Introducing the Bidder-as-a-Service

Applying Design To Solve Scaling Problems and Evolve an Architecture

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What is Beeswax?

We Built a Better Bidder

About Beeswax

- Beeswax is a 3-year-old ad tech startup based in NYC
- Founded by three ex-Googlers, CEO has deep roots in ad tech
- 40 employees in NYC and London

Why we are Different

- Customers get the benefits of a custom bidder stack, without the development and operating cost and risk
- Give customers access to all of their data
- Provide APIs for customers to customize bidding strategy, API-driven
- SaaS model and pricing, customers pay to use the platform

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RTB: Real Time Bidding (AKA "Please Let Us Do This")

Publisher

Step 1:
Send ad request & userid

Ad Exchange

Step 2:
Broadcast bid request

Beeswax Bidder

Scale: 1M QPS
Latency_99 : 20 ms
- Target campaigns
- Target user profiles
- Optimize for ROI
- Customize

< 200 ms

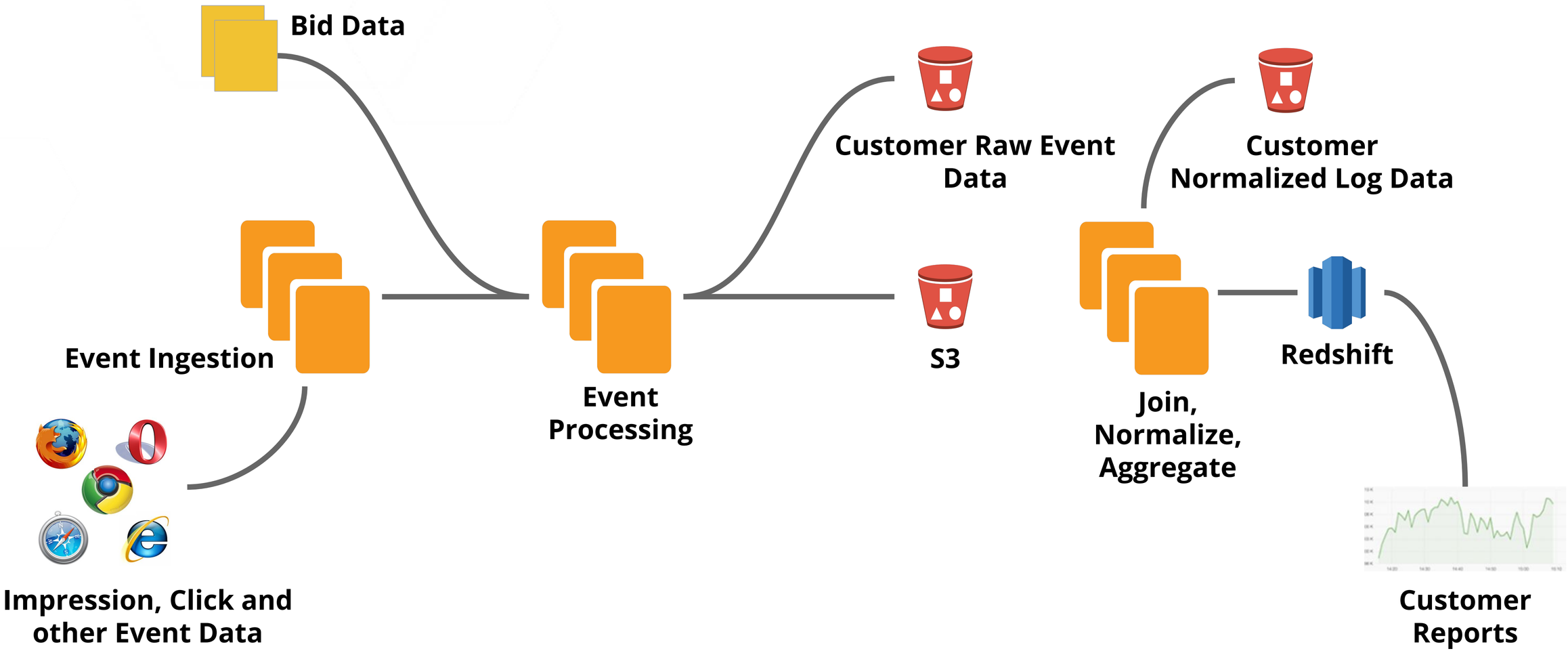
Step 3:
Submit bid & ad markup

Auction

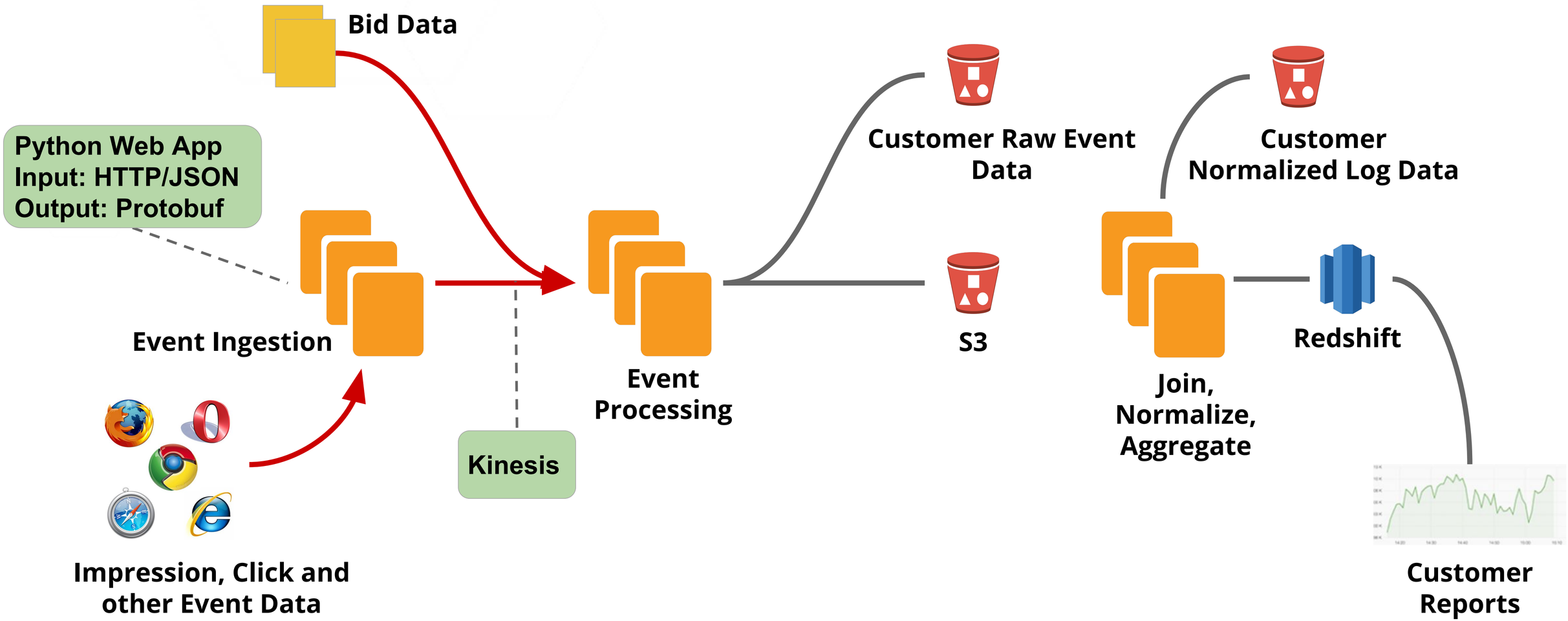
Step 4:
Show ad to user

What is the Beeswax Data Platform?

