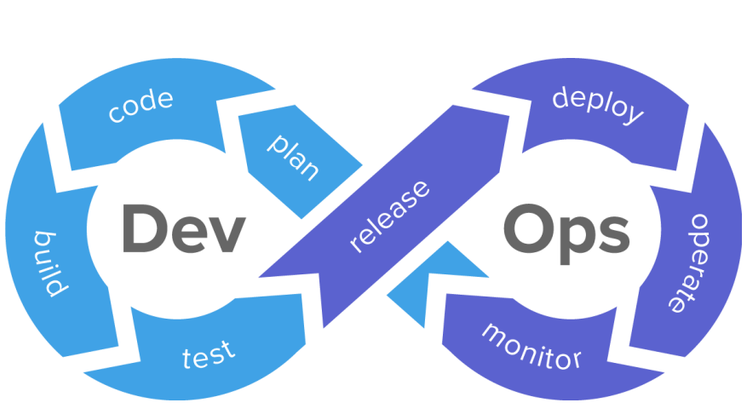
# AWS Solutions Architect Associate

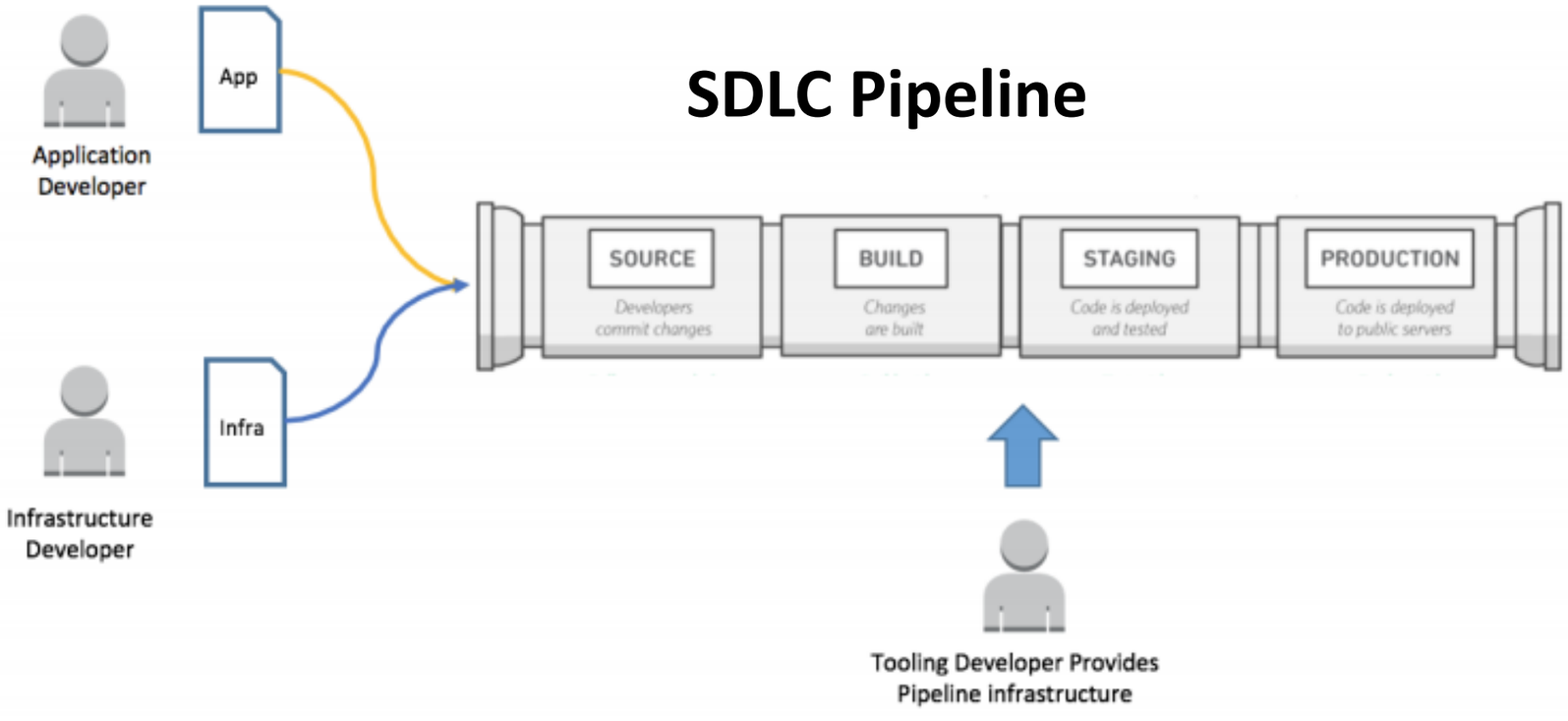
## Session 502

## Developer Tools & Containers

July/2024

- DevOps Culture: Automatizate everywhere
- Continous Integration (Source, Build, Test)
- Continous Delivery (Deployment and Ready Artifact, Manual Deploy to Productive)
- Continous Deployment (CD and Automatic Productive Deploy)




Taken from https://d0.awsstatic.com/whitepapers/DevOps/practicing-continuous-integration-continuous-delivery-on-AWS.pdf (10/10/2020) and updated on https://docs.aws.amazon.com/whitepapers/latest/practicing-continuous-integration-continuous-delivery/welcome.html (18/07/2024)

