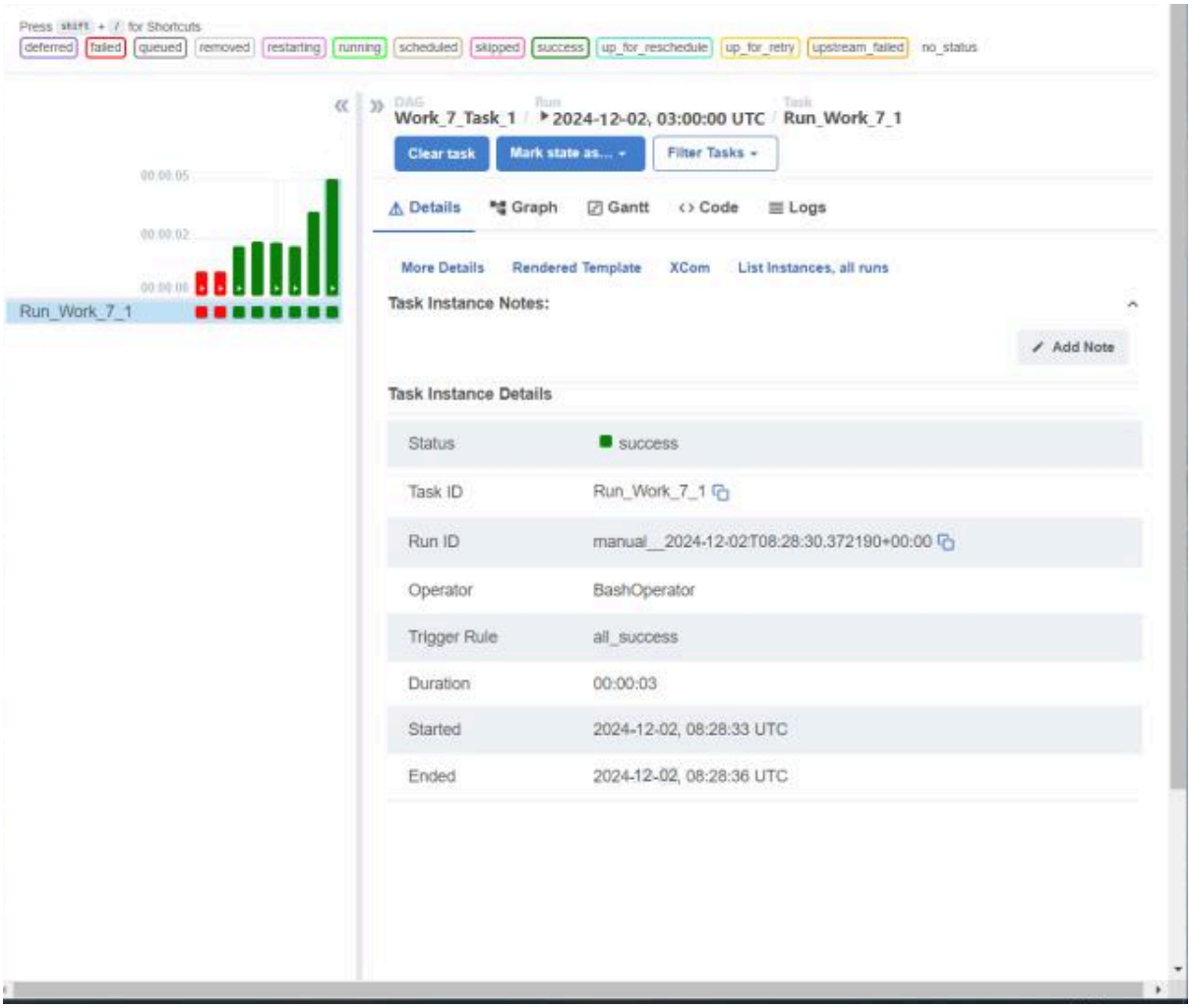
Урок 7. Построение пайплайнов и визуализация потоков данных в Airflow