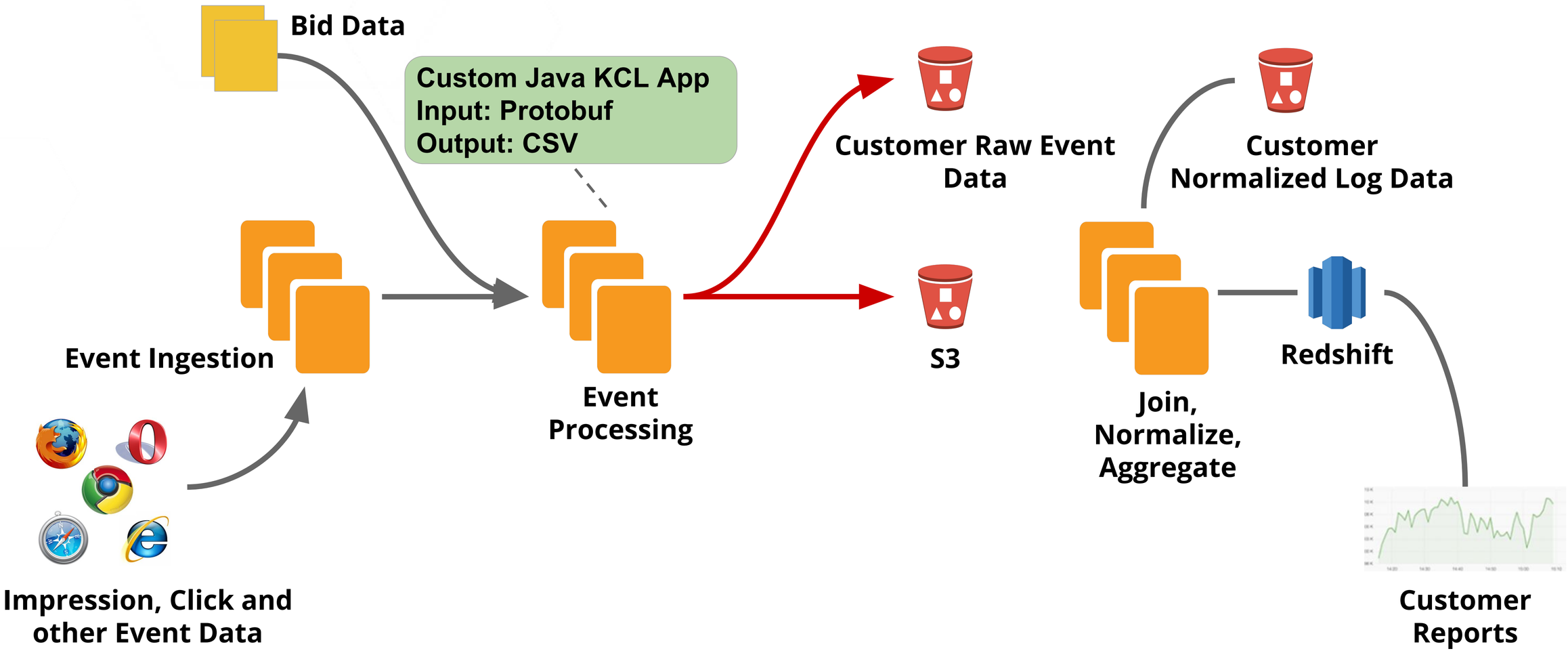
Beeswax Data Platform



Beeswax Data Platform: Event Stream



Beeswax Data Platform: Event Processing



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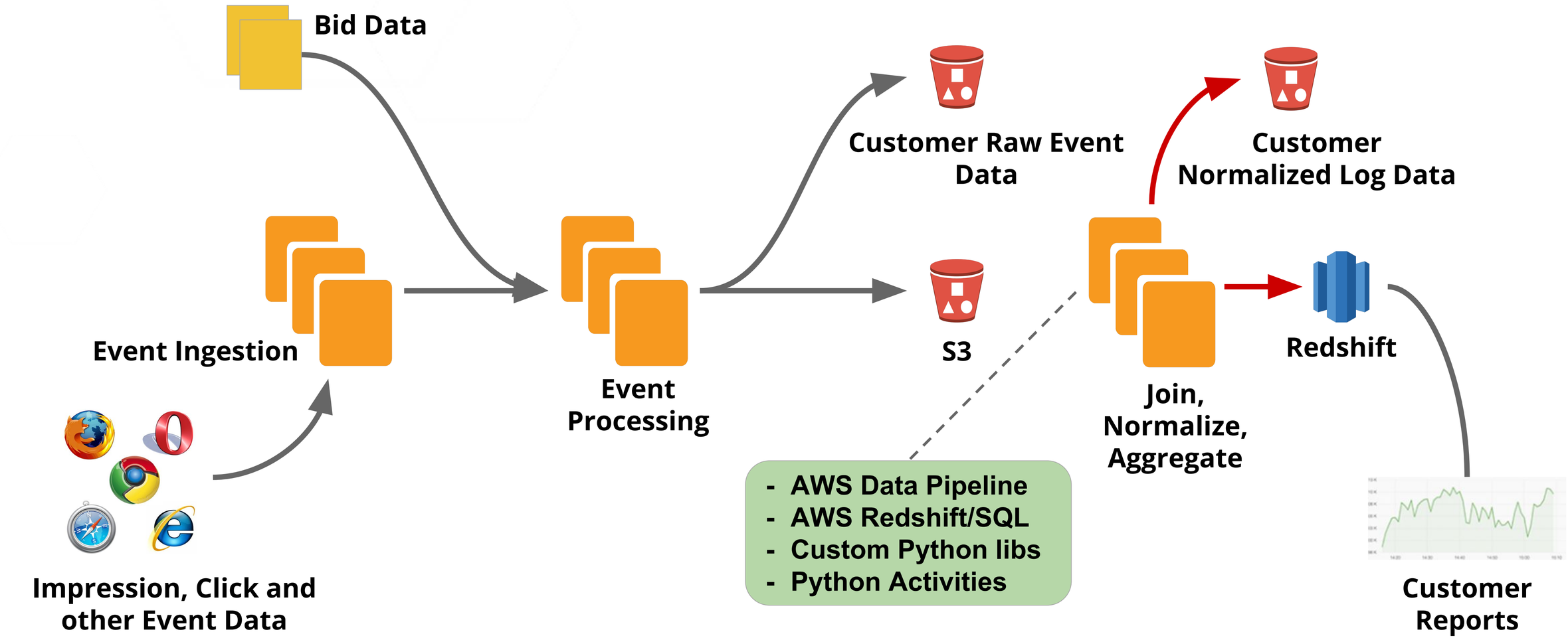

