

WorkEase

An Agentic Unified Intelligent Multi-Platform Communication System

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Session 2022–2026

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October, 2025

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Acknowledgements

We would like to express our deepest gratitude to our supervisor, **Dr. Nouman Azam**, for his continuous guidance, motivation, and valuable knowledge throughout the development of our Final Year Project. We also thank our department faculty and peers for their constructive feedback and encouragement. Lastly, we appreciate our families for their constant support and patience during the completion of this project.

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Abstract

This project presents the development of an **Agentic Unified Automation System**, a voice-assisted intelligent desktop application designed to integrate communication, file management, and task automation across multiple platforms such as Gmail, Slack, and local Linux utilities. The system operates as an agentic OS overlay, combining multiple autonomous agents coordinated by a supervisor agent to execute user commands seamlessly.

The key problem addressed is the fragmentation of productivity tools that forces users to constantly switch contexts, reducing focus and efficiency. The proposed solution provides a unified, AI-powered workspace that automates workflows, summarizes messages, manages notifications, and allows contextual voice interaction. Using natural language processing, multi-agent coordination, and secure API integration, the system can read, summarize, and respond to messages; execute terminal commands; and trigger custom event-based notifications. Evaluation was performed through detailed test cases to validate accuracy, response time, and integration stability. The results demonstrate enhanced productivity, reduced cognitive load, and effective cross-platform communication through automation.

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Chapter 1

Introduction

1.1 Project Overview

WorkEase is an intelligent desktop application that unifies multiple communication and productivity tools into a single workspace. It enables users to communicate, organize, and automate workflows using natural voice commands. The system integrates platforms such as Gmail, Slack, Discord, and file systems through secure APIs and runs natively on Linux. Its architecture is built around modular agents — each responsible for communication, file, or terminal tasks — coordinated by a central supervisor agent.

1.2 Problem Statement

Modern users struggle with managing multiple communication apps, notifications, and tasks simultaneously. This constant context switching causes inefficiency, distraction, and lost productivity. There is no unified, context-aware, and intelligent assistant that securely automates and integrates these tasks on a single desktop environment.

1.3 Proposed Solution

The proposed system introduces a **multi-agent intelligent platform** that integrates and automates workflows across Slack, Gmail, and local tools. It summarizes unread emails, manages Slack notifications, executes terminal commands, and triggers configurable alerts — all via natural speech or text input. The system learns user behavior and adapts accordingly.

1.4 Objectives

- Integrate multiple applications (Gmail, Slack, Discord, etc.) within one secure interface.
- Automate communication and task execution through voice commands.
- Generate contextual summaries and unified notifications.
- Provide configurable event-based alerts and reminders.
- Ensure data privacy with local storage and token-based access.

Chapter 2

System Analysis and Design

2.1 System Architecture

The system follows a **multi-agent architecture** where independent agents handle communication, file operations, or terminal commands, coordinated by a supervisor agent. This allows modular scalability, fault isolation, and efficient resource allocation.