1. Ваша задача с использование пандас, записать полученную температуру в таблицу mysql. Таблица должна содержать как минимум текущее время и температуру (т.е. два поля). Таблицу не удаляем, используем append.

```
from sqlalchemy import create_engine
from datetime import datetime
from pandas.io import sql
import requests


api_key = 'bc6d51747326a116e97fbc66146b6deb'
city = 'Tyumen'


def openwear_get_temp(api_key, city):
    url = f'https://api.openweathermap.org/data/2.5/weather?q={city}&appid={api_key}'
    response = requests.get(url)
    data = response.json()
    temperature = data['main']['temp']
    timestamp = data['dt']
    date_time = datetime.utcfromtimestamp(timestamp).strftime('%Y-%m-%d %H:%M:%S')
    return round(float(temperature) - 273.15, 2), date_time


def save_weather(api_key, city):
    temperature, date_time = openwear_get_temp(api_key, city)

    con = create_engine("mysql://root:1@localhost:33061/spark")
    sql.execute("""drop table if exists spark.`Temperature_Tyumen`""",con)
    sql.execute("""CREATE TABLE if not exists spark.`Temperature_Tyumen`
            (`date_time` TIMESTAMP NULL DEFAULT NULL, `temperature` FLOAT NULL
DEFAULT NULL)
            COLLATE='utf8mb4_general_ci' ENGINE=InnoDB""",con)

    with con.connect() as connection:
        ins = f"INSERT INTO spark.`Temperature_Tyumen` (date_time, temperature) VALUES
('{date_time}', {temperature})"
        connection.execute(ins)


save_weather(api_key, city)
```



2. То что мы делали на четвертом семинаре (ДЗ4) задача с гарфиком. Нужно с помощью аирфлоу (PythonOperator) сохранить этот график в png/jpeg. Используйте пандас, считайте им таблицу из mysql, постройте график и сохраните его в указанную директорию. На проверку ДЗ высылайте код и скриншоты аирфлоу выполненных задач, логов и сохраненного файла (в pdf).

