AI-102: Designing and Implementing a Microsoft Azure AI Solution

Multi-Agent System — Student Case Study

This document presents **three realistic student scenarios** that walk through the complete end-to-end flow of the Certification Prep Multi-Agent System. Each scenario covers: student profiling, personalised study plan generation, adaptive assessment, AI-powered verification, scoring, gap analysis, and the final readiness decision.

Component	Role
Learner Intake & Profiling	Converts student input → structured learner profile with skill gaps and time budget
1.1 Learning Path Planner	Maps AI-102 syllabus domains to Microsoft Learn modules and resources
1.2 Study Plan & Engagement Generator	Produces week-by-week schedule with milestones; sends reminders
2.1 Assessment Builder	Generates scenario-based questions tagged by domain and Bloom's level
2.2 Tiered Verifier + Repair Loop	Validates question quality, coverage, and safety; auto-repairs failures
2.3 Scoring Engine	Computes domain-level and overall scores deterministically
3.1 Gap Analyzer & Decision Policy	Ready if overall ≥ 75 % AND every domain ≥ 70 %; else → targeted remediation
3.2 Certification + Exam Planner	Guides student to book and sit the AI-102 exam with concrete next steps

Readiness thresholds: Overall score ≥ 75 % & All individual domains ≥ 70 %

SCENARIO 1

Priya Sharma — Fresh Graduate, Career Starter

1A. Student Profile

Name	Priya Sharma
Background	BSc Computer Science graduate (2025); strong Python basics; no prior Azure or AI services experience
Goal	Pass AI-102 to strengthen job applications for AI Engineer roles
Available time	10 hours/week over 10 weeks (100 hours total)
Declared gaps	No hands-on Azure experience; unfamiliar with Cognitive Services APIs; limited ML theory
Preferences	Prefers structured, linear learning; needs motivational reminders; hands-on labs important

1B. End-to-End Agent Flow

Agent	Action	Output / Decision
Learner Intake & Profiling	Parses Priya's free-text input; identifies zero Azure exposure, moderate Python, 10 hrs/wk budget	Profile: {level: beginner, azure_xp: 0, time_budget: 10h/wk, style: linear+labs, domains_at_risk: ALL}
1.1 Learning Path Planner	Maps all 6 AI-102 domains; assigns weights proportional to exam blueprint; anchors every module to Microsoft Learn paths	Ordered path: Fundamentals of AI → Azure AI Fundamentals → Cognitive Services → Vision → NLP → Generative AI. 18 Learn modules identified.
1.2 Study Plan & Engagement	Distributes 18 modules across 8 study weeks (2 exam-sim weeks reserved); sets weekly milestones; schedules 3× weekly reminders	10-week plan generated (see table below). Reminder cadence: Mon recap, Wed lab nudge, Fri milestone check.
2.1 Assessment Builder	After Wk 8 study plan completion signal → builds 60-question mock exam; tags each Q by domain + Bloom level (Apply/Analyse)	60 questions generated: 10 per domain. Mix: 40% scenario-based, 35% code-completion, 25% concept MCQ.
2.2 Tiered Verifier + Repair Loop	Tier-1: factual accuracy check (answer key vs. docs). Tier-2: coverage audit (each domain ≥ 8 Q). Tier-3: safety (no leaked exam content). 4 questions flagged → repaired → re-verified.	60/60 questions approved after 1 repair pass. Verifier confidence score: 0.94.
2.3 Scoring Engine	Priya completes the 60-question mock; engine scores each domain independently; computes weighted overall	See score breakdown table below.

