Hu-Fu: A Data Federation System for Secure Spatial Queries

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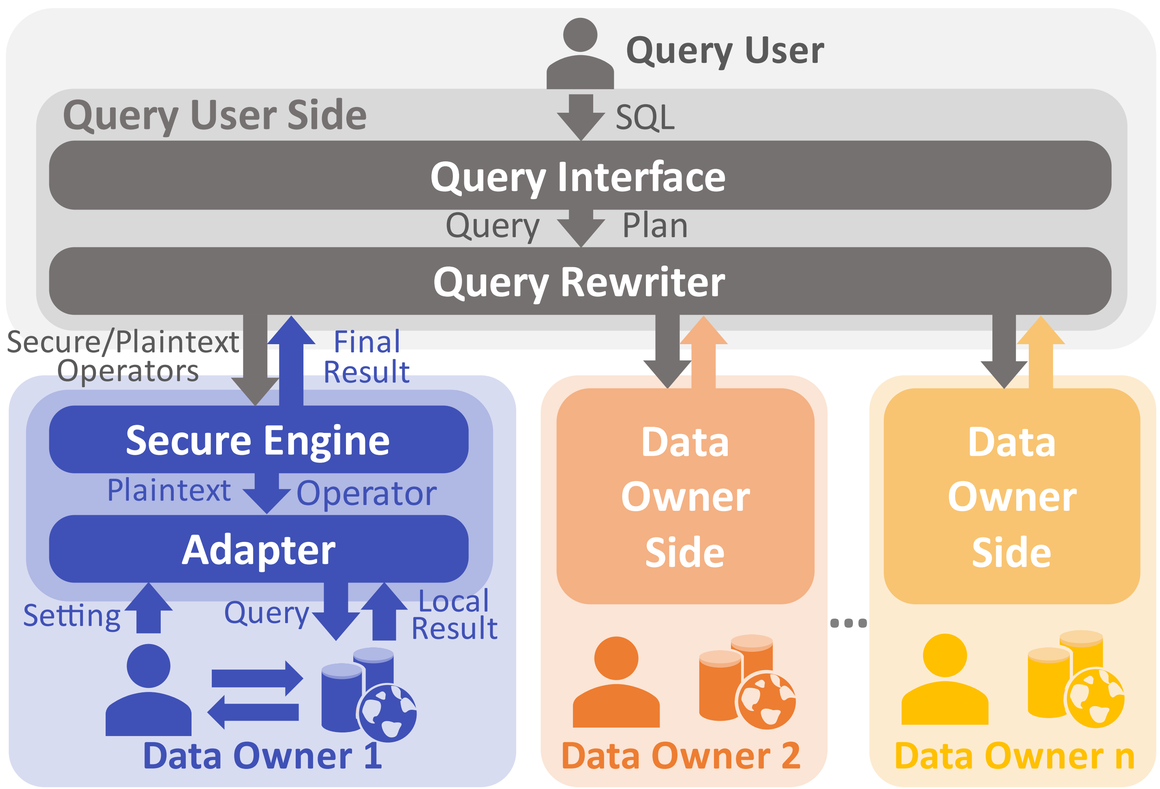
Introduction

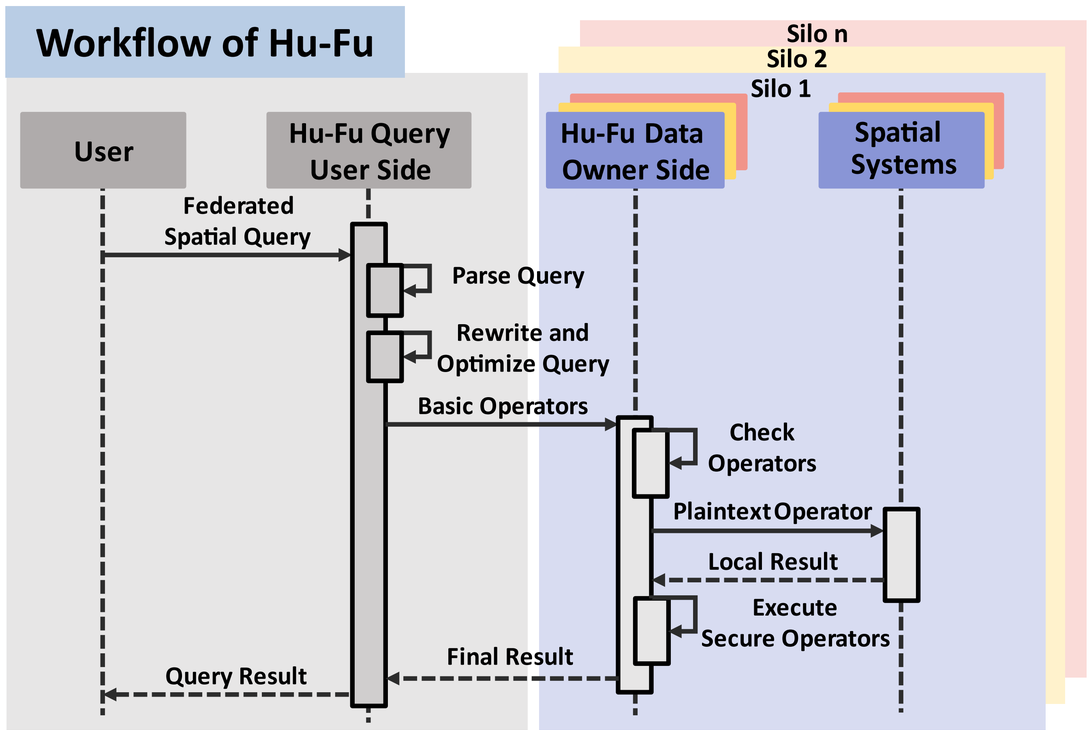
- Spatial queries are essential for a wide spectrum of applications, but data isolation has become an obstacle to scale up query processing due to security concerns

