

# Flink 在字节跳动的实践

## The Practice of Apache Flink at ByteDance

公司：字节跳动

职位：大数据工程师

演讲者：邹丹



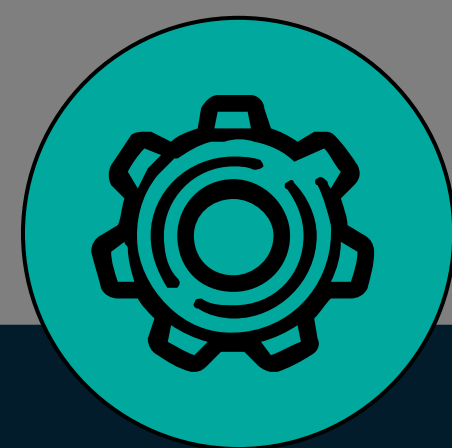
# 概览

## Outline

- 相关背景  
Related Background
- 流式作业管理平台  
Streaming Job Management Platform
- 生产实践  
Production Practices
- 展望  
Future Work



Yarn 集群 5+  
5+ Yarn clusters



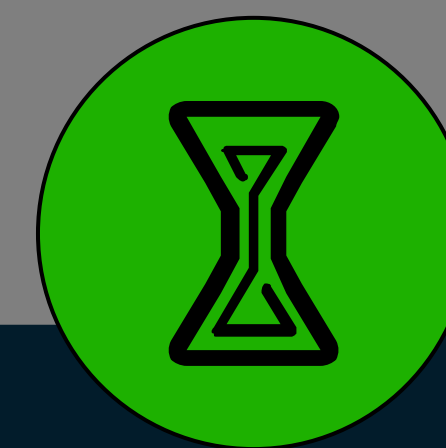
机器 1w+  
10k+ machines



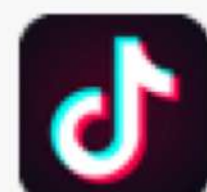
作业数 2000+  
2k+ jobs



用户数 300+  
300+ users



数十个产品  
Dozens of products



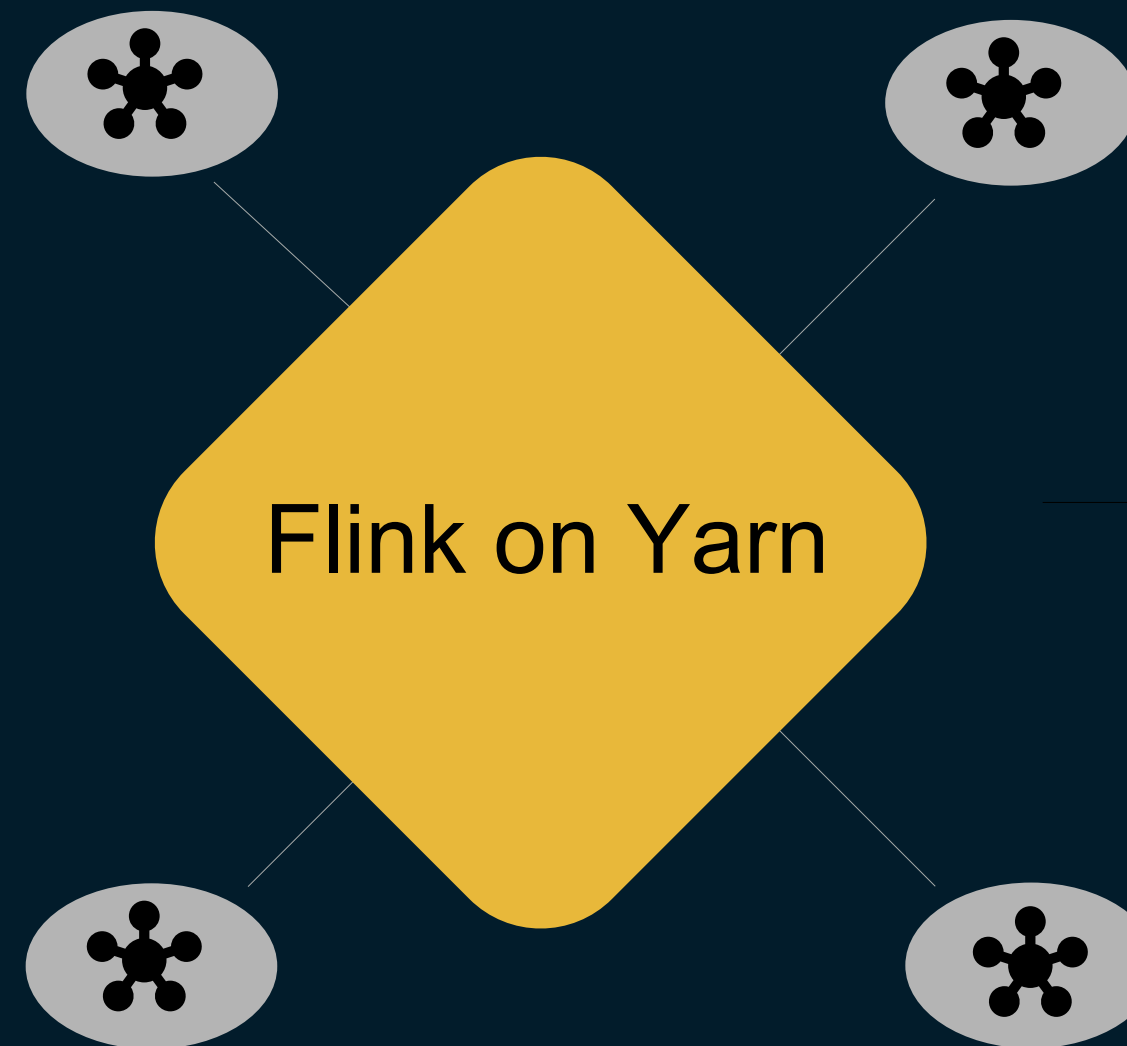
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# Flink on Yarn



