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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 Experiement :Truffle vs Hardhat – Dev Environment Showdown

Objective/Aim:

To explore and compare two popular Ethereum development frameworks — **Truffle** and **Hardhat**, and understand their unique features, advantages, and drawbacks in building and testing smart contracts.

Apparatus/Software Used:

- Laptop or Desktop Computer
- Any Web Browser (Google Chrome recommended)
- Active Internet Connection

Theory/Concept:

Truffle and Hardhat are both vital tools in the Ethereum development ecosystem, used for writing, compiling, testing, and deploying smart contracts.

Truffle is one of the earliest and most comprehensive frameworks, integrating tightly with **Web3.js** and often paired with **Ganache** for local blockchain simulation. It provides a complete development suite, ideal for users who prefer a stable, traditional workflow.

Hardhat, on the other hand, represents a newer and more flexible environment. It comes with a **built-in local network (Hardhat Network)**, advanced **console.log debugging**, and seamless **TypeScript and Ethers.js support**. It allows developers to easily customize configurations and automate tasks, offering a smoother modern experience.

In short, Truffle is best suited for those who prefer a classic, well-established toolchain, while Hardhat caters to developers looking for speed, modern debugging, and flexible integrations.

Procedure:

Step 1: Install and Initialize Truffle

```
npm install -g truffle
truffle init
```

Step 2: Compile and Deploy Contracts with Truffle

```
truffle compile
truffle migrate --network development
truffle console
```

Step 3: Install and Initialize Hardhat

```
npm install --save-dev hardhat
npx hardhat
```

Step 4: Compile and Deploy Contracts with Hardhat

```
npx hardhat compile
npx hardhat node
npx hardhat run scripts/deploy.js --network localhost
```

Observation Table:

Feature	**Truffle**	**Hardhat**
Year Introduced	**2015**	**2020**
Compilation Speed	Average	Very Fast
Debugging Tools	Limited	Advanced (console.log, error tracing)
Plugin Support	Moderate	Highly Customizable
Network Simulation	Ganache	Hardhat Network
Testing Framework	Mocha & Chai	Mocha & Chai
TypeScript Compatibility	Not Supported	Fully Supported
Developer Experience	Classic Interface	Modern and Intuitive

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
R No: