

尚硅谷大数据技术之 Azkaban

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第 1 章 Azkaban 概论

1.1 为什么需要 workflow 调度系统

1) 一个完整的数据分析系统通常都是由大量任务单元组成：

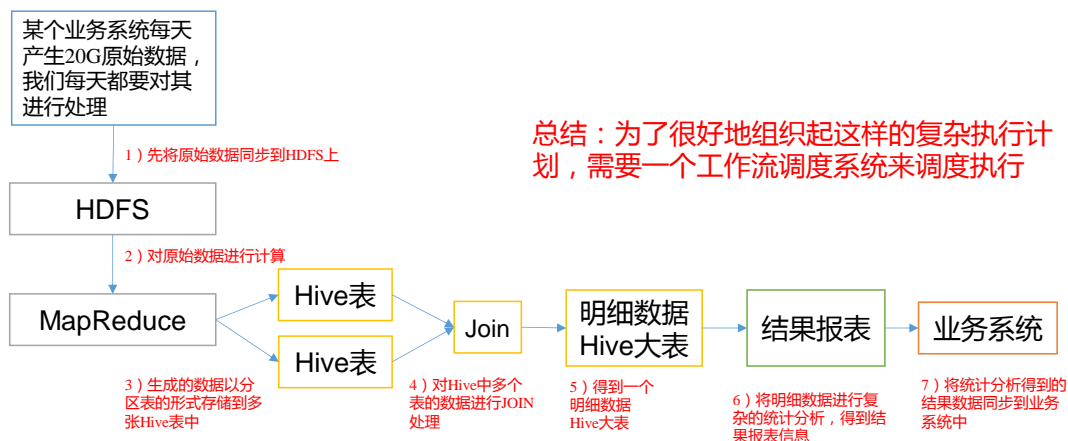
Shell 脚本程序，Java 程序，MapReduce 程序、Hive 脚本等

2) 各任务单元之间存在时间先后及前后依赖关系

3) 为了很好地组织起这样的复杂执行计划，需要一个 workflow 调度系统来调度执行；



为什么需要 workflow 调度系统



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1.2 常见 workflow 调度系统

1) 简单的任务调度：直接使用 Linux 的 Crontab 来定义；

2) 复杂的任务调度：开发调度平台或使用现成的开源调度系统，比如 Oozie、Azkaban、Airflow、DolphinScheduler 等。

1.3 Azkaban 与 Oozie 对比

总体来说，Oozie 相比 Azkaban 是一个重量级的任务调度系统，功能全面，但配置使用也更复杂。如果可以不在意某些功能的缺失，轻量级调度器 Azkaban 是很不错的候选对象。

第 2 章 Azkaban 入门

2.1 集群模式安装

2.1.1 上传 tar 包

- 1) 将 azkaban-db-3.84.4.tar.gz, azkaban-exec-server-3.84.4.tar.gz, azkaban-web-server-3.84.4.tar.gz 上传到 hadoop102 的 /opt/software 路径

```
[atguigu@hadoop102 software]$ ll
总用量 35572
-rw-r--r--. 1 atguigu atguigu      6433 4月  18 17:24 azkaban-db-3.84.4.tar.gz
-rw-r--r--. 1 atguigu atguigu 16175002 4月  18 17:26 azkaban-exec-server-3.84.4.tar.gz
-rw-r--r--. 1 atguigu atguigu 20239974 4月  18 17:26 azkaban-web-server-3.84.4.tar.gz
```

- 2) 新建 /opt/module/azkaban 目录, 并将所有 tar 包解压到这个目录下

```
[atguigu@hadoop102 software]$ mkdir /opt/module/azkaban
```

- 3) 解压 azkaban-db-3.84.4.tar.gz、 azkaban-exec-server-3.84.4.tar.gz 和 azkaban-web-server-3.84.4.tar.gz 到 /opt/module/azkaban 目录下

```
[atguigu@hadoop102 software]$ tar -zxvf azkaban-db-3.84.4.tar.gz -C /opt/module/azkaban/
[atguigu@hadoop102 software]$ tar -zxvf azkaban-exec-server-3.84.4.tar.gz -C /opt/module/azkaban/
[atguigu@hadoop102 software]$ tar -zxvf azkaban-web-server-3.84.4.tar.gz -C /opt/module/azkaban/
```

- 4) 进入到 /opt/module/azkaban 目录, 依次修改名称

```
[atguigu@hadoop102 azkaban]$ mv azkaban-exec-server-3.84.4/ azkaban-exec
[atguigu@hadoop102 azkaban]$ mv azkaban-web-server-3.84.4/ azkaban-web
```

2.1.2 配置 MySQL

- 1) 正常安装 MySQL

详见《尚硅谷大数据技术之 Hive》

- 2) 启动 MySQL

```
[atguigu@hadoop102 azkaban]$ mysql -uroot -p000000
```

- 3) 登陆 MySQL, 创建 Azkaban 数据库

```
mysql> create database azkaban;
```

- 4) 创建 azkaban 用户并赋予权限

设置密码有效长度 4 位及以上

```
mysql> set global validate_password_length=4;
```

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设置密码策略最低级别

```
mysql> set global validate_password_policy=0;
```

创建 Azkaban 用户，任何主机都可以访问 Azkaban，密码是 000000

```
mysql> CREATE USER 'azkaban'@'%' IDENTIFIED BY '000000';
```

赋予 Azkaban 用户增删改查权限

```
mysql> GRANT SELECT,INSERT,UPDATE,DELETE ON azkaban.* to  
'azkaban'@'%' WITH GRANT OPTION;
```

5) 创建 Azkaban 表，完成后退出 MySQL

```
mysql> use azkaban;  
mysql> source /opt/module/azkaban/azkaban-db-3.84.4/create-all-  
sql-3.84.4.sql  
mysql> quit;
```

6) 更改 MySQL 包大小；防止 Azkaban 连接 MySQL 阻塞

```
[atguigu@hadoop102 software]$ sudo vim /etc/my.cnf
```

在[mysqld]下面加一行 max_allowed_packet=1024M

```
[mysqld]  
max_allowed_packet=1024M
```

8) 重启 MySQL

```
[atguigu@hadoop102 software]$ sudo systemctl restart mysqld
```

2.1.3 配置 Executor Server

Azkaban Executor Server 处理工作流和作业的实际执行。

1) 编辑 azkaban.properties

```
[atguigu@hadoop102 azkaban]$ vim /opt/module/azkaban/azkaban-  
exec/conf/azkaban.properties
```

修改如下标红的属性

```
#...  
default.timezone.id=Asia/Shanghai  
#...  
azkaban.webserver.url=http://hadoop102:8081  
  
executor.port=12321  
#...  
database.type=mysql  
mysql.port=3306  
mysql.host=hadoop102  
mysql.database=azkaban  
mysql.user=azkaban  
mysql.password=000000  
mysql.numconnections=100
```

2) 同步 azkaban-exec 到所有节点

```
[atguigu@hadoop102 azkaban]$ xsync /opt/module/azkaban/azkaban-  
exec
```

3) 必须进入到/opt/module/azkaban/azkaban-exec 路径，分别在三台机器上，启动 executor server

```
[atguigu@hadoop102 azkaban-exec]$ bin/start-exec.sh
[atguigu@hadoop103 azkaban-exec]$ bin/start-exec.sh
[atguigu@hadoop104 azkaban-exec]$ bin/start-exec.sh
```

注意：如果在/opt/module/azkaban/azkaban-exec 目录下出现 executor.port 文件，说明启动成功

4) 下面激活 executor，需要

```
[atguigu@hadoop102 azkaban-exec]$ curl -G
".hadoop102:12321/executor?action=activate" && echo
[atguigu@hadoop103 azkaban-exec]$ curl -G
".hadoop103:12321/executor?action=activate" && echo
[atguigu@hadoop104 azkaban-exec]$ curl -G
".hadoop104:12321/executor?action=activate" && echo
```

