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SPM
Assignment 2

1. Project Scope Statement

Agent Description

The **Loyalty Program Optimizer Agent (LPOA)** is an intelligent software agent that dynamically adapts loyalty incentives (discounts, points, offers) to customer behavior. It analyzes synthetic behavioral logs, segments users, predicts responsiveness to rewards, and optimizes incentive allocation for maximum customer retention and lifetime value.

Project Justification

Customer retention is essential for sustainable business growth. Traditional loyalty systems offer static rewards that fail to engage customers effectively. LPOA leverages adaptive learning and behavioral analysis to deliver personalized incentives that drive measurable improvements in retention rates and engagement.
This project demonstrates intelligent automation and data-driven decision-making — aligning with real-world marketing analytics and AI applications.

Product Characteristics

- Adaptive incentive recommendation engine.
- Integration with synthetic purchase logs.
- Dynamic rules and bandit-style optimization.
- A/B testing and performance dashboards.
- REST API for integration with demo retail platform.
- Metrics generation: redemption rate, uplift, retention delta.

Deliverables

1. Functional LPOA prototype (backend agent + APIs).
2. Synthetic dataset and schema documentation.
3. System design and architecture documentation.
4. Test reports (integration, user simulation).
5. Final project presentation and report.

Assumptions

- All data used will be synthetic or public — no private information.
- The project team has intermediate knowledge of data analysis, ML, and web integration.

- Supervisor agent will coordinate integration timelines and monitor milestones.

Constraints

- Completion within one academic semester (14 weeks).
- Limited access to cloud infrastructure — use local execution or institutional servers.
- All deliverables must comply with course data ethics guidelines.

2. Work Breakdown Structure (WBS)

Hierarchical Decomposition (Tabular Format)

Level	Task ID	Task Name	Description
1	1.0	Project Initiation	Define objectives, team roles, and project charter
2	1.1	Team Formation	Assign PM and technical leads
2	1.2	Charter Approval	Supervisor sign-off
1	2.0	Planning Phase	Develop scope, WBS, schedule
2	2.1	Requirements Analysis	Define data sources, incentive rules
2	2.2	Scope Definition	Finalize boundaries, success criteria
2	2.3	Gantt Chart Creation	Establish timeline and dependencies
1	3.0	Design & Architecture	System modeling and component design
2	3.1	Data Schema Design	Define synthetic dataset
2	3.2	API Specification	Define interfaces and endpoints
2	3.3	Agent Logic Design	Define reward selection logic
1	4.0	Implementation	Develop and test components
2	4.1	Data Generator	Implement data creation scripts
2	4.2	Agent Core Development	Build adaptive logic module
2	4.3	API & Dashboard	Integrate with frontend
1	5.0	Testing & Validation	Perform integration and performance tests

Level	Task ID	Task Name	Description
2	5.1	Unit Testing	Validate individual modules
2	5.2	Integration Testing	Check full system interaction
2	5.3	A/B Testing	Simulate incentive effectiveness
1	6.0	Documentation & Closing	Compile reports, lessons learned
2	6.1	Final Report	Document all findings
2	6.2	Presentation	Prepare demo and summary

3. Scope Management Plan

Scope Definition

The scope will be defined using the approved Project Charter, stakeholder input, and WBS. Each phase must produce tangible deliverables aligned with project goals.

Scope Validation

- Regular reviews with supervisor agent.
- Checklists for deliverable acceptance.
- Verification against success metrics (retention uplift, accuracy, completeness).

Scope Control

- Any scope changes require supervisor approval through a formal **Change Request Form**.
- Project manager tracks progress via Gantt chart and weekly meetings.
- Scope creep prevention through locked baseline WBS and timeline control.

Scope Change Strategy

- Identify deviation during sprint review.
- Evaluate impact on timeline and resources.
- Approve or reject change requests after cost-benefit analysis.

Stakeholder Alignment

- Supervisor and integration coordinator review milestones.
- Weekly status updates ensure expectations remain aligned.

4. Gantt Chart Overview

Task	Duration (Weeks)	Dependencies	Milestone
Project Initiation	0–1	None	Charter Approved
Requirements & Planning	1–3	1	Data Schema Finalized
Design & Architecture	3–5	2	Design Sign-off
Implementation	5–9	3	Alpha Prototype
Integration Testing	9–11	4	System Stable
User Testing	11–12.5	5	Metrics Collected
Final Deliverable	12.5–14	6	Project Closed

5. Scope Verification & Validation Report

Tools & Steps

1. **Inspection:** Supervisor agent reviews deliverables for completeness.
2. **Testing:** Automated unit and integration tests verify functionality.
3. **Demonstration:** Live demo showing adaptive incentive results.
4. **Documentation Review:** Ensure all artifacts (API docs, test logs) meet requirements.
5. **Sign-off:** Supervisor agent formally accepts deliverables.

Acceptance Criteria

- Agent provides measurable retention improvement in test runs.
- All APIs and dashboards function without critical errors.
- Reports are accurate and aligned with scope definition.

Relation to Five Project Scope Management Processes

Process	Action Taken
Plan Scope Management	Defined in Scope Management Plan
Collect Requirements	Gathered from charter and stakeholder inputs
Define Scope	Described in detailed Scope Statement
Validate Scope	Supervisor and PM reviews deliverables
Control Scope	Formal change control and monitoring

6. Task Assignment & Monitoring (Sample)

Task	Assigned To	Start	End	Status
Charter & Setup	PM	01-Sep	07-Sep	Completed
Requirements Gathering	Analyst	08-Sep	14-Sep	Completed
Data Schema & API Design	Developer 1	15-Sep	28-Sep	In Progress
Agent Logic Implementation	Developer 2	29-Sep	26-Oct	Not Started
Integration Testing	QA	27-Oct	09-Nov	Pending
Documentation & Presentation	All	10-Nov	24-Nov	Not Started