

# ASAP Cab: Hop In, Let's Go!

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# Real Time Platform for Users to book a Cab

- **Real-life Problem:** Multiple users trying to call a cab using their app while cabs' availability is changing in real-time
- Customers often want the cab with the least waiting time (Hence ASAP Cab!)
- Real-time scalable platform is needed to address this problem

# Demo

<http://ec2-52-43-129-33.us-west-2.compute.amazonaws.com/bookmycab>

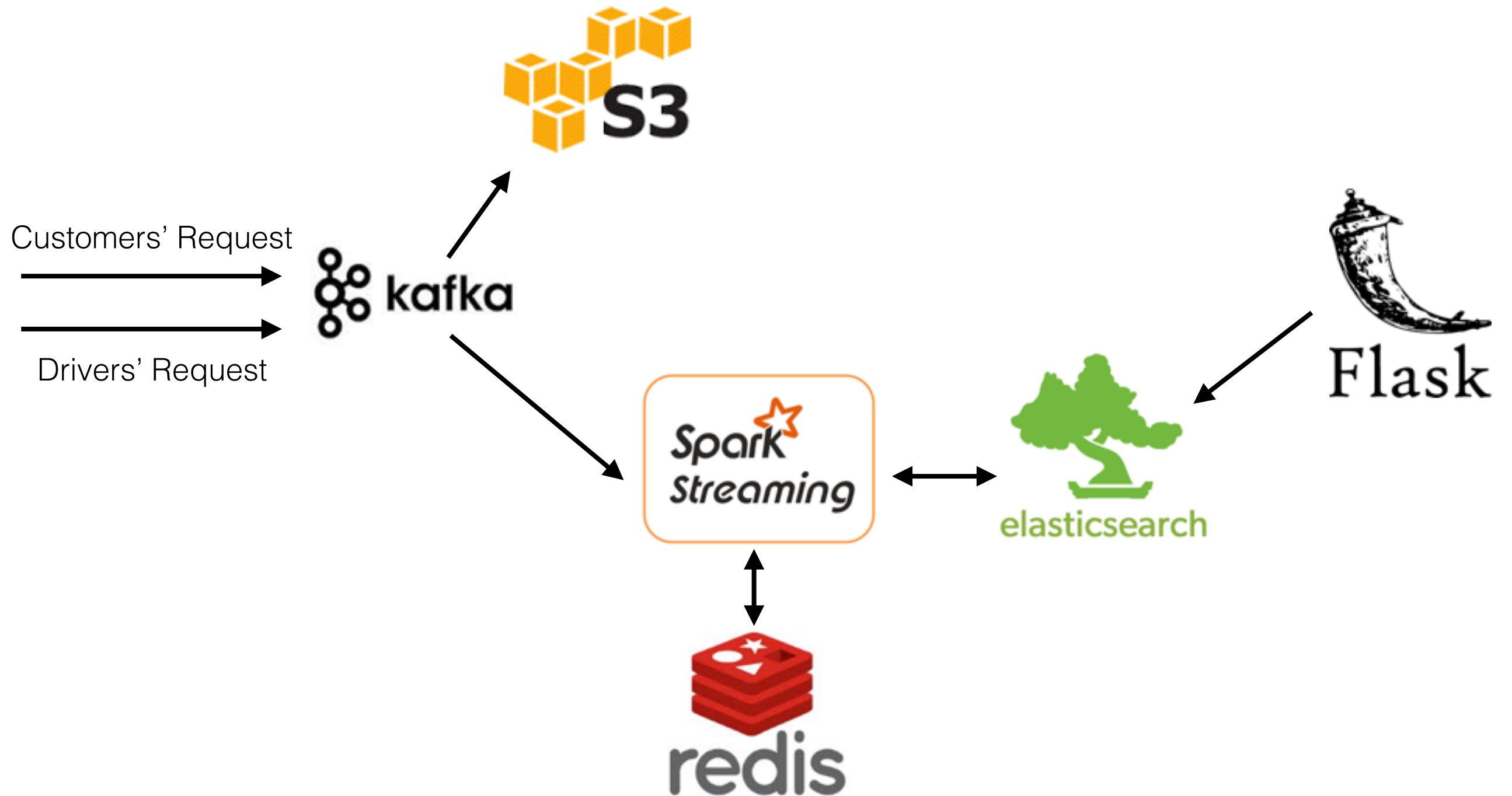
# Basic Algorithm

- Single Machine Algorithm
  - Driver availability info is saved into database in real-time
  - A new user is assigned an available cab at the closest geographical distance
  - Remove cab availability from cab database as soon as assignment is done
  - Iterate through all the users

