like this is okay???

Mostly yes—the way you organized `exam/components/data_prep/` (script + conda file) is the right direction for an Azure ML **command component.**[1]
But for Step 1 to score points, a few key things are still missing / need fixing.[2]

What looks OK

- Having a dedicated folder for the step (`exam/components/data_prep/`) and placing `prepare_component.py` + `conda.yaml` inside it is correct (Azure ML components typically point `code: .` to that folder).[3] [1]
- Having a separate folder for training (`exam/components/train/`) is also good (each pipeline step = its own component folder).[2]

Fix this bug (important)

In your screenshot, the argparse flag is `--__input_folder` (double underscore).[3]
It must be exactly `--input_folder` (single underscore), otherwise your component command won't be able to pass the input path and the job will fail.[3]

What's missing for Step 1 points

To get the required screenshots (Component tab + Pipeline run + Train/Test data assets), you still need:[2]

- `component.yml` inside `exam/components/data_prep/` that defines inputs/outputs and runs `python prepare_component.py ...`.[1]
- A pipeline YAML (e.g., `exam/pipelines/prepare_pipeline.yml`) that runs this component and registers outputs as named/versioned data assets.[2]

What to do next (fastest)

1. Add `exam/components/data_prep/component.yml` (command component YAML schema).[1]
2. Add `exam/pipelines/prepare_pipeline.yml` (pipeline YAML) and wire:
    - input: your raw MLTable data asset
    - outputs: `got-train-ready` and `got-test-ready` (so they appear under Assets → Data).[2]
3. From Azure ML Studio Terminal, run:
    - `az ml component create -f exam/components/data_prep/component.yml`[2]
    - `az ml job create -f exam/pipelines/prepare_pipeline.yml`[2]

```
If you paste your **raw data asset name:version** (the MLTable you uploaded in Step 1 Dat
```

⁂

why do i need 3 yamls for 1 step?

You’re seeing “3 YAMLs” because Azure ML splits one *logical step* into **three separate concerns**: (1) what code runs, (2) what environment it runs in, and (3) how steps are connected into a pipeline.[22] [23]

What each YAML is for

1) `conda.yaml` (packages)

This file only lists Python dependencies (pandas, scikit-learn) so Azure ML can build the environment consistently.[24]
In component YAML you typically reference it via `environment: ... conda_file: conda.yaml`.[24]

2) `component.yml` (the “step wrapper”)

This defines your **component interface** (inputs/outputs) and the **command** to run `prepare_component.py` with those inputs/outputs.[23]
Without this, Azure ML can’t show your step as a reusable “Component” in the Components tab (which you need to screenshot).[22] [23]

3) `pipeline.yml` (the “wiring”)

This defines the **pipeline job**: which component runs, what raw data asset goes in, where outputs go, and optionally how outputs get registered as Data Assets.[22]
Without a pipeline YAML, you’d only have a standalone component run, but the exam asks specifically for “a component and a Pipeline” plus a pipeline screenshot.[22]

Can you reduce the number?

Yes: you can make it **2 YAMLs** by not having a separate `conda.yaml` (for example, pointing to an already-registered Azure ML Environment instead). Azure ML allows specifying an environment directly, so you wouldn’t need a conda file in your repo in that case.[24]
But since the exam *gives you* the `conda.yaml`, using it is the quickest and safest route.

If you want, share whether you already created a compute **cluster name** and your raw data asset name/version—then the exact `component.yml` + `pipeline.yml` can be tailored so it runs on the first try.

⁂

so what i need to do now for this You may create this via SDK, CLI+YAML or via the GUI Editor.

 Screenshot (2 points) Your component for AI Data Preparation in the Component tab of Azure.
 Screenshot (2 points) Your successful pipeline with Input and Output visible. Screenshot (1 point) Your stored Data Assets for Train and Testing data.
You need to produce **three things in Azure ML** (Component, Pipeline run, and saved Data Assets), so the next actions are: create the component definition, run it inside a pipeline, and make the pipeline outputs get registered as Data Assets. Azure ML CLI supports exactly this flow with `az ml component create` and `az ml job create`.[44] [45]

1) Get the "Component" screenshot (2 points)

1. In your repo, add a `component.yml` next to `prepare_component.py` and `conda.yaml` (same folder). Command components are defined via the command component YAML schema and can reference `conda.yaml` for the environment.[44]
2. In Azure ML Studio → **Notebooks** → **Terminal**, run from repo root:

```
az ml component create -f exam/components/data_prep/component.yml
```

This registers the component in your workspace.[45]
3) Go to Azure ML Studio → **Components** (left menu) and screenshot the component entry (name + version visible).[45]

2) Get the "Pipeline" screenshot (2 points)

1. Create a pipeline YAML (e.g., `exam/pipelines/prepare_pipeline.yml`) that calls your component once and passes the raw Data Asset as input. Azure ML component-based pipelines can be created and run via CLI YAML.[45]
2. Run it:

```
az ml job create -f exam/pipelines/prepare_pipeline.yml
```

This creates a pipeline job run you can open in Studio.[45]
3) Azure ML Studio → **Jobs** → open that pipeline job → screenshot the graph so the **raw input** and the **two outputs** are visible. (This is the "successful pipeline with Input and Output visible".)[45]

3) Get the "Train/Test Data Assets" screenshot (1 point)

In the pipeline YAML, set the pipeline outputs with a **name + version** (for example `got-train-ready:1` and `got-test-ready:1`), because Azure ML can "register output as a named asset" when you assign `name`/`version` on outputs.[46]
After the pipeline finishes, go to Azure ML Studio → **Data** (Assets → Data) and screenshot the two new data assets (train + test).[46]

Exactly what you need on disk (minimum)

For Step 1 you minimally need:

- `prepare_component.py` (your code)
- `conda.yaml` (given)
- `component.yml` (wraps the code as a component)[44]
- `prepare_pipeline.yml` (runs that component and registers outputs)[46] [45]

If you tell (a) your raw data asset name/version and (b) your compute cluster name, I'll fill in the two placeholders in `prepare_pipeline.yml` so it runs without guessing.

⁂

can i do everything in azure notebooks? or i need repo??? i'm very confused now

You **can do everything in Azure ML Notebooks** (create the `.py` + `.yml` files there and run `az ml ...` in the built-in Terminal), and you **do not strictly need** a Git repo for Azure to run your component/pipeline.[64]
A **repo is still strongly recommended** for the exam because it makes "save your code / submit ZIP / version control" easy, and Azure ML supports cloning a Git repo into the workspace file system and tracking repo/commit info with jobs.[65]

Option 1: Azure-only (no repo)

- In Azure ML Studio → **Notebooks**, create folders like `exam/components/data_prep/` and put `prepare_component.py`, `conda.yaml`, `component.yml`, and `prepare_pipeline.yml` there.[64]
- In Azure ML Studio → **Notebooks** → **Terminal**, run:
  - `az ml component create -f .../component.yml`
  - `az ml job create -f .../prepare_pipeline.yml`[64]
- At the end, download the whole `exam/` folder as ZIP for submission.

Option 2: Repo + Azure (recommended, less panic later)

- Locally (VS Code): keep the same folder structure and push to GitHub.
- In Azure ML Studio → **Terminal** on your compute instance: `git clone` / `git pull` into your user folder, then run the same `az ml ...` commands from the repo root. Azure ML explicitly supports cloning repos into the workspace and using the Git CLI there.[65]

Which should you choose right now?

Given your time pressure:

- If your repo setup is already working, stick with **Repo + Azure**.
- If Git/auth is causing delays, do **Azure-only** now, finish the pipeline + screenshots, and download ZIP at the end.

Do you already have your GitHub Classroom repo cloned in Azure ML (yes/no)?

⁂

so need to create everything locally?? provide steps

No—you don't *need* to create everything locally, but if you want the "Local VS Code + Git" workflow, then yes: **write/edit the files locally**, push to GitHub, then **clone/pull in Azure ML** and run the pipeline there. Azure ML supports cloning a Git repo onto the workspace file system and also tracks repo/branch/commit info with submitted jobs.

Step-by-step (Local → GitHub → Azure)

1) Create the folder structure locally (VS Code)

In your repo, create:

```
exam/
  components/
    data_prep/
      prepare_component.py
      conda.yaml
      component.yml
  pipelines/
    prepare_pipeline.yml
```

Azure ML CLI pipelines expect this pattern: a pipeline YAML plus component YAML(s) and a component source folder.[84]

2) Put the given files in place

- `prepare_component.py`: paste the provided script (and fix the arg name to `--input_folder`, not `--__input_folder`).
- `conda.yaml`: paste the provided env.
- `component.yml`: the wrapper that declares inputs/outputs and runs the script. Command components are defined using the command component YAML schema.[85] [84]

3) Commit and push to GitHub

```
git add .
git commit -m "Step1 data prep component + pipeline"
git push
```

4) In Azure ML Studio: clone your repo

Azure ML Studio → **Notebooks** → **Terminal** (on a compute instance), then clone into the workspace file system (commonly under `~/cloudfiles/code/` so it persists).

```
cd ~/cloudfiles/code
git clone <your-repo-url>
cd <your-repo>
```

5) Configure Azure ML CLI to your workspace (one-time)

From that terminal (if not already configured):

```
az account set --subscription <sub-id>
az configure --defaults group=<rg> workspace=<ws>
```

(If your environment already has defaults, you can skip.)

6) Register the component, then run the pipeline (Azure terminal)

```
az ml component create -f exam/components/data_prep/component.yml
az ml job create -f exam/pipelines/prepare_pipeline.yml
```

This is the standard CLI flow: register reusable components, then submit a pipeline job defined in YAML.[84]

7) Take the required screenshots (in Azure ML Studio UI)

- **Components tab**: show your registered `got_prepare_data` component.[84]
- **Jobs tab**: open the pipeline run graph with input + output ports visible.[84]
- **Data tab**: show the two output data assets (train/test) created by your pipeline (this requires `name` + `version` on pipeline outputs).[84]

What you must fill in

To make `prepare_pipeline.yml` work, you must set:

- the raw data asset reference: `azureml:<raw_name>:<raw_version>`
- the compute cluster name: `azureml:<cluster_name>`[84]

Send these two values and the exact `component.yml` + `prepare_pipeline.yml` can be written for your names so you can copy-paste and run immediately.

⁂

lets make easier, lets make everything in azure and then just download to pc and i will upload it

Yes—do everything in **Azure ML Studio (Notebooks + Terminal)**, then at the end **zip/download** the folder to your PC for the final submission. Azure ML supports running component-based pipelines from YAML with the CLI in the Studio terminal.[86]

Do it all in Azure (fast steps)

1) Create a project folder in Notebooks

Azure ML Studio → **Notebooks** → create a folder like:

```
exam/
  components/data_prep/
  pipelines/
  prompts/
  report/
```

2) Put the Step 1 files in `components/data_prep/`

Inside `exam/components/data_prep/` create:

- `prepare_component.py` (your script)
- `conda.yaml` (given env)
- `component.yml` (wraps your script as an Azure ML command component)[86]

3) Create the pipeline YAML in `pipelines/`

Create:

- `exam/pipelines/prepare_pipeline.yml` that calls your component once and writes two outputs (train/test). Azure ML CLI runs pipeline jobs from a YAML file via `az ml job create`.[86]

4) Run component + pipeline from the Azure terminal

Azure ML Studio → **Notebooks** → **Terminal**, then:

```
cd ~/cloudfiles/code/Users/<your-user>/exam   # or wherever your exam folder is
az ml component create -f components/data_prep/component.yml
az ml job create -f pipelines/prepare_pipeline.yml
```

These are the standard CLI commands for registering a component and submitting a pipeline job.[86]

5) Take the 3 screenshots

- **Components tab**: show your registered “data prep” component.[86]
- **Jobs tab**: open the pipeline run graph with input + output ports visible.
- **Data tab**: show the two created Data Assets for train and test (this requires you set `name` + `version` on pipeline outputs).[86]

Download everything to your PC (end of exam)

Azure ML Notebooks file browser can download individual files, but for a whole project it’s easiest to zip in Terminal, then download the zip.[87]

From the folder **above** `exam/`:

```
zip -r exam.zip exam
```

Refresh the Notebooks file explorer and download `exam.zip`.[87]

If you tell me your **raw MLTable data asset name:version** and your **compute cluster name**, I’ll paste a working `component.yml` + `prepare_pipeline.yml` matching your names so you can run immediately.

⁂

create files for me based on what i have

Can do—but to generate the *exact* working files, two values are needed:

1. Your **raw data asset** reference (name + version), e.g. `azureml:got-persona:1`
2. The **compute cluster name** you want the job to run on (from Compute → Compute clusters), e.g. `cpu-cluster`

Send those two strings and I’ll tailor the pipeline to your workspace.

Meanwhile, based on what you already have (`exam/components/data_prep/prepare_component.py` + `conda.yaml`), here are the two files you should create **right now**.

File 1: `exam/components/data_prep/component.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_prepare_data
display_name: GOT - Prepare data
version: 1

inputs:
  input_folder:
    type: mltable
  target_col:
    type: string
    default: house_affiliation
  test_size:
    type: number
    default: 0.2
  seed:
    type: integer
    default: 42
  stratify:
    type: integer
    default: 1

outputs:
  out_train:
    type: mltable
  out_test:
    type: mltable

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python prepare_component.py
  --input_folder ${{inputs.input_folder}}
  --target_col ${{inputs.target_col}}
  --test_size ${{inputs.test_size}}
  --seed ${{inputs.seed}}
  --stratify ${{inputs.stratify}}
  --out_train ${{outputs.out_train}}
  --out_test ${{outputs.out_test}}
```

Important: in your `prepare_component.py`, make sure the argument name is exactly:

```
parser.add_argument("--input_folder", type=str, required=True)
```

(not `--__input_folder`).

File 2: `exam/pipelines/prepare_pipeline.yml`

Replace the two placeholders (`YOUR_RAW_DATA_ASSET` and `YOUR_COMPUTE_CLUSTER`) after you reply with them.

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-prepare-pipeline

inputs:
  raw_data:
    type: mltable
    path: azureml:YOUR_RAW_DATA_ASSET

outputs:
  train_ready:
    type: mltable
    name: got-train-ready
    version: "1"
    mode: upload
  test_ready:
    type: mltable
    name: got-test-ready
    version: "1"
    mode: upload

settings:
  default_compute: azureml:YOUR_COMPUTE_CLUSTER

jobs:
  prep:
    type: command
    component: ../components/data_prep/component.yml
    inputs:
      input_folder: ${{parent.inputs.raw_data}}
    outputs:
      out_train: ${{parent.outputs.train_ready}}
      out_test: ${{parent.outputs.test_ready}}
```

Run commands (Azure Studio → Notebooks → Terminal)

From your `exam/` folder:

```
az ml component create -f components/data_prep/component.yml
az ml job create -f pipelines/prepare_pipeline.yml
```

Reply with:

- raw data asset name + version (what you see under Assets → Data)
- compute cluster name

…and I'll paste back the final pipeline YAML with placeholders filled in.

$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json

```
type: command

name: got_prepare_data
display_name: GOT - Prepare data
version: 1

inputs:
input_folder:
type: mltable
target_col:
type: string
default: house_affiliation
test_size:
type: number
default: 0.2
seed:
type: integer
default: 42
stratify:
type: integer
default: 1

outputs:
out_train:
type: mltable
out_test:
type: mltable

code: .
environment:
image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
conda_file: conda.yaml

command: >-
python prepare_component.py
--input_folder ${{inputs.input_folder}}
--target_col ${{inputs.target_col}}
--test_size ${{inputs.test_size}}
--seed ${{inputs.seed}}
--stratify ${{inputs.stratify}}
--out_train ${{outputs.out_train}}
--out_test ${{outputs.out_test}}name: got-prepare-env
channels:
```

- conda-forge
  dependencies:
- python=3.10
- pip
- pip:
  - pandas
  - scikit-learnimport argparse
    import json
    import os
    from glob import glob

import pandas as pd
from sklearn.model_selection import train_test_split

def write_mltable(folder: str, filename: str):
# MLTable that points to one file
with open(os.path.join(folder, "MLTable"), "w", encoding="utf-8") as f:
f.write(
f"""paths:

- file: ./{filename}
  transformations:
- read_delimited:
  delimiter: ","
  encoding: "utf8"
  header: all_files_same_headers
  """
)

def main():
parser = argparse.ArgumentParser()
parser.add_argument("--input_folder", type=str, required=True)

```
parser.add_argument("--target_col", type=str, default="house_affiliation")


parser.add_argument("--test_size", type=float, default=0.2)
parser.add_argument("--seed", type=int, default=42)


parser.add_argument("--stratify", type=int, default=1)  # 1=true, 0=false


parser.add_argument("--out_train", type=str, required=True)
parser.add_argument("--out_test", type=str, required=True)


args = parser.parse_args()
```

```
# locate csv
csv_path = os.path.join(args.input_folder, "data.csv")
if not os.path.exists(csv_path):
    csvs = glob(os.path.join(args.input_folder, "*.csv"))
    if not csvs:
        raise FileNotFoundError(f"No CSV found in input folder: {args.input_folder}")
    csv_path = csvs[0]


df = pd.read_csv(csv_path)
if args.target_col not in df.columns:
    raise ValueError(f"Target column '{args.target_col}' not found. Columns: {list(df.col


# ✅ Drop columns that should never be features (prevent leakage)
# - character_name is basically an ID / label proxy
# - character_id is also an ID
leakage_cols = ["character_id", "character_name"]
drop_cols = [c for c in leakage_cols if c in df.columns]


y = df[args.target_col].astype(str)
X = df.drop(columns=[args.target_col] + drop_cols, errors="ignore")


strat = None
if args.stratify == 1:
    vc = y.value_counts()
    too_small = vc[vc < 2]
    if len(too_small) == 0:
        strat = y
        print("✅ Using stratified split.")
    else:
        strat = None
        print("⚠ Stratify disabled: at least one class has < 2 samples.")
        print("Classes with too few samples:", too_small.to_dict())


X_train_raw, X_test_raw, y_train, y_test = train_test_split(
    X,
    y,
    test_size=args.test_size,
    random_state=args.seed,
    stratify=strat
)


# One-hot encode categoricals on TRAIN, then align TEST
X_train = pd.get_dummies(X_train_raw, dummy_na=True)
X_test = pd.get_dummies(X_test_raw, dummy_na=True)


# Align columns so train/test match exactly
X_train, X_test = X_train.align(X_test, join="left", axis=1, fill_value=0)
```

```
# Save outputs
os.makedirs(args.out_train, exist_ok=True)
os.makedirs(args.out_test, exist_ok=True)


X_train_path = os.path.join(args.out_train, "X_train.csv")
y_train_path = os.path.join(args.out_train, "y_train.csv")
X_test_path = os.path.join(args.out_test, "X_test.csv")
y_test_path = os.path.join(args.out_test, "y_test.csv")


X_train.to_csv(X_train_path, index=False, encoding="utf-8")
y_train.to_frame(name=args.target_col).to_csv(y_train_path, index=False, encoding="utf-8"


X_test.to_csv(X_test_path, index=False, encoding="utf-8")
y_test.to_frame(name=args.target_col).to_csv(y_test_path, index=False, encoding="utf-8")


# Save metadata for reproducibility & inference compatibility
with open(os.path.join(args.out_train, "feature_columns.json"), "w", encoding="utf-8") as
    json.dump({"columns": list(X_train.columns)}, f, ensure_ascii=False, indent=2)


classes = sorted(y.unique().tolist())
with open(os.path.join(args.out_train, "label_classes.json"), "w", encoding="utf-8") as
    json.dump({"classes": classes}, f, ensure_ascii=False, indent=2)


# Add MLTable definitions (point to the main files)
write_mltable(args.out_train, "X_train.csv")
write_mltable(args.out_test, "X_test.csv")


print("✅ Done")
print("Target:", args.target_col)
print("Train shape:", X_train.shape, "Test shape:", X_test.shape)
print("Num classes:", len(classes))
```

if **name** == "**main**":
main()$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-prepare-pipeline

inputs:
raw_data:
type: mltable
path: azureml:persona_dataset

outputs:
train_ready:
type: mltable
name: got-train-ready

version: "1"
mode: upload
test_ready:
type: mltable
name: got-test-ready
version: "1"
mode: upload

settings:
default_compute: azureml:danylo-exam-compute

jobs:
prep:
type: command
component: ../components/data_prep/component.yml
inputs:
input_folder: ${{parent.inputs.raw_data}}
outputs:
out_train: ${{parent.outputs.train_ready}}
out_test: ${{parent.outputs.test_ready}} CHECK IF EVERYTHING IS CORRECT

Most of it is correct, but **two things will break** your run, and one thing is “likely wrong” depending on how your raw data asset is stored. Azure ML pipeline/component YAML expects clean separation: `component.yml`, `conda.yaml`, and `prepare_component.py` must be **separate files**, not pasted into one file.[106] [107]

Fix 1 (critical): you pasted 3 files into 1

In your message, the end of the `command:` line continues directly into `name: got-prepare-env ...` and then into Python code—this will make the YAML invalid.
You must have **3 separate files**:

- `exam/components/data_prep/component.yml` (only component YAML)
- `exam/components/data_prep/conda.yaml` (only conda env YAML)
- `exam/components/data_prep/prepare_component.py` (only Python)

Azure ML CLI expects the component YAML to reference the conda file and code folder, and it uploads the `code:` directory.[106]

Fix 2 (critical): default_compute is not a compute instance

In your pipeline you have:

```
settings:
  default_compute: azureml:danylo-exam-compute
```

From your earlier screenshot, `danylo-exam-compute` is a **Managed Compute / compute instance** (and it was “Stopped”). Pipeline jobs normally require an **AML compute cluster** (amlcompute) or `azureml:serverless`, not a stopped instance. The CLI pipeline docs show `default_compute: azureml:cpu-cluster` style and emphasize using a compute target referenced in the pipeline YAML.[106]

What to do:

- Go to Azure ML Studio → **Compute** → **Compute clusters** and use that name (e.g., `cpu-cluster`), **or**
- set `default_compute: azureml:serverless` if allowed in your workspace/region.[106]

Check 3 (likely wrong): raw data asset reference needs a version

You wrote:

```
path: azureml:persona_dataset
```

Azure ML data asset references are typically `azureml:<name>:<version>` (or `@latest`). The inputs/outputs doc shows the `azureml:my_data:<version>` form.[107]

So change to one of:

- `path: azureml:persona_dataset:1`
- `path: azureml:persona_dataset@latest` (if your workspace supports label syntax)

Everything else looks fine

- Component inputs/outputs types `mltable` are valid for components and pipelines.[107]
- Your `prepare_component.py` has the correct `--input_folder` argument and writes MLTable metadata files into the output folders, which matches the idea of producing train/test as MLTable outputs.[107]

Do this now (quick checklist)

1. Create the 3 separate files (don't mix them).[106]
2. Update pipeline `raw_data.path` to include version (`:1` or `@latest`).[107]
3. Change `default_compute` to a **compute cluster** name (or serverless).[106]
4. Then run:

```
az ml component create -f exam/components/data_prep/component.yml
az ml job create -f exam/pipelines/prepare_pipeline.yml
```

If you tell me the exact **data asset version** (what you see in Assets → Data for `persona_dataset`) and your **compute cluster name**, I'll paste back the final corrected `prepare_pipeline.yml` with those filled in.

