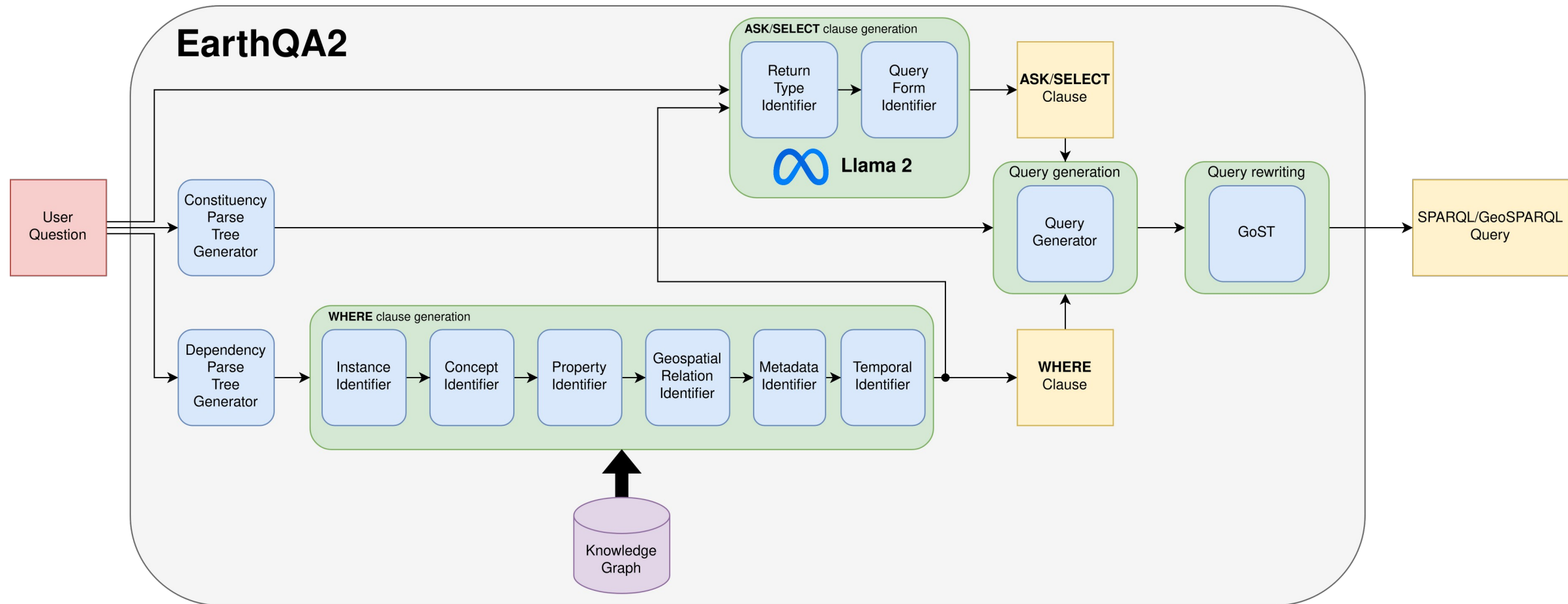


WP2.1 Design and development of innovative NLP Query Engines

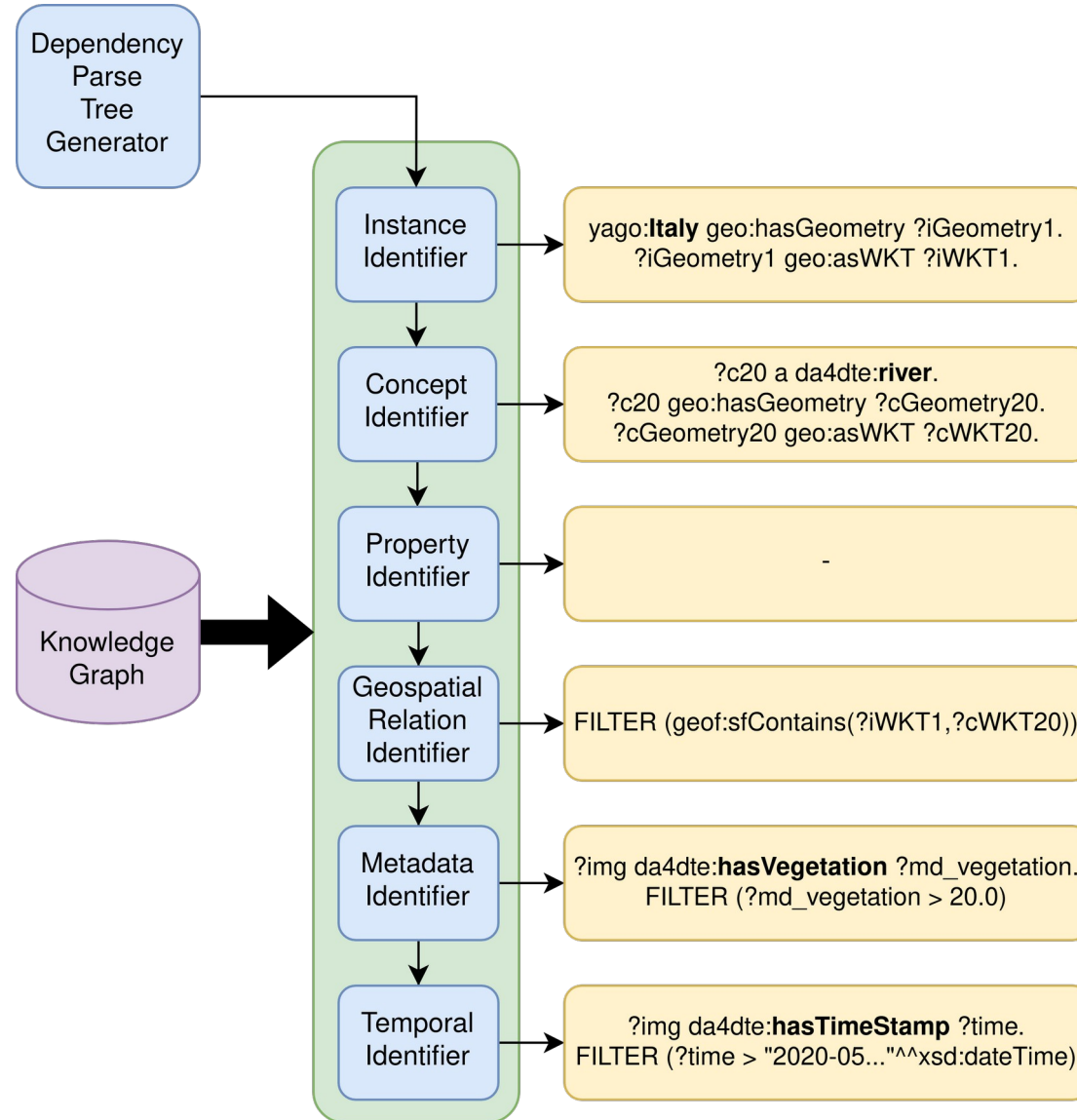
EarthQA2 Architectural Overview:



