Infrastructure Projects

This book section hold AWS infrastructure related implementations

- Containerized Web Application Deployment on AWS or Azure Cloud

Containerized Web Application Deployment on AWS or Azure Cloud

Field	Details
Document Type	Containerized Web Application Deployment on AWS or Azure Cloud
Applies To	AWS Cloud
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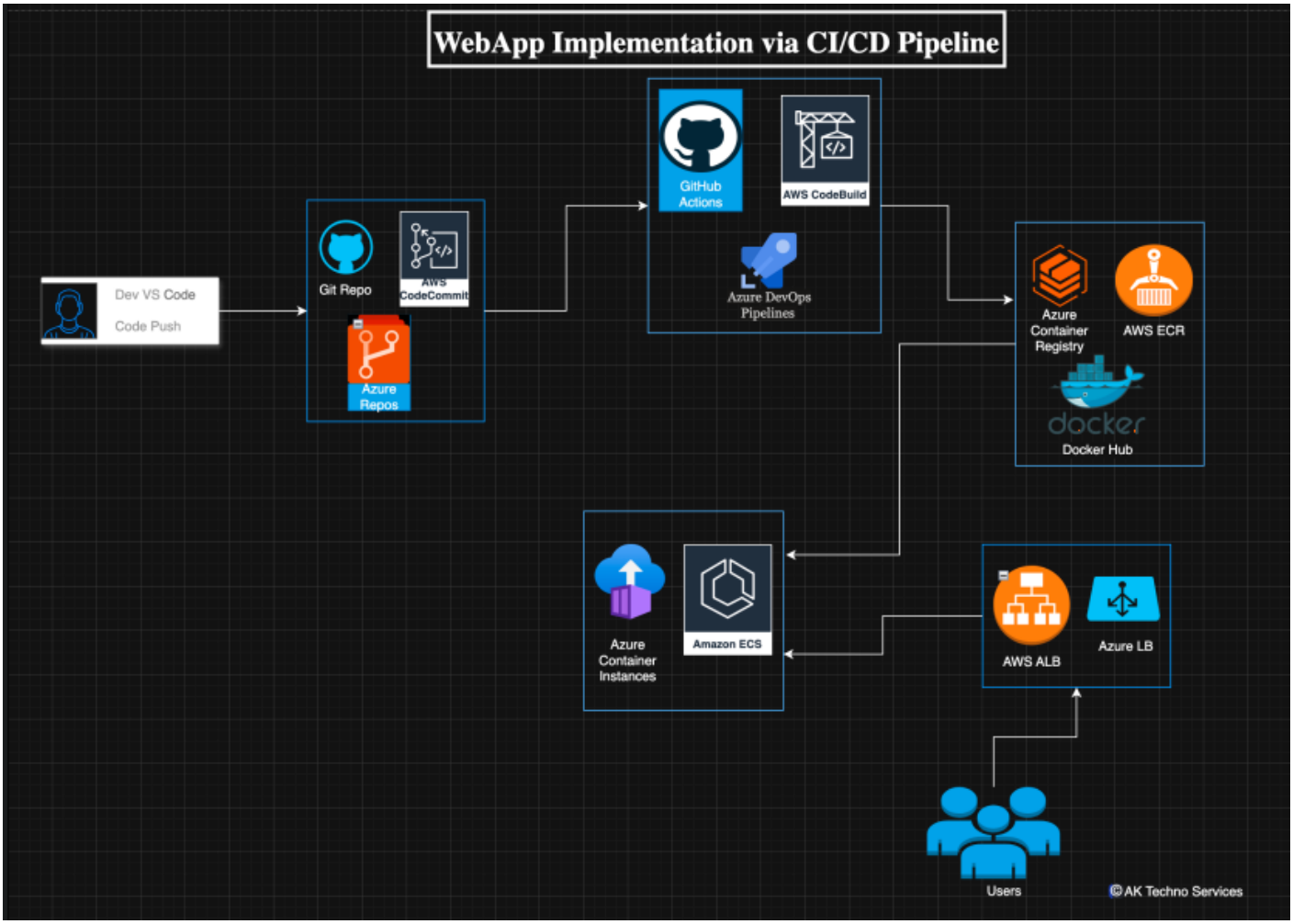
Overview



This configuration outlines a cloud-native deployment approach for containerized web applications using AWS-managed services.

The solution leverages a CI/CD pipeline to build and publish container images, which are then deployed onto a managed runtime platform behind a load balancer.

This approach ensures:

- Consistent application deliver
- Secure and scalable traffic routine
- Reduced operational overhead through automation

? Prerequisites

- AWS account with appropriate permissions (IAM, ECS, ECR, ALB)
- Access to source code repository (e.g. GitHub)
- Containerized application (Docker-ready)
- Basic networking setup (VPC, subnets, security groups)
- Domain name (optional for external access)

Step 1: CI/CD Pipeline Integration

Configure a CI/CD pipeline (e.g. GitHub Actions (CI/CD)) to:

- Build the application container image
- Tag the image appropriately (e.g. latest, version tags)
- Push the image to a container registry (Docker Hub / AWS ECR)

This ensures all deployments originate from a controlled and repeatable process.

Step 2: Deployment Scope

Define the deployment scope:

- Single application service or multi-service architecture
- Public-facing vs internal-only service
- Environments (dev, staging, production)

Scope should be clearly defined to avoid unintended exposure.

Step 3: Target Runtime Platform

Deploy the container to a managed compute service such as:

- Amazon ECS (Fargate or EC2 launch type)
- Alternatively equivalent container runtime platforms

The runtime platform is responsible for:

- Running containers
- Managing scaling
- Handling lifecycle events

Step 4: Core Configuration

Configure:

- Task definitions (CPU, memory, container image)
- Networking (subnets, security groups)
- Service definitions (desired count, scaling policies)

Ensure:

- Least privilege networking
- Proper resource allocation
- Health checks are defined

Step 5: Access Control / Traffic Management

Implement traffic routing using:

- Application Load Balancer (ALB)

Configure:

- Listener rules (HTTP/HTTPS)
- Target groups (container services)
- TLS termination for secure access

This layer ensures:

- Secure inbound access
- Controlled routing to backend services

Step 6: Controlled Deployment Strategy

Adopt a safe rollout approach:

- Deploy new versions alongside existing ones
- Validate health checks before shifting traffic
- Use rolling updates or blue/green deployment where possible

This reduces risk during updates.

Step 7: Monitoring & Validation

Monitor the deployment using:

- CloudWatch logs and metrics
- ECS service health status
- Load balancer target health

Validate:

- Application responsiveness
- Error rates
- Resource utilisation

Step 8: Go-Live & Stability Monitoring

Once validated:

- Route full traffic to the new deployment
- Monitor system behaviour closely post-deployment

Focus on:

- Latency
- Availability
- Unexpected failures

Important Considerations

- Misconfigured security groups can expose services publicly
- Missing health checks may cause unstable deployments
- Incorrect resource sizing can lead to performance degradation
- Lack of rollback strategy increases operational risk

Best Practices

- Use Infrastructure as Code (IaC) for repeatability
- Store container images in a secure registry (ECR preferred)
- Enforce HTTPS using ALB with TLS certificates
- Implement logging and monitoring from day one
- Separate environments (dev / staging / production)

Summary

This implementation establishes a scalable and secure deployment pipeline for containerized applications using:

- GitHub Actions (CI/CD) for automation
- Docker Hub / AWS ECR for image storage
- Amazon ECS as the runtime platform
- Application Load Balancer for secure traffic routing

The approach ensures consistency, reliability, and alignment with modern cloud deployment practices.