VIETNAM NATIONAL UNIVERSITY OF HOCHIMINH CITY
THE INTERNATIONAL UNIVERSITY
SCHOOL OF COMPUTER SCIENCE AND ENGINEERING



# THESIS TITLE

By

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STUDENT ID

A thesis submitted to the School of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science

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# [THESIS TITLE]

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# Acknowledgments

I would like to express my sincere gratitude to...

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# List of Abbreviations

**ABC** — Example Abbreviation

# Abstract

**Keywords:** keyword1, keyword2, keyword3, keyword4, keyword5

# Chapter 1

# INTRODUCTION

## 1.1 Motivation

Describe the motivation behind your research. Why is this topic important?

## 1.2 Problem Statement

Clearly define the problem you are addressing.

## 1.3 Scope

### 1.3.1 In Scope

What is included in your research?

### 1.3.2 Out of Scope

What is explicitly excluded from your research?

### 1.3.3 System Assumptions

List any assumptions made in your work.

### 1.3.4 System Constraints

Describe any limitations or constraints.

## 1.4 Objectives

List your research objectives in a table format:

**Table 1.1:** Research Objectives

| # | Objective | Measurement |
|---|-----------|-------------|
| 1 | Objective 1 | How to measure success |
| 2 | Objective 2 | How to measure success |

## 1.5 Thesis Organization

Describe how the rest of the thesis is organized.

**Chapter 1: Introduction** establishes the research foundation...

**Chapter 2: Background and Related Work** provides the theoretical foundation...

# Chapter 2

# BACKGROUND AND RELATED WORK

## 2.1 Theoretical Background

### 2.1.1 Topic 1

Describe the theoretical foundation of your research area.

### 2.1.2 Topic 2

Continue with relevant theoretical concepts.

## 2.2 Current Advancements

Survey existing work in your field:

**Table 2.1:** Comparison of Existing Systems

| System | Description |
|---|---|
| System A | Description of System A |
| System B | Description of System B |

## 2.3 Research Gaps

Identify the gaps in existing research that your work addresses.

# Chapter 3

# METHODOLOGY

## 3.1 System Requirements

### 3.1.1 Functional Requirements

**Table 3.1:** Functional Requirements

| ID | Requirement | Priority |
|----|-------------|----------|
| FR1 | Requirement 1 | Must |
| FR2 | Requirement 2 | Should |

### 3.1.2 Non-Functional Requirements

**Table 3.2:** Non-Functional Requirements

| ID | Requirement | Target |
|----|-------------|--------|
| NFR1 | Performance | Less than X seconds |
| NFR2 | Cost | Less than $X |

## 3.2 System Design

## 3.3 Complexity Analysis

**Table 3.3:** Time Complexity Analysis

| Operation | Complexity | Notes |
|-----------|------------|-------|
| Operation 1 | $O(n)$ | Description |
| Operation 2 | $O(\log n)$ | Description |

# Chapter 4

# IMPLEMENTATION

## 4.1 System Architecture Overview

Describe the overall architecture of your implementation.

## 4.2 Algorithms

Present key algorithms using pseudocode:

---
**Algorithm 1** Algorithm Name

---
1: **function** FunctionName(input) → output
2:    initialization
3:    **for each** item **in** collection **do**
4:        process item
5:    **end for**
6:    **return** result
7: **end function**

---

## 4.3 Implementation Details

Describe specific implementation choices, tools, and technologies used.

### 4.3.1 Technology Stack

Table 4.1: Development Tools and Their Purposes

| Tool | Purpose |
|------|---------|
| Tool 1 | Purpose description |
| Tool 2 | Purpose description |

## 4.4 Integration and Testing

Describe your testing approach and results.

**Table 4.2:** Testing Strategy by Level

| Level | Scope | Tools |
|---|---|---|
| Unit | Individual components | Testing framework |
| Integration | System interactions | Test clients |

# Chapter 5

# RESULTS

## 5.1 Performance Benchmarks

Present your experimental results:

**Table 5.1:** Performance Measurements

| Metric | Value |
|--------|-------|
| Metric 1 | Value 1 |
| Metric 2 | Value 2 |

### 5.1.1 Timing Benchmarks

**Table 5.2:** Timing Benchmarks

| Operation | Time |
|-----------|------|
| Operation 1 | X ms |
| Operation 2 | Y ms |

## 5.2 Analysis and Discussion

Analyze your results and discuss their implications.

# Chapter 6

# DISCUSSION

## 6.1 Interpretation of Results

Discuss the meaning and significance of your results.

### 6.1.1 Performance Implications

What do your performance results mean for practical use?

### 6.1.2 Security Implications

Discuss any security considerations.

## 6.2 Research Contributions

Summarize your key contributions:

**Table 6.1:** Research Contributions and Their Impact

| Contribution | Impact |
|---|---|
| Contribution 1 | Description of impact |
| Contribution 2 | Description of impact |

## 6.3 Limitations

Acknowledge the limitations of your work:

**Table 6.2:** System Limitations and Mitigations

| Limitation | Impact | Mitigation |
|---|---|---|
| Limitation 1 | Impact description | How to address |

## 6.4 Future Work

Suggest directions for future research:

- Future direction 1

- Future direction 2

- Future direction 3

# Chapter 7

# CONCLUSION

## 7.1  Summary of Contributions

Summarize the key contributions of your thesis:

1. First major contribution

2. Second major contribution

3. Third major contribution

## 7.2  Impact

Discuss the academic and practical impact of your work.

## 7.3  Final Remarks

Conclude with final thoughts on the research and its significance.

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[6] T. T. H. Le, "Blockchain-based transcript verification system," bachelor's thesis, The International University, Vietnam National University, 2023.

[7] W. Zhang, *Scalable Cryptographic Protocols for Distributed Systems*. PhD thesis, Massachusetts Institute of Technology, 2022.

# Appendix A

# Additional Material

## A.1 Proof of Theorem

Add your detailed proofs here.

## A.2 Additional Tables

**Table A.1:** Additional Data

| Column 1 | Column 2 | Column 3 |
|----------|----------|----------|
| Data     | Data     | Data     |
| Data     | Data     | Data     |

## A.3 Source Code

```solidity
pragma solidity ^0.8.19;

contract ExampleContract {
    address public owner;
    uint256 public value;

    event ValueUpdated(uint256 newValue);

    constructor() {
        owner = msg.sender;
    }

    function setValue(uint256 _value) public {
        require(msg.sender == owner, "Not authorized");
        value = _value;
        emit ValueUpdated(_value);
    }
}
```

**Listing A.1:** Sample Solidity Contract

```c
# Compile the project
gcc -o program main.c

```

```
4 # Run tests
5 ./run_tests.sh
6
7 # Clean build files
8 make clean
```

**Listing A.2:** Sample Build Commands

```python
1 def calculate_average(numbers):
2     """Calculate average of a list of numbers."""
3     if not numbers:
4         return 0
5     return sum(numbers) / len(numbers)
6
7 # Example usage
8 scores = [85, 90, 78, 92]
9 avg = calculate_average(scores)
10 print(f"Average: {avg}")
```

**Listing A.3:** Sample Python Script