Technology & Innovation skills pathway

AI Agents 101: A hands-on introduction for smarter investing

This notebook was created as companion material for the webinar presented on May 20, 2025 by Carlos Salas and organized by the CFA Society UK.

Table of Contents

In [9]:
```
# Library load
# Basic libraries
import time
import json
import requests  # for function calls like get_stock_price, if they use external
import warnings
import os
import requests
import asyncio
import configparser
import asyncio

# data analysis
import numpy as np
import pandas as pd

# financial libs
import yfinance as yf # terminal install -> pip install yfinance
import talib # terminal install -> pip install TA-Lib

# OpenAI libs
import openai # terminal install ->  pip install openai
from openai import OpenAI
from agents import Runner, Agent,function_tool, items # terminal install -> pip
from agents import (Agent, Runner, FunctionTool, InputGuardrail, GuardrailFuncti
                    handoff,  InputGuardrailTripwireTriggered, RunConfig, ModelS
from agents.exceptions import InputGuardrailTripwireTriggered
from agents.extensions import handoff_filters
from pydantic import BaseModel
```

1. Set Up

Check environment below if you come across any issues during the execution of this notebook:

In [2]:
```
! python --version
```

```
Python 3.11.11
```

In [2]:
```
!conda list
```

```
# packages in environment at C:\Users\Carlo\anaconda3\envs\quant_res_env_311:
#
# Name                    Version                   Build  Channel
aiohappyeyeballs          2.4.6              pyhd8ed1ab_0    conda-forge
aiohttp                   3.11.12         py311h5082efb_0    conda-forge
aiosignal                 1.3.2              pyhd8ed1ab_0    conda-forge
alembic                   1.14.1                    pypi_0    pypi
alpha_vantage             3.0.0              pyhd8ed1ab_0    conda-forge
alphalens-reloaded        0.4.5                     pypi_0    pypi
annotated-types           0.7.0                     pypi_0    pypi
anyio                     4.8.0              pyhd8ed1ab_0    conda-forge
appdirs                   1.4.4              pyhd8ed1ab_1    conda-forge
argon2-cffi               23.1.0             pyhd8ed1ab_1    conda-forge
argon2-cffi-bindings      21.2.0          py311he736701_5    conda-forge
arrow                     1.3.0              pyhd8ed1ab_1    conda-forge
asttokens                 3.0.0              pyhd8ed1ab_1    conda-forge
async-lru                 2.0.4              pyhd8ed1ab_1    conda-forge
attrs                     25.1.0             pyh71513ae_0    conda-forge
babel                     2.17.0             pyhd8ed1ab_0    conda-forge
bcolz-zipline             1.2.12                    pypi_0    pypi
beautifulsoup4            4.13.3             pyha770c72_0    conda-forge
blas                      1.0                         mkl
bleach                    6.2.0              pyh29332c3_4    conda-forge
bleach-with-css           6.2.0                h82add2a_4    conda-forge
blinker                   1.9.0                     pypi_0    pypi
blosc2                    3.1.1                     pypi_0    pypi
bottleneck                1.4.2           py311h57dcf0c_0
brotli-python             1.0.9           py311h5da7b33_9
bzip2                     1.0.8                h2bbff1b_6
ca-certificates           2025.1.31            h56e8100_0    conda-forge
cached-property           1.5.2                hd8ed1ab_1    conda-forge
cached_property           1.5.2              pyha770c72_1    conda-forge
cachetools                5.5.1                     pypi_0    pypi
catboost                  1.2.7                     pypi_0    pypi
certifi                   2025.1.31          pyhd8ed1ab_0    conda-forge
cffi                      1.17.1          py311he736701_0    conda-forge
charset-normalizer        3.4.1              pyhd8ed1ab_0    conda-forge
click                     8.1.8                     pypi_0    pypi
cloudpickle               3.1.1                     pypi_0    pypi
colorama                  0.4.6           py311haa95532_0
colorlog                  6.9.0                     pypi_0    pypi
comm                      0.2.2              pyhd8ed1ab_1    conda-forge
contourpy                 1.3.1           py311h214f63a_0
curl-cffi                 0.11.1                    pypi_0    pypi
cycler                    0.11.0             pyhd3eb1b0_0
databricks-sdk            0.44.1                    pypi_0    pypi
debugpy                   1.8.12          py311hda3d55a_0    conda-forge
decorator                 5.1.1              pyhd8ed1ab_1    conda-forge
defusedxml                0.7.1              pyhd8ed1ab_0    conda-forge
deprecated                1.2.18                    pypi_0    pypi
distro                    1.9.0                     pypi_0    pypi
docker                    7.1.0                     pypi_0    pypi
empyrical-reloaded        0.5.11                    pypi_0    pypi
et-xmlfile                2.0.0                     pypi_0    pypi
exceptiongroup            1.2.2              pyhd8ed1ab_1    conda-forge
exchange-calendars        4.9                       pypi_0    pypi
executing                 2.2.0                     pypi_0    pypi
ffn                       1.1.2                     pypi_0    pypi
finnhub-python            2.4.18             pyhd8ed1ab_0    conda-forge
flask                     3.1.0                     pypi_0    pypi
```

```
fonttools                 4.55.3          py311h827c3e9_0
fqdn                      1.5.1              pyhd8ed1ab_1    conda-forge
freetype                  2.12.1               ha860e81_0
frozendict                2.4.6           py311he736701_0    conda-forge
frozenlist                1.5.0           py311h5082efb_1    conda-forge
future                    1.0.0                    pypi_0    pypi
gitdb                     4.0.12                   pypi_0    pypi
gitpython                 3.1.44                   pypi_0    pypi
google-auth               2.38.0                   pypi_0    pypi
graphene                  3.4.3                    pypi_0    pypi
graphql-core              3.2.6                    pypi_0    pypi
graphql-relay             3.2.0                    pypi_0    pypi
greenlet                  3.1.1                    pypi_0    pypi
griffe                    1.7.3                    pypi_0    pypi
h11                       0.14.0             pyhd8ed1ab_1    conda-forge
h2                        4.2.0              pyhd8ed1ab_0    conda-forge
h5py                      3.13.0                   pypi_0    pypi
hpack                     4.1.0              pyhd8ed1ab_0    conda-forge
html5lib                  1.1                pyhd8ed1ab_2    conda-forge
httpcore                  1.0.7              pyh29332c3_1    conda-forge
httpx                     0.28.1             pyhd8ed1ab_0    conda-forge
httpx-sse                 0.4.0                    pypi_0    pypi
hyperframe                6.1.0              pyhd8ed1ab_0    conda-forge
hyperopt                  0.2.7                    pypi_0    pypi
icc_rt                    2022.1.0             h6049295_2
icu                       73.1                 h6c2663c_0
idna                      3.10               pyhd8ed1ab_1    conda-forge
importlib-metadata        8.5.0                    pypi_0    pypi
importlib_resources       6.5.2              pyhd8ed1ab_0    conda-forge
intel-openmp              2023.1.0         h59b6b97_46320
intervaltree              3.1.0                    pypi_0    pypi
ipykernel                 6.29.5             pyh4bbf305_0    conda-forge
ipython                   8.32.0             pyh9ab4c32_0    conda-forge
iso3166                   2.1.1                    pypi_0    pypi
iso4217                   1.12.20240625            pypi_0    pypi
isoduration               20.11.0            pyhd8ed1ab_1    conda-forge
itsdangerous              2.2.0                    pypi_0    pypi
jedi                      0.19.2             pyhd8ed1ab_1    conda-forge
jinja2                    3.1.5              pyhd8ed1ab_0    conda-forge
jiter                     0.9.0                    pypi_0    pypi
joblib                    1.4.2           py311haa95532_0
jpeg                      9e                   h827c3e9_3
json5                     0.10.0             pyhd8ed1ab_1    conda-forge
jsonpointer               3.0.0           py311h1ea47a8_1    conda-forge
jsonschema                4.23.0             pyhd8ed1ab_1    conda-forge
jsonschema-specifications 2024.10.1          pyhd8ed1ab_1    conda-forge
jsonschema-with-format-nongpl 4.23.0               hd8ed1ab_1    conda-forge
jupyter-lsp               2.2.5              pyhd8ed1ab_1    conda-forge
jupyter_client            8.6.3              pyhd8ed1ab_1    conda-forge
jupyter_core              5.7.2           py311h1ea47a8_0    conda-forge
jupyter_events            0.12.0             pyh29332c3_0    conda-forge
jupyter_server            2.15.0             pyhd8ed1ab_0    conda-forge
jupyter_server_terminals  0.5.3              pyhd8ed1ab_1    conda-forge
jupyterlab                4.3.5              pyhd8ed1ab_0    conda-forge
jupyterlab_pygments       0.3.0              pyhd8ed1ab_2    conda-forge
jupyterlab_server         2.27.3             pyhd8ed1ab_1    conda-forge
kiwisolver                1.4.8           py311h5da7b33_0
korean-lunar-calendar     0.3.1                    pypi_0    pypi
krb5                      1.20.1               h5b6d351_0
lcms2                     2.16                 hb4a4139_0
```

```
lerc                          4.0.0               h5da7b33_0
libblas                       3.9.0            26_win64_mkl    conda-forge
libcblas                      3.9.0            26_win64_mkl    conda-forge
libclang                      14.0.6         default_hb5a9fac_2
libclang13                    14.0.6         default_h8e68704_2
libdeflate                    1.22                h5bf469e_0
libffi                        3.4.4               hd77b12b_1
libiconv                      1.17                hcfcfb64_2    conda-forge
liblapack                     3.9.0            26_win64_mkl    conda-forge
libpng                        1.6.39              h8cc25b3_0
libpq                         17.2                h70ee33d_0
libsodium                     1.0.18              h8d14728_1    conda-forge
libsqlite                     3.49.1              h67fdade_1    conda-forge
libta-lib                     0.4.0               hcfcfb64_2    conda-forge
libtiff                       4.5.1               h44ae7cf_1
libwebp-base                  1.3.2               h3d04722_1
libxml2                       2.13.5              h24da03e_0
libxslt                       1.1.41              h0739af5_0
lightgbm                      4.6.0                   pypi_0    pypi
lru-dict                      1.3.0                   pypi_0    pypi
lxml                          5.3.0          py311h395c83e_1
lz4-c                         1.9.4               h2bbff1b_1
mako                          1.3.9                   pypi_0    pypi
markdown                      3.7                     pypi_0    pypi
markupsafe                    3.0.2          py311h5082efb_1    conda-forge
matplotlib                    3.10.0         py311haa95532_0
matplotlib-base               3.10.0         py311he19b0ae_0
matplotlib-inline             0.1.7             pyhd8ed1ab_1    conda-forge
mcp                           1.8.1                   pypi_0    pypi
mistune                       3.1.2             pyhd8ed1ab_0    conda-forge
mkl                           2023.1.0         h6b88ed4_46358
mkl-service                   2.4.0          py311h827c3e9_2
mkl_fft                       1.3.11         py311h827c3e9_0
mkl_random                    1.2.8          py311hea22821_0
mlflow                        2.20.2                  pypi_0    pypi
mlflow-skinny                 2.20.2                  pypi_0    pypi
msgpack                       1.1.0                   pypi_0    pypi
multidict                     6.1.0          py311h5082efb_1    conda-forge
multipledispatch              1.0.0                   pypi_0    pypi
multitasking                  0.0.9             pyhd8ed1ab_0    conda-forge
nbclient                      0.10.2            pyhd8ed1ab_0    conda-forge
nbconvert-core                7.16.6            pyh29332c3_0    conda-forge
nbformat                      5.10.4            pyhd8ed1ab_1    conda-forge
ndindex                       1.9.2                   pypi_0    pypi
nest-asyncio                  1.6.0             pyhd8ed1ab_1    conda-forge
networkx                      3.4.2                   pypi_0    pypi
notebook                      7.3.2             pyhd8ed1ab_0    conda-forge
notebook-shim                 0.2.4             pyhd8ed1ab_1    conda-forge
numexpr                       2.10.1         py311h4cd664f_0
numpy                         1.26.4                  pypi_0    pypi
openai                        1.78.1                  pypi_0    pypi
openai-agents                 0.0.14                  pypi_0    pypi
openjpeg                      2.5.2                hae555c5_0
openpyxl                      3.1.5                   pypi_0    pypi
openssl                       3.4.1                ha4e3fda_0    conda-forge
opentelemetry-api             1.30.0                  pypi_0    pypi
opentelemetry-sdk             1.30.0                  pypi_0    pypi
opentelemetry-semantic-conventions 0.51b0                   pypi_0    pypi
optuna                        4.2.1                   pypi_0    pypi
outcome                       1.3.0.post0             pypi_0    pypi
```

