



ANITA
B.ORG

2022

GRACE HOPPER
CELEBRATION

NEXT IS
NOW



NEXT IS
NOW

Ignite Your Projects with Fire Starter:
Go From Writing Code to Automating Cloud Deployments

Melana Hammel

About Your Speaker:

Melana Hammel

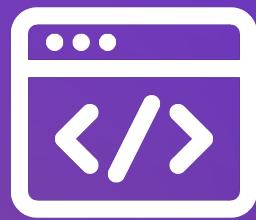
- Senior Software Engineer at Nike
- Wawa hoagie fanatic
- Frequently influenced by Instagram ads
- Serious competitor in the New York Times Daily Mini Crossword
- One of those people who yells at the TV when watching sports



Welcome to Fire Starter!



Agenda



Create



Containerize



Architect

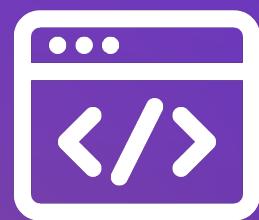


Automate

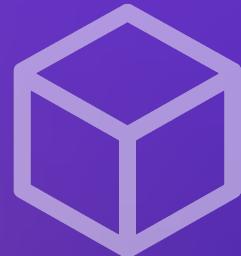


Deploy

Create



Create



Containerize



Architect



Automate



Deploy



x +

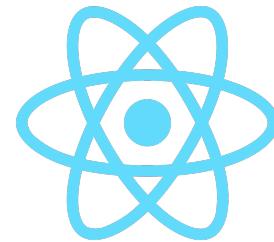
← → C



Fire Starter

Take a website running locally
and deploy it to a production
cloud environment

Get Started on Github



React

SUMMARY

Javascript library for building user interfaces

BENEFITS

Reusable components, widespread usage, great for complex apps

ALTERNATIVES

Vue.js, Angular

```
npx create-react-app my-app
```

```
npm run start
```

```
npx create-react-app my-app
```

```
npm run start
```



Runs the app in development mode locally on your machine

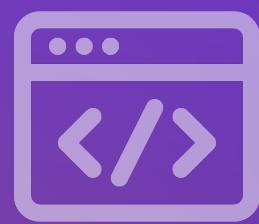


Fire Starter

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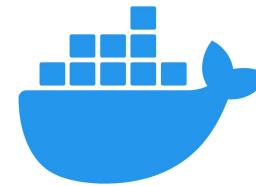
Containers

SUMMARY

Packages of software that contain code and all of its dependencies in order to run in any environment

BENEFITS

Consistency, speed, reduce dependency errors



Docker

SUMMARY

Open source container technology, separates application dependencies from infrastructure

BENEFITS

Industry standard, countless integrations, secure

ALTERNATIVES

Podman, LXD

```
FROM node:16-alpine
```

```
WORKDIR /app
```

```
COPY . .
```

```
WORKDIR /app/example-react-app
```

```
RUN npm ci
```

```
CMD ["npm", "run", "start"]
```

```
FROM node:16-alpine
```



Pull Node 16 base image

```
WORKDIR /app
```

```
COPY . .
```

```
WORKDIR /app/example-react-app
```

```
RUN npm ci
```

```
CMD ["npm", "run", "start"]
```

```
FROM node:16-alpine
```

```
WORKDIR /app
```

```
COPY . .
```

Copy files to the working directory

```
WORKDIR /app/example-react-app
```

```
RUN npm ci
```

```
CMD ["npm", "run", "start"]
```

```
FROM node:16-alpine
```

```
WORKDIR /app
```

```
COPY . .
```

```
WORKDIR /app/example-react-app
```

```
RUN npm ci
```



```
CMD ["npm", "run", "start"]
```

Install project
dependencies based on
the package-lock.json file

```
FROM node:16-alpine
```

```
WORKDIR /app
```

```
COPY . .
```

```
WORKDIR /app/example-react-app
```

```
RUN npm ci
```

```
CMD ["npm", "run", "start"]
```



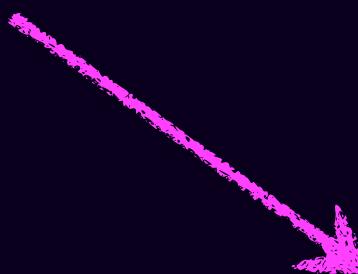
Start application

```
docker build  
-t fire-starter .
```

```
docker run  
-p 3000:3000  
Fire-starter
```

```
docker build  
-t fire-starter .
```

```
docker run  
-p 3000:3000  
fire-starter
```

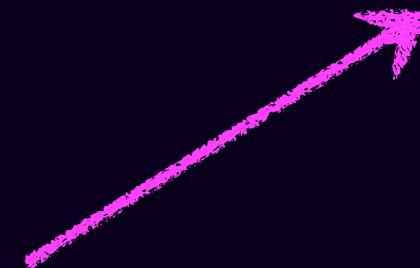


Builds and tags
image

```
docker build  
-t fire-starter .
```

Execute the image
and run web app out
of port 3000

```
docker run  
-p 3000:3000  
fire-starter
```



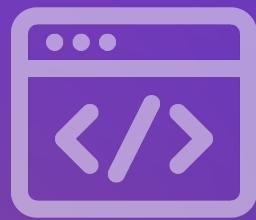


Fire Starter

Take a website running locally
and deploy it to a production
cloud environment

Get Started on Github

Architect



Create



Containerize



Automate



Deploy

Architectural Considerations

Reliability

Scalability

Security

Extensibility

Cost

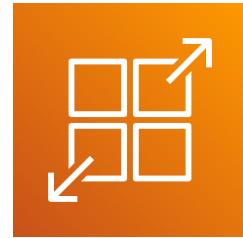
Performance

Architectural Priorities

Simple

Fully managed

Scales quickly



AWS App Runner

SUMMARY

Fully managed service that deploys containerized applications

BENEFITS

Integrates with containers, auto scaling, bonus monitoring and logging

ALTERNATIVES

Firebase, Netlify, Vercel



AWS Elastic Container Registry (ECR)