# CI/CD Services



## Developer Tools

AWS CodeCommit

AWS CodeStar

AWS CodePipeline

AWS CodeBuild

AWS CodeDeploy

## Containers

Amazon Elastic Container Registry

Registry

Image

Amazon Elastic Container Service

Container 1

Container 2

Container 3

Service

Task

Amazon Elastic Kubernetes Service

## Mgmt & Gov

AWS OpsWorks

# Development Services



AWS CodeStar

AWS CodePipeline

AWS CodeBuild

AWS CodeCommit

AWS CodeDeploy

## Management & Governance

AWS OpsWorks

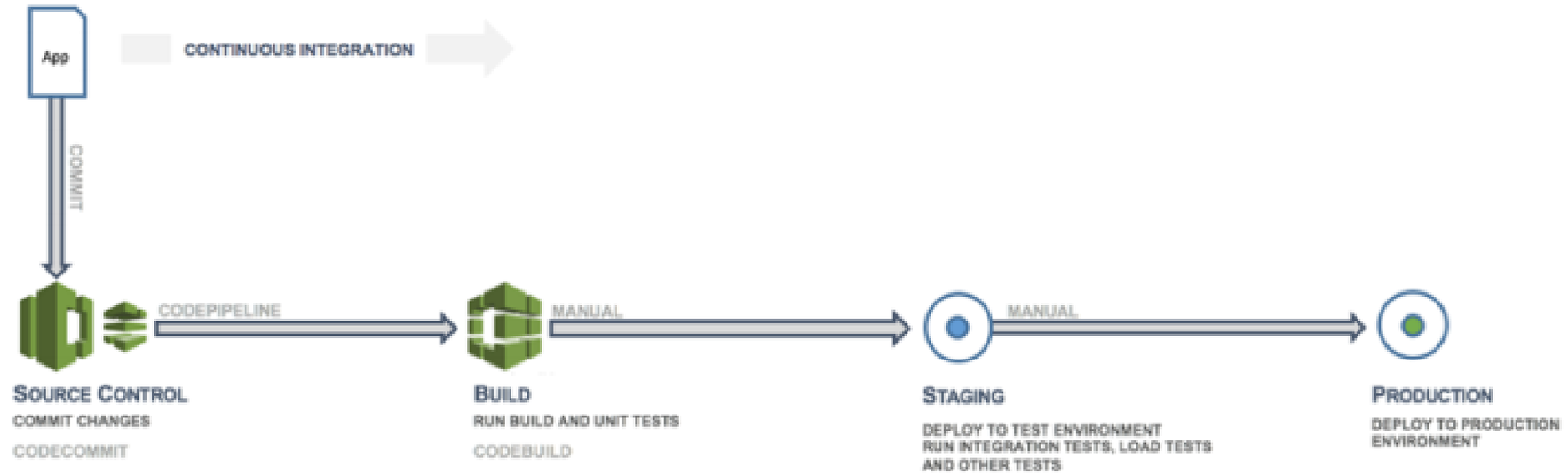



**Figure 2: Continuous integration—source and build**

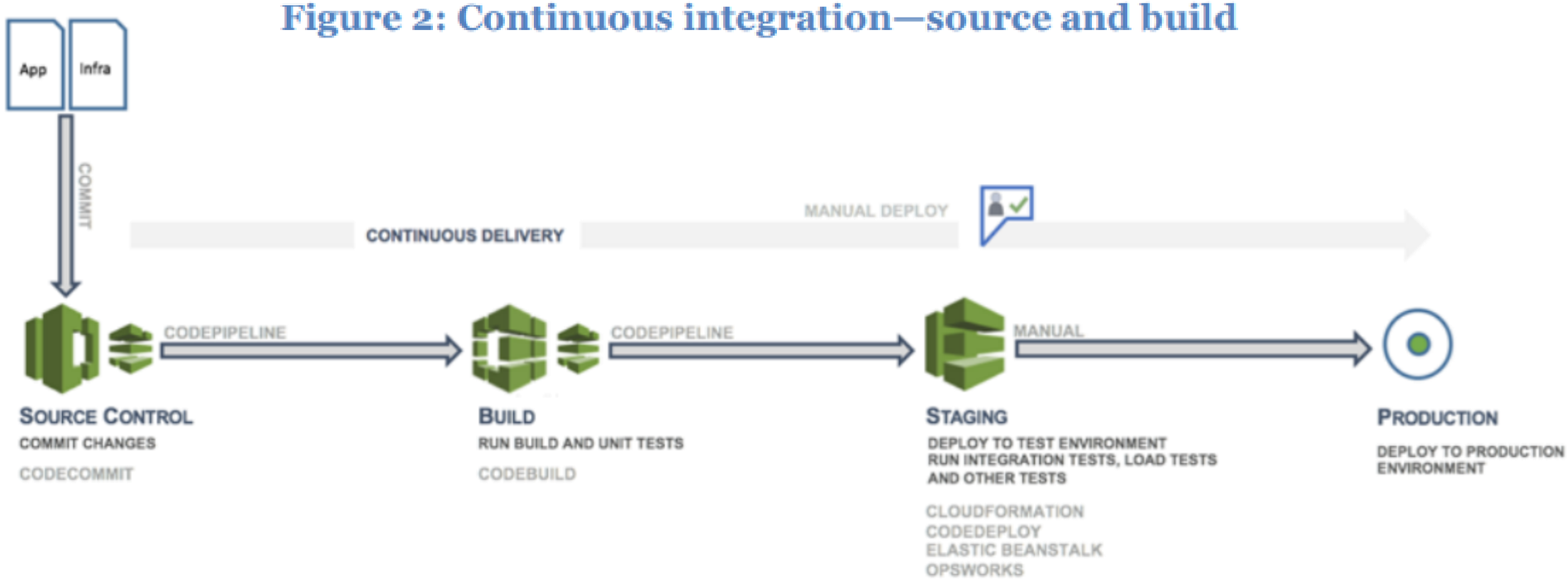



**Figure 3: Continuous delivery—staging**

Taken from https://d0.awsstatic.com/whitepapers/DevOps/practicing-continuous-integration-continuous-delivery-on-AWS.pdf (10/10/2020) and updated on https://docs.aws.amazon.com/whitepapers/latest/practicing-continuous-integration-continuous-delivery/welcome.html (18/07/2024)

# CI/CD Pipelines

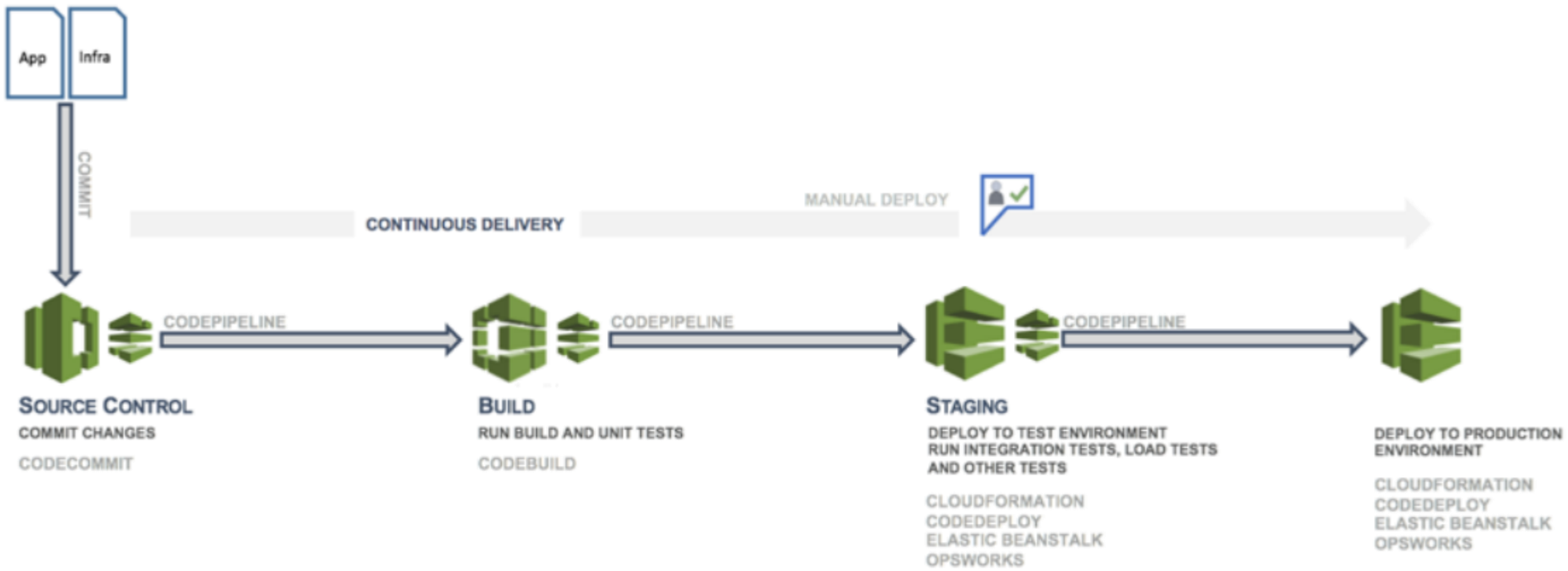



**Figure 4: Continuous delivery—production**

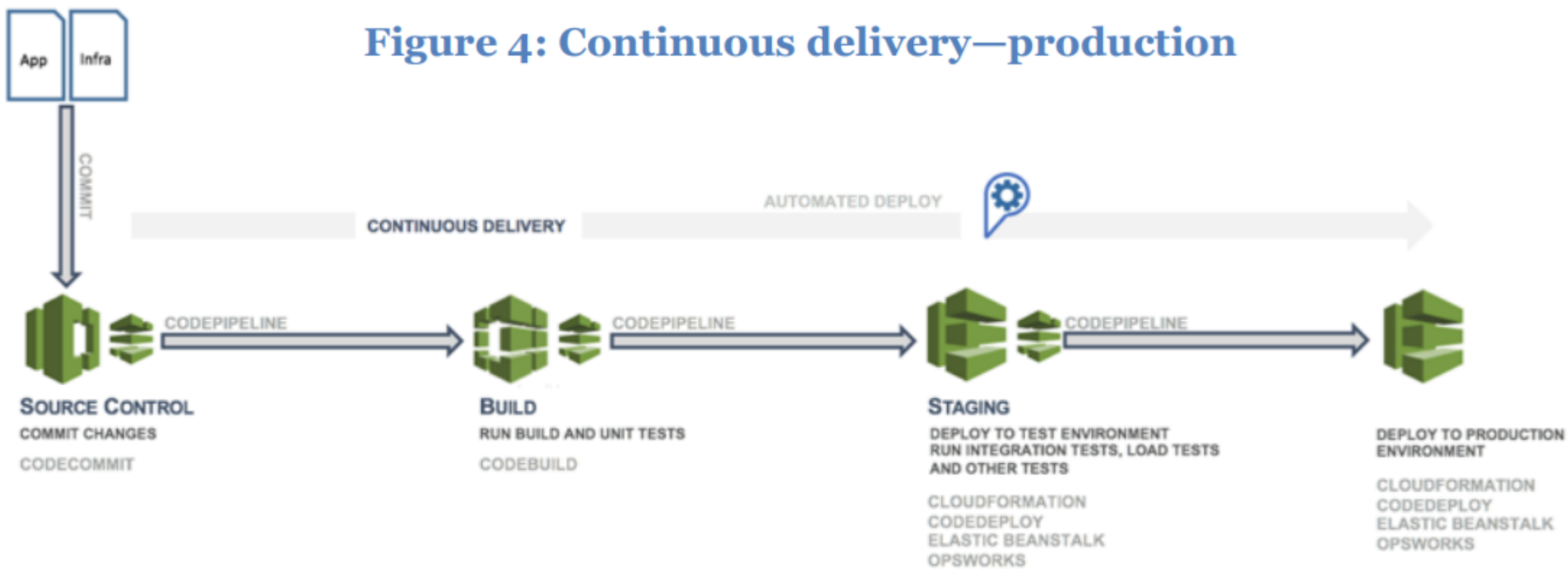



**Figure 5: Continuous deployment**

Taken from https://d0.awsstatic.com/whitepapers/DevOps/practicing-continuous-integration-continuous-delivery-on-AWS.pdf (10/10/2020) and updated on https://docs.aws.amazon.com/whitepapers/latest/practicing-continuous-integration-continuous-delivery/welcome.html (18/07/2024)

