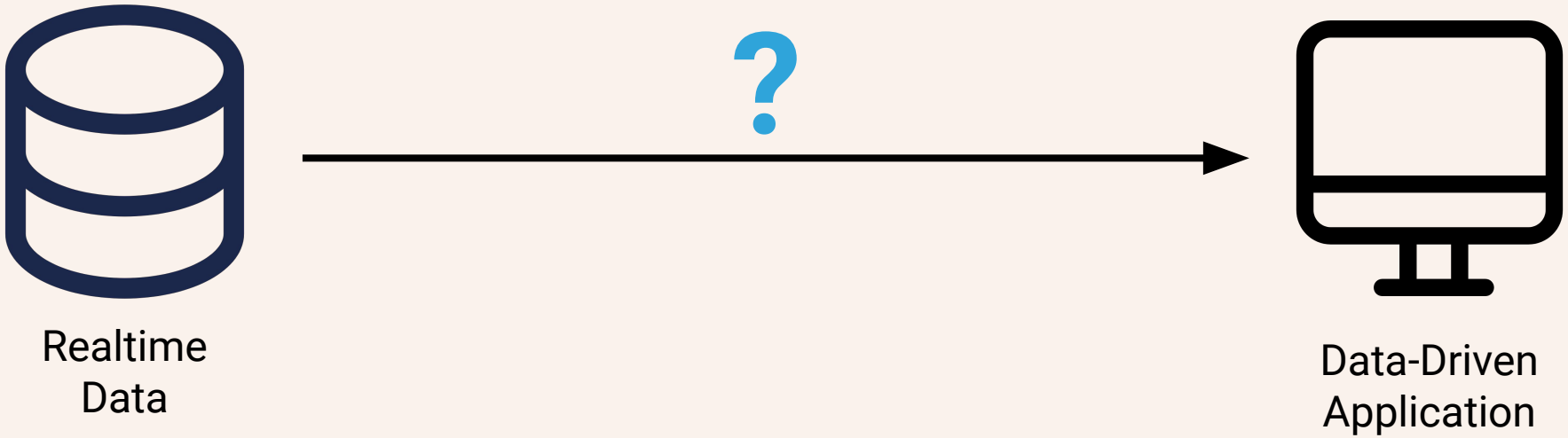
Building Realtime AI Applications with Apache Flink

Matthias Broecheler
Founder, DataSQRL

DataSQRL.com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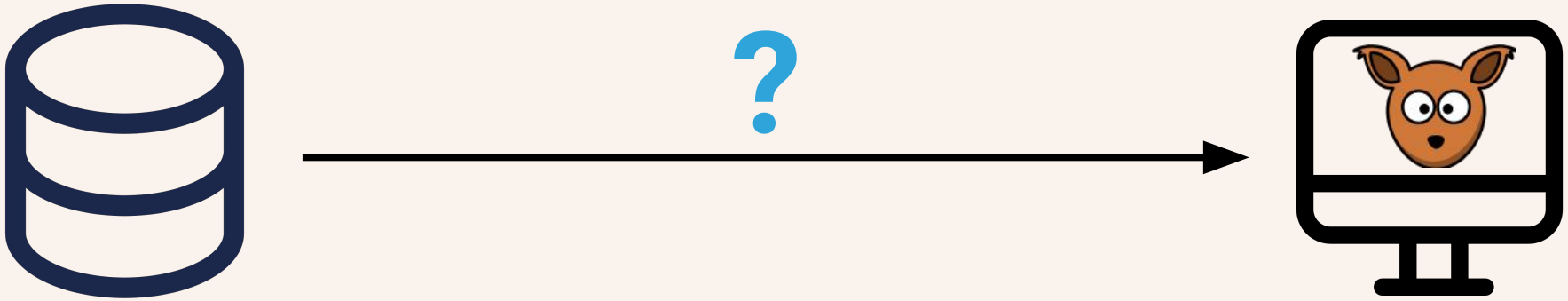
Realtime Data
Data-Driven Application

Squirrel Banking



Customer + Transaction Data

Bank Bot

Demo Time

You:

Show me yesterday's transactions

Assistant:

