Param Shavak ANUGA | HPC-in-a-Box Flood Simulation System

Overview

Param Shavak ANUGA is a **plug-and-play flood simulation pipeline** designed to run on HPC systems or powerful Linux workstations.

It packages the full workflow into one reproducible environment:

- ANUGA flood simulation engine (MPI parallel capable)
- Automated post-processing pipeline
- GeoServer map publishing
- React dashboard visualization
- Optional 3D ANUGA viewer

The goal is simple: Run one install → run simulation → visualize results.

Who This Repository Is For

HPC / System Administrators

Responsible for installing dependencies and setting up environment.

➡ Read: `INSTALL.md`

Flood Modelers / Researchers

Responsible for configuring simulations and generating outputs.

➡ Read: `RUNNING.md`

Stakeholders / Dashboard Users

Responsible only for viewing flood outputs on dashboard.

➡ Read: `USER_GUIDE.md`

First Time Setup (Golden Path)

Step 0 — Clone Repository

```
git clone https://github.com/anup619/Param-Shavak-Anuga
```

```
cd Param-Shavak-Anuga
git lfs pull
```

Run `git lfs pull` **only first time** or if large files are missing.

All commands in docs assume you are inside repo root directory.

Step 1 — Install Full Stack

```
make setup
```

This installs:

- System dependencies
- Python scientific stack
- MPI + mpi4py
- ANUGA core
- GeoServer (if archive present)
- Node.js (if archive present)

Step 2 — Run Simulation

```
source build/setup_mpi_env.sh
mpirun -np 16 python3 mahanadi_test_case/simulate.py
```

Step 3 — Start Visualization

```
make geoserver-start
source build/setup_tools_env.sh
cd anuga-viewer-app
npm run dev
```

Dashboard runs at: `http://localhost:5173`

How The Pipeline Works

```
Install → Configure → Simulate → Postprocess → Deploy → Visualize
```

Detailed behavior:

- `setup.sh` installs system + python dependencies
- CMake installs ANUGA locally
- Simulation produces `.sww`
- bridge.py converts outputs + deploys to GeoServer
- React dashboard reads WMS layers

Repository Structure

```
Param-Shavak-Anuga/
│
├ INSTALL.md
├ RUNNING.md
├ USER_GUIDE.md
│
├ build/
│ ├ setup_mpi_env.sh
│ ├ setup_tools_env.sh
│ ├ geoserver_start.sh
│ └ geoserver_stop.sh
│
├ opensource_tools/
│ ├ geoserver-.zip
│ └ node-.tar.xz
│
├ anuga_core/
│
└ mahanadi_test_case/
```

When To Read Which File

Situation	Read
First time installation	INSTALL.md
Running flood simulation	RUNNING.md
Viewing dashboard results	USER_GUIDE.md

Plug-and-Play Philosophy

This system is designed so that:

Admin installs once
Modelers run simulations
Stakeholders view results

No manual dependency chasing.

Support / Contact

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