SUMMARY

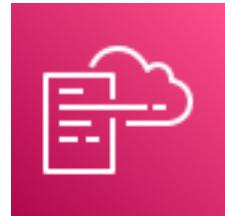
Container image registry service

BENEFITS

Secure, scalable, reliable

ALTERNATIVES

Docker Hub, Github Container Registry



AWS CloudFormation

SUMMARY

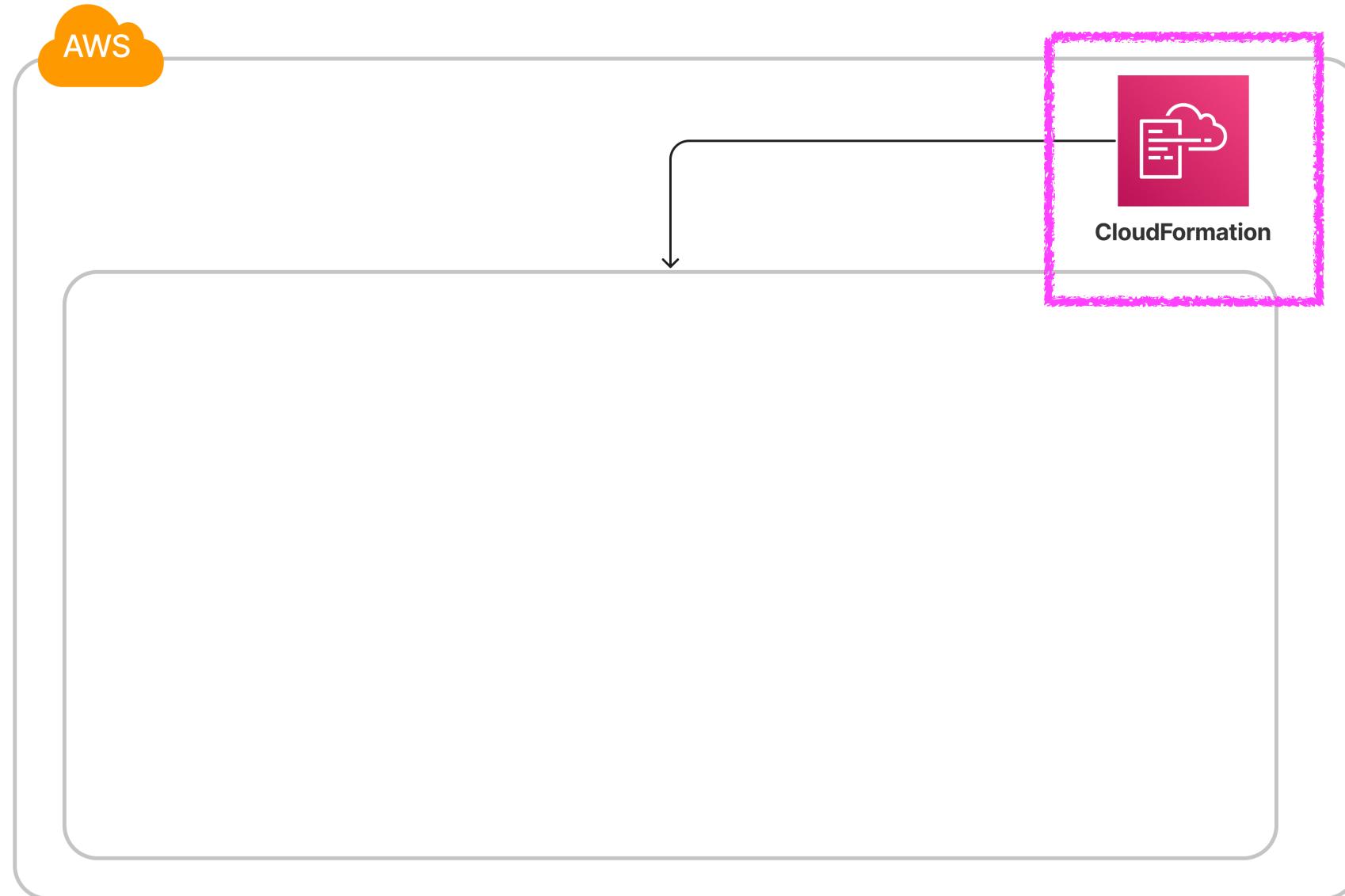
Infrastructure as code tool that allows you to set up AWS resources using templates