What Was the State of the System?

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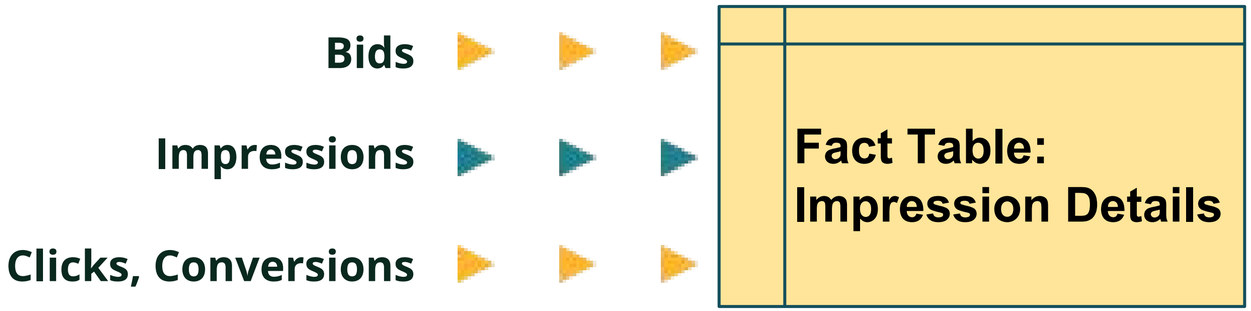
Event Join and Aggregation ("Everything Looks Good ...")