# CodeCommit and CodeBuild



AWS CodeCommit

| First 5 active users* | Each additional active user beyond the first 5* |
|---|---|
| $0.00 | $1.00 per month |
| Receives: | Receives: |
| • Unlimited repositories<br>• 50 GB-month of storage<br>• 10,000 Git requests/month | • Unlimited repositories<br>• 10 GB-month of storage per active user<br>• 2,000 Git requests/month per active user |

# CodeBuild

AWS CodeBuild

Build and Test using Gradle, Maven, npm for:
Java, Python, Node.js, Ruby, Go, Android, .NET Core for Linux, and Docker.
Specify build commands using YAML

Region: US East (N. Virginia)

| Compute instance type | Memory | vCPU | Linux price per build minute | Windows price per build minute |
|---|---|---|---|---|
| general1.small | 3 GB | 2 | $0.005 | N/A |
| general1.medium | 7 GB | 4 | $0.01 | $0.018 |
| arm1.large | 16 GiB | 8 | $0.015 | N/A |
| general1.large | 15 GB | 8 | $0.02 | $0.036 |
| general1.2xlarge | 144 GiB | 72 | $0.20 | N/A |
| gpu1.large | 244 GiB | 32 | $0.65 | N/A |

Bring code from:Github, Bitbucket, CodeCommit.

Deliver artifacts to S3, Any Repository.

Taken from https://aws.amazon.com/codebuild/pricing/?nc=sn&loc=3 (10/10/2020)

# CodeStar vs CodePipeline

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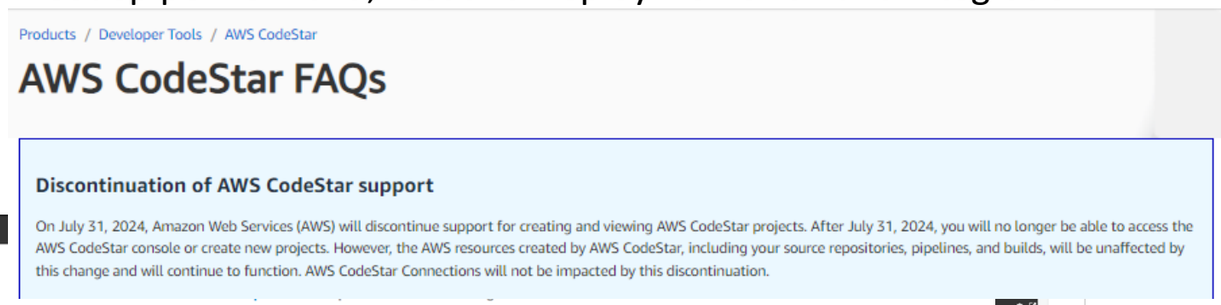
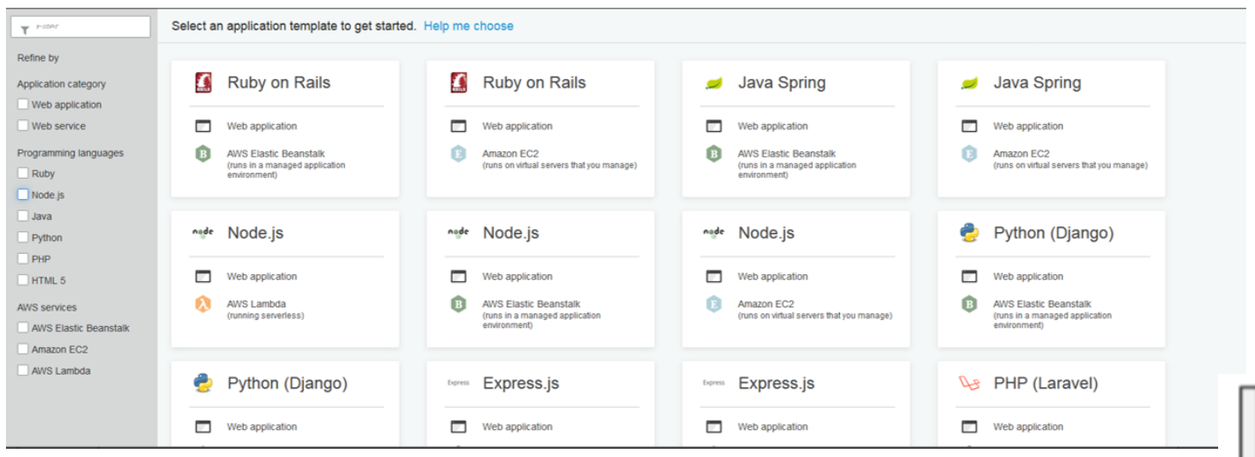
Codepipeline: Build, Test and Deploy. Powerfull and integration.