如果三台机器都出现如下提示，则表示激活成功

```
{"status": "success"}
```

2.1.4 配置 Web Server

Azkaban Web Server 处理项目管理，身份验证，计划和执行触发。

1) 编辑 azkaban.properties

```
[atguigu@hadoop102 azkaban]$ vim /opt/module/azkaban/azkaban-
web/conf/azkaban.properties
```

修改如下属性

```
...
default.timezone.id=Asia/Shanghai
...
database.type=mysql
mysql.port=3306
mysql.host=hadoop102
mysql.database=azkaban
mysql.user=azkaban
mysql.password=000000
mysql.numconnections=100
...
azkaban.executorselector.filters=StaticRemainingFlowSize,CpuStatus
```

说明：

#StaticRemainingFlowSize：正在排队的任务数；

#CpuStatus：CPU 占用情况

#MinimumFreeMemory：内存占用情况。测试环境，必须将 MinimumFreeMemory 删除掉，否则它会认为集群资源不够，不执行。

2) 修改 azkaban-users.xml 文件，添加 atguigu 用户

```
[atguigu@hadoop102 azkaban-web]$ vim /opt/module/azkaban/azkaban-
web/conf/azkaban-users.xml
```

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```
<azkaban-users>
  <user groups="azkaban" password="azkaban" roles="admin"
username="azkaban"/>
  <user password="metrics" roles="metrics" username="metrics"/>
  <user password="atguigu" roles="admin" username="atguigu"/>
  <role name="admin" permissions="ADMIN"/>
  <role name="metrics" permissions="METRICS"/>
</azkaban-users>
```

3) 必须进入到 hadoop102 的/opt/module/azkaban/azkaban-web 路径, 启动 web server

```
[atguigu@hadoop102 azkaban-web]$ bin/start-web.sh
```

4) 访问 <http://hadoop102:8081>, 并用 atguigu 用户登陆

2.2 Work Flow 案例实操

2.2.1 HelloWorld 案例

1) 在 windows 环境, 新建 azkaban.project 文件, 编辑内容如下

```
azkaban-flow-version: 2.0
```

注意: 该文件作用, 是采用新的 Flow-API 方式解析 flow 文件。

2) 新建 basic.flow 文件, 内容如下

```
nodes:
- name: jobA
  type: command
  config:
    command: echo "Hello World"
```

(1) Name: job 名称

(2) Type: job 类型。command 表示你要执行作业的方式为命令

(3) Config: job 配置

3) 将 azkaban.project、basic.flow 文件压缩到一个 zip 文件, 文件名称必须是英文。



4) 在 WebServer 新建项目: <http://hadoop102:8081/index>

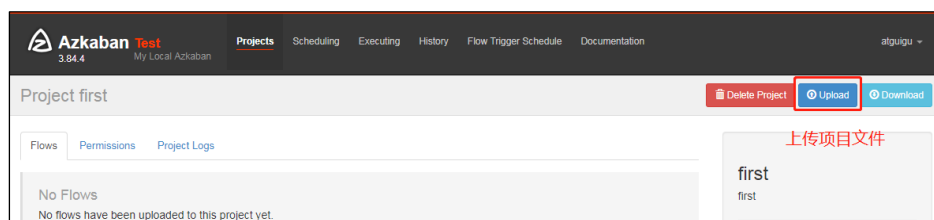


5) 给项目名称命名和添加项目描述



The 'Create Project' dialog box contains two input fields. The 'Name' field has the text 'first' and a red label '项目名称' to its right. The 'Description' field also has the text 'first' and a red label '项目描述' to its right. At the bottom right, there are two buttons: 'Cancel' and 'Create Project', with the latter highlighted by a red box.

6) first.zip 文件上传



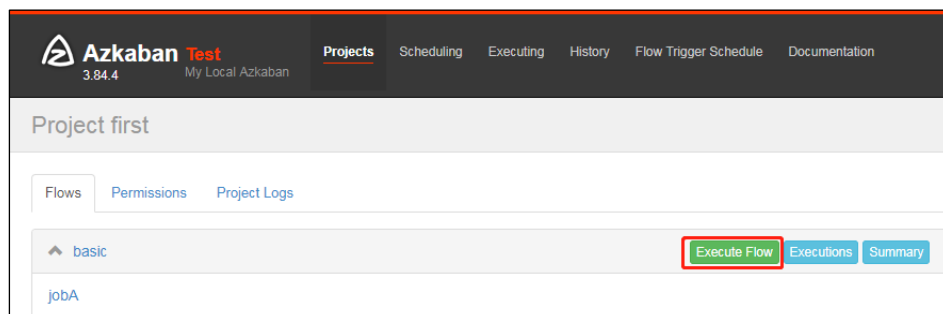
The screenshot shows the 'Project first' page in the Azkaban interface. At the top right, there are buttons for 'Delete Project', 'Upload', and 'Download', with 'Upload' highlighted by a red box. Below these, there is a section titled '上传项目文件' (Upload Project Files) with a sub-section for 'first'.

7) 选择上传的文件



The 'Upload Project Files' dialog box features a 'Job Archive' section with a file selection button labeled '选择文件' (highlighted by a red box) and the text '未选择任何文件'. At the bottom right, there are 'Cancel' and 'Upload' buttons, with 'Upload' highlighted by a red box.

8) 执行任务流



The screenshot shows the 'Project first' page with the 'Flows' tab selected. Under the 'basic' flow, there is a button labeled 'Execute Flow' (highlighted by a red box), along with 'Executions' and 'Summary' buttons.

Execute Flow basic

Flow View

Right click on the jobs to disable and enable jobs in the flow.

Notification

Failure Options

Concurrent

Flow Parameters

jobA

Schedule

Cancel

Execute

Flow submitted

Execution queued successfully with exec id 1

Continue

9) 在日志中，查看运行结果

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Flow Execution 1

SUCCEEDED

Submit User atguigu

Duration 1 sec

Start Time 2020-05-29 10:29 46s

End Time 2020-05-29 10:29 48s

Project first / Flow basic / Execution 1

Graph

Flow Trigger List

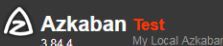
Job List

Flow Log

Stats

Prepare Execution

Name	Type	Timeline	Start Time	End Time	Elapsed	Status	Details
jobA	command	<div></div>	2020-05-29 10:29 47s	2020-05-29 10:29 47s	0 sec	Success	Log



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Job Execution jobA **SUCCEEDED**

[Project first](#) / [Flow basic](#) / [Execution 2](#) / Job jobA / Attempt 0

Job Logs

Job Logs

Refresh

29-05-2020 10:36:03 CST jobA INFO - Starting job jobA at 1590719763591
29-05-2020 10:36:03 CST jobA INFO - job JVM args: '-Dazkaban.flowid=basic' '-Dazkaban.execid=2' '-Dazkaban.jobid=jobA'
29-05-2020 10:36:03 CST jobA INFO - user.to.proxy property was not set, defaulting to submit user atguigu
29-05-2020 10:36:03 CST jobA INFO - Attached Ramp Props : [{}]
29-05-2020 10:36:03 CST jobA INFO - Building command job executor.
29-05-2020 10:36:03 CST jobA INFO - Failed with 5 inputs with exception e = null
29-05-2020 10:36:03 CST jobA INFO - Memory granted for job jobA
29-05-2020 10:36:03 CST jobA INFO - 1 commands to execute.
29-05-2020 10:36:03 CST jobA INFO - cwd=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/2
29-05-2020 10:36:03 CST jobA INFO - effective user is: atguigu
29-05-2020 10:36:03 CST jobA INFO - Command: echo "Hello World"
29-05-2020 10:36:03 CST jobA INFO - Environment variables: {JOB_OUTPUT_PROP_FILE=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/2/jobA_output_351957176180045449}
29-05-2020 10:36:03 CST jobA INFO - Working directory: /opt/module/azkaban/azkaban-exec-server-3.84.4/executions/2
29-05-2020 10:36:03 CST jobA INFO - Spawned process with id 5257
29-05-2020 10:36:03 CST jobA INFO - **Hello World**
29-05-2020 10:36:03 CST jobA INFO - Process with id 5257 completed successfully in 0 seconds.
29-05-2020 10:36:03 CST jobA INFO - output properties file=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/2/jobA_output_3519571761800454491_tmp
29-05-2020 10:36:03 CST jobA INFO - Finishing job jobA at 1590719763714 with status SUCCEEDED

2.2.2 作业依赖案例

需求：JobA 和 JobB 执行完了，才能执行 JobC

具体步骤：

1) 修改 basic.flow 为如下内容