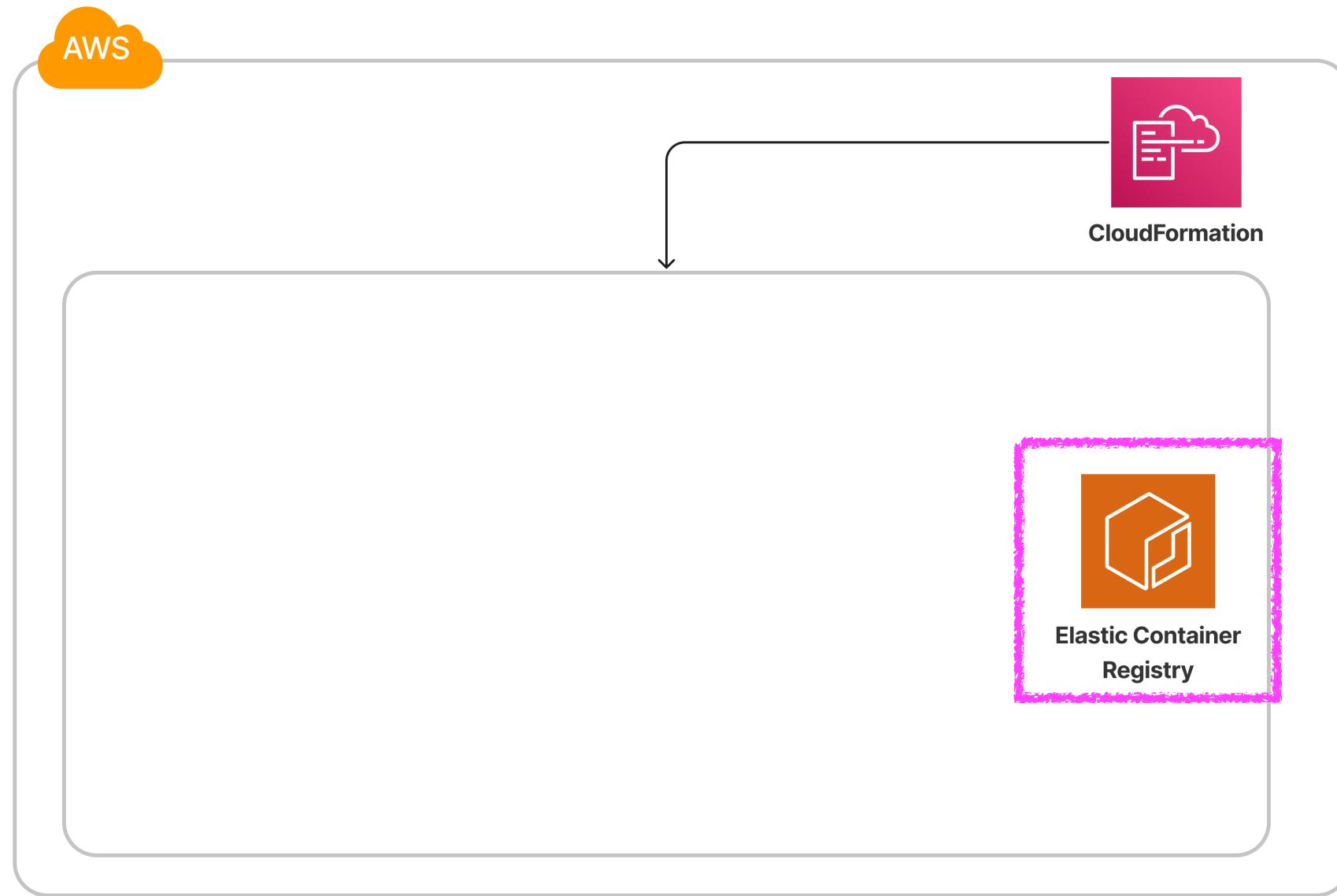
BENEFITS

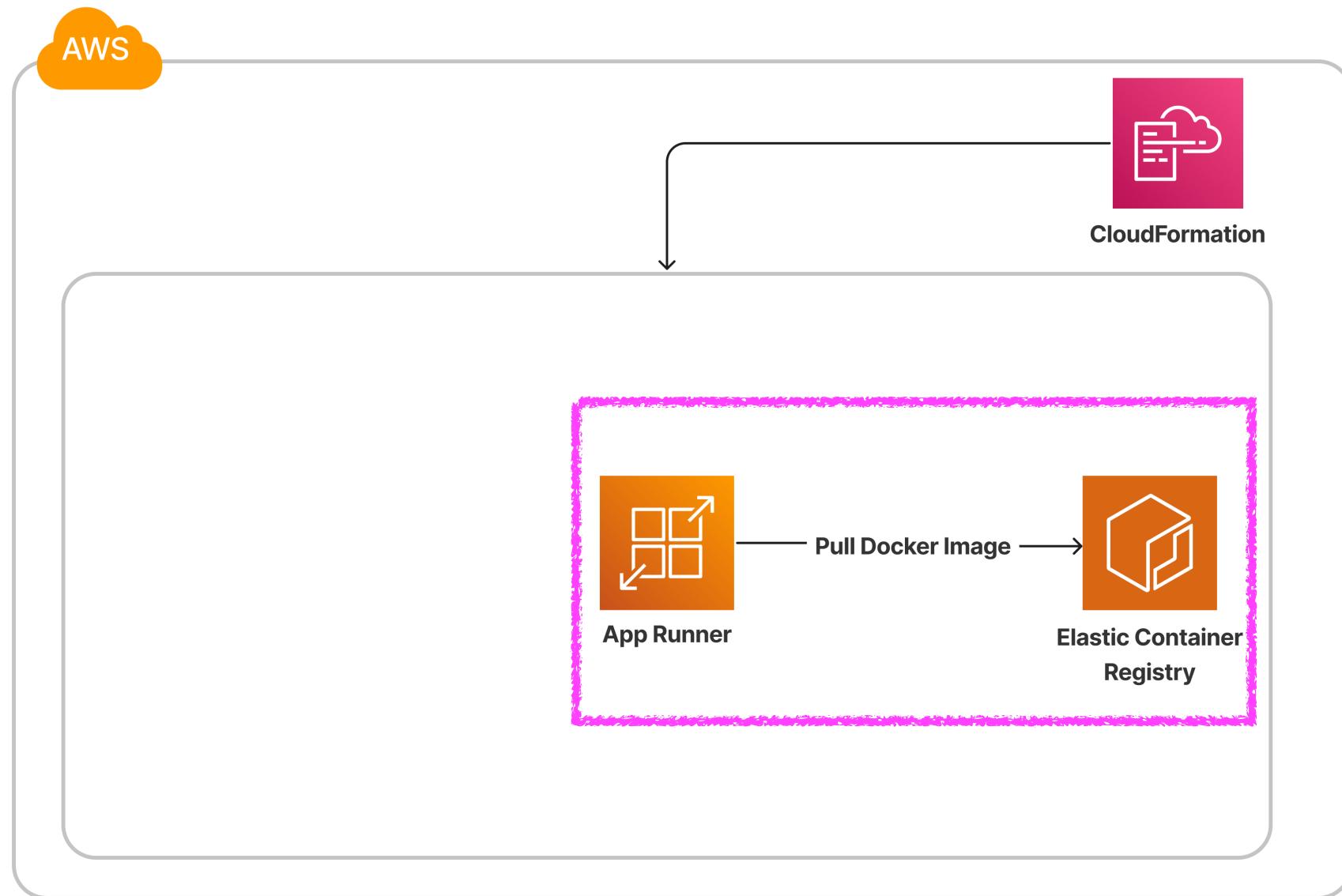
Consistency, scaling, auditing

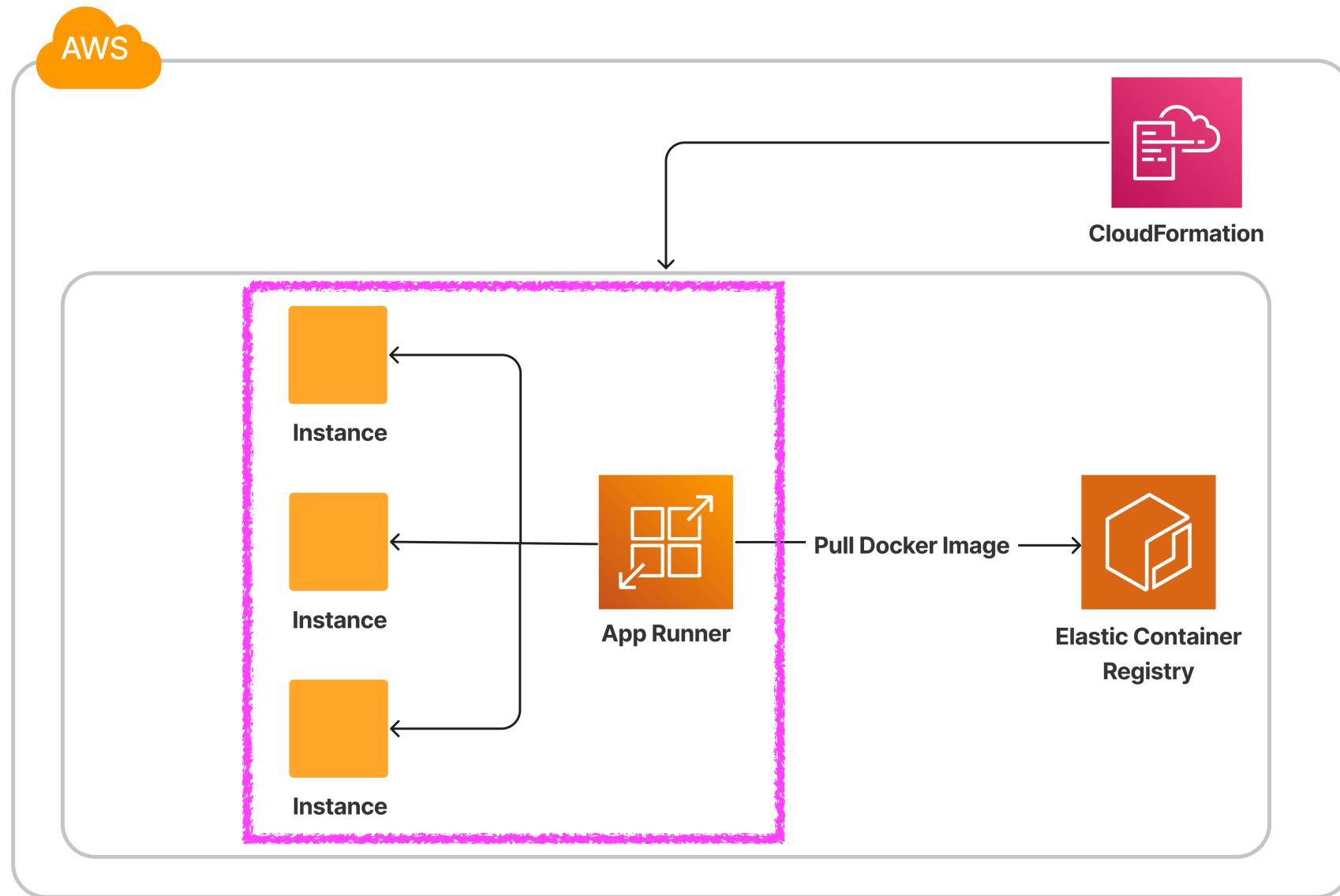
ALTERNATIVES

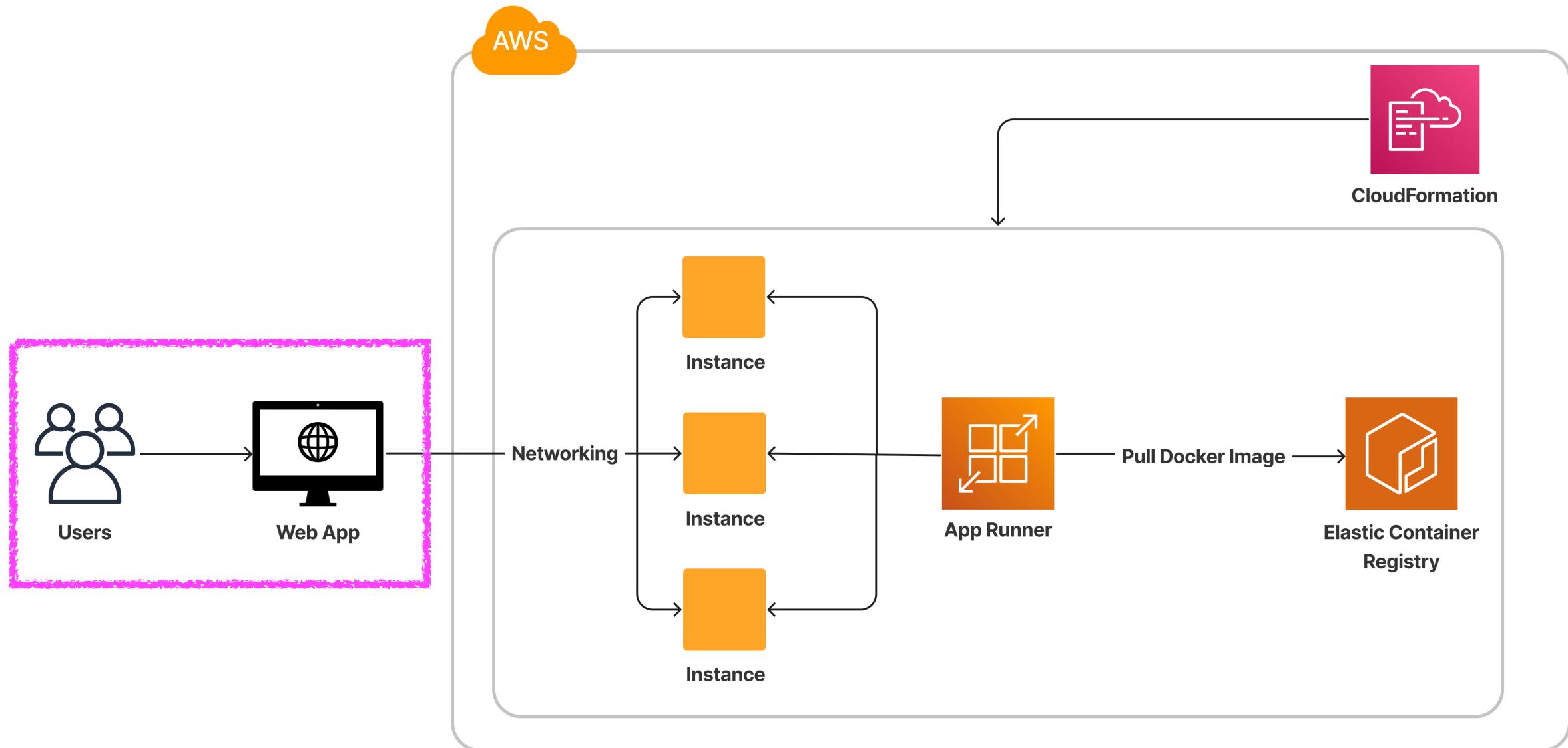
Terraform, Puppet, Ansible, Azure Resource Manager, Deployment Manager (GCP)











```
AWS::TemplateFormatVersion: '2010-09-09'
```

Parameters:

```
EcrRepositoryName:
```

Type: String

Description: Name for the ECR Repository

Default: 'fire-starter-ecr-repository'

Resources:

```
FireStarterEcrRepository:
```

Type: AWS::ECR::Repository

Properties:

```
RepositoryName: !Ref EcrRepositoryName
```

```
AwSTemplateFormatVersion: '2010-09-09'
```

Parameters:

EcrRepositoryName:

Type: String

Description: Name for the ECR Repository

Default: 'fire-starter-ecr-repository'

Resources:

FireStarterEcrRepository:

Type: AWS::ECR::Repository

Properties:

RepositoryName: !Ref EcrRepositoryName

Creates ECR
repository

Stacks (1)

Active View nested

< 1 >

Timestamp	Logical ID	Status	Status reason
2022-09-10 11:59:39 UTC-0400	fire-starter-stack	CREATE_COMPLETE	-
2022-09-10 11:59:39 UTC-0400	FireStarterEcrRepository	CREATE_COMPLETE	-
2022-09-10 11:59:38 UTC-0400	FireStarterEcrRepository	CREATE_IN_PROGRESS	Resource creation Initiated
2022-09-10 11:59:38 UTC-0400	FireStarterEcrRepository	CREATE_IN_PROGRESS	-
2022-09-10 11:59:35 UTC-0400	fire-starter-stack	CREATE_IN_PROGRESS	User Initiated

Stack infoEventsResourcesOutputsParametersTemplateChange sets

Events (5)

Timestamp	Logical ID	Status	Status reason
2022-09-10 11:59:39 UTC-0400	fire-starter-stack	CREATE_COMPLETE	-
2022-09-10 11:59:39 UTC-0400	FireStarterEcrRepository	CREATE_COMPLETE	-
2022-09-10 11:59:38 UTC-0400	FireStarterEcrRepository	CREATE_IN_PROGRESS	Resource creation Initiated
2022-09-10 11:59:38 UTC-0400	FireStarterEcrRepository	CREATE_IN_PROGRESS	-
2022-09-10 11:59:35 UTC-0400	fire-starter-stack	CREATE_IN_PROGRESS	User Initiated

Amazon Elastic Container Registry

[Private registry](#)[Public registry](#)[Repositories](#)[Getting started](#)[Documentation](#)[Public gallery](#)

Amazon ECR > Repositories