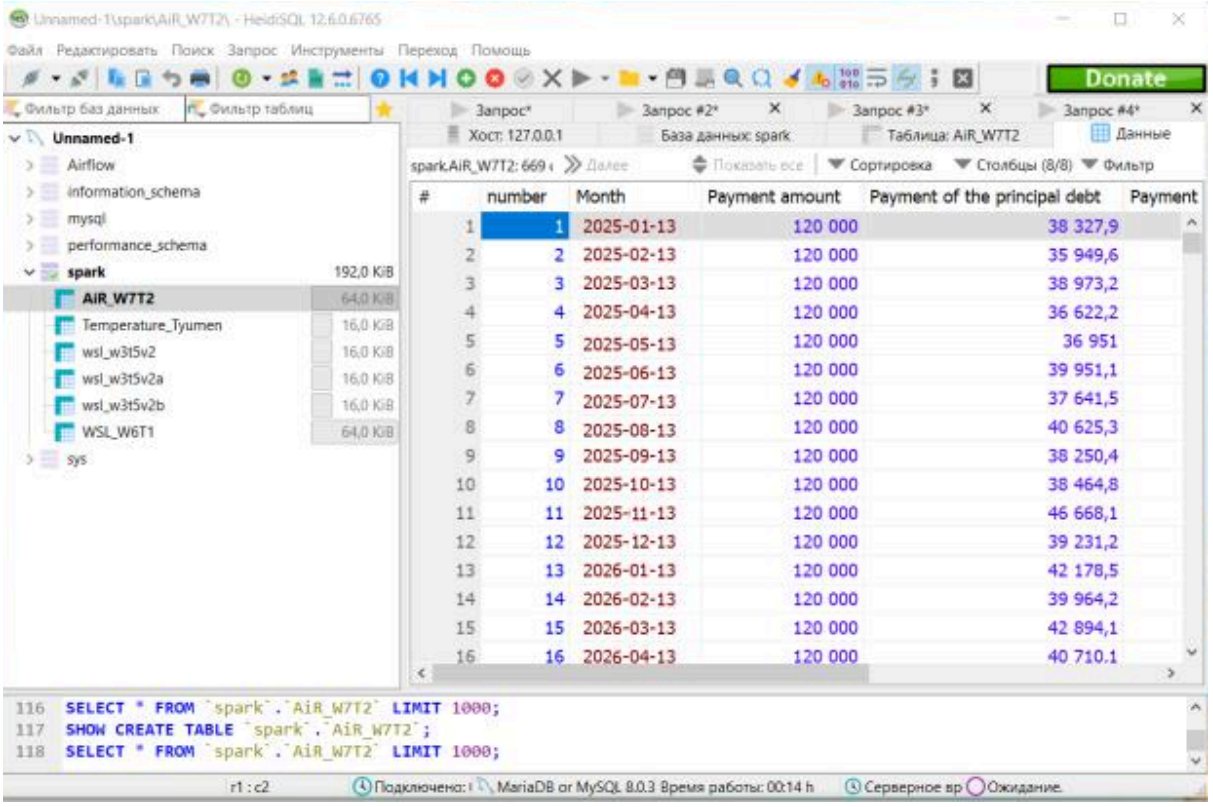
```
import time, sys, os
from pyspark.sql.session import SparkSession
from pyspark.sql.functions import col, lit
import matplotlib.pyplot as plt
from sqlalchemy import create_engine
from pandas.io import sql
import warnings

warnings.filterwarnings("ignore")
t0=time.time()
con=create_engine("mysql://root:1@localhost:33061/spark")
os.environ['PYSPARK_PYTHON'] = sys.executable
os.environ['PYSPARK_DRIVER_PYTHON'] = sys.executable
spark=SparkSession.builder.appName("AiR Home Work №7").getOrCreate()
```

```
sql.execute("""drop table if exists spark.`AiR_W7T2`""",con)
sql.execute("""CREATE TABLE if not exists spark.`AiR_W7T2` (
        `number` INT(10) NULL DEFAULT NULL,
        `Month` DATE NULL DEFAULT NULL,
        `Payment amount` FLOAT NULL DEFAULT NULL,
        `Payment of the principal debt` FLOAT NULL DEFAULT NULL,
        `Payment of interest` FLOAT NULL DEFAULT NULL,
        `Balance of debt` FLOAT NULL DEFAULT NULL,
        `interest` FLOAT NULL DEFAULT NULL,
        `debt` FLOAT NULL DEFAULT NULL
)
COLLATE='utf8mb4_general_ci'
ENGINE=InnoDB""",con)

from pyspark.sql.window import Window
from pyspark.sql.functions import sum as sum1
w =
Window.partitionBy(lit(1)).orderBy("number").rowsBetween(Window.unboundedPreceding,
Window.currentRow)
dfG = spark.read.format("com.crealytics.spark.excel")\
      .option("dataAddress", "'General'!A1:F361")\
      .option("useHeader", "false")\
      .option("treatEmptyValuesAsNulls", "false")\
      .option("inferSchema", "true").option("addColorColumns", "true")\
         .option("usePlainNumberFormat","true")\
      .option("startColumn", 0)\
      .option("endColumn", 99)\
      .option("timestampFormat", "MM-dd-yyyy HH:mm:ss")\
      .option("maxRowsInMemory", 20)\
      .option("excerptSize", 10)\
      .option("header", "true")\
      .format("excel")\
      .load("/home/ritorta/HomeWork/W7/Task_2/W7T2.xlsx").limit(1000)\
      .withColumn("interest", sum1(col("Payment of interest")).over(w))\
      .withColumn("debt", sum1(col("Payment of the principal debt")).over(w))

df120 = spark.read.format("com.crealytics.spark.excel")\
      .option("dataAddress", "'120'!A1:F135")\
      .option("useHeader", "false")\
      .option("treatEmptyValuesAsNulls", "false")\
      .option("inferSchema", "true").option("addColorColumns", "true")\
         .option("usePlainNumberFormat","true")\
      .option("startColumn", 0)\
      .option("endColumn", 99)\
      .option("timestampFormat", "MM-dd-yyyy HH:mm:ss")\
      .option("maxRowsInMemory", 20)\
      .option("excerptSize", 10)\
```

