Project Proposal Report
AgentOS: An MCP-Native Operating System for Autonomous Multi-Agent AI Systems
Student: Kranthi Sai Gadi
Program: M.S. Applied Artificial Intelligence, Purdue University Northwest
Course: Special Problems in Applied AI (Independent Study)
Instructor: [Professor name]
Date: [Today's date]

1. Introduction
Large Language Models (LLMs) are evolving from dialogue systems to active tool-using agents. MCP offers a universal interface for secure interaction with external resources. This project proposes AgentOS, an operating-system-inspired multi-agent LLM environment built natively on MCP.

2. Problem Statement
Current AI agents lack unified tool access, standardized interaction, long-term reliability, and OS-like management. There is no kernel, scheduler, safety layer, or hierarchical memory system.

3. Proposed Solution: AgentOS
AgentOS treats:
• Agents as processes
• MCP tools as system resources
• Orchestrator as the kernel
• Memory tiers as OS-style memory
• Safety firewall as access control

4. Research Objectives
• Design OS-style agent architecture
• Build modular MCP tool ecosystem
• Implement scheduler for multi-agent processes
• Create hierarchical memory layers
• Add risk-scored trust & safety firewall
• Benchmark performance and autonomy

5. System Architecture
Core components:
• Agent Kernel
• MCP Tools Layer
• Multi-Agent Process Layer
• Hierarchical Memory System
• Zero-Trust Firewall
• Observability & Metrics Layer

6. Expected Outcomes
• Working AgentOS prototype
• Research paper with metrics
• Skills in MCP, multi-agent orchestration, OS concepts, hierarchical memory systems

7. Evaluation Plan
Metrics include:
• Latency, throughput, memory accuracy
• Reliability under long-running tasks
• Tool safety detections
• Comparisons with LangGraph, LangChain, CrewAI

8. Innovation
First MCP-native operating system for agents with hierarchical memory and zero-trust tool governance.

9. Project Timeline
Week-by-week schedule covering design, implementation, testing, and research paper writing.

10. Conclusion
AgentOS is a significant research contribution and strong applied AI project suitable for publication.