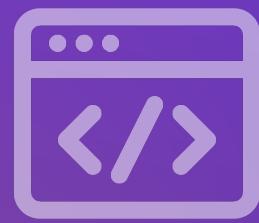
[Private](#)[Public](#)

Private repositories (1)

 Find repositories[View push commands](#)[Delete](#)

Repository name	URI	Created at	Tag immutability	Scan frequency
fire-starter-ecr-repository	701233117839.dkr.ecr.us-east-1.amazonaws.com/fire-starter-ecr-repository	September 10, 2022, 11:59:40 (UTC-04)	Disabled	Manual

Automate



Create



Containerize



Architect



Deploy

CI/CD

Continuous Integration / Continuous Deployment

SUMMARY

Set of operating principles that aim to automate the development and release cycle for software

BENEFITS

Reliable deployments, faster product delivery, increase developer happiness



GitHub Actions



SUMMARY

CI/CD platform that allows you to build, test, and deploy your code from Github using event-driven triggers

BENEFITS

Direct integration with GitHub, readable syntax, Marketplace with numerous actions to use

ALTERNATIVES

Travis CI, Circle CI, Jenkins

```
name: Build Image  
  
on: [push]  
  
jobs:  
  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
  
  steps:  
    - name: Checkout Github repo  
      uses: actions/checkout@v3  
    - name: Build image  
      run: |  
        docker build -t example-react-app .
```

```
name: Build Image  
on: [push]  
jobs:  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
  
  steps:  
    - name: Checkout Github repo  
      uses: actions/checkout@v3  
    - name: Build image  
      run: |  
        docker build -t example-react-app .
```

Specifies what events trigger your workflow

```
name: Build Image  
  
on: [push]  
  
jobs:  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
  
steps:  
  - name: Checkout Github repo  
    uses: actions/checkout@v3  
  - name: Build image  
    run: |  
      docker build -t example-react-app .
```



Defines the steps that make up the workflow

```
name: Build Image  
  
on: [push]  
  
jobs:  
  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
  
    steps:  
      - name: Checkout Github repo  
        uses: actions/checkout@v3  
      - name: Build image  
        run: |  
          docker build -t example-react-app .
```

