

# Apache Flink在中国农业银行的探索和实践——神荼平台

The Exploration and Practice of Apache Flink in Agricultural Bank of China

侯鑫磊

HouXinlei

中国农业银行 高级研发工程师

AGRICULTURAL BANK OF CHINA · Senior Development Engineer

**FLINK FORWARD # ASIA**

实时即未来 # Real-time Is The Future

**FLINK  
FORWARD**



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# 背景介绍

Project Background.

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01



# 1.1 经济环境

The Environment of Economy.

## 站在数字化转型的门口

We are in the revolution of digital transformation.



### 外部环境变化

Changes in External Environment

- 宏观经济增速放缓  
Macroeconomic Growth Slowed Down.
- 互联网金融冲击  
Impact of Internet Finance.
- 客户消费习惯趋于数字化  
Online Consumption.
- 科技推动商业变革  
Technology is Driving Business Change.

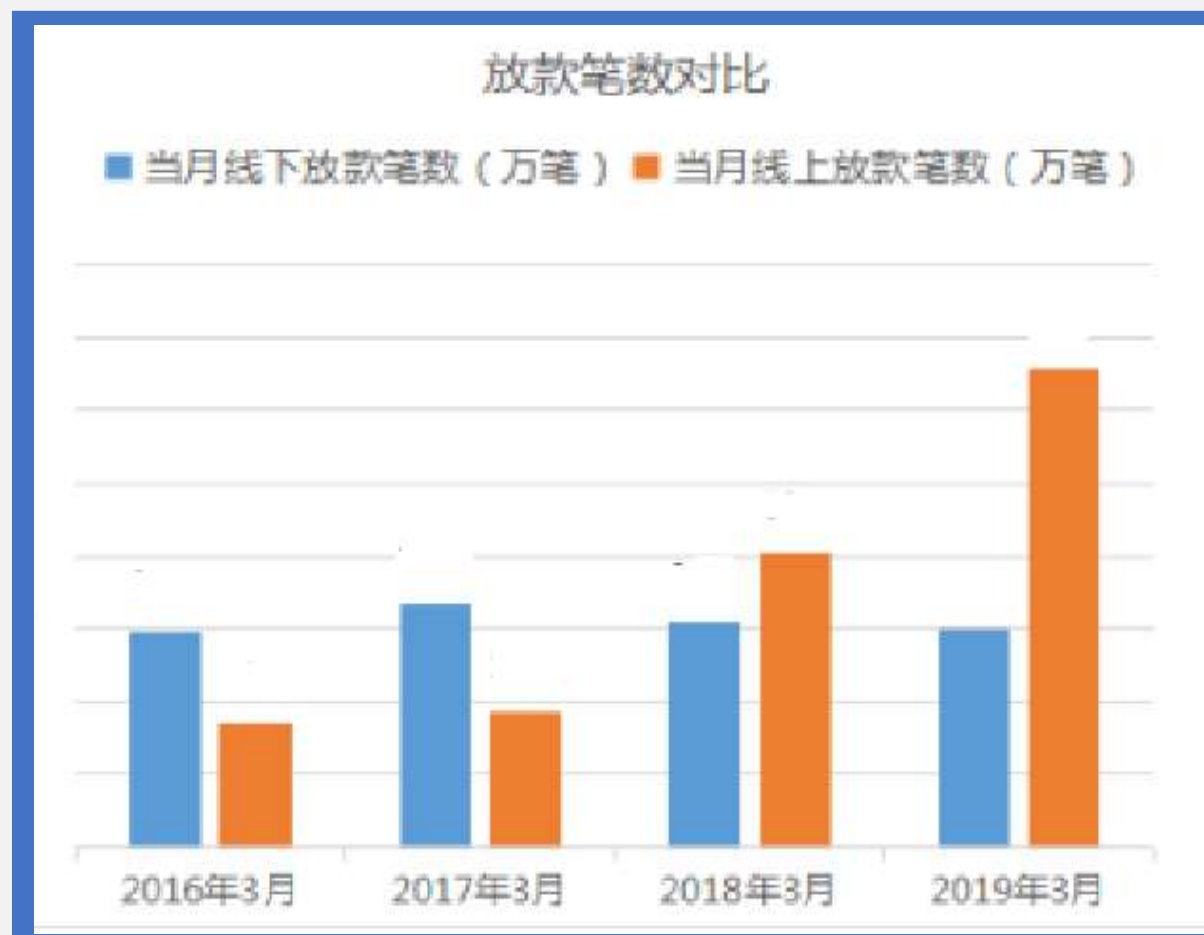
### 内部环境变化

Changes in Internal Environment

- 银行利润增速放缓  
Bank's profits growth falls.
- 信贷产品供需矛盾凸显  
Market needs more loan products.
- 信贷风险防控压力加大  
More risk.
- 业务发展的线上化趋势  
More Online Services.

# 1.2 业务发展

The Development of Business.



## 农行信贷业务驶入数字化转型快车道

Swift Development of Credit Service in ABC.



# 1.3 信贷发展与风控

Loan Services Development and Risk Control.

## 普惠金融提升收益的三大要素

The 3 factors to improve revenue

### 01 下沉的客户群体

More Customer and Demand

- a. 普惠金融客户群体数量大  
Large Number of Customers
- b. 客户需求丰富  
Rich Financial Needs
- c. 提升银行收益  
Increase Bank Revenue