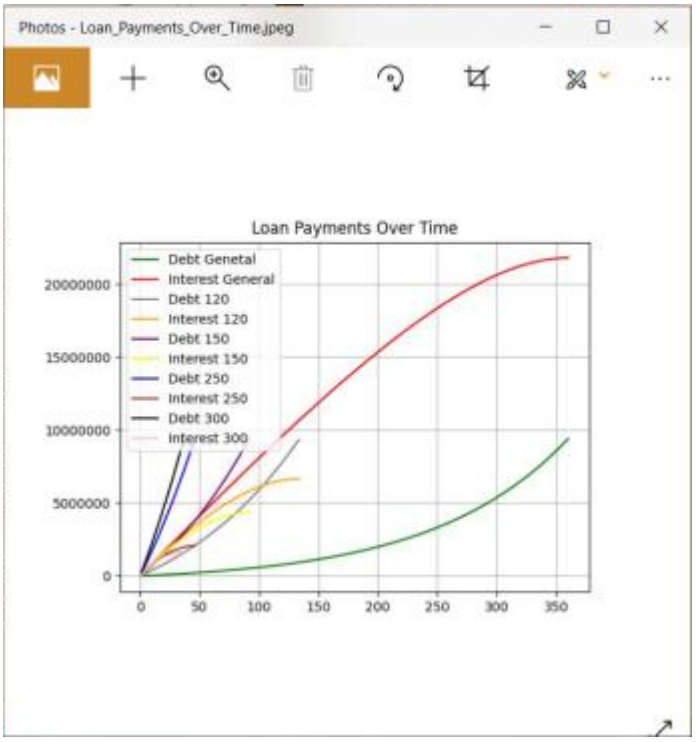
```
        .option("header", "true")\
        .format("excel")\
        .load("/home/ritorta/HomeWork/W7/Task_2/W7T2.xlsx").limit(1000)\
        .withColumn("interest", sum1(col("Payment of interest")).over(w))\
        .withColumn("debt", sum1(col("Payment of the principal debt")).over(w))

df150 = spark.read.format("com.crealytics.spark.excel")\
        .option("dataAddress", "'150'!A1:F93")\
        .option("useHeader", "false")\
        .option("treatEmptyValuesAsNulls", "false")\
        .option("inferSchema", "true").option("addColorColumns", "true")\
           .option("usePlainNumberFormat","true")\
        .option("startColumn", 0)\
        .option("endColumn", 99)\
        .option("timestampFormat", "MM-dd-yyyy HH:mm:ss")\
        .option("maxRowsInMemory", 20)\
        .option("excerptSize", 10)\
        .option("header", "true")\
        .format("excel")\
        .load("/home/ritorta/HomeWork/W7/Task_2/W7T2.xlsx").limit(1000)\
        .withColumn("interest", sum1(col("Payment of interest")).over(w))\
        .withColumn("debt", sum1(col("Payment of the principal debt")).over(w))

df250 = spark.read.format("com.crealytics.spark.excel")\
        .option("dataAddress", "'250'!A1:F47")\
        .option("useHeader", "false")\
        .option("treatEmptyValuesAsNulls", "false")\
        .option("inferSchema", "true").option("addColorColumns", "true")\
           .option("usePlainNumberFormat","true")\
        .option("startColumn", 0)\
        .option("endColumn", 99)\
        .option("timestampFormat", "MM-dd-yyyy HH:mm:ss")\
        .option("maxRowsInMemory", 20)\
        .option("excerptSize", 10)\
        .option("header", "true")\
        .format("excel")\
        .load("/home/ritorta/HomeWork/W7/Task_2/W7T2.xlsx").limit(1000)\
        .withColumn("interest", sum1(col("Payment of interest")).over(w))\
        .withColumn("debt", sum1(col("Payment of the principal debt")).over(w))

df300 = spark.read.format("com.crealytics.spark.excel")\
        .option("dataAddress", "'300'!A1:F38")\
        .option("useHeader", "false")\
        .option("treatEmptyValuesAsNulls", "false")\
        .option("inferSchema", "true").option("addColorColumns", "true")\
           .option("usePlainNumberFormat","true")\
        .option("startColumn", 0)\
        .option("endColumn", 99)\
```

```
        .option("timestampFormat", "MM-dd-yyyy HH:mm:ss")\
        .option("maxRowsInMemory", 20)\
        .option("excerptSize", 10)\
        .option("header", "true")\
        .format("excel")\
        .load("/home/ritorta/HomeWork/W7/Task_2/W7T2.xlsx").limit(1000)\
        .withColumn("interest", sum1(col("Payment of interest")).over(w))\
        .withColumn("debt", sum1(col("Payment of the principal debt")).over(w))

df_combined = dfG.union(df120).union(df150).union(df250).union(df300)

df_combined.write.format("jdbc").option("url","jdbc:mysql://localhost:33061/spark?user=root&
password=1")\
        .option("driver", "com.mysql.cj.jdbc.Driver").option("dbtable", "AiR_W7T2")\
        .mode("append").save()

"""df_pandas = df_combined.toPandas()"""

df_pandas1 = dfG.toPandas()
df_pandas2 = df120.toPandas()
df_pandas3 = df150.toPandas()
df_pandas4 = df250.toPandas()
df_pandas5 = df300.toPandas()

ax = plt.gca()
ax.ticklabel_format(style='plain')

df_pandas1.plot(kind='line', x='number', y='debt', color='green', ax=ax, label='Debt Genetal')
df_pandas1.plot(kind='line', x='number', y='interest', color='red', ax=ax, label='Interest
General')
df_pandas2.plot(kind='line', x='number', y='debt', color='grey', ax=ax, label='Debt 120')
df_pandas2.plot(kind='line', x='number', y='interest', color='orange', ax=ax, label='Interest
120')
df_pandas3.plot(kind='line', x='number', y='debt', color='purple', ax=ax, label='Debt 150')
df_pandas3.plot(kind='line', x='number', y='interest', color='yellow', ax=ax, label='Interest
150')
df_pandas4.plot(kind='line', x='number', y='debt', color='blue', ax=ax, label='Debt 250')
df_pandas4.plot(kind='line', x='number', y='interest', color='brown', ax=ax, label='Interest
250')
df_pandas5.plot(kind='line', x='number', y='debt', color='black', ax=ax, label='Debt 300')
df_pandas5.plot(kind='line', x='number', y='interest', color='pink', ax=ax, label='Interest 300')

plt.title('Loan Payments Over Time')
plt.grid ( True )
ax.set(xlabel=None)

plt.savefig("/home/ritorta/HomeWork/W7/Task_2/Loan_Payments_Over_Time.jpeg")
plt.show()
```

```
spark.stop()
t1=time.time()
print('finished',time.strftime('%H:%M:%S',time.gmtime(round(t1-t0))))
```