Sequence of tasks
that will execute

```
name: Build Image  
  
on: [push]  
  
jobs:  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
    steps:  
      - name: Checkout Github repo  
        uses: actions/checkout@v3  
      - name: Build image  
        run: |  
          docker build -t example-react-app .
```

```
name: Build Image  
on: [push]  
  
jobs:  
  build:  
    name: Build image  
    runs-on: ubuntu-latest  
    steps:  
      - name: Checkout Github repo  
        uses: actions/checkout@v3  
  
      - name: Build image  
        run: |  
          docker build -t example-react-app .
```

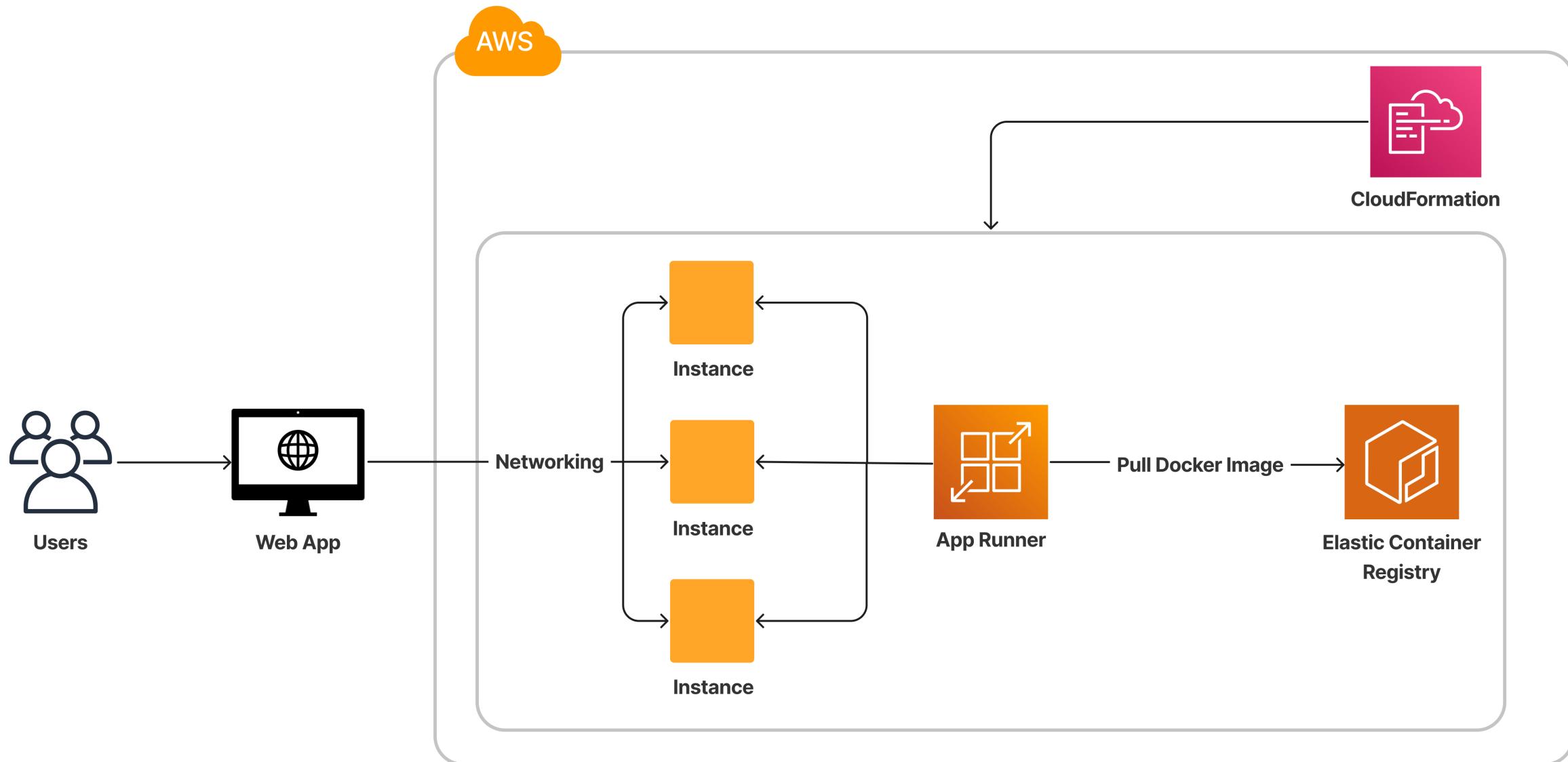
Builds container image

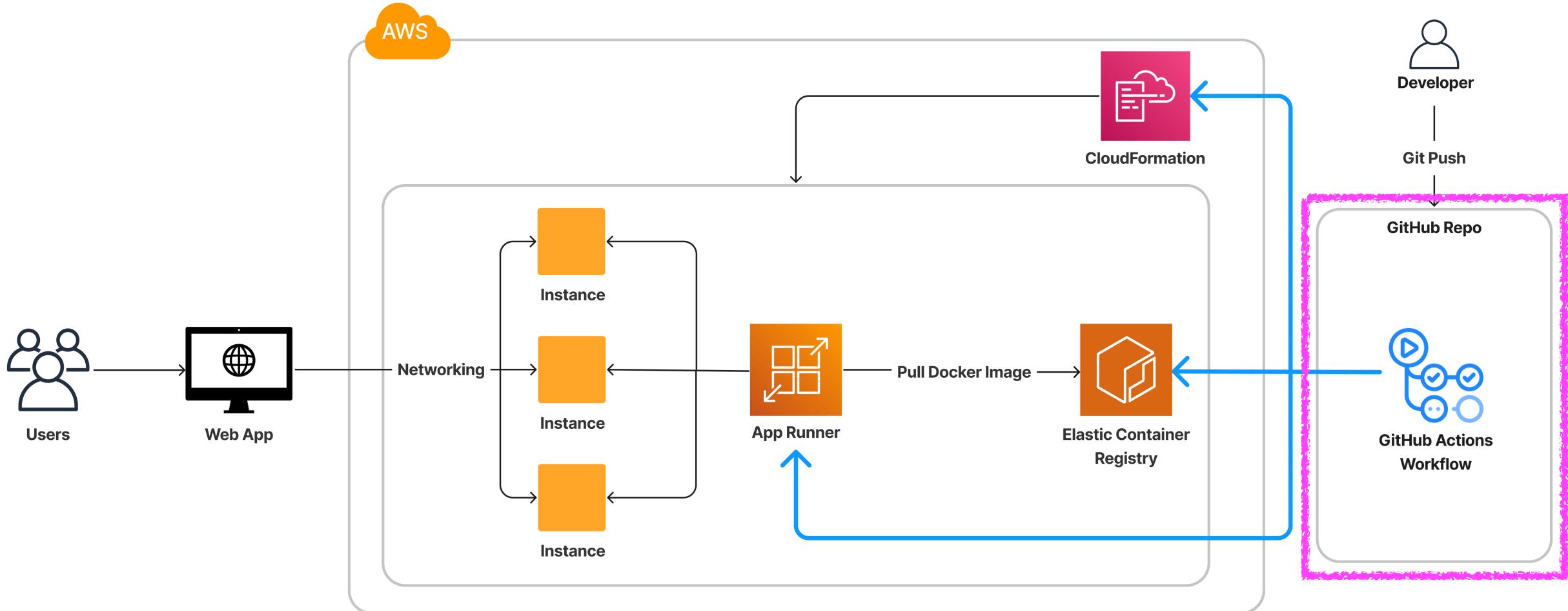
✓ Add Github workflow to build container image Build Container Image #3

[Summary](#)[Jobs](#)[Build image](#)

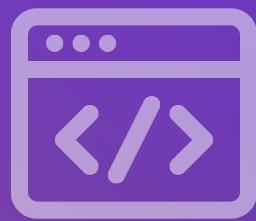
Build image

- > Set up job
- > Run actions/checkout@v2
- > Build image
- > Post Run actions/checkout@v2
- > Complete job





Deploy



Create



Containerize



Architect



Automate



Deploy



AWS for GitHub Actions

<https://amazon.com/aws> Verified

Overview Repositories 13 Projects Packages People 4

Popular repositories

configure-aws-credentials Public

Configure AWS credential environment variables for use in other GitHub Actions.