2.2 Use Case Diagram

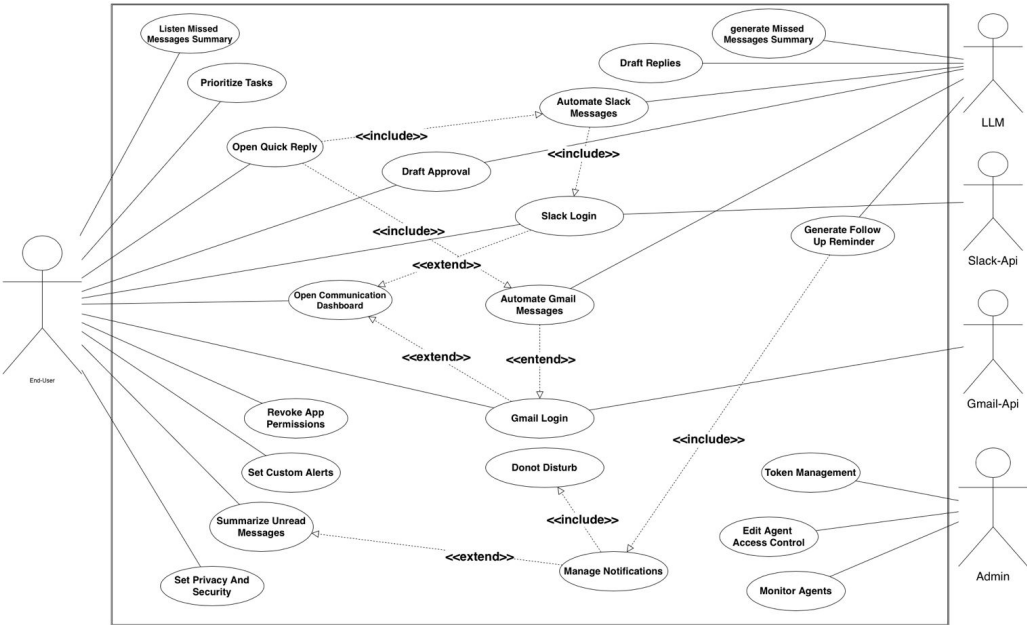
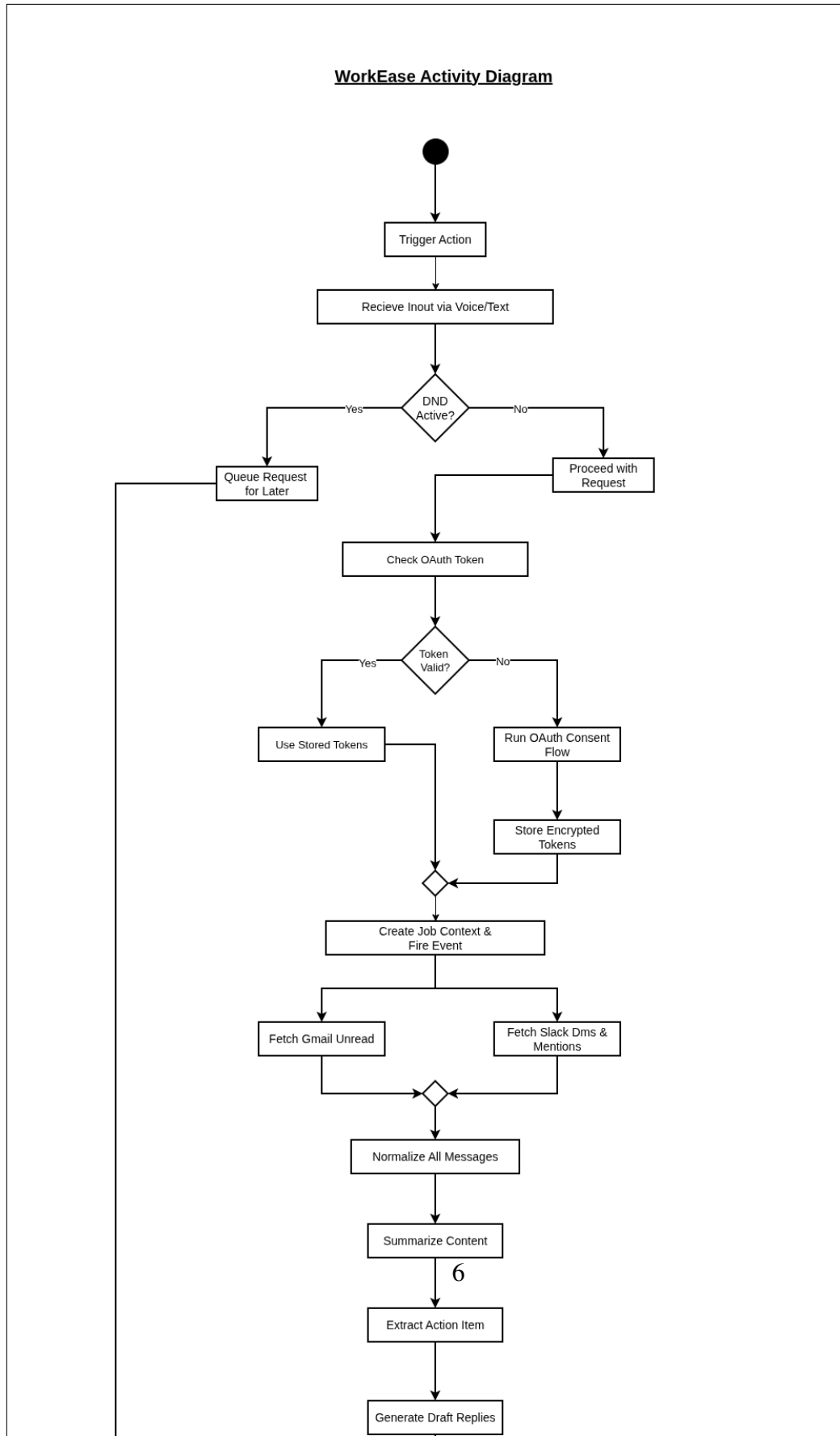