Agent	Action	Output / Decision
3.1 Gap Analyzer & Decision Policy	Compares each domain score vs. 70 % threshold; flags NLP (62%) and Generative AI (58%) as gaps; applies overall ≥ 75 % gate	Decision: NOT READY. Remediation plan: 2 focused weeks on NLP + Gen AI modules + targeted re-assessment.
Remediation Loop (automatic)	System re-routes to Preparation block with narrowed scope: only NLP and Generative AI modules refreshed	New 2-week targeted plan generated. 30-question focused re-assessment built and verified.
2nd Assessment Cycle	Priya completes the 30-question targeted re-assessment	NLP: 74% → 78% | Gen AI: 58% → 76% | Overall: 68% → 79%
3.1 Gap Analyzer (2nd pass)	All domains now ≥ 70%; overall 79% ≥ 75%	Decision: READY. Routes to 3.2 Certification + Exam Planner.
3.2 Certification + Exam Planner	Generates exam booking checklist; recommends Pearson VUE online proctored exam; suggests final day-before review	Booking link, ID requirements, calm-down tips, and 2-hour quick-review cheat sheet delivered.

1C. Generated Study Plan (excerpt)

Week	Focus Domain	Microsoft Learn Modules	Milestone
Wk 1	Azure AI Fundamentals + Platform Overview	Intro to Azure AI • Azure AI Services overview • Responsible AI	Create Azure AI resource; call REST endpoint
Wk 2	Plan & Manage Azure AI Solutions	Authenticate & secure AI services • Monitor with Azure Monitor • Deploy containers	Deploy Cognitive Services container locally
Wk 3	Computer Vision	Azure AI Vision • Image Analysis • Face API • Custom Vision training	Build image classifier on custom dataset
Wk 4	Document Intelligence & Knowledge Mining	Azure AI Document Intelligence • Azure Cognitive Search • Custom skills	Extract structured data from PDF invoices
Wk 5	Natural Language Processing	Azure AI Language • Sentiment analysis • NER • Question answering	Build FAQ bot with CLU + QnA
Wk 6	Conversational AI + Bot Service	Azure Bot Service • Power Virtual Agents • Dialogues	Deploy FAQ bot to Teams channel
Wk 7	Generative AI + Azure OpenAI	Azure OpenAI Service • Prompt engineering • RAG patterns • Content filters	Build RAG app with Azure OpenAI + Cognitive Search
Wk 8	Revision + Mock Exam	Full syllabus revision using flash cards • 60-question mock exam	Complete system mock exam → trigger assessment agent
Wk 9–10	Targeted Remediation (NLP + Gen AI)	Deepen NLP modules • Azure OpenAI advanced patterns	30-question focused re-assessment → READY

1D. Assessment Scores

Domain	Score %	Threshold	Status
Plan & Manage Azure AI Solutions	**82%**	70%	✓ Pass
Implement Computer Vision Solutions	**78%**	70%	✓ Pass
Implement NLP Solutions	**62%**	70%	✗ Gap
Implement Document Intelligence	**71%**	70%	✓ Pass
Implement Conversational AI Solutions	**75%**	70%	✓ Pass
Implement Generative AI Solutions	**58%**	70%	✗ Gap
OVERALL	**68%**	75%	✗ NOT READY

↑ After first assessment. Two domains below 70% threshold triggered remediation loop.

1E. Final Decision

DECISION	**✓ READY TO SIT AI-102 (after remediation cycle)** 2nd cycle scores: NLP 78% | Gen AI 76% | Overall 79%. All domains > 70%, overall > 75%. Estimated time from start to ready: 10 weeks. Booking recommendation: Pearson VUE online proctored.

SCENARIO 2

Marcus Chen — Cloud Solutions Architect, Fast-Track

2A. Student Profile

Name	Marcus Chen
Background	5 years as Cloud Solutions Architect; deep Azure infrastructure expertise (AZ-104, AZ-305 certified); no AI/ML certifications
Goal	Add AI-102 to badge wall before Q1 performance review; wants fast-track focused prep
Available time	15 hours/week over 3 weeks (45 hours total)
Declared gaps	AI-specific services (Vision, NLP, Gen AI); responsible AI governance; Azure OpenAI Service details
Preferences	Skips basics he already knows; wants reference cards; assessment-heavy approach to identitfy gaps fast