WP2.1 Design and development of innovative NLP Query Engines

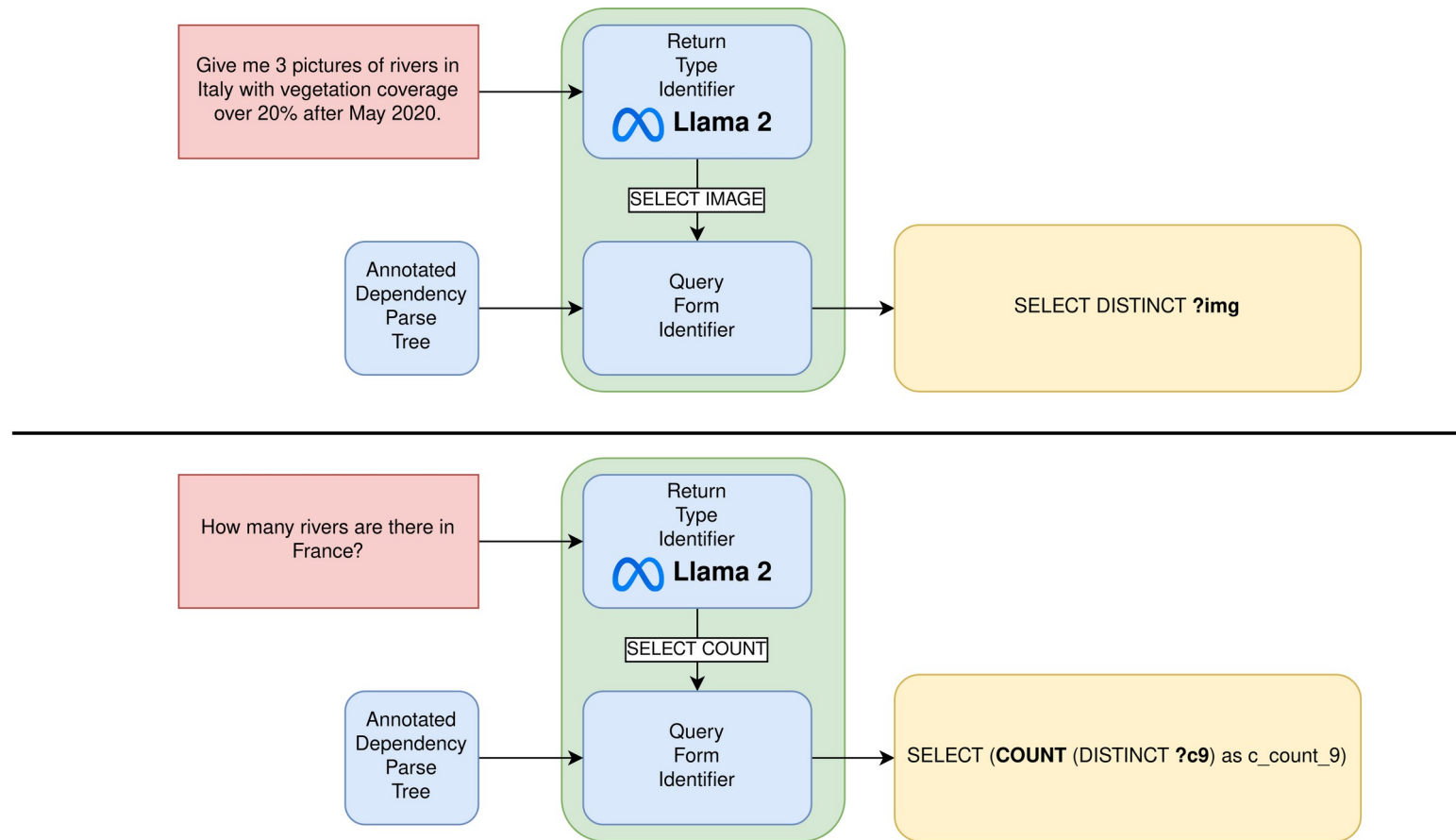
EarthQA2: **WHERE** clause generation

- Each component is responsible for identifying a specific feature-type of interest and generating the appropriate SPARQL/GeoSPARQL statements.
- All components save information as annotations on the dependency parse tree.
- A number of heuristics and semantic parsing algorithms are employed to achieve each individual task.