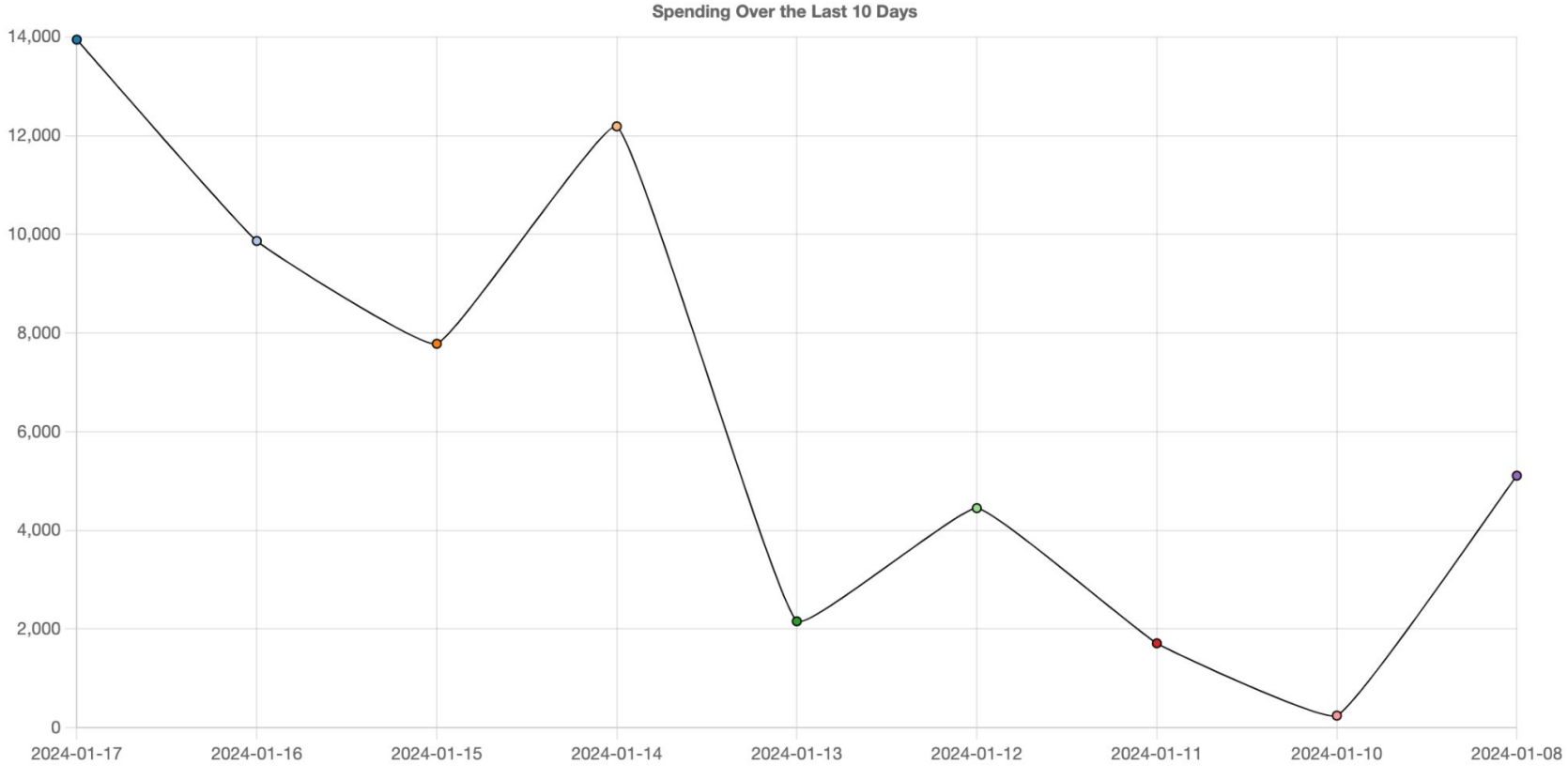
Here are your transactions from yesterday:

Time	Card Number	Amount	Merchant Name	Category
2024-01-17T22:10:54.012Z	6011986024927166	1159.43	Corwin and Sons	Housing & Utilities
2024-01-17T20:32:41.634Z	67718939932354 90	796.42	Leuschke LLC	Miscellaneous
2024-01-17T20:17:04.321Z	4898131601331	335.75	Cole-Wilderman	Transportation
2024-01-17T19:50:45.063Z	6011986024927166	972.16	Beahan Group	Childcare
2024-01-17T19:23:44.810Z	4898131601331	167.86	Jones, Macejkovic and Quitzon	Clothing & Apparel
2024-01-17T19:02:57.584Z	4898131601331	786.58	Ebert, Okuneva and McKenzie	Travel & Vacations
2024-01-17T17:59:51.788Z	67718939932354 90	1640.58	Howe and Sons	Housing & Utilities
2024-01-17T15:22:56.045Z	4898131601331	386.1	Considine Inc	Groceries
2024-01-17T14:49:37.615Z	67718939932354 90	157.58	Blick-Dicki	Restaurants & Dining
2024-01-17T14:21:36.647Z	6771893993235490	29.23	Grant and Sons	Clothing & Apparel
2024-01-17T09:31:04.765Z	4898131601331	130.16	Kulas Group	Communication
2024-01-17T09:29:22.100Z	4898131601331	759.72	Kuhlman, Luettgen and Hahn	Education
2024-01-17T07:03:57.650Z	6771893993235490	396.95	Kem	

You:

What was my spending over the last 10 days?

