

Certification Exam:
Airflow Fundamentals

Modules

 Exam and Badge Details Getting Started Certification Exam Wrap Up

Certification Exam



You have passed the quiz!

Your score:
65 of 75 Correct (86%)Elapsed time:
43 minutes

75 of 75 questions answered

[Hide Answers](#)

Question 1: Incorrect answer

What task dependency relationship results in the following DAG? (select all that apply)



- t3 << t2 << t1 << t0
- t0->>[t1-t2]->>t3
- t0->>[t1,t2,-t3]
- t0 >> t1 >> t2 >> t3

Question 2: Correct answer

A DAG was designed to fetch data from files coming from different data sources. The DAG has to be triggered every day at 7:00 AM. What value should be assigned to the `schedule_interval` DAG parameter to achieve this scheduling frequency?

- `schedule_interval='0 7 * * *'`
- `schedule_interval='7 * * * *'`
- `schedule_interval=timedelta(hours=6)`
- `schedule_interval=timedelta(hours=7)`

Question 3: Correct answer

Which of the following are valid values for scheduling a DAG in Airflow? (select all that apply)

- Calendar
- Cron
- Timedelta
- Integers

Question 4: Correct answer

If a DAG has a `schedule_interval` parameter with the value of `@daily` and a `catchup` parameter with the value of `True`, how far back in time will Airflow try to catch up on missed DAG runs?

- All days from the set `'start_date'` parameter value of the DAG
- One-day
- One-week
- One-month

Question 5: Correct answer

What's the role of a worker in Airflow?

- To execute tasks.
- To define how and on which system to execute tasks.
- To manage the scheduling of tasks.
- To verify if dependencies are met.

Question 6: Correct answer

Assume a data team member has added `task_b` to the DAG below:

```
from airflow import DAG
from airflow.operators.bash_operator import BashOperator
from datetime import datetime

dag = DAG(
    'data_dag',
    start_date=datetime(2023, 1, 1),
    catchup=False,
)

task_a = BashOperator(
    task_id='task_a',
    bash_command='echo "Executing task A"',
    dag=dag,
)

#This task was added
task_b = BashOperator(
    task_id='task_b',
    bash_command='echo "Executing task B"',
    dag=dag,
)

task_a >> task_b
```

The team member doesn't see the new task in the DAG on the Airflow UI. What could be the cause?

- The task dependency setup is incorrect.
- The schedule_interval parameter is missing.
- Airflow has a default delay of up to 30 seconds to detect a new task in a DAG.
- Airflow has a default delay of up to 5 minutes to detect a new task in a DAG.

Question 7: ✓ Correct answer

Which feature in Airflow allows tasks to communicate with each other and share data?

- Variables
- Hooks
- Connections
- XComs

Question 8: ✓ Correct answer

What is the default value for the `start_date` parameter of a DAG?

- The parameter has to be explicitly set and has no default value.
- The current date and time of a user's location (e.g., New York).
- Midnight on January 1, 1900.
- The current UTC date and time.

Question 9: ✓ Correct answer

Assume a DAG experienced a bug, and a data team needed to pause the DAG to fix it. The bug took 3 days to fix. The DAG is scheduled to be triggered every day and has a DAG `start_date` parameter value of `2023/01/05 00:00`. The current date after the fix is `2023/01/08 10:00`. If the DAG is unpause; how many running DAG runs will occur if the DAG `catchup` parameter value is set to `True`?

- 2
- 3
- 4
- ±

Question 10: ✓ Correct answer

Which of the following is the correct way to define an Airflow variable using an environment variable with the name `customer_folder` and the value 'my_folder'?

- `AIRFLOW_VAR_CUSTOMER_FOLDER='my_folder'`
- `AIRFLOW_VARIABLE_CUSTOMER_FOLDER='my_folder'`
- `AIRFLOW-CUSTOMER-FOLDER='my_folder'`
- `CUSTOMER_FOLDER='my_folder'`

Question 11: ✓ Correct answer

What is the default timezone in Airflow?

- The user's local timezone
- AEST
- EST
- UTC

Question 12: ✓ Correct answer

Which of the following best describes what a Sensor Operator does?

- It provides various utility functions to support workflow management.
- It waits for a certain condition to be met before proceeding with a workflow.
- It evaluates conditions and determines the path a workflow should take.
- It sends notifications or alerts during the execution of a workflow.

Question 13: ✗ Incorrect answer

Assume there is a DAG with four tasks labeled t0, t1, t2, and t3. Would writing the DAG's task dependency as `[t0, t1] >> [t2, t3]` work?