### 02 多样化的产品设计

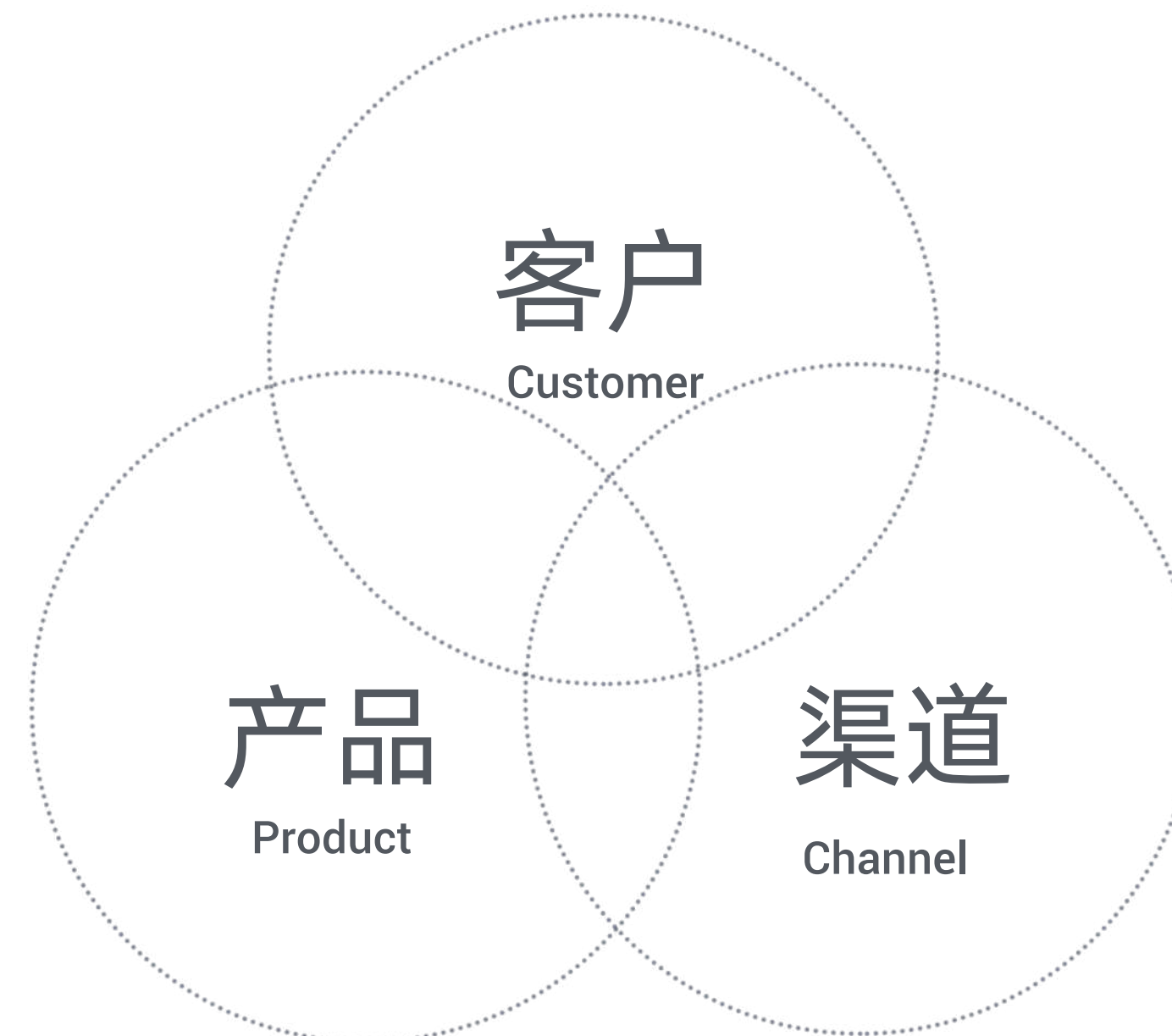
Varied Product Design

- a. 客户的需求复杂  
Complicated Requirements
- b. 产品设计多样化  
Varied Product Design

### 03 更丰富的获客渠道

Varied Channel to Receive Customer

- a. 线上渠道流量增长  
Rapid Growth of Online Channels.
- b. To Be Anything、Anytime、Anywhere。



## 对应的风控问题

The risk problem.

### 01 下沉的客户群体

Lower Loan Customer

- a. 普惠金融客户资信水平降低  
Lower Loan Customer
- b. 欺诈和违约风险提高  
Higher Risk of Fraud and Overdue
- c. 更有效的风控手段  
Effective Method of Risk Control

### 02 多样化的产品设计

More Product More Risk

- a. 系统设计及开发难度大  
Difficulty in System Design and Development
- b. 风控的难度更高  
Higher Difficulty in Risk Control