2B. End-to-End Agent Flow

Agent	Action	Output / Decision
Learner Intake & Profiling	Detects existing AZ-104/AZ-305 certs; maps Azure platform knowledge as 'known'; flags AI services domains as priority gaps	Profile: {level: advanced_azure, ai_xp: low, time_budget: 15h/wk x3, style: gap-focused+reference, skip_modules: [platform_basics, auth_security]}
1.1 Learning Path Planner	Skips 4 already-mastered modules (auth, monitoring, containers, deployment); focuses path on AI-specific domains only	Compressed path: 8 modules (was 18). Azure AI Vision, NLP, Document Intelligence, OpenAI Service, Responsible AI governance.
1.2 Study Plan & Engagement	Builds aggressive 3-week plan; front-loads hardest domains; schedules diagnostics at end of week 1	3-week plan with daily 2-hour blocks. Mid-point diagnostic at end of Week 1 to validate pace.
Week 1 Diagnostic Assessment	After 5 days of study, system triggers an early 30-question diagnostic to check pace and identify any surprises	Diagnostic: Vision 85%, NLP 71%, Gen AI 55%, Responsible AI 68%. Gen AI flagged as bigger gap than expected.
Plan Adaptation	Gap Analyzer compares diagnostic vs. thresholds; triggers partial replan for Week 2 to allocate extra 3 hours to Gen AI	Revised Week 2: +3h Azure OpenAI deep-dive; -3h Vision (already strong). Dynamic replan delivered.
2.1 Assessment Builder	After Week 3 study → builds 50-question final mock; skips pure infrastructure Qs; heavier weighting on AI service config + security	50 questions: 35% Gen AI, 25% NLP, 20% Vision, 10% Document Intelligence, 10% Responsible AI.
2.2 Tiered Verifier + Repair Loop	All 50 questions pass Tier-1 and Tier-2. 2 Gen AI questions flagged for potential answer ambiguity → repaired.	50/50 approved after 1 repair pass. Verifier confidence: 0.97.

Agent	Action	Output / Decision
2.3 Scoring Engine	Marcus completes mock exam	See score table below. All domains pass on first attempt.
3.1 Gap Analyzer & Decision Policy	All domains ≥ 70%, overall ≥ 75%	Decision: READY. No remediation needed. Routes directly to Certification Planner.
3.2 Certification + Exam Planner	Generates fast-track booking checklist; recommends earliest available slot (within 5 days); provides 2-page reference card	Same-week exam booking recommended. Reference cards: Azure AI service endpoints, exam time-management tips.

2C. Generated Study Plan

Week	Focus Domain	Microsoft Learn Modules	Milestone
Wk 1	Azure AI Vision + Document Intelligence	Azure AI Vision (Image Analysis, Face, OCR) • Document Intelligence models • Custom Vision	Build invoice extraction pipeline; mid-week diagnostic quiz
Wk 2	NLP + Conversational AI + Responsible AI	Azure AI Language • CLU • Bot Service • Responsible AI principles • Content Safety	Build + deploy CLU model; Responsible AI assessment quiz
Wk 3	Generative AI + Azure OpenAI Service	Azure OpenAI: models, deployments, prompt engineering • RAG architecture • Content filters • BYOD	RAG prototype with Cognitive Search; 50-question final mock exam

2D. Assessment Scores

Domain	Score %	Threshold	Status
Plan & Manage Azure AI Solutions	**91%**	70%	✓ **Pass**
Implement Computer Vision Solutions	**83%**	70%	✓ **Pass**
Implement NLP Solutions	**76%**	70%	✓ **Pass**
Implement Document Intelligence	**79%**	70%	✓ **Pass**
Implement Conversational AI Solutions	**74%**	70%	✓ **Pass**
Implement Generative AI Solutions	**72%**	70%	✓ **Pass**
OVERALL	**79%**	75%	✓ **READY**

All domains ≥ 70%, overall 79% ≥ 75%. First-attempt pass. Total prep time: 3 weeks.

2E. Final Decision

DECISION

✓ READY TO SIT AI-102 — First Attempt

All 6 domains cleared ≥ 70%. Overall 79%. No remediation required. Fast-track route completed in 3 weeks / 45 hours. Exam booking recommended within 5 days.