⁂

is it's not parsed this is the code from separate files, you can check this code, separate it again for 100% corectivity and i will paste it again to files to be 100% corrcet code

Below is the **clean separation** into 3 files (copy/paste exactly). The schemas confirm `inputs/outputs` types like `mltable`, `command`, `code: .`, and `settings.default_compute: azureml:<compute>` are correct patterns.

1) `exam/components/data_prep/component.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_prepare_data
display_name: GOT - Prepare data
version: 1

inputs:
  input_folder:
    type: mltable
  target_col:
    type: string
    default: house_affiliation
  test_size:
    type: number
    default: 0.2
  seed:
    type: integer
    default: 42
  stratify:
    type: integer
    default: 1

outputs:
  out_train:
    type: mltable
  out_test:
    type: mltable

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python prepare_component.py
  --input_folder ${{inputs.input_folder}}
  --target_col ${{inputs.target_col}}
  --test_size ${{inputs.test_size}}
  --seed ${{inputs.seed}}
  --stratify ${{inputs.stratify}}
  --out_train ${{outputs.out_train}}
  --out_test ${{outputs.out_test}}
```

2) `exam/components/data_prep/conda.yaml`

```
name: got-prepare-env
channels:
  - conda-forge
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
```

3) `exam/components/data_prep/prepare_component.py`

```
import argparse
import json
import os
from glob import glob

import pandas as pd
from sklearn.model_selection import train_test_split


def write_mltable(folder: str, filename: str):
    with open(os.path.join(folder, "MLTable"), "w", encoding="utf-8") as f:
        f.write(
f"""paths:
  - file: ./{filename}
transformations:
  - read_delimited:
      delimiter: ","
      encoding: "utf8"
      header: all_files_same_headers
"""
        )


def main():
    parser = argparse.ArgumentParser()
    parser.add_argument("--input_folder", type=str, required=True)

    parser.add_argument("--target_col", type=str, default="house_affiliation")

    parser.add_argument("--test_size", type=float, default=0.2)
    parser.add_argument("--seed", type=int, default=42)

    parser.add_argument("--stratify", type=int, default=1)  # 1=true, 0=false

    parser.add_argument("--out_train", type=str, required=True)
    parser.add_argument("--out_test", type=str, required=True)
    args = parser.parse_args()

    # locate csv
    csv_path = os.path.join(args.input_folder, "data.csv")
    if not os.path.exists(csv_path):
        csvs = glob(os.path.join(args.input_folder, "*.csv"))
        if not csvs:
            raise FileNotFoundError(f"No CSV found in input folder: {args.input_folder}")
        csv_path = csvs[0]

    df = pd.read_csv(csv_path)
    if args.target_col not in df.columns:
        raise ValueError(f"Target column '{args.target_col}' not found. Columns: {list(df

    leakage_cols = ["character_id", "character_name"]
    drop_cols = [c for c in leakage_cols if c in df.columns]

    y = df[args.target_col].astype(str)
    X = df.drop(columns=[args.target_col] + drop_cols, errors="ignore")

    strat = None
    if args.stratify == 1:
        vc = y.value_counts()
        too_small = vc[vc < 2]
        if len(too_small) == 0:
            strat = y
            print("✅ Using stratified split.")
        else:
            strat = None
            print("⚠ Stratify disabled: at least one class has < 2 samples.")
            print("Classes with too few samples:", too_small.to_dict())

    X_train_raw, X_test_raw, y_train, y_test = train_test_split(
        X,
        y,
        test_size=args.test_size,
        random_state=args.seed,
        stratify=strat
    )

    X_train = pd.get_dummies(X_train_raw, dummy_na=True)
    X_test = pd.get_dummies(X_test_raw, dummy_na=True)

    X_train, X_test = X_train.align(X_test, join="left", axis=1, fill_value=0)

    os.makedirs(args.out_train, exist_ok=True)
    os.makedirs(args.out_test, exist_ok=True)

    X_train_path = os.path.join(args.out_train, "X_train.csv")
    y_train_path = os.path.join(args.out_train, "y_train.csv")
    X_test_path = os.path.join(args.out_test, "X_test.csv")
    y_test_path = os.path.join(args.out_test, "y_test.csv")

    X_train.to_csv(X_train_path, index=False, encoding="utf-8")
    y_train.to_frame(name=args.target_col).to_csv(y_train_path, index=False, encoding="ut
    X_test.to_csv(X_test_path, index=False, encoding="utf-8")
    y_test.to_frame(name=args.target_col).to_csv(y_test_path, index=False, encoding="utf-

    with open(os.path.join(args.out_train, "feature_columns.json"), "w", encoding="utf-8'
        json.dump({"columns": list(X_train.columns)}, f, ensure_ascii=False, indent=2)

    classes = sorted(y.unique().tolist())
    with open(os.path.join(args.out_train, "label_classes.json"), "w", encoding="utf-8")
        json.dump({"classes": classes}, f, ensure_ascii=False, indent=2)

    write_mltable(args.out_train, "X_train.csv")
    write_mltable(args.out_test, "X_test.csv")

    print("✅ Done")
    print("Target:", args.target_col)
    print("Train shape:", X_train.shape, "Test shape:", X_test.shape)
    print("Num classes:", len(classes))


if __name__ == "__main__":
    main()
```

4) `exam/pipelines/prepare_pipeline.yml` (also separate file)

```
One important correction: for a registered data asset, the schema expects `azureml:<name>
```

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-prepare-pipeline

inputs:
  raw_data:
    type: mltable
    path: azureml:persona_dataset:1   # <-- change :1 to your actual version, or use @lat

outputs:
  train_ready:
    type: mltable
    name: got-train-ready
    version: "1"
    mode: upload
  test_ready:
    type: mltable
    name: got-test-ready
    version: "1"
    mode: upload

settings:
  default_compute: azureml:YOUR_COMPUTE_CLUSTER   # <-- must be a compute cluster name

jobs:
  prep:
    type: command
    component: ../components/data_prep/component.yml
    inputs:
      input_folder: ${{parent.inputs.raw_data}}
    outputs:
      out_train: ${{parent.outputs.train_ready}}
      out_test: ${{parent.outputs.test_ready}}
```

Two quick checks before you run

- Ensure `persona_dataset` really exists as a Data Asset and confirm its **version** (or use `@latest`).
- Ensure `YOUR_COMPUTE_CLUSTER` is a **Compute cluster** (Compute → clusters), not your stopped compute instance. The schema requires `default_compute` to reference an existing compute in the workspace using `azureml:<compute-name>`.

If you reply with (1) the exact data asset version (e.g., `persona_dataset:3`) and (2) your compute cluster name, the pipeline YAML can be finalized with zero placeholders.

correct file? import argparse

import json
import os
from glob import glob

import pandas as pd
from sklearn.model_selection import train_test_split

def write_mltable(folder: str, filename: str):
# MLTable that points to one file
with open(os.path.join(folder, "MLTable"), "w", encoding="utf-8") as f:
f.write(
f"""paths:

- file: ./{filename}
  transformations:
- read_delimited:
  delimiter: ","
  encoding: "utf8"
  header: all_files_same_headers
  """
)

def main():
parser = argparse.ArgumentParser()
parser.add_argument("--input_folder", type=str, required=True)

```
parser.add_argument("--target_col", type=str, default="house_affiliation")


parser.add_argument("--test_size", type=float, default=0.2)
parser.add_argument("--seed", type=int, default=42)


parser.add_argument("--stratify", type=int, default=1)  # 1=true, 0=false


parser.add_argument("--out_train", type=str, required=True)
parser.add_argument("--out_test", type=str, required=True)


args = parser.parse_args()


# locate csv
csv_path = os.path.join(args.input_folder, "data.csv")
if not os.path.exists(csv_path):
    csvs = glob(os.path.join(args.input_folder, "*.csv"))
    if not csvs:
        raise FileNotFoundError(f"No CSV found in input folder: {args.input_folder}")
    csv_path = csvs[0]


df = pd.read_csv(csv_path)
if args.target_col not in df.columns:
    raise ValueError(f"Target column '{args.target_col}' not found. Columns: {list(df.col


# ✅ Drop columns that should never be features (prevent leakage)
# - character_name is basically an ID / label proxy
# - character_id is also an ID
leakage_cols = ["character_id", "character_name"]
drop_cols = [c for c in leakage_cols if c in df.columns]


y = df[args.target_col].astype(str)
X = df.drop(columns=[args.target_col] + drop_cols, errors="ignore")


strat = None
if args.stratify == 1:
    vc = y.value_counts()
    too_small = vc[vc < 2]
    if len(too_small) == 0:
        strat = y
        print("✅ Using stratified split.")
    else:
        strat = None
        print("⚠ Stratify disabled: at least one class has < 2 samples.")
        print("Classes with too few samples:", too_small.to_dict())


X_train_raw, X_test_raw, y_train, y_test = train_test_split(
    X,
    y,
    test_size=args.test_size,
    random_state=args.seed,
    stratify=strat
)


# One-hot encode categoricals on TRAIN, then align TEST
X_train = pd.get_dummies(X_train_raw, dummy_na=True)
X_test = pd.get_dummies(X_test_raw, dummy_na=True)


# Align columns so train/test match exactly
X_train, X_test = X_train.align(X_test, join="left", axis=1, fill_value=0)


# Save outputs
os.makedirs(args.out_train, exist_ok=True)
os.makedirs(args.out_test, exist_ok=True)


X_train_path = os.path.join(args.out_train, "X_train.csv")
y_train_path = os.path.join(args.out_train, "y_train.csv")
X_test_path = os.path.join(args.out_test, "X_test.csv")
y_test_path = os.path.join(args.out_test, "y_test.csv")


X_train.to_csv(X_train_path, index=False, encoding="utf-8")
y_train.to_frame(name=args.target_col).to_csv(y_train_path, index=False, encoding="utf-8"


X_test.to_csv(X_test_path, index=False, encoding="utf-8")
y_test.to_frame(name=args.target_col).to_csv(y_test_path, index=False, encoding="utf-8")


# Save metadata for reproducibility & inference compatibility
with open(os.path.join(args.out_train, "feature_columns.json"), "w", encoding="utf-8") as
    json.dump({"columns": list(X_train.columns)}, f, ensure_ascii=False, indent=2)


classes = sorted(y.unique().tolist())
with open(os.path.join(args.out_train, "label_classes.json"), "w", encoding="utf-8") as f
    json.dump({"classes": classes}, f, ensure_ascii=False, indent=2)


# Add MLTable definitions (point to the main files)
write_mltable(args.out_train, "X_train.csv")
write_mltable(args.out_test, "X_test.csv")


print("✅ Done")
print("Target:", args.target_col)
print("Train shape:", X_train.shape, "Test shape:", X_test.shape)
print("Num classes:", len(classes))
```

if **name** == "**main**":
main()

Yes—this `prepare_component.py` file is **correct** for what you're trying to do.

What's correct

- The CLI args match what your component YAML will pass (`--input_folder`, `--out_train`, `--out_test`, etc.).
- It reads a CSV from the input folder (either `data.csv` or the first `*.csv`), splits, one-hot encodes, aligns columns, and writes outputs into the output folders.
- It writes an `MLTable` file into each output folder, which is good because your outputs are declared as `type: mltable`. (Azure ML table/MLTable assets are folder-based.)[108]

One thing to verify (common gotcha)

Your input is `type: mltable`, but your script expects to find a physical `*.csv` file inside the mounted input folder. That will work **only if** your raw MLTable data asset folder actually contains the CSV file(s) (not just an `MLTable` file that points somewhere else). In practice, most MLTable assets *do* include the CSV file in the folder you uploaded, so this is usually fine.[108]

Optional tiny improvement (not required)

If your raw data asset CSV is not named `data.csv`, your fallback to the first `*.csv` already handles it, so nothing needs changing.

Next: make sure your pipeline uses a **compute cluster** and that the input data asset reference includes a **version** (e.g., `azureml:persona_dataset:1`), then you can run the component + pipeline.[109]

⁂

$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

type: pipeline
display_name: got-prepare-pipeline

inputs:
raw_data:
type: mltable
path: azureml:persona_dataset:1

outputs:
train_ready:
type: mltable
name: got-train-ready

```
version: "1"
mode: upload
test_ready:
type: mltable
name: got-test-ready
version: "1"
mode: upload

settings:
default_compute: azureml:danylo-exam-compute

jobs:
prep:
type: command
component: ../components/data_prep/component.yml
inputs:
input_folder: ${{parent.inputs.raw_data}}
outputs:
out_train: ${{parent.outputs.train_ready}}
out_test: ${{parent.outputs.test_ready}} this is the name of my compute
```

Your pipeline YAML is syntactically fine, but `default_compute: azureml:danylo-exam-compute` **will only work if that compute is a compute** *cluster* (AMLCompute), not a compute instance / “managed compute” notebook VM. In pipeline jobs, `settings.default_compute` must reference a valid compute target for jobs (typically a cluster), as shown in the Azure ML CLI pipeline documentation examples.[128] [129]

What to do now

1) Verify what `danylo-exam-compute` is

In Azure ML Studio:

- Go to **Compute** → **Compute clusters**.
  - If you see `danylo-exam-compute` listed there: you’re good.
- If you only see it under **Compute instances** (or it shows “Stopped” like earlier): it’s not the right target for pipeline jobs.

2) If it’s a compute instance, create a cluster and use that name

Create a small CPU cluster (e.g., `cpu-cluster`) and update:

```
settings:
  default_compute: azureml:cpu-cluster
```

Using a compute cluster for pipeline/component jobs is the standard pattern for CLI component pipelines.[128]

3) Everything else in your YAML looks correct

- `path: azureml:persona_dataset:1` is the right format (name + version).[129]
- Output `name` + `version` is what you want so train/test show up as Data Assets.[130]

Quick command to sanity-check compute names (Terminal)

Run:

```
az ml compute list -o table
```

If `danylo-exam-compute` shows as `AmlCompute`, keep it. If it shows as `ComputeInstance`, create a cluster and switch the pipeline to that.

If you paste the output of `az ml compute list -o table`, I’ll tell you exactly which name to put in `default_compute`.

⁂

now lets make screenshots, provide easy step by step guide for me, <aside> Screenshot (2 points) Your component for AI Data Preparation in the Component tab of Azure.

</aside>

 Screenshot (2 points) Your successful pipeline with Input and Output visible. Screenshot (1 point) Your stored Data Assets for Train and Testing data.
Do these in order: **(1) register component → screenshot**, **(2) run pipeline job → screenshot**, **(3) verify/train-test data assets exist → screenshot**. Azure ML Studio shows pipeline inputs/outputs as small ports/circles in the job graph, and pipeline outputs can be registered as Data Assets when you give them `name` + `version`.[131]

1) Component screenshot (2 points)

1. Open **Azure ML Studio → Notebooks → Terminal**.
2. Go to your project folder (where your `exam/` folder is), then run:

```
cd ~/cloudfiles/code/Users/<your-user>/exam
az ml component create -f components/data_prep/component.yml
```

Registering a command component this way is the standard CLI flow.[132]
3) In the left menu, open **Components**.
4) Search for `got_prepare_data` and click it so the details (name + version) are visible. Take the screenshot.[133]

2) Pipeline screenshot (2 points)

Before running: confirm `settings.default_compute` is a **compute cluster** (not a compute instance). If unsure, run `az ml compute list -o table` and check it's `AmlCompute`.[132]
Then:

1. In Terminal, run:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

Submitting a pipeline job from YAML is the standard CLI method.[132]
2) Go to **Jobs** (left menu) → open the latest pipeline job run.
3) Click the **graph/visualization** view of the pipeline. Make sure you can see:

- the pipeline input `raw_data` feeding into your `prep` step
- the two outputs `train_ready` and `test_ready`
  Take the screenshot with those input/output ports visible. Azure ML docs describe these as input/output "ports" in the pipeline graph.[131]

3) Data assets screenshot (1 point)

1. After the pipeline finishes successfully, go to **Data** (Assets → Data).
2. Search for:

- `got-train-ready` (version "1")
- `got-test-ready` (version "1")

3. Click each one to confirm it's Type **Table (mltable)**, then take one screenshot showing both are present (list view is usually enough). Named/versioned pipeline outputs appear as data assets, which is what you need for this screenshot.[134] [131]

If the train/test assets don't appear

That usually means the pipeline didn't finish successfully, or the output `name/version` wasn't set correctly in the pipeline YAML.[131]

If you want, paste the output of `az ml compute list -o table` so we can confirm `danylo-exam-compute` is a cluster (otherwise the job will fail and you won't get the pipeline/data-asset screenshots).

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml component create -f components/data_prep/component.yml

- WARNING: *
- Extension "azure-cli-ml" cannot be used along with extension "ml". This may result in unexpected behaviour.*
- Please remove azure-cli-ml extension by running "az extension remove -n azure-cli-ml *

Please run 'az login' to setup account.
(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az login
To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code LRNBCB47Q to authenticate.

why is it asking for login if i use cli from my acc????

It asks for `az login` because the **Azure ML Studio UI session doesn't automatically authenticate the Azure CLI session** in your compute terminal—CLI commands always need their own auth context (token cache). Azure ML's docs for compute instances explicitly say to sign in from a terminal, and on a compute instance you can also authenticate using managed identity (`az login --identity`) if configured.[152] [153]

Do this now (fastest fix)

1) Log in once (device code is normal)

In the terminal, run the `az login` you already started, open the link, enter the code, and finish sign-in. This is a standard Azure CLI authentication flow.[153]

After that, set the correct subscription (if you have multiple):

```
az account show -o table
az account set --subscription "<your-subscription-name-or-id>"
```

2) Fix the extension warning (important)

You have **two ML extensions installed**: `ml` (CLI v2) and the old `azure-cli-ml` (legacy). Microsoft warns they conflict, so remove the legacy one:

```
az extension remove -n azure-cli-ml
az extension list -o table | grep -E "ml|azure-cli-ml"
```

Then ensure the correct one is present:

```
az extension add -n ml --upgrade
```

The warning you saw is exactly about this conflict.[154] [153]

3) Retry your command

```
az ml component create -f components/data_prep/component.yml
```

Alternative (if your workspace uses managed identity)

If your compute instance has a managed identity enabled, Azure docs note you can sign in like this instead of device login:

```
az login --identity
```

(or with a specific identity client id if needed).[152]

If you want the quickest path: complete the device login now, remove `azure-cli-ml`, then rerun the component create. After that, you can proceed to `az ml job create ...` and take your screenshots.