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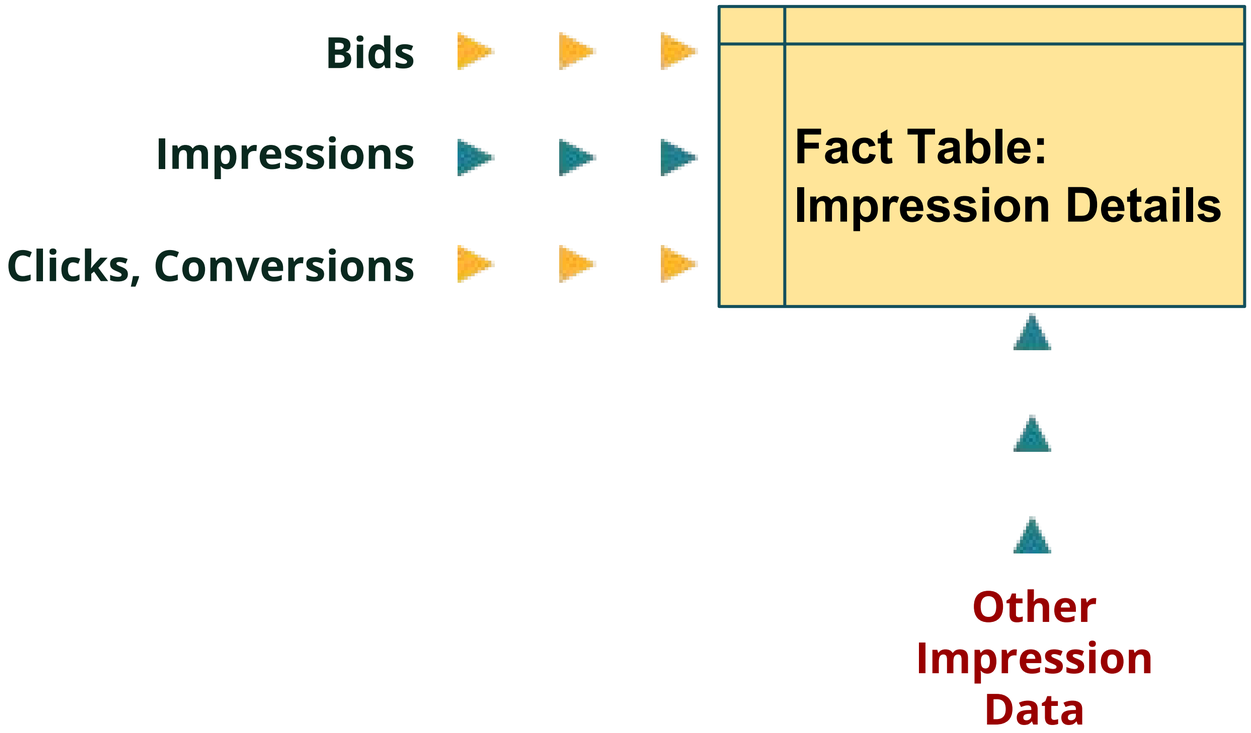

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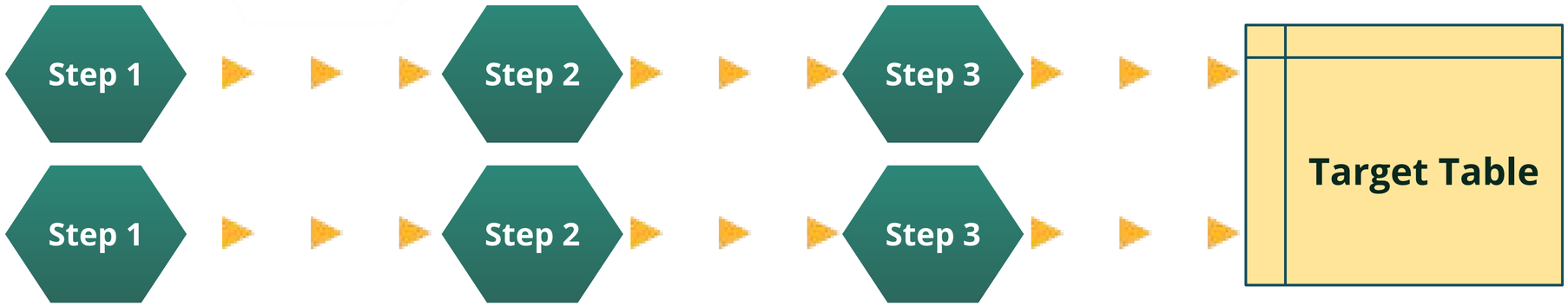
Pipeline Problems: Monolithic and Inflexible