独立的 Yarn 集群  
Independent Yarn clusters

内存和 CPU 隔离  
Memory and CPU Isolation



按不同的业务划分队列  
Queue divide by groups

重要作业跑在 Yarn 独立 label  
的机器上  
Business critical jobs on labeled  
machines of the cluster

# 流式作业管理平台

## Streaming Job Management Platform

# 流式作业管理平台

Streaming Job Management Platform

## 1 提供页面操作，一键启动，停止，重启

Enable simple operations e.g. start , stop and restart.

## 2 作业和用户(组) 绑定，方便作业管理

Bind job and user (group) for ease of management.

## 3 代码版本管理，升级/回滚简单

Manage code versions for ease of upgrade / rollback.

## 4 代码配置分离

Separate code and configuration.

## 流式作业管理平台

Streaming Job Management Platform

### 5 监控作业状态，作业失败自动拉起。

Monitor job status, and restart the failed job automatically.

### 6 记录操作历史，方便追溯

Record operating history for easy tracing.

### 7 提供作业问题自动排查工具

Provide automatic troubleshooting tools.

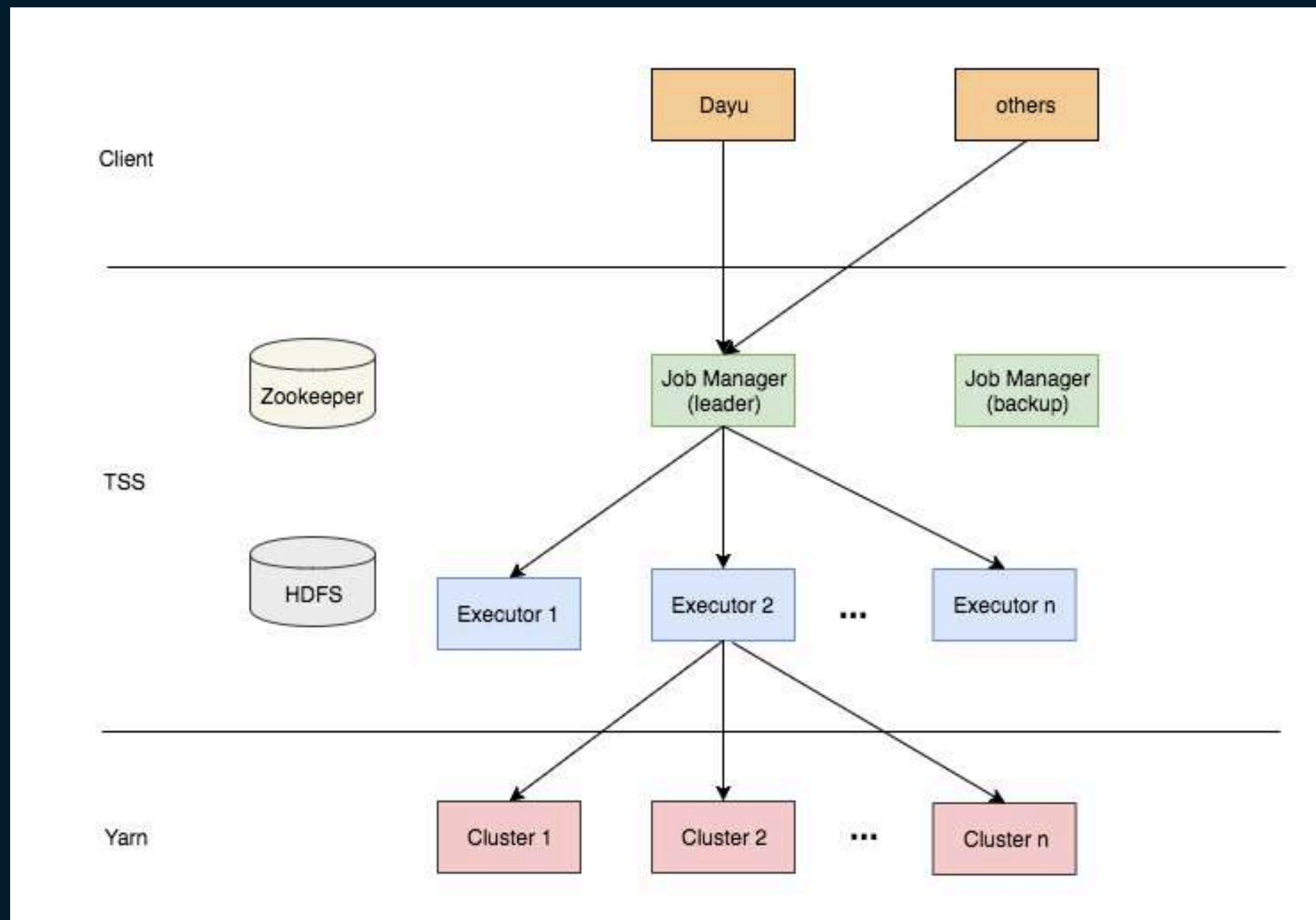
### 8 一站式管理

One stop management.



