

Enterprise Text-to-SQL is significantly more challenging than public datasets because of its greater query and schema complexity, yet addressing it is essential for enabling real-world enterprise adoption.

Challenges of enterprise text-to-SQL

1 High query complexity due to nesting and joins

User intent: A librarian wants to report statistics about the library.  
User task: *For each department, list the name of the department, ..., the total number of materials available in the library for the department, the total number of instructors per library book for the department, and the total number of available materials across all departments.*

```
WITH TIPMaterials AS(  
  SELECT tm.TITLE AS TIP_Title, tm.ISBN AS TIP_ISBN,  
  tm.AUTHOR AS TIP_AUTHOR, tso.OFFER_DEPT_NAME AS  
  TIP_Department  
  FROM TIP_MATERIAL tm  
  JOIN TIP_DETAIL td ON tm.TIP_MATERIAL_KEY =  
  td.TIP_MATERIAL_KEY  
  JOIN TIP_SUBJECT_OFFERED tso ON  
  td.TIP_SUBJECT_OFFERED_KEY = tso.TIP_SUBJECT_OFFERED_KEY)
```

```
InstructorCounts AS (...)  
  
DepartmentMaterials AS (...)  
  
SELECT (...) FROM TIPMaterials  
JOIN InstructorCounts JOIN  
DepartmentMaterials JOIN ...
```

2 High schema complexity due to domain-specific knowledge

User question:  
What is the building street address for Building 32?

*Building\_Address*

ID	Number	Name	Purpose
B1	68	Heroic St.	Street
B1	32	Hope St.	Mail
B2	54	Bank St.	Package
...	...	...	...

*Buildings*

ID	Name
B1	Student Center
B2	Education Center
...	...

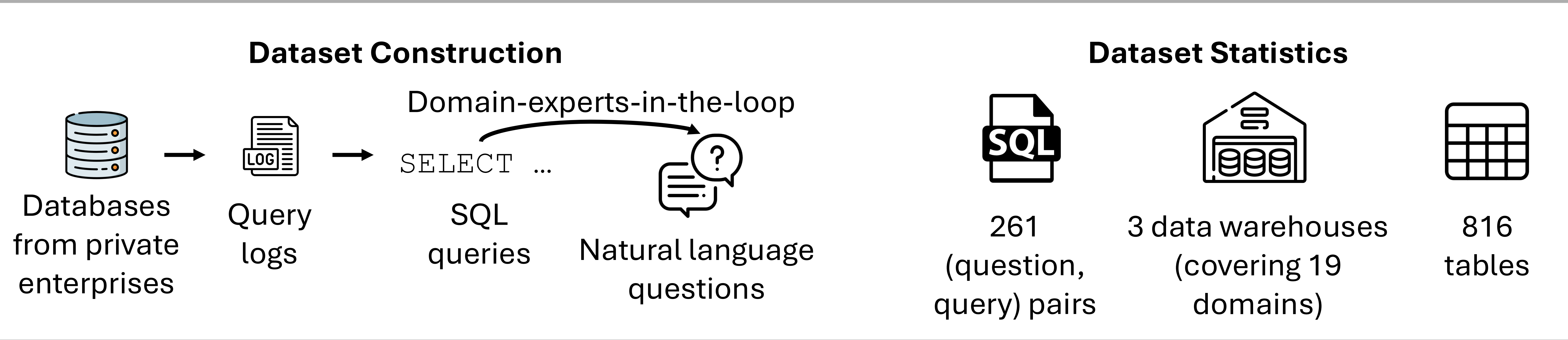
Predicted SQL statement using GPT-4o

```
SELECT ba.Number ||  
ba.Name FROM  
Buildings_Address ba  
JOIN Buildings b ON  
ba.ID = b.ID WHERE  
b.Name = 32
```

Gold SQL statement

```
SELECT ba.Number ||  
ba.Name FROM  
Buildings_Address ba JOIN  
Buildings b ON ba.ID =  
b.ID WHERE  
ba.Purpose = 'Street' and  
b.Name = 'Stata Center'
```

- Incorrect column mapping: GPT-4o is not aware that the same building can have multiple addresses for different purposes and thus failed to link street address to column *Purpose* and Instance ‘*Street*’
- Incorrect instance mapping: GPT-4o cannot link *Building 32* to *Stata Center*



Results	End-to-end execution accuracy				End-to-end execution accuracy improves with gold tables (GT), gold column mappings (M), gold join keys (J)					
		Spider	Bird	BEAVER	GPT	Qwen2.5-It		Llama3.1-It		
					4o	72B	Coder-32B	70B	8B	
	GPT-4o	69.5	30.9	3.83	Base	3.83	4.21	1.92	1.15	0.0
	Qwen2.5-72B-It	69.9	28.6	4.21	Base + GT	7.28	6.13	4.21	5.36	0.77
	Qwen2.5-32B-It	71.7	27.7	1.92	Base + GT + M	8.43	6.90	8.05	2.30	2.68
Llama3.1-70B-It	60.3	25.8	1.15	Base + GT + M + J	10.3	8.05	7.66	5.75	4.21	
Llama3.1-8B-It	51.1	13.8	0							