- Yes
- No

Question 14: ✓ Correct answer

What Airflow CLI command runs a task without checking for dependencies or recording its state in the metadata database?

- airflow-standalone
- airflow-dags-test
- airflow-tasks-start
- airflow tasks test

Question 15: ✓ Correct answer

Which of the following DAG `schedule_interval` parameter Cron values would cause a DAG to run every day at midnight? (select all that apply)

- 0+---*
- @daily
- 0-0---0
- 0 0 * * *

Question 16: ✓ Correct answer

To avoid having too many DAG runs running at the same time, a DAG has its `catchup` parameter set to the value of `False`. Is it still possible to backfill the data even if the `catchup` parameter is set to this value?

- No, when `catchup` is set to `False`, it is impossible to backfill missing DAG runs.
- Yes, with the REST API.
- Yes, with the Airflow command line interface (CLI).

Question 17: ✓ Correct answer

An Airflow variable was created using an environment variable and is not visible on the Airflow UI. Can it still be accessed/used in DAGs?

- No
- Yes

Question 18: ✓ Correct answer

Which of the following best describes what a Transfer Operator does?

- It sends notifications or alerts during the execution of a workflow.
- It evaluates conditions and determines the path a workflow should take.
- It intakes and transforms data into a different format or structure.
- It moves or transfers data between different sources, destinations, or storage systems

Question 19: ✓ Correct answer

Assume a scenario where a company is running a website, and a specific DAG should only be triggered when a customer hits a button on a form. This means that the DAG should not be scheduled. Which of the following values for the `trigger_rule` parameter of the DAG configuration then?

`schedule_interval` parameter of the DAG accomplishes this?

- `schedule_interval=None`
- `schedule_interval=None`
- `schedule_interval=@never`
- `schedule_interval=@once`

Question 20: ✘ Incorrect answer

Examine the Airflow UI below:

DAG	Owner	Runs	Schedule	Last Run	Next Run
check_dag	airflow	1	never	2023-08-08, 15:51:09	2023-08-08, 00:00:00

What does the "Last Run" column represent?

- The date when the DAG is scheduled to run next.
- The start date/time of the latest DAG run.
- The interval of time between each DAG run.
- The end datetime of the most recent DAG run.

Question 21: ✓ Correct answer

In which of the following places do Airflow users set up the dependencies between tasks in a DAG?

- In the Airflow UI
- In the DAG file itself
- In a separate configuration file
- In a Python file in the 'includes' directory

Question 22: ✓ Correct answer

What is a limitation of using XComs? (select all that apply)

- The amount of data that can be given to an XCom is limited.
- XComs can only be used with a maximum of two tasks in a DAG.
- XComs are the only way to share data between tasks.
- There must be a defined DAG with at least one associated task to create an XCom.

Question 23: ✓ Correct answer

A member of a data team writes a Python script that downloads data from an API and stores it in a database on a daily basis. Is this scenario a use case for Airflow?

- No
- Yes

Question 24: ✓ Correct answer

Examine the DAG below:

```
from airflow import DAG
from airflow.operators.bash_operator import BashOperator
from datetime import datetime

# Define the DAG instance
dag = DAG(
    'basic_bash_dag',
    start_date=datetime(2023, 1, 1),
    schedule_interval='@daily',
    catchup=False,
)

# Define the BashOperator tasks
task_1 = BashOperator(
    task_id='task_1',
    bash_command='echo "Executing task 1"',
    dag=dag,
)

task_2 = BashOperator(
    task_id='task_2',
    bash_command='echo "Executing task 2"',
    dag=dag,
)

# Set task dependencies
task_1 >> task_2
```

Which of the following ways allows the code to avoid defining a DAG object in all operators (`dag=dag`)? (Select all that apply)

- By instantiating the DAG object with the context manager with
- By defining tasks within a function decorated by `@dag`
- By creating a default argument dictionary
- By giving all tasks the same task_id

Question 25: ✘ Incorrect answer

What happens if two DAGs share the same `dag_id` parameter?

- Airflow will use the DAG with the earlier start_date parameter value and disregard the other DAG.
- Airflow will throw an error because it does not allow two DAGs to share the same `dag_id`.
- Airflow will automatically assign a new `dag_id` parameter value to one of the two DAGs.
- Airflow will exhibit unpredictable behavior and may switch randomly between the two DAGs.