# 架构

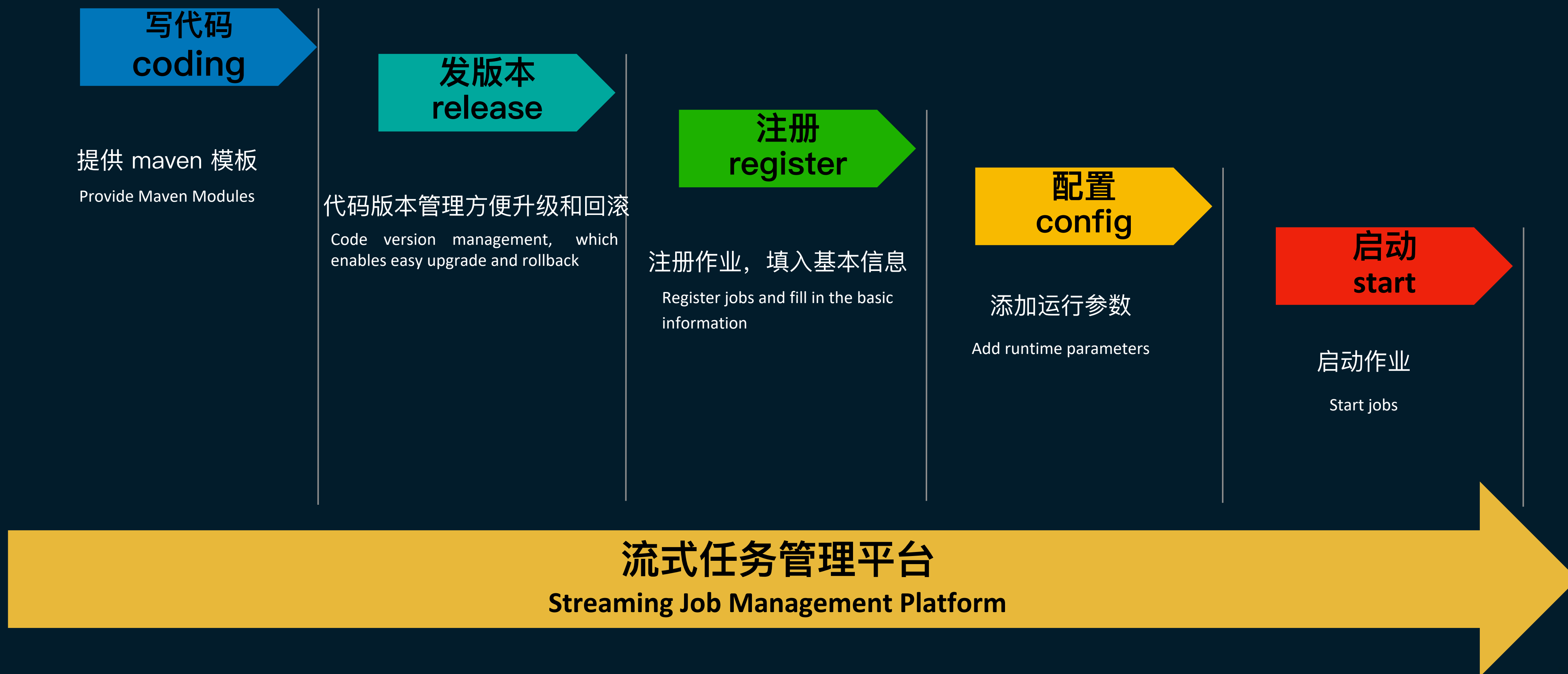
## Architecture





# 流程

## Work Flow

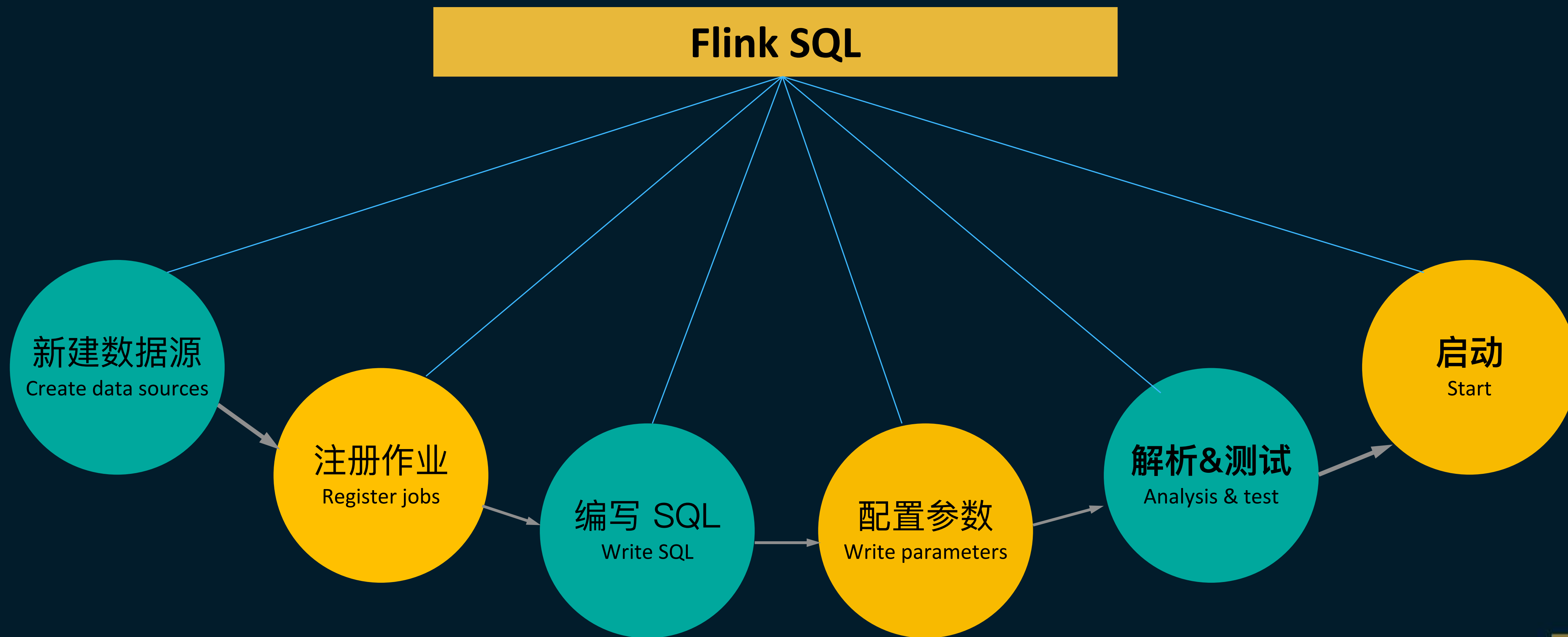


# Flink SQL

- 简单易懂，使用门槛低  
Easy to understand, lower entry bar
- API 较为稳定，版本升级时，用户无需修改代码  
Stable API, users do not need to modify the code after upgrade
- 优秀的优化框架，用户只需要专注于业务逻辑实现  
Great optimization frameworks, users only need to focus on the business logic

# Flink SQL 流程

Flink SQL Work Flow





# 编写 SQL

## Write SQL

基本信息

SQL和配置

数据源

搜索

kafka\_logcollector

topic

vidstring

cyp\_stateinteger

prd\_numlong

req\_idstring

req\_numlong

psmstring

ritstring

dcstring

1 select

2 vid\_one as vid,

3 inventory\_type,

4 content\_type,

5 image\_mode,

6 sum(

7 case

8 when label = 'send' then 1

9 else 0

10 end

11 ) as sends,

12 sum(

13 case

14 when (

15 (

16 merge\_type = 1

编辑器主题: default

全屏

格式化

解析

调试

# 测试

## Test



解析结果

测试日志

测试结果

⬇️ 下载测试结果

vid	inventory_type	content_type	image_mode	sends
415914	40002	4	0	2
413912	9	1	4	1
428338	9	1	4	1
423375	9	1	4	1
378450	9	1	4	1
420624	9	1	4	1
426616	9	1	4	1
392461	9	1	4	1
411842	9	1	4	1