Figure 2.1: Use Case Diagram for WorkEase

2.3 Activity Diagrams

2.3.1 Overall System Activity



2.3.2 Activity 1: Voice-Based Interaction And Control

Map to Action (e.g. Fetch, Summarize)

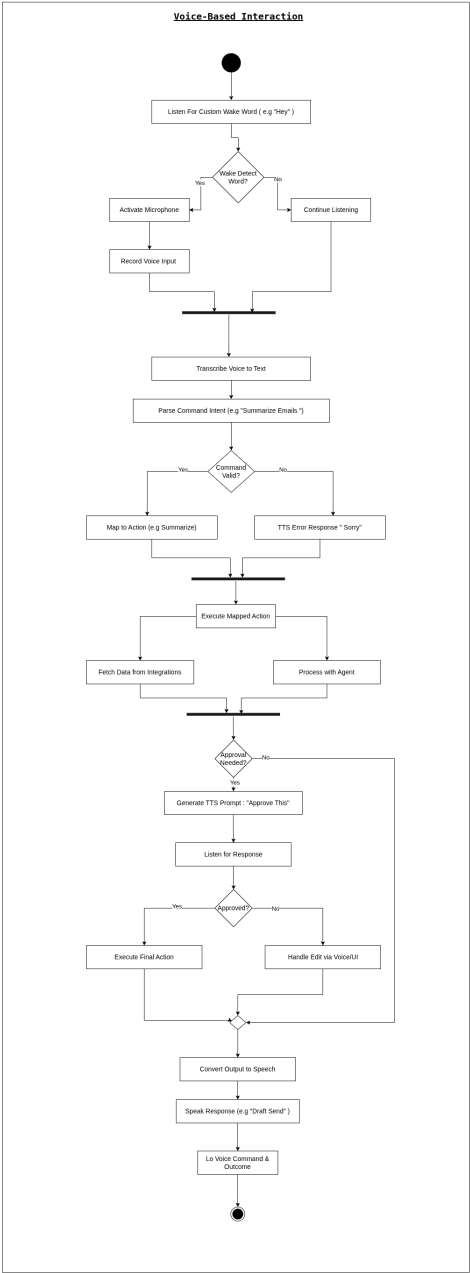
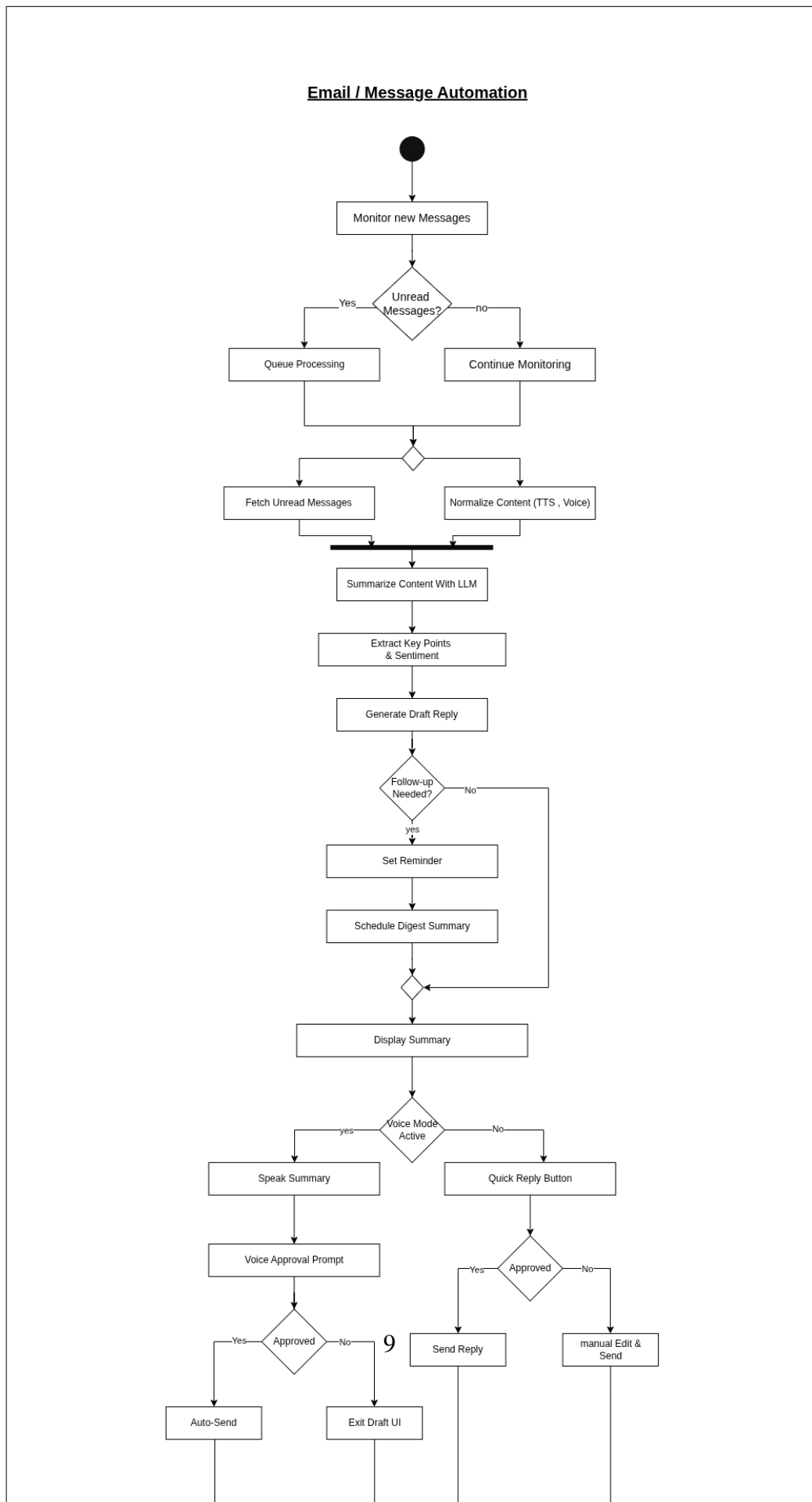
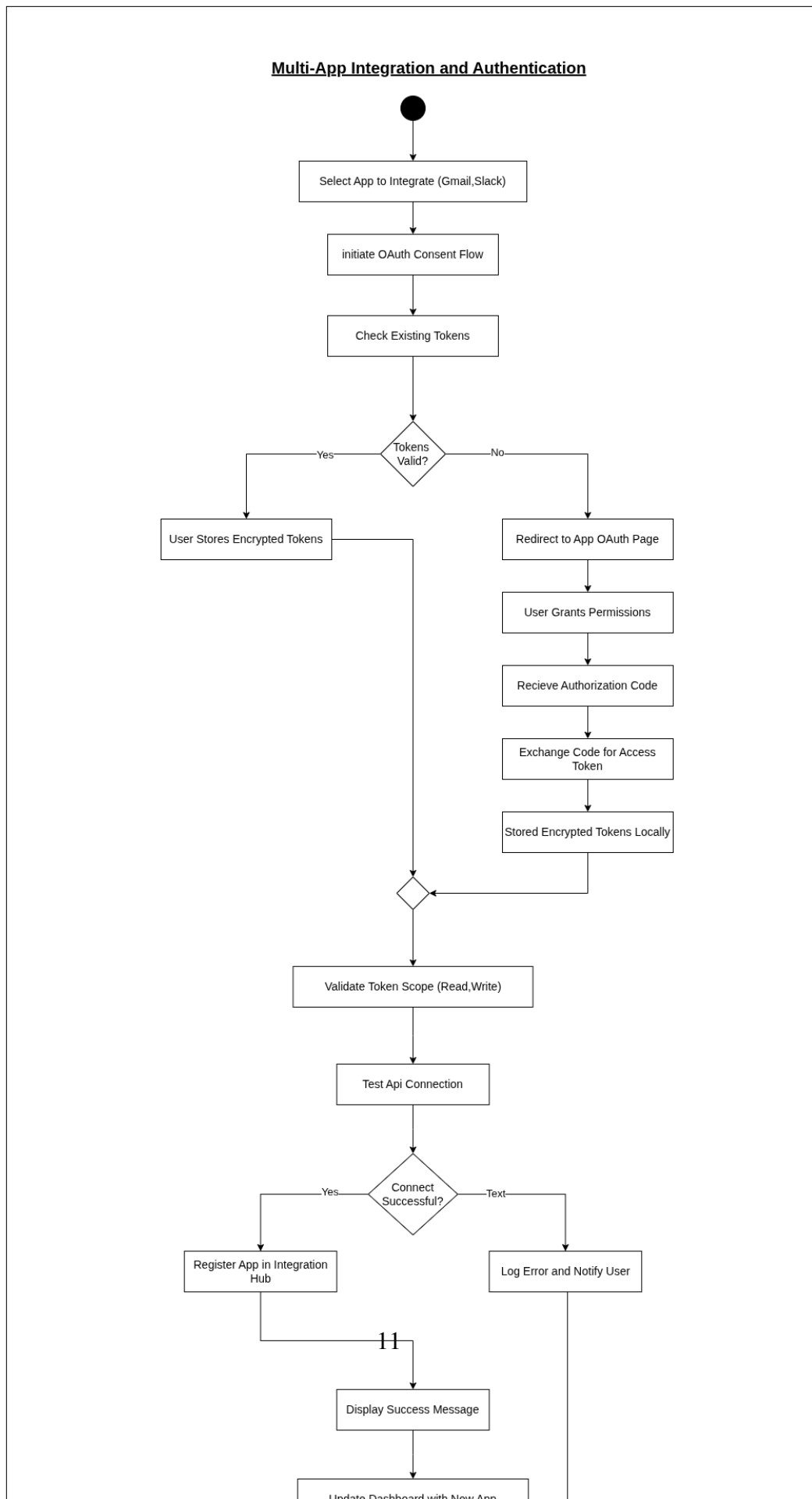