### 03 更丰富的获客渠道

More Channels More Hidden Risks

- a. 欺诈更具隐蔽性  
More Convert Fraud
- b. 欺诈模式更新速度提升  
Fraud Pattern Update Quick

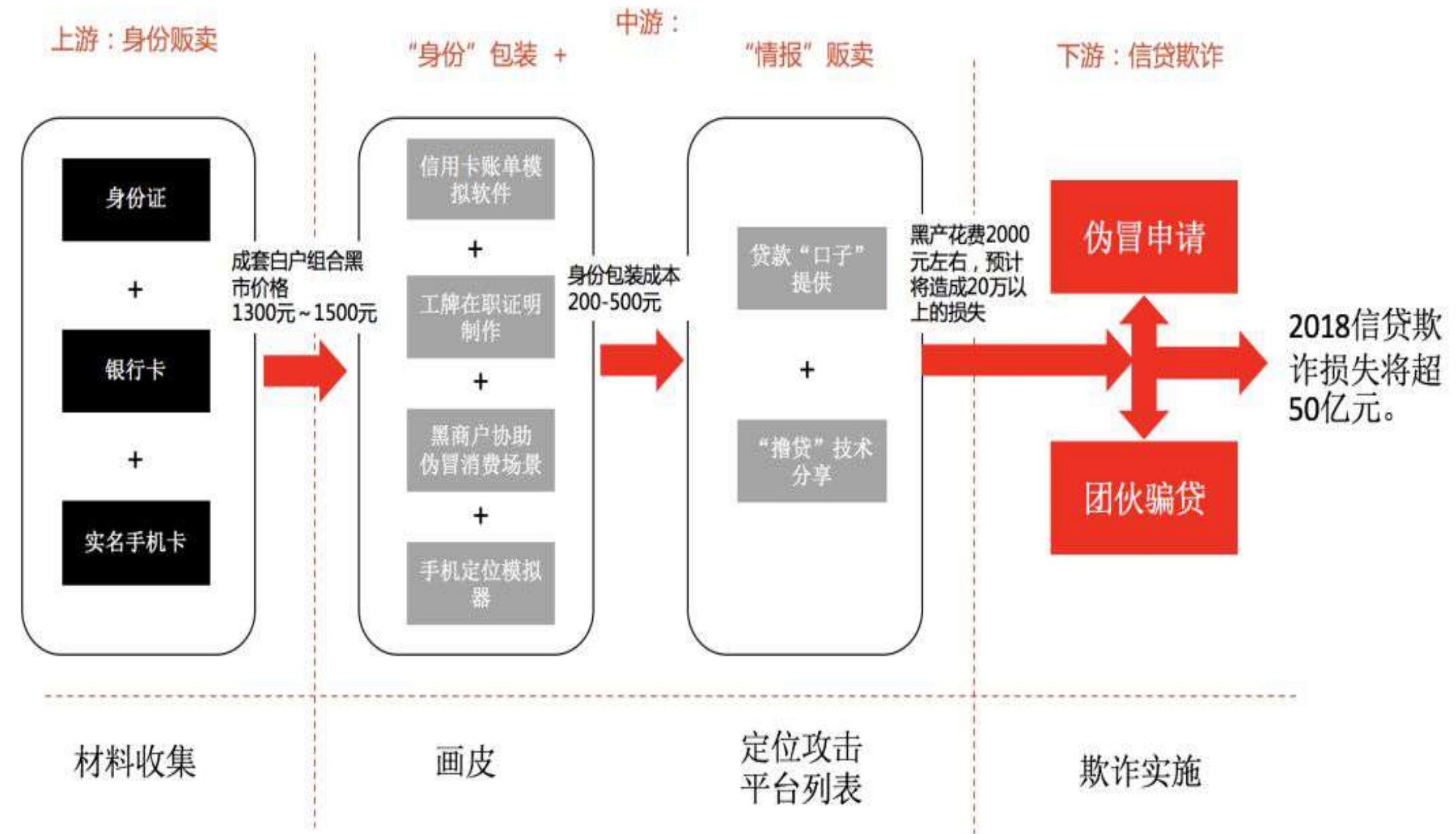
# 1.4 风控形式

The Form of Fraud Risk.

## 风控形势日趋严峻

The Risks Become Increasingly Severe.

- **160万的黑产从业人员**  
1.6millions people being engaged in Dark industry in China.
- **1000万张游离的身份证**  
10million ID cards.
- **1.3亿运营商黑卡。**  
130 millions phone cards.
- **每年因黑产欺诈导致的损失超千亿。**  
Loss reach more than 100 billions per year.
- **50%的逾期来源于欺诈。**  
50% of overdue loans are due to fraud.



**团伙化**  
Organized

**专业化**  
Professional

**线上化**  
Cyber Crime

**智能化**  
Smart

# 1.5 欺诈和攻击类型

Types of Fraud and Attack.

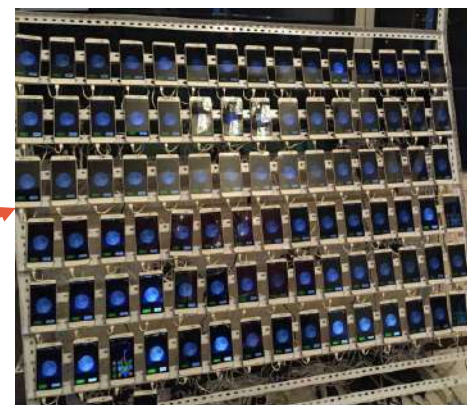
- 羊毛党  
Get "Petty Profits"
- 中介  
Loan Intermediaries
- 冒名贷款  
Impersonate Loan
- 个体欺诈  
Individual fraud
- 团伙攻击  
Gang Attack



黑产从业人员  
Fraud Gang



生物特征  
Biosignature.



设备  
Device



身份  
ID



其他技术.....  
Other Technology

- 伪造设备  
Forged Equipment
- 代理IP  
Agent IP
- 修改LBS  
Change LBS
- 批量养号  
Batch Maintenance Artificial Account
- 模拟器  
Device Simulator
- 伪造资质  
Forgery Qualification



# 1.6 传统风控的不足

The Shortage of Traditional Risk Control Method.



经验为主

Experience-based



客户体验

Sacrifice Customer Experience



实时性差

Poor Real-Time Performance



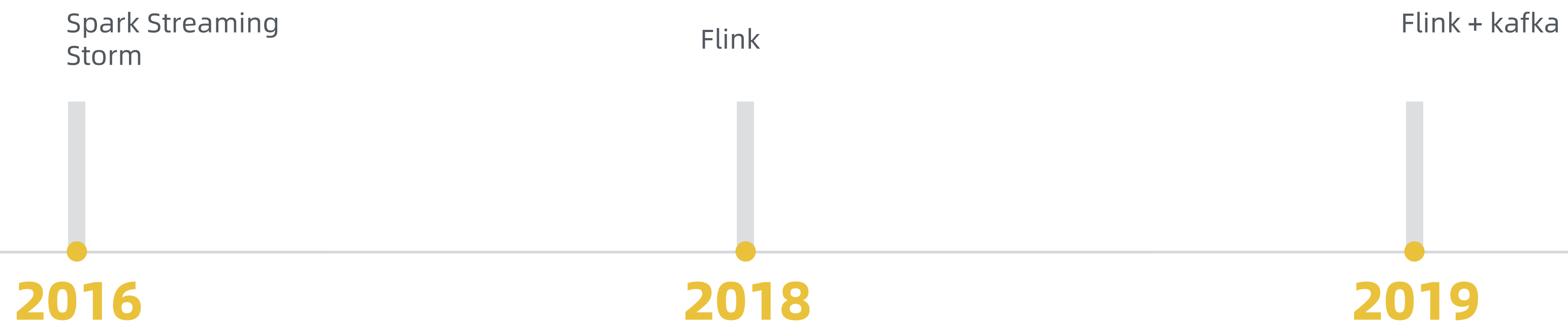
模型失灵

Algorithm Failure



# 1.7 选型—实时计算在农业银行的演进

Real-time Calculation in ABC.





# 1.7 选型—实时计算引擎的要求

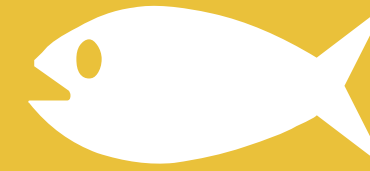
The requirement of Real-time Calculation Engine



实时性  
Swifter



准确性  
Exacter



吞吐率  
High Throuhput



# 1.7 选型—横向比较

Compare of Technology.



Framework	Storm	Spark Streaming	Flink
Streming Model	Native	Micro-batch	Native
Fault Tolerance	Record-ACK	Checkpoint	Checkpoint
Latency	Very Low	High	Low
Guarantees	At last once	Exactly Once	Exactly Once
Throughput	Low	High	High





# 实践分享

Sharing of Practice.

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## 02



## 2.1 线上信贷业务流程

Online Credit Operations Process.