JavaScript 1.3k 250

amazon-ecr-login Public

Logs into Amazon ECR with the local Docker client.

JavaScript 575 120

amazon-ecs-deploy-task-definition Public

Registers an Amazon ECS task definition and deploys it to an ECS service.

JavaScript 429 128

aws-codebuild-run-build Public

Run an AWS CodeBuild project as a step in a GitHub Actions workflow job.

JavaScript 175 87

aws-cloudformation-github-deploy Public archive

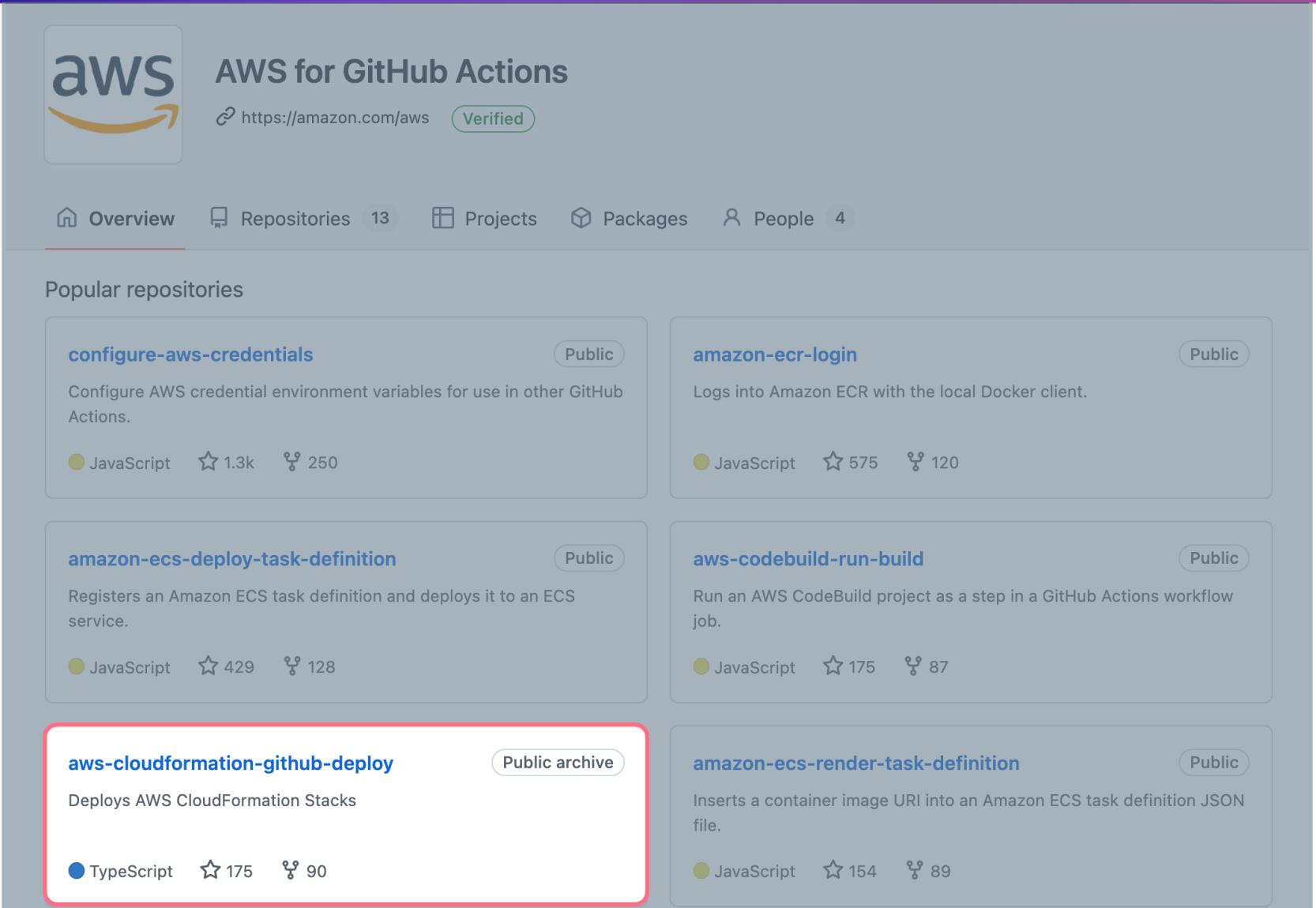
Deploys AWS CloudFormation Stacks

TypeScript 175 90

amazon-ecs-render-task-definition Public

Inserts a container image URI into an Amazon ECS task definition JSON file.

JavaScript 154 89



AWS for GitHub Actions

https://amazon.com/aws Verified

Overview Repositories 13 Projects Packages People 4

Popular repositories

- configure-aws-credentials** Public Configure AWS credential environment variables for use in other GitHub Actions. JavaScript 1.3k 250
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- aws-codebuild-run-build** Public Run an AWS CodeBuild project as a step in a GitHub Actions workflow job. JavaScript 175 87
- aws-cloudformation-github-deploy** Public archive Deploys AWS CloudFormation Stacks TypeScript 175 90
- amazon-ecs-render-task-definition** Public Inserts a container image URI into an Amazon ECS task definition JSON file. JavaScript 154 89

```
- name: Deploy to AWS CloudFormation
  uses: aws-actions/aws-cloudformation-github-deploy@v1
  with:
    name: fire-starter-stack
    template: cloudformation/application.yaml
    no-fail-on-empty-changeset: '1'
    capabilities: CAPABILITY_NAMED_IAM
```

```
- name: Deploy to AWS CloudFormation
  uses: aws-actions/aws-cloudformation-github-deploy@v1
  with:
    name: fire-starter-stack
    template: cloudformation/application.yaml
    no-fail-on-empty-changeset: '1'
    capabilities: CAPABILITY_NAMED_IAM
```

Add test workflow Deploy AWS Cloudformation Template #1

Summary

Jobs

Deploy AWS CloudFormation template

Deploy AWS CloudFormation template

Search logs

Set up job

Checkout Github repo

Deploy to AWS CloudFormation

```
1 ▼Run aws-actions/aws-cloudformation-github-deploy@v1
2   with:
3     name: fire-starter-stack
4     template: cloudformation/application.yaml
5     no-fail-on-empty-changeset: 1
6     capabilities: CAPABILITY_NAMED_IAM
7     no-execute-changeset: 0
8     no-delete-failed-changeset: 0
9     disable-rollback: 0
10    termination-protection: 0
```

Error: Missing region in config

Post Checkout Github repo

Complete job

```
- name: Configure AWS credentials
  uses: aws-actions/configure-aws-credentials@v1
  with:
    role-to-assume: ${{ secrets.AWS_GITHUB_ROLE_ARN }}
    aws-region: us-east-1
```

```
- name: Configure AWS credentials
  uses: aws-actions/configure-aws-credentials@v1
  with:
    role-to-assume: ${{ secrets.AWS_GITHUB_ROLE_ARN }}
    aws-region: us-east-1
```