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We were a lucky startup with a bunch of "good problems to have"

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System Goals for Architectural Evolution

- Support separate pipelines writing to the same target tables
- Support any pipeline depending on the data from any other
- Centralize job-level state management and job control

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System Goals for Architectural Evolution

- Support separate pipelines writing to the same target tables
- Support any pipeline depending on the data from any other
- Centralize job-level state management and job control
- Continue to use the existing platform technologies … for now

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From Goals to Principles to Patterns to Design

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Goals to Principles: Remove Contention

Goal	Principle
Multiple asynchronous pipelines with no write contention	Jobs always write to new versioned instances of target tables
Multiple pipelines land data in same master fact table	One job per master target table reads from multiple sources and writes into the target table sequentially

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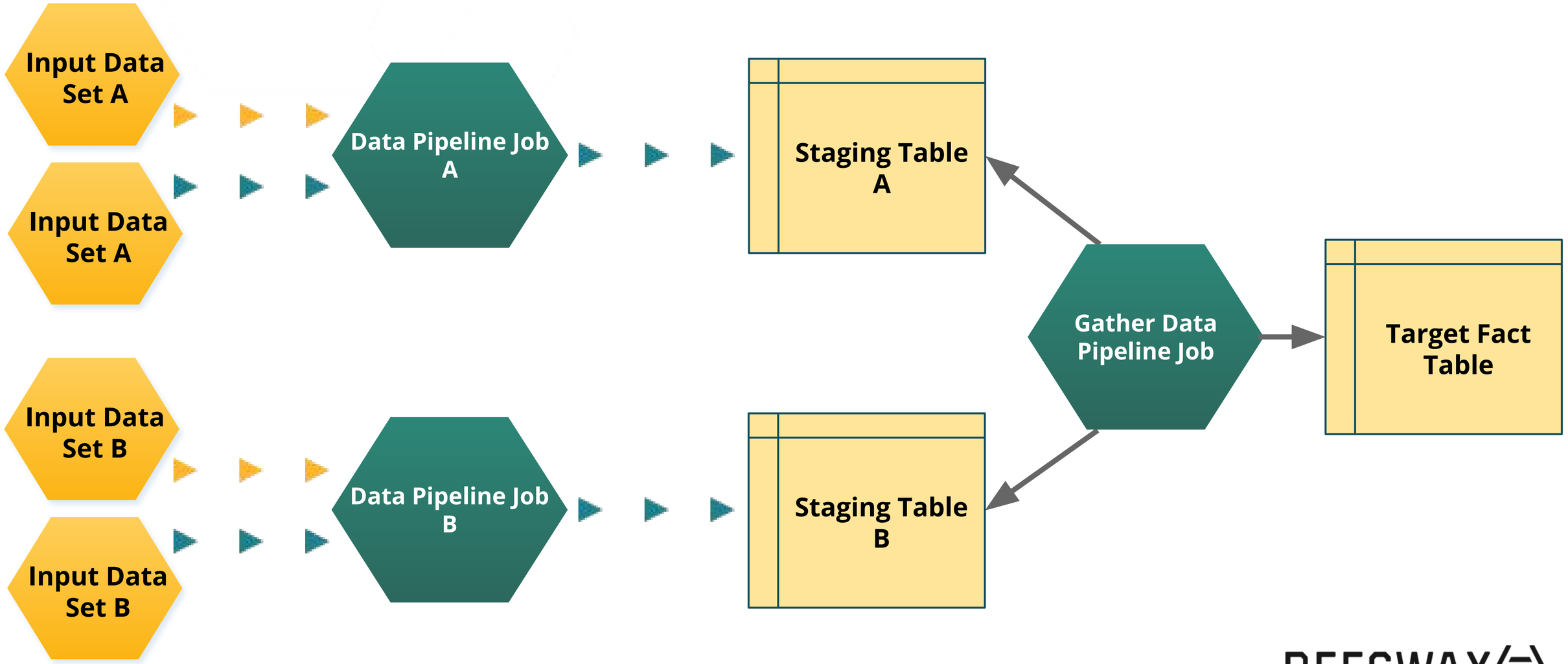
Principles to Patterns: Remove Contention



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Goals to Principles: Job Composition and Job State

Goal	Principle
Any job can depend on any other job	Jobs record completion of uniquely identifiable, timestamped data sets into one source of truth for all jobs
Jobs always consume the most recent source data available	Jobs can query one source of truth to discover the the most recent data sets available upon which they depend