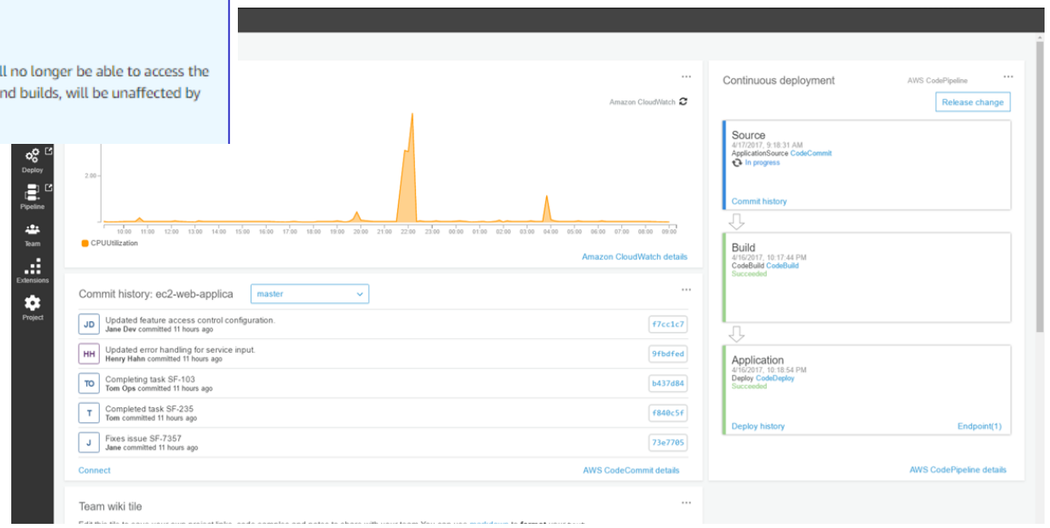
AWS CodeStar

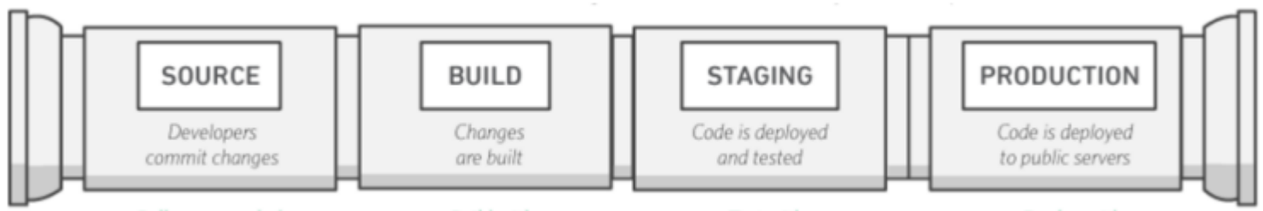
AWS CodePipeline



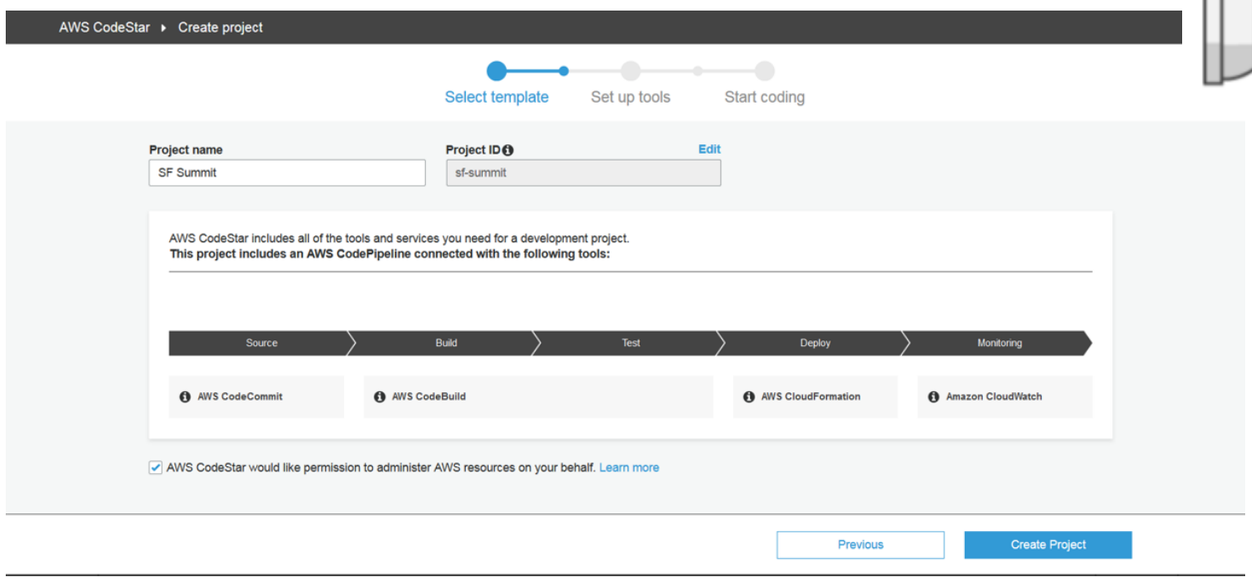

develop and integrate in minutes (Boards,




Java, Node.js (Javascript), PHP, Python and Ruby.




Atlassian Jira or using AWS Codepipeline

Amazon EC2, AWS Elastic Beanstalk or AWS Lambda

**No additional charge**

Taken from https://aws.amazon.com/codestar/features/ (18/07/2024)

# CodeStart vs CodePipeline

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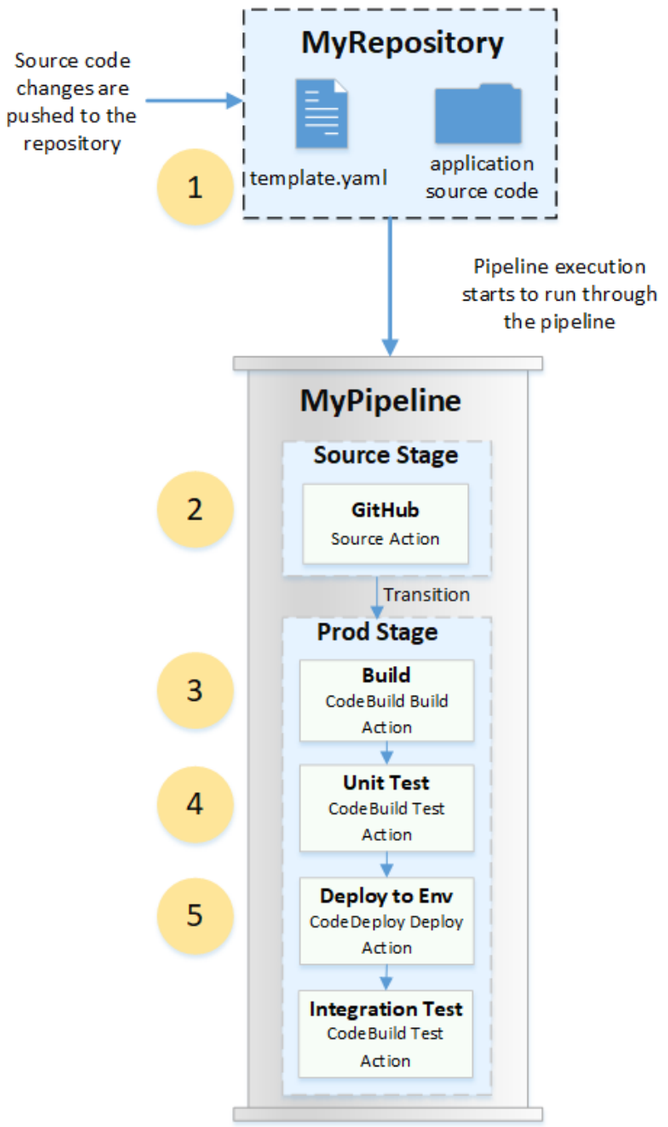
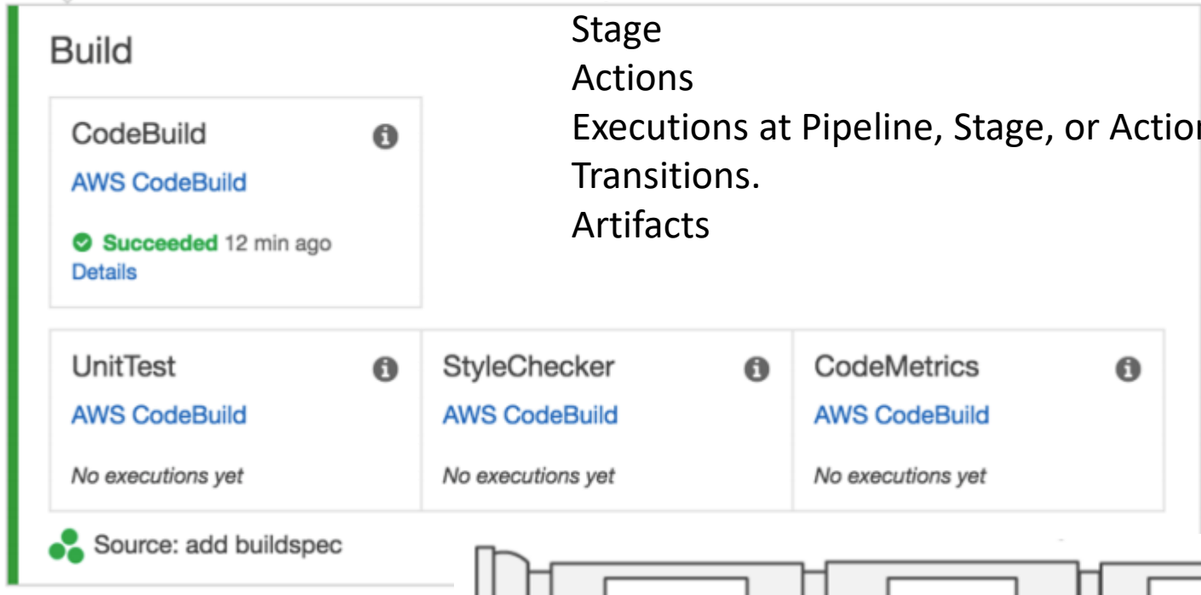


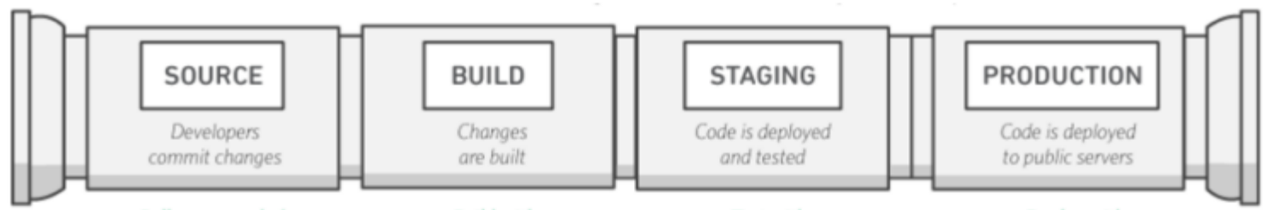

**No additional charge**

AWS CodeStar

AWS CodePipeline

Pipeline
Stage
Actions
Executions at Pipeline, Stage, or Actions states.
Transitions.
Artifacts