```
nodes:
- name: jobC
  type: command
  # jobC 依赖 JobA 和 JobB
  dependsOn:
    - jobA
    - jobB
  config:
    command: echo "I'm JobC"

- name: jobA
  type: command
  config:
    command: echo "I'm JobA"

- name: jobB
  type: command
  config:
    command: echo "I'm JobB"
```

(1) dependsOn: 作业依赖，后面案例中演示

2) 将修改后的 basic.flow 和 azkaban.project 压缩成 second.zip 文件



second.zip

3) 重复 2.3.1 节 HelloWorld 后续步骤。

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Create Project

Name

second

Description

second

Cancel

Create Project

Upload Project Files

Job Archive

选择文件

second.zip

Cancel

Upload

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Summary

jobB

jobA

jobC

Flow View

Right click on the jobs to disable and enable jobs in the flow.

Notification

Failure Options

Concurrent

Flow Parameters

jobA

jobB

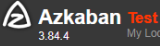
jobC

Schedule

Cancel

Execute

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Flow Execution 4 SUCCEEDED

Submit User atguigu

Duration 0 sec

Start Time 2020-05-29 11:42:47s

End Time 2020-05-29 11:42:48s

Project second / Flow basic / Execution 4

Graph




Flow Trigger List

Job List

Flow Log

Stats

Prepare Execution

Name	Type	Timeline	Start Time	End Time	Elapsed	Status	Details
jobB	command		2020-05-29 11:42:47s	2020-05-29 11:42:47s	0 sec	Success	Log
jobA	command		2020-05-29 11:42:47s	2020-05-29 11:42:47s	0 sec	Success	Log
jobC	command		2020-05-29 11:42:48s	2020-05-29 11:42:48s	0 sec	Success	Log

Job Execution jobC SUCCEEDED

Job Properties

Project second / Flow basic / Execution 4 / Job jobC / Attempt 0

Job Logs

Refresh

Job Logs

29-05-2020 11:42:48 CST jobC INFO - Starting job jobC at 1590723768031

29-05-2020 11:42:48 CST jobC INFO - job JVM args: '-Dazkaban.Flowid=basic' '-Dazkaban.execid=4' '-Dazkaban.jobid=jobC'

29-05-2020 11:42:48 CST jobC INFO - user.to.proxy property was not set, defaulting to submit user atguigu

29-05-2020 11:42:48 CST jobC INFO - Attached Ramp Props : [{}]

29-05-2020 11:42:48 CST jobC INFO - Building command job executor.

29-05-2020 11:42:48 CST jobC INFO - Failed with 5 inputs with exception e = null

29-05-2020 11:42:48 CST jobC INFO - Memory granted for job jobC

29-05-2020 11:42:48 CST jobC INFO - 1 commands to execute.

29-05-2020 11:42:48 CST jobC INFO - cwd=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/4

29-05-2020 11:42:48 CST jobC INFO - effective user is: atguigu

29-05-2020 11:42:48 CST jobC INFO - Command: echo "I'm JobC"

29-05-2020 11:42:48 CST jobC INFO - Environment variables: {JOB_OUTPUT_PROP_FILE=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/4/jobC_output_257836250422777364}

29-05-2020 11:42:48 CST jobC INFO - Working directory: /opt/module/azkaban/azkaban-exec-server-3.84.4/executions/4

29-05-2020 11:42:48 CST jobC INFO - Spawned process with id 6018

29-05-2020 11:42:48 CST jobC INFO - I'm JobC

29-05-2020 11:42:48 CST jobC INFO - Process with id 6018 completed successfully in 0 seconds.

29-05-2020 11:42:48 CST jobC INFO - output properties file=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/4/jobC_output_257836250422777364_tmp

29-05-2020 11:42:48 CST jobC INFO - Finishing job jobC at 1590723768456 with status SUCCEEDED

2.2.3 自动失败重试案例

需求：如果执行任务失败，需要重试 3 次，重试的时间间隔 10000ms

具体步骤：

1) 编译配置流

```
nodes:
- name: JobA
  type: command
  config:
    command: sh /not_exists.sh
    retries: 3
    retry.backoff: 10000
```

参数说明：

retries: 重试次数

retry.backoff: 重试的时间间隔

2) 将修改后的 basic.flow 和 azkaban.project 压缩成 four.zip 文件



3) 重复 2.3.1 节 HelloWorld 后续步骤。

Create Project

Name

four

Description

four

Cancel

Create Project

Upload Project Files

Job Archive

选择文件

four.zip

Cancel

Upload

Flow View

Right click on the jobs to disable and enable jobs in the flow.

Notification

Failure Options

Concurrent

Flow Parameters

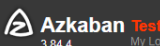
jobA

Schedule

Cancel

Execute

4) 执行并观察到一次失败+三次重试



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Flow Execution 19 **FAILED**

Submit User atguigu

Duration 31 sec

Start Time 2020-06-01 10:09:22s

End Time 2020-06-01 10:09:53s

Project four / Flow basic / Execution 19

Graph

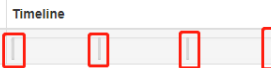
Flow Trigger List

Job List

Flow Log

Stats

Prepare Execution

Name	Type	Timeline	Start Time	End Time	Elapsed	Status	Details
JobA	command		2020-06-01 10:09:52s	2020-06-01 10:09:52s	0 sec	Failed	Log

5) 也可以点击上图中的 Log, 在任务日志中看到, 总共执行了 4 次。

Job Logs

Job Logs

21-04-2020 04:30:08 CST JobA INFO - Delaying start of execution for 10000 milliseconds.

21-04-2020 04:30:18 CST JobA INFO - Execution has been delayed for 10000 ms. Continuing with execution.

21-04-2020 04:30:18 CST JobA INFO - Starting Job JobA retry: 3 at 1587414618153

21-04-2020 04:30:18 CST JobA INFO - Job VM args: "-Dazkaban.flowid=basic" "-Dazkaban.execid=27" "-Dazkaban.jobid=JobA"

21-04-2020 04:30:18 CST JobA INFO - user.to.group property was not set, defaulting to submit user atguigu

21-04-2020 04:30:18 CST JobA INFO - Attached Ramp Props : {}

21-04-2020 04:30:18 CST JobA INFO - Building command Job executor.

21-04-2020 04:30:18 CST JobA INFO - failed with 5 inputs with exception e = null

21-04-2020 04:30:18 CST JobA INFO - Memory granted for Job JobA

21-04-2020 04:30:18 CST JobA INFO - 1 commands to execute.

21-04-2020 04:30:18 CST JobA INFO - cd:/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27

21-04-2020 04:30:18 CST JobA INFO - effective user is: atguigu

21-04-2020 04:30:18 CST JobA INFO - Command: sh /opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27/job_output_3327588119016367457_tmp, JOB_PROP_FILE=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27/

21-04-2020 04:30:18 CST JobA INFO - Environment variables: [JOB_OUTPUT_PROP_FILE=/opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27/

21-04-2020 04:30:18 CST JobA INFO - Working directory: /opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27

21-04-2020 04:30:18 CST JobA INFO - Spawning process with id 8832

21-04-2020 04:30:18 CST JobA INFO - sh: /opt/module/azkaban/azkaban-exec-server-3.84.4/executions/27/job_output_3327588119016367457_tmp: 没有那个文件或目录

21-04-2020 04:30:18 CST JobA INFO - Process with id 8832 completed unsuccessfully in 0 seconds.

21-04-2020 04:30:18 CST JobA ERROR - Job run failed!

21-04-2020 04:30:18 CST JobA ERROR - java.lang.RuntimeException: azkaban.jobexecutor.util.ProcessFailureException: Process exited with code 127

21-04-2020 04:30:18 CST JobA ERROR - at azkaban.jobexecutor.ProcessJob.run(ProcessJob.java:112)

21-04-2020 04:30:18 CST JobA ERROR - at azkaban.executor.JobRunner.runJob(JobRunner.java:823)

21-04-2020 04:30:18 CST JobA ERROR - at azkaban.executor.JobRunner.runJob(JobRunner.java:802)

21-04-2020 04:30:18 CST JobA ERROR - at azkaban.executor.JobRunner.run(JobRunner.java:563)

21-04-2020 04:30:18 CST JobA ERROR - at java.util.concurrent.Executors\$RunnableAdapter.call(Executors.java:511)

21-04-2020 04:30:18 CST JobA ERROR - at java.util.concurrent.FutureTask.run(FutureTask.java:266)

21-04-2020 04:30:18 CST JobA ERROR - at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1149)

21-04-2020 04:30:18 CST JobA ERROR - at java.util.concurrent.ThreadPoolExecutor\$Worker.run(ThreadPoolExecutor.java:624)

21-04-2020 04:30:18 CST JobA ERROR - at java.lang.Thread.run(Thread.java:748)

6) 也可以在 Flow 全局配置中添加任务失败重试配置, 此时重试配置会应用到所有 Job。

案例如下:

```

config:
  retries: 3
  retry.backoff: 10000
nodes:
- name: JobA
  type: command
  config:
    command: sh /not_exists.sh

```

2.2.4 手动失败重试案例

需求: JobA=>JobB (依赖于 A) =>JobC=>JobD=>JobE=>JobF。生产环境, 任何 Job 都有可能挂掉, 可以根据需求执行想要执行的 Job。

具体步骤:

1) 编译配置流

```

nodes:
- name: JobA
  type: command
  config:
    command: echo "This is JobA."
- name: JobB

```

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```

type: command
dependsOn:
  - JobA
config:
  command: echo "This is JobB."

- name: JobC
  type: command
  dependsOn:
    - JobB
  config:
    command: echo "This is JobC."

- name: JobD
  type: command
  dependsOn:
    - JobC
  config:
    command: echo "This is JobD."

- name: JobE
  type: command
  dependsOn:
    - JobD
  config:
    command: echo "This is JobE."

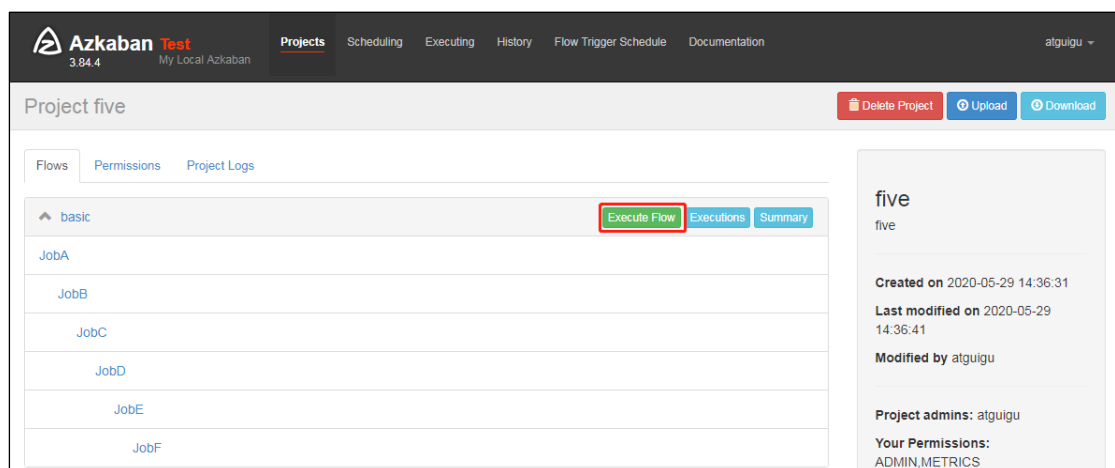
- name: JobF
  type: command
  dependsOn:
    - JobE
  config:
    command: echo "This is JobF."

```

2) 将修改后的 basic.flow 和 azkaban.project 压缩成 five.zip 文件



3) 重复 2.3.1 节 HelloWorld 后续步骤。



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Execute Flow basic

Flow View

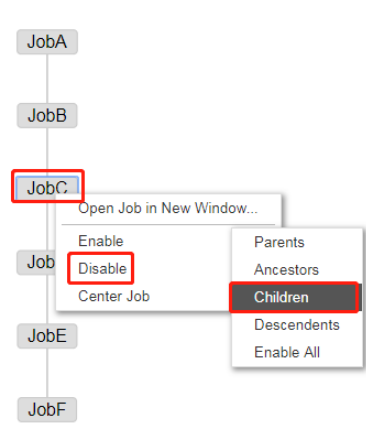
Right click on the jobs to disable and enable jobs in the flow.

Notification

Failure Options

Concurrent

Flow Parameters



Flow View

Right click on the jobs to disable and enable jobs in the flow.

Notification

Failure Options

Concurrent

Flow Parameters



Enable 和 Disable 下面都分别有如下参数：

Parents：该作业的上一个任务

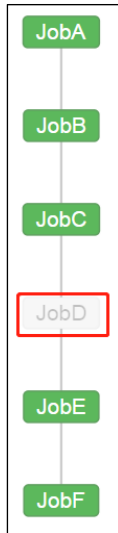
Ancestors：该作业前的所有任务

Children：该作业后的一个任务

Descendents：该作业后的所有任务

Enable All：所有的任务

4) 可以根据需求选择性执行对应的任务。



第 3 章 Azkaban 进阶

3.1 JavaProcess 作业类型案例

JavaProcess 类型可以运行一个自定义主类方法，type 类型为 javaprocess，可用的配置为：

Xms: 最小堆

Xmx: 最大堆

classpath: 类路径

java.class: 要运行的 Java 对象，其中必须包含 Main 方法

main.args: main 方法的参数

案例：

1) 新建一个 azkaban 的 maven 工程

2) 创建包名：com.atguigu

3) 创建 AzTest 类

```
package com.atguigu;

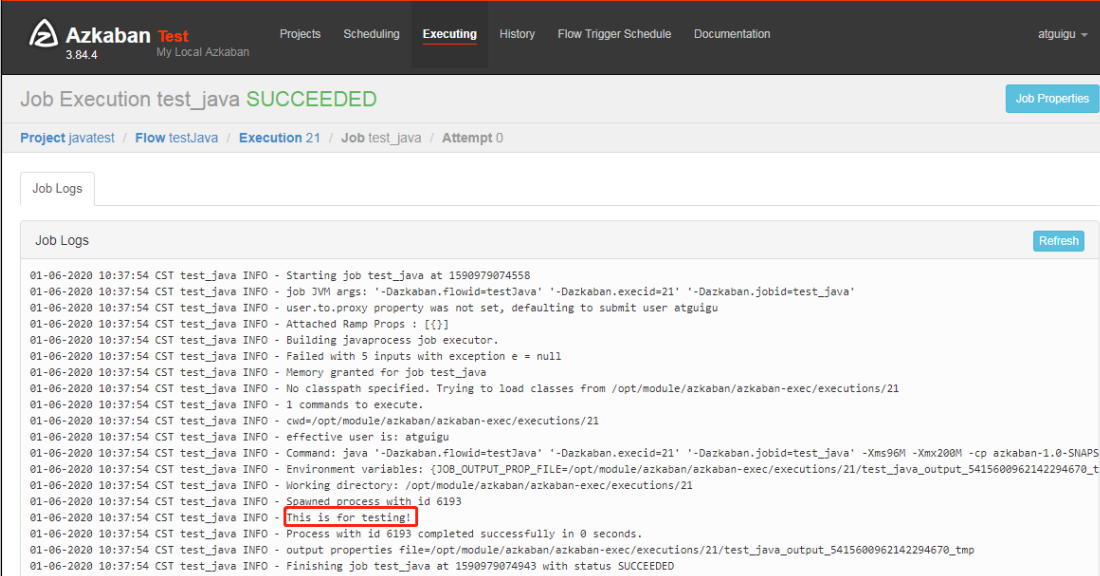
public class AzTest {
    public static void main(String[] args) {
        System.out.println("This is for testing!");
    }
}
```

4) 打包成 jar 包 azkaban-1.0-SNAPSHOT.jar

5) 新建 testJava.flow，内容如下

```
nodes:
- name: test_java
  type: javaprocess
  config:
```

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The screenshot displays the Azkaban web interface. At the top, there's a navigation bar with links for Projects, Scheduling, Executing (active), History, Flow Trigger Schedule, and Documentation. The user 'atguigu' is logged in. The main content area shows the 'Job Execution test_java' status as 'SUCCEEDED'. Below this, a breadcrumb trail indicates the path: Project javatest / Flow testJava / Execution 21 / Job test_java / Attempt 0. A 'Job Logs' tab is selected, showing a list of log entries. The logs indicate the job started at 15:09:79074558, built a Java process executor, and completed successfully at 15:09:79074943. A specific log entry is highlighted with a red box: 'Spawning process with id 6193' followed by 'This is for testing!'.