# 作业监控

## Job Monitoring





# 生产实践 Production Practices

# 问题一：运维压力大

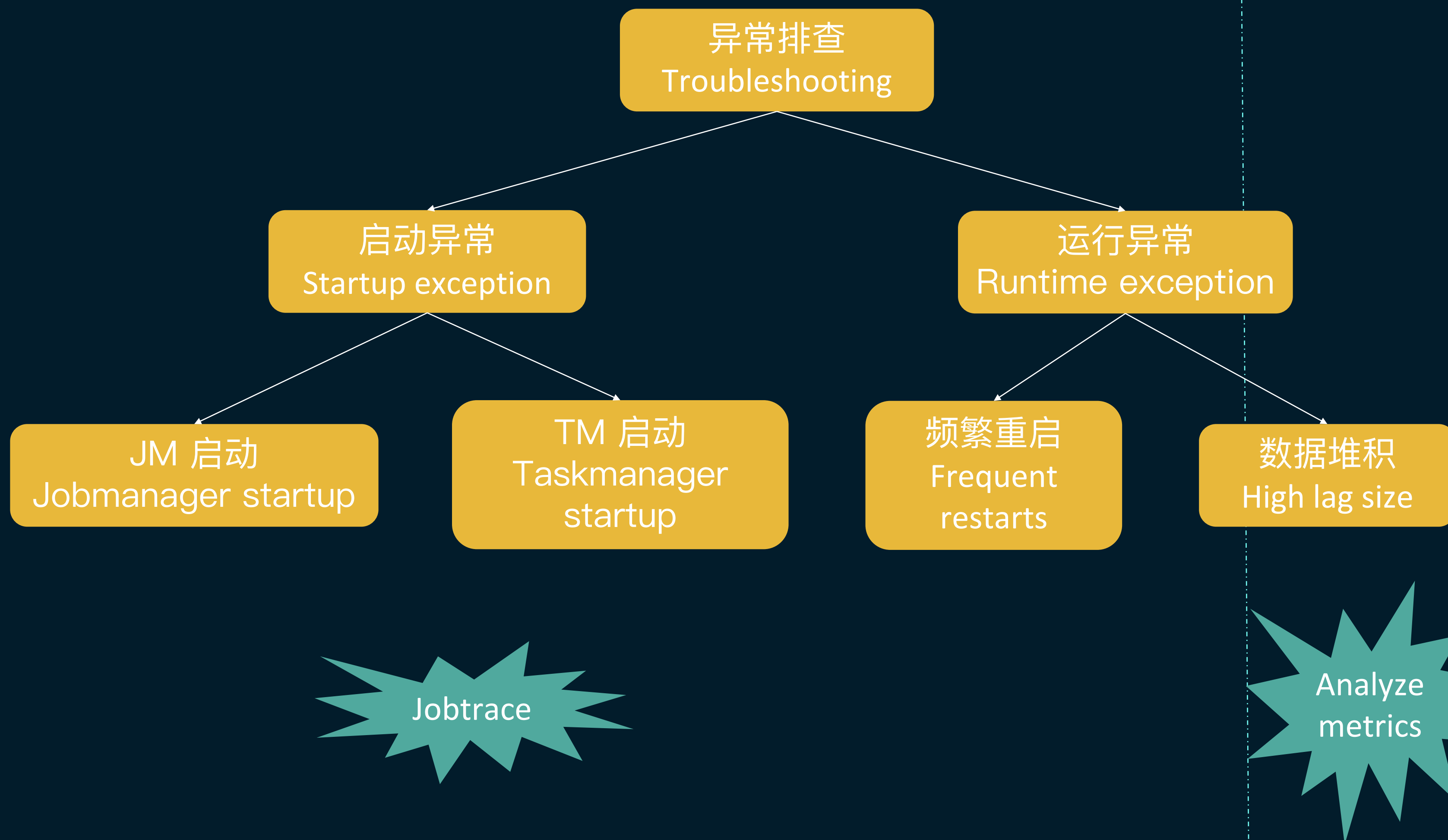
High Operation and Maintenance Pressure

- 2k+ 作业, 3+ 攻城狮  
2000+ jobs , 3+ engineers
- 实时性要求高  
Critical real-time requirement



# 解法: 自动排查工具

## Automatic Troubleshooting Tools





# 错误日志

## Error Log

自动检查工具 错误日志

☒ 只看RootCause ?

application\_1541486727338\_13934 开始时间: 2018-12-01 16:56:55 [收起]