Environment variable that
is an encrypted secret

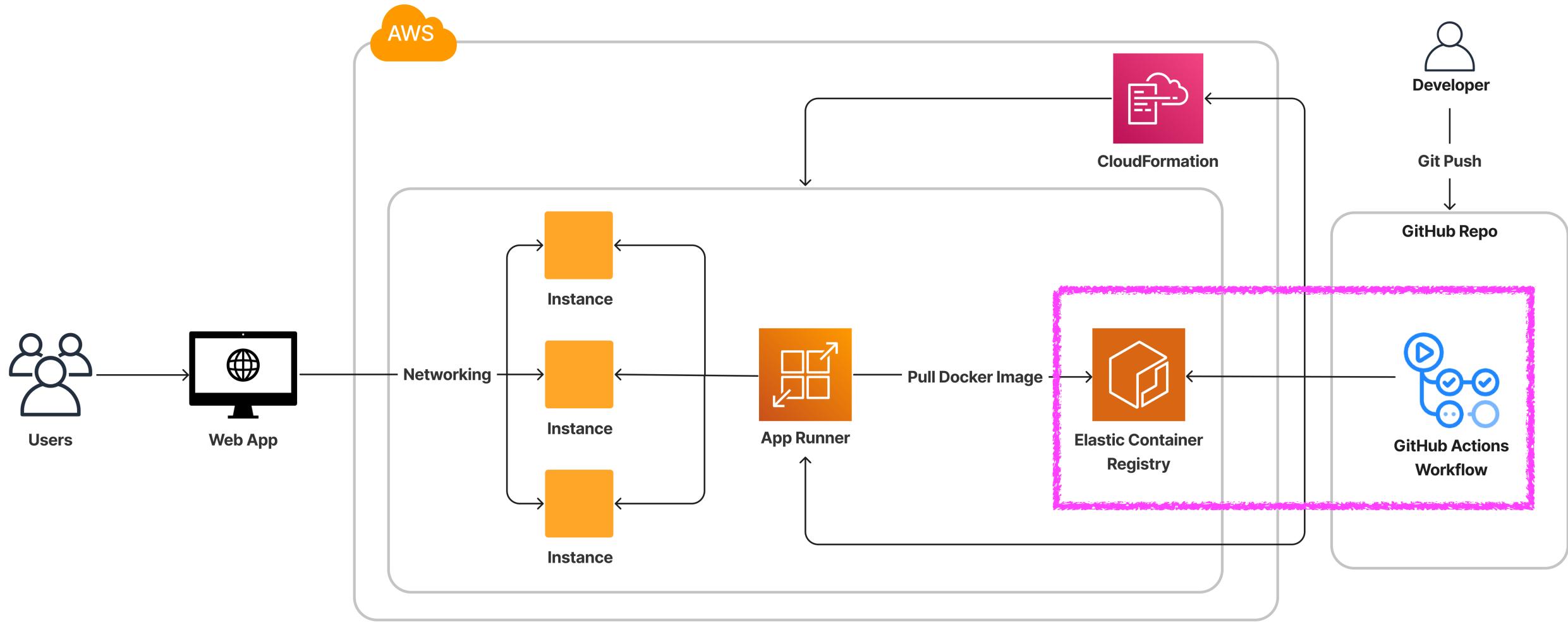
✓ Obtain credentials to deploy clouformation Deploy AWS Cloudformation Template #2

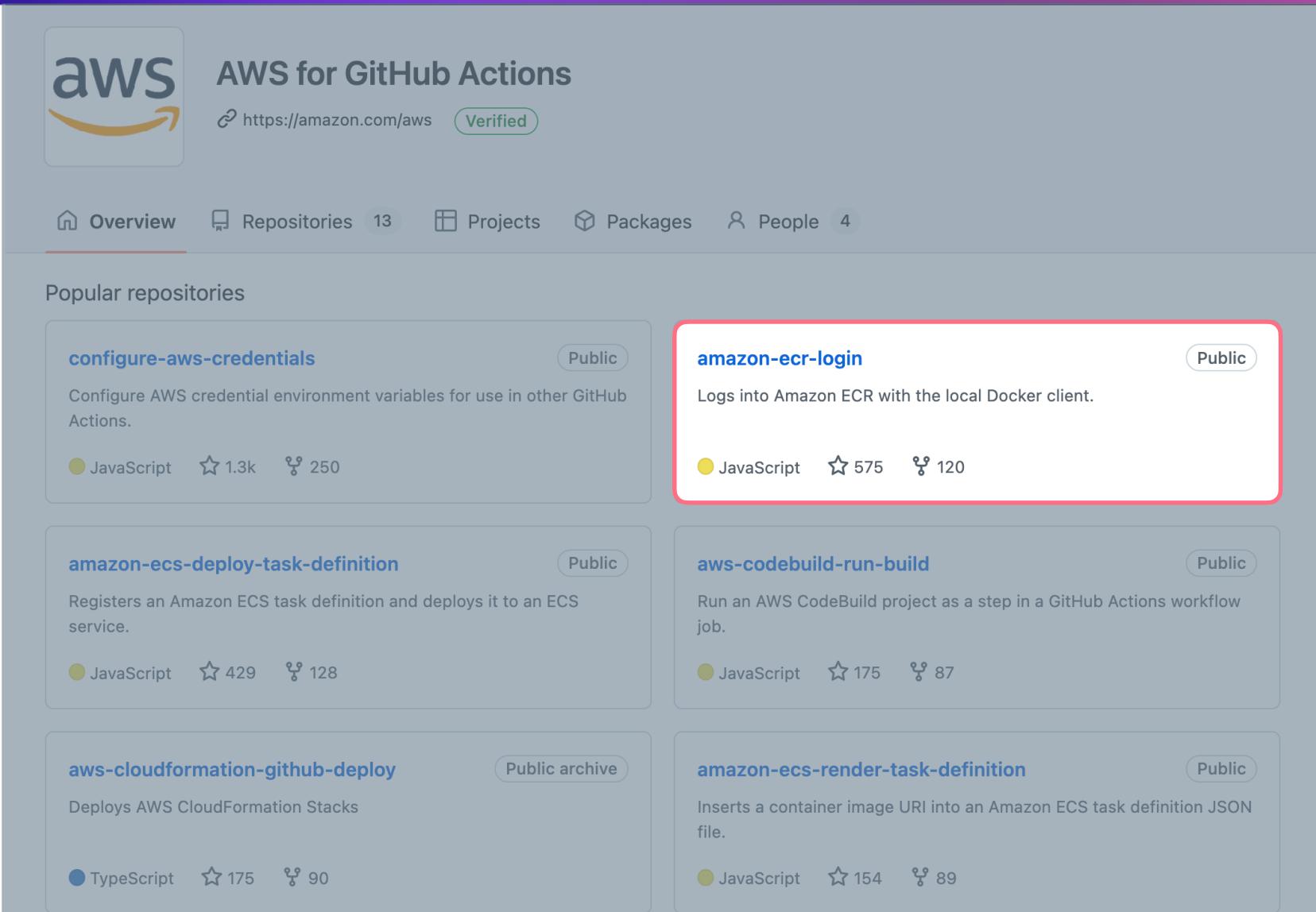
[Summary](#)[Jobs](#)[Deploy AWS CloudFormation template](#)

Deploy AWS CloudFormation template

[Search logs](#)

- > Set up job
- > Checkout Github repo
- > Configure AWS credentials
- > Deploy to AWS CloudFormation
 - 1 ▼Run aws-actions/aws-cloudformation-github-deploy@v1
 - 2 with:
 - 3 name: fire-starter-stack
 - 4 template: cloudformation/application.yaml
 - 5 no-fail-on-empty-changeset: 1
 - 6 capabilities: CAPABILITY_NAMED_IAM
 - 7 no-execute-changeset: 0
 - 8 no-delete-failed-changeset: 0
 - 9 disable-rollback: 0
 - 10 termination-protection: 0
 - 11 env:
 - 12 AWS_DEFAULT_REGION: us-east-1
 - 13 AWS_REGION: us-east-1
 - 14 AWS_ACCESS_KEY_ID: ***
 - 15 AWS_SECRET_ACCESS_KEY: ***
 - 16 AWS_SESSION_TOKEN: ***
- > Post Configure AWS credentials
- > Post Checkout Github repo
- > Complete job





