Fraud Prevention with Machine Learning

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Outline

- Primer on Credit Card Fraud
- Data Science
    - Challenges
    - Human Intuition
    - Machine Learning
- Data Engineering
    - Real-time Metrics
    - Batch Metrics
    - Transaction Lifecycle

Primer on Credit Card Fraud

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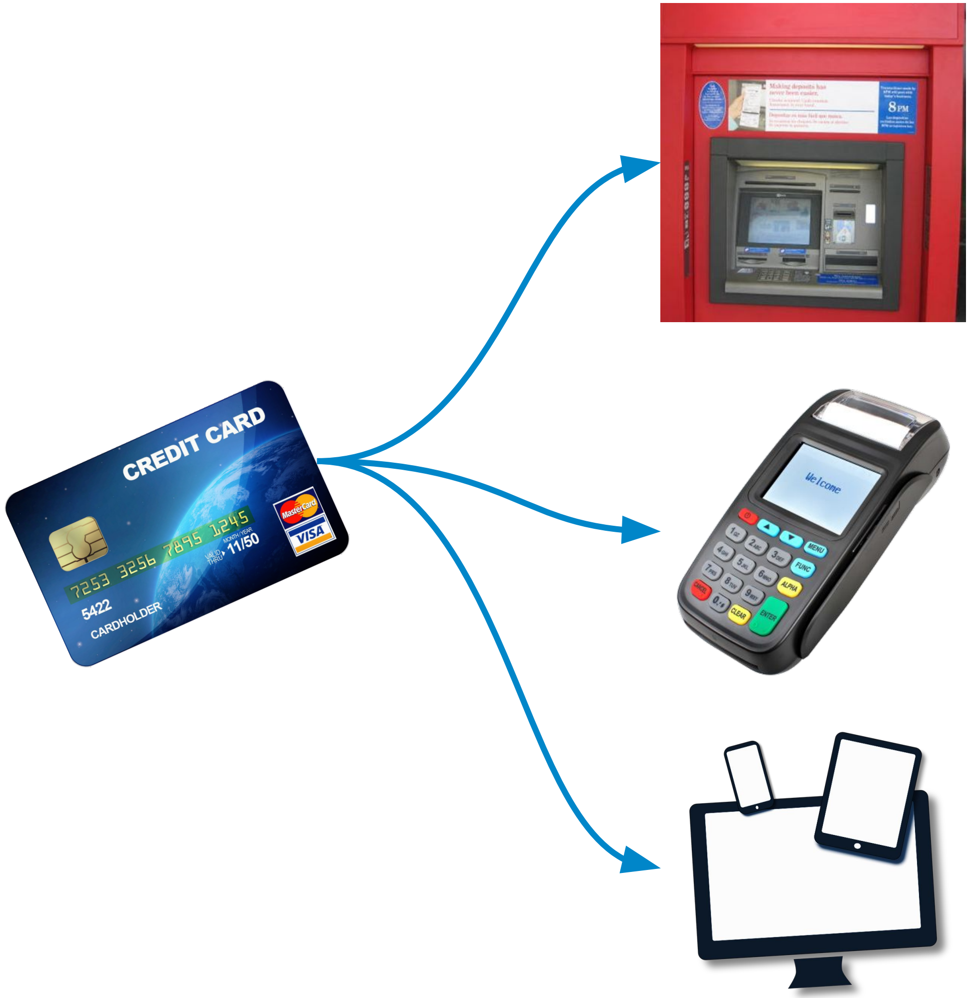
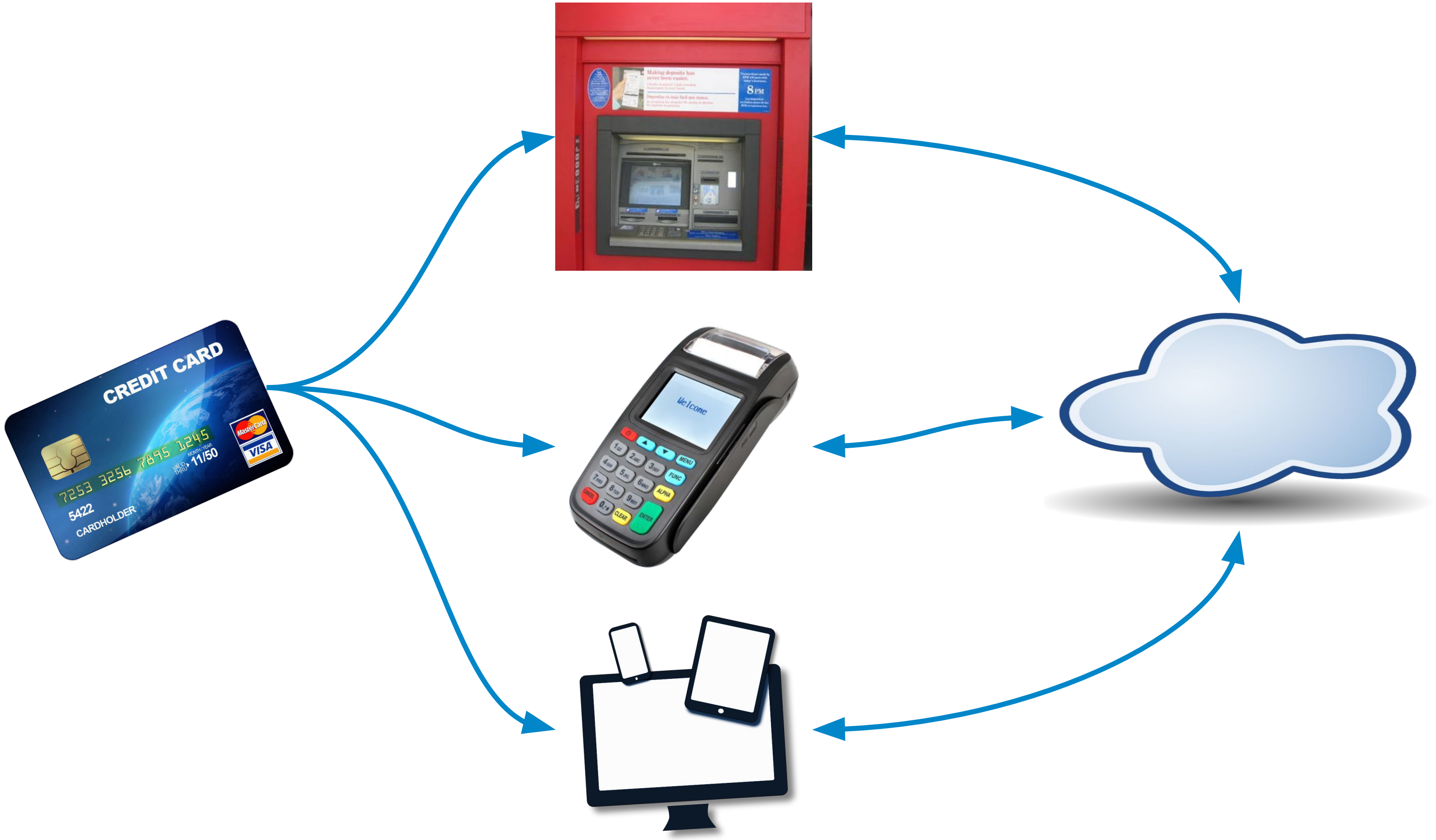