- A promising paradigm to tackle the data isolation problem is to perform secure queries over a data federation
- Existing data federation systems are inefficient on spatial queries due to
  - excessive secure distance operations for query processing
  - usage of general-purpose SMC libraries for secure operation implementation

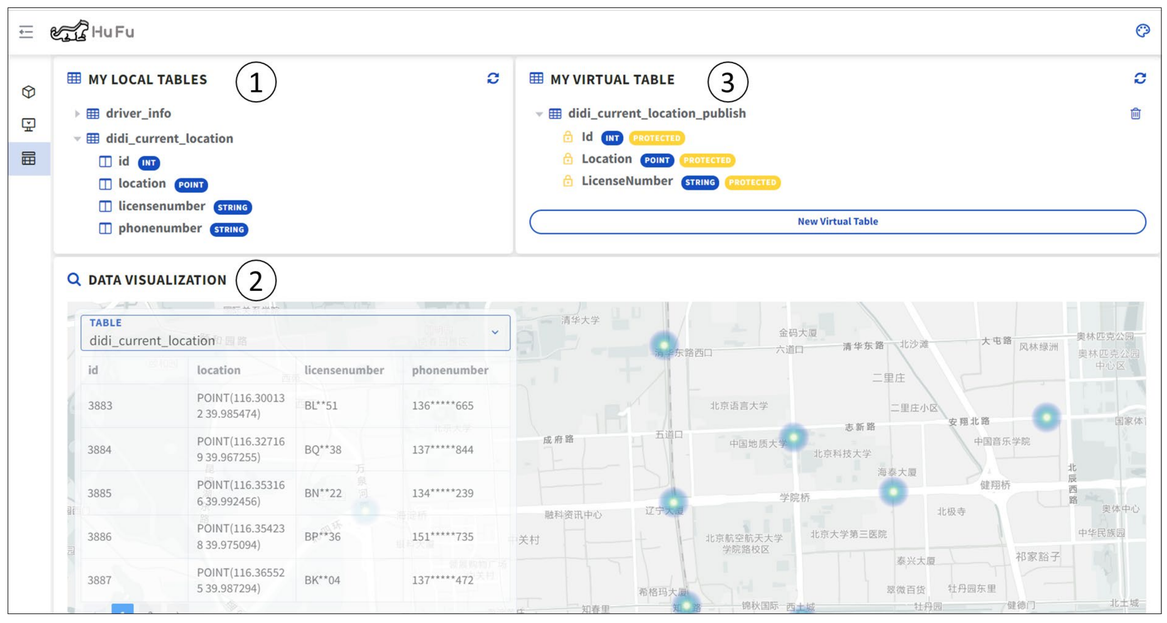
Hu-Fu Overview



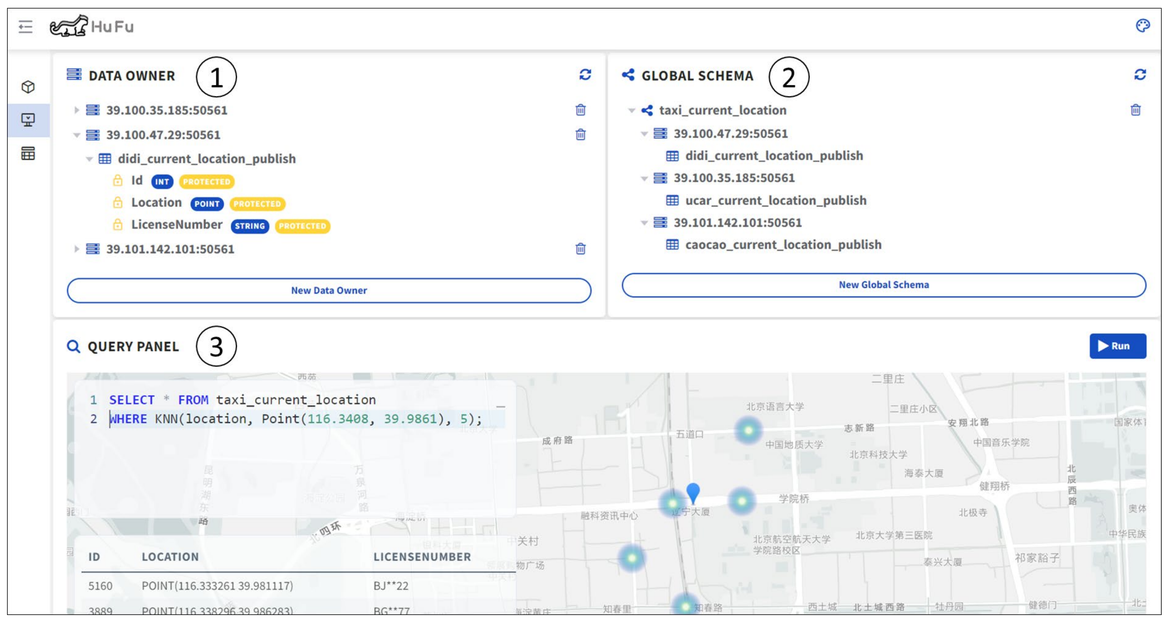
- **Data Owner Side:** Defines and implements plaintext / secure operators and interfaces on top