3.2 条件工作流案例

条件工作流功能允许用户自定义执行条件来决定是否运行某些 Job。条件可以由当前 Job 的父 Job 输出的运行时参数构成，也可以使用预定义宏。在这些条件下，用户可以在确定 Job 执行逻辑时获得更大的灵活性，例如，只要父 Job 之一成功，就可以运行当前 Job。

3.2.1 运行时参数案例

1) 基本原理

- (1) 父 Job 将参数写入 `JOB_OUTPUT_PROP_FILE` 环境变量所指向的文件
- (2) 子 Job 使用 `${jobName:param}` 来获取父 Job 输出的参数并定义执行条件

2) 支持的条件运算符：

- (1) `=` 等于
- (2) `!=` 不等于
- (3) `>` 大于
- (4) `>=` 大于等于
- (5) `<` 小于
- (6) `<=` 小于等于
- (7) `&&` 与
- (8) `||` 或
- (9) `!` 非

3) 案例：

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需求:

JobA 执行一个 shell 脚本。

JobB 执行一个 shell 脚本，但 JobB 不需要每天都执行，而只需要每个周一执行。

(1) 新建 JobA.sh

```
#!/bin/bash
echo "do JobA"
wk=`date +%w`
echo "{\"wk\":\"$wk\"}" > $JOB_OUTPUT_PROP_FILE
```

(2) 新建 JobB.sh

```
#!/bin/bash
echo "do JobB"
```

(3) 新建 condition.flow

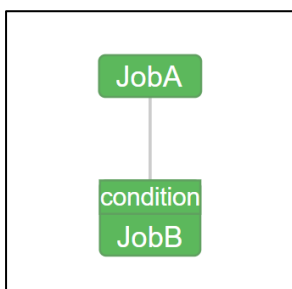
```
nodes:
- name: JobA
  type: command
  config:
    command: sh JobA.sh

- name: JobB
  type: command
  dependsOn:
    - JobA
  config:
    command: sh JobB.sh
    condition: ${JobA:wk} == 1
```

(4) 将 JobA.sh、JobB.sh、condition.flow 和 azkaban.project 打包成 condition.zip

(5) 创建 condition 项目=》上传 condition.zip 文件=》执行作业=》观察结果

(6) 按照我们设定的条件，JobB 会根据当日日期决定是否执行。



3.2.2 预定义宏案例

Azkaban 中预置了几个特殊的判断条件，称为预定义宏。

预定义宏会根据所有父 Job 的完成情况进行判断，再决定是否执行。可用的预定义宏如下:

(1) all_success: 表示父 Job 全部成功才执行(默认)

(2) all_done: 表示父 Job 全部完成才执行

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- (3) all_failed: 表示父 Job 全部失败才执行
- (4) one_success: 表示父 Job 至少一个成功才执行
- (5) one_failed: 表示父 Job 至少一个失败才执行

1) 案例

需求:

JobA 执行一个 shell 脚本

JobB 执行一个 shell 脚本

JobC 执行一个 shell 脚本, 要求 JobA、JobB 中有一个成功即可执行

(1) 新建 JobA.sh

```
#!/bin/bash
echo "do JobA"
```

(2) 新建 JobC.sh

```
#!/bin/bash
echo "do JobC"
```

(3) 新建 macro.flow

```
nodes:
- name: JobA
  type: command
  config:
    command: sh JobA.sh

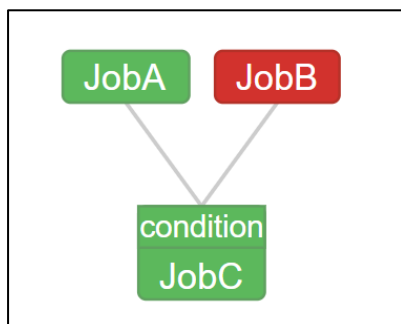
- name: JobB
  type: command
  config:
    command: sh JobB.sh

- name: JobC
  type: command
  dependsOn:
    - JobA
    - JobB
  config:
    command: sh JobC.sh
    condition: one_success
```

(4) JobA.sh、JobC.sh、macro.flow、azkaban.project 文件, 打包成 macro.zip。

注意: 没有 JobB.sh。

(5) 创建 macro 项目=》上传 macro.zip 文件=》执行作业=》观察结果

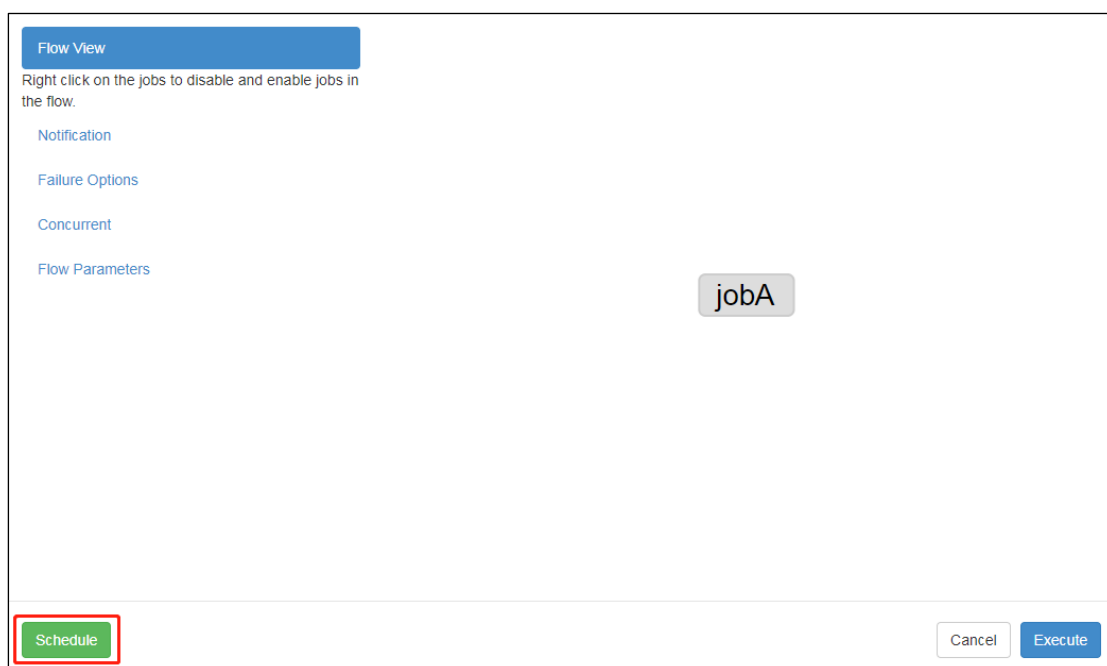


3.3 定时执行案例

需求：JobA 每间隔 1 分钟执行一次；

具体步骤：

1) Azkaban 可以定时执行工作流。在执行工作流时候，选择左下角 Schedule



2) 右上角注意时区是上海，然后在左面填写具体执行事件，填写的方法和 crontab 配置定时任务规则一致。

Schedule Flow Options

All schedules are based on the server timezone: **Asia/Shanghai**.

Warning: the execution will be skipped if it is scheduled to run during the hour that is lost when DST starts in the Spring. E.g. there is no 2 - 3 AM when PST switches to PDT.