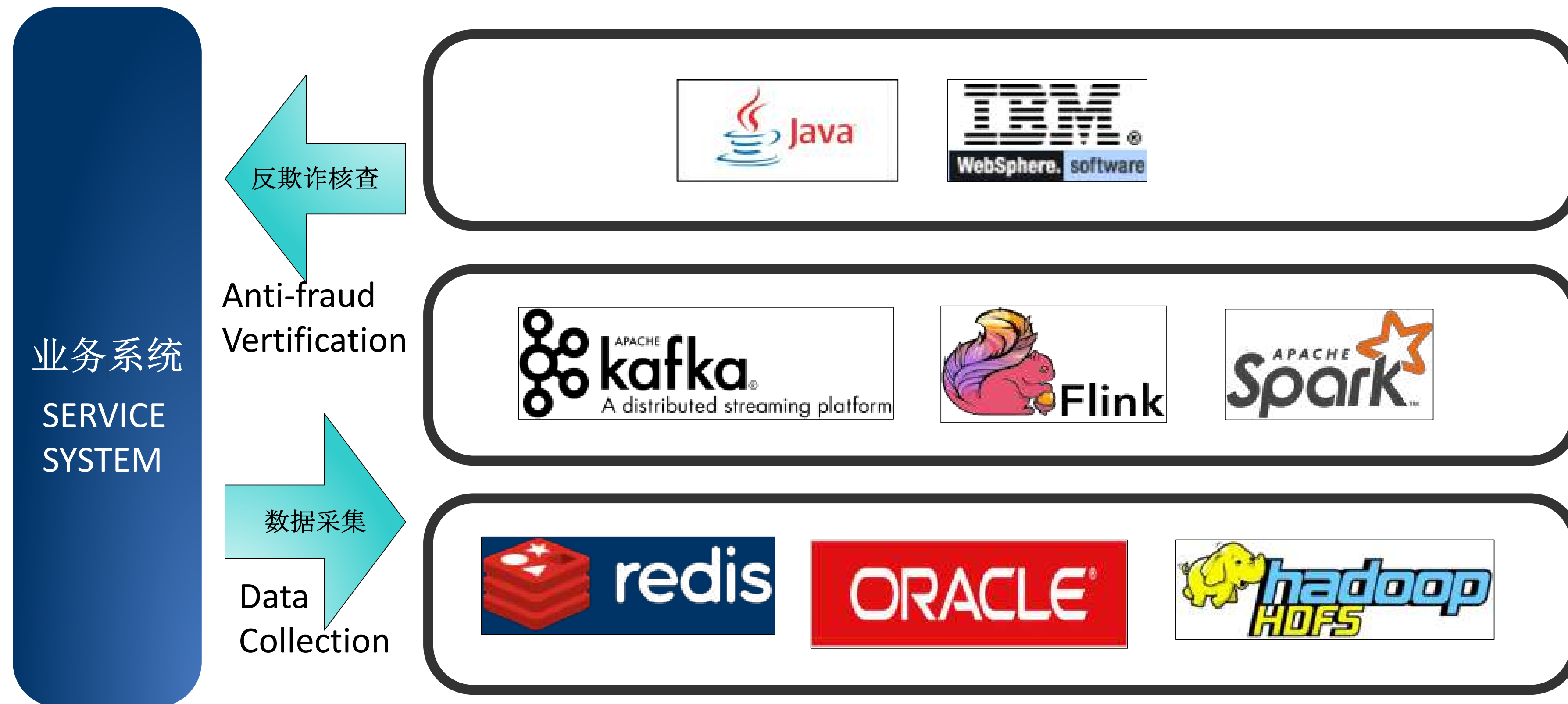
## 2.2 神荼应用架构

Application Architecture.



## 2.3 技术栈

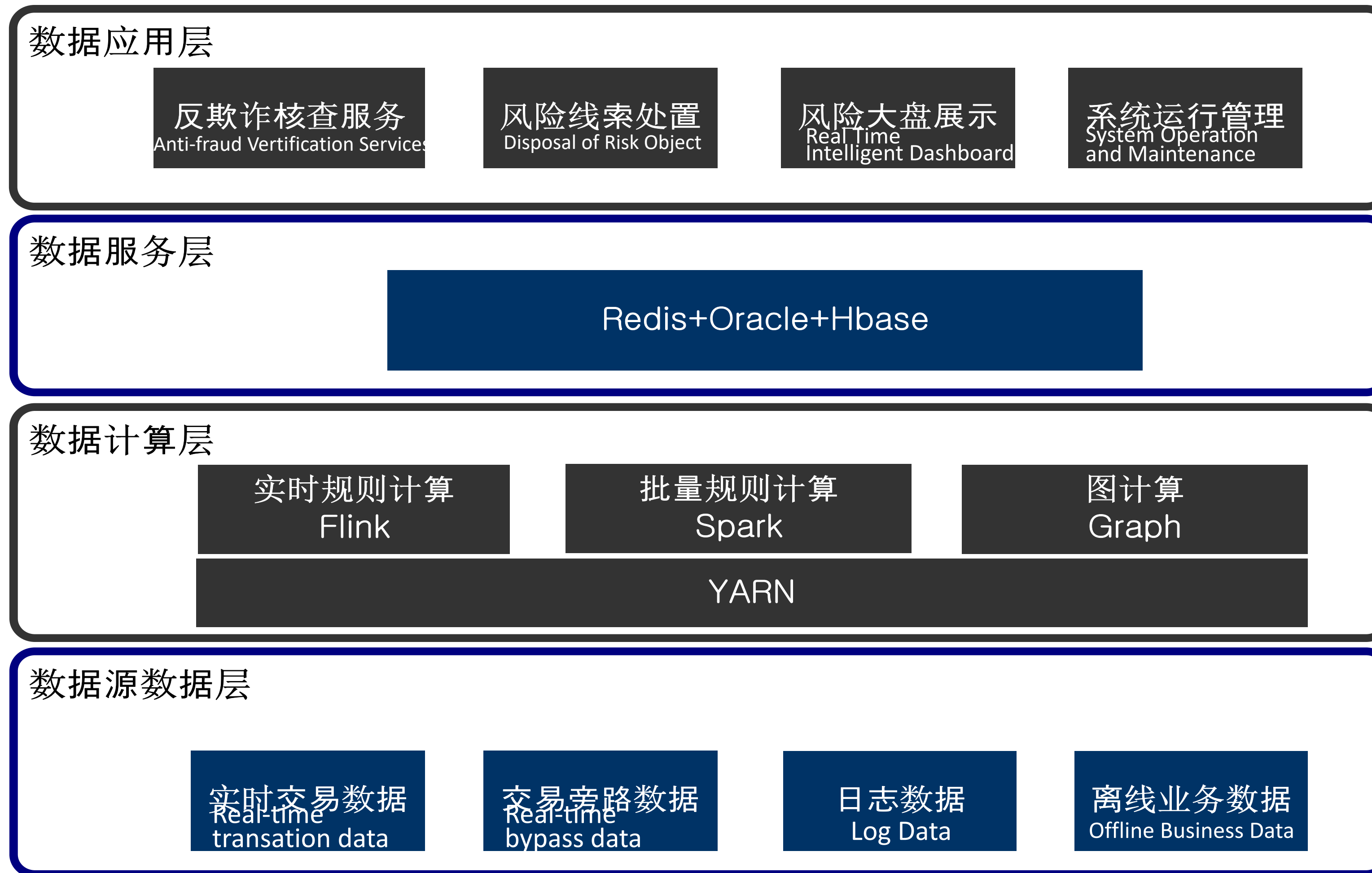
Technology Stack.





