Report: Cloud-Formation Template Deployment and Drift Detection

Name: Chaithanya M
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Topic: Cloud-Formation Template Deployment and Drift Detection

1. Introduction

In cloud infrastructure management, maintaining consistency, repeatability, and visibility is essential. AWS CloudFormation provides a powerful solution for achieving these goals by enabling users to define infrastructure as code. This allows you to provision and manage a collection of AWS resources in a predictable and automated manner.

This report focuses on the use of CloudFormation to deploy an Amazon S3 bucket and monitor the stack's integrity using drift detection. Drift detection is a feature that checks whether the actual state of the stack resources matches the expected configuration defined in the template. It plays a critical role in identifying manual changes that can lead to configuration inconsistencies and unexpected behaviors.

2. **Objective**

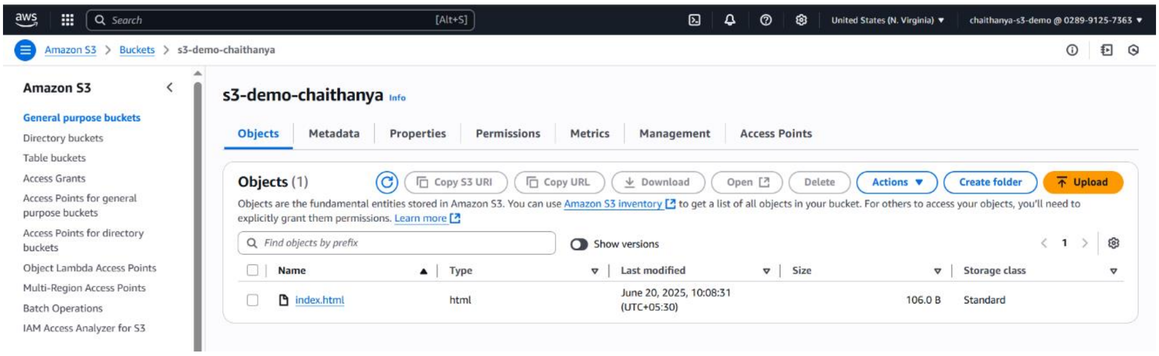
The primary objectives of this implementation are:

- Automate Infrastructure Provisioning: Use a CloudFormation template to programmatically create an AWS S3 bucket.
- Improve Resource Consistency: Define and manage infrastructure declaratively to ensure consistent deployments across environments.
- Enable Change Tracking: Use drift detection to identify any changes made to the resources outside of CloudFormation’s control.
- Reduce Human Errors and Costs: Minimize manual operations and unintended misconfigurations by maintaining an IaC-driven environment.
- Demonstrate a Complete Lifecycle: Show the complete workflow from template creation to stack deployment, and validation using drift detection.

3. Implementation

Step 1: Create an S3 Bucket (Manually or Via Console)

- Click Create bucket.
- Enter a bucket name: s3-demo-chaithanya.
- Keep other settings default and click Create bucket.
- Upload the index.html object.

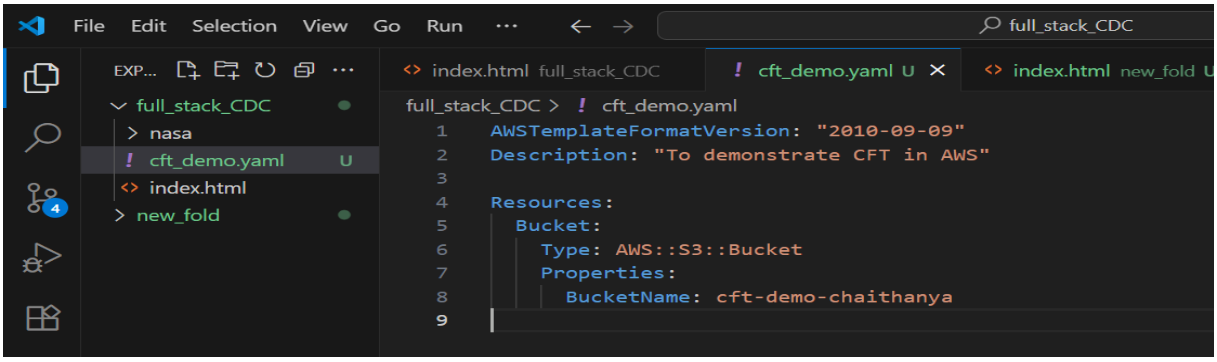


Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

□	Name	Type	Last modified	Size	Storage class
□	index.html	html	June 20, 2025, 10:08:31 (UTC+05:30)	106.0 B	Standard

Step 2: Prepare CloudFormation Template

Here’s a sample YAML template to create a simple S3 bucket:



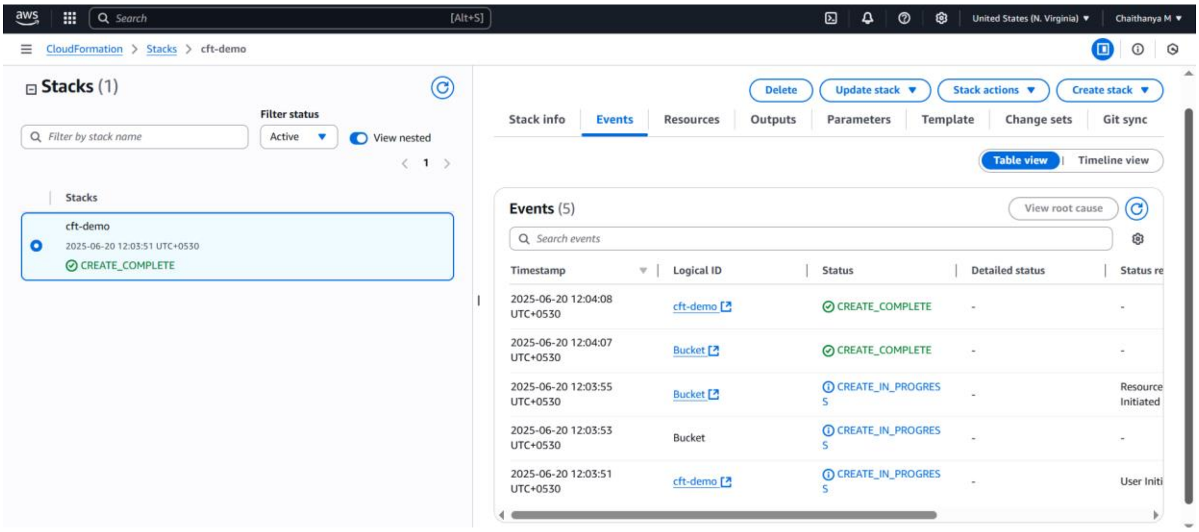
```yaml
AWSTemplateFormatVersion: "2010-09-09"
Description: "To demonstrate CFT in AWS"

Resources:
  Bucket:
    Type: AWS::S3::Bucket
    Properties:
      BucketName: cft-demo-chaithanya

```

Step 3: Create CloudFormation Stack

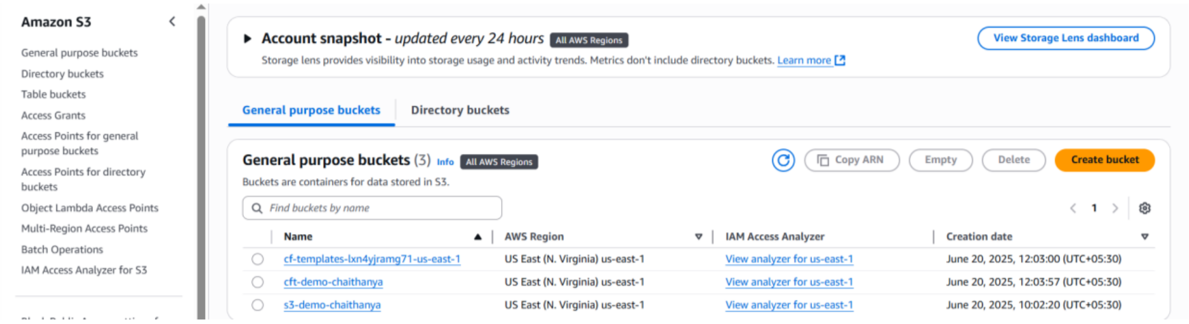
1. Navigate to AWS Console → CloudFormation
2. Click Create stack → With new resources (standard)
3. Choose Template is ready
4. Upload your ctf_demo.yaml file or select the S3 URL if stored there
5. Click Next
6. Stack name: DemoStack-S3, then Create stack



cft-demo
2025-06-20 12:03:51 UTC+0530
CREATE_COMPLETE

Events (5)

Timestamp	Logical ID	Status	Detailed status	Status re
2025-06-20 12:04:08 UTC+0530	cft-demo	CREATE_COMPLETE	-	-
2025-06-20 12:04:07 UTC+0530	Bucket	CREATE_COMPLETE	-	-
2025-06-20 12:03:55 UTC+0530	Bucket	CREATE_IN_PROGRESS	-	Resource Initiated
2025-06-20 12:03:53 UTC+0530	Bucket	CREATE_IN_PROGRESS	-	-
2025-06-20 12:03:51 UTC+0530	cft-demo	CREATE_IN_PROGRESS	-	User Initi



Account snapshot - *updated every 24 hours*

Storage lens provides visibility into storage usage and activity trends. Metrics don't include directory buckets. Learn more