Primer on Credit Card Fraud



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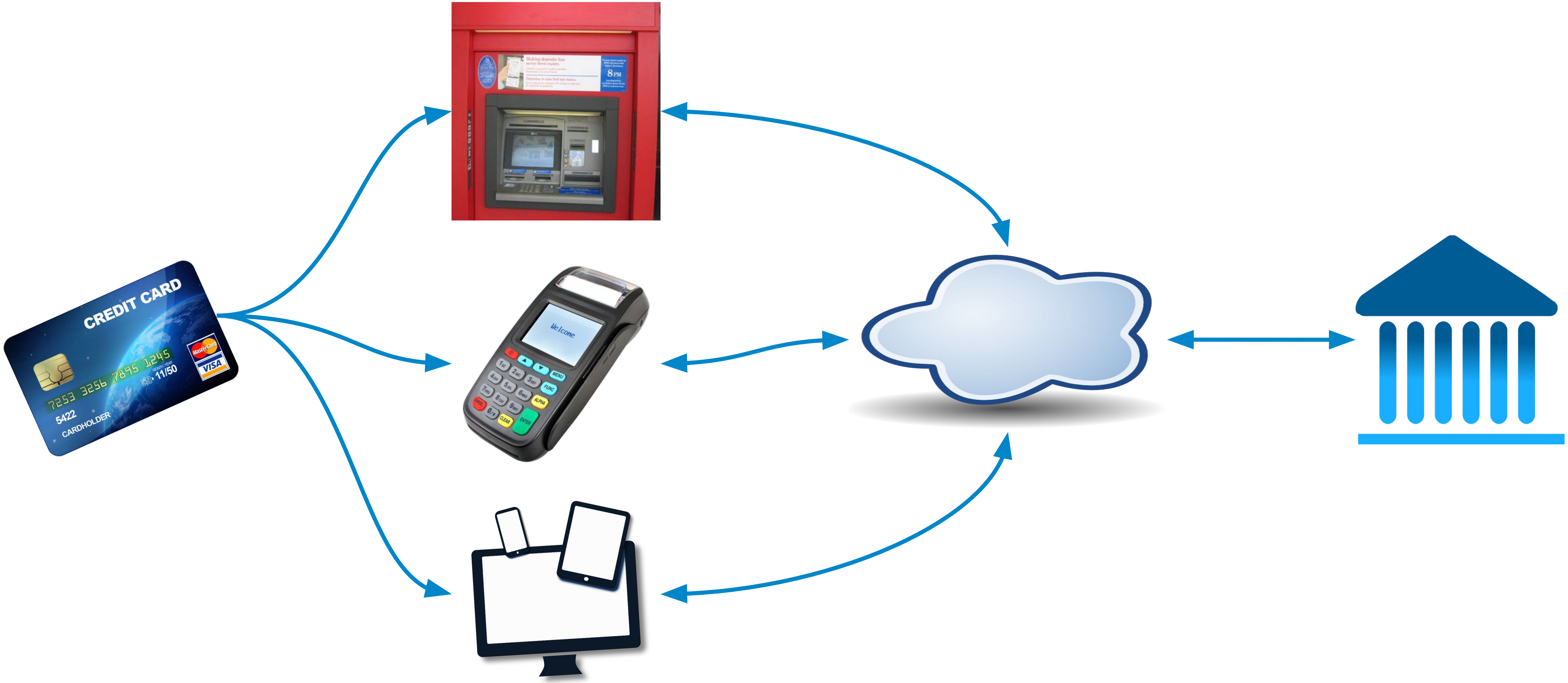

How do you prevent fraud?

Data Science

Challenges

- Data Volume
  - 20M+ transactions per day
  - 200+ added features

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    - Positive Class: 0.1% ~ 1.0%
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- Data Volume
    - 20M+ transactions per day
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- (Really) Unbalanced Problem
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- Time Series Problem

Human Intuition

- Real-time Features
  - Distance between consecutive transactions
  - Number of failed attempts in last hour
  - Total money spent in last hour by merchant

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- Batch Features
    - Total money spent in last month
    - Average transaction money by merchant in last month
    - Percentage of transactions abroad in last month

Human Intuition

- Real-time Features
  - Distance between consecutive transactions