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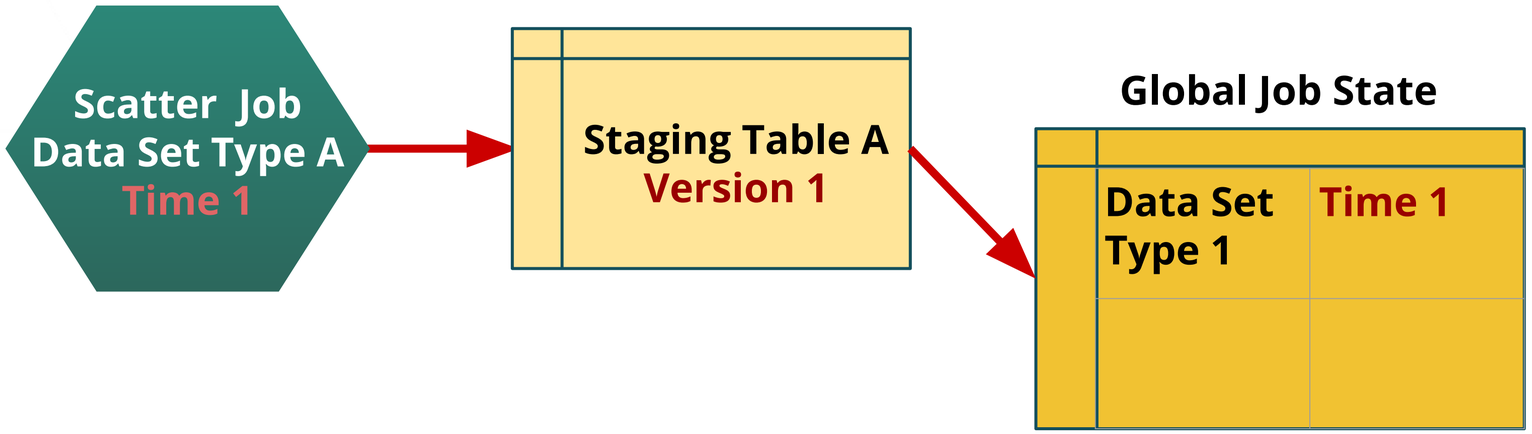
Principles to Patterns: Job Composition and Job State



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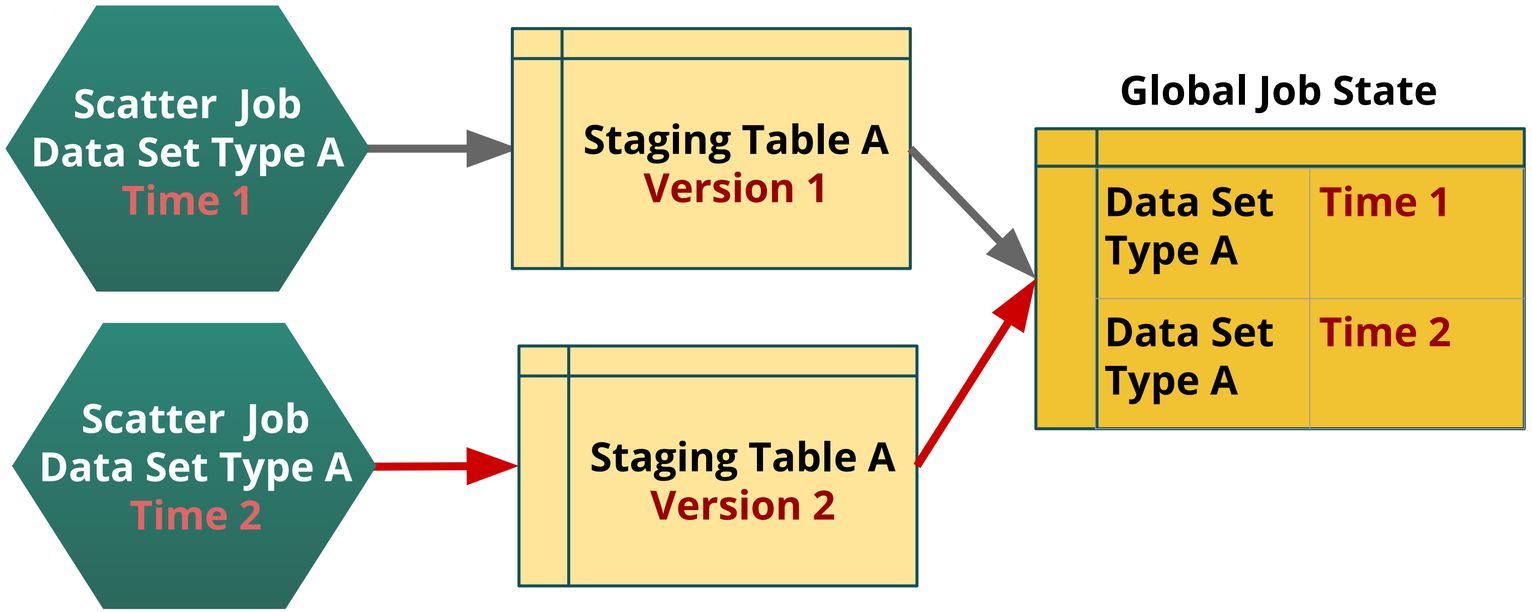