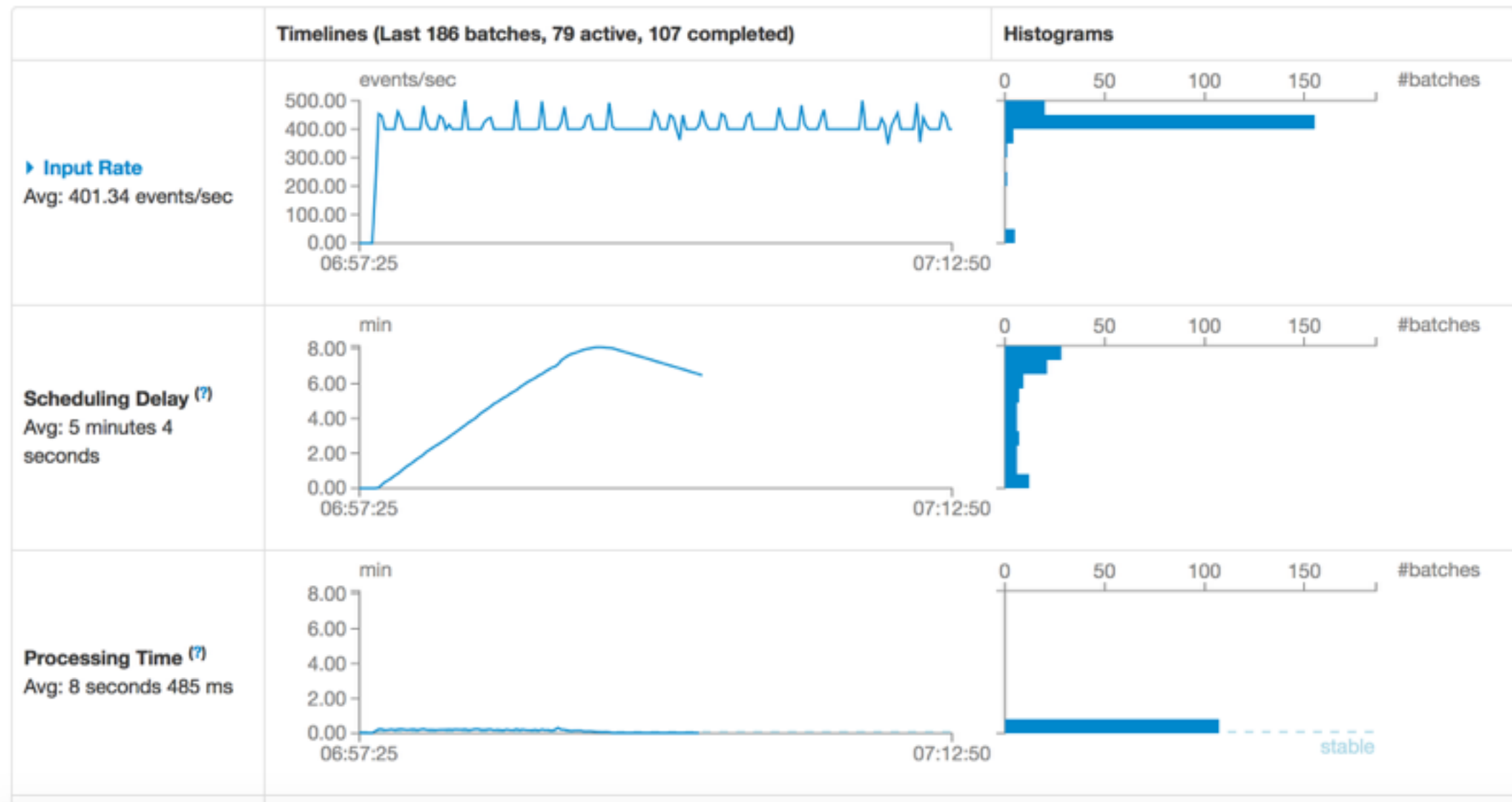
# How to Design this in Distributed & Parallel Fashion?

- Each worker machine computes a list of geo-graphically closest cabs for its users by making bulk queries to a geo-spatial database (Map Operation)
- How to avoid double-booking a cab? :
  - Use a shared centralized cache for a given micro-batch and clear it before next micro-batch starts
  - If a cab is already claimed by other worker, pick the second best one and so on

# Data Pipeline



# Performance Numbers!



- Playback with NYC Yellow Cab data, 4-node AWS cluster
- System completes assignment of ~ 2000 customers and ~2000 drivers in 8-9 s.
- The biggest bottleneck comes from elasticsearch geo-spatial queries

# Next Steps

- Take the full advantage of a micro-batch to come up with even more optimal cab assignment algorithm to improve systems throughout e.g. Maximal Weight Matching
- Challenge: More computationally intensive  $O(N^3)$



# About Me

- Software Engineer @Apple
- Understands Hardware, Wireless
- Loves travel, sports and history



“ Every day I remind myself that my inner and outer life are based on the labors of other men, living and dead, and that I must exert myself in order to give in the same measure as I have received and am still receiving.” - Albert Einstein