SCENARIO 3

Sarah Al-Rashid — Data Scientist, ML-to-Azure Bridge

3A. Student Profile

Name	Sarah Al-Rashid
Background	Senior Data Scientist at a retail enterprise; 7 years scikit-learn / PyTorch / Jupyter; Azure ML workspace experience but no Cognitive Services usage
Goal	Formalise and certify Azure AI knowledge to lead company's AI-102 compliance programme
Available time	8 hours/week over 5 weeks (40 hours total)
Declared gaps	Azure Cognitive Services (non-ML), Bot Service, Document Intelligence, Responsible AI policies in enterprise context
Preferences	Learns by doing; likes API-first exploration; wants to map new concepts to familiar ML equivalents

3B. End-to-End Agent Flow

Agent	Action	Output / Decision
Learner Intake & Profiling	Recognises ML/data science background; maps Azure ML experience as partial credit for 'Plan & Manage' domain; flags Cognitive Services and Bot Service as cold-start gaps	Profile: {level: expert_ml, azure_ml: yes, cognitive_services: no, bot_service: no, time_budget: 8h/wk x5, style: api-first+analogies}
1.1 Learning Path Planner	Generates ML→Azure AI analogy map (e.g., scikit-learn pipeline ↔ Azure ML Pipeline; custom model ↔ Custom Vision); skips basic ML theory; emphasises service configuration and REST/SDK usage	Tailored path: 11 modules with ML-to-Azure bridging commentary. Analogy reference card auto-generated.
1.2 Study Plan & Engagement	5-week plan with API-first labs each week; learning style annotation (show SDK code before portal steps); end-of-week reflection prompts	5-week plan with 3 lab sessions/week. Reflection prompts: 'How does this differ from your PyTorch pipeline?'
Week 2 Early Diagnostic	System detects Sarah completed Week 1+2 modules ahead of schedule; triggers early 20-question diagnostic	Vision: 90%, Document Intelligence: 62%, NLP: 84%, Bot: 55%. Bot Service identified as major gap.
Plan Adaptation	Decision Policy identifies Bot Service below threshold; re-allocates Week 3 to focus on Bot Service + CLU integration; compresses Vision (already strong)	Dynamic replan: Week 3 becomes Bot Service deep-dive. Vision revision moved to Week 5 quick-review.
2.1 Assessment Builder	After Week 5 → builds 55-question enterprise-flavoured mock; includes policy/governance scenarios relevant to a senior practitioner	55 questions: 20% enterprise governance, 20% NLP, 20% Bot, 20% Vision+Doc Intel, 20% Gen AI. All tagged with enterprise context.

Agent	Action	Output / Decision
2.2 Tiered Verifier + Repair Loop	Tier-1 flags 3 governance questions as potentially ambiguous due to policy version mismatch → repaired using latest Responsible AI docs. All 55 pass after repair.	55/55 approved. 3 questions updated to reference 2025 Responsible AI Standard v2. Verifier confidence: 0.96.
2.3 Scoring Engine	Sarah completes 55-question mock	See score table below.
3.1 Gap Analyzer & Decision Policy	Bot Service (68%) marginally below 70% threshold; all others pass	Decision: NOT READY. Targeted 1-week remediation: Bot Service + CLU only. 20-question focused re-assessment.
Remediation Loop (Bot Service only)	1-week focused plan: Bot Framework Composer, CLU channel integration, Adaptive Dialogs lab	Bot Service score: 68% → 77%. Overall: 78% → 80%.
3.1 Gap Analyzer (2nd pass)	All domains ≥ 70%, overall 80% ≥ 75%	Decision: READY. Routes to Certification Planner.
3.2 Certification + Exam Planner	Generates enterprise-context exam booking; suggests case-study review of real-world Responsible AI governance; provides 90-day re-cert reminder	Exam booked. Enterprise governance quick-reference delivered. 90-day renewal reminder set.