Amazon ECR source actions
Amazon S3 source actions
Bitbucket source actions
CodeCommit source actions
GitHub source actions

CodeBuild build actions
CloudBees build actions
Jenkins build actions
TeamCity build actions

Amazon S3 deploy actions
AWS AppConfig deploy actions
AWS CloudFormation deploy actions
Amazon ECS deploy actions
Elastic Beanstalk deploy actions
AWS OpsWorks deploy actions
AWS Service Catalog deploy actions
Amazon Alexa deploy actions
CodeDeploy deploy actions
XebiaLabs deploy actions

CodeBuild test actions
AWS Device Farm test actions
BlazeMeter test actions
Ghost Inspector test actions
Micro Focus StormRunner Load test actions
Nouvola test actions
Runscope test actions

Approval e Invoke:
SNS, Lambda and Steps

Taken from https://docs.aws.amazon.com/codepipeline/latest/userguide/concepts-how-it-works.html (18/07/2024)

# Deploy Table for CodeDeploy and BeanStalk



| Method | Impact of Failed Deployment | Deploy Time | Zero Downtime | No DNS Change | Rollback Process | Code Deployed To |
|---|---|---|---|---|---|---|
| **Deploy in place** | Downtime | 🕒 | X | ✓ | Re-deploy | Existing instances |
| **Rolling** | Single batch out of service. Any successful batches prior to failure running new application version. | 🕒🕒† | ✓ | ✓ | Re-deploy | Existing instances |
| **Rolling with additional batch (beanstalk)** | Minimal if first batch fails, otherwise similar to rolling. | 🕒🕒🕒 † | ✓ | ✓ | Re-deploy | New & existing instances |
| **Immutable** | Minimal | 🕒🕒🕒 🕒 | ✓ | ✓ | Re-deploy | New instances |
| **Blue/green** | Minimal | 🕒🕒🕒 🕒 | ✓ | X | switch back to old environment | New instances |

**Deployment Configuration:**

**Canary (Soft Rolling)**: Traffic is shifted in two increments. You can choose from predefined canary options that specify the percentage of traffic shifted to your updated new deploy version in the first increment and the interval, in minutes, before the remaining traffic is shifted in the second increment.
**Linear**: Traffic is shifted in equal increments with an equal number of minutes between each increment. You can choose from predefined linear options that specify the percentage of traffic shifted in each increment and the number of minutes between each increment.
**All-at-Once:** All traffic shifted

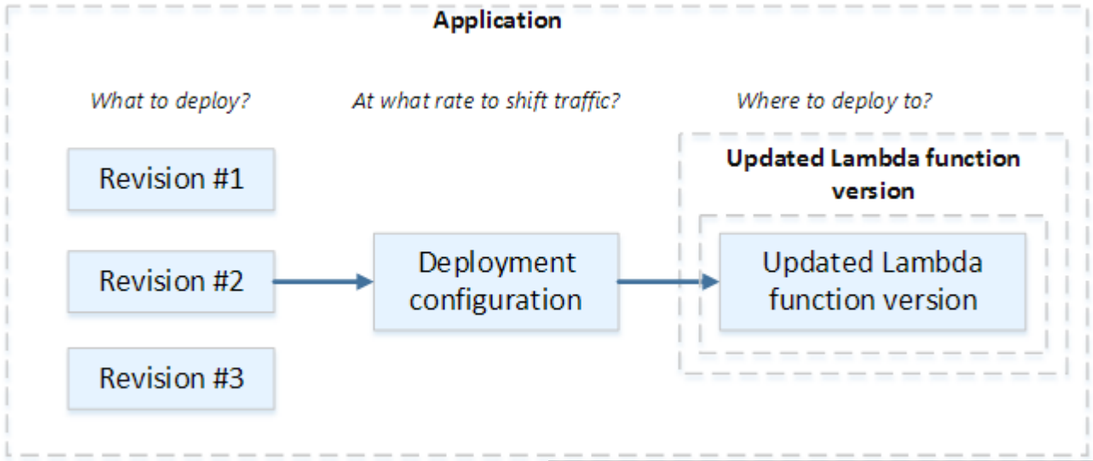
Inmutable using the new ASG to have new servers (non-mutable) and then assign to ELB the ASG.
Mutable means no capable of reconfiguring, so coming from scratch.

Taken from https://d0.awsstatic.com/whitepapers/DevOps/practicing-continuous-integration-continuous-delivery-on-AWS.pdf (10/10/2020) and updated on https://docs.aws.amazon.com/whitepapers/latest/practicing-continuous-integration-continuous-delivery/welcome.html (18/07/2024)

# AWS CodeDeploy



AWS CodeDeploy



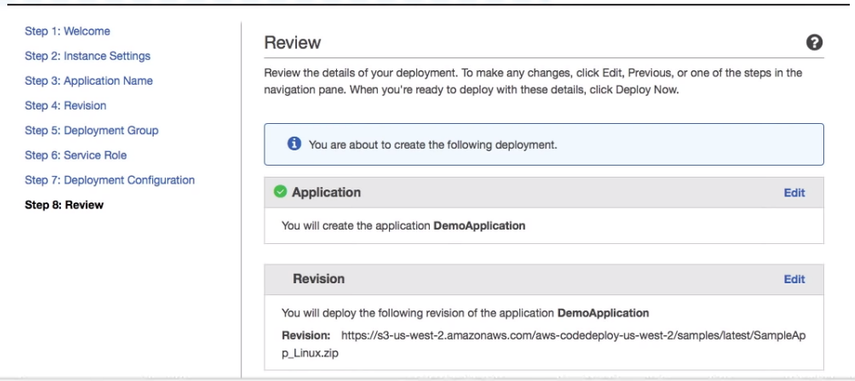

Computing Scope: EC2/OnPremises, ECS, Lambda
**Application:** Unique identifier for Code, cfg files, Lambda functions, executables, packages, scripts.
**Deployment configuration:** Canary, Linear, All-At-Once.
**Deployment group:** Set of Instances or ASG.
**Deployment Type**: In-Place, Blue/Green.

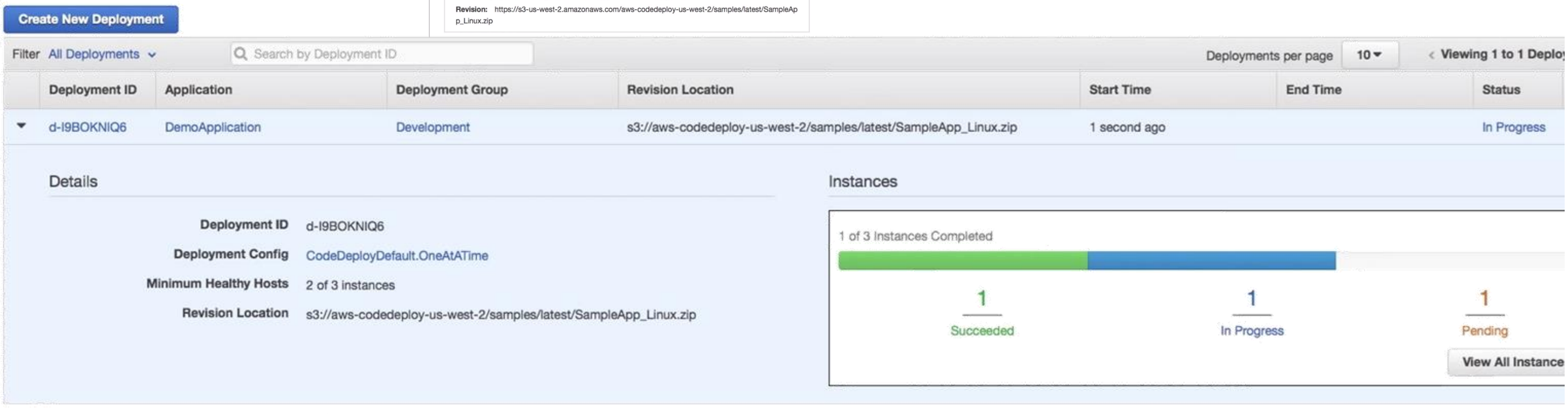
**IAM Instance Profile:** For the deployed instances.

