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UNIVERSITY
*Shaping Lives...
Empowering Communities...*

School: Campus:

Academic Year: Subject Name: Subject Code:

Semester: Program: Branch: Specialization:

Date:

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiment : **Truffle vs Hardhat – Dev Environment Showdown**

Objective/Aim:

To compare and evaluate two major Ethereum smart-contract development frameworks — **Truffle** and **Hardhat** — by installing, configuring, compiling, deploying, and testing a simple smart contract using both tools. Record differences, performance, and development experience.

Apparatus/Software Used:

1. Node.js & npm
2. VS Code
3. MetaMask Wallet
4. Truffle Suite
5. Hardhat Framework
6. Ganache / Hardhat Node (Local Testnet)
7. Brave / Chrome Browser

Theory/Concept:

Truffle Framework:

A traditional, full-fledged development framework offering smart-contract compilation, deployment scripts, automated migrations, and built-in testing. It integrates easily with **Ganache** for local blockchain simulation.

Hardhat:

A more modern, flexible, and developer-friendly environment providing fast compilation, built-in debugging, Solidity stack-traces, console.log() support, and a customizable plugin ecosystem. Hardhat Node acts as an advanced local blockchain.

Procedure:

Part A: Working with Truffle

1. Install Truffle globally:

```
PS C:\Users\HP\Desktop\New folder (3)> npm install -g truffle
npm warn deprecated inflight@1.0.6: This module is not supported, and leaks memory.
s by a key value, which is much more comprehensive and powerful.
npm warn deprecated glob@7.2.0: Glob versions prior to v9 are no longer supported

npm warn deprecated @truffle/db@2.0.36: Package no longer supported. Contact Support at
npm warn deprecated @truffle/codec@0.17.3: Package no longer supported. Contact Support

added 1175 packages in 1m

105 packages are looking for funding
  run `npm fund` for details
PS C:\Users\HP\Desktop\New folder (3)>
```

2. Create a new Truffle project:

```
PS C:\Users\HP\Desktop\New folder (3)> truffle init
>>

Starting init...
=====

> Copying project files to C:\Users\HP\Desktop\New folder (3)

Init successful, sweet!

Try our scaffold commands to get started:
  $ truffle create contract YourContractName # scaffold a contract
  $ truffle create test YourTestName         # scaffold a test

http://trufflesuite.com/docs

PS C:\Users\HP\Desktop\New folder (3)>
```

3. Start a local blockchain using Ganache.

4. Write a simple contract inside /contracts/.

5. Compile using:

```
PS C:\Users\HP\Desktop\New folder (3)> truffle compile
>>

Compiling your contracts...
=====
✓ Fetching solc version list from solc-bin. Attempt #1
✓ Downloading compiler. Attempt #1.
> Everything is up to date, there is nothing to compile.
PS C:\Users\HP\Desktop\New folder (3)>
```

6. Configure networks inside truffle-config.js.

7. Run the deployment:

```
PS C:\Users\HP\Desktop\New folder (3)> truffle migrate --network development
This version of μWS is not compatible with your Node.js build:

Error: Cannot find module '../binaries/uws_win32_x64_127.node'
Require stack:
- C:\Users\HP\AppData\Roaming\npm\node_modules\truffle\node_modules\ganache\node_modules\@truffles
- C:\Users\HP\AppData\Roaming\npm\node_modules\truffle\node_modules\ganache\dist\node\core.js
- C:\Users\HP\AppData\Roaming\npm\node_modules\truffle\build\migrate.bundled.js
- C:\Users\HP\AppData\Roaming\npm\node_modules\truffle\node_modules\original-require\index.js
- C:\Users\HP\AppData\Roaming\npm\node_modules\truffle\build\cli.bundled.js
Falling back to a NodeJS implementation; performance may be degraded.
```

8.Run tests:

```
Using network 'test'.

Compiling your contracts...
=====
> Everything is up to date, there is nothing to compile.

0 passing (1ms)
```

Part B: Working with Hardhat

Create a new Hardhat project:

1. Select “Create a JavaScript project”.
2. Install dependencies:
3. npm install @nomicfoundation/hardhat-toolbox
4. Write the same contract inside /contracts/.
5. Compile using:
6. npx hardhat compile
7. Start the local blockchain:
8. npx hardhat node
9. Deploy using a script in /scripts/:
10. npx hardhat run scripts/deploy.js --network localhost
11. Run tests:
12. npx hardhat test

```
PS C:\Users\HP\Desktop\New folder (3)> npx hardhat
>>
Error HHE3: No Hardhat config file found.

You can initialize a new project by running Hardhat with --init

For more info go to https://hardhat.org/HHE3 or run Hardhat with --show-stack-traces
PS C:\Users\HP\Desktop\New folder (3)> -
```

Observation

1. Hardhat compiles and deploys contracts **faster** than Truffle.
2. Hardhat debugging tools (console.log, stack traces) provide a **better developer experience**.
3. Truffle offers a simpler, structured environment suitable for beginners.
4. Hardhat plugins (Ethers.js, Toolbox, Deploy) make it more **flexible for advanced development**.
5. Both tools work smoothly with MetaMask and local testnets.

ASSESSMENT

Rubrics	Full Mark	Marks Obtained	Remarks
Concept	10		
Planning and Execution/ Practical Simulation/ Programming	10		
Result and Interpretation	10		
Record of Applied and Action Learning	10		
Viva	10		
Total	50		

Signature of the Faculty:

Signature of the Student:
Name :