Question 26: ✓ Correct answer

Which of the following is a valid way to create a connection in Airflow? (select all that apply)

- Airflow UI
- Environment Variables
- Airflow CLI
- Inside of a XCom

Question 27: ✓ Correct answer

Assume there is a DAG with defined task dependencies running in an Airflow instance. What would be the most helpful Airflow UI view for an overview of the dependencies?

- DAGs-view
- Gantt-view
- Grid-view
- Graph view

Question 28: ✓ Correct answer

Examine the DAG below:

```
from airflow.decorators import dag, task
from airflow.utils.dates import datetime

@dag(start_date=datetime(2023, 1, 1), catchup=False)
def my_dag():

    @task
    def my_task():
        print('My task executed')
```

This DAG doesn't show up on the Airflow UI. Why?

- The `catchup` parameter is set to `False`
- The `start_date` parameter is incorrectly formatted
- The `schedule_interval` parameter is missing
- `my_dag` isn't called

Question 29: ✓ Correct answer

Assume a DAG needs to process data one month before the value of the DAG's `start_date` parameter. Which of the following Airflow CLI commands is the best way to accomplish this?

- `airflow dags-trigger`
- `airflow dags backfill`
- `airflow dags run`
- It is not possible in Airflow

Question 30: ✓ Correct answer

What is an Airflow provider?

- A separate Python package that extends Airflow's functionality, in most cases by integrating with external systems or services.
- A configuration in Airflow that allows users to control the number of tasks running at a time.
- A Docker image that installs Airflow.
- Operators that are part of core Airflow, like the `PythonOperator` and the `BashOperator`.

Question 31: ✓ Correct answer

Which of the following statements are true about a DAG in Airflow? (select all that apply)

- DAG stands for Directed Acyclic Graph.
- A DAG's nodes define its tasks, and the directed edges define the dependencies between those tasks.
- It is a good practice to have loops in a DAG.
- A DAG is a programming language used for data analysis.

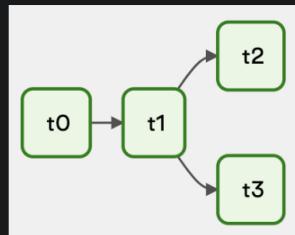
Question 32: ✗ Incorrect answer

What are the core architectural components of Airflow? (select all that apply)

- A web server
- A NoSQL database
- DAGs
- A metadata database
- A scheduler
- An executor

Question 33: ✓ Correct answer

What task dependency relationship results in the following DAG?



- [t0-t1] >> [t2-t3]
- t0 >> t1 >> [t2, t3]
- t0 >> t1 >> t2, t3
- [t0-t1] >> t2 >> t3

Question 34: ✓ Correct answer

Which parameters are optional when creating a new DAG object without using the `@dag` decorator? (select all that apply)

- `schedule_interval`
- `start_date`
- `default_args`
- `dag_id`

Question 35: ✓ Correct answer

What mode is considered best practice to use when a sensor's `poke_interval` parameter value is set to a very short duration (< 5 minutes)?

- `reschedule`
- `poke`

Question 36: ✓ Correct answer

What is the purpose of an Airflow variable? (select all that apply)

- To avoid hardcoding a value
- To store a XCom
- To reuse a value across multiple DAGs
- To store large amounts of data

Question 37: ✓ Correct answer

Examine the Airflow UI below:



Is it possible to determine which tasks have failed across all DAG runs of a single DAG using the "Recent Tasks" column?

Question 38: ✓ Correct answer

Yes

No

Examine the DAG Below:

```
from airflow import DAG
from airflow.operators.bash import BashOperator
from datetime import datetime, timedelta

dag = DAG(
    'basic_bash_dag',
    schedule_interval='@daily',
    start_date=datetime(2023, 1, 1),
    catchup=False,
)

task_1 = BashOperator(
    task_id='task_1',
    bash_command='ls',
    dag=dag,
)

task_2 = BashOperator(
    task_id='task_2',
    bash_command='pwd',
    dag=dag,
)

task_1 >> task_2
```

Assuming the current date is **2023/01/04**, how many DAG runs will occur right after the DAG is triggered?

- 0
- 4
- 1
- 2

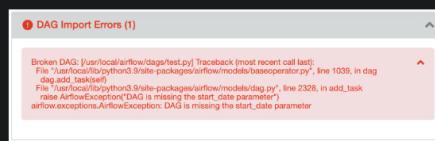
Question 39: ✓ Correct answer

Assume an Airflow instance has a variable named **my_json** which stores a JSON value. Which of the following would return the variable as a python dictionary?