2018-12-01\_16:59:15 类型:INSUFFICIENT\_NETWORK\_BUFFERS Root Cause:是

NetwordBuffer 不够, 照处理建议的 wiki 自行调整 NetworkBuffer 比例 [收起]  
建议:查看链接

日志:  
container\_e60\_1541486727338\_13934\_01\_000001,2018-12-01\_16:59:15,WARN,ExecutionGraph:,Co-Flat Map (9/1500) (3ec374c4a4f163f075107651b1046276) switched from DEPL  
java.io.IOException: Insufficient number of network buffers: required 480, but only 26 available. The total number of network buffers is currently set to 65536 of 32768 byt  
at org.apache.flink.runtime.io.network.buffer.NetworkBufferPool.createBufferPool(NetworkBufferPool.java:244)  
at org.apache.flink.runtime.io.network.NetworkEnvironment.setupInputGate(NetworkEnvironment.java:249)  
at org.apache.flink.runtime.io.network.NetworkEnvironment.registerTask(NetworkEnvironment.java:199)  
at org.apache.flink.runtime.taskmanager.Task.run(Task.java:611)  
at java.lang.Thread.run(Thread.java:748)

# 数据延迟

Data Delay



自动检查工具

错误日志

本次检查是否解决了你的问题? [已解决](#) [未解决](#)

✓

错误日志

⌵

✓

Lag Size

⌵

✗

作业资源

⌶

问题描述:

1. 单container最大内存使用率为 1.0 (设置值: 30.0, 使用峰值: 29.99) , 超过阈值0.85。

处理建议:

1. 建议调大tm\_memory.

> 检查项

[查看故障排查和处理wiki](#)

✓

Kafka 延迟

⌵

✓

Spout 数据倾斜

⌵

✓

Bolt 入队列使用率

⌵

✓

Bolt 数据倾斜

⌵

# 问题二：集群管理困难

Hard to Manage Clusters



- 缺少集群状态监控  
Insufficient cluster monitoring
- 缺少批量操作功能  
Lack of batch operation capacities



