AWS EC2 Deployment

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1. What is AWS EC2?

- **Elastic Compute Cloud (EC2):** Virtual servers on AWS.
- **Elastic = scalable** → increase/decrease resources on demand.
- **Use in DevOps:** Run backend, frontend, and DB in the cloud.

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2. AWS Account Setup

1. Go to aws.amazon.com.
2. Click **Create an AWS Account**.
3. Provide email, password, credit card (for verification).
4. Choose **Free Tier** → eligible for **t2.micro** instance.

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3. Launch EC2 Instance

1. **Login** → go to **EC2 Dashboard**.
2. Click **Launch Instance**.
3. Name: `mern-app`
4. AMI: Ubuntu 22.04 LTS
5. Instance type: `t2.micro`
6. Key pair: Create/download PEM file
7. Security group:
    - 22/tcp → SSH (your IP)
    - 80/tcp → HTTP (anywhere)
    - 5000/tcp → API (anywhere for testing)
8. Launch → note **Public IPv4 address**.

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4. Connect from Windows

```
ssh -i "C:\Users\yourname\.ssh\keypair.pem" ec2-user@<EC2_PUBLIC_IP>
```

- **Fix permission issues (Windows):**

```
icacls "C:\Users\yourname\.ssh\keypair.pem" /inheritance:r
icacls "C:\Users\yourname\.ssh\keypair.pem" /grant:r "$($env:USERNAME):(R)"
```

5. Install Dependencies on EC2

- **Install Docker:**

```
sudo yum update -y
sudo yum install docker -y
sudo service docker start
sudo usermod -aG docker ec2-user
```

- **Install Docker Compose:**

```
sudo mkdir -p /usr/local/lib/docker/cli-plugins
sudo curl -SL https://github.com/docker/compose/releases/download/v2.29.2/
docker-compose-linux-x86_64 -o /usr/local/lib/docker/cli-plugins/docker-
compose
sudo chmod +x /usr/local/lib/docker/cli-plugins/docker-compose
docker compose version
```

- **Install Git:**

```
sudo dnf install -y git
```

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6. Deploy MERN App on EC2

1. Clone repo:

```
git clone https://github.com/user/mern-app.git
cd mern-app
```

2. Create environment files:

```
nano server/.env
PORT=5000
NODE_ENV=production
MONGODB_URI=<atlas-uri>

nano client/.env
VITE_API_URL=http://<EC2_PUBLIC_IP>:5000/api
```

3. Build & Run with Docker Compose:

```
docker compose build
docker compose up -d
docker compose ps
docker compose logs -f backend
```

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7. Verify Deployment

- **Frontend:** `http://<EC2_PUBLIC_IP>/`
- **API (Backend):** `http://<EC2_PUBLIC_IP>:5000/api/health`

✅If API calls fail → check client `.env` and rebuild frontend:

```
docker compose up -d --build frontend
```

✅**Summary:** - AWS EC2 = cloud VM. - Setup Ubuntu instance, install Docker + Compose + Git. - Clone MERN repo, configure `.env`, run with Docker Compose. - App accessible via EC2 public IP.