- Variable.retrieve('my_json', deserialize_json=False)
- Variable.get('my_json', deserialize_json=True)
- Variable.retrieve('my_json', deserialize_json=True)
- Variable.get('my_json')

Question 40: ✓ Correct answer

Examine the Airflow error below:



Which of the following is likely to resolve this error?

- Changing the format of the start_date parameter
- There is not enough information from the error to solve the error
- Importing the correct DAG object
- Adding a start_date parameter to the DAG

Question 41: ✓ Correct answer

After several weeks of testing, a data team has decided to use Airflow in their tech stack. Before getting started, they need to communicate with their DevOps team to set up an Airflow instance on Linux Ubuntu OS. However, the DevOps team needs to know which version of Python is currently running on the environment that the data team has been testing.

Which of the following Airflow CLI commands would quickly allow the team to know what version of Python the environment is running?

- airflow info
- airflow-python-version
- airflow-version
- airflow-standalone

Question 42: ✓ Correct answer

What happens when a DAG is deleted by using the Airflow UI?

- All metadata related to the DAG is removed from the metadata database. The file corresponding to the DAG is deleted.
- The file corresponding to the DAG is deleted. Only the history of the DAG runs remains in the Airflow UI.
- All metadata related to the DAG is removed from the metadata database. The file corresponding to the DAG is not deleted.
- The file corresponding to the DAG is put into an "archives" directory.

Question 43: ✓ Correct answer

What is the default timeout value of a sensor?

- 1-day
- 7 days
- 7-hours
- 1-minute

Question 44: ✓ Correct answer

A member of a data team is tasked with checking whether multiple data pipelines have failed every morning. If they have, then they have to rerun them manually. They are looking for a data tool that offers automated notifications when something goes wrong with the data pipelines. Is this scenario a use case for Airflow?

- Yes
- No

Question 45: ✓ Correct answer

Which of the following is a valid way to create a data pipeline in Airflow? (select all that apply)

- Using the DAG class and defining the dag parameter in an operator
- Creating a Python function called DAG

- Using the `@dag` decorator
 Using with DAG()

Question 46: ✓ Correct answer

What does it mean when a DAG's task has the status of queued?

- The task is executed immediately.
- The task is running in a worker.
- The task is waiting to be scheduled.
- The task has been assigned to an Executor and is awaiting a worker.

Question 47: ✓ Correct answer

What method allows an Airflow user to get data from an XCom?

- By executing the method `xcom_pull`
 By executing the method `xcom_add`
 By providing the data to the `xcom` parameter of the DAG object
 By executing the method `xcom_push`

Question 48: ✓ Correct answer

Examine the DAG below:

```
from airflow import DAG
from airflow.operators.python_operator import PythonOperator
from datetime import datetime

with DAG(
    'basic_python_dag',
    schedule_interval='@daily',
    catchup=False
):

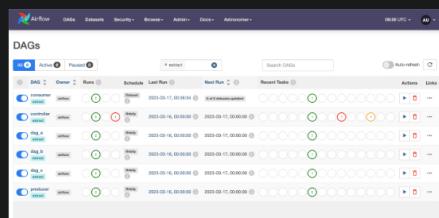
    python_task = PythonOperator(
        python_callable=lambda: print('Hello Learner!')
```

Which of the following are issues with this DAG? (select all that apply)

- The value assigned to the `python_callable` parameter has an error.
- The `start_date` parameter is missing.
- The `tags` parameter is missing.
- The `PythonOperator` is missing a `task_id` parameter.

Question 49: ✗ Incorrect answer

Examine the Airflow UI below:



There is no DAG with the tag "processing" visible. Why?

- There is a 30-second default delay to see a new DAG.
- There is a filter applied for tags.
- Airflow is experiencing an error.
- There is a 5-minute default delay to see a new DAG.

Question 50: ✗ Incorrect answer

Assume there is a DAG with four tasks labeled t0, t1, t2, and t3. Is writing the DAG's task dependency as `t0 >> t1 >> t2 >> t3` equivalent to writing `t3 << t2 << t1 << t0`?

- No
 Yes

Question 51: ✓ Correct answer

What is the purpose of the `catchup` parameter in a DAG?

- It determines the number of retries for failed tasks.
- It determines whether the DAG should be run retroactively for missed intervals.
- It determines whether the DAG should be scheduled to run in the future.
- It determines the schedule interval for the DAG.

