Agentic AI: Foundations and Development

Mid-term Exam (Total: 120 points)

May 8, 2025

1. Multiple choice / Multiple select questions (12 points)

   (1) Which of the following are considered Agentic Reasoning Design Patterns? Select all that apply. (3 points)
   - A. Planning
   - B. Prompt Injection
   - C. Tool Use
   - D. Reflection
   - E. Few-shot Learning
   - F. Multi-agent Collaboration
   - G. Memorization
   - H. Chain-of-Thought

   (2) Which of the following correctly describes one of the main components of the SGP-TOD architecture? (3 points)
   - A. The LLM tracks user dialogue states and generates SQL queries to access the database.
   - B. The DST Prompter generates system responses based on user intent and slots.
   - C. The Policy Prompter defines system behavior based on dialogue state and database outputs.
   - D. The LLM converts raw data into structured schema definitions.

   (3) What is the main function of Belief Instructions (BI) in the SGP-TOD system? (3 points)
   - A. To help the model determine the tone of response (e.g., formal vs. casual)
   - B. To assist the model in understanding user intent and tracking dialogue state
   - C. To define the format of pretraining data required for task-oriented dialogues
   - D. To describe the structure and field names of the underlying database

   (4) When the database returns no results in the SGP-TOD system, what is the typical response of the Policy Prompter? (3 points)
   - A. Automatically switch to a different task domain
   - B. Ask the user to provide additional preference information
   - C. End the conversation and show a "no data found" message
   - D. Re-ask the same question to confirm user intent

2. In the Mixture of Experts (MoE) architecture, what mechanism is used to select experts, and how does this architecture achieve parameter efficiency? (10 points)

3. Explain what tasks Tree of Thoughts (ToT) can solve but Chain of Thought (CoT) can not. Provide one type of task you believe would benefit from ToT. (10 points)

4. Briefly compare the main differences between ReAct agents and Act-Only agents in handling tasks, and explain how ReAct agents improve task performance (4 points). Suppose an agent needs to submit a booking form to the library, where each item can only be reserved for one student. Define the action space for the agent (4 points). Describe a simple workflow for a ReAct agent in this task, including at least two thought steps, two actions, and two observation results, to show how it ensures a correct answer. Feel free to propose other reasonable actions that align with the task (6 points).

5. Every major AI player — OpenAI, Anthropic, Google — is quietly betting that whoever defines these protocols will shape the future agent ecosystem. To understand why this matters, it's important to distinguish what each protocol contributes. Based on your understanding from the course (and reference notes if needed), fill in the missing cells for Function Calling and MCP (14 points), following the column for A2A.

	Function Calling	**MCP**	**A2A**
What it solves	(1) 2 points	(4) 2 points	Agent → Agent collaboration
Good for	(2) 2 points	(5) 2 points	Distributed multi-agent workflows
Pain points	(3) 2 points	(6) 2 points	Still early days, limited support
Real-world analogy	Telling LLM how to email and make a phone call	(7) 2 points	Having teams of bots working together like coworkers

6. Explain the design principle of AutoGen and the three primary ways that can drive agents' movement. For each method, provide at least one specific capability or characteristic it enables in the agent. (10 points)

7. Briefly describe the main differences between the LATS (Language Agent Tree Search) method and the traditional Chain of Thought (CoT) reasoning approach. What are the advantages and disadvantages of these differences? (10 points)

8. What is robotic process automation (RPA)? How can LLMs improve RPA? (10 points)

9. Explain how the schema-guided dialog (SGD) corpus is constructed and what problem it solves. (10 points)

10. In addition to API function calling, what methods could agents use to interact with the environment in digital worlds? (10 points)

11. GraphRAG uses LLMs to extract triplets (entity, relation, entity) from text and builds a graph where nodes represent entities and edges represent semantic relations. What are the main differences between Local Search and Global Search in GraphRAG? (8 points) Briefly describe their retrieval scope and information characteristics, and name one type of task where Local Search would be more appropriate. (2 points)