overrides	7.7.0	pyhd8ed1ab_1	conda-forge
packaging	24.2	py311haa95532_0	
pandas	2.2.3	py311h5da7b33_0	
pandas-datareader	0.10.0	pypi_0	pypi
pandas-market-calendars	4.6.1	pypi_0	pypi
pandocfilters	1.5.0	pyhd8ed1ab_0	conda-forge
parso	0.8.4	pyhd8ed1ab_1	conda-forge
patsy	1.0.1	py311haa95532_0	
peewee	3.17.3	pypi_0	pypi
pickleshare	0.7.5	pyhd8ed1ab_1004	conda-forge
pillow	11.1.0	py311h096bfcc_0	
pip	25.0	py311haa95532_0	
pkgutil-resolve-name	1.3.10	pyhd8ed1ab_2	conda-forge
platformdirs	4.3.6	pyhd8ed1ab_1	conda-forge
plotly	5.24.1	py311h746a85d_0	
ply	3.11	py311haa95532_0	
prometheus_client	0.21.1	pyhd8ed1ab_0	conda-forge
prompt-toolkit	3.0.50	pyha770c72_0	conda-forge
propcache	0.2.1	py311h5082efb_1	conda-forge
protobuf	5.29.3	pypi_0	pypi
psutil	6.1.1	py311he736701_0	conda-forge
pure_eval	0.2.3	pyhd8ed1ab_1	conda-forge
py-cpuinfo	9.0.0	pypi_0	pypi
py4j	0.10.9.9	pypi_0	pypi
pyarrow	18.1.0	pypi_0	pypi
pyasn1	0.6.1	pypi_0	pypi
pyasn1-modules	0.4.1	pypi_0	pypi
pycparser	2.22	pyh29332c3_1	conda-forge
pydantic	2.10.6	pypi_0	pypi
pydantic-core	2.27.2	pypi_0	pypi
pydantic-settings	2.9.1	pypi_0	pypi
pyfolio-reloaded	0.9.8	pypi_0	pypi
pygments	2.19.1	pyhd8ed1ab_0	conda-forge
pyluach	2.2.0	pypi_0	pypi
pyparsing	3.2.0	py311haa95532_0	
pyqt	5.15.10	py311h5da7b33_1	
pyqt5-sip	12.13.0	py311h827c3e9_1	
pysocks	1.7.1	pyh09c184e_7	conda-forge
python	3.11.11	h4607a30_0	
python-dateutil	2.9.0post0	py311haa95532_2	
python-dotenv	1.1.0	pypi_0	pypi
python-fastjsonschema	2.21.1	pyhd8ed1ab_0	conda-forge
python-graphviz	0.20.3	pypi_0	pypi
python-interface	1.6.1	pypi_0	pypi
python-json-logger	2.0.7	pyhd8ed1ab_0	conda-forge
python-multipart	0.0.20	pypi_0	pypi
python-tzdata	2023.3	pyhd3eb1b0_0	
python_abi	3.11	2_cp311	conda-forge
pytrends	4.9.2	pypi_0	pypi
pytz	2024.1	py311haa95532_0	
pywin32	308	pypi_0	pypi
pywinpty	2.0.15	py311hda3d55a_0	conda-forge
pyyaml	6.0.2	py311h5082efb_2	conda-forge
pyzmq	24.0.1	py311h7b3f143_1	conda-forge
qt-main	5.15.2	h19c9488_12	
quantconnect-stubs	16998	pypi_0	pypi
referencing	0.36.2	pyh29332c3_0	conda-forge
requests	2.32.3	pyhd8ed1ab_1	conda-forge
rfc3339-validator	0.1.4	pyhd8ed1ab_1	conda-forge
rfc3986-validator	0.1.1	pyh9f0ad1d_0	conda-forge

```
rpds-py                   0.22.3          py311h533ab2d_0    conda-forge
rsa                       4.9                     pypi_0    pypi
scikit-learn              1.6.1           py311h585ebfc_0
scipy                     1.15.1          py311h9f229c6_0
seaborn                   0.13.2          py311haa95532_1
selenium                  4.29.0                  pypi_0    pypi
send2trash                1.8.3              pyh5737063_1    conda-forge
setuptools                75.8.0          py311haa95532_0
sip                       6.7.12          py311h5da7b33_1
six                       1.16.0             pyhd3eb1b0_1
smmap                     5.0.2                   pypi_0    pypi
sniffio                   1.3.1              pyhd8ed1ab_1    conda-forge
sortedcontainers          2.4.0                   pypi_0    pypi
soupsieve                 2.5                pyhd8ed1ab_1    conda-forge
sqlalchemy                2.0.38                  pypi_0    pypi
sqlite                    3.45.3               h2bbff1b_0
sqlparse                  0.5.3                   pypi_0    pypi
sse-starlette             2.3.5                   pypi_0    pypi
stack_data                0.6.3              pyhd8ed1ab_1    conda-forge
starlette                 0.46.2                  pypi_0    pypi
statsmodels               0.14.4          py311h827c3e9_0
ta                        0.11.0             pyhd8ed1ab_1    conda-forge
ta-lib                    0.5.1           py311he736701_0    conda-forge
tables                    3.10.2                  pypi_0    pypi
tabulate                  0.9.0                   pypi_0    pypi
tbb                       2021.8.0             h59b6b97_0
tenacity                  9.0.0           py311haa95532_0
terminado                 0.18.1             pyh5737063_0    conda-forge
threadpoolctl             3.5.0           py311h746a85d_0
tinycss2                  1.4.0              pyhd8ed1ab_0    conda-forge
tk                        8.6.14               h0416ee5_0
tomli                     2.2.1              pyhd8ed1ab_1    conda-forge
toolz                     1.0.0                   pypi_0    pypi
tornado                   6.4.2           py311h827c3e9_0
tqdm                      4.67.1          py311h746a85d_0
traitlets                 5.14.3             pyhd8ed1ab_1    conda-forge
trio                      0.29.0                  pypi_0    pypi
trio-websocket            0.12.2                  pypi_0    pypi
types-python-dateutil     2.9.0.20241206     pyhd8ed1ab_0    conda-forge
types-requests            2.32.0.20250515         pypi_0    pypi
typing-extensions         4.12.2               hd8ed1ab_1    conda-forge
typing-inspection         0.4.0                   pypi_0    pypi
typing_extensions         4.12.2             pyha770c72_1    conda-forge
typing_utils              0.1.0              pyhd8ed1ab_1    conda-forge
tzdata                    2025a                h04d1e81_0
ucrt                      10.0.22621.0         h57928b3_1    conda-forge
unicodedata2              15.1.0          py311h827c3e9_1
uri-template              1.3.0              pyhd8ed1ab_1    conda-forge
urllib3                   2.3.0              pyhd8ed1ab_0    conda-forge
uvicorn                   0.34.2                  pypi_0    pypi
vc                        14.42                haa95532_4
vc14_runtime              14.42.34433         h6356254_24    conda-forge
vs2015_runtime            14.42.34433         hfef2bbc_24    conda-forge
waitress                  3.0.2                   pypi_0    pypi
wcwidth                   0.2.13             pyhd8ed1ab_1    conda-forge
webcolors                 24.11.1            pyhd8ed1ab_0    conda-forge
webencodings              0.5.1              pyhd8ed1ab_3    conda-forge
websocket-client          1.8.0              pyhd8ed1ab_1    conda-forge
websockets                15.0.1                  pypi_0    pypi
werkzeug                  3.1.3                   pypi_0    pypi
```

```
wheel                     0.45.1          py311haa95532_0
win_inet_pton             1.1.0             pyh7428d3b_8    conda-forge
winpty                    0.4.3                        4    conda-forge
wrapt                     1.17.2                  pypi_0    pypi
wsproto                   1.2.0                   pypi_0    pypi
xgboost                   2.1.4                   pypi_0    pypi
xz                        5.6.4                 h4754444_1
yaml                      0.2.5                 h8ffe710_2    conda-forge
yarl                      1.18.3          py311h5082efb_1    conda-forge
yfinance                  0.2.61                  pypi_0    pypi
zeromq                    4.3.4                 h0e60522_1    conda-forge
zipline-reloaded          3.1                     pypi_0    pypi
zipp                      3.21.0             pyhd8ed1ab_1    conda-forge
zlib                      1.2.13                h8cc25b3_1
zstandard                 0.23.0          py311h53056dc_1    conda-forge
zstd                      1.5.6                 h8880b57_0
```