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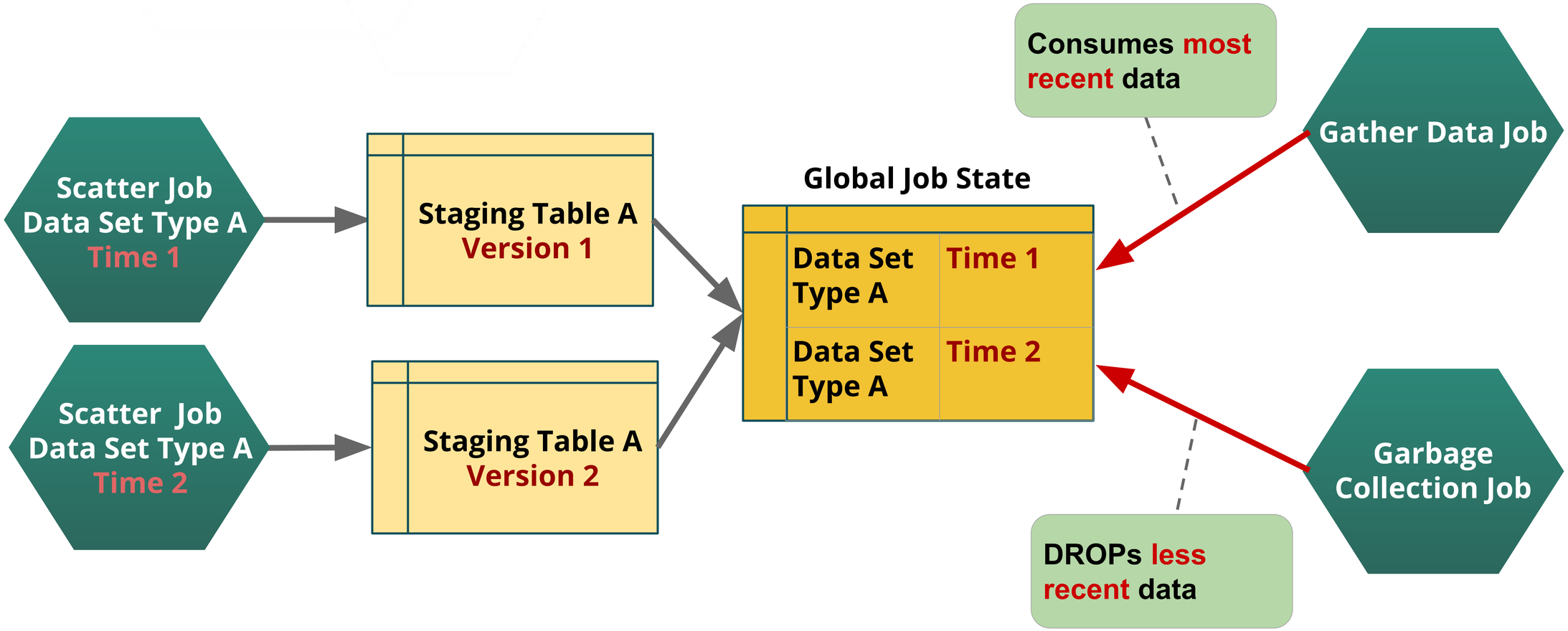

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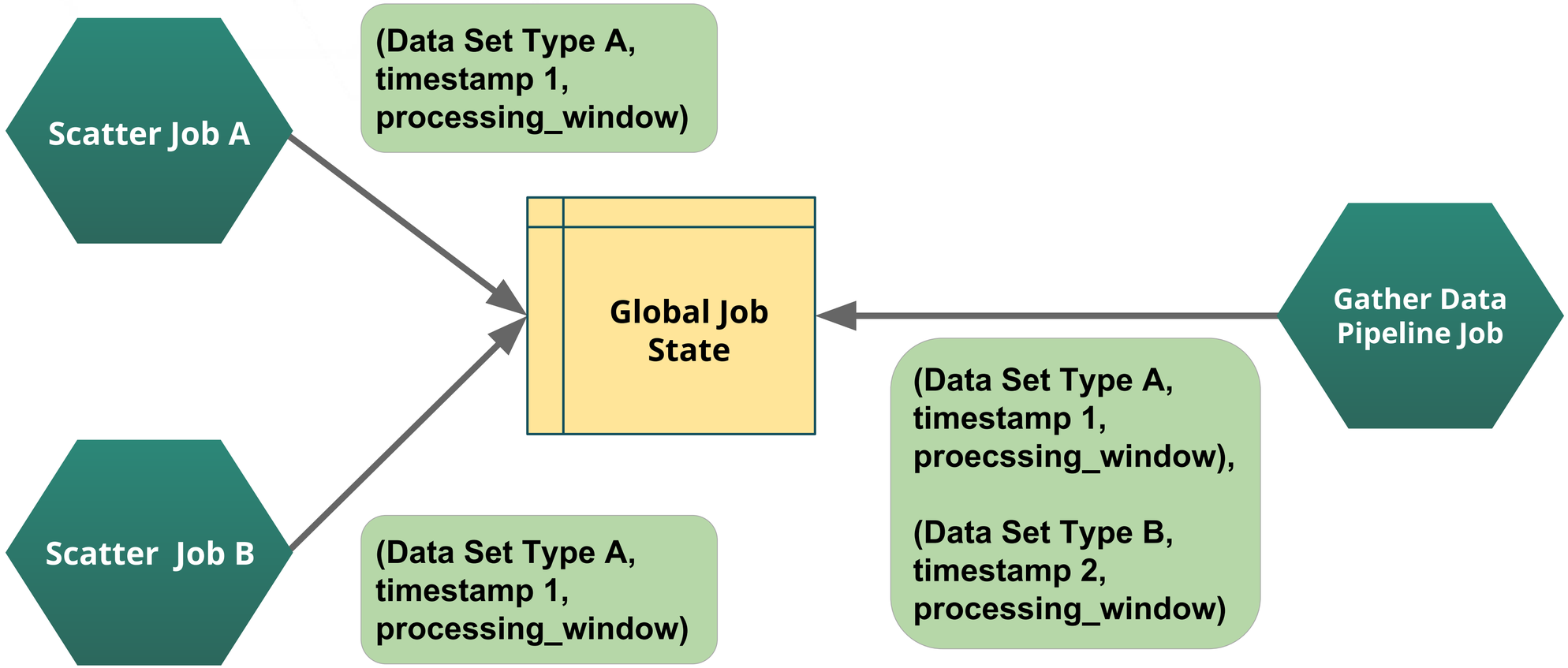
Patterns to Design: Job Composition and Job State