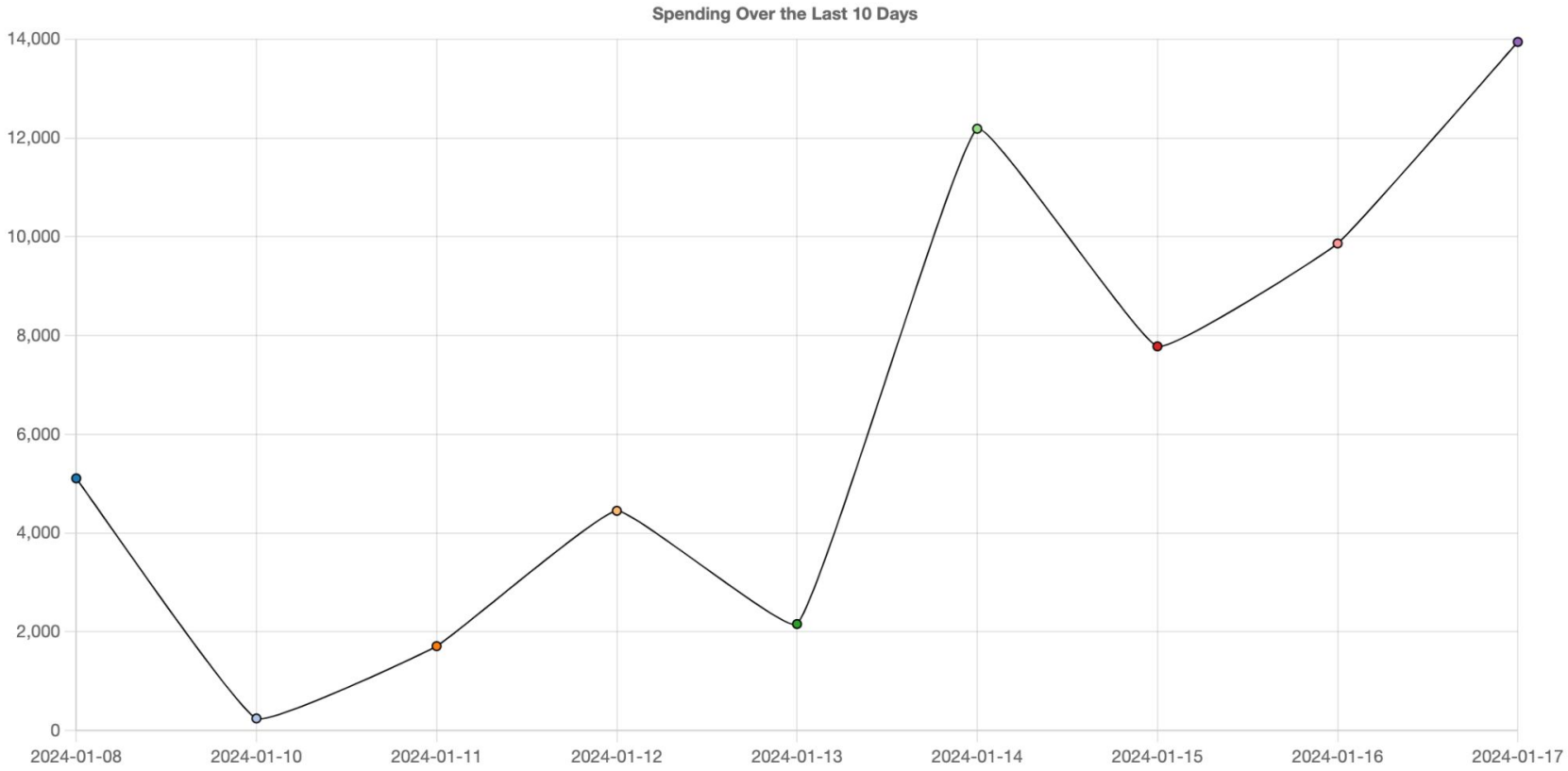
Assistant:



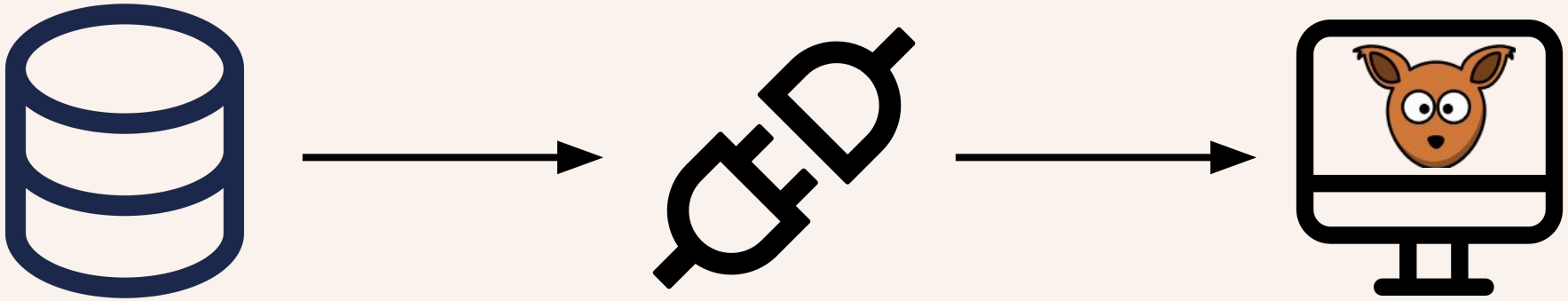
You:

Can you sort the data from least to most recent?

Assistant:



Bank Bot Architecture



Customer + Transaction Data

Realtime Data API

Bank Bot

Bank Bot Architecture

Customer + Transaction Data

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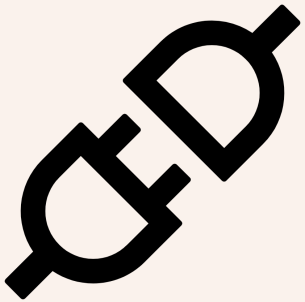
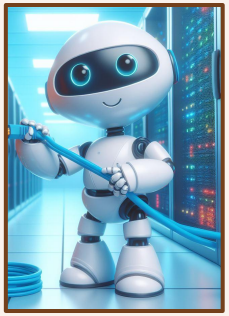