Both `OpenAI` and `FMP (Financial Modeling PRep)` APIs have a free-trial for new users for a limited amount of time and data. For more information click in the next links:

- OpenAI
- FMP

Sign-up to `FMP` and `OpenAI` to obtain an API key. Once this is done, login with your API keys changing the `path` variable provided below.

In [3]:
```
## Retrieve API Keys and start OpenAI session

#  retrieve keys:
key_file_name = 'config.ini'
path = r'C:\Users\Carlo\OneDrive\Desktop\SSH_KEYS'  # use your path to where you
config = configparser.ConfigParser()
config.read(path+'\\'+ key_file_name)
api_key = config['openai']['api_key']
os.environ["OPENAI_API_KEY"] = api_key # required by OpenAI agents
fmp_key = config['financialmodelingprep']['api_key']
warnings.filterwarnings('ignore')
```

Please beware `config.ini` has to contain your own API keys obtained from signing up on `OpenAI` and `FMP` using the next format:

```
[openai]
api_key = sk-fsdlfkmsdlkfmsmfmldkmfmsdlfmlksd

[financialmodelingprep]
api_key = lkj4lkj2lk4jlkjl23j4l2kjlkjlkj32
```

This can be easily achieved with a text editor such as `Notepad`.

You can check available models for agents in the next cell:

In [11]:
```
# LLMs models available for the Agent in OpenAI
models = openai.models.list()
for model in models.to_dict()['data']:
    print(model['id'])
```

```
gpt-4o-realtime-preview-2024-12-17
gpt-4o-audio-preview-2024-12-17
gpt-4-1106-preview
dall-e-3
dall-e-2
gpt-4o-audio-preview-2024-10-01
gpt-4-turbo-preview
text-embedding-3-small
babbage-002
gpt-4
text-embedding-ada-002
chatgpt-4o-latest
gpt-4o-mini-audio-preview
gpt-4o-audio-preview
o1-preview-2024-09-12
gpt-4o-mini-realtime-preview
gpt-4o-mini-realtime-preview-2024-12-17
gpt-4.1-nano
gpt-3.5-turbo-instruct-0914
gpt-4o-mini-search-preview
gpt-4.1-nano-2025-04-14
gpt-3.5-turbo-16k
gpt-4o-realtime-preview
davinci-002
gpt-3.5-turbo-1106
gpt-4o-search-preview
gpt-3.5-turbo-instruct
gpt-3.5-turbo
o3-mini-2025-01-31
gpt-4o-mini-search-preview-2025-03-11
gpt-4-0125-preview
gpt-4o-2024-11-20
gpt-4o-2024-05-13
text-embedding-3-large
o1-2024-12-17
o1
o1-preview
gpt-4-0613
o1-mini
gpt-4o-mini-tts
o1-pro
gpt-4o-transcribe
gpt-4.5-preview
o1-pro-2025-03-19
gpt-4.5-preview-2025-02-27
gpt-4o-search-preview-2025-03-11
omni-moderation-2024-09-26
gpt-image-1
o1-mini-2024-09-12
tts-1-hd
gpt-4o
tts-1-hd-1106
gpt-4o-2024-08-06
gpt-4o-mini-2024-07-18
gpt-4.1-mini
gpt-4o-mini
gpt-4o-mini-audio-preview-2024-12-17
gpt-3.5-turbo-0125
gpt-4-turbo
tts-1
```

```
gpt-4-turbo-2024-04-09
tts-1-1106
gpt-4o-realtime-preview-2024-10-01
gpt-4o-mini-transcribe
gpt-4.1-mini-2025-04-14
o3-mini
gpt-4.1
whisper-1
gpt-4.1-2025-04-14
omni-moderation-latest
o4-mini-2025-04-16
o4-mini
codex-mini-latest
```

`OpenAI SDK` allows to user third party models as well so you can check this link if you are interested.

2. Single Agent Intro

`OpenAI` has recently launched a powerful new `OpenAI Agents SDK` designed to help developers build and manage multi-agent workflows, significantly advancing beyond last year's experimental Swarm SDK. This updated toolkit introduces several key features:

- **Agents**: Easily configurable language models with clear instructions and integrated tools, including web search, file search, and system access.
- **Handoffs**: Seamless control transfer between agents. Unlike Swarm, which required manual method definitions, this SDK enables intelligent, automated transitions.
- **Guardrails**: Customizable input and output validation to ensure safety and reliability across agent interactions.
- **Tracing & Observability**: Visual tools for debugging and performance tuning. The OpenAI Dashboard provides detailed logs and execution traces, giving a transparent view of agent calls and intermediate outputs.

