[Delete] [Update] [Stack actions ▼] [Create stack ▼]

Stack info | Events - updated | Resources | **Outputs** | Parameters | Template | Change sets | Git sync

Outputs (3)   ↻

🔍 Search outputs   < 1 >   ⚙

Key ▲	Value ▽	Description ▽	Export name ▽
EbsVolumeId	vol-07eb88c16eb0ddc4f	-	-
WebServerInstanceId	i-02cd9c836a26abafb	-	-
WebServerPublicDns	ec2-54-76-93-69.eu-west-1.compute.amazonaws.com	The public DNS name of the web server	-

13. Create a second stack with both options disabled, verify skipped resources, and validate outputs.

Specify stack details

Provide a stack name

Stack name

```
solution5Stack-Test
```

Stack name must be 1 to 128 characters, start with a letter, and only contain alphanumeric characters. Character count: 19/128.

Parameters

Parameters are defined in your template and allow you to input custom values when you create or update a stack.

VPC Settings

Select a VPC

```
vpc-0b0c8badfef0024a4                                                              ▼
```

Select a subnet for the web server
It should be in the same VPC.

```
subnet-0619479663b4084af                                                           ▼
```

Web Server Settings

Select an EC2 key pair

```
key-1                                                                              ▼
```

EBS Volume Settings

EbsVolumeSize
Size in GiB

```
10
```

AllowSshAccess
Whether to allow SSH access to the web server

```
false                                                                              ▼
```

NewVolumeOption
Whether to create and attach an EBS volume

```
false                                                                              ▼
```

Cancel   Previous   Next

---

solution5Stack-Test   ⚙   >

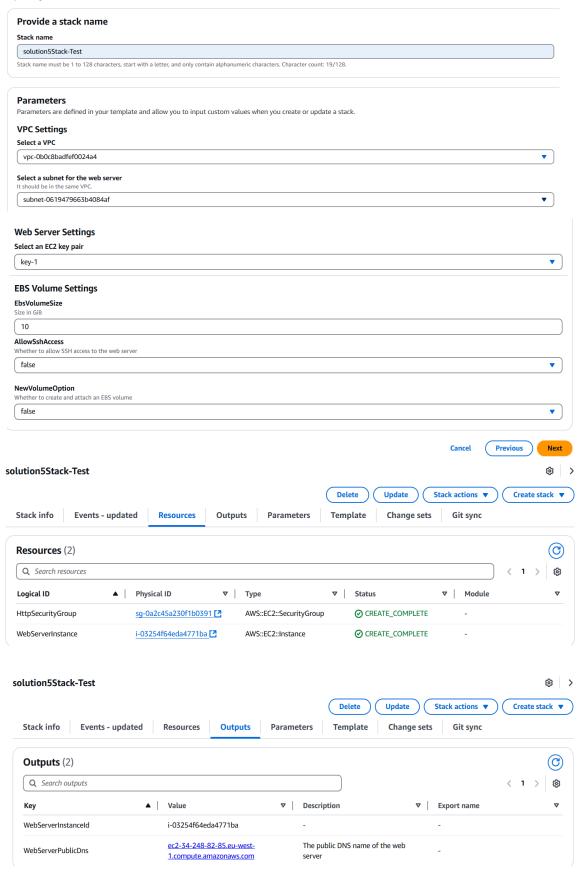Delete   Update   Stack actions ▼   Create stack ▼

| Stack info | Events - updated | **Resources** | Outputs | Parameters | Template | Change sets | Git sync |

Resources (2)   ⟳

🔍 Search resources   < 1 > ⚙

Logical ID ▲	Physical ID ▽	Type ▽	Status ▽	Module ▽
HttpSecurityGroup	sg-0a2c45a230f1b0391 ↗	AWS::EC2::SecurityGroup	⊘ CREATE_COMPLETE	-
WebServerInstance	i-03254f64eda4771ba ↗	AWS::EC2::Instance	⊘ CREATE_COMPLETE	-

---

solution5Stack-Test   ⚙   >

Delete   Update   Stack actions ▼   Create stack ▼

| Stack info | Events - updated | Resources | **Outputs** | Parameters | Template | Change sets | Git sync |

Outputs (2)   ⟳

🔍 Search outputs   < 1 > ⚙

Key ▲	Value ▽	Description ▽	Export name ▽
WebServerInstanceId	i-03254f64eda4771ba	-	-
WebServerPublicDns	ec2-34-248-82-85.eu-west-1.compute.amazonaws.com	The public DNS name of the web server	-

14. Clean up by deleting both stacks.

solution5Stack-Test ⚙ >

Delete   Update   Stack actions ▼   Create stack ▼

Stack info | **Events - updated** | Resources | Outputs | Parameters | Template | Change sets | Git sync

Table view | Timeline view - new

Events (14)   Detect root cause   ⟳

🔍 Search events   ⚙

Timestamp ▼	Logical ID	Status	Detailed status	Status reason
2024-12-19 15:20:18 UTC+0530	solution5Stack-Test	⊘ DELETE_COMPLETE	-	-
2024-12-19 15:20:17 UTC+0530	HttpSecurityGroup	⊘ DELETE_COMPLETE	-	-
2024-12-19 15:20:16 UTC+0530	HttpSecurityGroup	ⓘ DELETE_IN_PROGRESS	-	-
2024-12-19 15:20:16 UTC+0530	WebServerInstance	⊘ DELETE_COMPLETE	-	-
2024-12-19 15:19:05 UTC+0530	WebServerInstance	ⓘ DELETE_IN_PROGRESS	-	-