  - Number of failed attempts in last hour
  - Total money spent in last hour by merchant
- Batch Features
  - Total money spent in last month
  - Average transaction money by merchant in last month
  - Percentage of transactions abroad in last month
- Enrichment Features

Machine Learning

- Literature Algorithms
    - Random Forests
    - XGBoost

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- In-house Algorithms
  - Points Of Compromise
  - Cost Sensitive Scoring

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- Others

Data Engineering

Real-time Metrics

- Event Stream Processing
  - Data Studio
  - PQL
  - PKernel

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- Mission-critical Java
    - Zing® JVM (by Azul Systems®)

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    - Data Studio
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    - Cassandra

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Transaction Lifecycle

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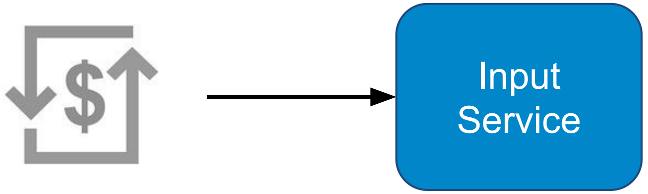
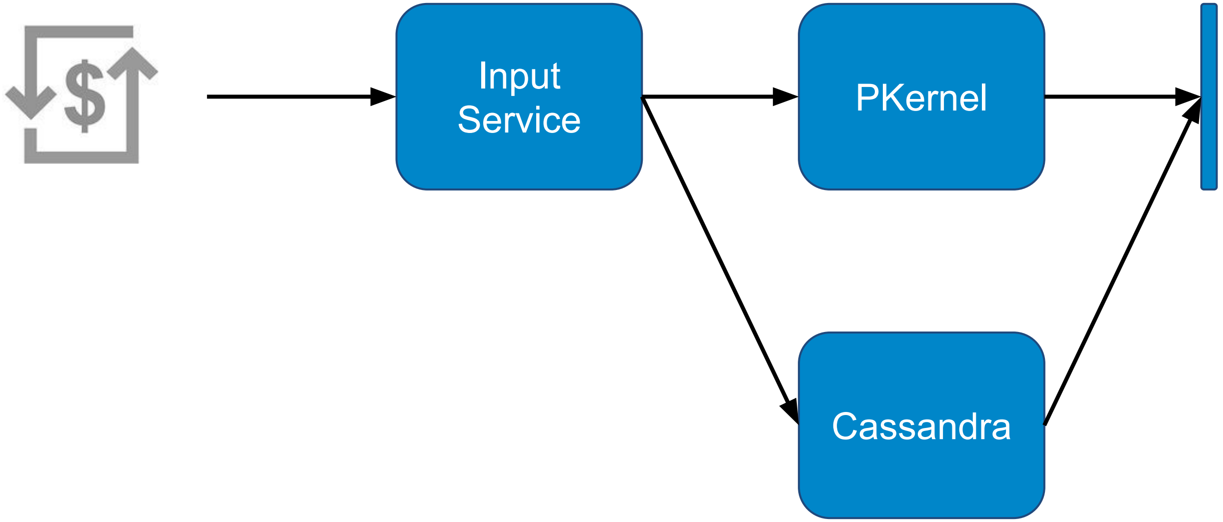