To install `OpenAI` agent-specific library:

```
pip install openai-agents
```

A Single Agent system configured with:

- `instructions` : also known as a developer message or system prompt.
- `model` : which LLM to use, and optional *model_settings* to configure model tuning parameters like temperature, top_p, etc.
- `tools` : Tools that the agent can use to achieve its tasks.

We are going to create a very basic trading assistant agent to help us:

In [104…

```python
# 1. Define Tools

@function_tool
def get_stock_company_info(symbol: str) -> dict:
    """
    Fetch company's basic information such as price, CEO name, description, sect
```

```
    Returns dictionary with values for the next fields:
        'symbol', 'price', 'beta', 'volAvg', 'mktCap', 'lastDiv', 'range',
        'changes', 'companyName', 'currency', 'cik', 'isin', 'cusip', 'exchange'
        'exchangeShortName', 'industry', 'website', 'description', 'ceo', 'secto
        'country', 'fullTimeEmployees', 'phone', 'address', 'city', 'state', 'zi
        'dcfDiff', 'dcf', 'image', 'ipoDate', 'defaultImage', 'isEtf', 'isActive
    """
    url = f"https://financialmodelingprep.com/api/v3/profile/{symbol}?apikey={fm
    try:
        response = requests.get(url)
        info = response.json()[0]
        return {
            "symbol": symbol.upper(),
            "price": info['price'],
            "beta": info['beta'],
            "description": info['description'],
            "sector": info['sector'],
            "industry": info['industry'],
            "dcf_valuation": info['dcf']
        }
    except (IndexError, KeyError):
        return {"error": f"Could not fetch financials for symbol: {symbol}"}

@function_tool
def get_stock_technical(symbol:str) -> dict:
    """
    Fetches last price, 50d SMA, 200d SMA, RSI and 6-month ROC using yfinance an
    """
    try:
        # Fetch 1 year of daily price data
        df = yf.download(symbol, period="1y", interval="1d", progress=False)

        # Check data validity
        if df.empty or 'Close' not in df.columns:
            return {"error": f"No valid data for symbol: {symbol}"}

        close_series = df['Close'].dropna()
        close_np = close_series.to_numpy(dtype='float64').flatten() # Ensure TAL

        # Ensure enough data
        if len(close_series) < 200:
            return {"error": f"Not enough data to compute indicators for {symbol

        # Compute indicators
        sma_50 = talib.SMA(close_np, timeperiod=50)
        sma_200 = talib.SMA(close_np, timeperiod=200)
        rsi = talib.RSI(close_np, timeperiod=14)

        # Extract the most recent values
        latest_sma_50 = sma_50[-1]
        latest_sma_200 = sma_200[-1]
        latest_rsi = rsi[-1]
        last_price = close_np[-1]
        roc_6m = close_np[-1]/close_np[-21*6] - 1 # 6-month price momentum

        # Check for NaNs
        if np.isnan(latest_sma_50) or np.isnan(latest_sma_200) or np.isnan(lates
            return {"error": f"Indicator values not ready — possible NaNs at the
```

```
        return {
            "symbol": symbol.upper(),
            "last_price": round(last_price, 2),
            "SMA_50d": round(latest_sma_50, 2),
            "SMA_200d": round(latest_sma_200, 2),
            "RSI": round(latest_rsi, 2),
            "6_month_price_momentum":round(roc_6m,2)
        }

    except Exception as e:
        return {"error": f"Unhandled error for symbol {symbol}: {str(e)}"}
```

In [ ]:

```
# 2. Define Basic Agent
trading_assistant = Agent(
    name="trading_assistant",
    instructions="""
You are a stock trading assistant. You should act like a quantitative trading as

Your responsibilities are:
- Retrieve and summarize key information about a company's stock using only the
- Provide concise, relevant trading insights based strictly on the retrieved dat
- Provide BUY, SELL, or HOLD recommendation if requested.

Rules:
- Always use tools to obtain real-time data or the provided input data. Do not g
- Do not include disclaimers or additional context unless explicitly requested.
- Keep your output concise and focused — avoid verbosity, off-topic elaboration.
- If a tool fails or returns no data, clearly state this and do not make assumpt

Example response formats:
Query: What is the the valuation of XYZ?
Response: "XYZ is currently trading at $125. Its DCF is $225, indicating signifi
Query: What is the situation of ticker XYZ? (XYZ ticker incorrect)
Response: "Unable to retrieve data for ticker 'XYZ'. Please check the symbol and
Query: What is your policy on EU GDPR regulation?
Response: "Unable to answer non-investment questions."

""",
    tools=[
        get_stock_company_info,
        get_stock_technical
    ],
    model = "gpt-4o" # "gpt-4o-mini" for smaller model or any other available su
)
```

In [ ]:

```
# 3 Simulate Feed: this code simulates users (e.g. human analysts) using concurr

async def main():
    output = [] # store each query answer
    queries = ["What's the price trend of NVDA?", #investment question
            "What's your view on BTC?", #  crypto question
            "What's the valuation of Nvidia?", # investment question
            "What are the implications of EU GDPR for an asset manager?", #  reg
            "What's the market sensitivity of NVDA?", # investment question
            "What is a better investment NVDA or AMD?", # investment question
            "What is life?"] # non-investment question
    for i, query in enumerate(queries):
        print(f'Q_{i+1}: {query}')
        result = await Runner.run(trading_assistant, query)
```

```
        print(f'A:{result.final_output}')
        output.append(result)
        print("\n", 175*"-","\n")
    return queries, output
```

In [107…

```
# 4 . Execute Workflow Simulation:
try:
    queries, result_list = await main()
except RuntimeError:
    asyncio.run(main())
```

```
Q_1: What's the price trend of NVDA?
A:NVIDIA Corporation (NVDA) is currently trading at $135.57. Here's a brief analy
sis of its price trend:

- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **RSI**: 73.04 (Overbought)
- **6-month Price Momentum**: -0.08

**Insights:**

- The stock is trading above both its 50-day and 200-day SMAs, indicating a near-
term uptrend.
- The RSI of 73.04 suggests that the stock may be overbought, which could lead to
a potential price correction or consolidation.
- The 6-month price momentum indicates a very slight negative trend over this per
iod.

Strategically, the stock is trading slightly below its DCF valuation of $144.72,
which might suggest potential undervaluation in the long term.

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Q_2: What's your view on BTC?
A:I don't have tools to provide information on cryptocurrencies like Bitcoin. You
might want to check financial news sites or cryptocurrency exchanges for real-tim
e data and analysis.

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Q_3: What's the valuation of Nvidia?
A:Nvidia (NVDA) is currently trading at $135.57. The Discounted Cash Flow (DCF) v
aluation is approximately $144.72, suggesting that the stock is slightly underval
ued.

**Technical Indicators:**
- 50-Day SMA: $113.13
- 200-Day SMA: $125.57
- RSI: 73.04 (Indicating overbought conditions)
- 6-Month Price Momentum: -0.08

Given the technical and valuation metrics, Nvidia appears slightly undervalued wi
th overbought conditions according to RSI. Adjustments based on market trends and
RSI behavior may be considered for trading strategy.

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Q_4: What are the implications of EU GDPR for an asset manager?
A:"Unable to answer non-investment questions."

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```

Q_5: What's the market sensitivity of NVDA?
A:NVIDIA Corporation (NVDA) is trading at $135.57. Here's a summary of its market sensitivity:

- **Beta**: 2.114, indicating higher volatility compared to the market.
- **RSI**: 73.04, suggesting the stock is currently overbought.
- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **6-month Price Momentum (ROC)**: -0.08, showing a slight downward trend in price momentum.
- **DCF Valuation**: $144.72, indicating potential undervaluation relative to its intrinsic value.

Overall, NVDA is characterized by high market sensitivity and current overbought conditions.

Q_6: What is a better investment NVDA or AMD?
A:### NVIDIA Corporation (NVDA)
- **Current Price:** $135.57
- **DCF Valuation:** $144.72
- **50-day SMA:** $113.13
- **200-day SMA:** $125.57
- **RSI:** 73.04 (Overbought)
- **6-Month Price Momentum:** -0.08
- **Beta:** 2.114

Company Overview: NVIDIA is a leader in graphics processing units (GPUs) and AI solutions. It operates in gaming, data centers, automotive, and more.

Advanced Micro Devices, Inc. (AMD)
- **Current Price:** $114.74
- **DCF Valuation:** $53.97
- **50-day SMA:** $99.84
- **200-day SMA:** $126.92
- **RSI:** 65.28
- **6-Month Price Momentum:** -0.17
- **Beta:** 1.968

Company Overview: AMD focuses on x86 microprocessors, GPUs, and developing technology for game consoles and embedded systems.

Investment Insights:
- **NVDA** is trading above both its 50-day and 200-day SMAs, indicating a strong upward trend. However, its RSI suggests it may be overbought.
- **AMD** is under its 200-day SMA, and slightly above the 50-day SMA. The RSI indicates it's approaching the overbought territory.

Recommendation:
- **NVDA** appears fundamentally overvalued with a potential short-term price correction due to its RSI level.
- **AMD** appears overvalued based on DCF, and it is also nearing the overbought range.

Given these data points, if you favor momentum and technical upward trends, NVDA may currently present a stronger case. However, be mindful of the overbought RSI, signaling caution.

