

AIML Engineer Assessment

ASSESSMENT INSTRUCTIONS

Position: AIML Engineer

STRICT 48-HOUR DEADLINE- NO EXTENSION GRANTED

Start Date: Sunday, 31 August 2025, 10AM IST

Submission Deadline: Tuesday, 2 September 2025, 10:00 AM IST

LATE SUBMISSIONS ARE DISQUALIFIED

Submission Requirements:

- **Format: Word Document(.docx)**
- **File Name: AIML_Assessment_ [Your_Name]_August 2025**
- **Email to: [career@purplemerit.com] with subject “AIML Assessment Submission-[Your_Name]”**

Assessment Overview

Marketing Multi-Agent System with Adaptive Memory

This advanced assessment challenges AIML engineering candidates with a hands-on scenario involving the design, implementation, and evaluation of an AI-driven, marketing-focused multi-agent system. Candidates are expected to demonstrate expertise in agent architecture, adaptive memory systems, collaborative agent communication, and robust engineering practices for real-world product delivery.

Scenario:

Purple Merit's client requires an autonomous marketing system with multiple specialized agents collaborating to optimize lead management, campaign execution, and customer engagement. The system should be capable of learning and adapting from ongoing interactions to improve future marketing outreach.

Task:

Build a 3-agent collaborative marketing system:

- Lead Triage Agent - Categorizes incoming marketing leads (e.g., Campaign Qualified, Cold Lead, General Inquiry)
- Engagement Agent - Manages personalized outreach, email campaigns, social media interactions, and lead nurturing
- Campaign Optimization Agent - Monitors campaign performance and adapts strategies or escalates to marketing managers for complex decisions

Technical Requirements:

- Implement MCP (Model Context Protocol) server/client for secure data access to marketing databases and analytics
- Use JSON-RPC 2.0 for inter-agent communication
- Support WebSocket and HTTP transport layers for real-time campaign updates
- Create agent handoff protocols preserving conversation and campaign context
- Include persistent memory for each agent to learn and improve marketing outreach

Adaptive Learning Agent Memory

Scenario: Design a sophisticated memory architecture to allow agents to adapt from customer interactions and improve over time.

Task:

Develop memory systems including:

- Short-term memory for current conversation contexts
- Long-term memory for customer history and preferences
- Episodic memory capturing successful problem-resolution patterns
- Semantic memory using domain knowledge graphs

Technical Requirements:

- Memory consolidation algorithms
- Graph databases for relationship and memory modeling
- Optimization for memory retrieval and sharing
- Memory compression to prevent overload

Assessment Deliverables

- Architecture Decision Records (ADRs) documenting key design choices
- API documentation with OpenAPI specifications
- Deployment runbooks for production operations
- Agent interaction analysis with conversation flow diagrams
- Security enhancement suggestions for production deployment
- Scalability analysis focusing on handling a 10x load increase

Deployment Setup - Production-Ready Configuration

Prepare a detailed design, plan, and production-ready deployment configuration for a multi-agent system in either marketing or sales. Your deployment setup should strictly follow the specifications and content provided earlier, ensuring the final implementation aligns precisely with the outlined requirements. Describe your approach to managing the deployment lifecycle and how you would validate that the system operates as expected in a production environment.

Documentation & Enhancement - Process Documentation

Task:

Create comprehensive system documentation and analysis including the following key deliverables:

- **Architecture Decision Records (ADRs):** Detailed documents capturing major design decisions, their context, rationale, and impact on the system.
- **API Documentation:** Complete specifications using OpenAPI standards to describe the interfaces, endpoints, and data models for the system's APIs.
- **Deployment Runbooks:** Step-by-step operational manuals to deploy, configure, and maintain the system in production environments.
- **Agent Interaction Analysis with Conversation Flow Diagrams:** Visual and analytical representations of how agents interact and manage conversations.
- **Security Enhancement Suggestions:** Recommendations and plans to harden the system's security posture for production readiness.
- **Scalability Analysis for 10x Load Increase:** Assessment and strategy to enable the system to handle a tenfold increase in load, identifying performance bottlenecks and optimization plans.

FINAL REMINDER: Submission Deadline is Tuesday, September 2, 2025, 10:00 AM IST - Exactly 48 hours from start time. Late submissions will not be considered.

Good luck! We look forward to reviewing your comprehensive and innovative approach.