Figure 2.3: Activity Diagram – Voice-Based Interaction And Control

2.3.3 Activity 2: Smart Email and Message Automation



2.3.4 Activity 3: Multi-App Integration and Authentication



2.4 Component Diagram

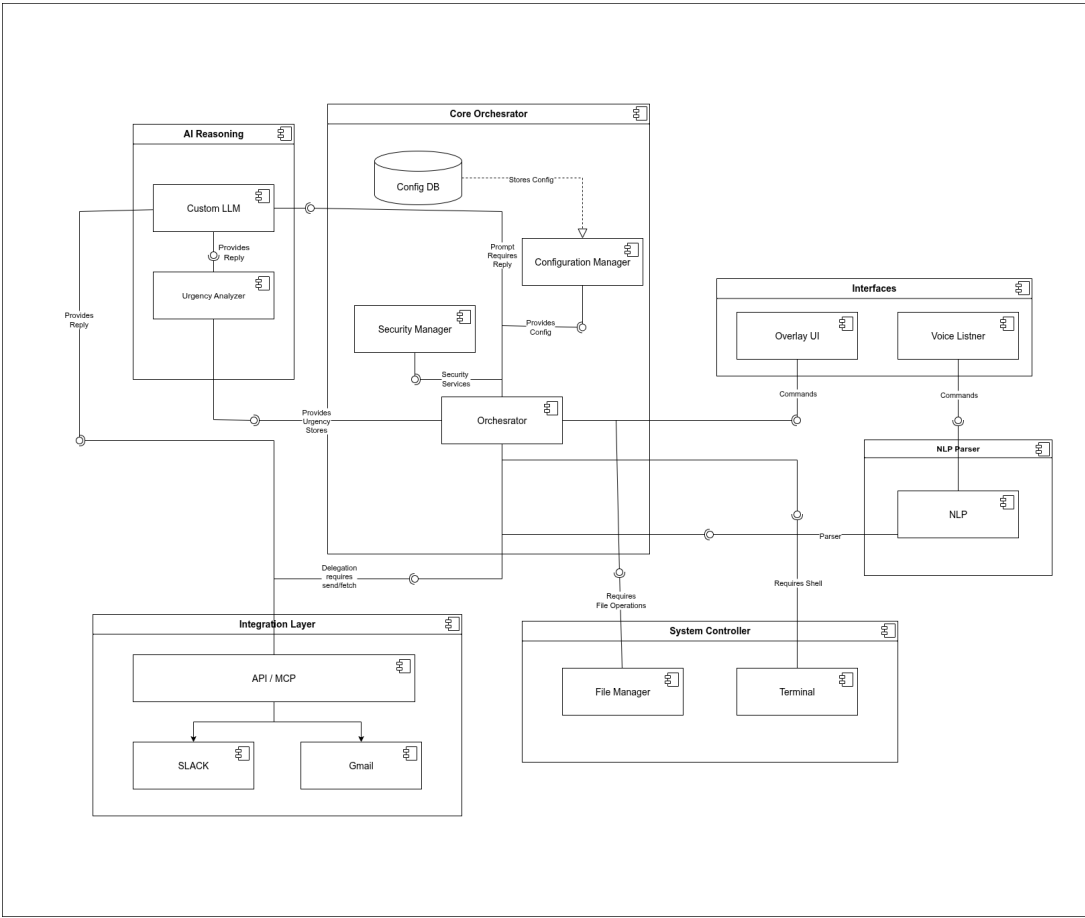


Figure 2.6: Component Diagram of WorkEase System

Chapter 3

Implementation

3.1 Development Environment

- **Language:** Python (FastAPI, LangChain)
- **OS:** Linux (Ubuntu)
- **Database:** SQLite / JSON-based storage
- **Frontend:** Electron + React
- **AI Models:** Whisper (STT), Mistral (LLM), Coqui (TTS)

3.2 Implemented Features

1. Unified communication dashboard (Slack + Gmail)
2. Auto email summarization and voice drafting
3. Task extraction and prioritization
4. Configurable alerts and quiet hours
5. Secure OAuth authentication and local token management

Chapter 4

Testing and Evaluation

4.1 Test Cases – Part 1

ID	Scenario	Objective	Pre-conditions	Test Steps	Test Data	Expected Result
TC_INT_01	Verify multi-app integration	Ensure APIs connect successfully	Valid tokens	Connect apps and fetch messages	OAuth keys	Unified inbox retrieved
TC_AUTO_01	Auto email summarization	Verify NLP summaries	Gmail linked	Run summarization	Sample emails	Concise summaries shown
TC_TASK_01	Task extraction	Ensure tasks identified	Slack + Gmail active	Run task extractor	Message text	Prioritized task list generated
TC_NOTIF_01	Configurable alerts	Validate custom notifications	Event rule set	Trigger alert condition	“Interview call” email	Notification triggered
TC_DASH_01	Unified inbox display	Verify dashboard merges notifications	Apps linked	Open dashboard	Message events	Combined view accurate
TC_STATUS_01	Slack status voice control	Check voice-based status update	Mic active	Say “Mute Slack 1h”	Voice input	Slack muted for set time

Table 4.1: Test Cases – Integration and Automation

4.2 Test Cases – Part 2

ID	Scenario	Objective	Pre-conditions	Test Steps	Test Data	Expected Result