of the heterogeneous databases of individual data owners for efficient and easy-to-use federated spatial query execution.
- **Query User Side:** Parse the federated spatial queries input by the query user and decompose query plans into as many plaintext operators and as few secure operators as possible without compromising security.



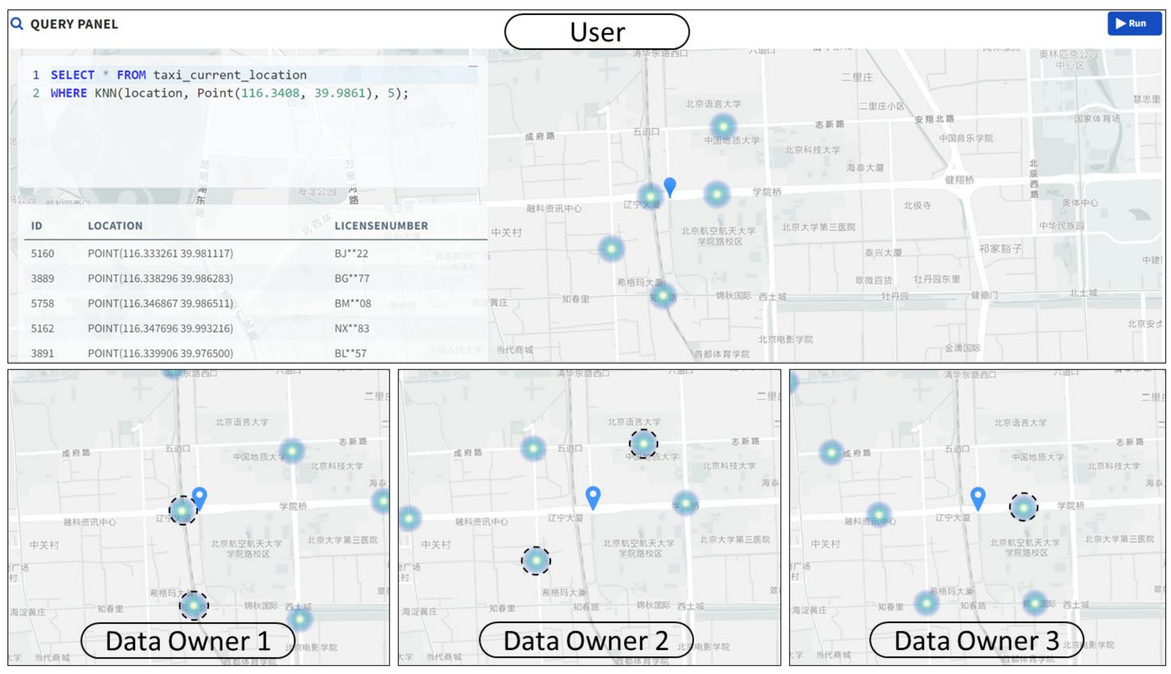
Demonstration



Owner side of Hu-Fu



User side of Hu-Fu



Example of federated spatial query

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