```
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Q_7: What is life?
A:"Unable to answer non-investment questions."

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```

In [109…

```python
for i, result in enumerate(result_list):
    print(f'Q_{i+1}: {queries[i]}')
    print(result.final_output)
    print("\n", 175*"-","\n")
```

```
Q_1: What's the price trend of NVDA?
NVIDIA Corporation (NVDA) is currently trading at $135.57. Here's a brief analysi
s of its price trend:

- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **RSI**: 73.04 (Overbought)
- **6-month Price Momentum**: -0.08

**Insights:**

- The stock is trading above both its 50-day and 200-day SMAs, indicating a near-
term uptrend.
- The RSI of 73.04 suggests that the stock may be overbought, which could lead to
a potential price correction or consolidation.
- The 6-month price momentum indicates a very slight negative trend over this per
iod.

Strategically, the stock is trading slightly below its DCF valuation of $144.72,
which might suggest potential undervaluation in the long term.

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Q_2: What's your view on BTC?
I don't have tools to provide information on cryptocurrencies like Bitcoin. You m
ight want to check financial news sites or cryptocurrency exchanges for real-time
data and analysis.

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Q_3: What's the valuation of Nvidia?
Nvidia (NVDA) is currently trading at $135.57. The Discounted Cash Flow (DCF) val
uation is approximately $144.72, suggesting that the stock is slightly undervalue
d.

**Technical Indicators:**
- 50-Day SMA: $113.13
- 200-Day SMA: $125.57
- RSI: 73.04 (Indicating overbought conditions)
- 6-Month Price Momentum: -0.08

Given the technical and valuation metrics, Nvidia appears slightly undervalued wi
th overbought conditions according to RSI. Adjustments based on market trends and
RSI behavior may be considered for trading strategy.

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Q_4: What are the implications of EU GDPR for an asset manager?
"Unable to answer non-investment questions."

 ----------------------------------------------------------------------------
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```

Q_5: What's the market sensitivity of NVDA?
NVIDIA Corporation (NVDA) is trading at $135.57. Here's a summary of its market s
ensitivity:

- **Beta**: 2.114, indicating higher volatility compared to the market.
- **RSI**: 73.04, suggesting the stock is currently overbought.
- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **6-month Price Momentum (ROC)**: -0.08, showing a slight downward trend in pri
ce momentum.
- **DCF Valuation**: $144.72, indicating potential undervaluation relative to its
intrinsic value.

Overall, NVDA is characterized by high market sensitivity and current overbought
conditions.

Q_6: What is a better investment NVDA or AMD?
NVIDIA Corporation (NVDA)
- **Current Price:** $135.57
- **DCF Valuation:** $144.72
- **50-day SMA:** $113.13
- **200-day SMA:** $125.57
- **RSI:** 73.04 (Overbought)
- **6-Month Price Momentum:** -0.08
- **Beta:** 2.114

Company Overview: NVIDIA is a leader in graphics processing units (GPUs) and
AI solutions. It operates in gaming, data centers, automotive, and more.

Advanced Micro Devices, Inc. (AMD)
- **Current Price:** $114.74
- **DCF Valuation:** $53.97
- **50-day SMA:** $99.84
- **200-day SMA:** $126.92
- **RSI:** 65.28
- **6-Month Price Momentum:** -0.17
- **Beta:** 1.968

Company Overview: AMD focuses on x86 microprocessors, GPUs, and developing te
chnology for game consoles and embedded systems.

Investment Insights:
- **NVDA** is trading above both its 50-day and 200-day SMAs, indicating a strong
upward trend. However, its RSI suggests it may be overbought.
- **AMD** is under its 200-day SMA, and slightly above the 50-day SMA. The RSI in
dicates it's approaching the overbought territory.

Recommendation:
- **NVDA** appears fundamentally overvalued with a potential short-term price cor
rection due to its RSI level.
- **AMD** appears overvalued based on DCF, and it is also nearing the overbought
range.

Given these data points, if you favor momentum and technical upward trends, NVDA
may currently present a stronger case. However, be mindful of the overbought RSI,
signaling caution.

```
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Q_7: What is life?
"Unable to answer non-investment questions."

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```

The answers are far from perfect but it's a good start.

We can dig each answer result object further for more information:

In [110…

```python
for i, result in enumerate(result_list):
    print(f'Q1_{i+1}: {queries[i]}')
    print("\n", 175*"#","\n")
    for item in result.new_items[:]:
        if type(item) == items.HandoffCallItem:
            print("HandoffCallItem")
            print(item.agent.name)
            print(item.agent.instructions)
            print(item.raw_item.name)
        if type(item) == items.MessageOutputItem:
            print("MessageOutputItem")
            print(item.raw_item.content[0].text)
        if type(item) == items.ToolCallItem:
            print("ToolCallItem")
            print(item.agent.name)
        if type(item) == items.ToolCallOutputItem or type(item) == items.Handoff
            print("ToolCallOutputItem or HandoffOutputItem")
            print(item.raw_item['output'])
        print("\n", 175*"-","\n")
```

```
Q1_1: What's the price trend of NVDA?

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ToolCallItem
trading_assistant

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ToolCallItem
trading_assistant

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ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'last_price': 135.57, 'SMA_50d': 113.13, 'SMA_200d': 125.57,
'RSI': 73.04, '6_month_price_momentum': -0.08}

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--------------

ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'price': 135.57, 'beta': 2.114, 'description': "NVIDIA Corpora
tion provides graphics, and compute and networking solutions in the United State
s, Taiwan, China, and internationally. The company's Graphics segment offers GeFo
rce GPUs for gaming and PCs, the GeForce NOW game streaming service and related i
nfrastructure, and solutions for gaming platforms; Quadro/NVIDIA RTX GPUs for ent
erprise workstation graphics; vGPU software for cloud-based visual and virtual co
mputing; automotive platforms for infotainment systems; and Omniverse software fo
r building 3D designs and virtual worlds. Its Compute & Networking segment provid
es Data Center platforms and systems for AI, HPC, and accelerated computing; Mell
anox networking and interconnect solutions; automotive AI Cockpit, autonomous dri
ving development agreements, and autonomous vehicle solutions; cryptocurrency min
ing processors; Jetson for robotics and other embedded platforms; and NVIDIA AI E
nterprise and other software. The company's products are used in gaming, professi
onal visualization, datacenter, and automotive markets. NVIDIA Corporation sells
its products to original equipment manufacturers, original device manufacturers,
system builders, add-in board manufacturers, retailers/distributors, independent
software vendors, Internet and cloud service providers, automotive manufacturers
and tier-1 automotive suppliers, mapping companies, start-ups, and other ecosyste
m participants. It has a strategic collaboration with Kroger Co. NVIDIA Corporati
on was incorporated in 1993 and is headquartered in Santa Clara, California.", 's
ector': 'Technology', 'industry': 'Semiconductors', 'dcf_valuation': 144.72005260
473833}

 --------------------------------------------------------------------------------
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--------------

MessageOutputItem
NVIDIA Corporation (NVDA) is currently trading at $135.57. Here's a brief analysi
s of its price trend:
```

```
- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **RSI**: 73.04 (Overbought)
- **6-month Price Momentum**: -0.08

**Insights:**

- The stock is trading above both its 50-day and 200-day SMAs, indicating a near-
term uptrend.
- The RSI of 73.04 suggests that the stock may be overbought, which could lead to
a potential price correction or consolidation.
- The 6-month price momentum indicates a very slight negative trend over this per
iod.

Strategically, the stock is trading slightly below its DCF valuation of $144.72,
which might suggest potential undervaluation in the long term.

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Q1_2: What's your view on BTC?

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MessageOutputItem
I don't have tools to provide information on cryptocurrencies like Bitcoin. You m
ight want to check financial news sites or cryptocurrency exchanges for real-time
data and analysis.

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Q1_3: What's the valuation of Nvidia?

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ToolCallItem
trading_assistant

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ToolCallItem
trading_assistant

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ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'price': 135.57, 'beta': 2.114, 'description': "NVIDIA Corpora
tion provides graphics, and compute and networking solutions in the United State
s, Taiwan, China, and internationally. The company's Graphics segment offers GeFo
```

