

Git, GitHub & Environment Management

1. Git Basics

- **What is Git?**
- A distributed version control system (VCS).
- Tracks changes in code and enables collaboration.

- **Git Lifecycle Commands:**

```
git init           # start a repo
git status         # check changes
git add file.js    # stage file
git commit -m "msg" # save snapshot
git log            # history
```

- **.gitignore Example:**

```
node_modules/
.env
dist/
```

2. GitHub Basics

- **What is GitHub?**
- Remote platform to host Git repositories.
- Enables collaboration, pull requests, CI/CD integrations.

- **Remote Setup:**

```
git remote add origin https://github.com/user/repo.git
git branch -M main
git push -u origin main
```

- **Branching Flow:**

```
git checkout -b dev      # create dev branch
git checkout main        # switch branch
git merge dev            # merge dev → main
```

3. Environment Management

- **Why Needed?**
- Separate configs for **Dev, Staging, Production**.
- Prevents bugs & leaks (different DB, API, keys).

- **Example Diagram:**

```
GitHub → Dev (Localhost) → Staging (test server) → Production (live)
```

- **Env Files:**

```
# server/.env
PORT=5000
MONGO_URI=mongodb://localhost:27017/dev_db
NODE_ENV=development

# server/.env.prod
PORT=80
MONGO_URI=mongodb+srv://user:pass@cluster.mongodb.net/prod
NODE_ENV=production
```

- **Git Ignore Secrets:**

```
echo ".env" >> .gitignore
```

4. Applying in MERN Project

- **Backend (Node + Express):**

```
import dotenv from 'dotenv';
dotenv.config();
```

```
const PORT = process.env.PORT;  
const MONGO_URI = process.env.MONGO_URI;
```

• **Frontend (React + Vite):**

```
# client/.env.development  
VITE_API_URL=http://localhost:5000/api  
  
# client/.env.production  
VITE_API_URL=https://your-prod-domain.com/api
```

• **Switching:**

```
npm run dev      # uses .env.development  
npm run build    # uses .env.production
```

✅ **Summary:** Git tracks code, GitHub hosts & enables collaboration, and environment management ensures safe configs for different stages in a MERN DevOps workflow.