Min

Hours

Day of Month

Month

Day of Week

Year

TimeZone

Special Characters:

- * any value
- , value list separators
- range of values
- / step values
- 0-59 allowed values

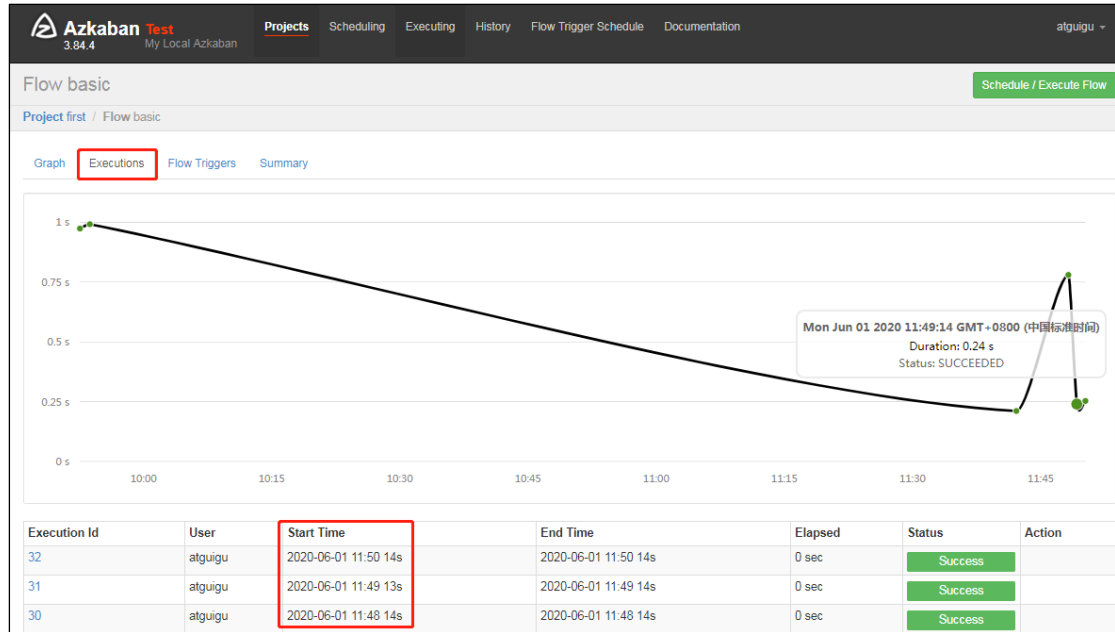
[Detailed instructions.](#)

Next 10 scheduled executions for this cron expression only:

- 2020-06-01T11:52:00
- 2020-06-01T11:53:00
- 2020-06-01T11:54:00
- 2020-06-01T11:55:00
- 2020-06-01T11:56:00
- 2020-06-01T11:57:00
- 2020-06-01T11:58:00
- 2020-06-01T11:59:00
- 2020-06-01T12:00:00
- 2020-06-01T12:01:00

3) 观察结果

Azkaban Test 3.84.4 My Local Azkaban											
Scheduling											
Scheduled Flows											
* Click column headers to sort.											
#	ID	Flow	Project	Submitted By	First Scheduled to Run	Next Execution Time	Repeats Every	Cron Expression	Execution Options	Has SLA	Action
1	1	basic	first	atguigu	2020-06-01 11:47:35	2020-06-01 11:48:00	Not Applicable	0 */1 * ? * *	Show	false	Remove Schedule Set SLA



4) 删除定时调度

点击 remove Schedule 即可删除当前任务的调度规则。

Azkaban Test 3.84.4 My Local Azkaban											
Scheduling											
Scheduled Flows											
* Click column headers to sort.											
#	ID	Flow	Project	Submitted By	First Scheduled to Run	Next Execution Time	Repeats Every	Cron Expression	Execution Options	Has SLA	Action
1	3	basic	first	atguigu	2020-06-01 11:53:42	2020-06-01 11:54:00	Not Applicable	0 */1 * ? * *	Show	false	Remove Schedule Set SLA

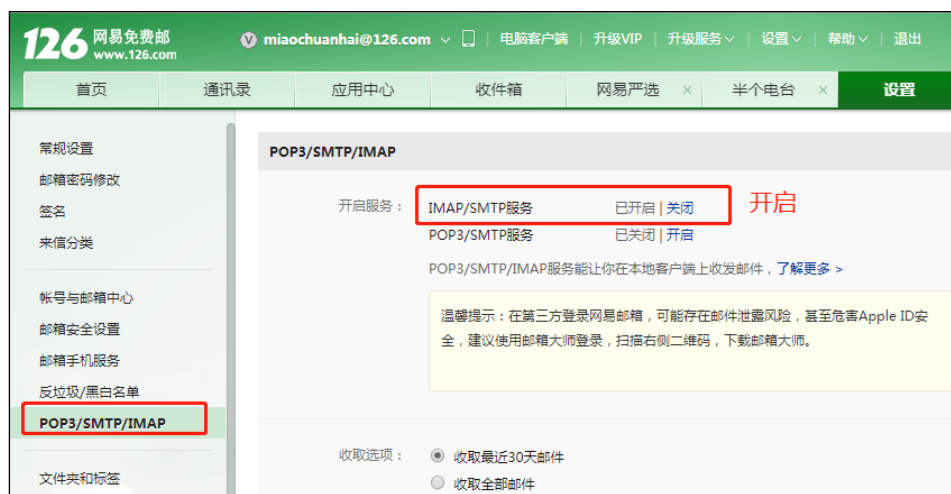
3.4 邮件报警案例

3.4.1 注册邮箱

- 1) 申请注册一个 126 邮箱
- 2) 点击邮箱账号=》账号管理



3) 开启 SMTP 服务



4) 一定要记住授权码



3.4.2 默认邮件报警案例

Azkaban 默认支持通过邮件对失败的任务进行报警，配置方法如下：

- 1) 在 azkaban-web 节点 hadoop102 上，编辑 /opt/module/azkaban/azkaban-web/conf/azkaban.properties，修改如下内容：

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```
[atguigu@hadoop102 azkaban-web]$ vim /opt/module/azkaban/azkaban-web/conf/azkaban.properties
```

添加如下内容:

```
#这里设置邮件发送服务器, 需要 申请邮箱, 切开通 stmp 服务, 以下只是例子
mail.sender=atguigu@126.com
mail.host=smtp.126.com
mail.user=atguigu@126.com
mail.password=用邮箱的授权码
```

2) 保存并重启 web-server。

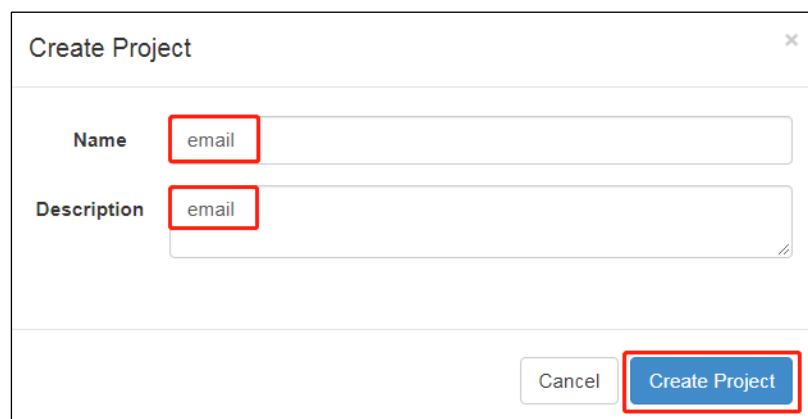
```
[atguigu@hadoop102 azkaban-web]$ bin/shutdown-web.sh
[atguigu@hadoop102 azkaban-web]$ bin/start-web.sh
```

3) 编辑 basic.flow

