Transportation Agent

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Current Section

Crash Analysis Agent

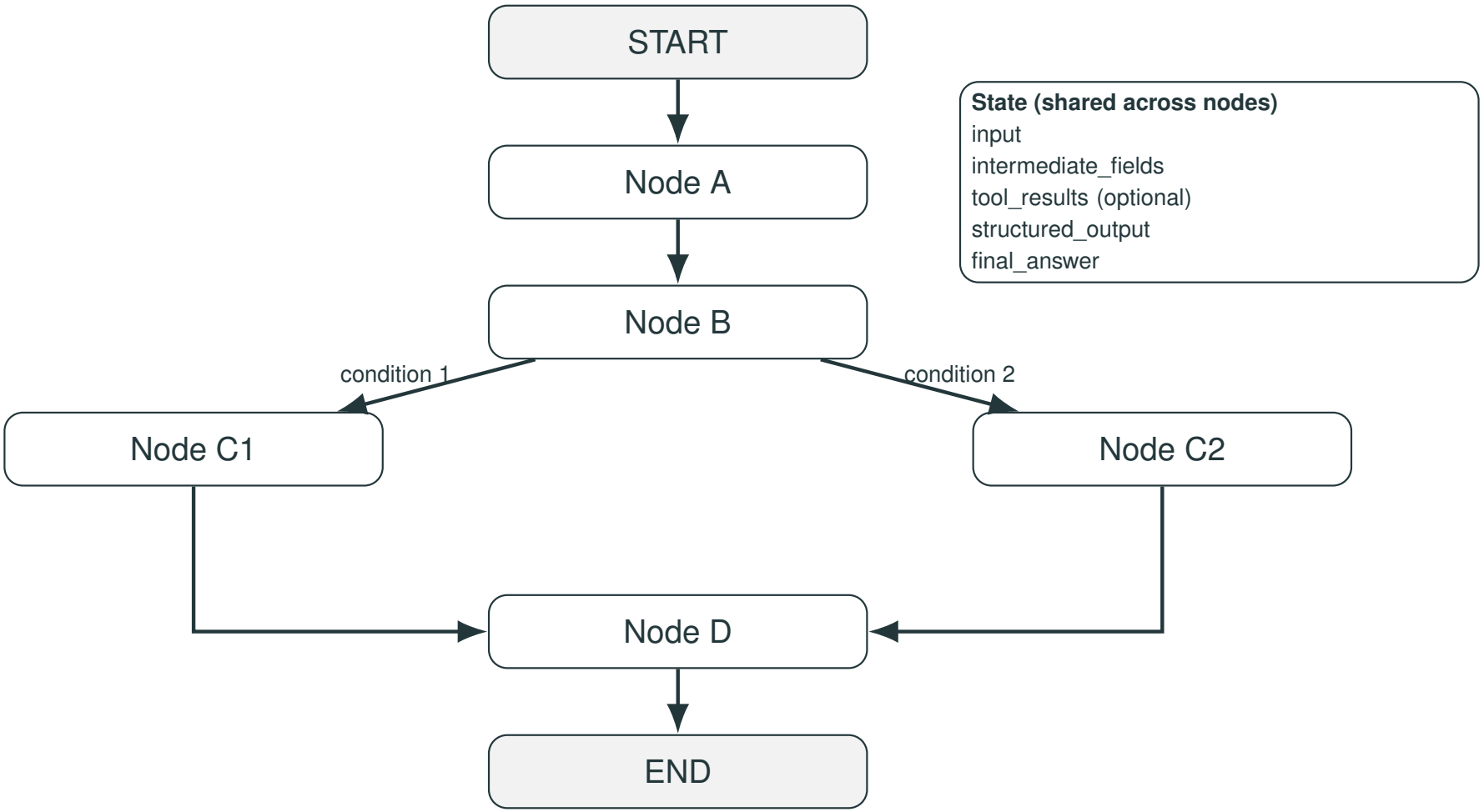
Project Overview

- Built a LangGraph LLM agent that converts structured crash records into evidence-linked contributing-factor reports.
- Implemented data enrichment pipeline: external context proxies (e.g., retail density, nightlife concentration).
- Added an MLOps design.
- Developing adaptive logic so factor explanations evolve with seasonality/policy/road changes