Question 52: ✓ Correct answer

Examine the `SqlSensor` below:

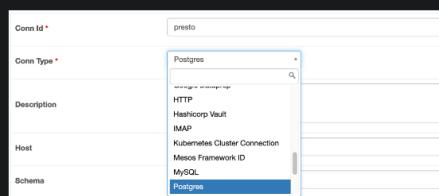
```
waiting_for_table = SQLSensor(
    task_id='waiting_for_table',
    conn_id='postgres',
    sql='sql/CHECK_TABLE.sql',
    poke_interval=30
)
```

The goal of the sensor is to expect data to arrive in a SQL table every 30 minutes. Is the sensor configured correctly to accomplish this goal?

- No
 Yes

Question 53: ✓ Correct answer

Assume a data team member is building a connection in Airflow. They notice the provider they are trying to use (e.g., Presto) is missing from the dropdown in the UI (shown below). What should they do?



Login	<input type="text"/>
Password	<input type="password"/>
Port	<input type="text"/>
Extra	<input type="text"/>
<input type="button" value="Test"/> +	

- Find a different provider because if the provider is missing in the dropdown, then it is impossible to use it in Airflow
 Reinstall Airflow
 Restart Airflow
 Find and install the provider package

Question 54: ✓ Correct answer

A member of a data team has a SQL script that aggregates data about their company's previous day's performance. They want to schedule the SQL script to run every day at midnight. Is this scenario a use case for Airflow?

- No
 Yes

Question 55: ✓ Correct answer

A CEO asks their company's data team to create a dashboard that analyzes user behavior in the company's product. Which of the following best describes how Airflow can help create that dashboard?

- Airflow can be used to schedule a data pipeline that ingests user data into a data warehouse that powers the dashboard.
 Airflow can be embedded directly into a product to analyze user click events and present the information as a dashboard.
 Airflow can be used as the product's primary database for user information which powers the dashboard.
 Airflow can be used to build the analytics dashboard directly in the Airflow UI.

Question 56: ✓ Correct answer

Take a look at the code below from a `.env` file that creates a Snowflake connection:

```
AIRFLOW_CONN_SNOWFLAKE_CONN='snowflake://LOGIN:PASSWORD@?account=
```

What is the connection id?

- AIRFLOW_CONN_SNOWFLAKE_CONN
 SNOWFLAKE_CONN
 SNOWFLAKE
 CONN_SNOWFLAKE_CONN

Question 57: ✓ Correct answer

Assume a new DAG was just added to an Airflow instance. What is the default amount of time required for the new DAG to appear on the Airflow UI?

- 5 minutes
 30 seconds
 1 minute
 1 second

Question 58: ✓ Correct answer

In a typical Airflow setup, what folder is parsed by the scheduler for new DAG files?

- The /airflow-folder
 The /dags folder
 The /include-folder
 The /plugins-folder

Question 59: ✗ Incorrect answer

Examine the DAG below:

```
from airflow import DAG
from airflow.operators.python_operator import PythonOperator
from datetime import datetime

with DAG(
    'five_task_dag',
    start_date=datetime(2023, 1, 1),
    catchup=False,
):
    task_a = PythonOperator(
        task_id='task_a',
        python_callable=lambda: print('Executing Task A'),
    )

    task_b = PythonOperator(
        task_id='task_b',
        python_callable=lambda: print('Executing Task B'),
    )

    task_c = PythonOperator(
        task_id='task_c',
        python_callable=lambda: print('Executing Task C'),
    )

    task_d = PythonOperator(
        task_id='task_d',
        python_callable=lambda: print('Executing Task D'),
    )

    task_e = PythonOperator(
        task_id='task_e',
        python_callable=lambda: print('Executing Task E'),
    )

    [task_a, task_b] >> task_e
    [task_c, task_d] >> task_e
```

How many tasks will run at the same time if this DAG is unpause?

- 4
 8
 5
 10

Question 60: ✓ Correct answer

What method allows an Airflow user to add data to XComs?

- By executing the method `xcom_add`
- By providing the data to the `xcom` parameter of the DAG object
- By executing the method `xcom_pull`
- By executing the method `xcom_push`

Question 61: ✓ Correct answer

What is the purpose of the PythonOperator in Airflow?

- To execute Python code as a task in a DAG
- To deploy Python packages to remote servers
- To manage Python virtual environments for Airflow tasks
- To schedule Python scripts to run on a regular basis

Question 62: ✓ Correct answer

What mode is considered best practice to use when a sensor's `poke_interval` parameter value is set to greater than 5 minutes?