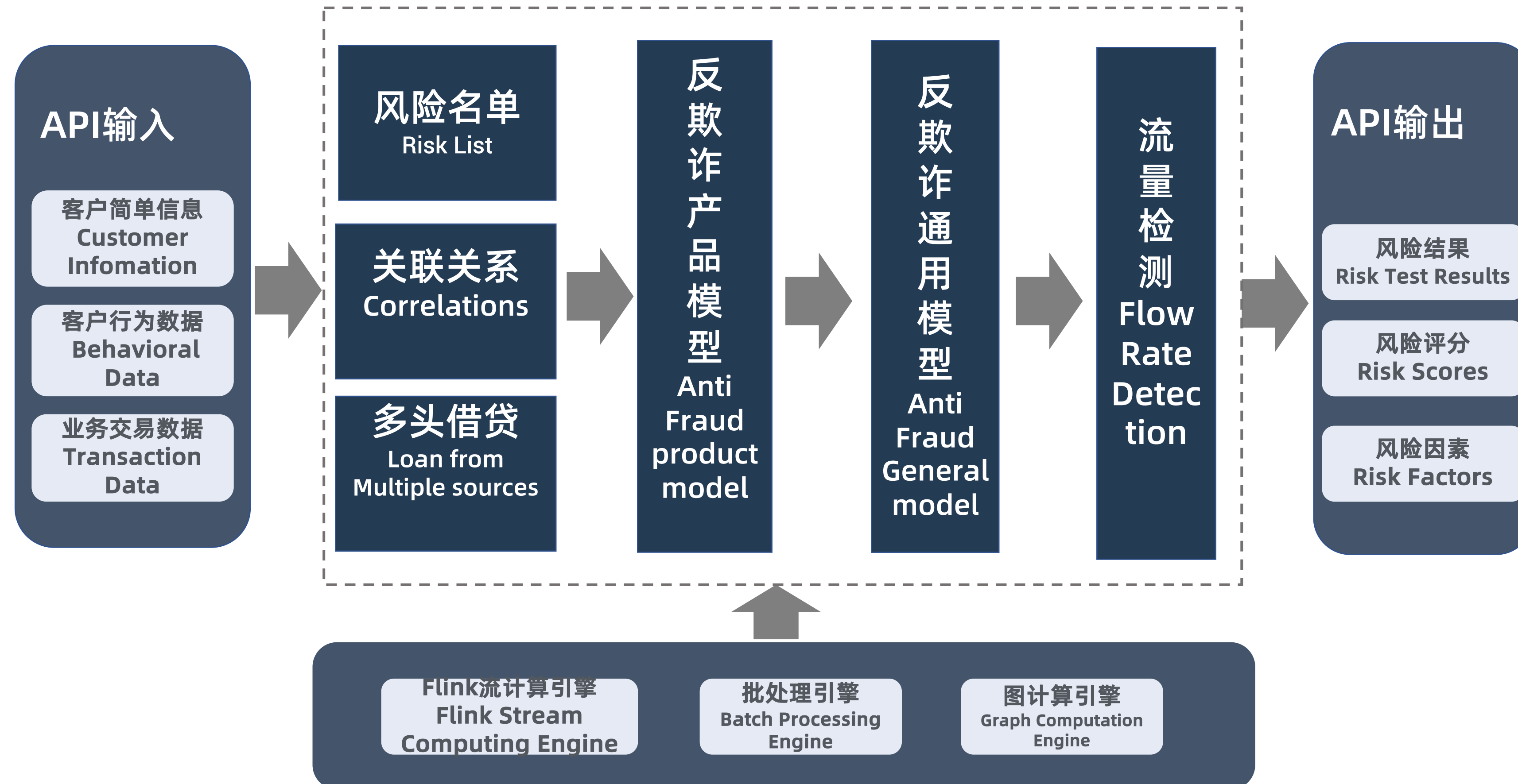
## 2.4 数据架构

Data Architecture.



## 2.5 神荼功能—反欺诈API

SETTLE Function—Anti fraud API.





## 2.6 神荼功能—监控云图

SETTLE Funciton— Real Time Intelligent Dashboard



(测试数据，无真实业务意义)

实时数据高效处置  
Real Time Data and Efficient Disposal

多元数据接入  
Diversified Data

统计维度丰富全面  
Rich Statistical Dimensions



# 典型应用

Typical Use.

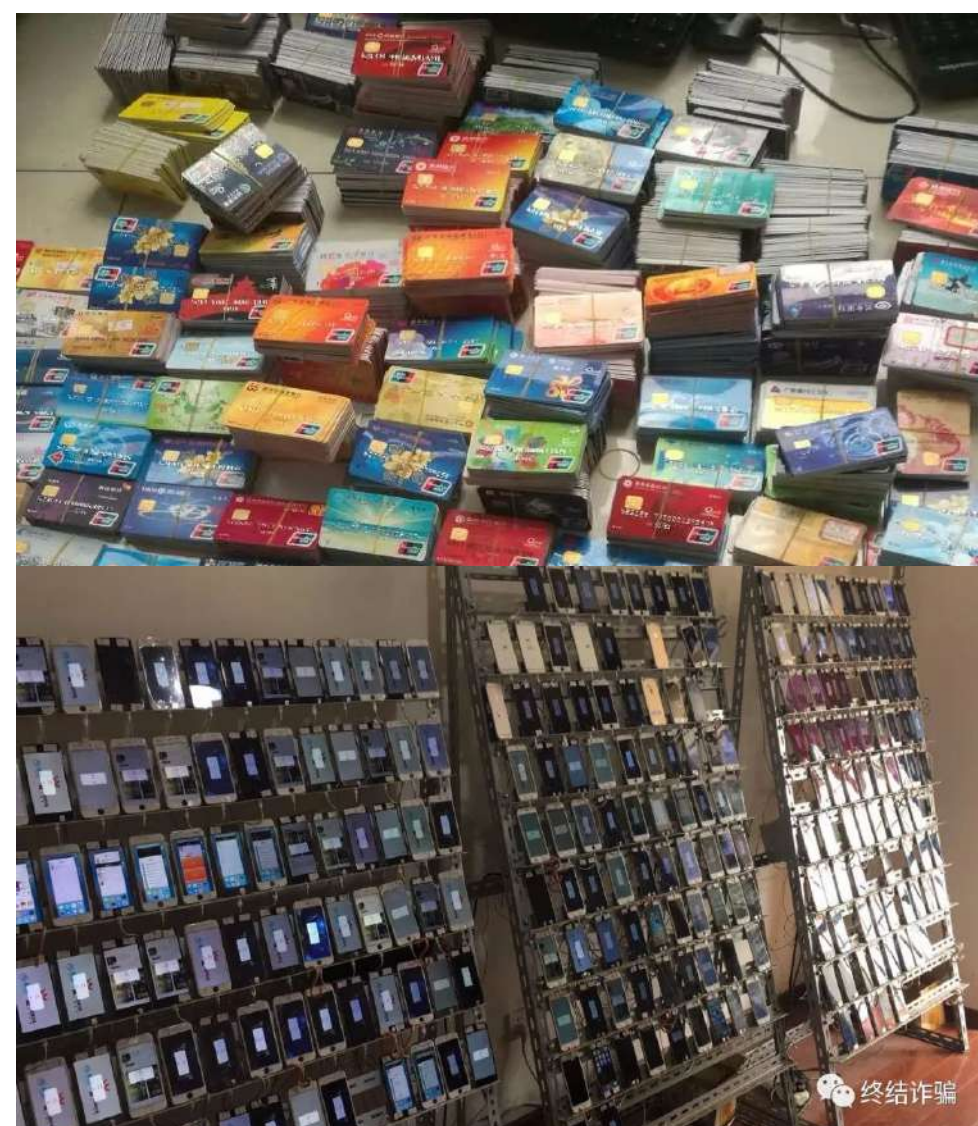
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**03**