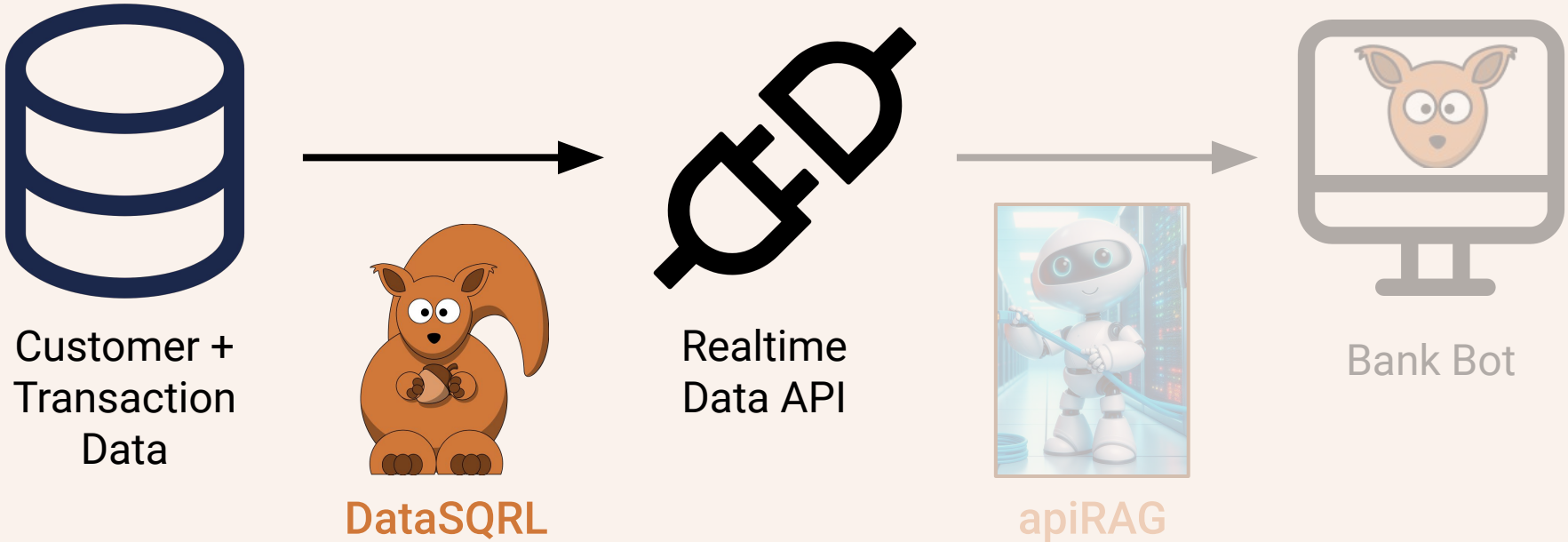
Realtime Data API



apiRAG

Bank Bot

Bank Bot Architecture



