**Unit 4 – Blockchain and Decentralized Applications**

**Lab 4 Manual**

**Introduction to Solidity Programming with VS Code and Truffle**

**Objective:**

In this lab, students will learn, implement and integrate the real-world use case of mappings, structs, and functions to create more complex data management structures, enabling scalable and efficient data handling.

By the end of this lab, students will:

* Understand mappings and how they store key-value pairs in Solidity.
* Learn how structs are used to group related variables.
* Explore combining mappings with structs for more complex data management.

1. Create a contract to store and retrieve messages, showcasing memory vs. storage usage.

A screen shot of a computer code

Description automatically generated

1. Develop a contract to represent a person’s information and retrieve it.

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1. Demonstrate how to use an array of structs to manage multiple records.

A computer screen shot of a program code

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1. Create and manage nested structures using a contract.

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1. Combine nested structures with mappings to manage data efficiently.

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**Lab Tasks**

1. Simulate a ticket booking system using mappings and structs. Also, use *require, assert and revert* for error handling.
2. Create a nested structure to manage an online shopping cart, where each item includes its name, price, and a nested shipping address.