

# DynaGraph: Cross-Domain Task Automation by AI Agents

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## Motivation

- Enterprises adopt AI agents but often **rebuild similar patterns** (task decomposition, orchestration, oversight).
- Current systems **lack scalability** and **offer opaque reasoning**, insufficient trust.
- Needed a **standardized yet flexible framework** to scale across domains, automate tasks efficiently, and ensure transparency.

💡 How can we design a **scalable, trustworthy agentic framework** for enterprise workflows?

## Solution : DynaGraph Framework

Graph-based orchestration framework (built on LangGraph)

Planning : Decompose tasks into action blocks

Execution : Automate actions with optional Human-in-the-Loop

Response & Tracking : Response and generate execution trace

Context Memory : Maintain multi-turn interaction seamlessly

Action Blocks (Extendable depends on business domain)

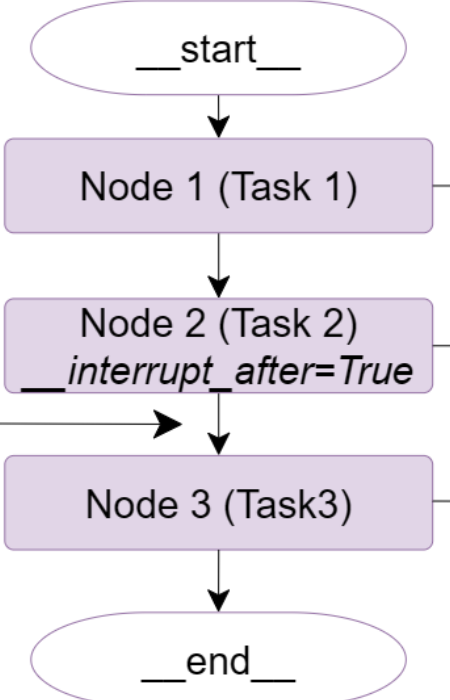
Reasoning

Web Search

Vector DB Search

SQL Generation / Execution

Email Composition / Management

User Layer (Requests & HITL)	Agent Orchestrator (Planner / Executor)	Chat Memory	External System (Tools/APIs)
User Request	<b>Phase 1. Task Planning</b> <ul style="list-style-type: none"><li>- Parse intent</li><li>- Choose appropriate agents &amp; specific action</li><li>- Build Execution DAG (LangGraph)</li><li>- Place HITL checkpoints (before/after nodes)</li></ul>	<b>Read</b> <ul style="list-style-type: none"><li>- Previous actions</li></ul> <b>Update</b> <ul style="list-style-type: none"><li>- Task plan</li></ul>	
HITL (interrupt_after Node2)	<b>Phase 2. Task Execution (LangGraph DAG)</b> <div></div>	<b>Read</b> <ul style="list-style-type: none"><li>- Task plan</li></ul> <b>Update</b> <ul style="list-style-type: none"><li>- Action result</li></ul> <b>Update</b> <ul style="list-style-type: none"><li>- Action result</li></ul> <b>Update</b> <ul style="list-style-type: none"><li>- Action result</li></ul>	<b>Tool or API</b> <b>Tool or API</b> <b>Tool or API</b>
Final Response Trace Diagram	<b>Phase 3. Response Generation &amp; Tracing</b> <ul style="list-style-type: none"><li>- Generate Final Response</li><li>- Return Trace Diagram</li></ul>	<b>Update</b> <ul style="list-style-type: none"><li>- Final Response</li></ul>	

## Case Studies

### Customer Service Automation

Check the order status #2002 and sent the result to this client email. Email address is woojin@gmail.com

SQL QUERY GENERATION

SQL QUERY EXECUTION

EMAIL COMPOSITION

EMAIL SEND

RESPONSE GENERATION

Generate SQL query to retrieve order status for order #2002

Execute the generated SQL query to get order status

Compose email content with order status detail

Send email with order status to woojin@gmail.com

Confirmation message for user

Approve

Approve

I've checked the status of order #2002 and sent the details to this email address (woojin@gmail.com). Here's what I found and did:

1. I retrieved the order information from the database.

2. Found that **order #2002 has been shipped**.

3. Sent you a detailed email with the following information:

- Order was placed on June 21, 2024
- Shipped on June 22, 2024
- Shipping carrier: FedEx (Tracking number: FEDX2024062101)

The **email has been successfully delivered** to inbox. Is there anything else you'd like to know about your order?

### Procurement Decision Support

We need to replenish Aluminum Frame for Mountain Explorer Pro model. What is current stock/available quantity and max stock level? Among suppliers that previously fulfilled this component, who is the best choice and why?

SQL QUERY GENERATION

SQL QUERY EXECUTION

REASONING

RESPONSE GENERATION

Generate SQL query to get current stock and max stock level for Aluminum Mountain Frame

Execute query to get current stock information

Analyze supplier performance data to determine the best supplier based on factors like delivery time, price, quality, and reliability

Compile comprehensive response including current stock levels, max stock levels, and supplier recommendation with justification

Approve

Both *Nippon Alloy Co.* and *Asian Components Ltd* have prior transaction history, but **Nippon stands out as the stronger choice**.

Quality: 4.6 vs 4.2; defects 0.83% vs 1.70%

Reliability: 4.7 vs 4.5

Delivery: 9 days vs 14 days

Cost: \$160 vs \$163.50

While Nippon has fewer past orders (1 vs 2), its superior quality, reliability, speed, and cost make it the best overall supplier.

### HR Policy Compliance

How does our company's severance policy for 5+ year employees comply with Korean labor law, and are there any gaps we need to address?

WEB SEARCH

VECTOR DB SEARCH

REASONING

RESPONSE GENERATION

Search for current Korean labor law requirements regarding severance pay

Search company documents for current severance policy for 5+ year employees

Compare Korean labor law requirements with company policy to identify compliance and gaps

Provide comprehensive response about compliance status and recommend actions.

Approve

**Korean Labor Law:**

- Requires 30 days' average wage x years of service
- For 5+ years : ≥ 5 months average wage, paid within 14 days.

**Our Policy:**

- 2 months base salary +2 weeks per extra year (cap: 6 months)
- Base salary only, payment within 30 days.

**Gaps:**

Our payout is too low, calculated only on base salary instead of average wage, and the payment deadline is longer than the legal requirements.

## Business Value

- Scalability** : One architecture, multiple domains → Reduce development / operational cost
- Efficiency** : Automates multi-step workflows → Reduce execution time & User burden.
- Transparency** : Human oversight & Traceability → Boost trust and verifiability for enterprise adoption
- Adaptability** : Modular tools → Easily extendable to new use cases.