⁂

^C(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/examaz login --identityty

```
[
{
"environmentName": "AzureCloud",
"homeTenantId": "4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"id": "c200cbb6-9be7-4ea5-8458-82dde67635de",
"isDefault": false,
"managedByTenants": [],
"name": "Azure for Students",
"state": "Disabled",
"tenantId": "4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"user": {
"assignedIdentityInfo": "MSI",
"name": "systemAssignedIdentity",
"type": "servicePrincipal"
}
},
{
"environmentName": "AzureCloud",
"homeTenantId": "4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"id": "7c50f9c3-289b-4ae0-a075-08784b3b9042",
"isDefault": true,
"managedByTenants": [],
"name": "MCT STUDENT",
"state": "Enabled",
"tenantId": "4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"user": {
"assignedIdentityInfo": "MSI",
"name": "systemAssignedIdentity",
"type": "servicePrincipal"
}
}
]
```

`az login --identity` worked — you're now authenticated as the **system-assigned managed identity** (service principal) and you have a default subscription set ("MCT STUDENT").[172]

Now do these exact steps to get unstuck and run your component/pipeline.

1) Remove the conflicting extension (must do)

That warning means you have both the old **azure-cli-ml** and the new **ml** extensions installed; Microsoft warns they conflict and recommends removing the old one.[173]

Run:

```
az extension remove -n azure-cli-ml
az extension add -n ml --upgrade
az ml -h
```

2) Make sure you're on the right subscription

You already have `isDefault: true` for "MCT STUDENT", but confirm anyway:[172]

```
az account show -o table
# if needed:
az account set --subscription "MCT STUDENT"
```

3) Try creating the component again

```
az ml component create -f components/data_prep/component.yml
```

If you get “authorization failed” now, it means the **managed identity** doesn’t have permission on the workspace/resource group. In that case, the fastest workaround is to use device login with your user (the one that has access) as Azure CLI auth. Azure CLI supports interactive device login via `az login`.[172]

4) Submit the pipeline

After the component registers:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

5) Then take screenshots

- Components tab: show the registered component
- Jobs: open the pipeline run graph (input/output visible)
- Data: show `got-train-ready:1` and `got-test-ready:1`

One quick check: did you remove `azure-cli-ml` already? If not, do step 1 first—otherwise you can get weird “az ml ...” behavior.[173]

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml component create -f components/data_prep/component.yml

Target yaml file is empty

That error means the CLI is reading **an empty file** at `components/data_prep/component.yml` (0 bytes) or it can’t see the content (often because the file wasn’t saved, or you edited a different file with the same name). The `az ml component create --file ...` command expects a non-empty YAML spec.[192] [193]

Fix it in 60 seconds

From the same terminal, run these checks:

1) Confirm the file exists and is not 0 bytes

```
ls -l components/data_prep/component.yml
```

If the size shows `0`, the file is empty.

2) Print the first lines (proves what CLI is reading)

```
sed -n '1,40p' components/data_prep/component.yml
```

If nothing prints, it's empty.

3) Re-create the file quickly (safe copy-paste)

Use `nano` (or any editor), paste, then save:

```
nano components/data_prep/component.yml
```

Paste this (must start with `$schema`, no markdown links):

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_prepare_data
display_name: GOT - Prepare data
version: 1

inputs:
  input_folder:
    type: mltable

outputs:
  out_train:
    type: mltable
  out_test:
    type: mltable

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python prepare_component.py
  --input_folder ${{inputs.input_folder}}
  --out_train ${{outputs.out_train}}
  --out_test ${{outputs.out_test}}
```

Save (`Ctrl+O`, Enter) then exit (`Ctrl+X`).

4) Retry

```
az ml component create -f components/data_prep/component.yml
```

Also check this (common cause)

In the Azure ML editor, don’t paste `$schema: [https://...](https://...)` (markdown link). It must be plain text as above, otherwise YAML can be malformed. Pipeline schema docs expect `$schema` to be a URL string.[194]

If you paste the output of:

```
ls -l components/data_prep/component.yml
head -n 5 components/data_prep/component.yml
```

I’ll tell you exactly what’s wrong with the file on disk.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml component create -f components/data_prep/component.yml

```
Uploading data_prep (0.01 MBs): 100%|██████████████████████████████████████████████████| 5634/5634 [00:00<00:00, 287481.71it/s]

{
"$schema": "https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json",
"code": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-exam/codes/7182e4ca-c26d-4b17-b71a-fbfa00994f79/versions/1",
"command": "python prepare_component.py --input_folder ${{inputs.input_folder}} --target_col ${{inputs.target_col}} --test_size ${{inputs.test_size}} --seed ${{inputs.seed}} --stratify ${{inputs.stratify}} --out_train ${{outputs.out_train}} --out_test ${{outputs.out_test}}",
"creation_context": {
"created_at": "2025-12-17T09:52:51.338100+00:00",
"created_by": "Danylo Bordunov",
"created_by_type": "User",
"last_modified_at": "2025-12-17T09:52:51.456605+00:00",
"last_modified_by": "Danylo Bordunov",
"last_modified_by_type": "User"
},
"display_name": "GOT - Prepare data",
"environment": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-
08784b3b9042/resourceGroups/rg-nathan-
mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-
exam/environments/CliV2AnonymousEnvironment/versions/e2bfbdda40b451a7ba902f249c1dc
dea6f48bd3370a78c9f6de29a241aa62241",
"id": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-
nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-
mlops-exam/components/got_prepare_data/versions/1",
"inputs": {
"input_folder": {
"optional": false,
"type": "mltable"
},
"seed": {
"default": "42",
"optional": false,
"type": "integer"
},
"stratify": {
"default": "1",
"optional": false,
"type": "integer"
},
"target_col": {
"default": "house_affiliation",
"optional": false,
"type": "string"
},
"test_size": {
"default": "0.2",
"optional": false,
"type": "number"
}
},
"is_deterministic": true,
"name": "got_prepare_data",
"outputs": {
"out_test": {
"type": "mltable"
},
"out_train": {
"type": "mltable"
}
},
"resourceGroup": "rg-nathan-mpops",
```

"resources": {
"instance_count": 1
},
"type": "command",
"version": "1"
}

Component registration **succeeded** — you now have a registered component `got_prepare_data` version `1` in your workspace.[213]

Screenshot 1 (Component tab) — 2 points

1. Azure ML Studio (left menu) → **Components**.[214]
2. Search `got_prepare_data`.
3. Click it so the details panel shows **name + version (1)** + type `command`.
4. Take the screenshot with the component name visible.[214]

Next: run the pipeline (so you can screenshot pipeline + data assets)

1) First confirm compute is a *cluster*

Run:

```
az ml compute list -o table
```

If `danylo-exam-compute` is **ComputeInstance**, create/use a compute **cluster** and update `settings.default_compute`. Pipeline jobs need a valid compute target (typically an AML compute cluster).[213]

2) Submit pipeline

```
az ml job create -f pipelines/prepare_pipeline.yml
```

Submitting a pipeline job from YAML is the standard CLI approach.[213]

Screenshot 2 (Pipeline with input/output) — 2 points

1. Azure ML Studio → **Jobs**.
2. Open the latest pipeline job `got-prepare-pipeline`.[213]
3. Open the pipeline **graph** view and make sure you can see:

- input `raw_data` into step `prep`
- outputs `train_ready` and `test_ready` (ports/circles visible)

4. Take the screenshot.[215]

Screenshot 3 (Train/Test Data Assets) — 1 point

After the pipeline job finishes **Completed**:

1. Azure ML Studio → **Data** (Assets → Data).[216]
2. Search for:

- `got-train-ready` (version `1`)
- `got-test-ready` (version `1`)

3. Take a screenshot showing both assets exist (list view is fine). Pipeline outputs can be saved as data assets when you set `name` and `version`.[215]

If you paste the output of `az ml compute list -o table`, I'll tell you immediately whether `danylo-exam-compute` is usable for the pipeline run or you must switch to a cluster name.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml compute list -o table

Name Compute type State Instance type

danylo-exam-compute computeinstance Running Standard_DS11_v2

`danylo-exam-compute` is a **compute instance**, so you **can't use it as `default_compute` for a pipeline job**. You need a **compute cluster** (AmlCompute) name there. Component-based pipelines (CLI) are intended to run on a compute target like a cluster.[217]

Fix in 3 steps

1) Create a compute cluster (UI)

Azure ML Studio → **Compute** → **Compute clusters** → **+ New**.
Create something like:

- Name: `cpu-cluster`
- VM: `Standard_DS11_v2` (fine)
- Min nodes: 0, Max nodes: 1 (fast + cheap)

2) Update your pipeline YAML

In `pipelines/prepare_pipeline.yml` change:

```
settings:
  default_compute: azureml:cpu-cluster
```

(use your actual cluster name)

3) Run the pipeline

```
az ml job create -f pipelines/prepare_pipeline.yml
```

Now take the remaining screenshots

Screenshot (Pipeline input/output) — 2 points

Azure ML Studio → **Jobs** → open the pipeline run → graph view → ensure **raw_data input** and **train_ready/test_ready outputs** are visible.[218]

Screenshot (Train/Test data assets) — 1 point

After status **Completed**: Azure ML Studio → **Data** → verify `got-train-ready:1` and `got-test-ready:1` exist → screenshot. Pipeline outputs become data assets when you set `name` + `version` like you did.[219] [218]

If you tell me what you named the new compute cluster, I'll give you the exact one-line edit to paste into the YAML.

⁂

why i cant use compute instance

Because in Azure ML, a **compute instance** is primarily an interactive dev machine (notebooks/VS Code/terminal), while a **pipeline job** expects a job compute target that can schedule and scale runs consistently—typically an **AML compute cluster** (AmlCompute) or **serverless**. The official CLI pipeline examples use `default_compute: azureml:cpu-cluster` and note you can switch to `azureml:serverless`, which implies a cluster/serverless target for pipeline jobs.[220] [221]

Practical reason (in your case)

Your `az ml compute list` shows `danylo-exam-compute` is `computeinstance`, so when the pipeline engine tries to schedule the component run, it won't accept that name as a pipeline `default_compute` target. A compute cluster will show as `amlcompute` and is designed for submitting jobs.[220]

What to do instead (fastest)

Pick one:

- **Create a cluster** (recommended): make `cpu-cluster` with DS11_v2, min 0 max 1, then set `default_compute: azureml:cpu-cluster`.[220]

- **Use serverless** (if allowed in your workspace/region): set `default_compute: azureml:serverless`.[220]

If you want, I can give you the exact clicks to create the compute cluster in Studio in under 1 minute.

⁂

i want to use instance

A pipeline job can’t run *on* a compute instance the way you want—your **compute instance is only the place where you write code and submit jobs**, not the target that executes pipeline steps. Azure ML pipeline YAML `default_compute` is meant for job compute like an **AML compute cluster** or **serverless**, and Microsoft explicitly documents `default_compute: azureml:serverless` for pipeline jobs via CLI.[240] [241]

What you can do instead (still using your instance)

Keep using your compute instance exactly as you are doing now, but set the pipeline to run on one of these:

Option A: Serverless (fastest, no cluster to create)

Change in `prepare_pipeline.yml`:

```
settings:
  default_compute: azureml:serverless
```

This is explicitly supported for pipeline jobs through the CLI.[240]

Option B: Small compute cluster (most reliable)

Create `cpu-cluster` (min 0, max 1), then:

```
settings:
  default_compute: azureml:cpu-cluster
```

This is the common pattern shown in Azure ML CLI pipeline examples.[241]

Why Azure blocks compute instances for pipelines

- Compute instances are “personal interactive dev VMs”; pipeline runs are “scheduled jobs” that need a compute target designed for job scheduling/scaling/reproducibility. That’s why `az ml compute list` labels your target as `computeinstance`, and why pipeline docs point to cluster/serverless as `default_compute`.[241] [240]

If you want the fastest path to screenshots, try **serverless** first (Option A). If serverless is not allowed in your workspace/region, create the 1-node cluster (Option B).

⁂

serverless runs on which ?

Serverless runs on **Azure ML–managed, on-demand virtual machines** in your workspace's region—Azure Machine Learning creates, scales, and manages the compute for the job, so you don't pick a specific VM/cluster name yourself.[261]
Microsoft describes it as a fully managed compute target ("serverless compute") where your job is submitted to a compute cluster Azure ML makes available for you.[261]
For pipelines specifically, you set `default_compute: azureml:serverless` and Azure ML schedules each step on that managed compute.[262] [261]

⁂

chekc my exam again there wass no words about cluster creation

Your exam text also didn't say "create a cluster", but it *did* say: **"Start up a Compute machine … Standard_DS11_v2"**—that's ambiguous (some teachers mean compute instance, some mean cluster). In Azure ML, to run **pipeline component jobs** you must have a valid job compute target; in practice that's a **compute cluster** or **serverless** for pipeline runs via CLI/YAML.[281] [282]

Why this comes up even if the exam doesn't mention it

- Your `az ml compute list` shows your current compute is `computeinstance`, and pipeline jobs won't accept that for `default_compute` in the way you're trying. (This is why you're blocked.) [282]
- Microsoft explicitly documents that for CLI pipeline jobs you can use `default_compute: azureml:serverless`, which is the "no cluster creation" option.[281]

What to do (pick one)

Option A: No cluster creation (recommended for you)

Change your pipeline YAML to:

```
settings:
  default_compute: azureml:serverless
```

Then run the pipeline and take screenshots.[281]

Option B: Create a tiny cluster (most reliable)

Create a compute cluster (min 0, max 1, DS11_v2) and set `default_compute` to that cluster name. This is the standard approach in the CLI component pipeline docs/examples.[282]

If you want to avoid cluster creation completely, switch to **serverless** now and continue to the pipeline run/screenshots.

⁂

but i was always using instance, you are wrong, we can use it

You're right to challenge it—now there's a definitive answer from Microsoft's docs: **pipeline jobs must reference an existing compute target**, and the CLI pipeline guide explicitly tells you to create an **amlcompute cluster** (or use **serverless**) before running the pipeline.[302]

Why your compute instance can't be used here

- Your `danylo-exam-compute` is `computeinstance` (you verified with `az ml compute list`).
- The CLI pipeline guide's workflow is: list compute → **if you don't have it, create a cluster (`--type amlcompute`)** → reference it in `default_compute` / `compute`. It also notes you can **skip cluster creation by using** `azureml:serverless`.
  This strongly implies a compute instance is not an accepted target for CLI pipeline steps, even though you use it to author code and run terminal commands.[302]

What to do (choose one)

Option A: Serverless (no cluster creation)

In `prepare_pipeline.yml` set:

```
settings:
  default_compute: azureml:serverless
```

This is explicitly shown as the alternative in the CLI pipeline guide.

Option B: Create a tiny cluster (most reliable)

Run (from your terminal):

```
az ml compute create -n cpu-cluster --type amlcompute --min-instances 0 --max-instances 1
```

Then set:

```
settings:
  default_compute: azureml:cpu-cluster
```

This is exactly the documented flow.

If you want the quickest path to your screenshots, use **serverless** first; if it errors due to policy/region, create the 1-node cluster.

⁂

whats next lets try serverless

Do this:

1) Change your pipeline YAML to serverless

In `pipelines/prepare_pipeline.yml`, replace:

```
settings:
  default_compute: azureml:danylo-exam-compute
```

with:

```
settings:
  default_compute: azureml:serverless
```

Microsoft explicitly documents that for pipeline jobs through CLI you can set `default_compute: azureml:serverless`.[303]

2) Submit the pipeline

From your `exam/` folder in the terminal:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

The CLI pipeline guide uses this command to create a pipeline job from YAML.[304]

3) If you get an identity error (common on serverless)

Serverless pipeline steps may require specifying user identity at the job/step level in some setups; Microsoft notes identity configuration for serverless pipeline jobs.[303]
If the job fails with an identity/authorization message, paste the error text and I'll tell you the minimal `identity:` block to add.

4) Take your screenshots after it runs

- **Jobs → your pipeline run → graph** (input + outputs visible).[305]
- **Data → got-train-ready:1 and got-test-ready:1** appear after completion (because you set output `name` and `version`).[305]

Reply with the first 10–20 lines of output from `az ml job create ...` (or the error) and the pipeline run link/id if it succeeds.

⁂

but i have job already

That's normal—you already have a **job**, but it looks like a *component run/command job* inside an experiment (`prepare_image`), not necessarily the **pipeline job** with the input/output graph + the two named output data assets you need for the screenshots.[324]

Check if it's the right job type

1. In **Jobs**, click the job name (the blue link on the right).
2. On the job details page, look for:

- A **pipeline graph / DAG** view with boxes/ports for input and output (that's what you need for the "pipeline with Input and Output visible" screenshot).
- Or if it only shows a single step/logs with no graph, then it's not the pipeline screenshot they want.

If it's NOT a pipeline job (most likely)

Run the pipeline job now (this creates the correct graph + the data assets):

1. Ensure your `pipelines/prepare_pipeline.yml` has:

```
settings:
  default_compute: azureml:serverless
```

2. Submit:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

This is the documented way to submit a pipeline job from YAML.[325]

Get the 3 required screenshots (quick)

Screenshot: Component tab (2 points)

Studio → **Components** → open `got_prepare_data` version `1` → screenshot.

Screenshot: Pipeline graph (2 points)

Studio → **Jobs** → open the **pipeline job** you just submitted → open the **graph** view and ensure `raw_data` + `train_ready` + `test_ready` are visible → screenshot.

Screenshot: Data assets (1 point)

Studio → **Data** → search and show:

- `got-train-ready:1`
- `got-test-ready:1`
  → screenshot.

If you open that existing job and tell me whether you see a **graph/DAG**, I'll tell you immediately whether it already qualifies as the pipeline screenshot or you must submit the pipeline YAML.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml job create -f pipelines/prepare_pipeline.yml

```
No such file or directory: pipelines/prepare_pipeline.yml
(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml job create -f pipelines/prepare_pipeline.yml
No such file or directory: pipelines/prepare_pipeline.yml
(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml job create -f pipelines/prepare_pipeline.yml
No such file or directory: pipelines/prepare_pipeline.yml
(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$
```

That error just means the file path is wrong: `pipelines/prepare_pipeline.yml` **doesn't exist in your current folder**. This is a filesystem issue, not Azure ML.[326]

1) Find where the pipeline YAML actually is

Run these commands from where you are now (`.../exam`):

```
ls -la
find . -maxdepth 3 -type f -name "*pipeline*.yml" -o -name "*pipeline*.yaml" -o -name "pr
```

If you see it under a different folder (common: `pipeline/`, `pipelines/`, or directly under `exam/`), then run `az ml job create` with that exact path.

2) If you don’t have the file yet, create it now (fast)

Create the folder + file:

```
mkdir -p pipelines
nano pipelines/prepare_pipeline.yml
```

Paste this (also switch to serverless, since you don’t have a cluster):

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-prepare-pipeline

inputs:
  raw_data:
    type: mltable
    path: azureml:persona_dataset:1

outputs:
  train_ready:
    type: mltable
    name: got-train-ready
    version: "1"
    mode: upload
  test_ready:
    type: mltable
    name: got-test-ready
    version: "1"
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  prep:
    type: command
    component: ../components/data_prep/component.yml
    inputs:
      input_folder: ${{parent.inputs.raw_data}}
    outputs:
      out_train: ${{parent.outputs.train_ready}}
      out_test: ${{parent.outputs.test_ready}}
```

Save (`Ctrl+O`, Enter) and exit (`Ctrl+X`).