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Implementing the Design with What we Have on Hand

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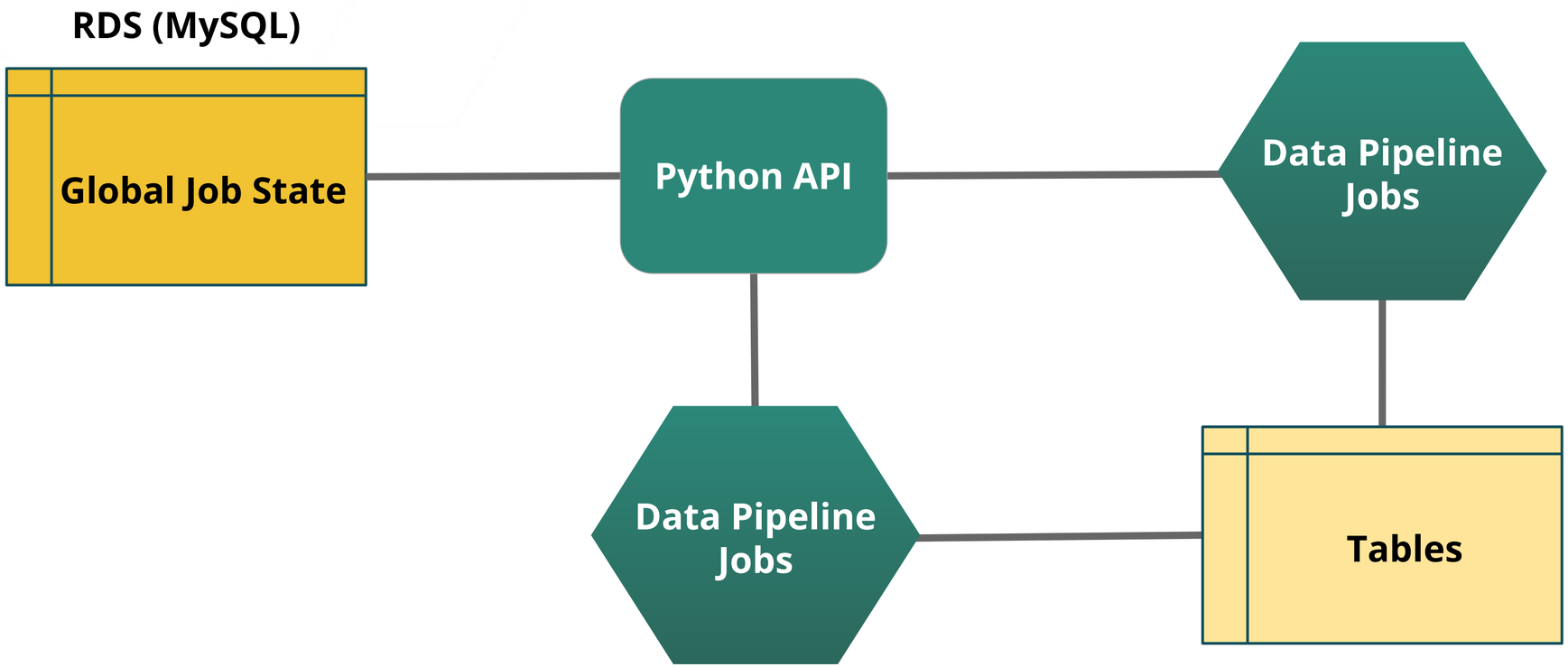
Implementing the Design



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Conclusions

- You can evolve data architecture without adopting new technology
- Carefully chosen invariants define a design that can solve present problems and supports future flexibility
- Invariants are system Goals
- Identifying goals suggest Principles
- Patterns embody Principles
- Design applies patterns

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Introducing the Bidder-as-a-Service

Questions?

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We have a great team!
We have lots of fun problems to solve!
We have LaCroix and Kind Bars!
We're hiring!
https://www.beeswax.com/careers/