#	number	Month	Payment amount	Payment of the principal debt	Payment
1	1	2025-01-13	120 000	38 327,9	
2	2	2025-02-13	120 000	35 949,6	
3	3	2025-03-13	120 000	38 973,2	
4	4	2025-04-13	120 000	36 622,2	
5	5	2025-05-13	120 000	36 951	
6	6	2025-06-13	120 000	39 951,1	
7	7	2025-07-13	120 000	37 641,5	
8	8	2025-08-13	120 000	40 625,3	
9	9	2025-09-13	120 000	38 250,4	
10	10	2025-10-13	120 000	38 464,8	
11	11	2025-11-13	120 000	46 668,1	
12	12	2025-12-13	120 000	39 231,2	
13	13	2026-01-13	120 000	42 178,5	
14	14	2026-02-13	120 000	39 964,2	
15	15	2026-03-13	120 000	42 894,1	
16	16	2026-04-13	120 000	40 710,1	



3. Зарегистрируйтесь в OpenWeatherApi (https://openweathermap.org/api) 3.1 Создайте ETL, который получает температуру в заданной вами локации, и дальше делает ветвление: - В случае, если температура больше 15 градусов цельсия — идёт на ветку, в которой есть оператор, выводящий на экран «тепло»; - В случае, если температура ниже 15 градусов, идёт на ветку с оператором, который выводит в консоль «холодно». - Оператор ветвления должен выводить в консоль полученную от API температуру. - Приложите скриншот графа и логов работы оператора ветвленния.

```
from datetime import datetime
from airflow import DAG
from airflow.operators.bash import BashOperator
from airflow.operators.python import PythonOperator, BranchPythonOperator
from datetime import datetime, timedelta
from airflow.operators.python import PythonOperator
from datetime import datetime
import requests
import os
from dotenv import load_dotenv


def openwear_get_temp(**kwargs):

    #API
    dotenv_path = '/home/ritorta/HomeWork/API_KEY.env' # Проверить путь к API
    load_dotenv(dotenv_path)
    openweather_api = os.getenv('OPENWEATHER_API')

    ti = kwargs['ti']
    city = "Tyumen"
    api_key = openweather_api
    url = f"https://api.openweathermap.org/data/2.5/weather?q={city}&appid={api_key}"
    payload = {}
    headers = {}
    response = requests.request("GET", url, headers=headers, data=payload)
    return round(float(response.json()['main']['temp'])-273.15, 2)


def openwear_check_temp(ti):
    temp = int(ti.xcom_pull(task_ids='Tyumen_get_temperature'))
    print(f'Temperature now is {temp}')
    if temp >= 15:
        return 'Tyumen_Temp_warm'
    else:
        return 'Tyumen_Temp_cold'

with DAG(
        'Tyumen_check_temperature_warm_or_cold',
        start_date=datetime(2024, 12, 02),
```

```
        catchup=False,
        tags=['W7T3'],
) as dag:
    Tyumen_get_temperature = PythonOperator(
        task_id='Tyumen_get_temperature',
        python_callable=openwear_get_temp,
    )

    Tyumen_check_temperature = BranchPythonOperator(
        task_id='Tyumen_check_temperature',
        python_callable=openwear_check_temp,
    )

    Tyumen_Temp_warm = BashOperator(
        task_id='Tyumen_Temp_warm',
        bash_command='echo "It is warm"',
    )

    Tyumen_Temp_cold = BashOperator(
        task_id='Tyumen_Temp_cold',
        bash_command='echo "It is cold"',
    )

Tyumen_get_temperature >> Tyumen_check_temperature >> [Tyumen_Temp_warm,
Tyumen_Temp_cold]
```