- reschedule
- poke

Question 63: ✓ Correct answer

Examine the DAG below:

```
from airflow import DAG
from airflow.operators.bash_operator import BashOperator
from datetime import datetime

with DAG(
    'data_dag',
    schedule='@daily',
    catchup=False
):

    task_a = BashOperator(
        task_id='task_a',
        bash_command='echo "Executing task A"'
    )

    task_b = BashOperator(
        task_id='task_b',
        bash_command='echo "Executing task B"'
    )

    task_a >> task_b
```

Would this DAG be able to run properly?

- Yes
- No

Question 64: ✓ Correct answer

What is the purpose of a DAG in Airflow?

- It is a process that runs Airflow tasks.
- It is a Python script that defines the tasks and dependencies of a data pipeline.
- It is a visualization tool used to monitor the status of Airflow tasks.
- It is a data storage system used to store metadata about Airflow tasks.

Question 65: ✓ Correct answer

What is the purpose of setting dependencies between tasks in Airflow?

- To ensure that tasks are executed in the correct order.
- To improve the performance of the Airflow scheduler.
- To increase the parallelism of task execution.
- To reduce the likelihood of task failures.

Question 66: ✓ Correct answer

Take a look at the code below from a `.env` file that creates a PostgreSQL connection:

```
AIRFLOW_CONN_POSTGRES='my-conn-type://login:password@host:port/sql'
```

Is this the correct way to create a connection using an environment variable?

- No
- Yes

Question 67: ✗ Incorrect answer

Assume a member of a data team working with Airflow added a new DAG file into the `/dags` folder but reports that it doesn't show up on the Airflow UI. Which of the following could be causing the issue? (select all that apply)

- The Airflow instance must be restarted for the DAG to show up on the UI.
- The code in the DAG does not contain any words, including "airflow" or "dag".
- The `airflowignore` file has the name of the file in it.
- Airflow has a default delay of 5 minutes before Airflow acknowledges the new DAG file.

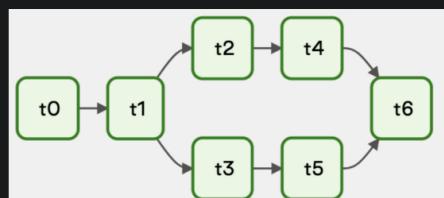
Question 68: ✓ Correct answer

Assume there is a DAG with six tasks labeled t0, t1, t2, t3, t4, and t5. Would writing the DAG's task dependency as `[t0, t1] >> t2 >> [t3, t4] >> t5` work?

- Yes
- No

Question 69: ✗ Incorrect answer

What task dependency relationship results in the following DAG?



`chain(t0, t1, [t2, t3], [t4, t5], t6)`

`[t0, t1] >>> (2 >>> (3 >>> t4) >>> [t5, t6])`

`(0 >>> (1 >>> [t2, t3]) >> [t4, t5]) >>> t6`

`chain(t0, t1, [t2, t4], [t3, t5], t6)`

Question 70: ✓ Correct answer

What types of data can be stored in an Airflow variable? (select all that apply)

Python Dataclasses

Integers

JSON

Strings

Question 71: ✓ Correct answer

Which of the following Airflow CLI commands is necessary to run to create the metadata database?

`airflow db init`

`airflow db start`

`airflow db-reset`

`airflow db-check`

Question 72: ✓ Correct answer

In a bank setting, a DAG is designed to process awaiting transfers. To accomplish this, the DAG should be triggered every 4 hours, starting from the date `datetime(2023, 1, 1)`. What value should be assigned to the `schedule_interval` DAG parameter to achieve this scheduling frequency?

`schedule_interval=0 4 * * *`

`schedule_interval=timedelta(hours=4)`

`schedule_interval=4 * * * *`

`schedule_interval=4'`

Question 73: ✓ Correct answer

Assume an Airflow variable with the name `airtable_api_key` was created via the Airflow UI. Will the variable's value be hidden on the Airflow UI?

Yes

No

Question 74: ✓ Correct answer

What would be the value of the `schedule_interval` parameter of a DAG if it needed to be triggered every 10 minutes but not on weekends?

`schedule_interval='*/10 * * * *`

`schedule_interval='10 * * * *`

`schedule_interval=timedelta(minutes=10)`

`schedule_interval='10 * * * 1-5'`

Question 75: ✓ Correct answer

What is the purpose of the `default_args` parameter in a DAG?

It specifies the operator a-DAG will use.

It specifies a dictionary of default parameters for at max one task in a DAG.

It specifies the schedule interval of a DAG.

It specifies a dictionary of default parameters for all tasks in a DAG.