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rce GPUs for gaming and PCs, the GeForce NOW game streaming service and related i
nfrastructure, and solutions for gaming platforms; Quadro/NVIDIA RTX GPUs for ent
erprise workstation graphics; vGPU software for cloud-based visual and virtual co
mputing; automotive platforms for infotainment systems; and Omniverse software fo
r building 3D designs and virtual worlds. Its Compute & Networking segment provid
es Data Center platforms and systems for AI, HPC, and accelerated computing; Mell
anox networking and interconnect solutions; automotive AI Cockpit, autonomous dri
ving development agreements, and autonomous vehicle solutions; cryptocurrency min
ing processors; Jetson for robotics and other embedded platforms; and NVIDIA AI E
nterprise and other software. The company's products are used in gaming, professi
onal visualization, datacenter, and automotive markets. NVIDIA Corporation sells
its products to original equipment manufacturers, original device manufacturers,
system builders, add-in board manufacturers, retailers/distributors, independent
software vendors, Internet and cloud service providers, automotive manufacturers
and tier-1 automotive suppliers, mapping companies, start-ups, and other ecosyste
m participants. It has a strategic collaboration with Kroger Co. NVIDIA Corporati
on was incorporated in 1993 and is headquartered in Santa Clara, California.", 's
ector': 'Technology', 'industry': 'Semiconductors', 'dcf_valuation': 144.72005260
473833}

 ------------------------------------------------------------------------------
------------------------------------------------------------------------------
--------------

ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'last_price': 135.57, 'SMA_50d': 113.13, 'SMA_200d': 125.57,
'RSI': 73.04, '6_month_price_momentum': -0.08}

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--------------

MessageOutputItem
Nvidia (NVDA) is currently trading at $135.57. The Discounted Cash Flow (DCF) val
uation is approximately $144.72, suggesting that the stock is slightly undervalue
d.

**Technical Indicators:**
- 50-Day SMA: $113.13
- 200-Day SMA: $125.57
- RSI: 73.04 (Indicating overbought conditions)
- 6-Month Price Momentum: -0.08

Given the technical and valuation metrics, Nvidia appears slightly undervalued wi
th overbought conditions according to RSI. Adjustments based on market trends and
RSI behavior may be considered for trading strategy.

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Q1_4: What are the implications of EU GDPR for an asset manager?

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MessageOutputItem
"Unable to answer non-investment questions."
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Q1_5: What's the market sensitivity of NVDA?

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ToolCallItem
trading_assistant

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ToolCallItem
trading_assistant

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ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'last_price': 135.57, 'SMA_50d': 113.13, 'SMA_200d': 125.57,
'RSI': 73.04, '6_month_price_momentum': -0.08}

 ------------------------------------------------------------------------------
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ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'price': 135.57, 'beta': 2.114, 'description': "NVIDIA Corpora
tion provides graphics, and compute and networking solutions in the United State
s, Taiwan, China, and internationally. The company's Graphics segment offers GeFo
rce GPUs for gaming and PCs, the GeForce NOW game streaming service and related i
nfrastructure, and solutions for gaming platforms; Quadro/NVIDIA RTX GPUs for ent
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mputing; automotive platforms for infotainment systems; and Omniverse software fo
r building 3D designs and virtual worlds. Its Compute & Networking segment provid
es Data Center platforms and systems for AI, HPC, and accelerated computing; Mell
anox networking and interconnect solutions; automotive AI Cockpit, autonomous dri
ving development agreements, and autonomous vehicle solutions; cryptocurrency min
ing processors; Jetson for robotics and other embedded platforms; and NVIDIA AI E
nterprise and other software. The company's products are used in gaming, professi
onal visualization, datacenter, and automotive markets. NVIDIA Corporation sells
its products to original equipment manufacturers, original device manufacturers,
system builders, add-in board manufacturers, retailers/distributors, independent
software vendors, Internet and cloud service providers, automotive manufacturers
and tier-1 automotive suppliers, mapping companies, start-ups, and other ecosyste
m participants. It has a strategic collaboration with Kroger Co. NVIDIA Corporati
on was incorporated in 1993 and is headquartered in Santa Clara, California.", 's
ector': 'Technology', 'industry': 'Semiconductors', 'dcf_valuation': 144.72005260
473833}

 ------------------------------------------------------------------------------
------------------------------------------------------------------------------
--------------
```

```
MessageOutputItem
NVIDIA Corporation (NVDA) is trading at $135.57. Here's a summary of its market s
ensitivity:

- **Beta**: 2.114, indicating higher volatility compared to the market.
- **RSI**: 73.04, suggesting the stock is currently overbought.
- **50-day SMA**: $113.13
- **200-day SMA**: $125.57
- **6-month Price Momentum (ROC)**: -0.08, showing a slight downward trend in pri
ce momentum.
- **DCF Valuation**: $144.72, indicating potential undervaluation relative to its
intrinsic value.

Overall, NVDA is characterized by high market sensitivity and current overbought
conditions.

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Q1_6: What is a better investment NVDA or AMD?

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ToolCallItem
trading_assistant

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ToolCallItem
trading_assistant

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ToolCallItem
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ToolCallItem
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ToolCallOutputItem or HandoffOutputItem
{'symbol': 'NVDA', 'price': 135.57, 'beta': 2.114, 'description': "NVIDIA Corpora
tion provides graphics, and compute and networking solutions in the United State
s, Taiwan, China, and internationally. The company's Graphics segment offers GeFo
rce GPUs for gaming and PCs, the GeForce NOW game streaming service and related i
nfrastructure, and solutions for gaming platforms; Quadro/NVIDIA RTX GPUs for ent
```

erprise workstation graphics; vGPU software for cloud-based visual and virtual co
mputing; automotive platforms for infotainment systems; and Omniverse software fo
r building 3D designs and virtual worlds. Its Compute & Networking segment provid
es Data Center platforms and systems for AI, HPC, and accelerated computing; Mell
anox networking and interconnect solutions; automotive AI Cockpit, autonomous dri
ving development agreements, and autonomous vehicle solutions; cryptocurrency min
ing processors; Jetson for robotics and other embedded platforms; and NVIDIA AI E
nterprise and other software. The company's products are used in gaming, professi
onal visualization, datacenter, and automotive markets. NVIDIA Corporation sells
its products to original equipment manufacturers, original device manufacturers,
system builders, add-in board manufacturers, retailers/distributors, independent
software vendors, Internet and cloud service providers, automotive manufacturers
and tier-1 automotive suppliers, mapping companies, start-ups, and other ecosyste
m participants. It has a strategic collaboration with Kroger Co. NVIDIA Corporati
on was incorporated in 1993 and is headquartered in Santa Clara, California.", 's
ector': 'Technology', 'industry': 'Semiconductors', 'dcf_valuation': 144.72005260
473833}

ToolCallOutputItem or HandoffOutputItem

{'symbol': 'AMD', 'price': 114.74, 'beta': 1.968, 'description': 'Advanced Micro
Devices, Inc. operates as a semiconductor company worldwide. The company operates
in two segments, Computing and Graphics; and Enterprise, Embedded and Semi-Custo
m. Its products include x86 microprocessors as an accelerated processing unit, ch
ipsets, discrete and integrated graphics processing units (GPUs), data center and
professional GPUs, and development services; and server and embedded processors,
and semi-custom System-on-Chip (SoC) products, development services, and technolo
gy for game consoles. The company provides processors for desktop and notebook pe
rsonal computers under the AMD Ryzen, AMD Ryzen PRO, Ryzen Threadripper, Ryzen Th
readripper PRO, AMD Athlon, AMD Athlon PRO, AMD FX, AMD A-Series, and AMD PRO A-S
eries processors brands; discrete GPUs for desktop and notebook PCs under the AMD
Radeon graphics, AMD Embedded Radeon graphics brands; and professional graphics p
roducts under the AMD Radeon Pro and AMD FirePro graphics brands. It also offers
Radeon Instinct, Radeon PRO V-series, and AMD Instinct accelerators for servers;
chipsets under the AMD trademark; microprocessors for servers under the AMD EPYC;
embedded processor solutions under the AMD Athlon, AMD Geode, AMD Ryzen, AMD EPY
C, AMD R-Series, and G-Series processors brands; and customer-specific solutions
based on AMD CPU, GPU, and multi-media technologies, as well as semi-custom SoC p
roducts. It serves original equipment manufacturers, public cloud service provide
rs, original design manufacturers, system integrators, independent distributors,
online retailers, and add-in-board manufacturers through its direct sales force,
independent distributors, and sales representatives. The company was incorporated
in 1969 and is headquartered in Santa Clara, California.', 'sector': 'Technolog
y', 'industry': 'Semiconductors', 'dcf_valuation': 53.96580831266909}

ToolCallOutputItem or HandoffOutputItem

{'symbol': 'NVDA', 'last_price': 135.57, 'SMA_50d': 113.13, 'SMA_200d': 125.57,
'RSI': 73.04, '6_month_price_momentum': -0.08}

```
ToolCallOutputItem or HandoffOutputItem
{'symbol': 'AMD', 'last_price': 114.74, 'SMA_50d': 99.84, 'SMA_200d': 126.92, 'RS
I': 65.28, '6_month_price_momentum': -0.17}

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MessageOutputItem
### NVIDIA Corporation (NVDA)
- **Current Price:** $135.57
- **DCF Valuation:** $144.72
- **50-day SMA:** $113.13
- **200-day SMA:** $125.57
- **RSI:** 73.04 (Overbought)
- **6-Month Price Momentum:** -0.08
- **Beta:** 2.114

**Company Overview:** NVIDIA is a leader in graphics processing units (GPUs) and
AI solutions. It operates in gaming, data centers, automotive, and more.