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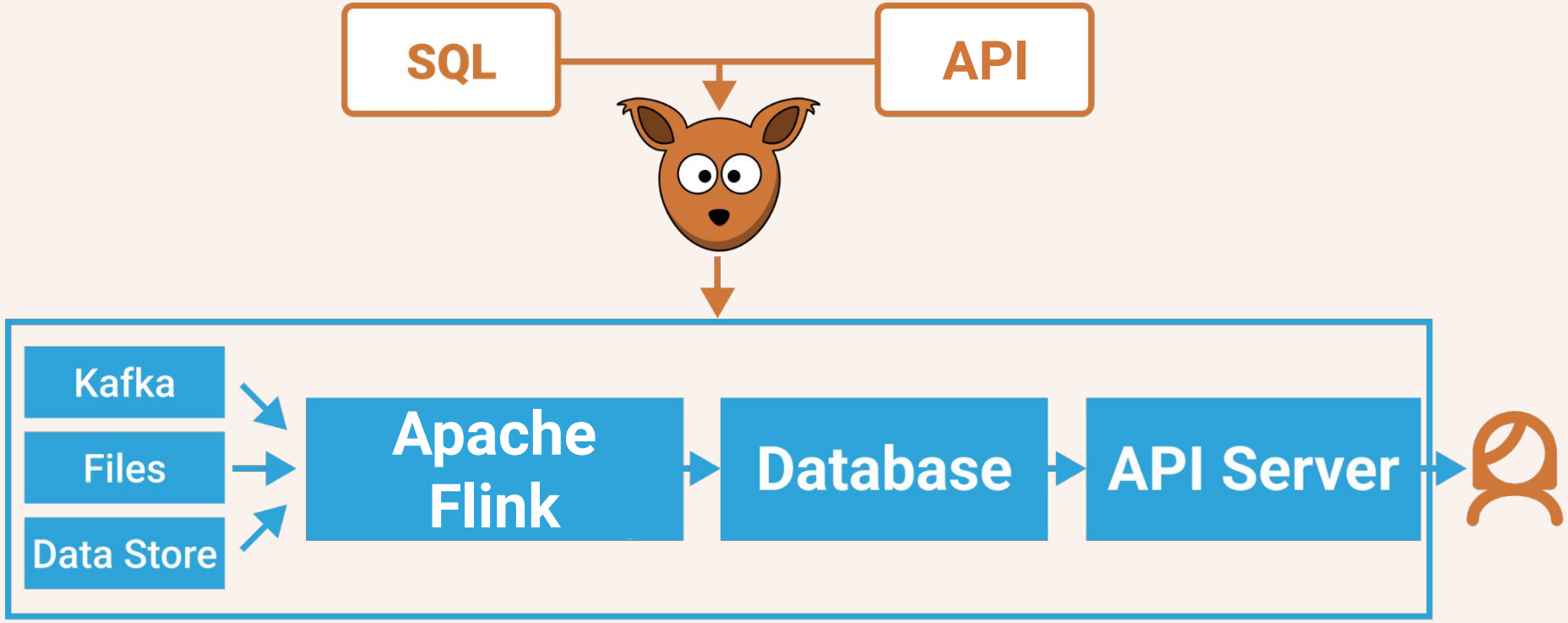
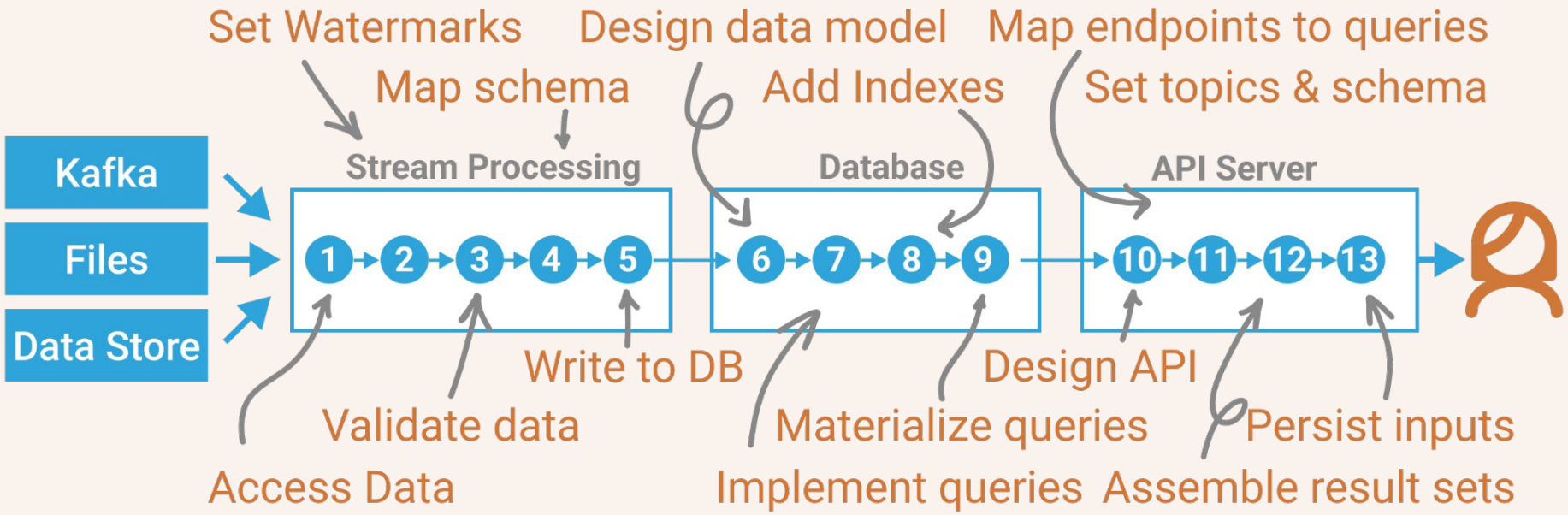
