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Academic Year: ..... Subject Name: ..... Subject Code: .....

Semester: ..... Program: ..... Branch: ..... Specialization: .....

Date: .....

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiement : Truffle vs Hardhat – Dev Environment Showdown

Objective/Aim:

To compare and analyze the two most widely used Ethereum development frameworks — Truffle and Hardhat — and understand their setup, features, and differences in compiling, deploying, and testing smart contracts.

Apparatus/Software Used:

- Node.js & npm (JavaScript runtime and package manager)
- Truffle Suite
- Hardhat Framework
- Ganache (local Ethereum blockchain for testing)
- Metamask Wallet
- VS Code or any IDE

Theory:

What is Truffle?

Truffle is one of the oldest Ethereum development frameworks, providing an end-to-end suite for:

- Smart contract compilation and deployment
- Automated testing
- Scripted migrations
- Network configuration and debugging

It uses Ganache for local blockchain simulation.

What is Hardhat?

Hardhat is a modern Ethereum development environment designed for flexibility and advanced debugging.

It includes:

- Hardhat Network (built-in local Ethereum node)
- Ethers.js & Waffle integration for scripting and testing
- Stack traces & console.log debugging

Procedure:

Setting up Truffle:

1. Install Truffle:

```
PS C:\Users\shrut\OneDrive\Desktop\WEB3> npm install -g truffle
>>
npm warn deprecated testrpc@0.0.1: testrpc has been renamed to ganache-cli, please use this package from now on.
npm warn deprecated inflight@1.0.6: This module is not supported, and leaks memory. Do not use it. Check out lru-cache if you want a good and t
ested way to coalesce async requests by a key value, which is much more comprehensive and powerful.
npm warn deprecated @truffle/source-map-utils@1.3.119: Package no longer supported. Contact Support at https://www.npmjs.com/support for more i
nfo.
npm warn deprecated mkdirp-promise@5.0.1: This package is broken and no longer maintained. 'mkdirp' itself supports promises now, please switch
 to that.
npm warn deprecated rimraf@2.7.1: Rimraf versions prior to v4 are no longer supported
npm warn deprecated level-concat-iterator@3.1.0: Superseded by abstract-level (https://github.com/Level/community#faq)
npm warn deprecated @truffle/db-loader@0.2.36: Package no longer supported. Contact Support at https://www.npmjs.com/support for more info.
```

2. Initialize Project:

```
PS C:\Users\shrut\OneDrive\Desktop\WEB3> mkdir truffle-lab


    Directory: C:\Users\shrut\OneDrive\Desktop\WEB3


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         03-11-2025     22:23                truffle-lab


PS C:\Users\shrut\OneDrive\Desktop\WEB3> cd truffle-lab
```

```
PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab> truffle init

Starting init...
================

> Copying project files to C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab

Init successful, sweet!
```

3. Now we can write the solidity code and compile it.

Setting up Hardhat:

1. Create Project Folder:

```
PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab> mkdir hardhat-lab


    Directory: C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         03-11-2025     22:29                hardhat-lab


PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab> cd hardhat-lab
PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab\hardhat-lab> npm init -y
Wrote to C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab\hardhat-lab\package.json:

{
  "name": "hardhat-lab",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
```

```
PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab\hardhat-lab> npm install --save-dev hardhat

added 59 packages, and audited 60 packages in 11s

16 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

2. Initialize Hardhat:

```
found 0 vulnerabilities
PS C:\Users\shrut\OneDrive\Desktop\WEB3\truffle-lab\hardhat-lab> npx hardhat
>>
```

3. Now we can write the smart contract and compile it by

```
npx hardhat compile
```

Observation:

Step	Truffle	Hardhat
Setup Time	Slightly longer	Very quick
Compilation	Standard	Faster with cache
Deployment	Uses Migrations	Uses scripts
Testing	Basic	Advanced + flexible
Debugging	Limited	Built-in console.log

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 Student:

Name :

Regn. No. :

Signature of the Faculty:

**As applicable according to the experiment. Two sheets per experiment (10-20) to be used.*