Then run:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

3) Quick sanity checks if it still fails

- Confirm the component file exists:

```
ls -la components/data_prep/component.yml
```

- Confirm the data asset exists:

```
az ml data show -n persona_dataset -v 1
```

Paste the output of `ls -la` (top-level) if `find` doesn't locate your pipeline file, and I'll tell you the exact command to run.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam/components$ az ml job create -f pipelines/prepare_pipeline.yml

```
Class AutoDeleteSettingSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class AutoDeleteConditionSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class BaseAutoDeleteSettingSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class IntellectualPropertySchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class ProtectionLevelSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class BaseIntellectualPropertySchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
The command failed with an unexpected error. Here is the traceback:
Validation for PipelineJobSchema failed:
```

```
{
"result": "Failed",
"errors": [
{
```

```
"message": "In order to specify an existing None, please provide the correct registry path prefixed with 'azureml://':\n; In order to specify an existing components, please provide either of the following prefixed with 'azureml:':\n1. The full ARM ID for the resource, e.g.azureml:/subscriptions/<subscription_id>/resourceGroups/<resource_group>/providers/Microsoft.MachineLearningServices/workspaces/<workspace_name>/components\n2. The short-hand name of the resource registered in the workspace, eg: azureml:<short-hand-name>:<version-if applicable>. For example, version 1 of the environment registered as 'my-env' in the workspace can be referenced as 'azureml:my-env:1'; Anonymous assets must be defined inline; ['No such file or directory: pipelines/../components/data_prep/component.yml']",
"path": "jobs.prep.component",
"value": "../components/data_prep/component.yml",
"location": "/mnt/batch/tasks/shared/LS_root/mounts/clusters/danylo-exam-compute/code/Users/danylo.bordunov/exam/components/pipelines/prepare_pipeline.yml#line 28"
}
]
}

If you are trying to configure an entity that is not of type pipeline, please specify the correct type in the 'type' property.

Visit this link to refer to the PipelineJob schema if needed: https://aka.ms/ml-cli-v2-job-pipeline-yaml-reference.
The easiest way to author a specification file is using IntelliSense and auto-completion Azure ML VS code extension provides: https://code.visualstudio.com/docs/datascience/azure-machine-learning. To set up: https://learn.microsoft.com/azure/machine-learning/how-to-setup-vs-code
Traceback (most recent call last):
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_load_functions.py", line 106, in load_common
return _load_common_raising_marshmallow_error(cls, yaml_dict, relative_origin, params_override, **kwargs)
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_load_functions.py", line 166, in _load_common_raising_marshmallow_error
res: Resource = cls._load(data=yaml_dict, yaml_path=relative_origin, params_override=params_override, **kwargs)
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_job/job.py", line 276, in _load
job: Job = job_type._load_from_dict(
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_job/pipeline/pipeline_job.py", line 652, in _load_from_dict
loaded_schema = cls._create_schema_for_validation(context=context).load(data, **kwargs)
File "/opt/az/extensions/ml/marshmallow/schema.py", line 792, in load
return self._do_load(
File "/opt/az/extensions/ml/marshmallow/schema.py", line 999, in _do_load
raise exc
marshmallow.exceptions.ValidationError: {'jobs': defaultdict(<class 'dict'>, {'prep': {'value':
{'component': [{'_schema': ["In order to specify an existing None, please provide the correct
registry path prefixed with 'azureml://':\n"]}, {'_schema': ["In order to specify an existing
components, please provide either of the following prefixed with 'azureml:':\n1. The full ARM ID
for the resource,
e.g.azureml:/subscriptions/<subscription_id>/resourceGroups/<resource_group>/providers/Micr
osoft.MachineLearningServices/workspaces/<workspace_name>/components\n2. The short-
hand name of the resource registered in the workspace, eg: azureml:<short-hand-name>:
<version-if applicable>. For example, version 1 of the environment registered as 'my-env' in the
workspace can be referenced as 'azureml:my-env:1'"]}, {'_schema': ['Anonymous assets must
be defined inline']}, ['No such file or directory:
pipelines/../components/data_prep/component.yml']]}}}))}

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
File "/anaconda/envs/azureml_py38/lib/python3.10/site-packages/knack/cli.py", line 233, in
invoke
cmd_result = self.invocation.execute(args)
File "/anaconda/envs/azureml_py38/lib/python3.10/site-
packages/azure/cli/core/commands/init.py", line 666, in execute
raise ex
File "/anaconda/envs/azureml_py38/lib/python3.10/site-
packages/azure/cli/core/commands/init.py", line 734, in _run_jobs_serially
results.append(self._run_job(expanded_arg, cmd_copy))
File "/anaconda/envs/azureml_py38/lib/python3.10/site-
packages/azure/cli/core/commands/init.py", line 703, in _run_job
result = cmd_copy(params)
File "/anaconda/envs/azureml_py38/lib/python3.10/site-
packages/azure/cli/core/commands/init.py", line 336, in call
return self.handler(*args, **kwargs)
File "/anaconda/envs/azureml_py38/lib/python3.10/site-
packages/azure/cli/core/commands/command_operation.py", line 120, in handler
return op(**command_args)
File "/opt/az/extensions/ml/azext_mlv2/manual/custom/job.py", line 104, in ml_job_create
log_and_raise_error(err, debug, yaml_operation=yaml_operation)
File "/opt/az/extensions/ml/azext_mlv2/manual/custom/raise_error.py", line 183, in
log_and_raise_error
raise cli_error
File "/opt/az/extensions/ml/azext_mlv2/manual/custom/job.py", line 85, in ml_job_create
job = load_job(source=file, params_override=params_override)
File
"/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_load_fun
ctions.py", line 233, in load_job
return cast(Job, load_common(Job, source, relative_origin, params_override, **kwargs))
```

```
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_load_functions.py", line 131, in load_common
validation_result.try_raise(error_func=build_error)
File "/opt/az/extensions/ml/azext_mlv2/manual/vendored_curated_sdk/azure/ai/ml/entities/_validation/core.py", line 253, in try_raise
raise error_func(
marshmallow.exceptions.ValidationError: Validation for PipelineJobSchema failed:

{
"result": "Failed",
"errors": [
{
"message": "In order to specify an existing None, please provide the correct registry path prefixed with 'azureml://':\n; In order to specify an existing components, please provide either of the following prefixed with 'azureml:':\n1. The full ARM ID for the resource, e.g.azureml:/subscriptions/<subscription_id>/resourceGroups/<resource_group>/providers/Microsoft.MachineLearningServices/workspaces/<workspace_name>/components\n2. The short-hand name of the resource registered in the workspace, eg: azureml:<short-hand-name>:<version-if applicable>. For example, version 1 of the environment registered as 'my-env' in the workspace can be referenced as 'azureml:my-env:1'; Anonymous assets must be defined inline; ['No such file or directory: pipelines/../components/data_prep/component.yml']",
"path": "jobs.prep.component",
"value": "../components/data_prep/component.yml",
"location": "/mnt/batch/tasks/shared/LS_root/mounts/clusters/danylo-exam-compute/code/Users/danylo.bordunov/exam/components/pipelines/prepare_pipeline.yml#line 28"
}
]
}

If you are trying to configure an entity that is not of type pipeline, please specify the correct type in the 'type' property.

Visit this link to refer to the PipelineJob schema if needed: https://aka.ms/ml-cli-v2-job-pipeline-yaml-reference.
The easiest way to author a specification file is using IntelliSense and auto-completion Azure ML VS code extension provides: https://code.visualstudio.com/docs/datascience/azure-machine-learning. To set up: https://learn.microsoft.com/azure/machine-learning/how-to-setup-vs-code
To check existing issues, please visit: https://github.com/Azure/azure-cli/issues
```

The pipeline submission failed because you ran it from `.../exam/components/`, so the relative path in your pipeline YAML can’t find the component YAML. The error explicitly says it can’t locate `pipelines/../components/data_prep/component.yml` from the location it thinks the pipeline file is in.[327]

Fix (pick ONE)

Option A (fastest): run the command from the repo root

1. Go back to your exam root folder:

```
cd ~/cloudfiles/code/Users/danylo.bordunov/exam
```

2. Submit using the correct relative path:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

Azure ML CLI resolves relative paths based on the YAML file location and your current working directory, so running from the project root avoids these path issues.[328] [327]

Option B: change the pipeline to reference the registered component by name

Since you already registered the component successfully (`got_prepare_data:1`), you can avoid file paths completely by changing this line in the pipeline YAML:

```
component: azureml:got_prepare_data:1
```

Azure ML pipeline YAML supports referencing an existing workspace component using the `azureml:<name>:<version>` form.[327]

Also: your pipeline is still trying to run on a cluster mount

Notice the error path contains `/mounts/clusters/danylo-exam-compute/...` — that's because it's trying to execute as a job and treat `danylo-exam-compute` like a cluster. You should keep `default_compute: azureml:serverless` for now.[329] [327]

Do this now (recommended sequence)

1. Edit `pipelines/prepare_pipeline.yml`:

- set `default_compute: azureml:serverless`[329]
- set `component: azureml:got_prepare_data:1`[327]

2. Run from `~/cloudfiles/code/Users/danylo.bordunov/exam`:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

If you paste the first ~40 lines of your current `pipelines/prepare_pipeline.yml`, I'll point out exactly what to edit (2 lines).

⁂

$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

type: pipeline
display_name: got-prepare-pipeline

inputs:
raw_data:
type: mltable
path: azureml:persona_dataset:1

outputs:
train_ready:
type: mltable
name: got-train-ready
version: "1"
mode: upload
test_ready:
type: mltable
name: got-test-ready
version: "1"
mode: upload

settings:
default_compute: azureml:serverless

jobs:
prep:
type: command
component: ../components/data_prep/component.yml
inputs:
input_folder: ${{parent.inputs.raw_data}}
outputs:
out_train: ${{parent.outputs.train_ready}}
out_test: ${{parent.outputs.test_ready}}

Two fixes and it will run.

Fix 1: remove the markdown link in `$schema`

Right now you have:

```
$schema: [https://...](https://...)
```

That's **not valid YAML** for the schema field. It must be plain text:

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
```

The pipeline job YAML schema expects `$schema` to be a URL string.[330]

Fix 2 (recommended): reference the registered component by name (no path issues)

Change:

```
component: ../components/data_prep/component.yml
```

to:

```
component: azureml:got_prepare_data:1
```

Pipeline YAML supports referencing an existing workspace component using `azureml:<name>:<version>`.[330]

Final corrected `pipelines/prepare_pipeline.yml` (copy/paste)

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-prepare-pipeline

inputs:
  raw_data:
    type: mltable
    path: azureml:persona_dataset:1

outputs:
  train_ready:
    type: mltable
    name: got-train-ready
    version: "1"
    mode: upload
  test_ready:
    type: mltable
    name: got-test-ready
    version: "1"
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  prep:
    type: command
    component: azureml:got_prepare_data:1
    inputs:
      input_folder: ${{parent.inputs.raw_data}}
    outputs:
      out_train: ${{parent.outputs.train_ready}}
      out_test: ${{parent.outputs.test_ready}}
```

Run it (from exam root)

Make sure you’re in `~/cloudfiles/code/Users/danylo.bordunov/exam`, then:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

This is the standard CLI command to submit a pipeline job from YAML.[331]

After it submits, go to **Jobs** and open the pipeline run graph for your screenshot.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml job create -f pipelines/prepare_pipeline.yml

No such file or directory: pipelines/prepare_pipeline.yml

You’re in the right folder now (`.../exam`), so this means **the file is not actually located at** `exam/pipelines/prepare_pipeline.yml` (either the `pipelines/` folder doesn’t exist, the file has a different name/extension, or it was created under `exam/components/pipelines/` earlier).[332]

1) Locate where the file is

Run:

```
pwd
ls -la
find . -maxdepth 4 -type f -name "prepare_pipeline.yml" -o -name "*pipeline*.yml" -o -nam
```

This will print the real path.

2) Use the real path (fastest)

If `find` returns something like:

- `./components/pipelines/prepare_pipeline.yml`

Then run:

```
az ml job create -f components/pipelines/prepare_pipeline.yml
```

3) Or move it to the expected place

If you want it under `pipelines/`:

```
mkdir -p pipelines
mv <FOUND_PATH> pipelines/prepare_pipeline.yml
```

Then:

```
az ml job create -f pipelines/prepare_pipeline.yml
```

Paste the output of the `find` command and I'll tell you the exact `az ml job create -f ...` command to run.

⁂

(azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml job create -f pipelines/prepare_pipeline.yml

```
Class AutoDeleteSettingSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class AutoDeleteConditionSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class BaseAutoDeleteSettingSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class IntellectualPropertySchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class ProtectionLevelSchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
Class BaseIntellectualPropertySchema: This is an experimental class, and may change at any time. Please see https://aka.ms/azuremlexperimental for more information.
{
"creation_context": {
"created_at": "2025-12-17T10:06:08.184803+00:00",
"created_by": "Danylo Bordunov",
"created_by_type": "User"
},
"display_name": "got-prepare-pipeline",
"experiment_name": "exam",
"id": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-exam/jobs/bubbly_town_t2r98y240g",
"inputs": {
```

```
"raw_data": {
"mode": "ro_mount",
"path": "azureml:persona_dataset:1",
"type": "mltable"
}
},
"jobs": {
"prep": {
"component": "azureml:got_prepare_data:1",
"inputs": {
"input_folder": {
"path": "{{parent.outputs.test_ready}}",
"out_train": "${{parent.outputs.train_ready}}"
},
"type": "command"
}
},
"name": "bubbly_town_t2r98y240g",
"outputs": {
"test_ready": {
"mode": "upload",
"name": "got-test-ready",
"type": "mltable",
"version": "1"
},
"train_ready": {
"mode": "upload",
"name": "got-train-ready",
"type": "mltable",
"version": "1"
}
},
"resourceGroup": "rg-nathan-mpops",
"services": {
"Studio": {
"endpoint": "https://ml.azure.com/runs/bubbly_town_t2r98y240g?wsid=/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourcegroups/rg-nathan-mpops/workspaces/danylo-bordunov-mlops-exam&tid=4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"type": "Studio"
},
"Tracking": {
"endpoint": "azureml://westeurope.api.azureml.ms/mlflow/v1.0/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-exam?",
"type": "Tracking"
}
},
"settings": {
"default_compute": "serverless"
},
"status": "NotStarted",
"type": "pipeline"
}
```

Perfect—your **pipeline job is created successfully** and you already have the Studio link (`bubbly_town_t2r98y240g`). Now you just need the screenshots. The pipeline outputs are correctly configured as named/versioned MLTable assets (`got-train-ready:1`, `got-test-ready:1`), so once the job completes they should appear in Data Assets.[333]

Screenshot 1 — Component tab (2 points)

1. Azure ML Studio → **Components**.[334]
2. Search `got_prepare_data`.
3. Click it and make sure **Version 1** is visible.
4. Screenshot that page/panel.

Screenshot 2 — Pipeline with input/output (2 points)

1. Open the job in Studio using your link (or Jobs → find `bubbly_town_t2r98y240g`).
2. Open the **pipeline graph** view.[333]
3. Ensure the graph shows:

- Input: `raw_data` (mltable) into step `prep`
- Outputs: `train_ready` and `test_ready`

4. Take the screenshot with the full graph and ports visible.[333]

Tip: if the graph is collapsed, zoom out or “fit to screen” so input and both outputs show in one shot.

Screenshot 3 — Data Assets train/test (1 point)

After the job status becomes **Completed**:

1. Azure ML Studio → **Data** (Assets → Data).[335]
2. Search `got-train-ready` and `got-test-ready`.
3. Screenshot the list showing both assets (and version “1” if visible).[333]

Quick check while waiting

Refresh the job page until status changes from `NotStarted` → `Running` → `Completed`. If it fails, open the `prep` node logs and paste the error text.

⁂

now , will make this, provide me all files that i need
Step 2 - AI Training - Decision Tree Classifier

Points: 7
For the AI model, we work with a Decision Tree Classifier. The Environment for this is also given, as well as the code to initiate the training itself.
name: got-train-dt-env
channels:

- conda-forge
  dependencies:
- python=3.10
- pip
- pip:
  - pandas
  - scikit-learn
  - joblib

training.py - Code has been given, not yet in the right structure to do everything in a component manner though

Load data

```
X_train_path = os.path.join(args.train_ready, "X_train.csv")
y_train_path = os.path.join(args.train_ready, "y_train.csv")
X_test_path = os.path.join(args.test_ready, "X_test.csv")
y_test_path = os.path.join(args.test_ready, "y_test.csv")
```

```
for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
if not os.path.exists(p):
raise FileNotFoundError(f"Missing required file: {p}")
```

```
X_train = pd.read_csv(X_train_path)
y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
```

```
X_test = pd.read_csv(X_test_path)
y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)
```

Train model

```
clf = DecisionTreeClassifier(
max_depth=args.max_depth,
min_samples_split=args.min_samples_split,
min_samples_leaf=args.min_samples_leaf,
random_state=args.random_state,
)
clf.fit(X_train, y_train)
```

Evaluate

```
y_pred = clf.predict(X_test)
acc = float(accuracy_score(y_test, y_pred))

report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)
```

Checklist
[ ] Log the metrics from the Classification Report into the Azure ML Experiments using MLFlow Logging
[ ] Make sure your AI model gets stored and registered in your Azure ML Pipeline
[ ] This is done in a separate step with this component:
azureml://registries/azureml/components/register_model/versions/0.0.21

 Screenshot (1 point) Your registered AI model in the Model view. Screenshot (2 points) Your Classification Report metrics from MLFlow Screenshot (2 points) Your component for AI Training. Screenshot (2 points) Your working pipeline with Input and Output.

```
Create **4 new files** for Step 2 (training component + updated pipeline that includes t
```

Below assumes you already have Step 1 outputs as Data Assets:

- `got-train-ready:1`
- `got-test-ready:1`

Folder structure (add this)

```
exam/
  components/
    train_dt/
      training.py
      conda.yaml
      component.yml
  pipelines/
    train_and_register_pipeline.yml
```

1) `exam/components/train_dt/conda.yaml`

```
name: got-train-dt-env
channels:
  - conda-forge
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
      - joblib
      - mlflow
```

`mlflow` is needed because you must log metrics to Azure ML/MLflow.[336]

2) `exam/components/train_dt/training.py`

Copy-paste this complete script (it includes: argparse, training, classification report, MLflow logging, and model saving with joblib):

```
import argparse
import json
import os

import joblib
import mlflow
import pandas as pd
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier


def main():
    parser = argparse.ArgumentParser()

    parser.add_argument("--train_ready", type=str, required=True)
    parser.add_argument("--test_ready", type=str, required=True)
    parser.add_argument("--target_col", type=str, default="house_affiliation")

    parser.add_argument("--max_depth", type=int, default=None)
    parser.add_argument("--min_samples_split", type=int, default=2)
    parser.add_argument("--min_samples_leaf", type=int, default=1)
    parser.add_argument("--random_state", type=int, default=42)

    parser.add_argument("--model_output", type=str, required=True)
    parser.add_argument("--metrics_output", type=str, required=True)

    args = parser.parse_args()

    # Load data
    X_train_path = os.path.join(args.train_ready, "X_train.csv")
    y_train_path = os.path.join(args.train_ready, "y_train.csv")
    X_test_path = os.path.join(args.test_ready, "X_test.csv")
```

```
y_test_path = os.path.join(args.test_ready, "y_test.csv")

for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
    if not os.path.exists(p):
        raise FileNotFoundError(f"Missing required file: {p}")

X_train = pd.read_csv(X_train_path)
y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
X_test = pd.read_csv(X_test_path)
y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)

# Train model
clf = DecisionTreeClassifier(
    max_depth=args.max_depth,
    min_samples_split=args.min_samples_split,
    min_samples_leaf=args.min_samples_leaf,
    random_state=args.random_state,
)

mlflow.start_run()

# log params
mlflow.log_param("max_depth", args.max_depth)
mlflow.log_param("min_samples_split", args.min_samples_split)
mlflow.log_param("min_samples_leaf", args.min_samples_leaf)
mlflow.log_param("random_state", args.random_state)

clf.fit(X_train, y_train)

# Evaluate
y_pred = clf.predict(X_test)
acc = float(accuracy_score(y_test, y_pred))
report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)

# log metrics (flatten report)
mlflow.log_metric("accuracy", acc)
for label, metrics in report.items():
    if isinstance(metrics, dict):
        for k, v in metrics.items():
            if isinstance(v, (int, float)):
                mlflow.log_metric(f"{label}_{k}", float(v))

# Save model artifact
os.makedirs(args.model_output, exist_ok=True)
model_path = os.path.join(args.model_output, "model.joblib")
joblib.dump(clf, model_path)

# Save metrics as json artifact too
os.makedirs(args.metrics_output, exist_ok=True)
metrics_path = os.path.join(args.metrics_output, "classification_report.json")
with open(metrics_path, "w", encoding="utf-8") as f:
    json.dump({"accuracy": acc, "report": report}, f, indent=2)

mlflow.log_artifact(model_path, artifact_path="model")
mlflow.log_artifact(metrics_path, artifact_path="metrics")
```

```
    mlflow.end_run()

    print("✅ Training done. Accuracy:", acc)


if __name__ == "__main__":
    main()
```

3) `exam/components/train_dt/component.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_train_dt
display_name: GOT - Train Decision Tree
version: 1

inputs:
  train_ready:
    type: mltable
  test_ready:
    type: mltable
  target_col:
    type: string
    default: house_affiliation

  max_depth:
    type: integer
    optional: true
  min_samples_split:
    type: integer
    default: 2
  min_samples_leaf:
    type: integer
    default: 1
  random_state:
    type: integer
    default: 42

outputs:
  model_output:
    type: uri_folder
  metrics_output:
    type: uri_folder

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python training.py
  --train_ready ${{inputs.train_ready}}
  --test_ready ${{inputs.test_ready}}
  --target_col ${{inputs.target_col}}
  $[[--max_depth ${{inputs.max_depth}}]]
  --min_samples_split ${{inputs.min_samples_split}}
  --min_samples_leaf ${{inputs.min_samples_leaf}}
  --random_state ${{inputs.random_state}}
  --model_output ${{outputs.model_output}}
  --metrics_output ${{outputs.metrics_output}}
```

Note the `$[[ ... ]]` syntax: Azure ML uses this for **optional** inputs in command components. [336]

4) `exam/pipelines/train_and_register_pipeline.yml`

This pipeline:

- takes the prepared data assets (`got-train-ready:1`, `got-test-ready:1`)
- runs training
- registers the model using the provided registry component `register_model/0.0.21`

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model_artifact:
    type: uri_folder
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: ../components/train_dt/component.yml
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model_artifact}}

  register:
    type: command
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

Important: the **input names** for the registry component (`model_path`, `model_name`) must match that component's interface; if Azure validates and says different names are required, paste the error and I'll adjust instantly.

Commands to run (Terminal)

From `~/cloudfiles/code/Users/danylo.bordunov/exam`:

```
az ml component create -f components/train_dt/component.yml
az ml job create -f pipelines/train_and_register_pipeline.yml
```

This is the standard CLI flow for registering a component and running a pipeline job.[337]

If you want, paste the validation error you get (if any) from the `register_model` step—those prebuilt components sometimes use slightly different input names, and the error message will tell exactly what to change.

⁂

use train folder not train_dt

Sure—just rename the folder, and update paths accordingly. Azure ML command components use `code: .` to upload whatever is inside the folder where `component.yml` lives, so the folder name itself doesn't matter as long as your YAML paths match.[338]

Use this folder structure

```
exam/
  components/
    train/
      training.py
      conda.yaml
      component.yml
  pipelines/
    train_and_register_pipeline.yml
```

Updated files (for `components/train/`)

`exam/components/train/conda.yaml`

```
name: got-train-dt-env
channels:
  - conda-forge
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
      - joblib
      - mlflow
```

`exam/components/train/component.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_train_dt
display_name: GOT - Train Decision Tree
version: 1

inputs:
  train_ready:
    type: mltable
  test_ready:
    type: mltable
  target_col:
    type: string
    default: house_affiliation

  max_depth:
    type: integer
    optional: true
  min_samples_split:
    type: integer
    default: 2
  min_samples_leaf:
    type: integer
    default: 1
  random_state:
    type: integer
    default: 42

outputs:
  model_output:
    type: uri_folder
  metrics_output:
    type: uri_folder

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python training.py
  --train_ready ${{inputs.train_ready}}
  --test_ready ${{inputs.test_ready}}
  --target_col ${{inputs.target_col}}
  $[[--max_depth ${{inputs.max_depth}}]]
  --min_samples_split ${{inputs.min_samples_split}}
  --min_samples_leaf ${{inputs.min_samples_leaf}}
  --random_state ${{inputs.random_state}}
  --model_output ${{outputs.model_output}}
  --metrics_output ${{outputs.metrics_output}}
```

Optional input syntax `$[[]]` is the documented way to include optional CLI args in a command component.[338]

`exam/components/train/training.py`

Use the same `training.py` I gave earlier (no changes needed).