AWS for GitHub Actions

https://amazon.com/aws Verified

Overview Repositories 13 Projects Packages People 4

Popular repositories

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- amazon-ecs-deploy-task-definition** Public Registers an Amazon ECS task definition and deploys it to an ECS service. JavaScript 429 128
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- aws-cloudformation-github-deploy** Public archive Deploys AWS CloudFormation Stacks TypeScript 175 90
- amazon-ecs-render-task-definition** Public Inserts a container image URI into an Amazon ECS task definition JSON file. JavaScript 154 89

```
- name: Login to AWS ECR
  id: login-ecr
  uses: aws-actions/amazon-ecr-login@v1

- name: Build, tag, and push image to AWS ECR
  id: build-image
  env:
    ECR_REGISTRY: ${{ steps.login-ecr.outputs.registry }}
    ECR_REPOSITORY: ${{ secrets.AWS_ECR_REPO_NAME }}
    IMAGE_TAG: ${{ github.sha }}
  run:
    docker build -t $ECR_REGISTRY/$ECR_REPOSITORY:$IMAGE_TAG .
    docker push $ECR_REGISTRY/$ECR_REPOSITORY:$IMAGE_TAG
```

```
- name: Login to AWS ECR  
  id: login-ecr
```

```
  uses: aws-actions/amazon-ecr-login@v1
```

```
- name: Build, tag, and push image to AWS ECR
```

```
  id: build-image
```

```
  env:
```

```
    ECR_REGISTRY: ${{ steps.login-ecr.outputs.registry }}
```

```
    ECR_REPOSITORY: ${{ secrets.AWS_ECR_REPO_NAME }}
```

```
    IMAGE_TAG: ${{ github.sha }}
```

Build image and uploads to repository

```
run: |  
  docker build -t $ECR_REGISTRY/$ECR_REPOSITORY:$IMAGE_TAG .  
  docker push $ECR_REGISTRY/$ECR_REPOSITORY:$IMAGE_TAG
```

Amazon Elastic Container Registry

Private registry

Public registry

Repositories

Summary

Images

Permissions

Lifecycle Policy

Repository tags

Getting started 

Documentation 

Public gallery 

Amazon ECR > Repositories > fire-starter-ecr-repository

fire-starter-ecr-repository

Images (1)

 Find images

<input type="checkbox"/>	Image tag	Artifact type	Pushed at	Size (MB)	Image URI	Digest	Sc...
<input type="checkbox"/>	af4ece112b47d5b58e5f9aec8e74919fbc223265	Image	September 14, 2022, 08:57:43 (UTC-04)	134.11	 Copy URI	 sha256:0735cec16520290d2a029032c6821...	-

```
- name: Deploy to AWS App Runner  
uses: awslabs/amazon-app-runner-deploy@main
```

with:

```
service: fire-starter-service  
image: ${{ steps.get-image.outputs.image }}  
access-role-arn: ${{ secrets.AWS_APP_RUNNER_ROLE_ARN }}  
region: us-east-1  
cpu: 1  
memory: 2  
wait-for-service-stability: true
```

```
- name: Deploy to AWS App Runner
  id: deploy-app-runner
  uses: awslabs/amazon-app-runner-deploy@main
  with:
    service: fire-starter-service
    image: ${{ steps.get-image.outputs.image }}
    access-role-arn: ${{ secrets.AWS_APP_RUNNER_ROLE_ARN }}
    region: us-east-1
    cpu: 1
    memory: 2
    wait-for-service-stability: true
```



Container image for App
Runner to deploy

```
- name: Deploy to AWS App Runner
  id: deploy-app-runner
  uses: awslabs/amazon-app-runner-deploy@main
  with:
    service: fire-starter-service
    image: ${{ steps.get-image.outputs.image }}
    access-role-arn: ${{ secrets.AWS_APP_RUNNER_ROLE_ARN }}
    region: us-east-1
    cpu: 1
    memory: 2
    wait-for-service-stab
```

Environment variable that is outputted
during the get-image step



App Runner > Services

Services (1) Info

Create service

Filter services

< 1 >



Service name	Status	Default domain	Created	Last activity
fire-starter-service	Running	https://zyii8qjita.us-east-1.awsapprunner.com	9/10/2022, 4:53:06 PM UTC	9/13/2022, 9:33:38 PM UTC



Fire Starter



← → C

🔒 fire-starter.app

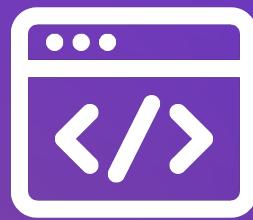


Fire Starter

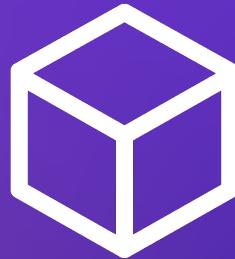
Take a website running locally
and deploy it to a production
cloud environment

🔗 Get Started on Github

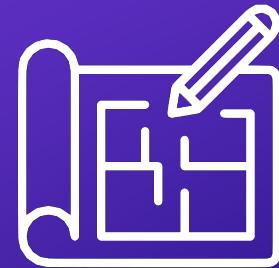
Final Thoughts



Create



Containerize



Architect



Automate



Deploy

References

- [React](#) by React
- [What are containers?](#) by Google Cloud
- [What is a container?](#) by Docker
- [Well-Architected Framework](#) by AWS
- [What is AWS App Runner?](#) by AWS
- [7 Places to host your Jamstack site](#) by Pluralsight
- [AWS CloudFormation Concepts](#) by AWS
- [What is CI/CD?](#) by GitLab
- [What is GitHub Actions?](#) by GitHub
- [An Illustrated Guide to OAuth and OpenID Connect](#) by Okta
- [Create React App](#)
- [Docker](#)
- [AWS App Runner](#)
- [GitHub Actions](#)
- [Configuring OpenID Connect in AWS](#) by Github
- [Deploy applications in AWS App Runner with Github Actions](#) by AWS

<https://github.com/melanahammel/fire-starter>





Appendix

Image Attributions

- [Firewood Animation](#) by [zhpeng](#) on [LottieFiles](#)
- [Fire Icon](#) by [freesvg.org](#)
- [Code Icon](#) by [Wishforge Games](#) on [freeicons](#)
- [Cube Icon](#) by [Wishforge Games](#) on [freeicons](#)
- [Architect Icon](#) by [Nawicon](#) on [freeicons](#)
- [Continuous Process Icon](#) by [Uniconlabs](#) on [IconScout](#)
- [Upload To Cloud Icon](#) by [Akveo](#) on [IconScout](#)
- QR code generated with [QR Code Generator](#)
- [Shipping Container Image](#) from [rawpixel](#)
- [Web Icon](#) by [Amit Jaku](#) on [IconScout](#)
- [React Logo](#) from [Wikimedia Commons](#)
- [Docker Logo](#) from [Docker](#)
- [AWS Elastic Container Registry Logo](#) from [AWS](#)
- [AWS App Runner Logo](#) from [AWS](#)
- [AWS CloudFormation Logo](#) from [AWS](#)
- [Github Logo](#) from [Github](#)
- [Github Actions Logo](#) from [Github](#)