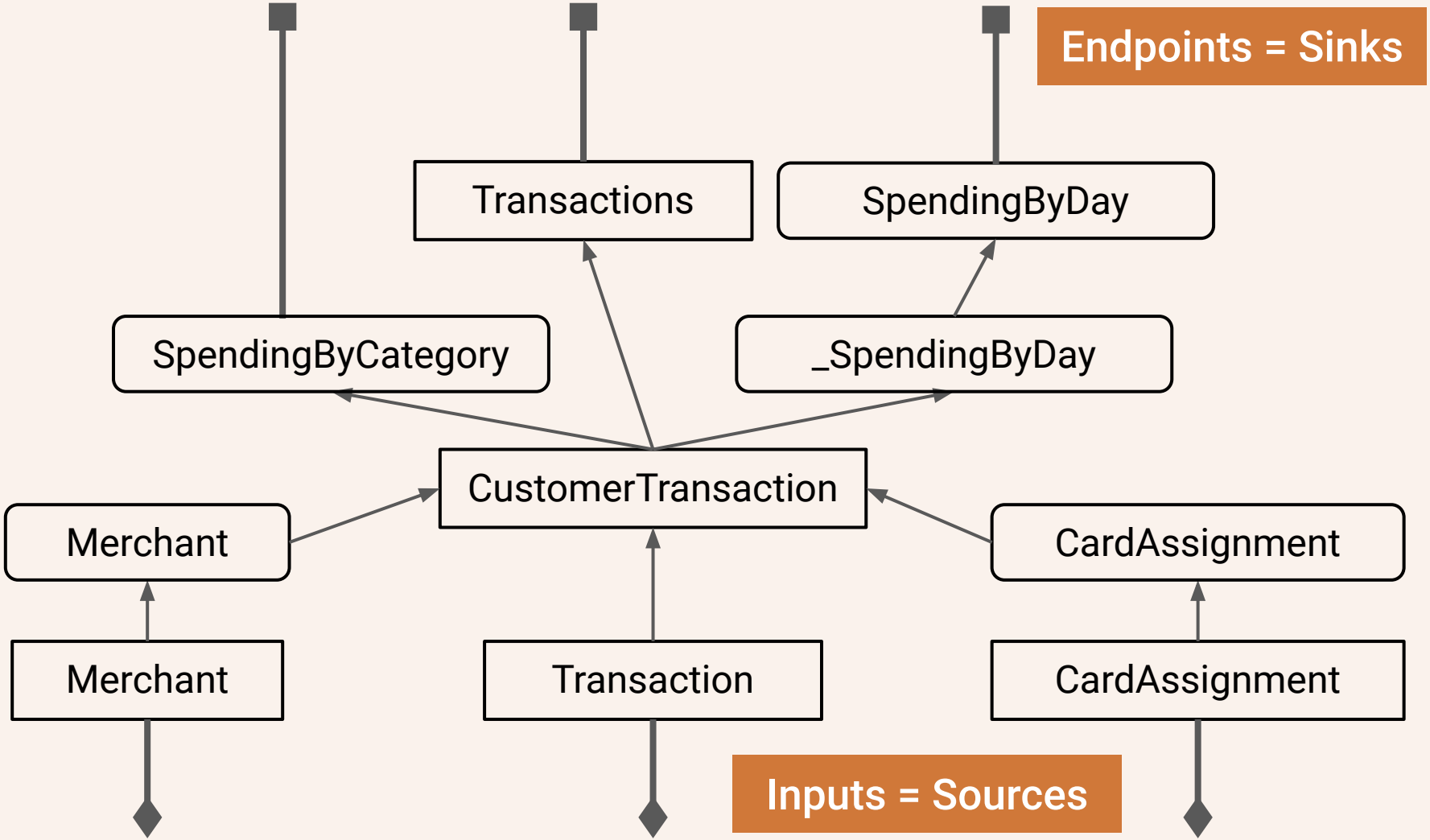
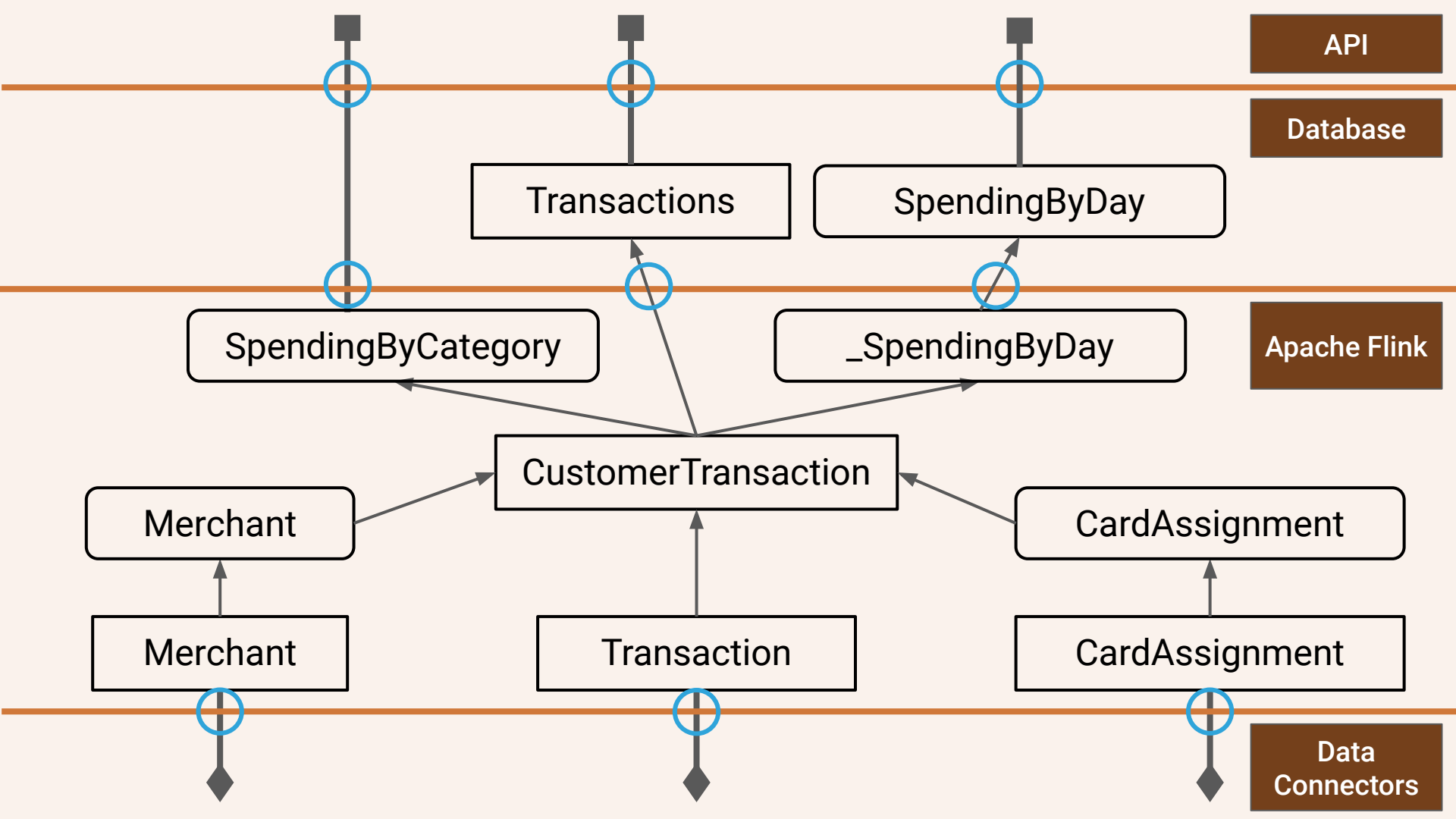
The Operating System for Data