### Advanced Micro Devices, Inc. (AMD)
- **Current Price:** $114.74
- **DCF Valuation:** $53.97
- **50-day SMA:** $99.84
- **200-day SMA:** $126.92
- **RSI:** 65.28
- **6-Month Price Momentum:** -0.17
- **Beta:** 1.968

**Company Overview:** AMD focuses on x86 microprocessors, GPUs, and developing te
chnology for game consoles and embedded systems.

### Investment Insights:
- **NVDA** is trading above both its 50-day and 200-day SMAs, indicating a strong
upward trend. However, its RSI suggests it may be overbought.
- **AMD** is under its 200-day SMA, and slightly above the 50-day SMA. The RSI in
dicates it's approaching the overbought territory.

### Recommendation:
- **NVDA** appears fundamentally overvalued with a potential short-term price cor
rection due to its RSI level.
- **AMD** appears overvalued based on DCF, and it is also nearing the overbought
range.

Given these data points, if you favor momentum and technical upward trends, NVDA
may currently present a stronger case. However, be mindful of the overbought RSI,
signaling caution.

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Q1_7: What is life?

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MessageOutputItem
```

```
"Unable to answer non-investment questions."

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```

The last example is simulating a live feed between hummans and our agent, yet we can also launch a live bot with our Agent as well:

In [51]:
```python
#  Create Agent Boot
async def agent_bot():
    print("Hi! I'm your stock trading Assistant. Ask me about any stock. Type 'e
    while True:
        user_input = input("\nYou: ")
        if user_input.lower() in ["exit", "quit"]:
            print("Assistant: The discussion is terminated.")
            break
        result = await Runner.run(trading_assistant, user_input)
        print(f'User Q: {user_input}')
        print(f"Assistant: {result.final_output}")
```

Once you launch the bot executing the cell below, an interactive window should appear in your IDE (VSCode, Sublime, Pycharm, etc) to interact with it:

In [53]:
```python
# A) this only runs in py scripts, not in notebooks:
# if __name__ == "__main__":
#     asyncio.run(agent_bot())

# B) this should work in scripts and notebooks
try:
    await agent_bot()
except RuntimeError:
    asyncio.run(agent_bot())
```

```
Hi! I'm your stock trading Assistant. Ask me about any stock. Type 'exit' to qui
t.
User Q: What is your view on MSFT
Assistant: Microsoft Corporation (MSFT) is currently trading at $458.87.

### Technical Indicators:
- **50-day SMA**: $396.79
- **200-day SMA**: $413.23
- **RSI**: 78.47 (Overbought)
- **6-Month Price Momentum**: +8%

### Valuation:
- **Discounted Cash Flow (DCF) Valuation**: $353.95

### Sector and Industry:
- **Sector**: Technology
- **Industry**: Software - Infrastructure

### Summary:
Microsoft shares are trading significantly above both the 50-day and 200-day SMA
s, signaling a strong uptrend. The RSI at 78.47 suggests that the stock is in ove
rbought territory, which might indicate potential for a pullback. The current pri
ce exceeds the discounted cash flow valuation, suggesting it may be overvalued at
present levels.

### Recommendation:
Based on the above indicators, consider a **HOLD** strategy if you currently own
the stock but be cautious of potential corrections. Wait for a potential pullback
before making additional buy entries if you are looking to invest.
User Q: What is your view on GenAI regulation?
Assistant: "Unable to answer non-investment questions."
User Q: What are the problems with UNH?
Assistant: UnitedHealth Group Incorporated (UNH) is facing several technical chal
lenges:

1. **Current Price**: $315.89
2. **50-day SMA**: $464.57 (Current price is significantly below this moving aver
age)
3. **200-day SMA**: $530.16 (Current price is also significantly below this longe
r-term moving average)
4. **RSI (Relative Strength Index)**: 28.94, indicating the stock is currently ov
ersold.
5. **6-month Price Momentum**: -0.46, suggesting downward pressure over the past
six months.

These indicators suggest potential weakness in the stock’s current momentum and t
echnical outlook. Consider further analysis to understand underlying issues regar
ding the company or market sentiment.
User Q: answer
Assistant: Please provide the specific stock ticker symbol or company information
you need insights on.
Assistant: The discussion is terminated.
```

As highlighted above, the Agent is able to:

- Use tools to effectively retrieve stock information such as technical indicator and valuation.
- Able to not answer when the question is out of the investment topic e.g. regulation question.

- Unable to deal with context beyond the tools since it's not able to identify structural issues in `UNH` ticker despite the news over the last months. That said, the good news is that it does not allucinate creating stories.

It's good news that the model does not hallucinate making up things about `UNH`, which minimizes hallucination risk. That said, the Agent is limited to a sandbox and needs to be empowered with more data retrieval tools to be able to read news.

To review what happened during your agent run, navigate to the Trace viewer in the OpenAI Dashboard to view traces of your agent runs.

3. Multi Agent System Intro

This section introduces a Multi-agent system where a specialized-agent is used a handoff for legal and regulatory questions. In addition, `guardrails`, output type and `run_config` are also introduced.