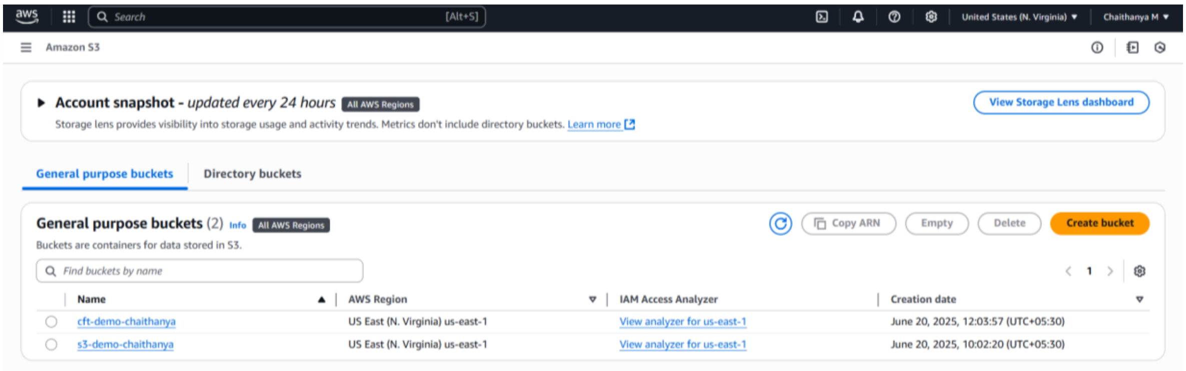
General purpose buckets (3)

Buckets are containers for data stored in S3.

Name	AWS Region	IAM Access Analyzer	Creation date
cf-templates-lxn4yjramg71-us-east-1	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 20, 2025, 12:03:00 (UTC+05:30)
cft-demo-chaithanya	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 20, 2025, 12:03:57 (UTC+05:30)
s3-demo-chaithanya	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 20, 2025, 10:02:20 (UTC+05:30)

Step 4: Manually Delete the S3 Bucket

1. Go to the S3 Console.
2. Locate the bucket created by CloudFormation (e.g., demo-cloudformation-bucket-unique-001).
3. Select the bucket → click Delete.



Account snapshot - *updated every 24 hours*

Storage lens provides visibility into storage usage and activity trends. Metrics don't include directory buckets. Learn more

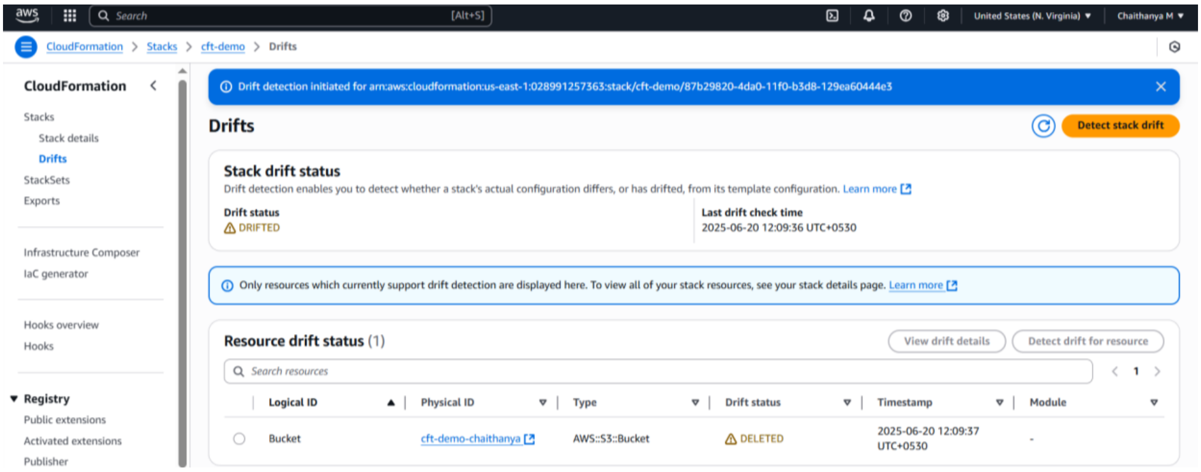
General purpose buckets (2)

Buckets are containers for data stored in S3.