**Service Role:** Role of CodeDeploy to deploy

To sum up all,

**Revision:** AppSpec about application, and deployment configuration.
**Deployment:** Its a execution




**Charge for OnPremise Deployments: $0.02, otherwise EC2/Lambda no charge.**

Taken from https://docs.aws.amazon.com/codedeploy/latest/userguide/welcome.html (18/07/2024)

# AWS OpsWork

AWS OpsWorks

Configuration Management Service. Configuration-as-a-Service to automate server configurations.
Master-Agent using Pull Configuration. Infrastructure is provided too.

3 Offers: OpsWork for Chef Automate, OpsWork for Puppet Enterprise and OpsWork Stacks (Chef Local Mode).

**Desired States**
Chef: Cookbook (Collection of Recipes), Recipes.

Stack

Layers

Deployments

Monitoring

Permissions

## What Is AWS OpsWorks?

PDF | RSS

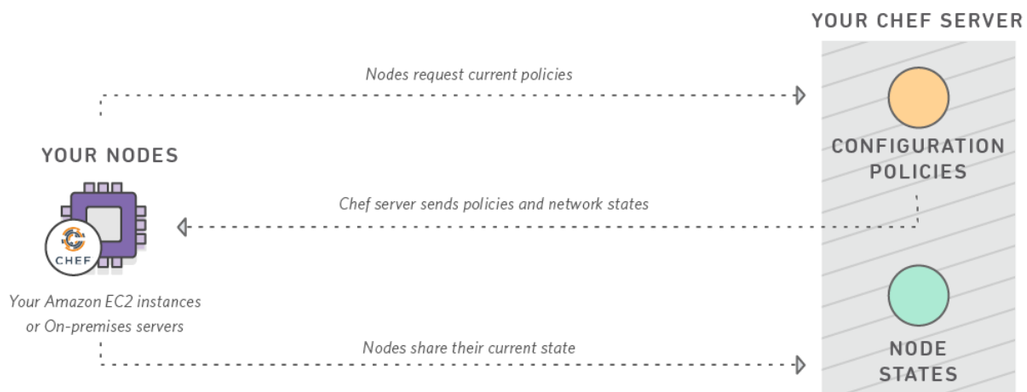
**Important**

The AWS OpsWorks services have reached end of life and have been disabled for both new and existing customers. We strongly recommend customers migrate their workloads to other solutions as soon as possible. If you have questions about migration, reach out to the AWS Support Team on AWS re:Post or through AWS Premium Support.

r Servers).

y. Declarative.

Deploy an app or run a command




**OS:**
Linux/Unix, Windows, Mac (Puppet)

Check Prices for Nodes per Hour, Chef License.

More info at deprecated at https://docs.aws.amazon.com/opsworks/latest/userguide/welcome.html (18/07/2024)
Taken from https://aws.amazon.com/opsworks/chefautomate/features/?nc=sn&loc=2 and https://logz.io/blog/chef-vs-puppet/#:~:text=To%20use%20an%20analogy%2C%20using,might%20be%20a%20better%20fit. (10/10/2020)

# Containers Services on AWS

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Amazon Elastic Container Registry