Transaction Lifecycle



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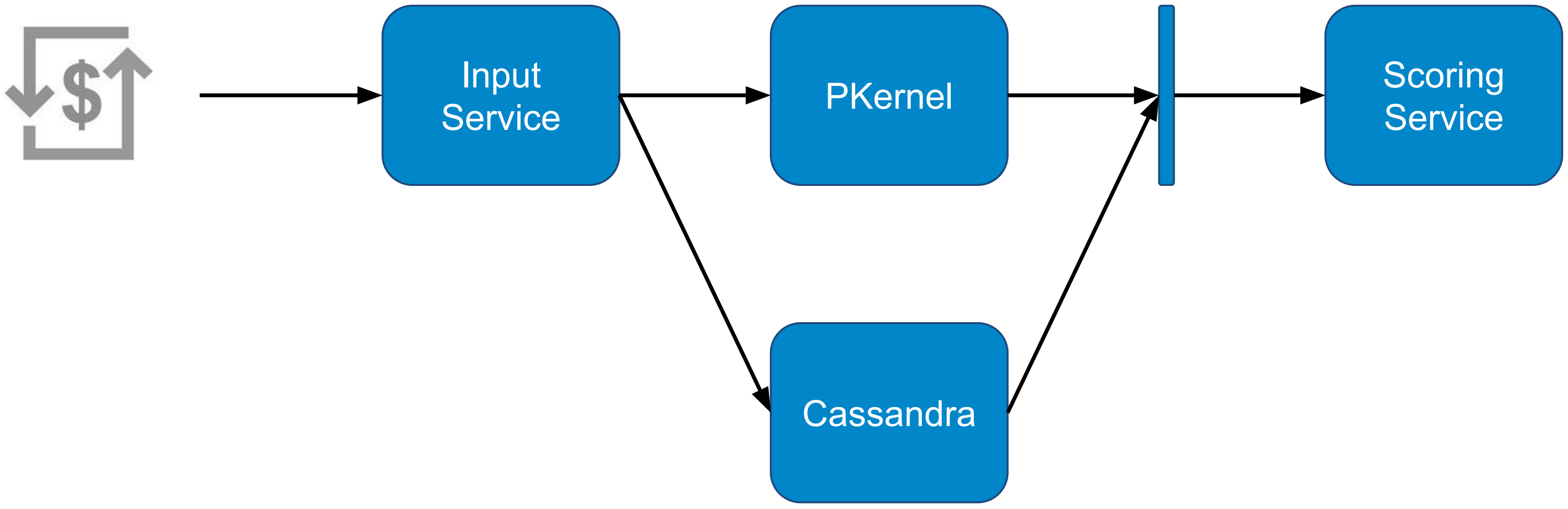