Demo System Architecture

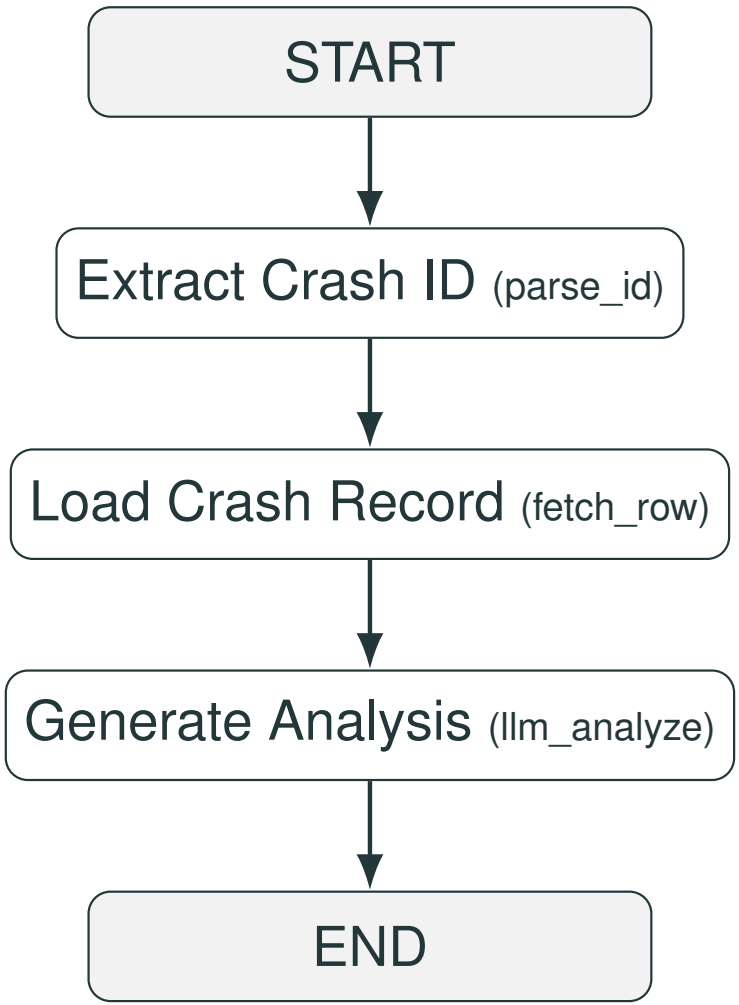
- Orchestrated multi-step reasoning with LangGraph (modular node graph).
- Components:
  - Record retrieval layer (query by crash ID).
  - LLM analysis layer (structured factor inference).
  - Output layer (report).

How LangGraph Works (General Illustration)



Each node reads/writes the same State; edges decide the next node (including branching).

LangGraph: State Evolution (Full State)



State
query="analyze crash 171125248"
id=None
record=None
analysis=None

State
query="analyze crash 171125248"
id=171125248
record=None
analysis=None

State
query="analyze crash 171125248"
id=171125248
record={coded fields from dataset...}
analysis=None

State
query="analyze crash 171125248"
id=171125248
record={coded fields from dataset...}
analysis={summary, factors, evidence, gaps}

State
query="analyze crash 171125248"
id=171125248
record={coded fields from dataset...}
analysis={printed report (human-readable)}

Demo Result

Input

```
analyze crash 171125248
```

Brief Output

```
=== Crash Summary ===
Single-vehicle motorcycle crash.

=== Top Possible Contributing Factors ===
1) Loss of control
   confidence: high
   evidence: ...

2) ...

=== Data Gaps ===
- SPEED_BEFORE missing; environment/roadway fields not available
```