SQL
API
Kafka
Files
Data Store
Apache Flink
Database
API Server


Set Watermarks
Map schema
Design data model
Add Indexes
Map endpoints to queries
Set topics & schema
Kafka
Files
Data Store
Stream Processing
Database
API Server
1
2
3
4
5
6
7
8
9
10
11
12
13
Write to DB
Design API
Validate data
Materialize queries
Persist inputs
Access Data
Implement queries
Assemble result sets


Endpoints = Sinks
Transactions
SpendingByDay
SpendingByCategory
_SpendingByDay
CustomerTransaction
Merchant
CardAssignment
Merchant
Transaction
CardAssignment
Inputs = Sources


API
Database
Transactions
SpendingByDay
SpendingByCategory
_SpendingByDay
Apache Flink
CustomerTransaction
Merchant
CardAssignment
Merchant
Transaction
CardAssignment
Data Connectors

Bank Bot Architecture

Customer + Transaction Data

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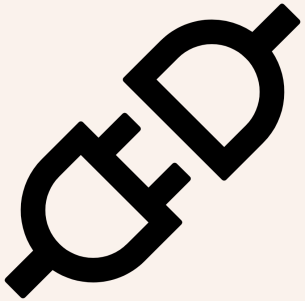
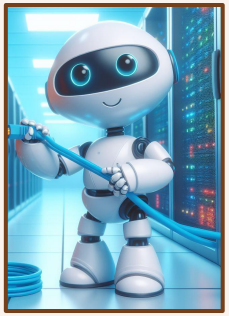


Realtime Data API



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Bank Bot

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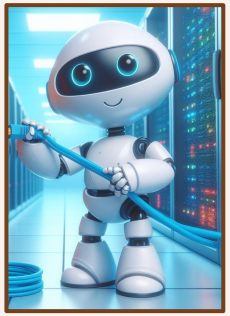
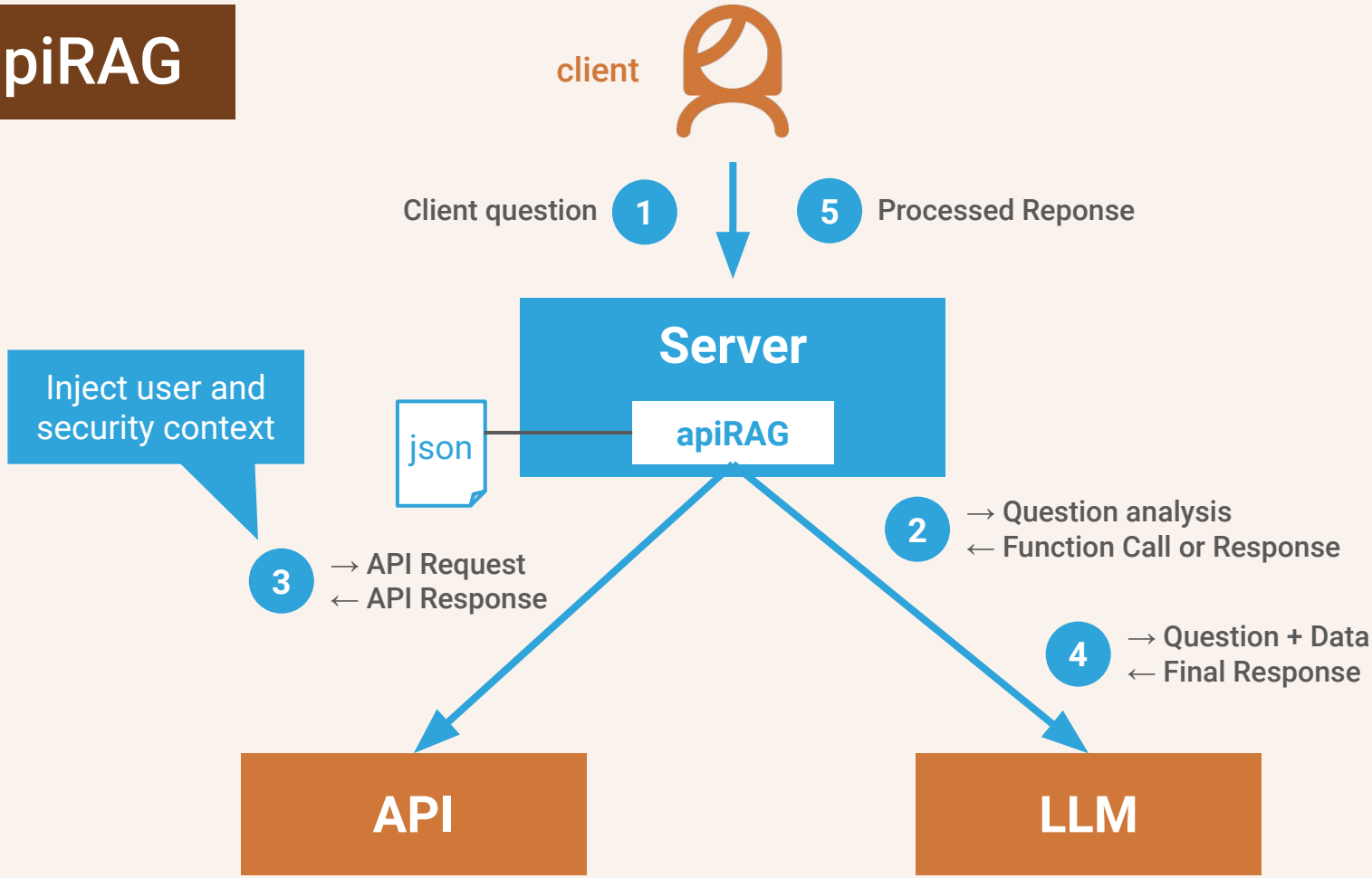
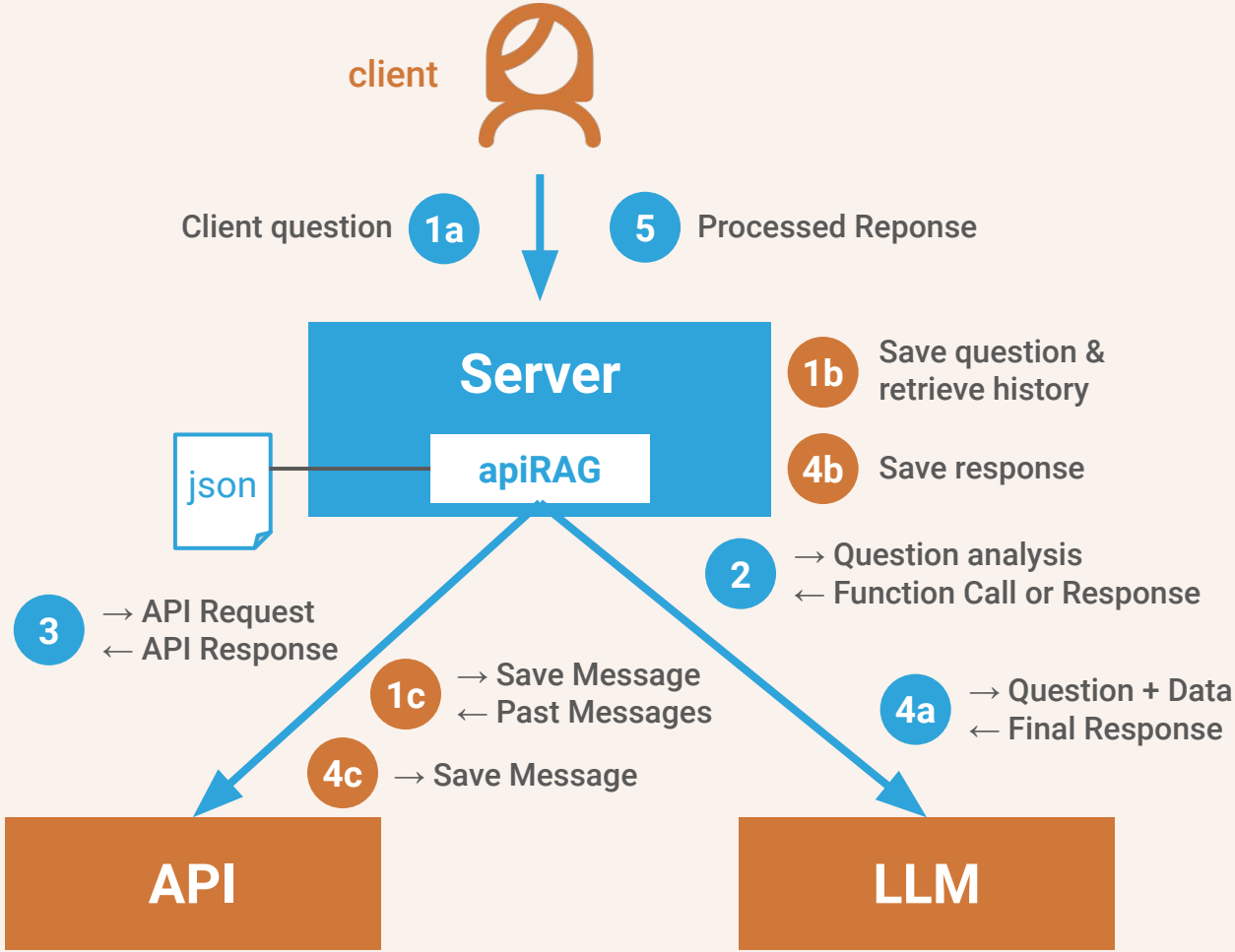