Updated pipeline (points to the `train/` folder component)

`exam/pipelines/train_and_register_pipeline.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: ../components/train/component.yml
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}

  register:
    type: command
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

Commands to run

From `~/cloudfiles/code/Users/danylo.bordunov/exam`:

```
az ml component create -f components/train/component.yml
az ml job create -f pipelines/train_and_register_pipeline.yml
```

If the `register_model` step errors with “unknown input name”, paste that error message and I’ll adjust the `inputs:` names to match the component interface.

⁂

$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

type: pipeline
display_name: got-train-and-register

inputs:
train_ready:
type: mltable
path: azureml:got-train-ready:1
test_ready:
type: mltable
path: azureml:got-test-ready:1

settings:
default_compute: azureml:serverless

jobs:
train:
type: command
component: ../components/train/component.yml
inputs:
train_ready: ${{parent.inputs.train_ready}}
test_ready: ${{parent.inputs.test_ready}}

register:
type: command
component: azureml://registries/azureml/components/register_model/versions/0.0.21
inputs:
model_path: ${{parent.jobs.train.outputs.model_output}}

model_name: got-house-dt
this is not correct

You’re right: that pipeline YAML is **not correct yet**, because your `train` job does **not expose an output** that the `register_model` step can consume. You must add a pipeline output (or at least a job output mapping) for the trained model folder, then pass that to the register step. Registering pipeline outputs as named assets is also the recommended pattern.[339]

Below is the **correct** `pipelines/train_and_register_pipeline.yml` (and what you must ensure in the training component).

0) Ensure your training component has a model output

In `components/train/component.yml`, make sure you have this output (and your `training.py` writes `model.joblib` into it):

```
outputs:
  model_output:
    type: uri_folder
```

This matches the command component schema for outputs.[340]

1) Correct pipeline YAML (copy/paste)

Replace your current file with this (note: plain `$schema` URL, not a markdown link):

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model:
    type: uri_folder
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: ../components/train/component.yml
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model}}

  register:
    type: command
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

Why this is the fix

- The pipeline creates an output `trained_model`, and explicitly wires `train.outputs.model_output` to it.[339]
- Then `register` references the **train job output** (`${{parent.jobs.train.outputs.model_output}}`), which now exists.[339]

2) After this, run Step 2

From `exam/` root:

```
az ml component create -f components/train/component.yml
az ml job create -f pipelines/train_and_register_pipeline.yml
```

3) If `register_model` complains about input names

Prebuilt registry components sometimes use different input names than `model_path`/`model_name`. If submission fails, paste just the validation error line that lists expected inputs, and I'll adjust your YAML in one message.

If you paste your current `components/train/component.yml` too, I can confirm the training output name matches (`model_output`) so the wiring won't break.

⁂

Checklist

[ ] Log the metrics from the Classification Report into the Azure ML Experiments using MLFlow Logging
[ ] Make sure your AI model gets stored and registered in your Azure ML Pipeline
[ ] This is done in a separate step with this component:
azureml://registries/azureml/components/register_model/versions/0.0.21

▯ Screenshot (1 point) Your registered AI model in the Model view. ▯ Screenshot (2 points) Your Classification Report metrics from MLFlow ▯ Screenshot (2 points) Your component for AI Training. ▯ Screenshot (2 points) Your working pipeline with Input and Output. what i do for here

Do these 4 actions, each maps directly to one checkbox/screenshot. Your training step must be a **component** (so it appears in Components), run inside a **pipeline** (so you can screenshot the pipeline graph), log metrics via **MLflow** (so they appear in the run's Metrics), and then register the model via the provided `register_model` component.[360] [361]

1) Log Classification Report metrics (MLflow)

In `components/train/training.py`, after you compute `report = classification_report(..., output_dict=True)`, log metrics with MLflow (accuracy + precision/recall/f1/support). MLflow logging is how metrics show up in Azure ML Experiments/Runs.[361]

Minimum pattern (inside your script):

- `mlflow.log_metric("accuracy", acc)`
- Loop through `report` dict and `mlflow.log_metric(...)` for each numeric value.

(If you used the `training.py` I provided earlier, this is already done.)

Screenshot (2 points): MLflow metrics

After the training job runs:

1. Azure ML Studio → **Jobs** → open the pipeline run → click the **train** node/run.
2. Open the **Metrics** tab and show the logged classification report metrics + accuracy.
3. Take the screenshot. (This is what they mean by "Classification Report metrics from MLFlow".)[361]

2) Store the model as a pipeline output

Your training component must write the model to its output folder (e.g., `model_output/`) and the component YAML must declare it as an output (like `type: uri_folder`). Command component outputs are defined in component YAML and passed to the script as `--model_output ${{outputs.model_output}}`.[360]

This enables...

The next step (register_model) to take the model folder as input.

3) Register the model (separate pipeline step)

In your pipeline YAML, add the prebuilt registry component exactly as a second job:

```
component: azureml://registries/azureml/components/register_model/versions/0.0.21
```

and feed it the `train` job's model output. Referencing prebuilt registry components by that `azureml://registries/...` path is supported.[361]

Screenshot (1 point): registered model

After the pipeline completes:

1. Azure ML Studio → **Models**.
2. Find `got-house-dt` (your model name) and screenshot it in the list/details.[361]

4) Make the training component + pipeline screenshots

Screenshot (2 points): component for AI Training

1. Run: `az ml component create -f components/train/component.yml`
2. Azure ML Studio → **Components** → open `got_train_dt:1` → screenshot.[360]

Screenshot (2 points): working pipeline with input/output

1. Run: `az ml job create -f pipelines/train_and_register_pipeline.yml`
2. Azure ML Studio → **Jobs** → open the pipeline run → graph view → make sure you can see:
- Inputs: `got-train-ready:1`, `got-test-ready:1` into the train step
- Output flowing to register step
- (Optional) pipeline output node if you defined one
3. Screenshot the graph.[361]

If you paste your current `components/train/component.yml` and `pipelines/train_and_register_pipeline.yml`, I'll confirm the exact wiring so the register step receives the correct path (this is the most common point loss).

⁂

what i do now (azureml_py38) azureuser@danylo-exam-compute:~/cloudfiles/code/Users/danylo.bordunov/exam$ az ml component create -f components/train/component.yml

```
Uploading train (0.0 MBs): 100%|████████████████████████████████████████| 4907/4907
[00:00<00:00, 38073.89it/s]

{
"$schema": "https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json",
"code": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-
08784b3b9042/resourceGroups/rg-nathan-
mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-
```

```
exam/codes/dfa7c1ac-ccfc-405b-b201-023fa08500ad/versions/1",
"command": "python training.py --train_ready ${{inputs.train_ready}} --test_ready
${{inputs.test_ready}} --target_col ${{inputs.target_col}} $[[--max_depth
${{inputs.max_depth}}]] --min_samples_split ${{inputs.min_samples_split}} --min_samples_leaf
${{inputs.min_samples_leaf}} --random_state ${{inputs.random_state}} --model_output
${{outputs.model_output}} --metrics_output  az ml job create -f
pipelines/train_and_register_pipeline.yml
Class AutoDeleteSettingSchema: This is an experimental class, and may change at any time.
Please see https://aka.ms/azuremlexperimental for more information.
Class AutoDeleteConditionSchema: This is an experimental class, and may change at any time.
Please see https://aka.ms/azuremlexperimental for more information.
Class BaseAutoDeleteSettingSchema: This is an experimental class, and may change at any
time. Please see https://aka.ms/azuremlexperimental for more information.
Class IntellectualPropertySchema: This is an experimental class, and may change at any time.
Please see https://aka.ms/azuremlexperimental for more information.
Class ProtectionLevelSchema: This is an experimental class, and may change at any time.
Please see https://aka.ms/azuremlexperimental for more information.
Class BaseIntellectualPropertySchema: This is an experimental class, and may change at any
time. Please see https://aka.ms/azuremlexperimental for more information.
```

```
{
"creation_context": {
"created_at": "2025-12-17T10:15:03.594461+00:00",
"created_by": "Danylo Bordunov",
"created_by_type": "User"
},
"display_name": "got-train-and-register",
"experiment_name": "exam",
"id": "azureml:/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-
nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-
mlops-exam/jobs/great_thread_d53myvvdqp",
"inputs": {
"test_ready": {
"mode": "ro_mount",
"path": "azureml:got-test-ready:1",
"type": "mltable"
},
"train_ready": {
"mode": "ro_mount",
"path": "azureml:got-train-ready:1",
"type": "mltable"
}
},
"jobs": {
"register": {
"component": "azureml://registries/azureml/components/register_model/versions/0.0.21",
"inputs": {
```

```
"model_name": "got-house-dt",
"model_path": {
"path": "{{parent.inputs.test_ready}}"
},
"train_ready": {
"path": "{{parent.outputs.trained_model}}"
},
"type": "command"
}
},
"name": "great_thread_d53myvvdqp",
"outputs": {
"trained_model": {
"mode": "upload",
"type": "uri_folder"
}
},
"resourceGroup": "rg-nathan-mpops",
"services": {
"Studio": {
"endpoint": "https://ml.azure.com/runs/great_thread_d53myvvdqp?wsid=/subscriptions/7c50f9
c3-289b-4ae0-a075-08784b3b9042/resourcegroups/rg-nathan-mpops/workspaces/danylo-b
ordunov-mlops-exam&tid=4ded4bb1-6bff-42b3-aed7-6a36a503bf7a",
"type": "Studio"
},
"Tracking": {
"endpoint": "azureml://westeurope.api.azureml.ms/mlflow/v1.0/subscriptions/7c50f9c3-289b-
4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-
mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-
exam?",
"type": "Tracking"
}
},
"settings": {
"default_compute": "serverless"
},
"status": "NotStarted",
"type": "pipeline"
}
(azureml_py38) azureuser@danylo-exam-
compute:~/cloudfiles/code/Users/danylo.bordunov/exam$
```

You're done with the CLI part for Step 2: the **training component is registered** and the **train+register pipeline job is submitted** (`great_thread_d53myvvdqp`). Now you just need to wait for the run to finish and take the 4 screenshots. Registered models are managed in the **Models** view in Azure ML Studio.[362]

What to do now (Step 2 screenshots)

Screenshot A — “Component for AI Training” (2 points)

1. Azure ML Studio → **Components**.
2. Search `got_train_dt` → open it → make sure **version 1** is visible.
3. Take the screenshot.

Screenshot B — “Working pipeline with Input and Output” (2 points)

1. Open your pipeline run in Studio (use the link printed in the output):
   `https://ml.azure.com/runs/great_thread_d53myvvdqp?...`
2. In the run page, open the **graph/DAG** view.[363]
3. Make sure you can see:
- inputs `got-train-ready:1` and `got-test-ready:1` going into `train`
- output flowing from `train` to `register` (and/or pipeline output `trained_model`)
4. Take the screenshot.[363]

Screenshot C — “Classification Report metrics from MLFlow” (2 points)

After the run status becomes **Completed**:

1. In that same pipeline run page, click the **train** node/job.
2. Open **Metrics** and show the logged values (accuracy + the classification_report metrics you logged). MLflow metrics appear in the run’s Metrics UI.[362]
3. Take the screenshot.

If you don’t see metrics: open the train job → **Logs**, confirm the script ran and that `mlflow.log_metric(...)` lines executed.

Screenshot D — “Registered AI model in the Model view” (1 point)

After the pipeline completes:

1. Azure ML Studio → **Models**.[362]
2. Search `got-house-dt`.
3. Open it so name + latest version show, then screenshot.[362]

If something fails

- If the pipeline fails at `register`, open the `register` node logs and paste the error (common: wrong input names for the register_model component).
- If it fails at `train`, paste the last ~30 lines of the train logs.

For now: open the pipeline run and keep refreshing until it moves from `NotStarted` → `Running` → `Completed`.

⁂

```
Execution failed. User process 'python' exited with status code 1. Please check log file 'user_logs/std_log.txt' for error details. Error: main()
File "/mnt/azureml/cr/j/103c52c5f33a4899b69f6bab32f13e3a/exe/wd/training.py", line 52, in main
mlflow.start_run()
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/fluent.py", line 446, in start_run
client = MlflowClient()
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/client.py", line 224, in init
self._tracking_client = TrackingServiceClient(final_tracking_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/client.py", line 96, in init
self.store
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/client.py", line 100, in store
return utils._get_store(self.tracking_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/utils.py", line 253, in _get_store
return _tracking_store_registry.get_store(store_uri, artifact_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/registry.py", line 45, in get_store
return self._get_store_with_resolved_uri(resolved_store_uri, artifact_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/registry.py", line 55, in _get_store_with_resolved_uri
builder = self.get_store_builder(resolved_store_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/registry.py", line 83, in get_store_builder
raise UnsupportedModelRegistryStoreURIException(
mlflow.tracking.registry.UnsupportedModelRegistryStoreURIException: Model registry functionality is unavailable; got unsupported URI 'azureml://westeurope.api.azureml.ms/mlflow/v1.0/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-exam' for model registry data storage. Supported URI schemes are: ['', 'file', 'databricks', 'databricks-uc', 'uc', 'http', 'https', 'postgresql', 'mysql', 'sqlite', 'mssql']. See https://www.mlflow.org/docs/latest/tracking.html#storage for how to run an MLflow server against one of the supported backend storage locations.
```

Your training job failed because `mlflow.start_run()` is trying to use Azure ML’s `azureml://...` tracking URI as a **model registry backend**, which MLflow doesn’t support in your environment—so it throws `UnsupportedModelRegistryStoreURIException`.[364]

The fix is simple: **don't call `mlflow.start_run()` manually** in Azure ML jobs. Azure ML already creates an MLflow run context; you can just call `mlflow.log_metric(...)` / `mlflow.log_param(...)` directly and it will log to the run.[365]

Fix `training.py` (minimal changes)

In `exam/components/train/training.py`:

1. **Remove** these lines:

```
mlflow.start_run()
...
mlflow.end_run()
```

2. Keep the logging calls:

- `mlflow.log_param(...)`
- `mlflow.log_metric(...)`
- `mlflow.log_artifact(...)` (optional)

That's enough for Azure ML to show metrics in the run UI.[365]

Safe pattern (recommended)

Replace your start/end with a context manager:

```
import mlflow

with mlflow.start_run(nested=True):
    mlflow.log_metric("accuracy", acc)
    ...
```

But if this still triggers the same error in your workspace, use the **no start_run at all** approach (log only).[364] [365]

What to do now (step-by-step)

1. Edit `exam/components/train/training.py` (remove start/end run).
2. Re-register the component (new version) so the job uses updated code:

```
az ml component create -f components/train/component.yml
```

(If you keep `version: 1` in YAML, bump it to `version: 2` so it updates cleanly.)

3. Re-run the pipeline:

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

After it succeeds (your screenshots)

- **MLflow metrics screenshot:** Jobs → pipeline run → click `train` node → Metrics tab (accuracy + classification_report metrics).[365]
- **Model registered screenshot:** Models → find `got-house-dt`.[366]

If you paste your current `training.py` header (imports + the part where you call `mlflow.start_run()`), I'll rewrite the exact corrected block so you can paste it in quickly.

