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|---|---|
| School: ........ | Campus: ........ |
| Academic Year: ........ Subject Name: ........ | Subject Code: ........ |
| Semester: ........ Program: ........ Branch: ........ | Specialization: ........ |
| Date: ........ | |

# Applied and Action Learning

Name of the Experiement : (Learning by Doing and Discovery)

~~Audit 101 – Smart Contract Vulnerabilities~~

## * Coding Phase: Pseudo Code / Flow Chart / Algorithm

Algorithm
1. **Start**.
2. **Open Remix IDE** and create a new Solidity file fee, (e.g., `VulnerabilityDemo.sol`).
3. **Write a smart contract** intentionally containing common vulnerabilities such as:
   - Reentrancy, Integer contract overflow/underflow, Unchecked external call, Missing access control.
4. **Compile the contract** using the Solidity compiler.
5. **Deploy the contract** in Remix using a local environment (Remix VM).
6. **Perform transactions** to test the contract's functions and observe abnormal behaviors or exploitable outcomes.
7. **Analyze vulnerabilities** by identifying how they affect the contract logic or funds.
8. **Implement fixes** (e.g., using `ReentrancyGuard`, `require` checks, or SafeMath).
9. **Re-compile and re-test** to ensure vulnerabilities are resolved.
10. **Document the findings** including:
    - Vulnerability type
    - Cause
    - Fix implemented
    - Final audit status
11. **Stop**

## * Softwares used

1. **Remix IDE** – For writing, deploying, and testing smart contracts.
2. **Solidity Compiler (Solc)** – To compile and check the smart contract code.
3. **MetaMask** – For interacting with the deployed contract using a Web3 wallet.
4. **Ganache** – For creating a local blockchain environment to simulate transactions.
5. **MythX / Slither (Optional)** – For automated smart contract vulnerability analysis and security auditing.

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

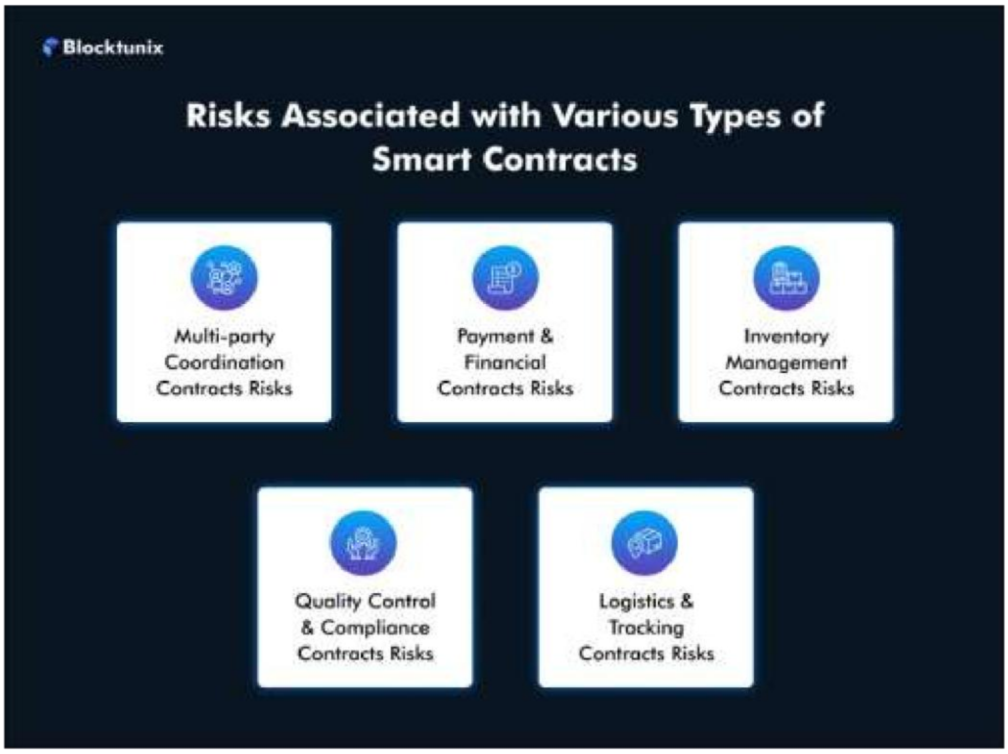
## * Implementation Phase: Final Output (no error)

~~Steps of Smart Contract Audit~~

1. **Code Review & Architecture Analysis**
   - Auditors study the smart contract's code structure, architecture, and logic flow.
   - Identify dependencies and potential integration issues.
2. **Unit Testing**
   - Run multiple test cases for each function.
   - Ensure all functions behave as expected under various conditions.
3. **Vulnerability Detection**
   - Use manual and automated tools (like Slither, MythX) to find bugs such as reentrancy, overflow, or access control flaws.
4. **Initial Report Preparation**
   - Prepare a draft report listing all discovered issues, categorized by severity (high, medium, low).
   - Share with the development team for fixes.
5. **Re-Audit and Final Report**
   - Verify that all reported issues are fixed.
   - Publish the final audit report with verified results and security recommendations.

### Types of Smart Contract Audit

1. **Manual Audit**
   - Conducted by human experts reviewing the code line-by-line.
   - Detects logic flaws and complex vulnerabilities that tools might miss.
2. **Automated Audit**
   - Uses specialized software to scan for known vulnerabilities.
   - Faster and cost-efficient, but may miss deeper logical issues.
3. **Hybrid Audit (Manual + Automated)**
   - Combines both methods for maximum accuracy and coverage.
   - Considered the most effective approach for professional audits.


Blocktunix
Risks Associated with Various Types of Smart Contracts
Multi-party Coordination Contracts Risks
Payment & Financial Contracts Risks
Inventory Management Contracts Risks
Quality Control & Compliance Contracts Risks
Logistics & Tracking Contracts Risks

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

## * Implementation Phase: Final Output (no error)

• **Comprehensive Vulnerability Analysis:**
Performed detailed security checks on smart contracts to identify potential issues like reentrancy, overflow, and access control flaws through manual and automated reviews.

• **Code Reliability & Risk Mitigation:**
Enhanced contract safety by validating logic, transaction flow, and data integrity to prevent exploits and ensure secure execution before deployment.

• **Standardized Audit Framework:**
Applied Ethereum-based audit practices using tools like Slither and Mythril, ensuring consistency, transparency, and adherence to smart contract security standards.

• **Scalability & Continuous Improvement:**
Established an adaptable audit setup supporting re-audits, modular analysis, and regular updates for future enhancements and learning applications.

## * Observations

1. Identified and analyzed key vulnerabilities in smart contracts like reentrancy and overflow errors.
2. Understood the importance of security audits to ensure safe and reliable blockchain deployment.
3. Gained practical insight into using audit tools and frameworks for code verification and risk prevention.

**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.*