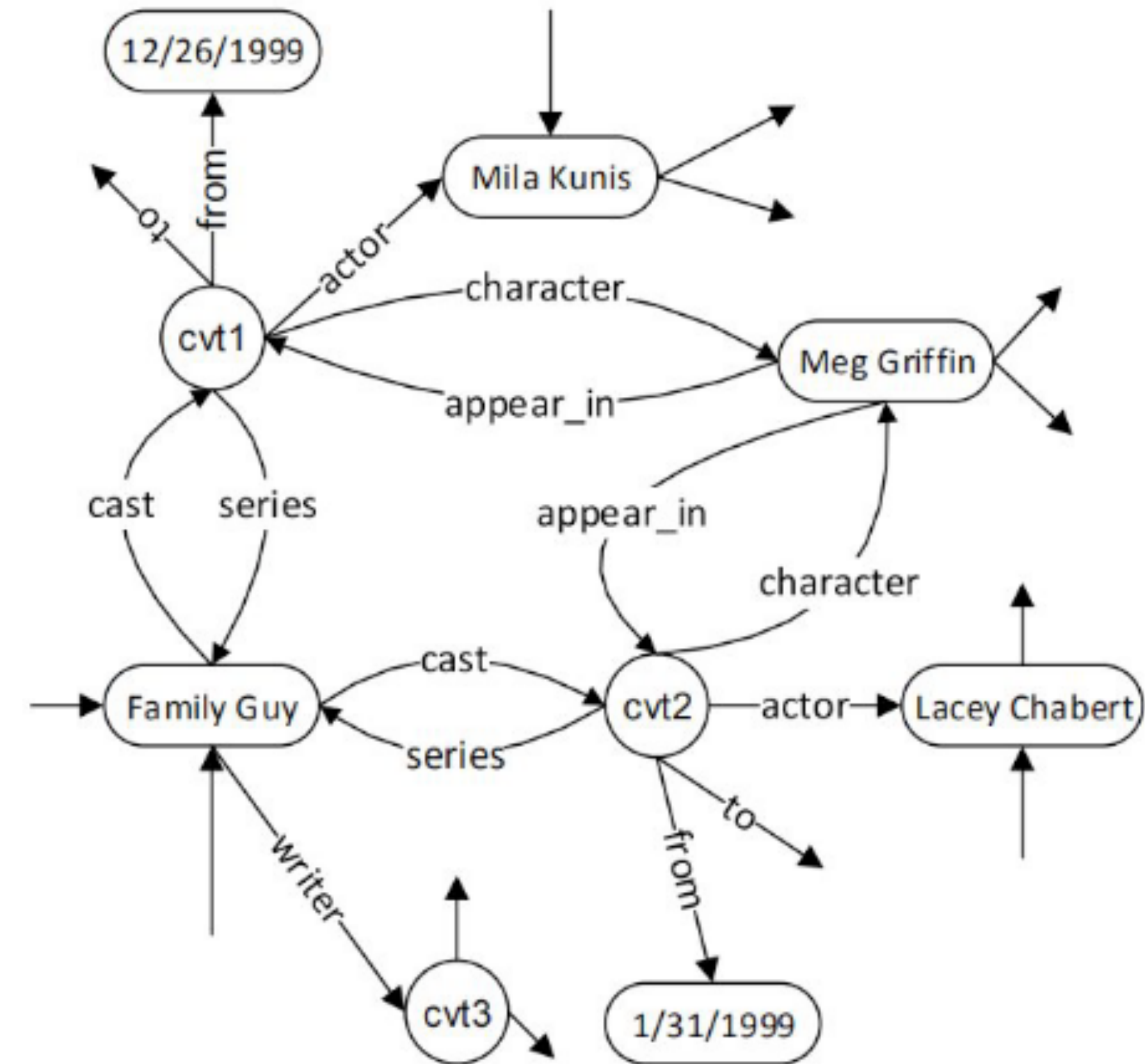


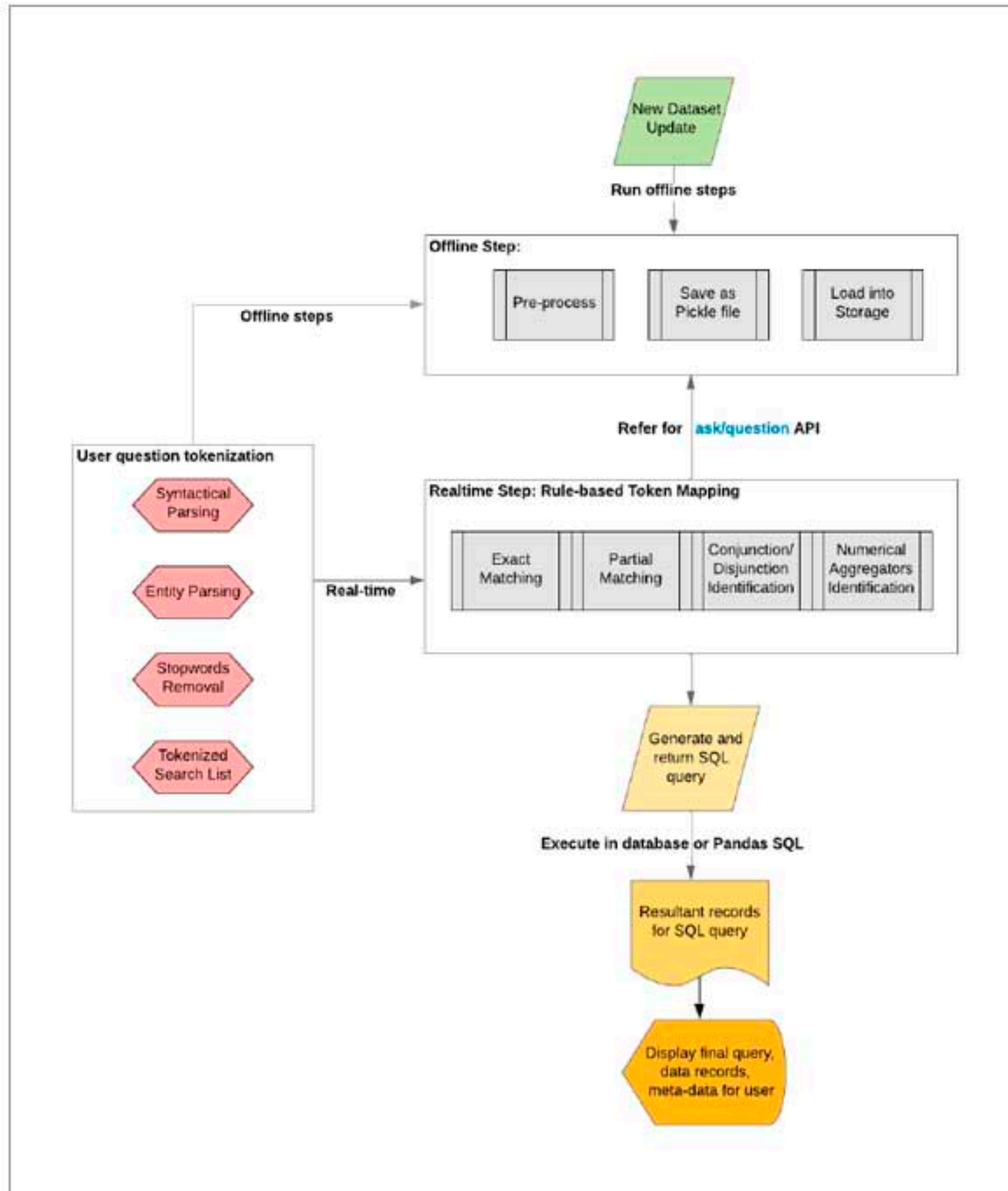
Knowledge bases ... Graph structure

Entity-Relation model

- * Entity: a graph node
 - * Subject
 - * Object
 - * Compound Value Type (CVT)
 - * Many-to-many relation
- * Relation: a graph edge
 - * Often context specific



E.g., Mapping natural language onto SQL



Q1: "Show all cases in Beijing from 3 months ago" would translate to –

```
SELECT * FROM data
WHERE ((LastUpdate LIKE '%2021-02%'
      OR ObservationDate LIKE '%2021-02%')
      AND Province_State LIKE '%Beijing%');
```

Q2: "Show average of Recovered in %Mainland China%" would translate to:

```
SELECT AVG(Recovered) AS AVG_OF_COLUMN
FROM data
WHERE Country_Region = 'Mainland China';
```

Q3: "Tell me the details about Tibet and %Mainland China%" would translate to:

```
SELECT *
FROM data
WHERE Province_State = 'Tibet'
      AND (Country_Region = 'Mainland China')
```