WP2.1 Design and development of innovative NLP Query Engines

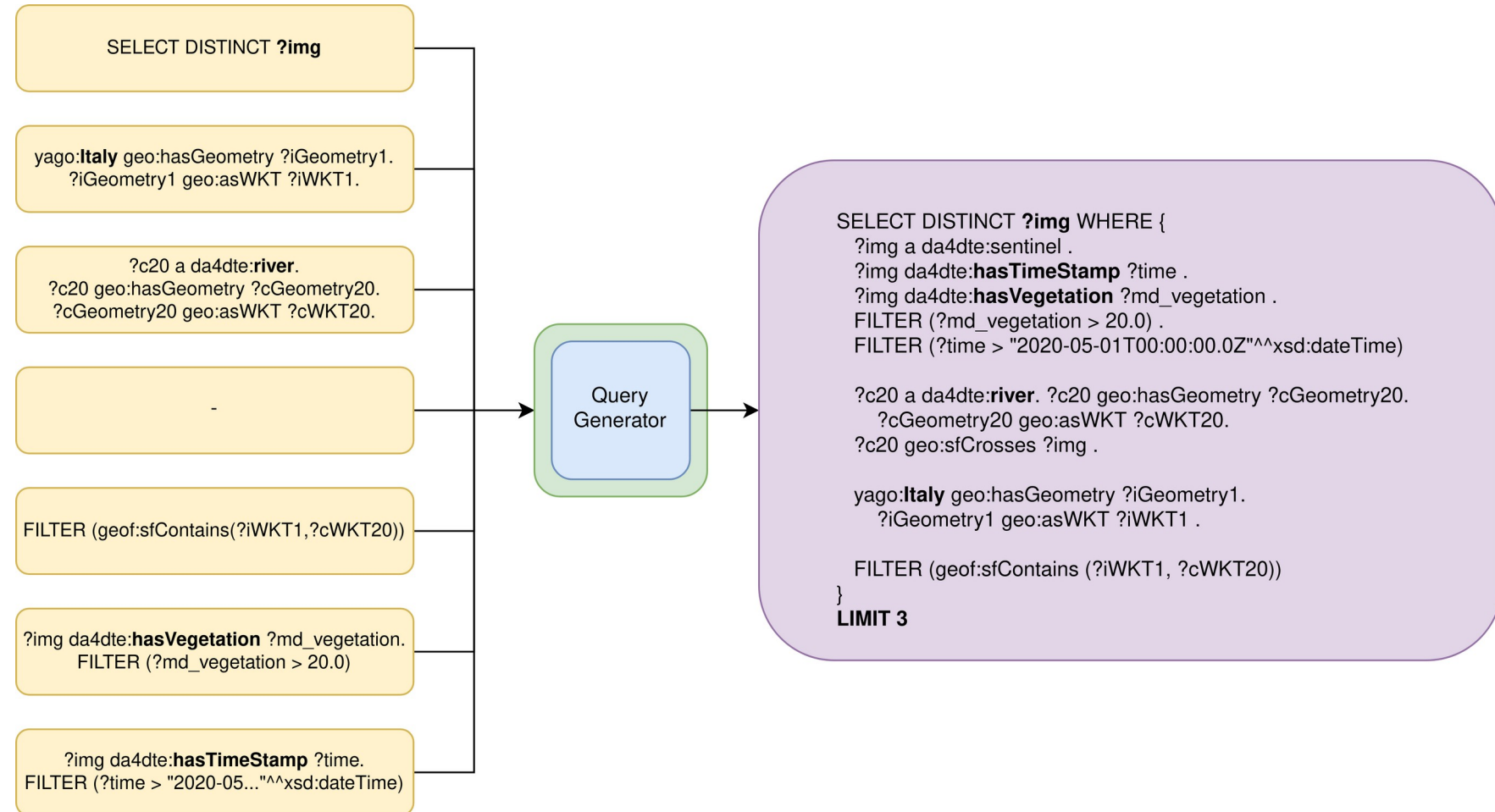
EarthQA2: ASK/SELECT clause generation



WP2.1 Design and development of innovative NLP Query Engines

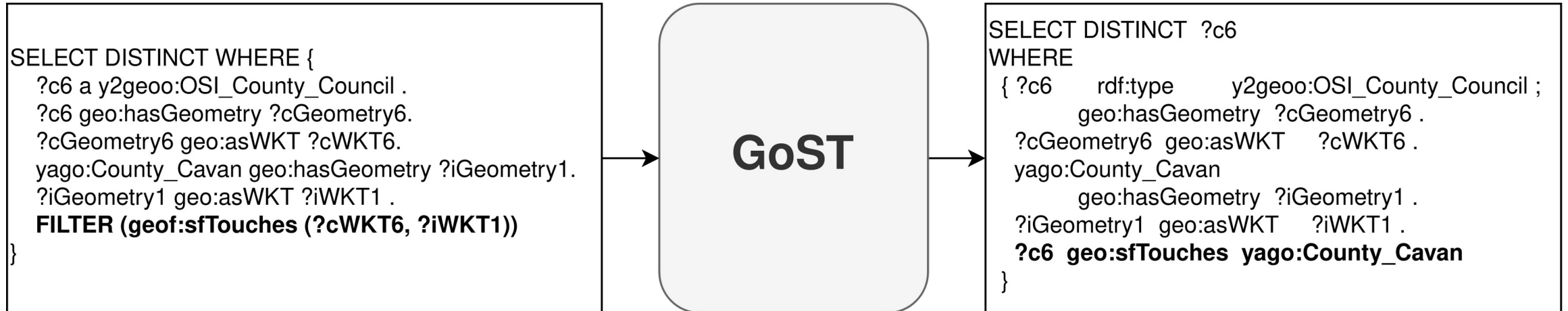
EarthQA2: Query generation

- Combines previously generated SPARQL blocks.
- Handles additional SPARQL constructs:
 - LIMIT
 - GROUP BY
 - ORDER BY
- Produces an executable query.



WP2.1 Design and development of innovative NLP Query Engines

EarthQA2: Query rewriting



- Filters that contain materialized geospatial relations are rewritten.
- Implemented as a standalone transpiler that has been integrated as an EarthQA2 component.

- <https://github.com/AI-team-UoA/GoST>

WP2.1 Design and development of innovative NLP Query Engines

Benchmarking EarthQA2 and modern geospatial QA engines on GeoQuestions1089

Category	Hamzei et al.		GeoQA2		EarthQA2	
	Generated	Correct	Generated	Correct	Generated	Correct
A	89.71%	10.85%	84%	47.42%	77.08%	56%
B	95.68%	53.23%	76.25%	58.99%	91.79%	57.50%
C	97.75%	30.33%	79.21%	44.38%	87.09%	45.46%
D	100%	12%	56%	12%	88%	24%
E	99.25%	7.40%	80%	31.85%	94.77%	34.80%
F	79.16%	4.10%	66.66%	16.66%	85.71%	8.33%
G	98.27%	11.49%	74.13%	32.18%	88.35%	33.90%
H	97.18%	7.74%	71.12%	26.05%	85.96%	29.50%
I	92%	0%	84%	20%	72.72%	24%
Total	95.77%	18.97%	76.99%	38.54%	87.03%	41.38%

- 7.3% improvement over the state of the art which has been refined over a number of years.
- We believe that the next version of EarthQA2 will show significant performance improvement.