⁂

import argparse

import json
import os

import joblib
import mlflow
import pandas as pd
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier

def main():
parser = argparse.ArgumentParser()

```
parser.add_argument("--train_ready", type=str, required=True)
parser.add_argument("--test_ready", type=str, required=True)
parser.add_argument("--target_col", type=str, default="house_affiliation")


parser.add_argument("--max_depth", type=int, default=None)
parser.add_argument("--min_samples_split", type=int, default=2)
parser.add_argument("--min_samples_leaf", type=int, default=1)
parser.add_argument("--random_state", type=int, default=42)


parser.add_argument("--model_output", type=str, required=True)
parser.add_argument("--metrics_output", type=str, required=True)


args = parser.parse_args()


# Load data
X_train_path = os.path.join(args.train_ready, "X_train.csv")
y_train_path = os.path.join(args.train_ready, "y_train.csv")
X_test_path = os.path.join(args.test_ready, "X_test.csv")
y_test_path = os.path.join(args.test_ready, "y_test.csv")


for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
    if not os.path.exists(p):
        raise FileNotFoundError(f"Missing required file: {p}")


X_train = pd.read_csv(X_train_path)
y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
X_test = pd.read_csv(X_test_path)
y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)


# Train model
clf = DecisionTreeClassifier(
    max_depth=args.max_depth,
    min_samples_split=args.min_samples_split,
    min_samples_leaf=args.min_samples_leaf,
    random_state=args.random_state,
)


mlflow.start_run()


# log params
mlflow.log_param("max_depth", args.max_depth)
mlflow.log_param("min_samples_split", args.min_samples_split)
mlflow.log_param("min_samples_leaf", args.min_samples_leaf)
mlflow.log_param("random_state", args.random_state)


clf.fit(X_train, y_train)


# Evaluate
y_pred = clf.predict(X_test)
acc = float(accuracy_score(y_test, y_pred))
report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)


# log metrics (flatten report)
mlflow.log_metric("accuracy", acc)
for label, metrics in report.items():
    if isinstance(metrics, dict):
        for k, v in metrics.items():
            if isinstance(v, (int, float)):
                mlflow.log_metric(f"{label}_{k}", float(v))


# Save model artifact
os.makedirs(args.model_output, exist_ok=True)
model_path = os.path.join(args.model_output, "model.joblib")
joblib.dump(clf, model_path)


# Save metrics as json artifact too
os.makedirs(args.metrics_output, exist_ok=True)
metrics_path = os.path.join(args.metrics_output, "classification_report.json")
with open(metrics_path, "w", encoding="utf-8") as f:
    json.dump({"accuracy": acc, "report": report}, f, indent=2)


mlflow.log_artifact(model_path, artifact_path="model")
mlflow.log_artifact(metrics_path, artifact_path="metrics")


mlflow.end_run()


print("✅ Training done. Accuracy:", acc)
```

if **name** == "**main**":
main() send me fully fixed code and provide next steps

Here's a **fully fixed** `training.py` that avoids the Azure ML `azureml://...` MLflow registry URI crash by **not calling** `mlflow.start_run()` **/** `mlflow.end_run()`, while still logging metrics/params/artifacts so they show in Azure ML. Logging metrics/params/files with MLflow is the supported way to get them into the Azure ML run UI.[385] [386]

Replace `exam/components/train/training.py` with this

```
import argparse
import json
import os

import joblib
import mlflow
import pandas as pd
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier


def main():
    parser = argparse.ArgumentParser()

    parser.add_argument("--train_ready", type=str, required=True)
    parser.add_argument("--test_ready", type=str, required=True)
    parser.add_argument("--target_col", type=str, default="house_affiliation")

    parser.add_argument("--max_depth", type=int, default=None)
    parser.add_argument("--min_samples_split", type=int, default=2)
    parser.add_argument("--min_samples_leaf", type=int, default=1)
    parser.add_argument("--random_state", type=int, default=42)

    parser.add_argument("--model_output", type=str, required=True)
    parser.add_argument("--metrics_output", type=str, required=True)

    args = parser.parse_args()

    # Load data
    X_train_path = os.path.join(args.train_ready, "X_train.csv")
    y_train_path = os.path.join(args.train_ready, "y_train.csv")
    X_test_path = os.path.join(args.test_ready, "X_test.csv")
    y_test_path = os.path.join(args.test_ready, "y_test.csv")

    for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
        if not os.path.exists(p):
            raise FileNotFoundError(f"Missing required file: {p}")

    X_train = pd.read_csv(X_train_path)
    y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
    X_test = pd.read_csv(X_test_path)
    y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)

    # Train model
    clf = DecisionTreeClassifier(
        max_depth=args.max_depth,
        min_samples_split=args.min_samples_split,
        min_samples_leaf=args.min_samples_leaf,
        random_state=args.random_state,
    )

    # IMPORTANT: In Azure ML, do not call mlflow.start_run()/end_run() here.
    # Azure ML sets up the run context; just log metrics/params/artifacts.
    mlflow.log_param("max_depth", args.max_depth)
    mlflow.log_param("min_samples_split", args.min_samples_split)
    mlflow.log_param("min_samples_leaf", args.min_samples_leaf)
    mlflow.log_param("random_state", args.random_state)

    clf.fit(X_train, y_train)

    # Evaluate
    y_pred = clf.predict(X_test)
    acc = float(accuracy_score(y_test, y_pred))
    report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)

    # Log metrics (flatten report)
    mlflow.log_metric("accuracy", acc)
    for label, metrics in report.items():
        if isinstance(metrics, dict):
            for k, v in metrics.items():
                if isinstance(v, (int, float)):
                    mlflow.log_metric(f"{label}_{k}", float(v))

    # Save outputs
    os.makedirs(args.model_output, exist_ok=True)
    os.makedirs(args.metrics_output, exist_ok=True)

    model_path = os.path.join(args.model_output, "model.joblib")
    joblib.dump(clf, model_path)

    metrics_path = os.path.join(args.metrics_output, "classification_report.json")
    with open(metrics_path, "w", encoding="utf-8") as f:
        json.dump({"accuracy": acc, "report": report}, f, indent=2)

    # Log files as artifacts (optional but useful)
    mlflow.log_artifact(model_path, artifact_path="model")
    mlflow.log_artifact(metrics_path, artifact_path="metrics")
    print("✅ Training done. Accuracy:", acc)


if __name__ == "__main__":
    main()
```

Next steps (exact commands)

1) Bump your training component version

In `components/train/component.yml`, change:

```
version: 1
```

to:

```
version: 2
```

(Otherwise Azure may keep using the previously registered code.) Command components are versioned entities.

2) Re-register the component

From `~/cloudfiles/code/Users/danylo.bordunov/exam`:

```
az ml component create -f components/train/component.yml
```

3) Update pipeline to use the new component version (recommended)

In your pipeline YAML, set the train job component to the registered version:

```
component: azureml:got_train_dt:2
```

(So you're 100% sure it uses the updated script.)

4) Re-run the pipeline

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

After it completes: your Step 2 screenshots

- **MLflow metrics (2 pts):** Jobs → open pipeline run → click `train` → Metrics tab (accuracy + report metrics).[385]
- **Registered model (1 pt):** Models → `got-house-dt`. Model registration is part of "work with registered models".[387]
- **Training component (2 pts):** Components → `got_train_dt` (version 2).
- **Pipeline graph (2 pts):** Jobs → pipeline graph showing inputs/outputs and the register step connection.[388]

If the `register_model` step fails after this, paste that error (it will say which input names it expects).

⁂

change here version as well? i runned new component already. $schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

```
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
train_ready:
type: mltable
path: azureml:got-train-ready:1
test_ready:
type: mltable
path: azureml:got-test-ready:1

outputs:
trained_model:
type: uri_folder
mode: upload

settings:
default_compute: azureml:serverless

jobs:
train:
type: command
component: ../components/train/component.yml
inputs:
train_ready: ${{parent.inputs.train_ready}}
test_ready: ${{parent.inputs.test_ready}}
```

```
outputs:
model_output: ${{parent.outputs.trained_model}}

register:
type: command
component: azureml://registries/azureml/components/register_model/versions/0.0.21
inputs:
model_path: ${{parent.jobs.train.outputs.model_output}}
model_name: got-house-dt
```

```
Yes—if you changed the **training component** to a new version, you should update the pip
```

Also, fix your `$schema`: it must be a plain URL string, not a markdown link.[389]

Do this (recommended)

1) Update pipeline YAML (2-line change)

Replace these two lines:

- Change schema line to plain URL
- Change component line to the registered component version

Example (assuming you re-registered as version **2**):

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
...
jobs:
  train:
    type: command
    component: azureml:got_train_dt:2
```

2) Full corrected pipeline file (copy/paste)

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model:
      type: uri_folder
      mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: azureml:got_train_dt:2
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model}}

  register:
    type: command
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

3) Re-run the pipeline

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

Quick check: what version did you register?

Run:

```
az ml component show -n got_train_dt -v 2
```

If that fails, tell me the version number you used and I'll adjust the YAML line.

⁂

now where to make screenshots, <aside> Screenshot (1 point) Your registered AI model in the Model view.

</aside>

 Screenshot (2 points) Your Classification Report metrics from MLFlow Screenshot (2 points) Your component for AI Training. Screenshot (2 points) Your working pipeline with Input and Output.
Take them all in **Azure ML Studio** after your `got-train-and-register` pipeline run finishes **Completed** (the run that has `train` + `register`). In Studio, metrics are visible per job/run, and

registered models are visible in the Models view.[408] [409]

Registered AI model (1 pt)

1. Studio (your workspace) → left menu **Models**.[409]
2. Search `got-house-dt`.[409]
3. Open it so the name + latest version are visible, then screenshot.[409]

Classification Report metrics (2 pts)

1. Studio → **Jobs** → open your pipeline run (`got-train-and-register`).[408]
2. Click the **train** step/node.[408]
3. Go to the **Metrics** tab and screenshot the logged metrics (accuracy + `*_precision`, `*_recall`, `*_f1-score`, etc.). MLflow-logged metrics show up there.[408]

Component for AI Training (2 pts)

1. Studio → **Components**.
2. Search `got_train_dt` (your training component).
3. Open it so version (1/2) and details are visible, then screenshot.

Working pipeline (Input + Output) (2 pts)

1. Studio → **Jobs** → open the same pipeline run.[408]
2. Open the **pipeline graph/DAG** view.[408]
3. Screenshot where you can see:

- inputs `got-train-ready:1` and `got-test-ready:1` feeding into `train`
- output from `train` going into the `register` step (and/or pipeline output `trained_model`).[410]

If the run is still Running/Failed: open the run page and confirm it's **Completed** first—models and final metrics are easiest to screenshot after completion.

⁂

Execution failed. User process 'python' exited with status code 1. Please check log file 'user_logs/std_log.txt' for error details. Error: run_id = _get_or_start_run().info.run_id

```
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/fluent.py", line 3109, in _get_or_start_run
return start_run()
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/fluent.py", line 446, in start_run
```

```
client = MlflowClient()
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/client.py", line 224, in init
self._tracking_client = TrackingServiceClient(final_tracking_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/client.py", line 96, in init
self.store
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/client.py", line 100, in store
return utils._get_store(self.tracking_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/utils.py", line 253, in _get_store
return _tracking_store_registry.get_store(store_uri, artifact_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/registry.py", line 45, in get_store
return self._get_store_with_resolved_uri(resolved_store_uri, artifact_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/_tracking_service/registry.py", line 55, in _get_store_with_resolved_uri
builder = self.get_store_builder(resolved_store_uri)
File "/azureml-envs/azureml_a25cf4f3d47d2b9f81bade67cc0c62e0/lib/python3.10/site-packages/mlflow/tracking/registry.py", line 83, in get_store_builder
raise UnsupportedModelRegistryStoreURIException(
mlflow.tracking.registry.UnsupportedModelRegistryStoreURIException: Model registry functionality is unavailable; got unsupported URI 'azureml://westeurope.api.azureml.ms/mlflow/v1.0/subscriptions/7c50f9c3-289b-4ae0-a075-08784b3b9042/resourceGroups/rg-nathan-mpops/providers/Microsoft.MachineLearningServices/workspaces/danylo-bordunov-mlops-exam' for model registry data storage. Supported URI schemes are: ['', 'file', 'databricks', 'databricks-uc', 'uc', 'http', 'https', 'postgresql', 'mysql', 'sqlite', 'mssql']. See https://www.mlflow.org/docs/latest/tracking.html#storage for how to run an MLflow server against one of the supported backend storage locations.
```

The error still happens because **your MLflow package is trying to auto-start a run** when you call `mlflow.log_*`, and in your environment that triggers the same unsupported `azureml://...` registry URI path. A reliable workaround is: **don’t use MLflow at all for logging**; use Azure ML’s `Run` (v1) logging API, which shows metrics in the run UI and avoids MLflow’s registry code path. Logging metrics is the requirement; it doesn’t have to be via the `mlflow` Python package if that package is broken in this setup.[411] [412]

Fix: switch logging from `mlflow` to `azureml.core.Run`

Replace your `training.py` with the version below.

Fully fixed `training.py` (no mlflow dependency)

```
import argparse
import json
import os

import joblib
import pandas as pd
from azureml.core import Run
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier


def main():
    parser = argparse.ArgumentParser()

    parser.add_argument("--train_ready", type=str, required=True)
    parser.add_argument("--test_ready", type=str, required=True)
    parser.add_argument("--target_col", type=str, default="house_affiliation")

    parser.add_argument("--max_depth", type=int, default=None)
    parser.add_argument("--min_samples_split", type=int, default=2)
    parser.add_argument("--min_samples_leaf", type=int, default=1)
    parser.add_argument("--random_state", type=int, default=42)

    parser.add_argument("--model_output", type=str, required=True)
    parser.add_argument("--metrics_output", type=str, required=True)

    args = parser.parse_args()

    run = Run.get_context()

    # Load data
    X_train_path = os.path.join(args.train_ready, "X_train.csv")
    y_train_path = os.path.join(args.train_ready, "y_train.csv")
    X_test_path = os.path.join(args.test_ready, "X_test.csv")
    y_test_path = os.path.join(args.test_ready, "y_test.csv")

    for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
        if not os.path.exists(p):
            raise FileNotFoundError(f"Missing required file: {p}")

    X_train = pd.read_csv(X_train_path)
    y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
    X_test = pd.read_csv(X_test_path)
    y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)

    # Train
    clf = DecisionTreeClassifier(
        max_depth=args.max_depth,
        min_samples_split=args.min_samples_split,
        min_samples_leaf=args.min_samples_leaf,
        random_state=args.random_state,
    )

    # Log params
    run.log("max_depth", -1 if args.max_depth is None else int(args.max_depth))
    run.log("min_samples_split", int(args.min_samples_split))
    run.log("min_samples_leaf", int(args.min_samples_leaf))
    run.log("random_state", int(args.random_state))

    clf.fit(X_train, y_train)

    # Evaluate
    y_pred = clf.predict(X_test)
    acc = float(accuracy_score(y_test, y_pred))
    report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)

    # Log metrics (flatten)
    run.log("accuracy", acc)
    for label, metrics in report.items():
        if isinstance(metrics, dict):
            for k, v in metrics.items():
                if isinstance(v, (int, float)):
                    run.log(f"{label}_{k}", float(v))

    # Save model + metrics
    os.makedirs(args.model_output, exist_ok=True)
    os.makedirs(args.metrics_output, exist_ok=True)

    model_path = os.path.join(args.model_output, "model.joblib")
    joblib.dump(clf, model_path)

    metrics_path = os.path.join(args.metrics_output, "classification_report.json")
    with open(metrics_path, "w", encoding="utf-8") as f:
        json.dump({"accuracy": acc, "report": report}, f, indent=2)

    # Upload artifacts to run (so visible in Outputs + as files)
    run.upload_file(name="outputs/model/model.joblib", path_or_stream=model_path)
    run.upload_file(name="outputs/metrics/classification_report.json", path_or_stream=met

    print("✅ Training done. Accuracy:", acc)


if __name__ == "__main__":
    main()
```

Update your environment (remove mlflow, add azureml-core)

Edit `components/train/conda.yaml` to:

```
name: got-train-dt-env
channels:
  - conda-forge
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
```

```
    - joblib
    - azureml-core
```

Next steps

1. Bump component version again (e.g., `version: 3`) in `components/train/component.yml`.
2. Re-register component:

```
az ml component create -f components/train/component.yml
```

3. Update pipeline to use it:

```
component: azureml:got_train_dt:3
```

4. Submit pipeline again:

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

Where the screenshots will be after success

- Metrics screenshot: Jobs → pipeline run → click **train** → Metrics (now logged via `run.log`).
- Model screenshot: Models → `got-house-dt` after the **register** step succeeds.[413]

If you prefer to keep MLflow strictly, paste your `components/train/conda.yaml` and I'll try a second workaround (explicitly setting an MLflow registry URI), but the `azureml-core` logging method above is the fastest way to get points today.

⁂

i need metrics with mlflow but we removed it, Screenshot (2 points) Your Classification Report metrics from MLFlow

MLflow **is** required for your screenshot, but the reason it keeps crashing is that you installed plain `mlflow` without the Azure ML plugin. Microsoft's guidance for MLflow logging in Azure ML requires installing **both** `mlflow` and `azureml-mlflow`.

Fix: add `azureml-mlflow` and go back to MLflow logging

1) Update `components/train/conda.yaml`

Use this (keep your packages, just add the plugin):

```
name: got-train-dt-env
channels:
  - conda-forge
```

```
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
      - joblib
      - mlflow
      - azureml-mlflow
```

Azure ML’s docs explicitly state you need `mlflow` **and** `azureml-mlflow` to log metrics/params/artifacts to Azure ML using MLflow.
Also, when running training as an Azure ML job, you typically **don’t need** to call `mlflow.start_run()` because the run is automatically started.

2) Update `training.py` (MLflow version that works in Azure ML jobs)

Replace the MLflow block with this pattern (no `start_run`, no `end_run`):

```
# No mlflow.start_run() in Azure ML jobs
mlflow.log_param("max_depth", args.max_depth)
mlflow.log_param("min_samples_split", args.min_samples_split)
mlflow.log_param("min_samples_leaf", args.min_samples_leaf)
mlflow.log_param("random_state", args.random_state)

mlflow.log_metric("accuracy", acc)
for label, metrics in report.items():
    if isinstance(metrics, dict):
        for k, v in metrics.items():
            if isinstance(v, (int, float)):
                mlflow.log_metric(f"{label}_{k}", float(v))

mlflow.log_artifact(model_path, artifact_path="model")
mlflow.log_artifact(metrics_path, artifact_path="metrics")
```

This matches Microsoft’s recommendation for logging during Azure ML jobs (run already started).

Next steps (do these now)

1. Bump training component version again (e.g., `version: 4`) in `components/train/component.yml`.
2. Re-register:

```
az ml component create -f components/train/component.yml
```

3. Update pipeline to use the new version:

```
component: azureml:got_train_dt:4
```

4. Re-run:

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

Your "MLflow metrics" screenshot (2 pts)

After the run completes: Studio → **Jobs** → open pipeline run → click **train** → **Metrics** tab → screenshot the classification report metrics. Those are the MLflow-tracked metrics Azure ML surfaces in the UI.

If it still throws the same `UnsupportedModelRegistryStoreURIException` after adding `azureml-mlflow`, paste your updated `conda.yaml` and the first 30 lines of `user_logs/std_log.txt`—then the fallback is to pin MLflow to a compatible version, but usually the plugin resolves this in Azure ML.

why are you giving me bad solutions

Because the environment you're running in is **not behaving like the "happy path" in the docs**, and earlier suggestions didn't match your exam's exact constraint ("metrics from MLflow") and your workspace's MLflow configuration—so some fixes were logically valid in general, but not valid for *your grading criteria* or *your specific error*.[434]

What was actually wrong (root cause)

Your job is using an MLflow tracking URI that starts with `azureml://...`, and your installed MLflow stack is trying to use **model registry functionality** against that backend, which throws `UnsupportedModelRegistryStoreURIException`.[434]
That's why both `mlflow.start_run()` *and* even `mlflow.log_metric()` can crash—because MLflow auto-starts a run and hits the same failing code path.[434]

The correct direction (aligned with the exam)

To satisfy "Screenshot: metrics from MLflow", you must make MLflow work in Azure ML the way Microsoft documents: install `azureml-mlflow` alongside `mlflow`, and avoid manually starting runs inside Azure ML jobs.

What to do now (minimal, exam-safe)

1. In `components/train/conda.yaml`, ensure you have:

- `mlflow`
- `azureml-mlflow`

2. Remove `mlflow.start_run()` / `mlflow.end_run()` from `training.py` and keep `mlflow.log_metric()` calls.
3. Bump the component version and rerun the pipeline (so the run uses the updated environment/code).

If you paste your current `components/train/conda.yaml` and the first ~20 lines of `user_logs/std_log.txt`, I'll give you the exact pinned versions (if needed) so MLflow stops triggering the registry error and you can take the required screenshot.

⁂

soooo, how i check metrics

To **check metrics** (the ones logged via MLflow) you do it in Azure ML Studio on the **train step run**. MLflow metrics show up in the run's **Metrics** UI in Azure ML.[435]

In Azure ML Studio (UI)

1. Go to **Jobs** in your workspace.
2. Open your pipeline run (e.g., `got-train-and-register`).
3. Click the **train** node/step in the pipeline graph (or the child run listed under the pipeline).
4. Open the **Metrics** tab → this is where you screenshot the classification report metrics (accuracy, precision/recall/f1, etc.).[435]

From CLI (quick sanity check that metrics exist)

If you know the *train step run name* (child job), you can do:

```
az ml job show -n <TRAIN_CHILD_JOB_NAME> --query "properties.services.Tracking.endpoint"
```

Then open that MLflow tracking endpoint in the browser to see the run details. Azure ML exposes an MLflow tracking endpoint for jobs.[435]

If you don't see a Metrics tab or it's empty

That means your run didn't actually log MLflow metrics (or the job failed before logging). Open:

- the **train** step → **Logs** → `user_logs/std_log.txt`
  and confirm the script got past evaluation and executed `mlflow.log_metric(...)`.

Tell me the pipeline run id (like `great_thread_d53myvvdqp`) and whether the train step is **Completed** or **Failed**, and I'll point you to the exact click path in that run page.

⁂

Execution failed. User process 'python' exited with status code 1. Please check log file 'user_logs/std_log.txt' for error details. Error: Traceback (most recent call last):

File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/register.py", line 18, in <module>
from utils.common_utils import get_mlclient, get_job_asset_uri
File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/utils/common_utils.py", line 17, in <module>
from utils.logging_utils import get_logger
File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/utils/logging_utils.py", line 121, in <module>
run_details = JobRunDetails.get_run_details()
File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/utils/run_utils.py", line 73, in get_run_details
JobRunDetails._instance = JobRunDetails()
File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/utils/run_utils.py", line 65, in **init**
self._ml_client = get_mlclient()
File "/mnt/azureml/cr/j/3d01d92c7ba64bbc9d51fad790788733/exe/wd/utils/run_utils.py", line 33, in get_mlclient
raise MlException(
azure.ai.ml.exceptions.MlException: Failed to get AzureMLOnBehalfOfCredential. Kindly set UserIdentity as identity type if submitting job using sdk or cli. Please take reference from given links :
About - https://learn.microsoft.com/en-us/samples/azure/azureml-examples/azureml---on-behalf-of-feature/
sdk - https://aka.ms/azureml-import-model
cli - https://aka.ms/obo-cli-sample

This new failure is in the **register** step (the prebuilt `register_model` component). It needs an **identity** to call AzureML control plane APIs, and your pipeline job is currently running without `user_identity`, so it can’t get `AzureMLOnBehalfOfCredential`. The pipeline YAML schema supports setting `identity: type: user_identity` (either at pipeline level or on the individual step).[436][437]

Fix (recommended): set identity on the `register` step

Edit `pipelines/train_and_register_pipeline.yml`:

1. Also fix `$schema` (remove markdown link):

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
```

2. Add identity under the `register` job:

```
  register:
    type: command
    identity:
      type: user_identity
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

`user_identity` is an allowed identity type in Azure ML job YAML and is exactly what the error message is asking for.[437] [436]

If it still fails

Some setups require putting `identity` on **each step that calls Azure APIs**, so you can also add the same block to `train` (safe, not harmful). The docs recommend setting identity at the individual step level for pipelines.[438]

Rerun

```
az ml job create -f pipelines/train_and_register_pipeline.yml
```

After it succeeds, where to check metrics

- **MLflow metrics screenshot:** Jobs → pipeline run → click **train** → **Metrics** tab.[439]
- **Registered model screenshot:** Models → `got-house-dt`.

If you paste your updated pipeline YAML (just the `register` block), I'll confirm indentation is correct—YAML whitespace mistakes are the #1 reason this fix "doesn't apply."

⁂

what i need to fix??? this? fix - $schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
train_ready:
type: mltable
path: azureml:got-train-ready:1
test_ready:

```
type: mltable
path: azureml:got-test-ready:1

outputs:
trained_model:
type: uri_folder
mode: upload

settings:
default_compute: azureml:serverless

jobs:
train:
type: command
component: azureml:got_train_dt:3
inputs:
train_ready: ${{parent.inputs.train_ready}}
test_ready: ${{parent.inputs.test_ready}}
outputs:
model_output: ${{parent.outputs.trained_model}}

register:
type: command
component: azureml://registries/azureml/components/register_model/versions/0.0.21
inputs:
model_path: ${{parent.jobs.train.outputs.model_output}}
model_name: got-house-dt
```

Yes—there are **two** fixes needed in that YAML: (1) `$schema` must be a plain URL (not a markdown link), and (2) you must add `identity: type: user_identity` (at least on the `register` step) so the register component can authenticate and stop throwing `Failed to get AzureMLOnBehalfOfCredential`.[457] [458]

Fix `$schema`

Change this:

```
$schema: [https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json](https://az
```

To this (plain string):

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
```

Azure ML expects `$schema` to be a string URL, not markdown.[458]

Fix the `register` step identity

Add this block under `register`:

```
  register:
    type: command
    identity:
      type: user_identity
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

`user_identity` is a supported job identity configuration in Azure ML YAML, and it matches what your exception is explicitly requesting.[457] [458]

Full corrected YAML (your file)

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model:
    type: uri_folder
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: azureml:got_train_dt:3
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model}}

  register:
    type: command
    identity:
      type: user_identity
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
```

```
      inputs:
        model_path: ${{parent.jobs.train.outputs.model_output}}
        model_name: got-house-dt
```

If you run from CLI and it still complains about identity, say how you submit it (`az ml job create ...` from local machine vs GitHub Actions vs inside a compute instance), because some environments don’t have a real “user” token available to pass through.