Airflow DAGs Cluster Activity Datasets Security Browse Admin Docs 08:41 UTC AA

DAG: Tyumen_check_temperature_warm_or_cold

Schedule: 1 day, 0:00:00 | Next Run: 2024-12-02, 00:00:00

Grid | Graph | Calendar | Task Duration | Task Tries | Landing Times | Gantt

Details | Code | Audit Log

02.12.2024 08:41:20 | 25 | All Run Types | All Run States | Clear Filters | Auto-refresh

Press shift + / for Shortcuts

deferred | failed | queued | removed | restarting | running | scheduled | skipped | success | up_for_reschedule | up_for_retry | upstream_failed | no_status

00:00:05
00:00:02
00:00:00

Tyumen_get_temperature
Tyumen_check_temperature
Tyumen_Temp_cold
Tyumen_Temp_warm

DAG
Tyumen_check_temperature_warm_or_cold

Clear task | Mark state as... | Filter Tasks

Details | Graph | Gantt | Code | Logs

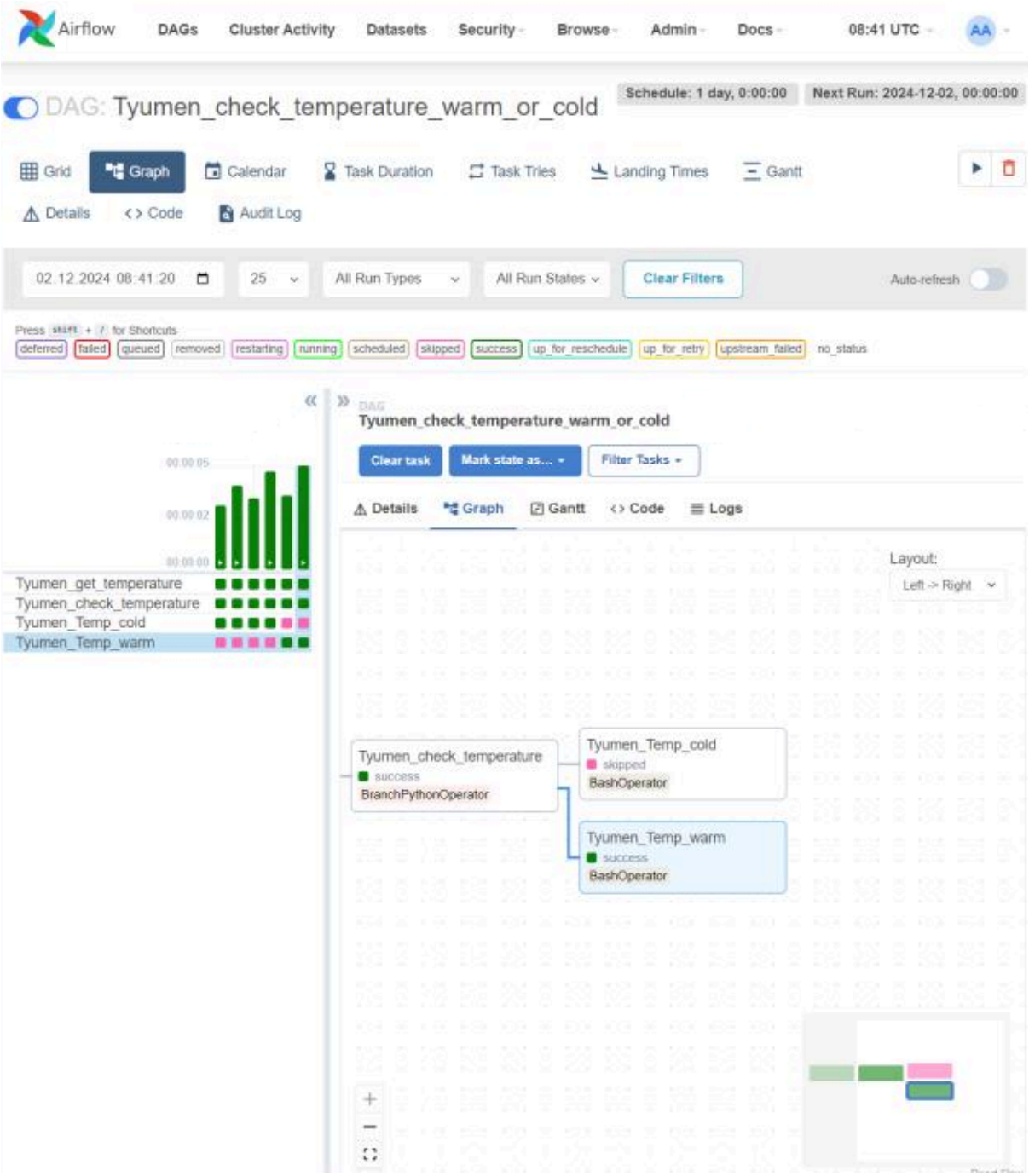
More Details | Rendered Template | XCom | List Instances, all runs