# 3.1 实时预警——场景

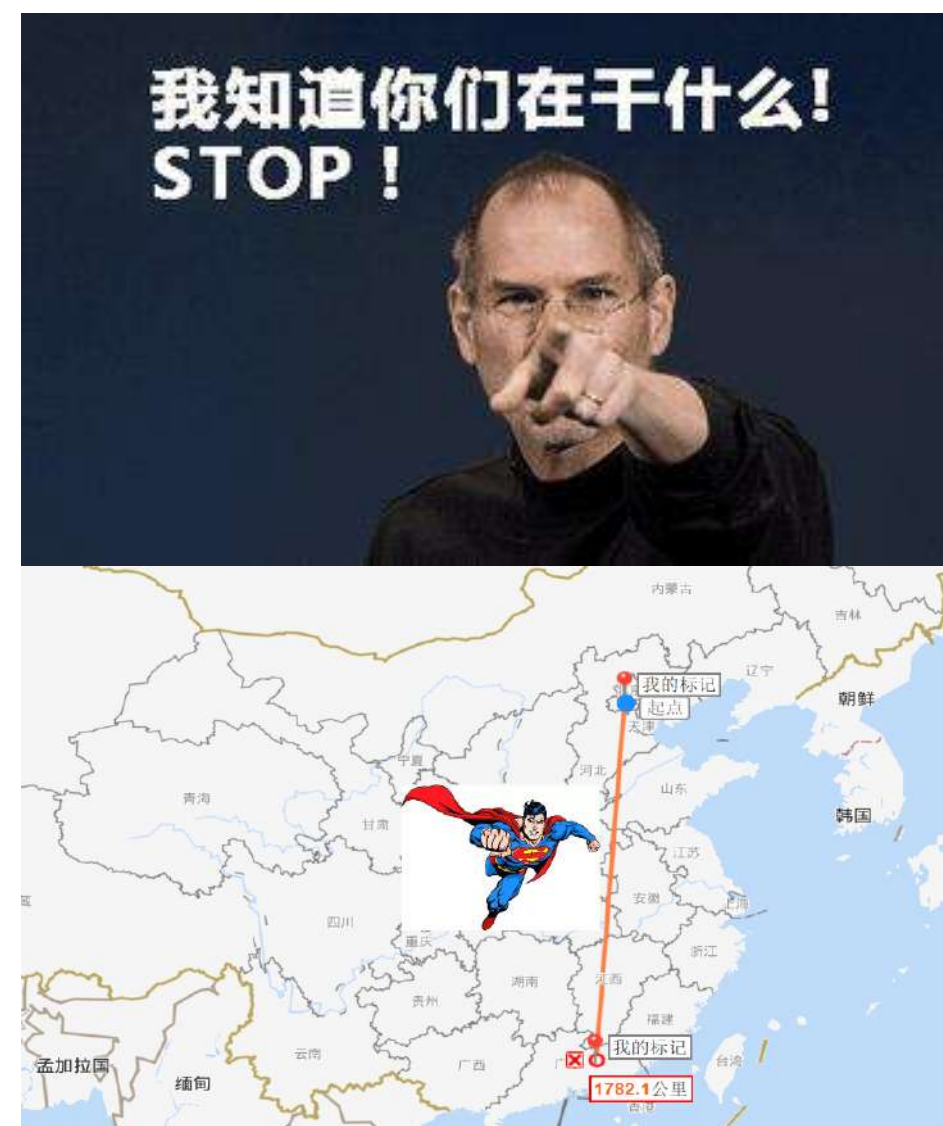
Real-Time Alert——Scene



## 异常交易要素检测

Abnormal Transation Element  
Detection

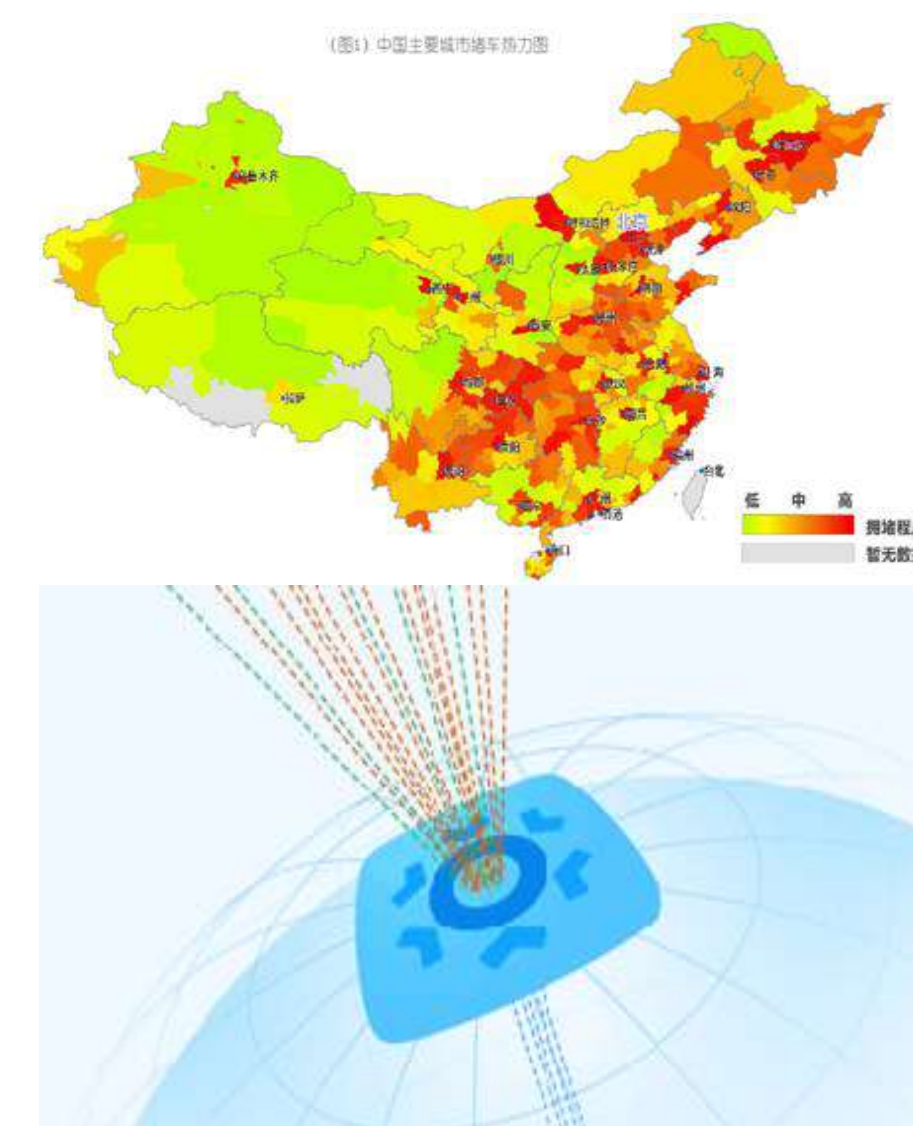
- 设备  
Equipment
- 手机号  
Mobile Number
- 银行卡  
Bank Card



## 客户异常行为

Customer Abnormal Behavior

- 客户异常操作  
Abnormal Behavior
- 账户异常登录  
Exception Login
- 申请等行为  
Exception Operation