⁂

let it run, now i need to make this! Step 3 - Deployment

Points: 5

You can perform this step on your local PC, without using Azure Machine Learning.
I do think it would be nice if there is an API in FastAPI or Gradio where the AI model can be applied.
You will need to send a request to an API endpoint(/predict) with the JSON payload below.
I expect a response where you show which House a character belongs to based on the JSON input entered.
Also post this on HuggingFaceThe necessary inputs can then be entered as follows:
{
"region": "The North",
"primary_role": "Commander",
"alignment": "Lawful Good",
"status": "Alive",
"species": "Human",
"honour_1to5": 4,
"ruthlessness_1to5": 2,
"intelligence_1to5": 3,
"combat_skill_1to5": 4,
"diplomacy_1to5": 3,
"leadership_1to5": 4,
"trait_loyal": true,
"trait_scheming": false
}

Screenshot (3 points) Your /docs endpoint showing a successful execution of the input data with output results. If you chose Gradio, you may also show a screenshot of your frontend, preferably with input and output visible. Screenshot (2 points) Show your HuggingFace Space where this is running.
You need to build a small API (FastAPI or Gradio) that loads your trained model, exposes **POST** `/predict`, and then deploy it to a **Hugging Face Space**. Hugging Face Spaces can run FastAPI via Docker/uvicorn on port 7860, and `/docs` will work for the screenshot.[477] [478]

FastAPI solution (recommended)

Local files you need

Put these in one folder:

- `app.py` (FastAPI server)
- `model.joblib` (your exported model pipeline; ideally includes preprocessing)
- `requirements.txt`
- (optional) `Dockerfile` for Spaces

Spaces' FastAPI template runs uvicorn on port **7860** (important), so the Dockerfile should start uvicorn on that port.[479] [477]

`app.py` (drop-in)

```
from fastapi import FastAPI
from pydantic import BaseModel
import joblib
import pandas as pd

app = FastAPI(title="GoT House Predictor")

MODEL_PATH = "model.joblib"
model = joblib.load(MODEL_PATH)

class Character(BaseModel):
    region: str
    primary_role: str
    alignment: str
    status: str
    species: str
    honour_1to5: int
    ruthlessness_1to5: int
    intelligence_1to5: int
    combat_skill_1to5: int
    diplomacy_1to5: int
    leadership_1to5: int
    trait_loyal: bool
    trait_scheming: bool

@app.get("/")
def health():
    return {"status": "ok"}

@app.post("/predict")
def predict(x: Character):
    df = pd.DataFrame([x.model_dump()])
    pred = model.predict(df)[^45_0]
    # If you have predict_proba, you can add confidence too.
    return {"house": str(pred)}
```

This will automatically generate `/docs` where you can "Try it out" with the exact JSON your teacher provided and screenshot the response. (That's the screenshot they want.)[478]

`requirements.txt`

Use versions that match how you trained/saved the model to avoid joblib/sklearn incompatibility issues on Spaces.[480]
Example:

```
fastapi==0.115.5
uvicorn[standard]==0.32.1
pydantic==2.10.2
pandas==2.2.3
scikit-learn==1.5.2
joblib==1.4.2
```

Run locally (for your `/docs` screenshot)

```
pip install -r requirements.txt
uvicorn app:app --host 0.0.0.0 --port 8000 --reload
```

Open: `http://127.0.0.1:8000/docs` and run the `/predict` call with your JSON.

Deploy on Hugging Face Spaces (FastAPI)

Create a **Docker Space** and add:

`Dockerfile`

```
FROM python:3.10

WORKDIR /app
COPY . /app
RUN pip install --no-cache-dir -r requirements.txt

CMD ["uvicorn", "app:app", "--host", "0.0.0.0", "--port", "7860"]
```

Hugging Face Spaces expects the app to listen on port 7860; this is the standard pattern.[477][479]

Push those files to the Space repo, wait for it to build, then open:

- `https://huggingface.co/spaces/<you>/<space-name>/docs` (screenshot for the HF part)
- also keep your local `/docs` screenshot if you prefer (they said it can be local).

One important question

Does your saved `model.joblib` expect a **pandas DataFrame with exactly these column names**, or did you train on encoded features already? If you show how you saved the model (the code that writes `model.joblib`), I'll adjust `app.py` so the input schema matches your pipeline 100%.

⁂

okay like this???

Yes—your folder layout is basically correct: you have a `fastapi/` folder with `app.py`, `Dockerfile`, and `requirements.txt` visible, which is exactly what you want for a Hugging Face **Docker Space**. [file:Screenshot-2025-12-17-at-11.42.15.jpg]

Two things to double-check

1. Put your saved model file in the same folder as `app.py` (for example `fastapi/model.joblib`) and make sure `app.py` loads that exact path.
   Example: `MODEL_PATH = "model.joblib"` works only if the model file sits next to `app.py`.
2. Make sure the Dockerfile starts uvicorn on **port 7860** (Hugging Face expects that). A good CMD is:

```
CMD ["uvicorn", "app:app", "--host", "0.0.0.0", "--port", "7860"]
```

One likely issue with your current structure

If you deploy the whole repo to Spaces and your FastAPI files are in a subfolder (`fastapi/`), then your Dockerfile must either:

- live at the repo root, or
- copy the correct subfolder and set `WORKDIR` to `/app/fastapi`.

Simplest for the exam: move `app.py`, `requirements.txt`, `Dockerfile`, and `model.joblib` to the **repo root** (same level as `README.md`). Then everything "just works" with the standard Dockerfile.

If you paste your current `Dockerfile` + first lines of `app.py` (where you load the model), I'll tell you exactly whether it will run on Spaces without path errors.

⁂

so i dont understand, do we need gradio, fastapi or hg??

You need **two deliverables**:

1. An API with a `POST /predict` endpoint that takes that JSON and returns the predicted House.

2. That API running on **Hugging Face Spaces** (so you can screenshot the Space).

So: **FastAPI (or Gradio) + Hugging Face**. Hugging Face is the hosting requirement; FastAPI vs Gradio is your choice.[498] [499]

What to choose

Option A (best match to "/docs endpoint"): FastAPI on a Docker Space

- FastAPI gives you `/docs` automatically (Swagger UI), which matches the screenshot requirement perfectly.[500]
- Deploy it on Hugging Face as a **Docker Space** and run uvicorn on port 7860.[501] [498]

Option B (easier UI): Gradio Space

- Gradio gives a simple frontend and you can screenshot input/output easily.[499]
- But your teacher explicitly mentions `/predict` and `/docs`, which are more "FastAPI style", so Gradio is only safe if you still provide the required `/predict` behavior (Gradio's default API is different).[502] [499]

What you should do for the exam

Use **FastAPI + Hugging Face Docker Space** so you can:

- Screenshot `http://localhost:8000/docs` showing a successful `/predict` call (local is allowed).
- Screenshot the Hugging Face Space running the same API.[501] [500]

If you paste your `Dockerfile` and `app.py`, I'll verify it will actually expose `/docs` and `/predict` correctly on Hugging Face.

⁂

still have register problem

```
Execution failed. User process 'python' exited with status code 1. Please check log file 'user_logs/std_log.txt' for error details. Error: Traceback (most recent call last):
File "/mnt/azureml/cr/j/933627ba6d8545fc8802fe50cc04a83f/exe/wd/register.py", line 225, in <module>
main()
File "/mnt/azureml/cr/j/933627ba6d8545fc8802fe50cc04a83f/exe/wd/utils/exceptions.py", line 90, in wrapper
raise azureml_exception
azure.ai.ml.exceptions.MlException: An error occurred: [[Errno 2] No such file or directory: 'mlflow_model_folder/MLmodel']
```

That error means the **register_model** component is trying to register an **MLflow model**, but the folder you pass as `model_path` does **not** contain an `MLmodel` file at its root. An MLflow model is a directory whose root contains `MLmodel` (plus other files), so if you only saved a `.pkl/.joblib` the register component can't find `mlflow_model_folder/MLmodel`.[518] [519]

What to fix (Azure part)

Fix A (best): log/save the model as an MLflow model

In your `train` component, instead of only writing a pickle/joblib, you must create an MLflow-model folder output.

Inside `training.py` after training:

```
import mlflow
import mlflow.sklearn

# model is your trained sklearn estimator or Pipeline
mlflow.sklearn.save_model(sk_model=model, path="mlflow_model_folder")
```

Then make sure your component output `model_output` points to that folder (so it uploads a directory that contains `MLmodel`). MLflow's sklearn save/log functions create the required `MLmodel` file.[520] [518]

Then in the pipeline YAML, your register step should point to the folder you created (the one that contains `MLmodel`), not to a random folder with a `.pkl`.[519]

Fix B (quick workaround): don't use the register_model component

If the exam *requires* model registration, don't do this. But if registration is optional, you can remove the `register` job and just keep training + MLflow metrics. (Your error is only in register.)

Why your current pipeline fails

Your pipeline passes `model_path: ${{parent.jobs.train.outputs.model_output}}`, but your `train` step output is not an MLflow model directory (missing `MLmodel`), so register crashes with "No such file or directory: '.../MLmodel'".[518]

What I need from you (so I can tell you the exact 2-line change)

Paste:

1. the part of `training.py` where you currently save the model (joblib/pickle)
2. your `got_train_dt` component's output definition (in the component YAML)

Then I'll tell you exactly how to write the output folder so register_model succeeds on the next run.

⁂

ensure everythong is correct!!! import argparse

import json
import os

import joblib
import pandas as pd
from azureml.core import Run
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier

def main():
parser = argparse.ArgumentParser()

```
parser.add_argument("--train_ready", type=str, required=True)
parser.add_argument("--test_ready", type=str, required=True)
parser.add_argument("--target_col", type=str, default="house_affiliation")


parser.add_argument("--max_depth", type=int, default=None)
parser.add_argument("--min_samples_split", type=int, default=2)
parser.add_argument("--min_samples_leaf", type=int, default=1)
parser.add_argument("--random_state", type=int, default=42)


parser.add_argument("--model_output", type=str, required=True)
parser.add_argument("--metrics_output", type=str, required=True)


args = parser.parse_args()


run = Run.get_context()


# Load data
X_train_path = os.path.join(args.train_ready, "X_train.csv")
y_train_path = os.path.join(args.train_ready, "y_train.csv")
X_test_path = os.path.join(args.test_ready, "X_test.csv")
y_test_path = os.path.join(args.test_ready, "y_test.csv")


for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
    if not os.path.exists(p):
        raise FileNotFoundError(f"Missing required file: {p}")


X_train = pd.read_csv(X_train_path)
y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
X_test = pd.read_csv(X_test_path)
y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)


# Train
```

```
clf = DecisionTreeClassifier(
    max_depth=args.max_depth,
    min_samples_split=args.min_samples_split,
    min_samples_leaf=args.min_samples_leaf,
    random_state=args.random_state,
)


# Log params
run.log("max_depth", -1 if args.max_depth is None else int(args.max_depth))
run.log("min_samples_split", int(args.min_samples_split))
run.log("min_samples_leaf", int(args.min_samples_leaf))
run.log("random_state", int(args.random_state))


clf.fit(X_train, y_train)


# Evaluate
y_pred = clf.predict(X_test)
acc = float(accuracy_score(y_test, y_pred))
report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)


# Log metrics (flatten)
run.log("accuracy", acc)
for label, metrics in report.items():
    if isinstance(metrics, dict):
        for k, v in metrics.items():
            if isinstance(v, (int, float)):
                run.log(f"{label}_{k}", float(v))


# Save model + metrics
os.makedirs(args.model_output, exist_ok=True)
os.makedirs(args.metrics_output, exist_ok=True)


model_path = os.path.join(args.model_output, "model.joblib")
joblib.dump(clf, model_path)


metrics_path = os.path.join(args.metrics_output, "classification_report.json")
with open(metrics_path, "w", encoding="utf-8") as f:
    json.dump({"accuracy": acc, "report": report}, f, indent=2)


# Upload artifacts to run (so visible in Outputs + as files)
run.upload_file(name="outputs/model/model.joblib", path_or_stream=model_path)
run.upload_file(name="outputs/metrics/classification_report.json", path_or_stream=metrics


print("✅ Training done. Accuracy:", acc)
```

if **name** == "**main**":
main() also this $schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json

```
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
train_ready:
type: mltable
path: azureml:got-train-ready:1
test_ready:
type: mltable
path: azureml:got-test-ready:1

outputs:
trained_model:
type: uri_folder
mode: upload

settings:
default_compute: azureml:serverless

jobs:
train:
type: command
component: azureml:got_train_dt:3
inputs:
train_ready: ${{parent.inputs.train_ready}}
test_ready: ${{parent.inputs.test_ready}}
outputs:
model_output: ${{parent.outputs.trained_model}}

register:
type: command
identity:
type: user_identity
component: azureml://registries/azureml/components/register_model/versions/0.0.21
inputs:
model_path: ${{parent.jobs.train.outputs.model_output}}
model_name: got-house-dt
```

Your YAML is *almost* correct, but your **training script is not producing an MLflow-model folder**, so the `register_model` component fails (it looks for `MLmodel`). An MLflow model must be a directory containing an `MLmodel` file at its root, which you don't create when you only `joblib.dump(...)`.[538] [539]

Fix the training script (required)

1) Stop using `azureml.core.Run` for logging (use MLflow)

Azure ML v2 expects MLflow-style logging for runs/metrics, and you already ran into MLflow-related requirements earlier.[540] [541]

Replace your logging with MLflow:

- Remove:

```
from azureml.core import Run
run = Run.get_context()
run.log(...)
run.upload_file(...)
```

- Add:

```
import mlflow
import mlflow.sklearn
```

2) Save the model as an MLflow model into `--model_output`

This is the key for the register component.

Replace:

```
model_path = os.path.join(args.model_output, "model.joblib")
joblib.dump(clf, model_path)
```

With:

```
mlflow.sklearn.save_model(sk_model=clf, path=args.model_output)
```

`mlflow.sklearn.save_model(...)` creates the `MLmodel` file inside that folder, which is exactly what `register_model` expects.[542] [539]

3) Log metrics with MLflow (so they appear in “Metrics” tab)

Replace:

```
run.log("accuracy", acc)
...
```

With:

```
mlflow.log_metric("accuracy", acc)
# and for the report:
mlflow.log_metric(f"{label}_{k}", float(v))
```

Azure ML can display these MLflow metrics in the job UI.[540]

4) Save + log your JSON report as an artifact (optional but nice)

Keep writing the JSON to `--metrics_output`, then:

```
mlflow.log_artifacts(args.metrics_output, artifact_path="metrics")
```

This makes the JSON visible as an artifact in the run.[540]

Fix your pipeline YAML `$schema` (required)

Your `$schema` line is still wrong because it's written as a markdown link. It must be a plain URL string.[543]

Change:

```
$schema: [https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json](https://az
```

To:

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
```

Your pipeline structure (good)

- `identity: type: user_identity` on `register` is correct and you should keep it.[544]
- Passing `model_path: ${{parent.jobs.train.outputs.model_output}}` is correct **only if** `train` outputs an MLflow model folder (after the script change).[542]

One question (so this doesn't break again)

In your `got_train_dt` component YAML, is `model_output` declared as `type: uri_folder`?
If it's `uri_file`, the MLflow folder won't upload properly and `MLmodel` can be lost.

⁂

send me 2 full corrected codes

Need two “full corrected codes” to fix your Azure pipeline **register** error (missing `MLmodel`) and make registration succeed:

1. **Corrected** `training.py` (so your `model_output` is a real MLflow model folder containing `MLmodel`). MLflow’s `save_model()` writes a directory with `MLmodel` at the root, which is exactly what the register step is looking for.[561] [562]
2. **Corrected pipeline YAML** (with `identity: user_identity` and correct `$schema`) so the register component can authenticate and register that MLflow model folder.[563] [564]

Code 1 — `components/train/training.py`

Assumptions (match your exam setup):

- Inputs are MLTable-mounted paths for train/test (Azure ML passes them as folders; `MLTable` file is inside).
- Output `model_output` is a folder path passed in by Azure ML.
- Your model is a scikit-learn `Pipeline` (recommended so the API can accept raw columns).

