

ETi / InfAI: Text2Sparql Agent

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Ingredients

- ReAct, Agentic LLM with tool support
- Adopted from SPINACH[1]
 - Semantic Search
 - with Qdrant
 - Graph Inspection
 - on Qlever via RPT[2]
- Team effort

[1] Liu et al. 2024: “SPINACH: SPARQL-Based Information Navigation for Challenging Real-World Questions”

[2]<https://github.com/SmartDataAnalytics/RdfProcessingToolkit>



What is the highest mountain in Germany?

Used Intermediate thoughts ^

- Used Step 1: search_wikidata
- Used Step 2: search_wikidata
- Used Step 3: get_wikidata_entry
- Used Step 4: execute_sparql

The highest mountain in Germany is Zugspitze, with an elevation of 2962 meters.

Here is the SPARQL query used:

```
Raw code
SELECT ?mountain ?mountainLabel ?elevation WHERE {
  wd:Q183 p:P610 ?statement.
  ?statement ps:P610 ?mountain;
  pq:P2044 ?elevation.
  SERVICE wikibase:label { bd:serviceParam wikibase:language
"[AUTO_LANGUAGE],en". }
```

Try it on Wikidata Query Service

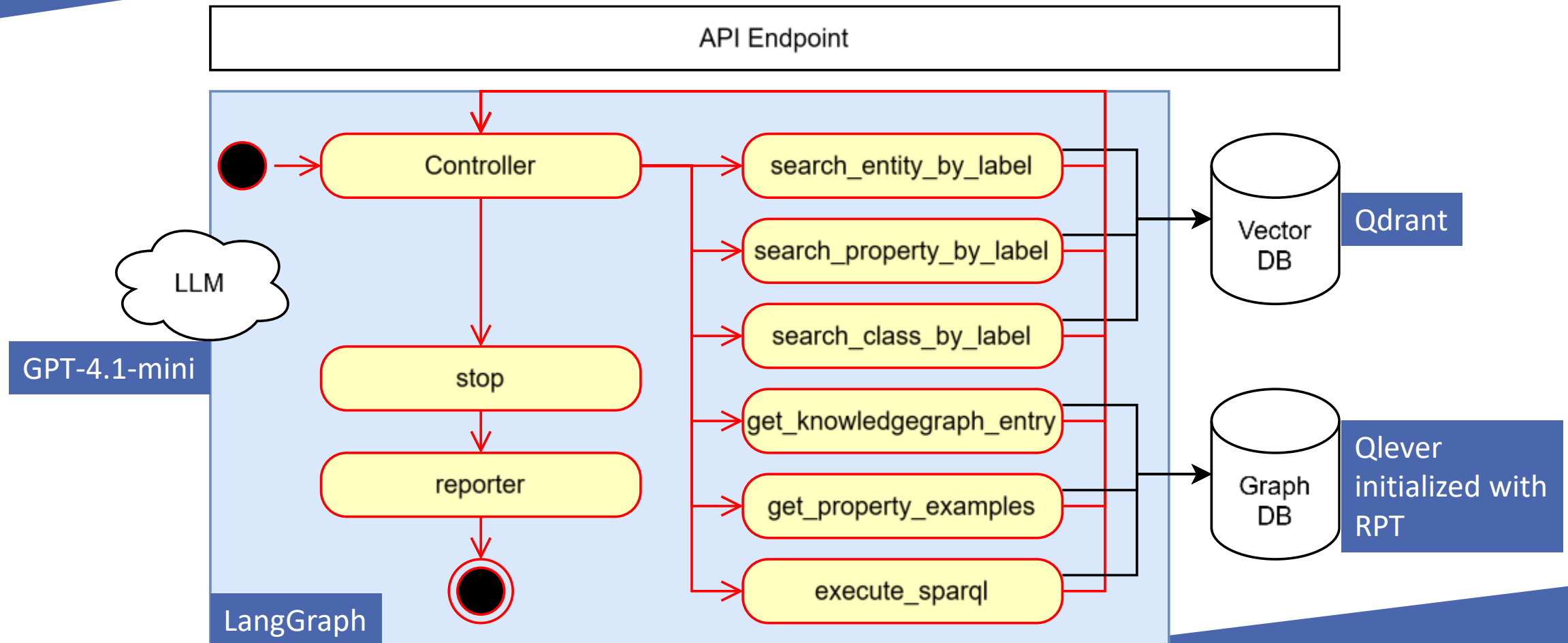
Result:

- Mountain: Zugspitze (Q3375)
- Elevation: 2962 meters

spinach_output...

Screenshot from <https://spinach.genie.stanford.edu/>

architecture



- adoption / generalization of spinach code & prompts
- Semantic Search (Vector-DB) with Qdrant
- Triple Store (Qlever with RPT)
- LLM evaluation and testing
- Integration with API

	DB25-en	DB25-es	CK25
Set-Precision	0.66	0.21	0.41
Set-Recall	0.53	0.26	0.54
Set-F1-score	0.55	0.21	0.44
NDCG	0.39	0.20	1.00
Set-F-NDCG	0.55	0.21	0.45

[3] Meyer et al. 2025: “LLM-KG-Bench 3.0”

Discussion

- Slow approach
 - Reduce/Combine steps?
- Query sometimes optimized for answer
 - Prompt optimization / restrictive ?
- For DB-ES often answers on es.dbpedia.org
- Approach similar to human expert
- Fast adoption thanks to RPT[2]

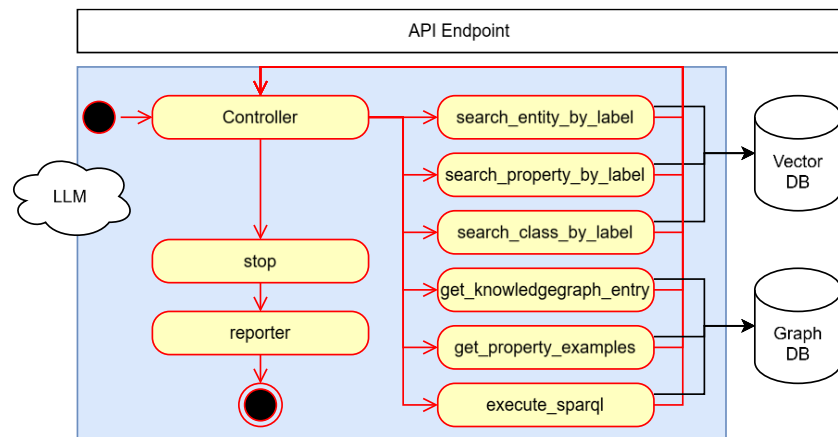
Who is the mayor of biggest city in saxony?

```
SELECT ?mayor {  
  dbr:Leipzig dbp:mayor ?mayor .  
}
```

```
SELECT ?c {  
  BIND (dbr:Burkhard_Jung AS ?c)  
}
```

Summary

- Based on SPINACH[1]
- LangGraph + Vector DB + graph inspection



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