Cloud DevOps MERN Stack demo

1. Create SSH key for EC2 connection

```
KEYPAIR_NAME=mern-demo-kp
aws ec2 create-key-pair --key-name=${KEYPAIR_NAME} --
query=KeyMaterial --output=text > ~/.ssh/${KEYPAIR_NAME}.pem
chmod 400 ~/.ssh/${KEYPAIR_NAME}.pem
```

2. Create an EC2 running Ubuntu (preferably, to align with existing instructions). The tested Ubuntu version is 20.04 LTS, but higher should work fine as well. An instance with 2 vCPU and 2 GB RAM is recommended. The user data below can be used to optimize the build:

```
#!/bin/bash -xe

# Update OS and install required packages
apt-get update
DEBIAN_FRONTEND=noninteractive apt-get upgrade -y

# Install required packages
DEBIAN_FRONTEND=noninteractive apt-get install -y \
  apt-transport-https \
  ca-certificates \
  curl \
  software-properties-common \
  git

# Add Docker's official GPG key
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | gpg --
dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg

# Add Docker repository
echo "deb [arch=$(dpkg --print-architecture) signed-
by=/usr/share/keyrings/docker-archive-keyring.gpg]
https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
| tee /etc/apt/sources.list.d/docker.list > /dev/null
```

```
# Update apt package list again
apt-get update

# Install Docker
DEBIAN_FRONTEND=noninteractive apt-get install -y \
  docker-ce \
  docker-ce-cli \
  containerd.io

# Start and enable Docker service
systemctl start docker
systemctl enable docker

# Install Docker Compose
curl -L
"https://github.com/docker/compose/releases/latest/download/docker-
compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
chmod +x /usr/local/bin/docker-compose

# Create application directory
mkdir -p /app
chown ubuntu:ubuntu /app

# Clone Git repositories
cd /app
sudo -u ubuntu git clone https://github.com/Acads-Ops-
GreatLearning/guided_project_e_comm_client.git react-app
sudo -u ubuntu git clone https://github.com/Acads-Ops-
GreatLearning/guided_project_e_comm_backend.git express-app
```

3. Connect to the EC2 and build the Docker images

```
ssh -i ~/.ssh/${KEYPAIR_NAME}.pem ubuntu@${EC2_PUBLIC_IP}

cd react-app
docker build -t react-app .
```

```
cd ../express-app
docker build -t express-app .
```


Downloading SSH private key for SSH key created in CloudFormation

To obtain the SSH private key for key creation using a CloudFormation template:

```
# Retrieve the key ID
KEYPAIR_ID=$(aws ec2 describe-key-pairs --filters Name=key-name,Values=<KeyName> --query 'KeyPairs[*].KeyPairId' --output text)

# Download the private key
aws ssm get-parameter --name /ec2/keypair/${KEYPAIR_ID} --with-decryption --query Parameter.Value --output text > ~/.ssh/${KEYPAIR_NAME}.pem
```

4. Whitelist the EC2 public IP in MongoDB Atlas

5. Update the `.env` file within the `react-app` folder with the MongoDB Atlas database URI

```
cat <<-EOF > .env
PORT=8080
DATABASE_URI=mongodb+srv://<db_username>:<db_password>@<db_cluster>.mongodb.net/?retryWrites=true&w=majority&appName=<db_name>
EOF
```

6. Run the Docker containers

```
# React app
docker run --name client -d -p 3000:3000 -e REACT_APP_BACKEND_URL_ENDPOINT=http://<EC2_PUBLIC_IP>:8080 react-app:latest
```

```
# Express app (run from location of .env file)
docker run --name backend -d -p 8080:8080 --env-file .env express-
app:latest
```

7. Access the apps via browser

```
React Frontend: http://<EC2_PUBLIC_IP>:3000
Express backend: http://<EC2_PUBLIC_IP>:8080
```

What are some possible improvements?

- Container hosting using ECS Fargate or EKS Fargate
- DocumentDB with MongoDB compatibility? Depends on the version (DocumentDB compatible up to MongoDB 4.0, but MongoDB at 8disolays

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