Registry

Image

Amazon Elastic Container Service

Container 1

Container 2

Container 3

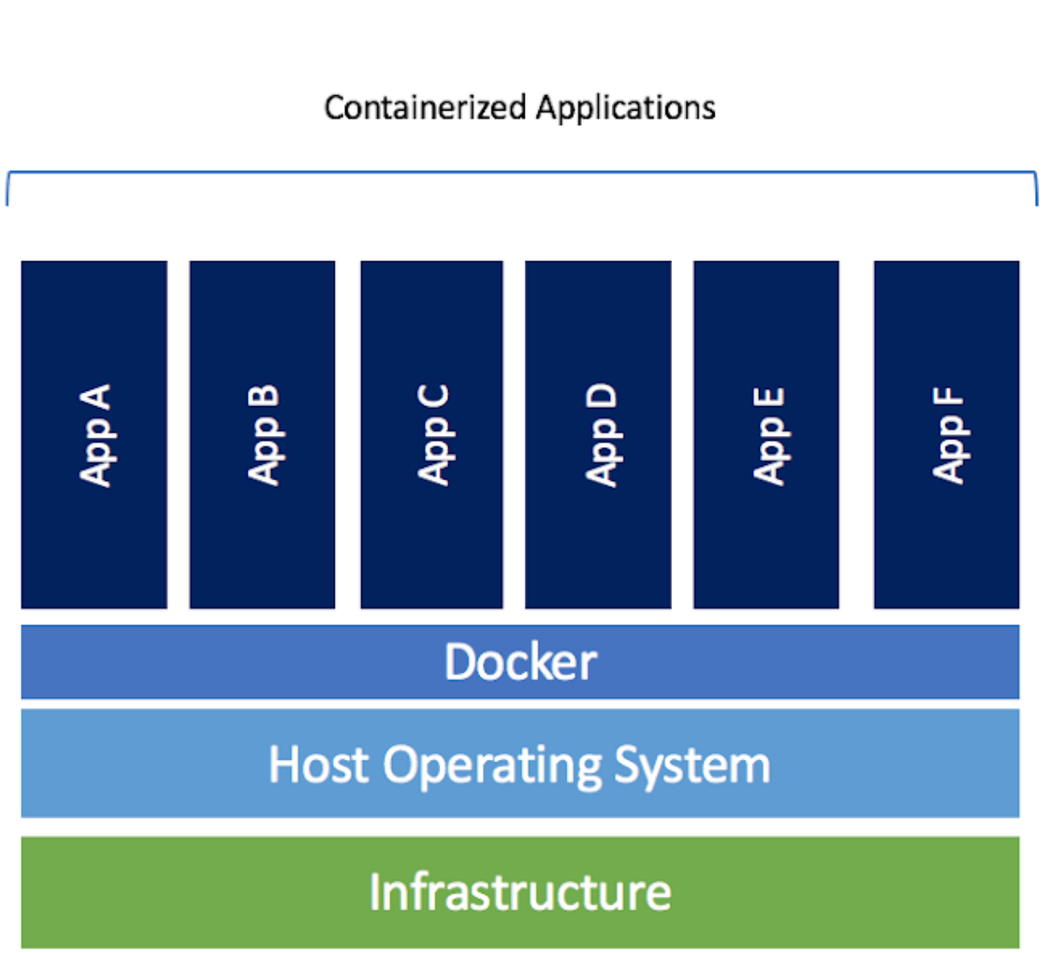
Task

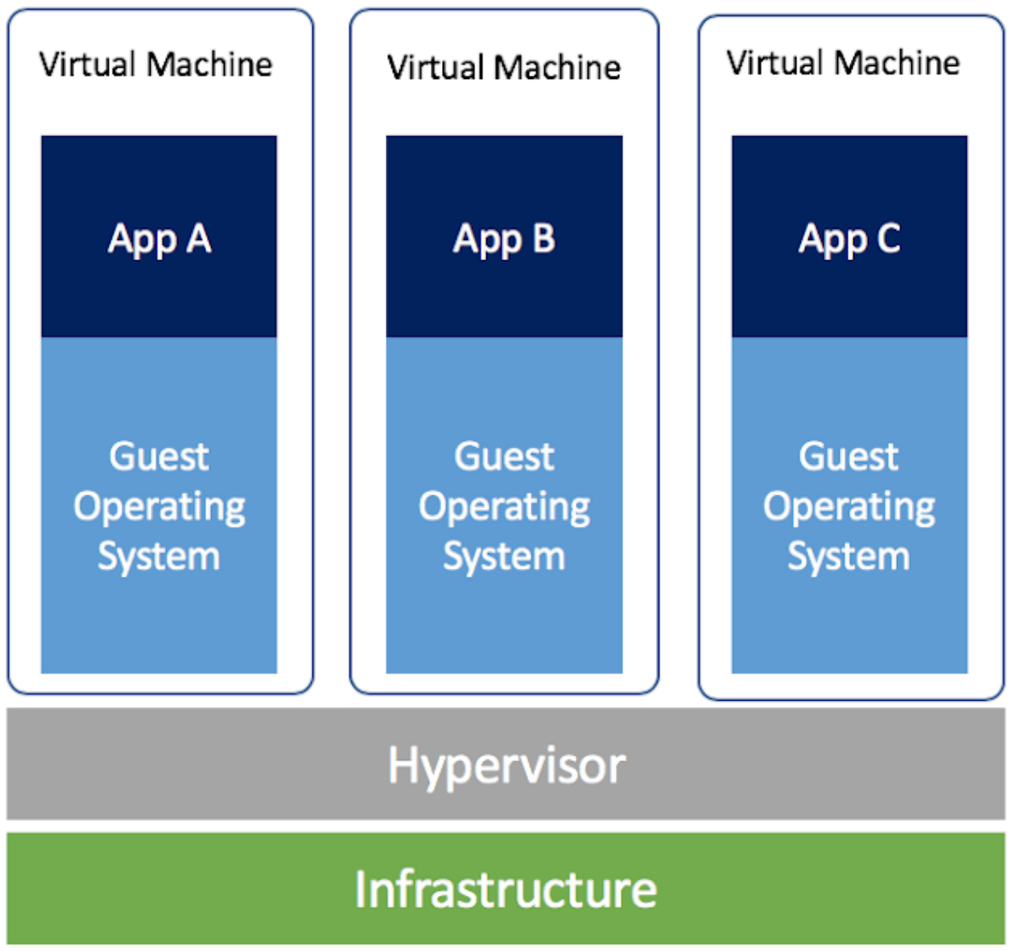
Service

Amazon Elastic Kubernetes Service

# Containers vs VM




Taken from https://www.docker.com/blog/containers-replacing-virtual-machines/ (10/10/2020)

# Elastic Container Registry - ECR

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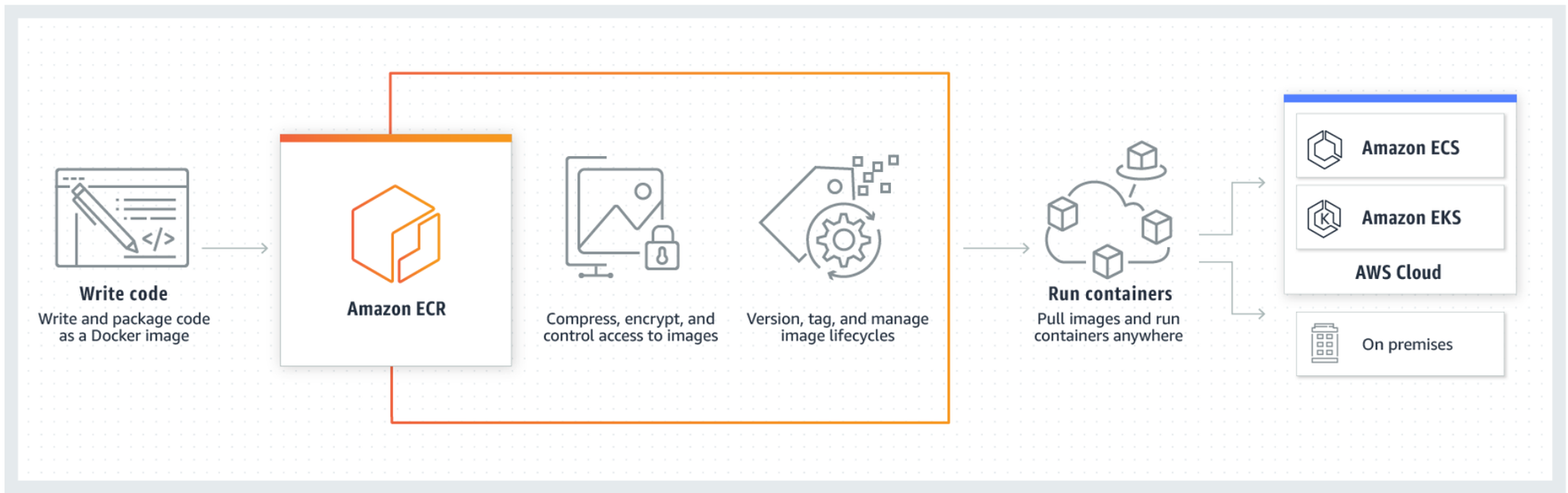



**Components:**
Repository including policies
Images including lifecycle
Authorization Token

**Features:**
ECS Integration,
Docker Support (OCI Images)
AWS Marketplace
HA and durability
Team collaboration using IAM
Encryption
* Vulnerabilities Scan

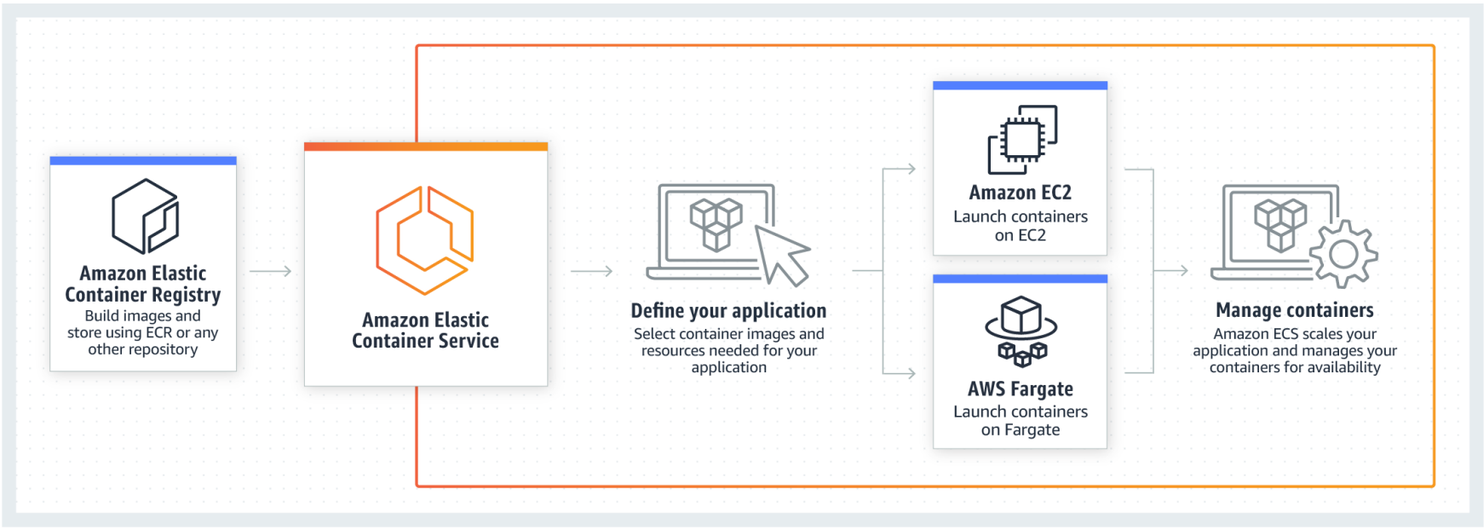
https://*aws_account_id*.dkr.ecr.*region*.amazonaws.com.

**Pricing:** per Storage (GB per Month), data transfer out.

Taken from https://docs.aws.amazon.com/AmazonECR/latest/userguide/Registries.html (10/10/2020)

# Elastic Container Services - ECS





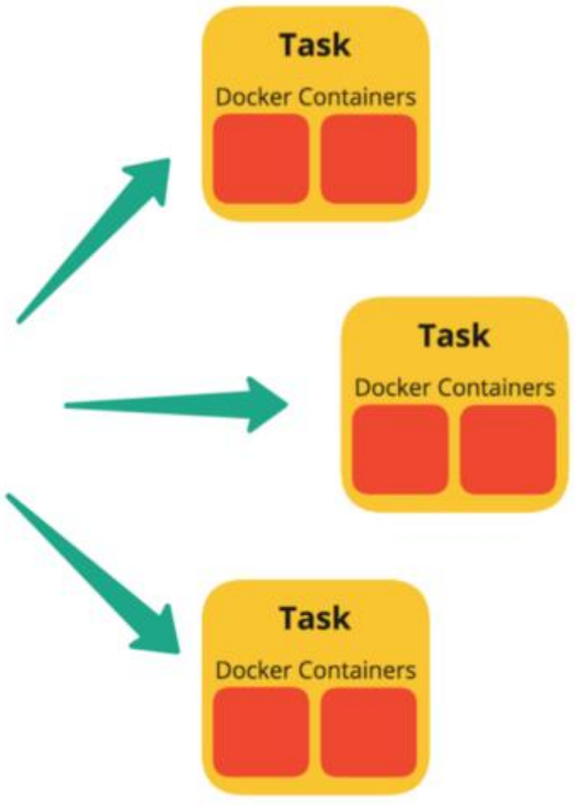

**Components:**

Cluster: Where. EC2 Instances, EBS, VPC, Sec Groups.
Task Definition: What. Container Definition: Image, CPU, Memory ,Ports, Tags. JSON on Web Mgmt Console and JSON/YAML on CFn.
Run Tasks: Try to fulfill task-definition request using Cluster.
Services: When. Workload, Automate Run Tasks (Monitor, Deploy). ELB.
Task Placement: How they fulfill task on EC2