```
nodes:
- name: jobA
  type: command
  config:
    command: echo "This is an email test."
```

4) 将 azkaban.project 和 basic.flow 压缩成 email.zip

5) 创建工程=》上传文件=》执行作业=》查看结果



The 'Create Project' dialog box contains two input fields: 'Name' and 'Description', both containing the text 'email'. At the bottom right, there are two buttons: 'Cancel' and 'Create Project'.



The 'Upload Project Files' dialog box features a 'Job Archive' field with a file selection button and the text 'email.zip'. At the bottom right, there are two buttons: 'Cancel' and 'Upload'.

[Flow View](#)

[Notification](#)

Change the address where success and failure emails will be sent.

[Failure Options](#)

[Concurrent](#)

[Flow Parameters](#)

Notify on failure

On a job failure, notify on either the first failure, and/or when the failed flow finishes.

First failure

Flow finished

Failure Emails

☒ Override flow email settings.

Notify these addresses on failure. Comma, space, or semi-colon delimited list.

miaochuanhai@126.com

Success Emails

☒ Override flow email settings.

Notify when the flow finishes successfully. Comma, space, or semi-colon delimited list.

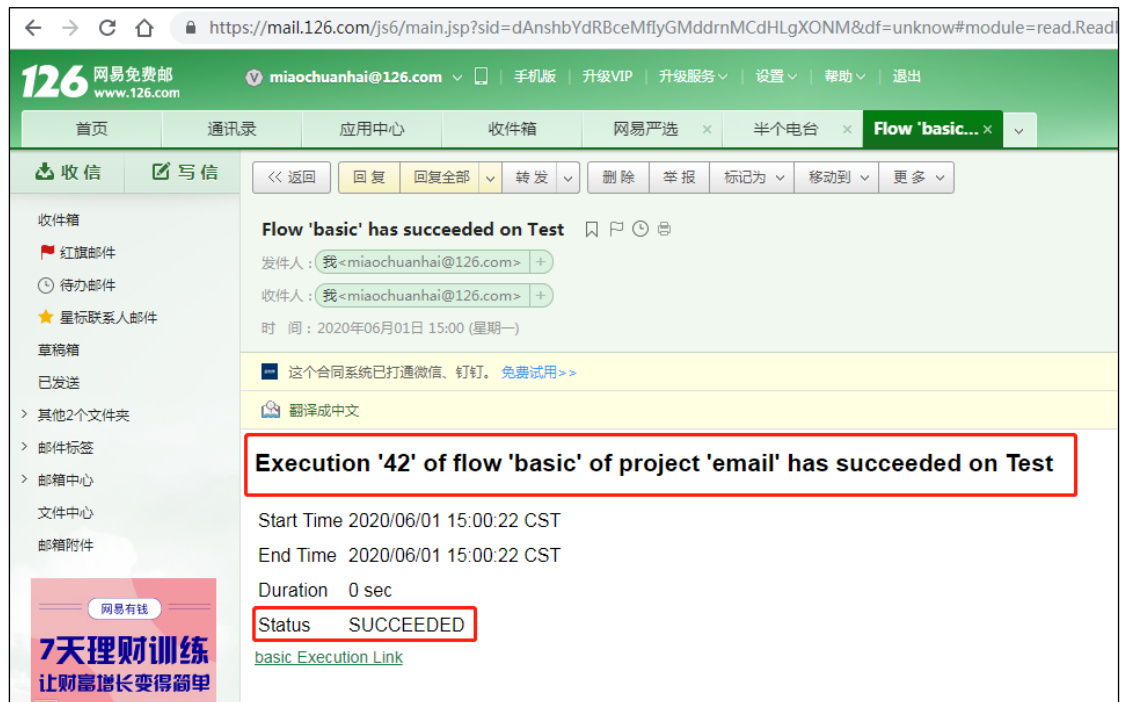
miaochuanhai@126.com

Schedule

Cancel

Execute

6) 观察邮箱，发现执行成功或者失败的邮件



The screenshot shows an email from miaochuanhai@126.com with the subject 'Flow 'basic' has succeeded on Test'. The email body contains the following information:

- 发件人: 我<miaochuanhai@126.com>
- 收件人: 我<miaochuanhai@126.com>
- 时间: 2020年06月01日 15:00 (星期一)
- 这个合同系统已打通微信、钉钉。 [免费试用>>](#)
- [翻译成中文](#)
- Execution '42' of flow 'basic' of project 'email' has succeeded on Test**
- Start Time 2020/06/01 15:00:22 CST
- End Time 2020/06/01 15:00:22 CST
- Duration 0 sec
- Status **SUCCEEDED**
- [basic Execution Link](#)

3.5 电话报警案例