## 异常热点检测

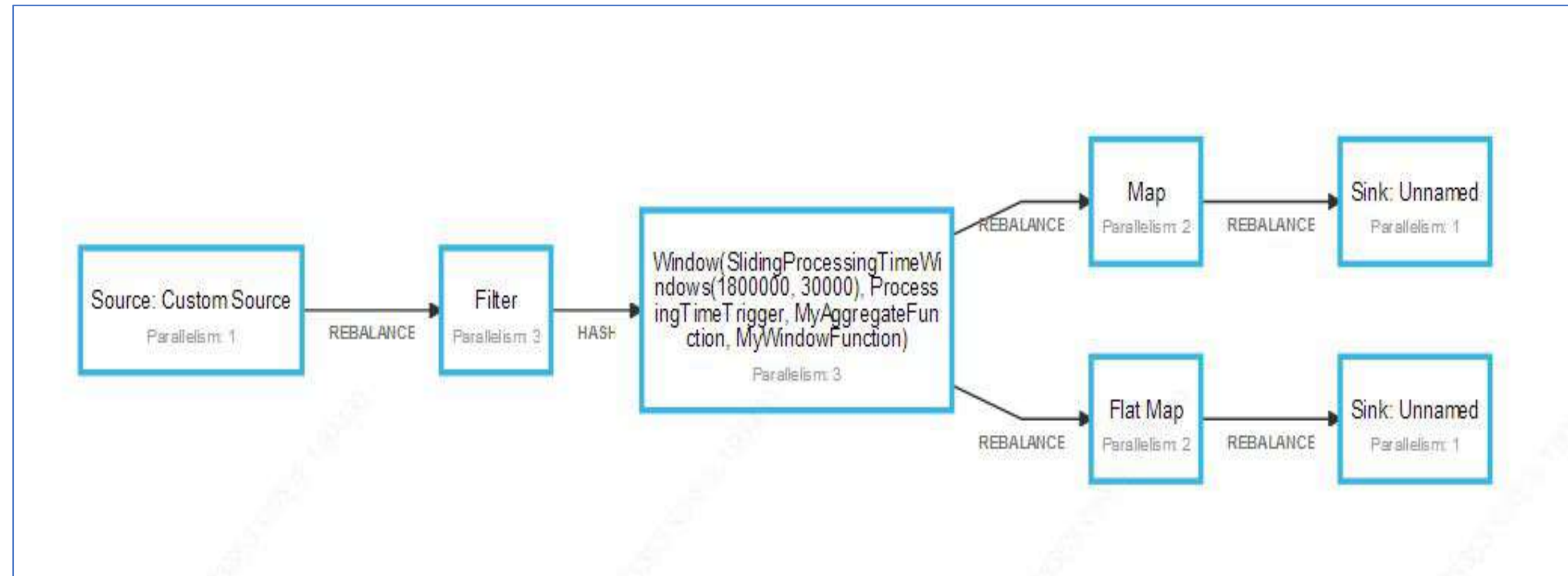
Abnormal Hotspot Detection

- 异常地区  
Abnormal Area
- 异常IP  
Abnormal IP
- 异常产品  
Abnormal Product



# 3.1 实时预警——Flink特性

Real-Time Alert——Flink Features



无容器state类规则  
Rules with value-state

带容器的state类规则  
Rules with collection-state

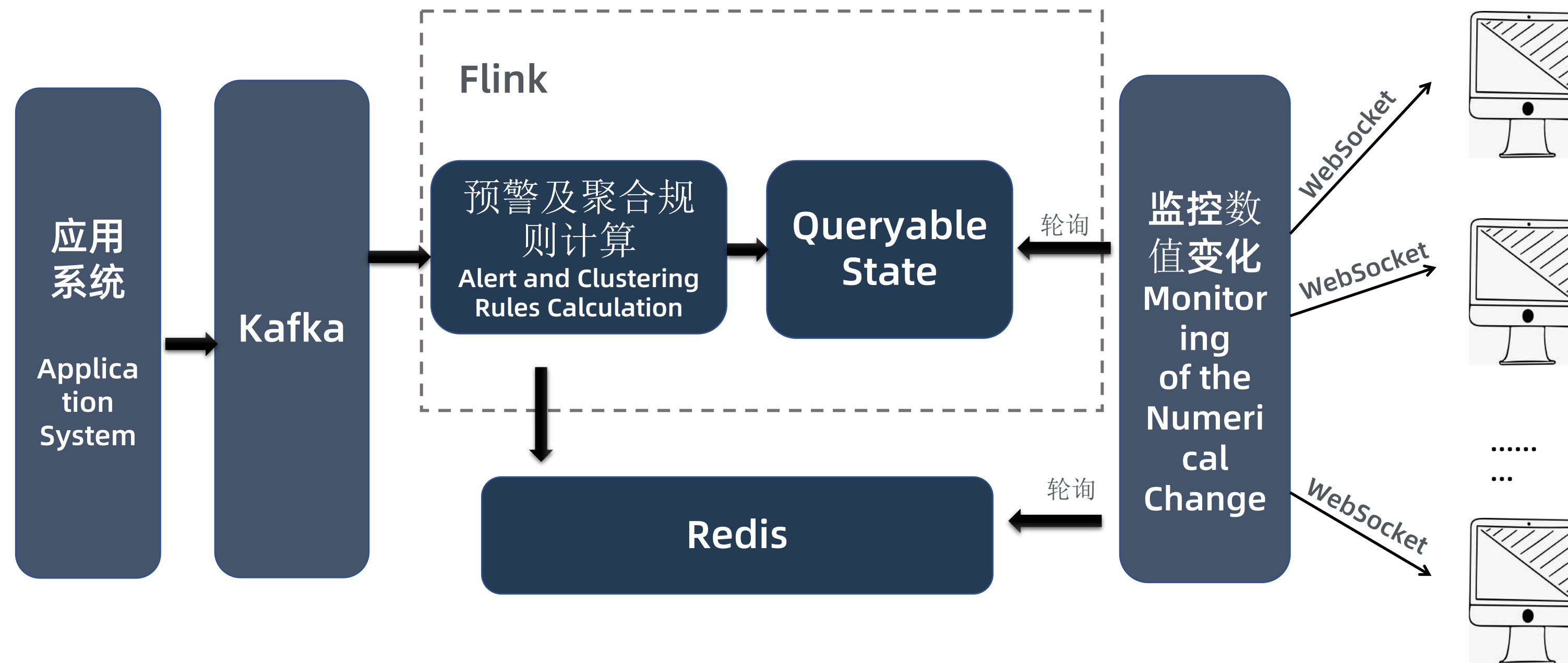
窗口类规则  
Rules with keyed-windows processing

CEP类规则  
Rules with Flink CEP