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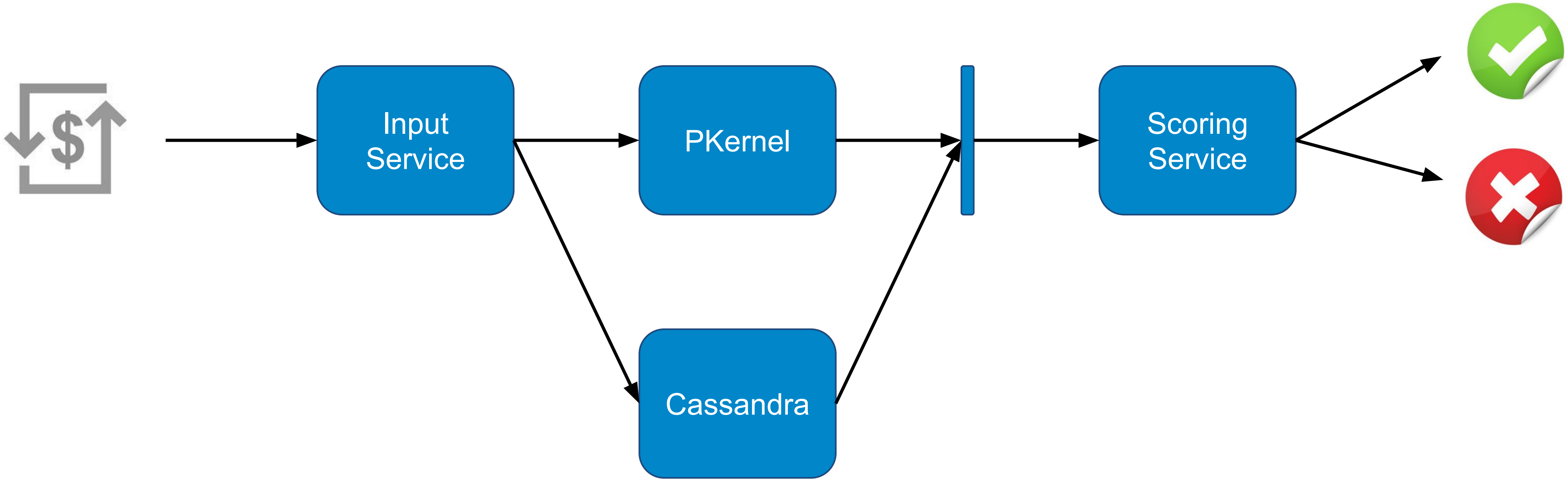

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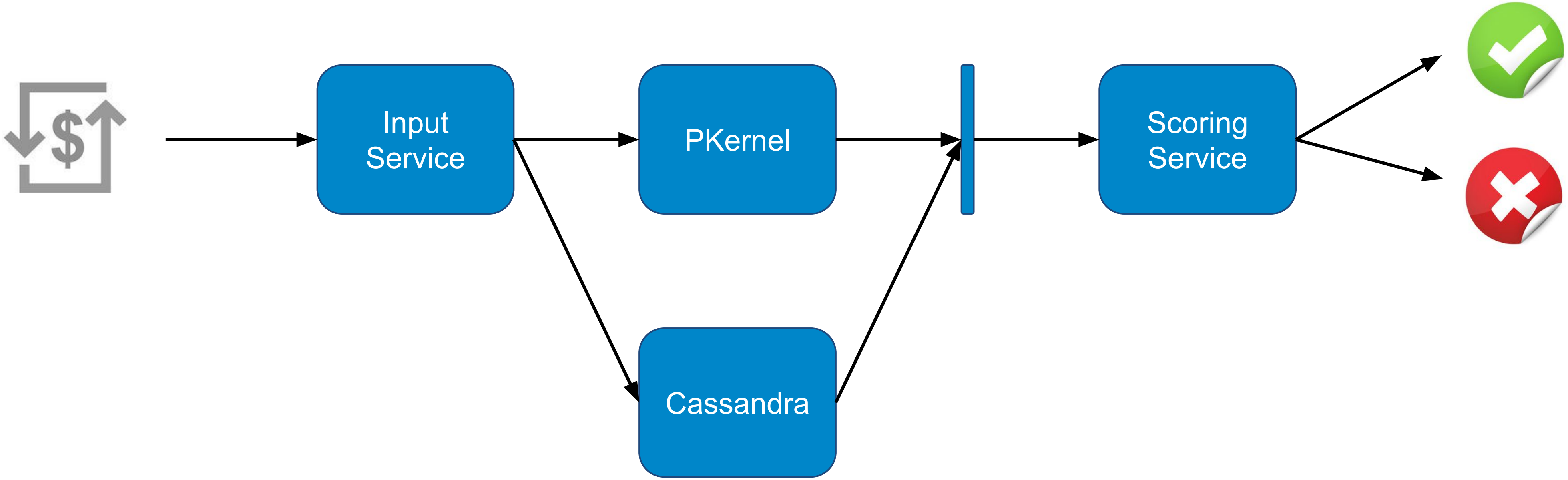

Processing time ~ 100 ms on 99.999% percentile

Thank you!