3.5.1 第三方告警平台集成

有时任务执行失败后邮件报警接收不及时，因此可能需要其他报警方式，比如电话报警。

如有类似需求，可与第三方告警平台进行集成，例如睿象云。

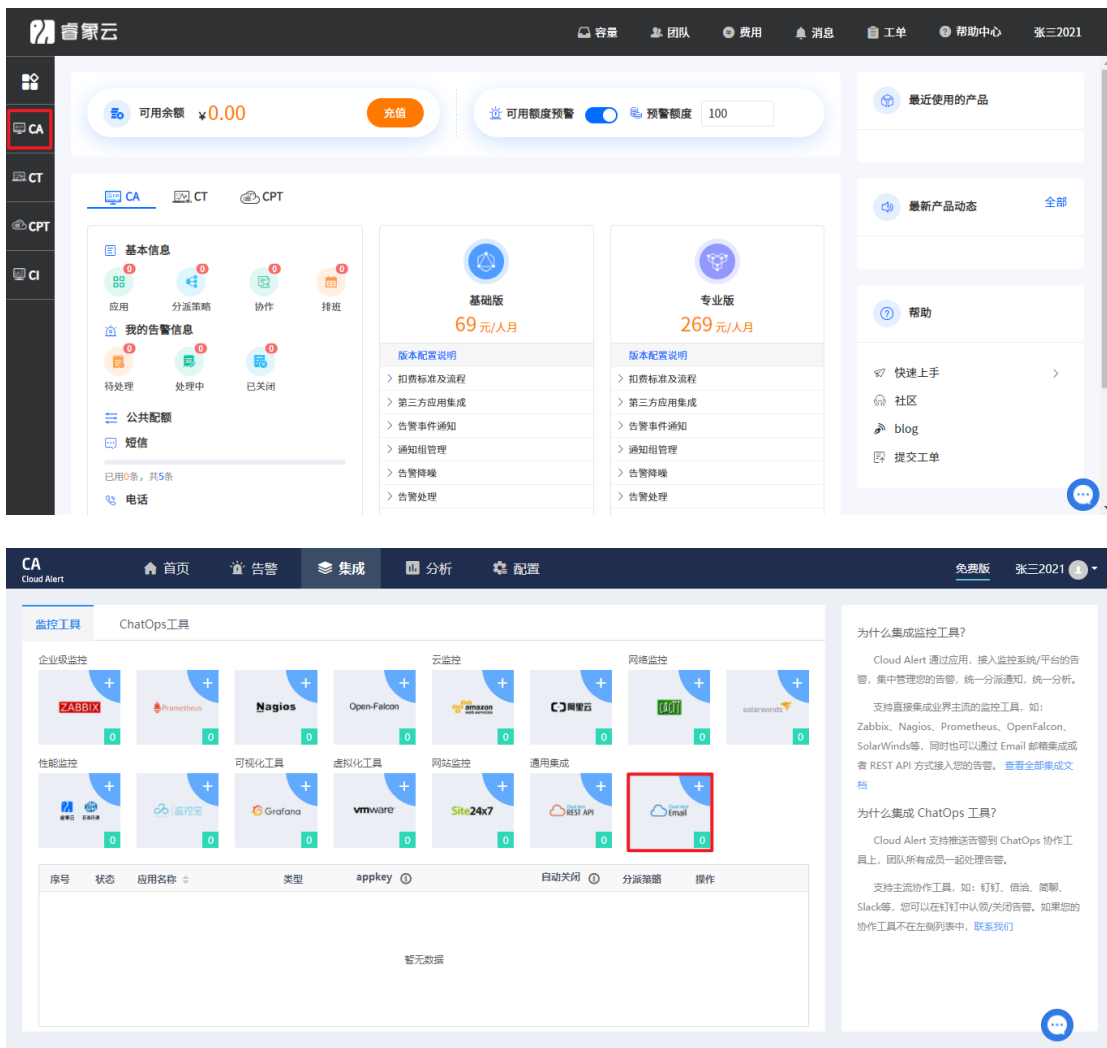
1) 进入睿象云官网注册账号并登录

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官网地址: <https://www.aiops.com/>



2) 集成告警平台，使用 Email 集成



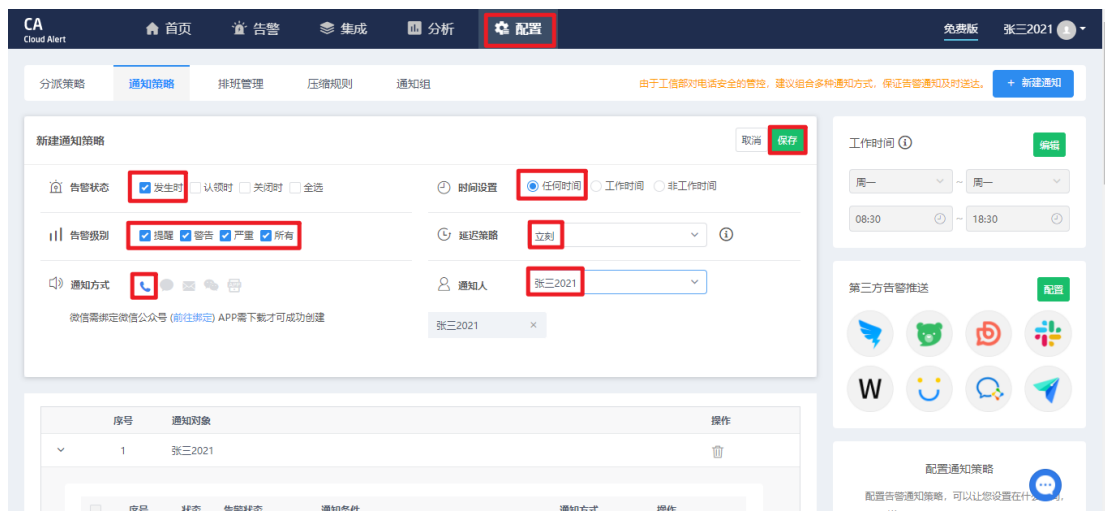
3) 获取邮箱地址，后边需将报警信息发送至该邮箱

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4) 配置分派策略

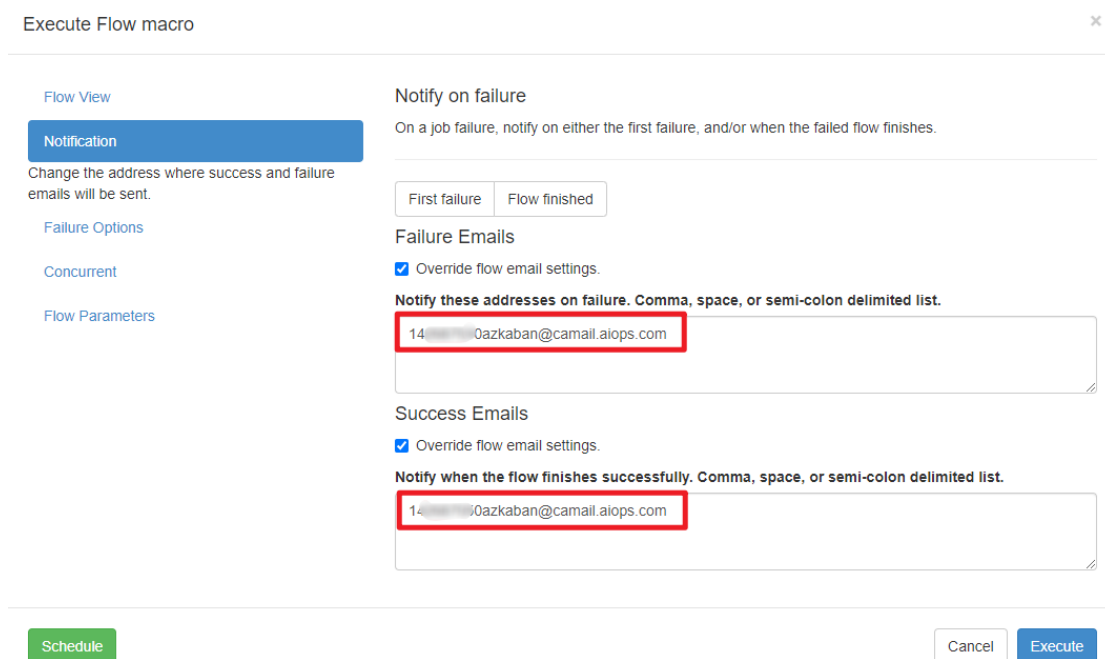
5) 配置通知策略

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3.5.2 测试

执行上一个邮件通知的案例，将通知对象改为刚刚集成第三方平台时获取的邮箱。



3.6 Azkaban 多 Executor 模式注意事项

Azkaban 多 Executor 模式是指，在集群中多个节点部署 Executor。在这种模式下，Azkaban web Server 会根据策略，选取其中一个 Executor 去执行任务。

为确保所选的 Executor 能够准确的执行任务，我们须在以下两种方案**任选其一，推荐使用方案二。**

方案一：指定特定的 Executor (hadoop102) 去执行任务。

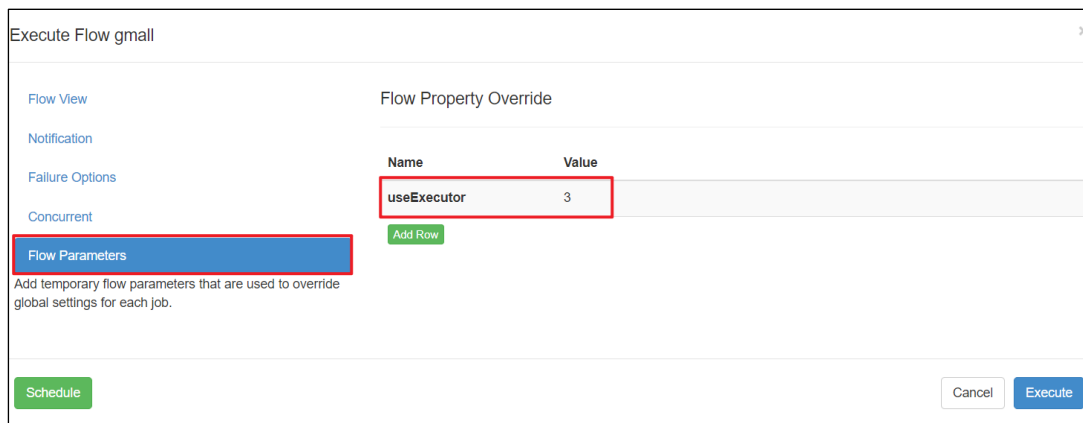
1) 在 MySQL 中 azkaban 数据库 executors 表中, 查询 hadoop102 上的 Executor 的 id。

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```
mysql> use azkaban;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> select * from executors;
+-----+-----+-----+-----+
| id | host      | port | active |
+-----+-----+-----+-----+
| 1  | hadoop103 | 35985 | 1      |
| 2  | hadoop104 | 36363 | 1      |
| 3  | hadoop102 | 12321 | 1      |
+-----+-----+-----+-----+
3 rows in set (0.00 sec)
```

2) 在执行工作流程时加入 useExecutor 属性，如下



Execute Flow gmall

Flow View

Notification

Failure Options

Concurrent

Flow Parameters

Add temporary flow parameters that are used to override global settings for each job.

Flow Property Override

Name	Value
useExecutor	3

Add Row

Schedule

Cancel

Execute

方案二：在 Executor 所在所有节点部署任务所需脚本和应用。

第 4 章 参考资料

4.1 Azkaban 完整配置

见官网文档：<https://azkaban.readthedocs.io/en/latest/configuration.html>

4.2 YAML 语法

Azkaban2.0 工作流文件是用 YAML 语法写的，相关教程如下：



YAML语法简易入门.mhtml