client
Client question
1
5
Processed Reponse
Server
apiRAG
json
Inject user and security context
3
→ API Request
← API Response
2
→ Question analysis
← Function Call or Response
4
→ Question + Data
← Final Response
API
LLM

apiRAG


client
Client question
1a
5
Processed Reponse
Server
apiRAG
json
1b
Save question &
retrieve history
4b
Save response
2
→ Question analysis
← Function Call or Response
3
→ API Request
← API Response
1c
→ Save Message
← Past Messages
4c
→ Save Message
4a
→ Question + Data
← Final Response
API
LLM

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Customer + Transaction Data

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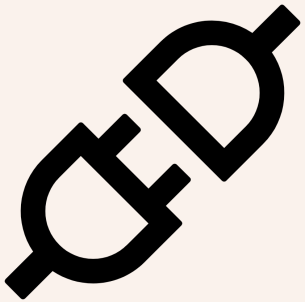

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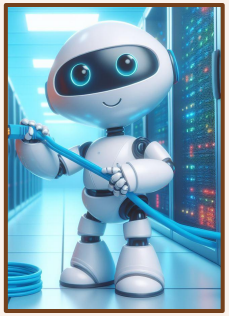

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Bank Bot

Join Us!

- ➔ datasqrl.com
- ➔ github.com/DataSQRL/sqrl
- ➔ github.com/DataSQRL/apiRAG

We're hiring

How to run the Demo yourself: Check the Speaker