Name	AWS Region	IAM Access Analyzer	Creation date
cft-demo-chaithanya	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 20, 2025, 12:03:57 (UTC+05:30)
s3-demo-chaithanya	US East (N. Virginia) us-east-1	View analyzer for us-east-1	June 20, 2025, 10:02:20 (UTC+05:30)

Step 5: Detect Drift in the CloudFormation Stack

1. Go to the CloudFormation Console.
2. Select created stack.
3. Click on Stack actions → choose Detect drift.



ⓘ Drift detection initiated for arn:aws:cloudformation:us-east-1:028991257363:stack/cft-demo/87b29820-4da0-11f0-b3d8-129ea60444e3

Drifts

Stack drift status

Drift detection enables you to detect whether a stack's actual configuration differs, or has drifted, from its template configuration. Learn more

Drift status: ⚠ DRIFTED

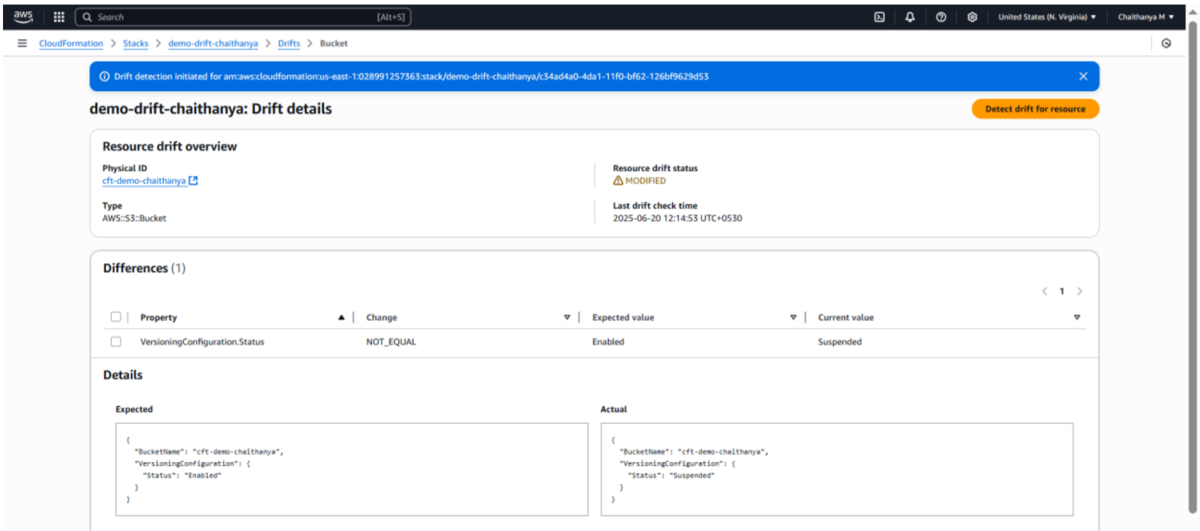
Last drift check time: 2025-06-20 12:09:36 UTC+0530

ⓘ Only resources which currently support drift detection are displayed here. To view all of your stack resources, see your stack details page. Learn more

Resource drift status (1)

	Logical ID	Physical ID	Type	Drift status	Timestamp	Module
○	Bucket	cft-demo-chaithanya	AWS::S3::Bucket	⚠ DELETED	2025-06-20 12:09:37 UTC+0530	-

Step 6: Edit bucket Versioning and detect drift


aws
Search [Alt+S]
United States (N. Virginia) ▾
Chaithanya M ▾
CloudFormation > Stacks > demo-drift-chaithanya > Drifts > Bucket
Detect drift for resource

ⓘ Drift detection initiated for arn:aws:cloudformation:us-east-1:028991257363:stack/demo-drift-chaithanya/c34ad4a0-4da1-11f0-bf62-126bf9629d53

demo-drift-chaithanya: Drift details

Resource drift overview

Physical ID: cft-demo-chaithanya

Type: AWS::S3::Bucket

Resource drift status: ⚠ MODIFIED

Last drift check time: 2025-06-20 12:14:53 UTC+0530

Differences (1)

□	Property	Change	Expected value	Current value
□	VersioningConfiguration.Status	NOT_EQUAL	Enabled	Suspended

Details

Expected

```
{
  "BucketName": "cft-demo-chaithanya",
  "VersioningConfiguration": {
    "Status": "Enabled"
  }
}
```

Actual

```
{
  "BucketName": "cft-demo-chaithanya",
  "VersioningConfiguration": {
    "Status": "Suspended"
  }
}
```

4. Conclusion

This project demonstrates the effective use of AWS CloudFormation for infrastructure automation and compliance monitoring through drift detection. By defining a CloudFormation template to create an S3 bucket, deploying it via a stack, and then deliberately introducing configuration changes such as manual deletion and enabling versioning, we validated CloudFormation’s ability to track deviations from the declared infrastructure state.

Drift detection successfully identified:

- Deleted resources (e.g., S3 bucket manually removed)
- Modified configurations (e.g., versioning enabled outside the template)

These features are critical in real-world cloud environments where infrastructure might be modified manually or by external automation scripts. Detecting such drifts ensures that teams can maintain infrastructure consistency, prevent unauthorized changes, and reinforce infrastructure as code (IaC) practices.

Overall, this workflow highlights CloudFormation’s role not only in provisioning resources but also in monitoring, auditing, and governing AWS infrastructure — making it a powerful tool for both DevOps engineers and cloud administrators.