Task Instance Notes:

Add Note

Task Instance Details

Status	success
Task ID	Tyumen_Temp_warm
Run ID	manual__2024-12-02T08:28:06.798638+00:00
Operator	BashOperator
Trigger Rule	all_success
Duration	00:00:00
Started	2024-12-02, 08:28:12 UTC
Ended	2024-12-02, 08:28:12 UTC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AA
DAG: Tyumen_check_temperature_warm_or_cold
Schedule: 1 day, 0:00:00
Next Run: 2024-12-02, 00:00:00
Grid
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Task Duration
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Audit Log
02.12.2024 08:41:20
25
All Run Types
All Run States
Clear Filters
Auto-refresh
Press shift + / for Shortcuts
deferred
failed
queued
removed
restarting
running
scheduled
skipped
success
up_for_reschedule
up_for_retry
upstream_failed
no_status
00:00:05
00:00:02
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Tyumen_get_temperature
Tyumen_check_temperature
Tyumen_Temp_cold
Tyumen_Temp_warm
DAG
Tyumen_check_temperature_warm_or_cold
Clear task
Mark state as...
Filter Tasks
Details
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Layout:
Left -> Right
Tyumen_check_temperature
success
BranchPythonOperator
Tyumen_Temp_cold
skipped
BashOperator
Tyumen_Temp_warm
success
BashOperator

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DAG: Tyumen_check_temperature_warm_or_cold

Schedule: 1 day, 0:00:00 Next Run: 2024-12-02, 00:00:00

Grid Graph Calendar Task Duration Task Tries Landing Times Gantt

Details Code Audit Log

02.12.2024 08:41:20 25 All Run Types All Run States Clear Filters Auto-refresh

Press SHIFT + / for Shortcuts

deferred failed queued removed restarting running scheduled skipped success up_for_reschedule up_for_retry upstream_failed no_status

00:00:05
00:00:02
00:00:00

Tyumen_get_temperature
Tyumen_check_temperature
Tyumen_Temp_cold
Tyumen_Temp_warm