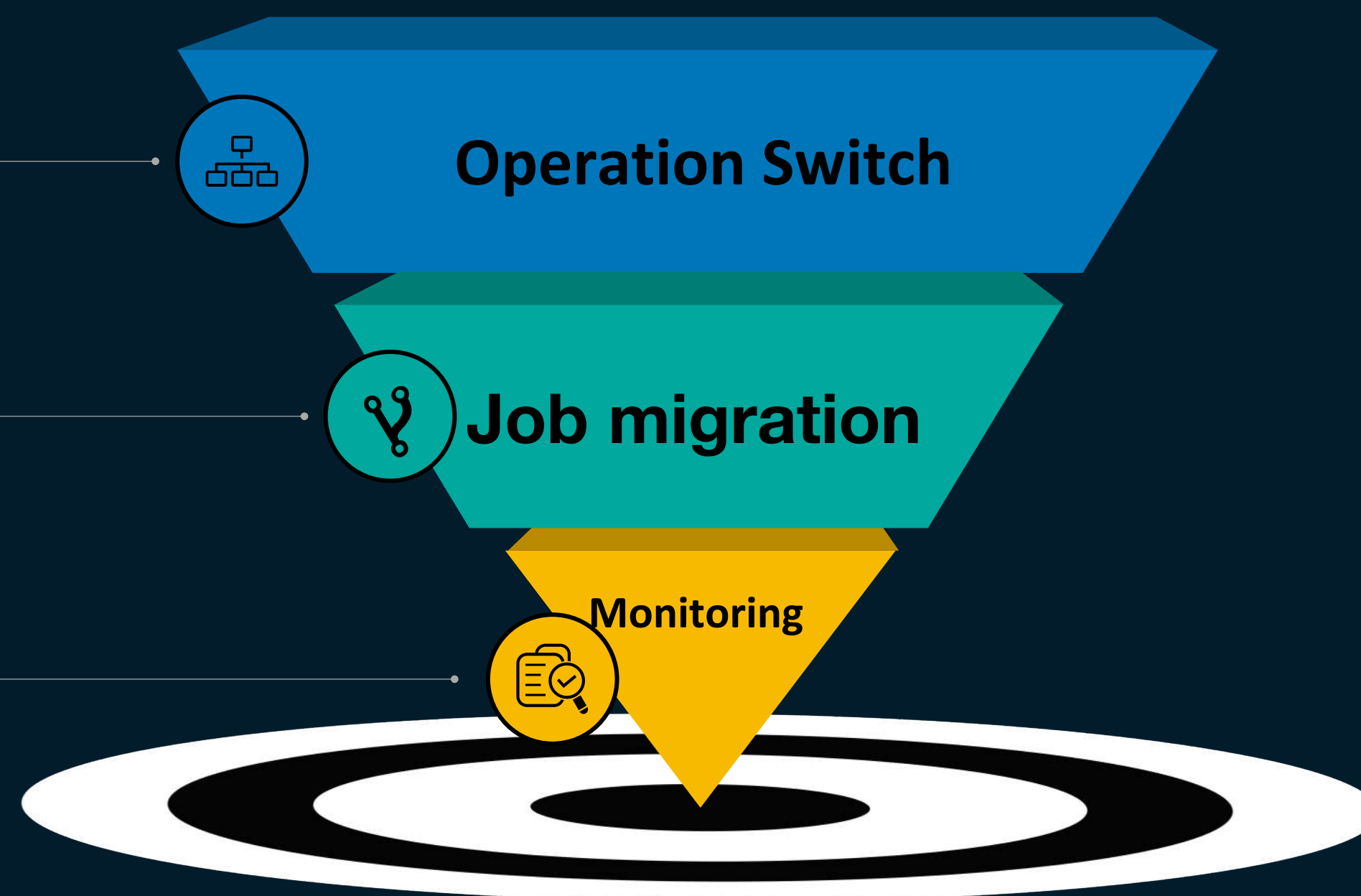
# 解法: 集群管理工具

## Cluster Management Tools

集群运维开关  
Cluster operation switch

作业批量迁移  
Bulk migration

集群状态监控  
Cluster status monitoring



# 问题三: 作业启动慢

Jobs Start Slow



- Yarn 分配 container 慢  
Container allocation by Yarn is slow
- Flink job 启动慢  
Starting flink jobs is slow

