Olympia Summit 2026 PANEL: Ontology and Agent Memory — Turning Research into Product Capabilities

Towards Graph-native LLMs and Agentic Systems: Rethinking the AI Harness

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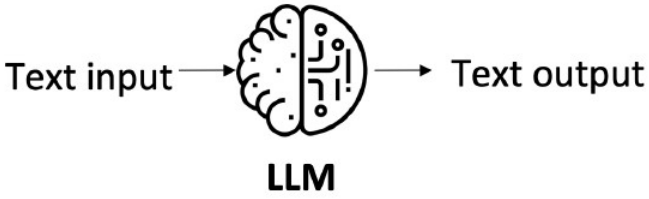
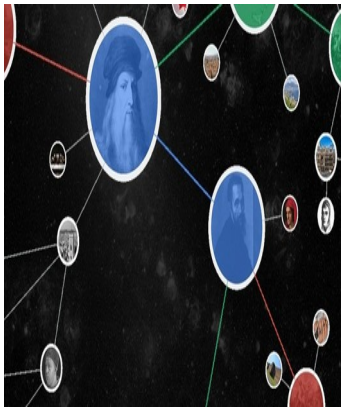
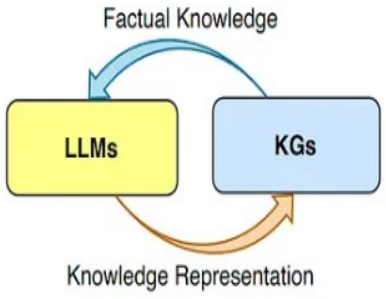
LLMs and knowledge graphs are **synergistic**, not competing – KGs ground LLMs with verifiable knowledge, and LLMs help build and reason over graphs. Graphs can also serve as the backbone of the **AI harness** (memory, planning, tool use, guardrails) around LLM agents, enabling graph-native agents that are more reliable, explainable, and effective for data integration and scientific discovery.

LLMs, AI Agents, Knowledge Graphs

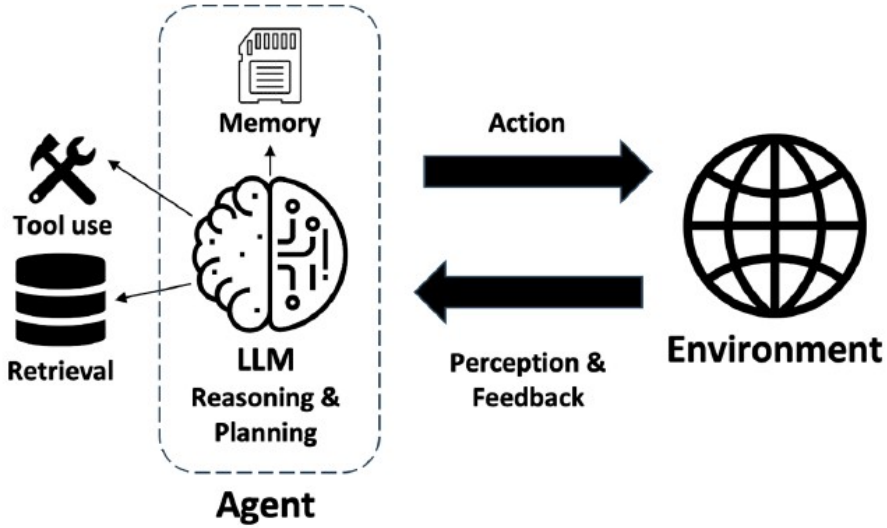




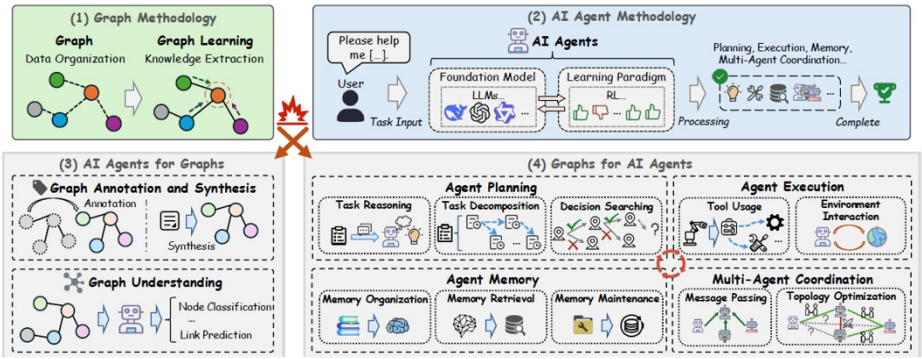
Knowledge Graph



LLM + KG



Graphs Meet AI Agents [Bei et al., https://arxiv.org/abs/2506.18019]



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Our Focus: Synergy

1. LLMs for Graphs

2. Graphs for LLMs

3. Knowledge Graphs for LLM ✓

4. LLMs for Knowledge Graphs

5. Graphs for AI Agent ✓

6. AI Agents for Graphs

7. Graphs/KGs + LLMs/Agents for Science (e.g., Ecology and Environmental Science)

PAKDD 2026 (Tutorial): A. Khan, L. Sun, and X. Huang, "***LLMs+Graphs: Toward Graph-Native, Synergistic AI Systems***".
https://llms-graphs.github.io/

Knowledge Graphs for LLMs

- KGs as background knowledge for LLMs
- KGs as reasoning guidelines for LLMs
- KGs as refiners and validators for LLMs
- LLM+KG for domain-specific applications (e.g., data integration, question answering)

Graph RAG

KG RAG

AI Guardrails

Explainable AI

AI Reliability and Responsibility

SIGMOD 2027: C. Ma, Z. Zhang, A. Khan, S. Schelter, and P. Groth, "***Cost-Efficient RAG for Entity Matching with LLMs: A Blocking-based Exploration***". https://arxiv.org/abs/2602.05708

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Graphs for AI Agents

- Agent Interaction With Task Planning Graphs
- Agent Interaction With Task Execution Graphs
- Agent Interaction With Memory Graphs
- Multi-Agent Coordination Graphs

Graph of-Thought

Tool Calling Graph

Graph-based Agentic Memory

Agentic Social Network

F. Li, A. Khan, Z. Shi, P. Fang, F. Wang, and D. Feng, "***GraphToolBench: Benchmarking LLMs for Sequential Graph Comprehension and Conflict Identification in Tool Learning***" https://openreview.net/forum?id=OnWhe1Zl1Q

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AI Harness and Graph Data Management



Graphs for AI Agents

Graph Schema and Task Planning Graph

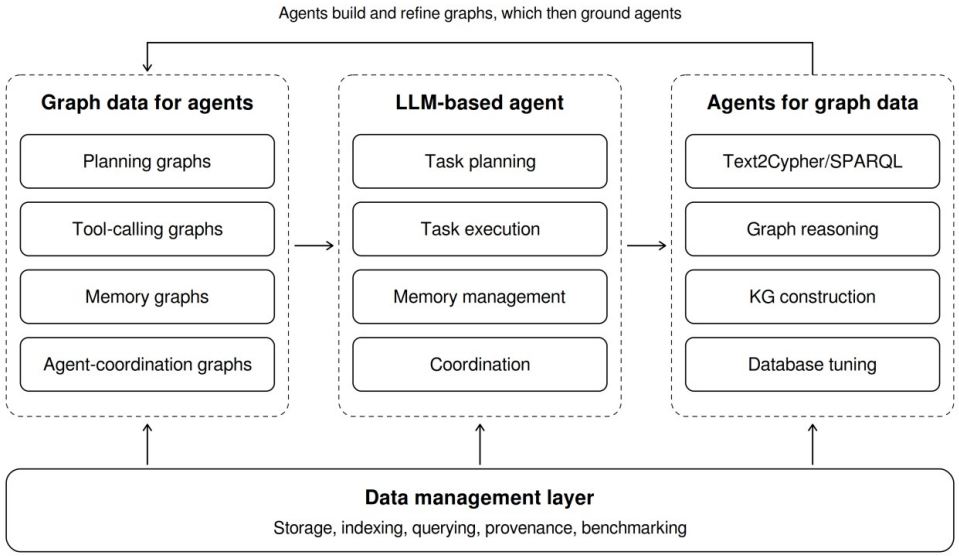
- Schemas serve as "planning" abstractions for humans, facilitating the understanding, retrieval, and exploration of graphs
- Task Planning Graph serves as a planning "schema" that enables AI agents to execute a given task.

Graph Queries and Task Execution Graph

- Graph queries enable humans to navigate graph data through query execution
- Task Execution Graphs enable agents to navigate relevant data through task execution.

Graph Data and Memory Graph

- Graph data interactions enable humans to explore and retrieve information
- Memory graph interactions enable agents to explore and retrieve contextual knowledge.



VLDB 2026 (Tutorial): Sourav S Bhowmick, **Arijit Khan**, and Byron Choi, "From Human-Graph to Agent-Graph Interaction: State of the Art and Future Directions"

Agents + Graph workshop (VLDB 2026): Yixiang Fang, **Arijit Khan,** Da Yan, Tianxing Wu

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