3C. Generated Study Plan

Week	Focus Domain	Microsoft Learn Modules	Milestone
Wk 1	Azure AI Foundations + Vision (API-first)	Azure AI Services SDK deep-dive • Image Analysis REST • Custom Vision Python SDK	Build image classifier with Custom Vision Python SDK
Wk 2	NLP + Document Intelligence (SDK mapping to sklearn)	Azure AI Language SDK (vs. NLTK/spaCy) • Document Intelligence Python SDK	Extract + classify financial docs; map to existing sklearn pipeline
Wk 3	Bot Service + CLU Deep-Dive (dynamic replan)	Bot Framework Composer • CLU channel deployment • Adaptive Dialogs	Deploy enterprise FAQ bot with CLU; connect to Teams
Wk 4	Generative AI + Azure OpenAI (enterprise)	Azure OpenAI API • RAG + Cognitive Search • Content Safety • BYOD governance	Build RAG-powered enterprise search; apply content filters
Wk 5	Responsible AI + Revision + Mock Exam	Responsible AI Standard v2 • Fairness / Reliability / Privacy • Enterprise governance case studies	Complete 55-question enterprise mock → Scoring Engine

3D. Assessment Scores

Domain	Score %	Threshold	Status
Plan & Manage Azure AI Solutions	**86%**	70%	✓ **Pass**
Implement Computer Vision Solutions	**88%**	70%	✓ **Pass**

Domain	Score %	Threshold	Status
Implement NLP Solutions	**82%**	70%	✓ **Pass**
Implement Document Intelligence	**75%**	70%	✓ **Pass**
Implement Conversational AI Solutions	**68%**	70%	✗ **Gap**
Implement Generative AI Solutions	**77%**	70%	✓ **Pass**
OVERALL	**78%**	75%	✓ **READY**

↑ After first assessment. Bot Service (68%) marginally below 70% → 1-week targeted remediation triggered.

3E. Final Decision

DECISION	**✓ READY TO SIT AI-102 (after 1-week remediation)** After Bot Service remediation: Conversational AI 77% | Overall 80%. All domains ≥ 70%. Total time: 6 weeks / 48 hours. Enterprise governance reference card delivered.

Cross-Scenario Comparison

Attribute	Priya (Beginner)	Marcus (Azure Pro)	Sarah (Data Scientist)
Target weeks	10 weeks	3 weeks	5 weeks
Hours/week	10 h/wk	15 h/wk	8 h/wk
Modules skipped	None (all 18)	4 of 18 (known)	7 of 18 (ML basics)
Assessment questions	60 Q + 30 Q remediation	30 Q diagnostic + 50 Q final	20 Q early diag + 55 Q final + 20 Q remediation
Verifier repair passes	1 pass (4 Q fixed)	1 pass (2 Q fixed)	1 pass (3 Q fixed)
Remediation cycles	1 cycle (NLP + Gen AI)	None — first attempt pass	1 cycle (Bot Service only)
Final overall score	79% (after remediation)	79% (first attempt)	80% (after remediation)
Dynamic replan triggered?	No	Yes (Week 2, Gen AI extra)	Yes (Week 3, Bot deep-dive)
Exam readiness	**✓ Ready — Wk 10**	**✓ Ready — Wk 3**	**✓ Ready — Wk 6**

Key Design Observations

1. Personalisation at intake: The Learner Profiling agent's ability to skip known content was the single biggest factor in Marcus completing prep in 3 weeks vs. Priya's 10 weeks. Skill-graph inference from declared certifications saved ~28 hours of redundant study.

2. Dynamic replan (adaptive loop): Both Marcus and Sarah benefited from mid-course diagnostic assessments that triggered plan revisions before the final mock. This prevented exam-day surprises and corrected trajectory 2–3 weeks early.

3. Tiered Verifier value: In all three scenarios the Verifier caught between 2–4 content errors before they reached the student. Sarah's scenario highlighted a real-world risk: policy-version drift in Responsible AI questions — the Verifier's doc-anchoring check caught this automatically.

4. Surgical remediation: The Gap Analyzer recommended domain-specific remediation (not a full retake) in both Priya's and Sarah's cases. This reduced extra prep time to 1–2 weeks instead of a full second cycle, preserving motivation.

5. Threshold gate enforcement: The 70%/75% policy was the system's most opinionated component. It correctly held Priya back despite an improving trend, ensuring she sat the exam only when domain-level confidence was verified.