```
import argparse
import os
import pandas as pd

import mlflow
import mlflow.sklearn

from azureml.fsspec import AzureMachineLearningFileSystem


def read_mltable_as_pandas(mltable_uri: str) -> pd.DataFrame:
    # Works when the input is an Azure ML data asset URI (azureml://...) or mounted path.
    # Azure ML v2 MLTable can be read via MLTable + fsspec, but simplest for exams is:
    # use mltable package if available; otherwise, read pre-exported parquet/csv.
    #
    # If you already read your MLTable differently in your existing code, keep that part
    # and only replace the model saving section below.
    import mltable

    tbl = mltable.load(mltable_uri)
    return tbl.to_pandas_dataframe()


def main():
    parser = argparse.ArgumentParser()
    parser.add_argument("--train_ready", type=str, required=True)
    parser.add_argument("--test_ready", type=str, required=True)
    parser.add_argument("--model_output", type=str, required=True)
    args = parser.parse_args()

    # Load data
    train_df = read_mltable_as_pandas(args.train_ready)
    test_df = read_mltable_as_pandas(args.test_ready)

    target_col = "house"  # <-- change if your label column has a different name
    X_train = train_df.drop(columns=[target_col])
    y_train = train_df[target_col]
    X_test = test_df.drop(columns=[target_col])
    y_test = test_df[target_col]

    # Train (example: DecisionTree; replace with your real training code)
    from sklearn.compose import ColumnTransformer
    from sklearn.pipeline import Pipeline
    from sklearn.preprocessing import OneHotEncoder
    from sklearn.tree import DecisionTreeClassifier
    from sklearn.metrics import accuracy_score, f1_score

    cat_cols = [c for c in X_train.columns if X_train[c].dtype == "object" or X_train[c].
    num_cols = [c for c in X_train.columns if c not in cat_cols]

    pre = ColumnTransformer(
        transformers=[
            ("cat", OneHotEncoder(handle_unknown="ignore"), cat_cols),
            ("num", "passthrough", num_cols),
        ]
    )

    model = Pipeline(
        steps=[
            ("preprocess", pre),
            ("clf", DecisionTreeClassifier(random_state=42)),
        ]
    )

    model.fit(X_train, y_train)
    preds = model.predict(X_test)

    acc = float(accuracy_score(y_test, preds))
    f1 = float(f1_score(y_test, preds, average="weighted"))

    # Log metrics (no manual start_run needed; Azure ML + azureml-mlflow handles it)
    mlflow.log_metric("accuracy", acc)
    mlflow.log_metric("f1_weighted", f1)

    # IMPORTANT: Save an MLflow model folder into the component output
    os.makedirs(args.model_output, exist_ok=True)
    mlflow.sklearn.save_model(sk_model=model, path=args.model_output)

    # At this point args.model_output contains an MLmodel file, so register_model will wo


if __name__ == "__main__":
    main()
```

Key part is the last lines: `mlflow.sklearn.save_model(..., path=args.model_output)` so `MLmodel` exists.[562] [561]

Code 2 — `pipelines/train_and_register_pipeline.yml`

This keeps your structure but fixes:

- `$schema` must be a plain URL
- `identity: user_identity` on the register step (and you can add to train too, but not required)

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model:
    type: uri_folder
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: azureml:got_train_dt:3
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model}}

  register:
    type: command
    identity:
      type: user_identity
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

`identity: type: user_identity` is supported in Azure ML job YAML and fixes the earlier OBO credential failure.[564] [563]

If your label column is **not** named `house`, tell me the real column name and I'll adjust `training.py` accordingly (otherwise training will fail before it even saves the MLflow model folder).

are you sure this is the only way to fix? here is the error Execution failed. User process 'python' exited with status code 1. Please check log file 'user_logs/std_log.txt' for error details. Error: Traceback (most recent call last):

File "/mnt/azureml/cr/j/933627ba6d8545fc8802fe50cc04a83f/exe/wd/register.py", line 225, in <module>
main()
File "/mnt/azureml/cr/j/933627ba6d8545fc8802fe50cc04a83f/exe/wd/utils/exceptions.py", line 90, in wrapper
raise azureml_exception
azure.ai.ml.exceptions.MlException: An error occurred: [[Errno 2] No such file or directory: 'mlflow_model_folder/MLmodel']. can you really carefully look at all 4 files that i have now:

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_train_dt
display_name: GOT - Train Decision Tree
version: 3

inputs:
train_ready:
type: mltable
test_ready:
type: mltable
target_col:
type: string
default: house_affiliation

max_depth:
type: integer
optional: true
min_samples_split:
type: integer
default: 2
min_samples_leaf:
type: integer
default: 1
random_state:
type: integer
default: 42
```

outputs:
model_output:
type: uri_folder
metrics_output:
type: uri_folder

code: .
environment:
image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
conda_file: conda.yaml

command: >-
python training.py
--train_ready ${{inputs.train_ready}}
--test_ready ${{inputs.test_ready}}
--target_col ${{inputs.target_col}}
$[[--max_depth ${{inputs.max_depth}}]]
--min_samples_split ${{inputs.min_samples_split}}
--min_samples_leaf ${{inputs.min_samples_leaf}}
--random_state ${{inputs.random_state}}
--model_output ${{outputs.model_output}}
--metrics_output ${{outputs.metrics_output}}, name: got-train-dt-env
channels:

- conda-forge
  dependencies:
- python=3.10
- pip
- pip:
  - pandas
  - scikit-learn
  - joblib
  - azureml-core, ,import argparse
    import json
    import os

import joblib
import pandas as pd
from azureml.core import Run
from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier

def main():
parser = argparse.ArgumentParser()

```
parser.add_argument("--train_ready", type=str, required=True)
parser.add_argument("--test_ready", type=str, required=True)
parser.add_argument("--target_col", type=str, default="house_affiliation")


parser.add_argument("--max_depth", type=int, default=None)
parser.add_argument("--min_samples_split", type=int, default=2)
parser.add_argument("--min_samples_leaf", type=int, default=1)
parser.add_argument("--random_state", type=int, default=42)


parser.add_argument("--model_output", type=str, required=True)
parser.add_argument("--metrics_output", type=str, required=True)


args = parser.parse_args()


run = Run.get_context()


# Load data
X_train_path = os.path.join(args.train_ready, "X_train.csv")
y_train_path = os.path.join(args.train_ready, "y_train.csv")
X_test_path = os.path.join(args.test_ready, "X_test.csv")
y_test_path = os.path.join(args.test_ready, "y_test.csv")


for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
    if not os.path.exists(p):
        raise FileNotFoundError(f"Missing required file: {p}")


X_train = pd.read_csv(X_train_path)
y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
X_test = pd.read_csv(X_test_path)
y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)


# Train
clf = DecisionTreeClassifier(
    max_depth=args.max_depth,
    min_samples_split=args.min_samples_split,
    min_samples_leaf=args.min_samples_leaf,
    random_state=args.random_state,
)


# Log params
run.log("max_depth", -1 if args.max_depth is None else int(args.max_depth))
run.log("min_samples_split", int(args.min_samples_split))
run.log("min_samples_leaf", int(args.min_samples_leaf))
run.log("random_state", int(args.random_state))


clf.fit(X_train, y_train)
```

```
# Evaluate
y_pred = clf.predict(X_test)
acc = float(accuracy_score(y_test, y_pred))
report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)


# Log metrics (flatten)
run.log("accuracy", acc)
for label, metrics in report.items():
    if isinstance(metrics, dict):
        for k, v in metrics.items():
            if isinstance(v, (int, float)):
                run.log(f"{label}_{k}", float(v))


# Save model + metrics
os.makedirs(args.model_output, exist_ok=True)
os.makedirs(args.metrics_output, exist_ok=True)


model_path = os.path.join(args.model_output, "model.joblib")
joblib.dump(clf, model_path)


metrics_path = os.path.join(args.metrics_output, "classification_report.json")
with open(metrics_path, "w", encoding="utf-8") as f:
    json.dump({"accuracy": acc, "report": report}, f, indent=2)


# Upload artifacts to run (so visible in Outputs + as files)
run.upload_file(name="outputs/model/model.joblib", path_or_stream=model_path)
run.upload_file(name="outputs/metrics/classification_report.json", path_or_stream=metrics


print("✅ Training done. Accuracy:", acc)
```

if **name** == "**main**":
main(), $schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
train_ready:
type: mltable
path: azureml:got-train-ready:1
test_ready:
type: mltable
path: azureml:got-test-ready:1

```
outputs:
trained_model:
type: uri_folder
mode: upload

settings:
default_compute: azureml:serverless

jobs:
train:
type: command
component: azureml:got_train_dt:3
inputs:
train_ready: ${{parent.inputs.train_ready}}
test_ready: ${{parent.inputs.test_ready}}
outputs:
model_output: ${{parent.outputs.trained_model}}

register:
type: command
identity:
type: user_identity
component: azureml://registries/azureml/components/register_model/versions/0.0.21
inputs:
model_path: ${{parent.jobs.train.outputs.model_output}}
model_name: got-house-dt
```

No—this is **not** the only theoretical way to “register a model”, but with your *current* pipeline using the `register_model` **registry component**, it’s the only way that will make *that specific component* stop failing: it expects an **MLflow model directory** (a folder whose root contains an `MLmodel` file), and your training step currently outputs only `model.joblib`, so it can’t find `mlflow_model_folder/MLmodel`.[583] [584]

What your 4 files show (the real problem)

- Your component YAML outputs `model_output: uri_folder`, and your `training.py` writes `model.joblib` into that folder. That folder will **not** contain `MLmodel`.
- The register component then tries to treat that output like an MLflow model folder and looks for `MLmodel` → error.[584]

So the fix is: **change the training output to be an MLflow model folder** (create `MLmodel`), *or* stop using the MLflow-only register component.

Two valid ways forward

Option 1 (recommended): keep `register_model` component → save as MLflow model

Replace your “joblib dump” section with MLflow saving (MLflow `save_model()` produces the `MLmodel` file in the output directory).[585] [584]

Minimal change inside your `training.py`:

```
# REMOVE these:
# model_path = os.path.join(args.model_output, "model.joblib")
# joblib.dump(clf, model_path)

# ADD these:
import mlflow.sklearn
os.makedirs(args.model_output, exist_ok=True)
mlflow.sklearn.save_model(sk_model=clf, path=args.model_output)
```

Then the `register_model` component will find `args.model_output/MLmodel` and stop crashing.[585] [584]

Also: your component `$schema` lines are still written as markdown links; change them to plain URLs, same as before.[586]

Option 2: register a non-MLflow artifact (joblib) without that component

Azure ML supports registering models from job outputs using `azureml://jobs/.../outputs/.../paths/...` URIs, and you can register a single file like `model.joblib` as a custom model asset.[587]
But this means **replacing** the `azureml://.../components/register_model/versions/0.0.21` step with your own registration step (CLI/SDK), so it’s more work and may not match your exam template.

Extra issues in what you pasted (will bite you later)

- Your `conda.yaml` currently has `- azureml-core, ,import argparse` which is invalid YAML and will eventually break environment resolution; `import argparse` must not be in `conda.yaml`.
- You’re using `azureml.core.Run` (v1 SDK) logging, but earlier you needed MLflow for the exam screenshots; mixing v1 Run logging and v2 components often leads to “metrics not where you expect.” Azure ML recommends MLflow for logging/visualizing metrics.[588]

If you want, paste the **exact** `conda.yaml` file contents (only that file) and your current `training.py` (as a file, not merged into one block), and I’ll return the fully corrected versions with minimal edits so: (1) train succeeds, (2) metrics show, (3) register succeeds.

⁂

okay makeOption 1 (recommended), send me all corrected files

Below are **all corrected files** for Option 1: train writes an **MLflow model folder** (contains `MLmodel`), and the pipeline registers it successfully. MLflow's `save_model()` produces the `MLmodel` file that the register component requires.[605] [606]

1) `components/train/got_train_dt.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/commandComponent.schema.json
type: command

name: got_train_dt
display_name: GOT - Train Decision Tree
version: 3

inputs:
  train_ready:
    type: mltable
  test_ready:
    type: mltable
  target_col:
    type: string
    default: house_affiliation

  max_depth:
    type: integer
    optional: true
  min_samples_split:
    type: integer
    default: 2
  min_samples_leaf:
    type: integer
    default: 1
  random_state:
    type: integer
    default: 42

outputs:
  model_output:
    type: uri_folder
  metrics_output:
    type: uri_folder

code: .
environment:
  image: mcr.microsoft.com/azureml/openmpi4.1.0-ubuntu20.04:latest
  conda_file: conda.yaml

command: >-
  python training.py
  --train_ready ${{inputs.train_ready}}
  --test_ready ${{inputs.test_ready}}
  --target_col ${{inputs.target_col}}
  $[[--max_depth ${{inputs.max_depth}}]]
  --min_samples_split ${{inputs.min_samples_split}}
  --min_samples_leaf ${{inputs.min_samples_leaf}}
  --random_state ${{inputs.random_state}}
  --model_output ${{outputs.model_output}}
  --metrics_output ${{outputs.metrics_output}}
```

The only “must fix” here is the `$schema` line (no markdown link).[607]

2) `components/train/conda.yaml`

```
name: got-train-dt-env
channels:
  - conda-forge
dependencies:
  - python=3.10
  - pip
  - pip:
      - pandas
      - scikit-learn
      - joblib
      - mlflow
      - azureml-mlflow
      - mltable
```

This removes the invalid `, ,import argparse` you had, and adds `mlflow` + `azureml-mlflow` so metrics + model saving works correctly in Azure ML runs.[608]

3) `components/train/training.py`

This keeps your CSV loading logic, but switches to MLflow logging + **MLflow model saving** into `model_output` so the register step finds `MLmodel`.[608] [605]

```
import argparse
import json
import os

import joblib
import pandas as pd
import mlflow
import mlflow.sklearn

from sklearn.metrics import accuracy_score, classification_report
from sklearn.tree import DecisionTreeClassifier


def main():
    parser = argparse.ArgumentParser()

    parser.add_argument("--train_ready", type=str, required=True)
    parser.add_argument("--test_ready", type=str, required=True)
    parser.add_argument("--target_col", type=str, default="house_affiliation")
    parser.add_argument("--max_depth", type=int, default=None)
    parser.add_argument("--min_samples_split", type=int, default=2)
    parser.add_argument("--min_samples_leaf", type=int, default=1)
    parser.add_argument("--random_state", type=int, default=42)

    parser.add_argument("--model_output", type=str, required=True)
    parser.add_argument("--metrics_output", type=str, required=True)

    args = parser.parse_args()

    # Load data (your existing structure)
    X_train_path = os.path.join(args.train_ready, "X_train.csv")
    y_train_path = os.path.join(args.train_ready, "y_train.csv")
    X_test_path = os.path.join(args.test_ready, "X_test.csv")
    y_test_path = os.path.join(args.test_ready, "y_test.csv")

    for p in [X_train_path, y_train_path, X_test_path, y_test_path]:
        if not os.path.exists(p):
            raise FileNotFoundError(f"Missing required file: {p}")

    X_train = pd.read_csv(X_train_path)
    y_train = pd.read_csv(y_train_path)[args.target_col].astype(str)
    X_test = pd.read_csv(X_test_path)
    y_test = pd.read_csv(y_test_path)[args.target_col].astype(str)

    # Train
    clf = DecisionTreeClassifier(
        max_depth=args.max_depth,
        min_samples_split=args.min_samples_split,
        min_samples_leaf=args.min_samples_leaf,
        random_state=args.random_state,
    )

    clf.fit(X_train, y_train)

    # Evaluate
    y_pred = clf.predict(X_test)
    acc = float(accuracy_score(y_test, y_pred))
    report = classification_report(y_test, y_pred, output_dict=True, zero_division=0)

    # Log params + metrics to MLflow (shows up in Azure ML "Metrics" tab)
    mlflow.log_param("max_depth", -1 if args.max_depth is None else int(args.max_depth))
    mlflow.log_param("min_samples_split", int(args.min_samples_split))
    mlflow.log_param("min_samples_leaf", int(args.min_samples_leaf))
    mlflow.log_param("random_state", int(args.random_state))

    mlflow.log_metric("accuracy", acc)
    for label, metrics in report.items():
        if isinstance(metrics, dict):
            for k, v in metrics.items():
                if isinstance(v, (int, float)):
                    mlflow.log_metric(f"{label}_{k}", float(v))

    # Save metrics file (optional, still useful as an artifact/output)
    os.makedirs(args.metrics_output, exist_ok=True)
    metrics_path = os.path.join(args.metrics_output, "classification_report.json")
    with open(metrics_path, "w", encoding="utf-8") as f:
        json.dump({"accuracy": acc, "report": report}, f, indent=2)

    # IMPORTANT: save an MLflow model folder to model_output (creates MLmodel file)
    os.makedirs(args.model_output, exist_ok=True)
    mlflow.sklearn.save_model(sk_model=clf, path=args.model_output)

    # Optional: also log the metrics json as an artifact
    mlflow.log_artifact(metrics_path, artifact_path="metrics")

    print("Training done. Accuracy:", acc)


if __name__ == "__main__":
    main()
```

4) `pipelines/train_and_register_pipeline.yml`

```
$schema: https://azuremlschemas.azureedge.net/latest/pipelineJob.schema.json
type: pipeline
display_name: got-train-and-register
experiment_name: exam

inputs:
  train_ready:
    type: mltable
    path: azureml:got-train-ready:1
  test_ready:
    type: mltable
    path: azureml:got-test-ready:1

outputs:
  trained_model:
    type: uri_folder
    mode: upload

settings:
  default_compute: azureml:serverless

jobs:
  train:
    type: command
    component: azureml:got_train_dt:3
    inputs:
      train_ready: ${{parent.inputs.train_ready}}
      test_ready: ${{parent.inputs.test_ready}}
    outputs:
      model_output: ${{parent.outputs.trained_model}}

  register:
    type: command
    identity:
      type: user_identity
    component: azureml://registries/azureml/components/register_model/versions/0.0.21
    inputs:
      model_path: ${{parent.jobs.train.outputs.model_output}}
      model_name: got-house-dt
```

`identity: user_identity` stays (fixes the OBO credential error), and now `model_path` points to a folder that actually contains `MLmodel`.[609] [605]

If you run this and registration still fails, the next most common cause is that your data `X_train.csv` contains already-encoded numeric columns while FastAPI later sends raw strings/booleans—so tell me what columns are in `X_train.csv` and I'll help you make the deployment input schema match.

⁂

what''s next????

Next you do **(A) verify Azure ML outputs + screenshots**, then **(B) build the FastAPI/Hugging Face deployment screenshots**.

Azure ML: rerun + screenshots

1. Re-register the component env/code (if you changed files): bump `got_train_dt` version (e.g., to `4`) and update the pipeline to use that new version, then run `az ml job create -f pipelines/train_and_register_pipeline.yml`.
2. When the pipeline finishes:

- Go to **Jobs** → **your pipeline run** → **click the `train` child job** → **Metrics tab** and take the screenshot showing metrics logged (accuracy, etc.). Azure ML Studio shows MLflow-logged metrics on the job's Metrics page.[626]
- Go to **Models** in the left menu and screenshot the registered model `got-house-dt` (your register step should have created it). Azure ML Studio lists registered models under Models.[627]

Deployment: FastAPI + Hugging Face (your Step 3)

3. Locally: run your FastAPI app and open `http://127.0.0.1:8000/docs`, click **Try it out** on `/predict`, paste the provided JSON, execute, screenshot success. FastAPI generates Swagger `/docs` automatically.[628]
4. Hugging Face: create a **Docker Space**, push your `app.py` + `Dockerfile` + `requirements.txt` + model artifact, wait until the Space is **Running**, then open `/docs` on the Space URL and take the "Space running" screenshot. Docker Spaces are the standard way to run FastAPI on Spaces.[629] [628]

Tell me: did the Azure pipeline now complete (both `train` and `register` green), or is it still failing? If it's failing, paste the newest `user_logs/std_log.txt` for the failing step.

⁂

NOO HOW TO RUN

Run it in **two places**: (1) Azure ML pipeline (CLI) and (2) your local FastAPI API.

Run the Azure ML pipeline

From the repo root (where your `pipelines/train_and_register_pipeline.yml` is), do:

```
# 0) Login (only once per machine/session)
az login

# 1) Make sure the Azure ML CLI extension exists
az extension add -n ml -y

# 2) Set defaults (edit these)
az configure --defaults group=<RG_NAME> workspace=<AML_WORKSPACE_NAME>

# 3) Register/update the component (run this when you changed component YAML/code)
az ml component create --file components/train/got_train_dt.yml
```

Now submit the pipeline job:

```
az ml job create --file pipelines/train_and_register_pipeline.yml
```

`az ml component create` and `az ml job create` are the standard CLI v2 commands for registering components and running pipeline jobs.[646] [647]

Run the FastAPI API locally (for the /docs screenshot)

From the folder containing `app.py`:

```
pip install -r requirements.txt
uvicorn app:app --host 0.0.0.0 --port 8000 --reload
```

Then open:

- `http://127.0.0.1:8000/docs`

Uvicorn is the typical way to run a FastAPI app locally and `/docs` is FastAPI's built-in Swagger UI. [648] [649]

Which one are you trying to run right now—Azure pipeline or FastAPI? Paste the command you typed and the exact error output.

⁂

did you changed component YAML/code??

Yes. To fix your `MLmodel not found` register error, the **code must change** (training must output an MLflow model folder), and your YAMLs also needed small fixes (remove markdown from `$schema`, add identity).[666] [667]

What changed (exactly)

- training.py: changed from `joblib.dump(... model.joblib ...)` to `mlflow.sklearn.save_model(..., path=args.model_output)` so the output folder contains an `MLmodel` file.[668] [666]
- **conda.yaml**: removed the invalid line and added `mlflow` + `azureml-mlflow` so MLflow logging/model saving works in Azure ML jobs.[669]
- **component YAML**: fixed `$schema:` to be a plain URL (not `[url](url)` markdown).[667]
- **pipeline YAML**: fixed `$schema:` and kept/added `identity: type: user_identity` for the register step.[670] [671]

Why you must "recreate" the component

Azure ML components are versioned assets; if you keep referencing `azureml:got_train_dt:3`, Azure will keep using that old version (old code/env) even if you edited local files. Creating a new component version (or overriding version in the create command) ensures the pipeline uses the updated definition.[672]

If you want the simplest workflow right now:

1. Change `version:` in `got_train_dt.yml` from `3` to `4`
2. Run: `az ml component create -f components/train/got_train_dt.yml`
3. Update pipeline to `component: azureml:got_train_dt:4`
4. Run: `az ml job create -f pipelines/train_and_register_pipeline.yml`

⁂

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2. https://learn.microsoft.com/en-us/azure/machine-learning/how-to-create-component-pipelines-cli?view=azureml-api-2
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