**Features:**

Docker Support.
Can use EC2 (OnDemand, Spot, RI) or Fargate
ECS Container Agent.

```yaml
taskDefinition:
  containerDefinitions:
    - name: "my-app"
      image: "xxx.ecr.{{region}}.amazonaws.com/xxx:{{tag}}"
      cpu: 300
      memory: 750
      portMappings:
        - containerPort: 5000
          protocol: "tcp"
      links:
        - statsd:statsd
      environment:
        - name: 'NODE_ENV'
          value: '{{ environment }}'
        - name: 'AWS_REGION'
          value: '{{ region }}'
        - name: 'UV_THREADPOOL_SIZE'
          value: '128'
    - name: "statsd"
      image: "xxx.ecr.{{region}}.amazonaws.com/xxx-statsd:4.5.0"
      cpu: 64
      memory: 64
      environment:
        - name: "TARGET"
          value: '{{ statsd_target }}'
  startupTimeout: 20
  taskRoleArn: {{ task_role_arn }}
```




Taken from https://aws.amazon.com/ecs/getting-started/ (10/10/2020)

# Elastic Kubernetes Services - EKS

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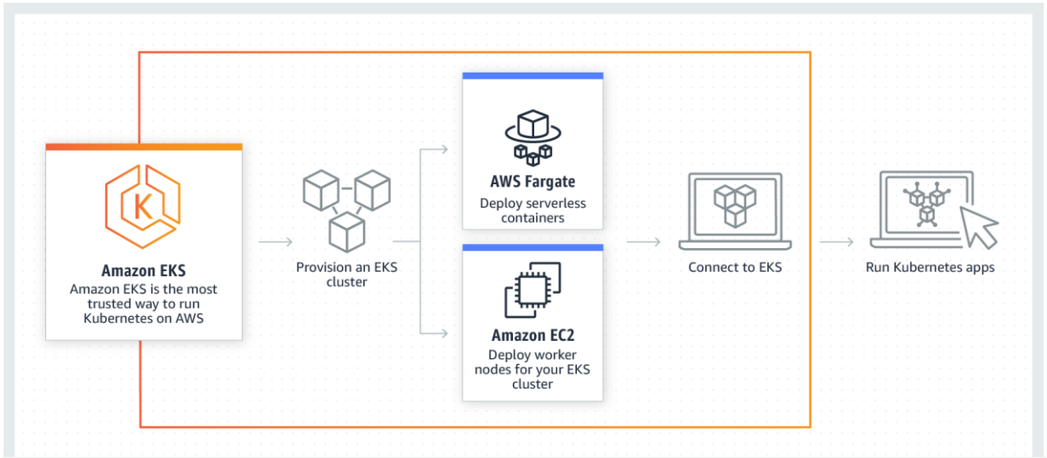


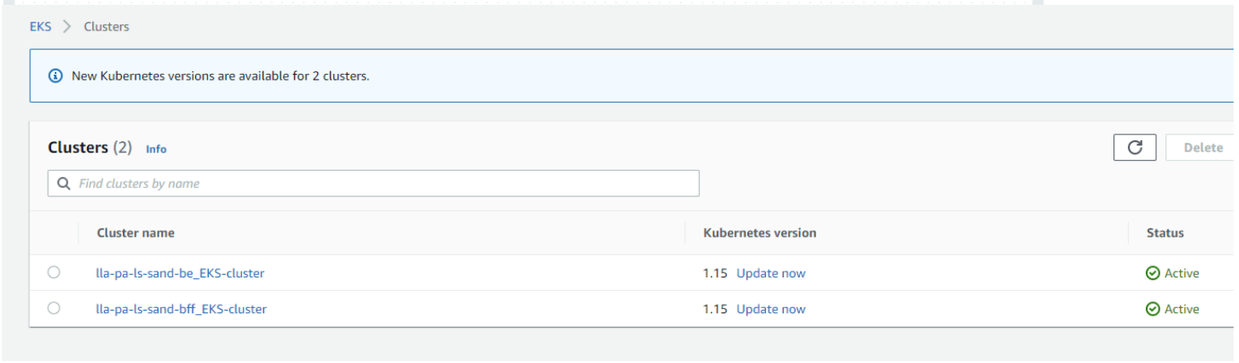


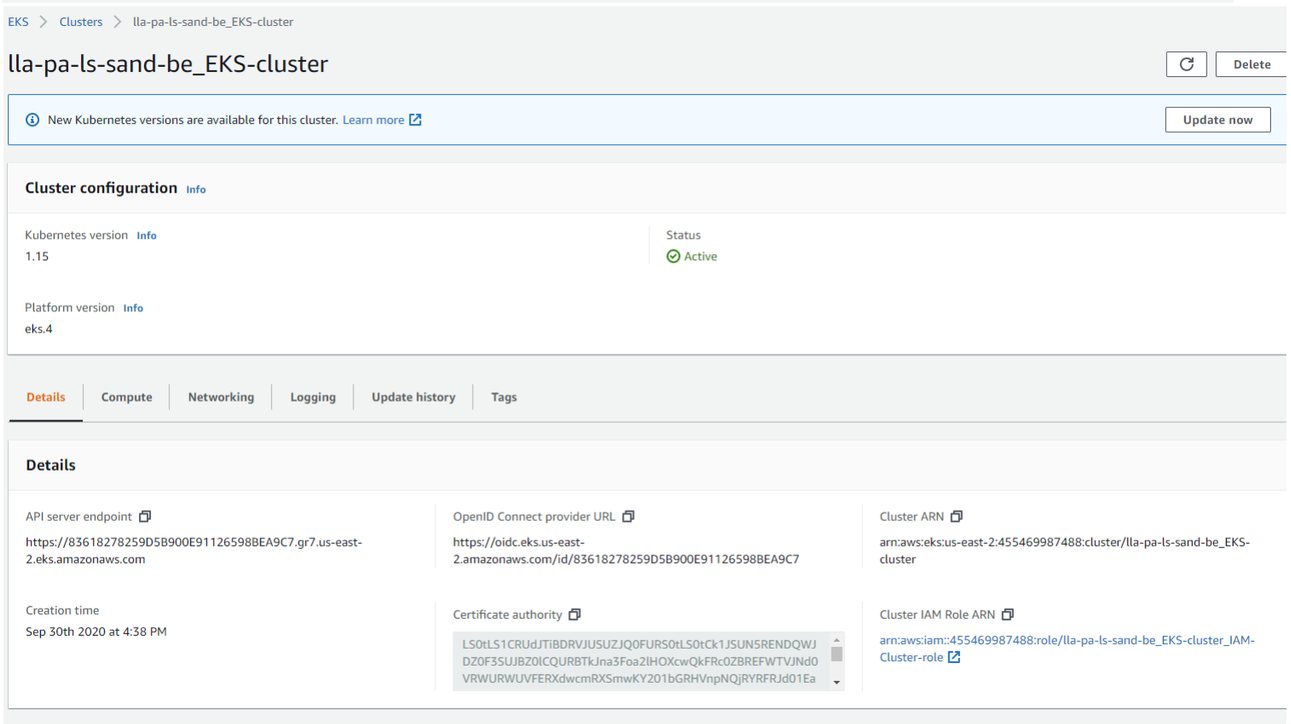


**Command Line Commands:**
eksctl, kubectl

**Kubernetes Definition:**
YAML

**Features:**
Managed Kubernetes Clusters
Launch using eksctl
Networking & Security
Windows Support
Classic Load Balancing
Serverless Compute - Fargate
Hybrid Deployments
Logging (Add Cloudtrail)
Certified Conformant
Managed cluster updates
Support for advanced workloads
Open Source Tools

**Pricing:**
$0.10 per hour → US$72

Taken from "https://docs.aws.amazon.com/eks/latest/userguide/what-is-eks.html (10/10/2020)