# 解法: 启动加速

## Job Start Speedup

- Yarn 调度优化

Yarn scheduling optimization

- 共享公共资源

Share public resources

- Slot 达到最低要求就启动

Start when slots meet minimum requirements



## 问题四: 机器资源短缺

### Machine Resources Shortage

- 业务高速发展  
Fast business growth
- 机器资源有限  
Machine Resources are limited

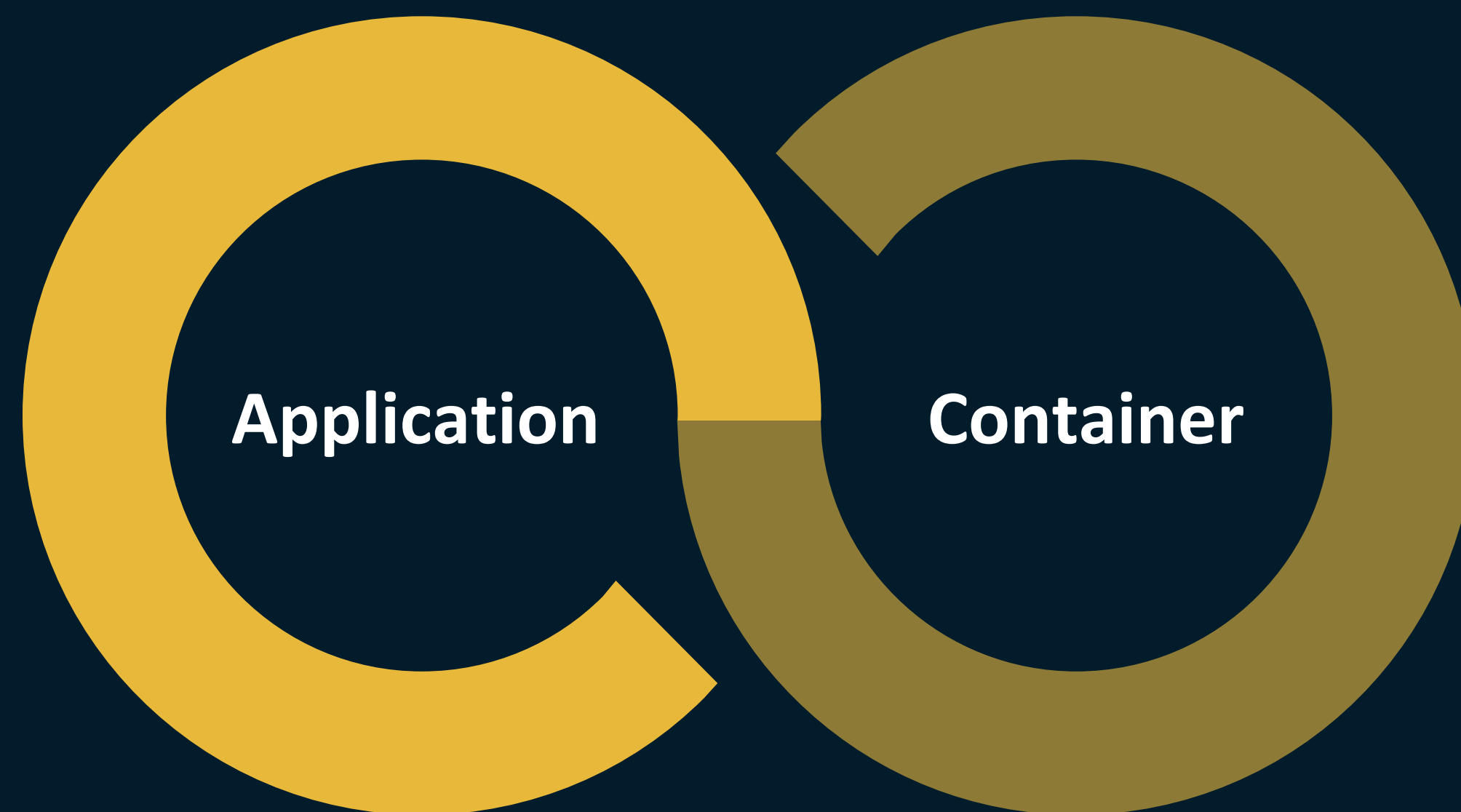


# 解法: 自动资源调整

## Automatic Resource Adjustment

重启  
Restart

过去24小时  
Last 24 hours



运行中  
Runtime

过去1小时  
Last 1 hour

# 问题五: 稳定性不足

## Instability

- 大作业稳定性差  