TC_REMIND_01	Follow-up reminder	Ensure reminders trigger correctly	Gmail + Slack active	Set reminder, simulate delay	Reminder = 3h	Alert generated
TC_SENTI_01	Sentiment analysis	Validate emotion/urgency detection	NLP model active	Analyze strong message tone	“URGENT! Project failed”	Marked as urgent
TC_LOG_01	Audit trail logging	Ensure action logs recorded	Admin access	Perform actions, open log	Log entries	Accurate timestamps
TC_ACCESS_01	Access revocation	Check permission removal	Active session	Revoke Gmail access	Gmail token	Access denied message
TC_OFFLINE_01	Offline functionality	Validate limited offline support	Cached data available	Disconnect, run summary	Cached threads	Summary shown locally
TC_SECURITY_01	Token encryption	Verify secure local storage	Tokens issued	Inspect encrypted store	Access tokens	Encrypted securely

Table 4.2: Test Cases – Notifications, Security, and Reliability

4.3 Testing Outcomes

All modules passed functional testing. Minor issues (API rate limits, occasional STT inaccuracies) were mitigated with retry logic and confidence thresholds.

Chapter 5

Project Management (CLO4)

5.1 Timeline and Scheduling

- **Phase 1:** Requirements & Design (Weeks 1–4)
- **Phase 2:** Core Development (Weeks 5–9)
- **Phase 3:** Integration & Testing (Weeks 10–13)
- **Phase 4:** Documentation & Presentation (Weeks 14–16)

5.2 Risk Management

- **R1:** API token expiry → Mitigation: auto-refresh mechanism.
- **R2:** Voice recognition errors → Mitigation: adaptive thresholds.
- **R3:** Integration failures → Mitigation: retry and logging systems.

Chapter 6

Conclusion

The **WorkEase** system demonstrates how intelligent automation and multi-agent coordination can unify productivity platforms into a seamless, privacy-first workspace. With successful Slack–Gmail integration, voice automation, and contextual task handling, it significantly reduces manual workload. Future improvements include integrating more third-party APIs, advanced on-device LLMs, and community-driven agent extensions.