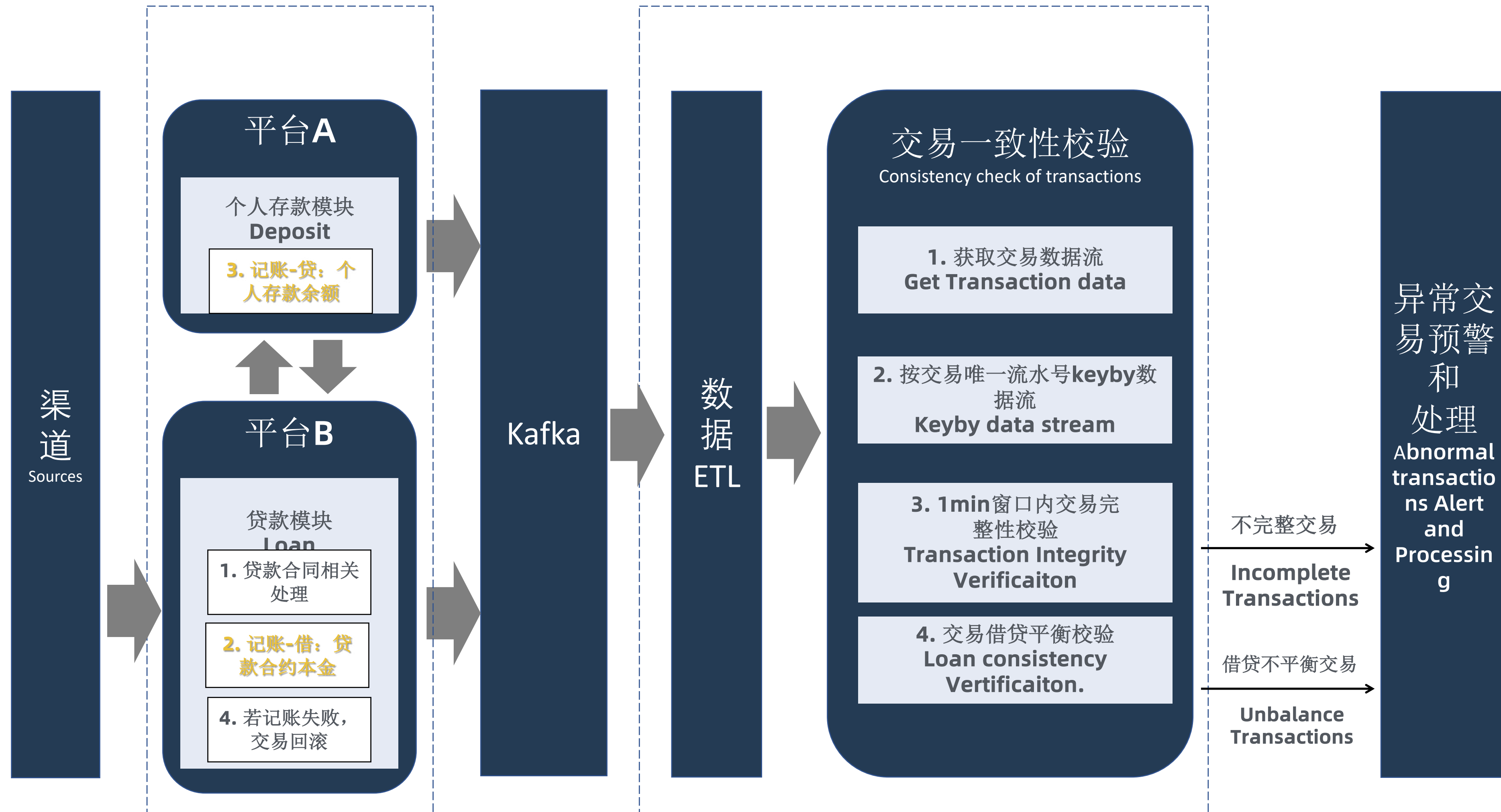
## 3.2 神荼功能—监控云图

SETTLE Funciton—— Real Time Intelligent Dashboard



# 3.3 分布式应用交易一致性校验

Consistency check of transactions on different application platforms.





# 应用效果和展望

Effect and Prospect.

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04



[illegible]

- API 1million/day
- 10ms
- 0.45%





使用范围

The Scope of Use



平台化

Platform Design



智能化

Intelligent



**THANKS**