Big jobs are not stable enough
- 升级不平滑  
Job upgrade is not smooth

# 解法: 作业切分

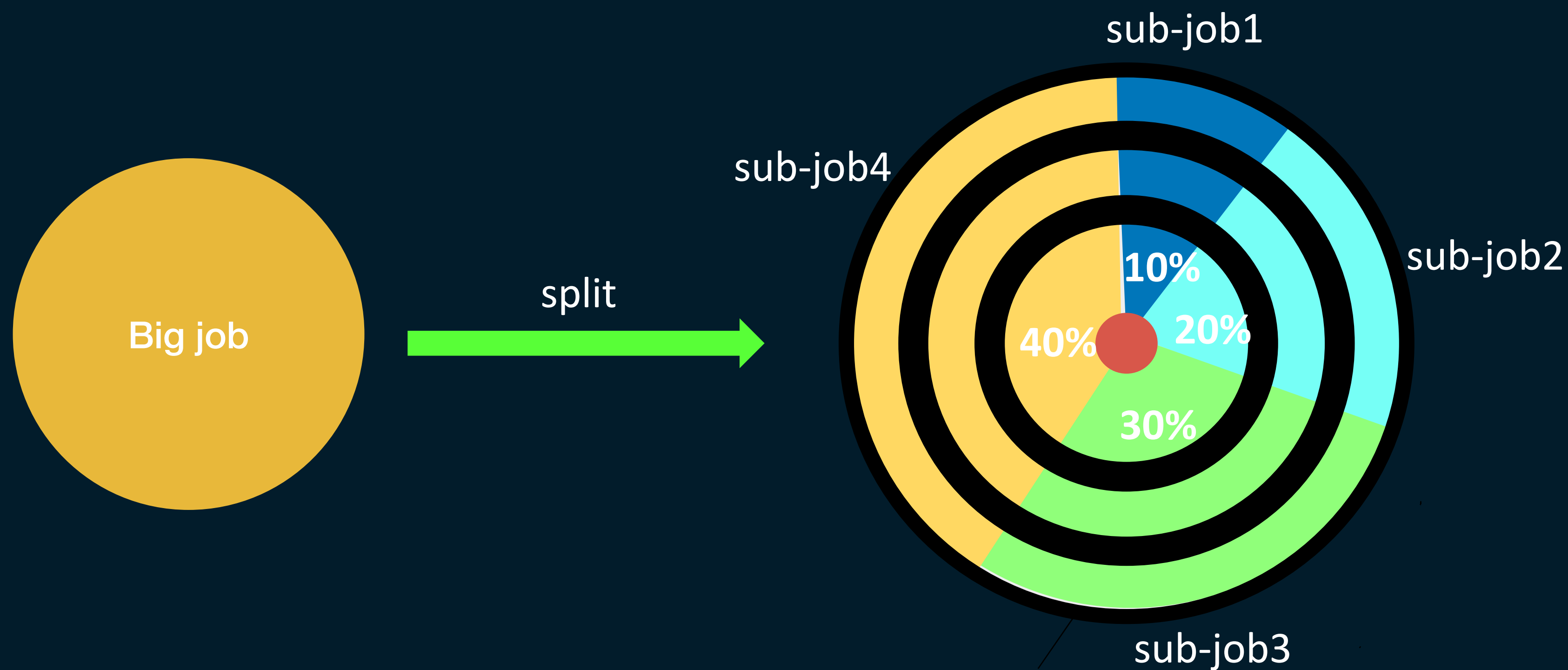
## Job Segmentation

✓ 稳定运行

Stably running

✓ 平滑升级

Smoothly upgrading



# 展望

## Future Work



- 推广 Flink SQL  
Promote Flink SQL
- 更多的业务场景  
Enable more business scenarios
- 提高稳定性  
Improve stability
- 回馈社区  
Contribute back to the community



# Q&A



# 致谢

感谢我们团队的小伙伴们，以上的内容是我们一起努力的成果。  
Thanks to my colleagues for the great work we have done.





**THANKS**