Continuous Delivery (CD) with GitHub Actions & EC2

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1. What is CD?

- **Continuous Delivery:** Automating deployment after CI.
- Push code → build/lint (CI) → deploy to server (CD).
- Ensures latest version is always running on EC2.

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2. GitHub Secrets Setup

In your repo → **Settings → Secrets and variables → Actions → New secret**

Add: - `EC2_HOST` → `<EC2_PUBLIC_IP>` - `EC2_USER` → `ec2-user` - `EC2_KEY` → contents of `.pem` file - `EC2_APP_DIR` → `/home/ec2-user/mern-app`

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3. CD Workflow File

`.github/workflows/ci-cd.yml`

```
name: ci-cd

on:
  push:
    branches: [main]

jobs:
  deploy:
    runs-on: ubuntu-latest

    steps:
      - name: Add EC2 host to known_hosts
        run: |
          mkdir -p ~/.ssh
          ssh-keyscan -H "$EC2_HOST" >> ~/.ssh/known_hosts
        env:
          EC2_HOST: ${{ secrets.EC2_HOST }}

      - name: Write SSH key
```

```
        run: |
          echo "${EC2_KEY}" > ec2_key.pem
          chmod 600 ec2_key.pem
        env:
          EC2_KEY: ${{ secrets.EC2_KEY }}

      - name: Deploy on EC2
        env:
          EC2_HOST: ${{ secrets.EC2_HOST }}
          EC2_USER: ${{ secrets.EC2_USER }}
          EC2_APP_DIR: ${{ secrets.EC2_APP_DIR }}
        run: |
          ssh -i ec2_key.pem ${EC2_USER}@${EC2_HOST} << EOF
            set -e
            cd "${EC2_APP_DIR}" || exit 1

            # fetch latest code
            git fetch --all
            git reset --hard origin/main

            # rebuild containers
            docker compose up -d --build

            # clean old images
            docker image prune -f

            docker compose ps
          EOF
```

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4. Deployment Flow

1. Developer pushes code → `main` branch.
2. GitHub Actions connects to EC2 via SSH.
3. Pulls latest code (`git reset --hard origin/main`).
4. Runs `docker compose up -d --build`.
5. Restarts app with new version.

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5. Verify Deployment

- **Check containers on EC2:**

```
docker compose ps
```

- **App available at:**
- Frontend → `http://<EC2_PUBLIC_IP>/`
- API → `http://<EC2_PUBLIC_IP>:5000/api`

✅**Summary:** - CD automates deployment after CI. - GitHub Actions uses SSH + Docker Compose on EC2. - Every push to `main` = updated live MERN app.