DAG
Tyumen_check_temperature_warm_or_cold

Clear task Mark state as... Filter Tasks

Details Graph Gantt Code Logs

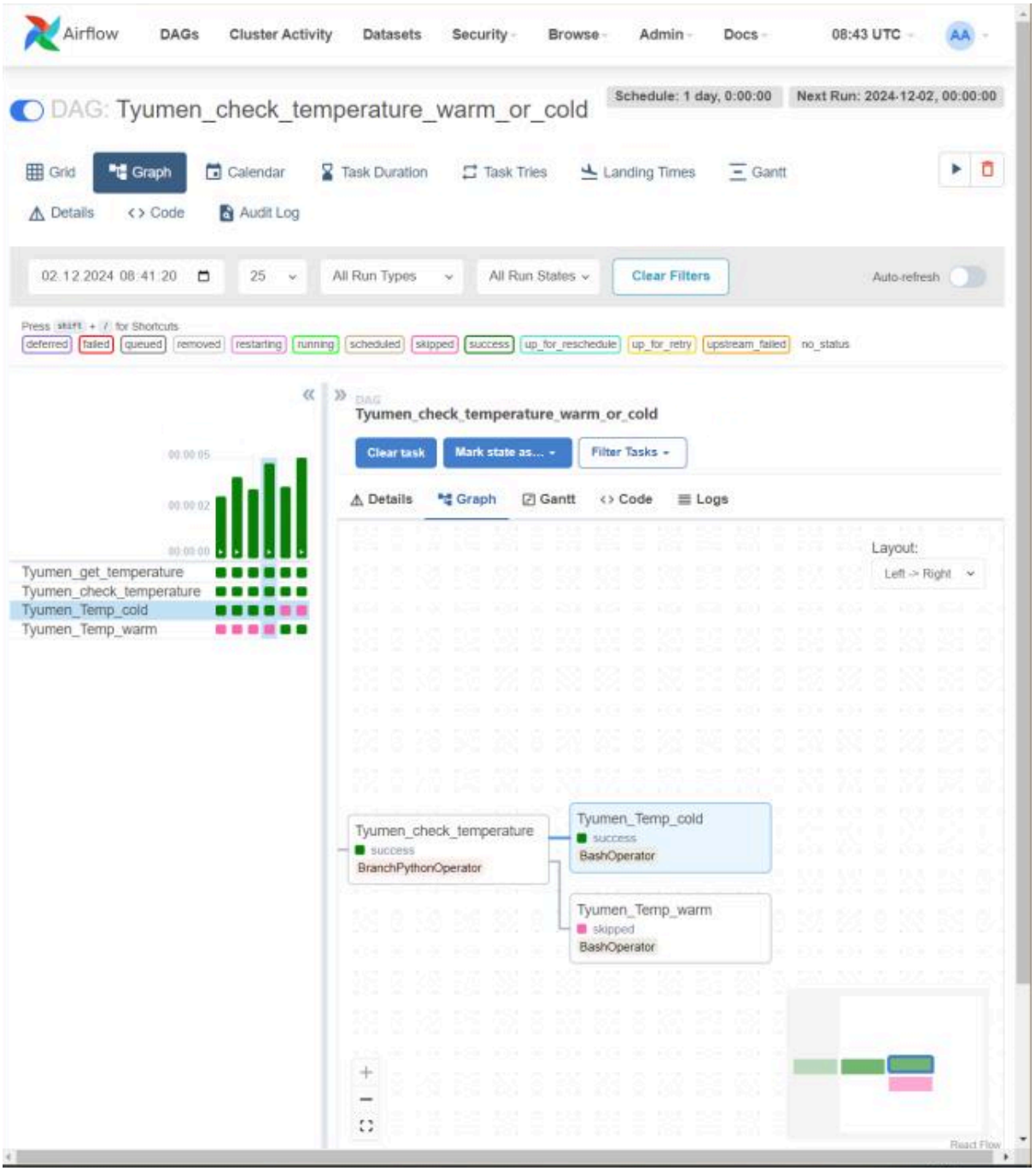
More Details Rendered Template XCom List Instances, all runs

Task Instance Notes:

Add Note

Task Instance Details

Status	success
Task ID	Tyumen_Temp_cold
Run ID	manual__2024-12-02T08:26:25.959084+00:00
Operator	BashOperator
Trigger Rule	all_success
Duration	00:00:00
Started	2024-12-02, 08:26:30 UTC
Ended	2024-12-26, 08:26:31 UTC


Airflow
DAGs
Cluster Activity
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Browse
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Docs
08:43 UTC
AA
DAG: Tyumen_check_temperature_warm_or_cold
Schedule: 1 day, 0:00:00
Next Run: 2024-12-02, 00:00:00
Grid
Graph
Calendar
Task Duration
Task Tries
Landing Times
Gantt
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Code
Audit Log
02.12.2024 08:41:20
25
All Run Types
All Run States
Clear Filters
Auto-refresh
Press shift + / for Shortcuts
deferred
failed
queued
removed
restarting
running
scheduled
skipped
success
up_for_reschedule
up_for_retry
upstream_failed
no_status
Tyumen_get_temperature
Tyumen_check_temperature
Tyumen_Temp_cold
Tyumen_Temp_warm
DAG
Tyumen_check_temperature_warm_or_cold
Clear task
Mark state as...
Filter Tasks
Details
Graph
Gantt
Code
Logs
Layout:
Left -> Right
Tyumen_check_temperature
success
BranchPythonOperator
Tyumen_Temp_cold
success
BashOperator
Tyumen_Temp_warm
skipped
BashOperator
React Flow

Livedigital — ... | How to get Tel... | DAGs - Airflow | api.telegram.org | GISMETEO: По...

localhost:8080/home

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Triggered Work_7_Task_2, it should start any moment now.

Triggered Work_7_Task_1, it should start any moment now.

DAGs

All 4 | Active 3 | Paused 1 | Running 1 | Failed 0 | Filter DAGs by tag | Search DAGs

Auto-refresh

DAG	Owner	Runs	Schedule	Last Run
Tyumen_check_temperature_warm_or_cold W7T3	airflow	6	1 day, 0:00:00	2024-12-02, 08:28:06
Work_6_Task_1	Ritorta	15 2	0 6 * * *	2024-11-24, 08:26:19
Work_7_Task_1	Ritorta	6 2	0 6 * * *	2024-12-02, 08:28:30
Work_7_Task_2	Ritorta	5 1	0 6 * * *	2024-12-02, 08:28:30

« ‹ 1 › »

Version: v2.7.3

Git Version: .release:f1243537838516b8bb8156130bc001595bfbeb01