In [111…

```
import asyncio
import requests
import yfinance as yf
import numpy as np
import pandas as pd
import talib
from agents import (Agent, Runner, FunctionTool, InputGuardrail, GuardrailFuncti
                    handoff,  InputGuardrailTripwireTriggered, RunConfig, ModelS
from agents.exceptions import InputGuardrailTripwireTriggered
from agents.extensions import handoff_filters
from pydantic import BaseModel


# ---- 1. Define Tools ----

@function_tool
def get_stock_company_info(symbol: str) -> dict:
    """
    Fetch company's basic information such as price, CEO name, description, sect

    Returns dictionary with values for the next fields:
        'symbol', 'price', 'beta', 'volAvg', 'mktCap', 'lastDiv', 'range',
        'changes', 'companyName', 'currency', 'cik', 'isin', 'cusip', 'exchange'
        'exchangeShortName', 'industry', 'website', 'description', 'ceo', 'secto
        'country', 'fullTimeEmployees', 'phone', 'address', 'city', 'state', 'zi
        'dcfDiff', 'dcf', 'image', 'ipoDate', 'defaultImage', 'isEtf', 'isActive
    """
    url = f"https://financialmodelingprep.com/api/v3/profile/{symbol}?apikey={fm
    try:
        response = requests.get(url)
        info = response.json()[0]
        return {
            "symbol": symbol.upper(),
            "price": info['price'],
            "beta": info['beta'],
            "description": info['description'],
            "sector": info['sector'],
            "industry": info['industry'],
```

```
            "dcf_valuation": info['dcf']
        }
    except (IndexError, KeyError):
        return {"error": f"Could not fetch financials for symbol: {symbol}"}

@function_tool
def get_stock_technical(symbol:str) -> dict:
    """
    Fetches last price, 50d SMA, 200d SMA, RSI and 6-month ROC using yfinance an
    """
    try:
        # Fetch 1 year of daily price data
        df = yf.download(symbol, period="1y", interval="1d", progress=False)

        # Check data validity
        if df.empty or 'Close' not in df.columns:
            return {"error": f"No valid data for symbol: {symbol}"}

        close_series = df['Close'].dropna()
        close_np = close_series.to_numpy(dtype='float64').flatten() # Ensure TAL

        # Ensure enough data
        if len(close_series) < 200:
            return {"error": f"Not enough data to compute indicators for {symbol

        # Compute indicators
        sma_50 = talib.SMA(close_np, timeperiod=50)
        sma_200 = talib.SMA(close_np, timeperiod=200)
        rsi = talib.RSI(close_np, timeperiod=14)

        # Extract the most recent values
        latest_sma_50 = sma_50[-1]
        latest_sma_200 = sma_200[-1]
        latest_rsi = rsi[-1]
        last_price = close_np[-1]
        roc_6m = close_np[-1]/close_np[-21*6] - 1 # 6-month price momentum

        # Check for NaNs
        if np.isnan(latest_sma_50) or np.isnan(latest_sma_200) or np.isnan(lates
            return {"error": f"Indicator values not ready — possible NaNs at the

        return {
            "symbol": symbol.upper(),
            "last_price": round(last_price, 2),
            "SMA_50d": round(latest_sma_50, 2),
            "SMA_200d": round(latest_sma_200, 2),
            "RSI": round(latest_rsi, 2),
            "6_month_price_momentum":round(roc_6m,2)
        }

    except Exception as e:
        return {"error": f"Unhandled error for symbol {symbol}: {str(e)}"}

# ---- 2. Guardrail: block crypto and invalid symbols ----

class GuardrailOutput(BaseModel):
    allow: bool
    reason: str

crypto_keywords = {"bitcoin", "btc", "eth", "ethereum", "crypto", "doge", "solan
```

```
async def reject_invalid_tickers(ctx, agent, input_data):
    input_text = input_data.lower()
    if any(word in input_text for word in crypto_keywords):
        return GuardrailFunctionOutput(
            output_info=GuardrailOutput(allow=False, reason="Crypto queries are
            tripwire_triggered=True
        )
    return GuardrailFunctionOutput(
        output_info=GuardrailOutput(allow=True, reason="OK"),
        tripwire_triggered=False
    )


# ---- 3. Compliance Agent ----

compliance_agent = Agent(
    name="Compliance Agent",
    instructions="You respond to questions that require regulatory caution. Do n
)

compliance_handoff = handoff(
    agent=compliance_agent,
    input_filter=handoff_filters.remove_all_tools # erase any previous chat info
)


# ---- 4. Trading Assistant Agent ----

trading_assistant = Agent(
    name="trading_assistant",
    instructions="""
You are a stock trading assistant. You should act like a quantitative trading as

Your Responsibilities:
- Use tools to fetch and summarize company stock data.
- Report results concisely, in markdown tables where appropriate.
- Only use retrieved data — never guess.
- Escalate to Compliance Agent if the question requests legal or regulatory advi
- Provide BUY, SELL, or HOLD recommendation if requested.

You must follow the next rules and constraints:
- Always use tools to obtain real-time data or the provided input data. Do not g
- Do not include disclaimers or additional context unless explicitly requested.
- Keep your output concise and focused — avoid verbosity, off-topic elaboration.
- If a tool fails or returns no data, clearly state this and do not make assumpt
- Do not provide any answer to those queries that are non-investment related.

You must use markdown format:
- Use **bold** for headers
- Use `code` formatting for ticker symbols
- Use tables for numeric indicators (price, RSI, SMAs)

""",
    tools=[get_stock_company_info, get_stock_technical],
    input_guardrails=[InputGuardrail(guardrail_function=reject_invalid_tickers)]
    handoffs=[compliance_handoff],
    handoff_description="Compliance_agent"
)
```

```
# ---- 5. Workflow Simulation
config = RunConfig(
    model_settings=ModelSettings(
        temperature=0.2          # Lower temp = more focused, less randomness in
    )
)
async def main():
    output = [] # store each query answer
    queries = ["What's the price trend of NVDA?",
            "What's your view on BTC?", #  crypto question
            "What's the valuation of Nvidia?",
            "What are the implications of EU GDPR for an asset manager?", #  reg
            "What's the market sensitivity of NVDA aka beta?", # investment ques
            "What is a better investment NVDA or AMD?", # investment question
            "What is life?"] # non-investment question
    for i, query in enumerate(queries):
        try:
            print(f'Q_{i+1}: {query}')
            result = await Runner.run(trading_assistant, query,run_config=config
            print(f'A:{result.final_output}')
            output.append(result)
        except InputGuardrailTripwireTriggered as e:
            reason = e.guardrail_result.output.output_info.reason
            print(f"Guardrail blocked input: {reason}")
            continue
        except Exception as e:
            print(f"Unexpected error: {str(e)}")
            continue
        print("\n", 175*"-","\n")
    return queries, output
```

In [112…

```
#  Execute Workflow Simulation:
try:
    queries, result_list = await main()
except RuntimeError:
    asyncio.run(main())
```

```
Q_1: What's the price trend of NVDA?
A:**NVDA Price Trend**

| Indicator                | Value   |
|--------------------------|---------|
| Last Price               | $135.57 |
| 50-Day SMA               | $113.13 |
| 200-Day SMA              | $125.57 |
| RSI                      | 73.04   |
| 6-Month Price Momentum   | -0.08   |

- **Trend Analysis**:
  - The current price is above both the 50-day and 200-day SMAs, indicating a pot
ential upward trend.
  - The RSI is above 70, suggesting the stock may be overbought.
  - The 6-month price momentum is slightly negative, indicating a recent decline
in price momentum.

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Q_2: What's your view on BTC?
Guardrail blocked input: Crypto queries are not supported.
Q_3: What's the valuation of Nvidia?
A:**Nvidia Corporation (`NVDA`) Valuation**

- **Current Price:** $135.57
- **DCF Valuation:** $144.72

**Company Overview:**

NVIDIA Corporation provides graphics, compute, and networking solutions globally.
It operates in two segments:
- **Graphics:** Includes GeForce GPUs for gaming and PCs, Quadro/NVIDIA RTX GPUs
for enterprise workstation graphics, and more.
- **Compute & Networking:** Offers Data Center platforms, Mellanox networking sol
utions, and automotive AI solutions.

**Sector:** Technology
**Industry:** Semiconductors

NVIDIA is headquartered in Santa Clara, California, and was incorporated in 1993.

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Q_4: What are the implications of EU GDPR for an asset manager?
A:The EU General Data Protection Regulation (GDPR) has significant implications f
or asset managers, primarily concerning how they handle personal data. Here are s
ome key considerations:

1. **Data Protection Principles**: Asset managers must adhere to principles such
as lawfulness, fairness, transparency, purpose limitation, data minimization, acc
uracy, storage limitation, integrity, and confidentiality.

2. **Lawful Basis for Processing**: They need to establish a lawful basis for pro
cessing personal data, such as consent, contract necessity, legal obligation, vit
al interests, public task, or legitimate interests.
```

3. **Data Subject Rights**: Asset managers must facilitate and respect data subje
ct rights, including the right to access, rectification, erasure, restriction of
processing, data portability, and objection.

4. **Data Protection Officer (DPO)**: Depending on the scale and nature of data p
rocessing, appointing a DPO might be necessary to oversee compliance.

5. **Data Breach Notification**: They are required to report certain types of dat
a breaches to the relevant supervisory authority within 72 hours and, in some cas
es, to the affected individuals.

6. **Data Processing Agreements**: Contracts with third-party processors must inc
lude specific terms to ensure GDPR compliance.

7. **International Data Transfers**: Transfers of personal data outside the EU mu
st comply with GDPR requirements, using mechanisms like Standard Contractual Clau
ses or adequacy decisions.

8. **Privacy by Design and Default**: Implementing appropriate technical and orga
nizational measures to ensure data protection principles are integrated into proc
essing activities.

9. **Accountability and Governance**: Asset managers must demonstrate compliance
through documentation, policies, and regular audits.

10. **Penalties**: Non-compliance can result in significant fines, up to €20 mill
ion or 4% of annual global turnover, whichever is higher.

Asset managers should conduct thorough assessments and implement robust data prot
ection strategies to ensure compliance with GDPR.

Q_5: What's the market sensitivity of NVDA aka beta?
A:**Market Sensitivity of NVIDIA (`NVDA`)**

- **Beta:** 2.114

This indicates that NVIDIA's stock is more volatile than the market. A beta great
er than 1 suggests that the stock tends to move more than the market.

Q_6: What is a better investment NVDA or AMD?
A:**Investment Comparison: NVIDIA (`NVDA`) vs. AMD (`AMD`)**

Company Overview
- **NVIDIA (`NVDA`)**
  - **Sector:** Technology
  - **Industry:** Semiconductors
  - **Description:** Provides graphics, compute, and networking solutions.
  - **DCF Valuation:** $144.72

- **AMD (`AMD`)**
  - **Sector:** Technology

```
  - **Industry:** Semiconductors
  - **Description:** Operates as a semiconductor company with a focus on micropro
cessors and GPUs.
  - **DCF Valuation:** $53.97

### Technical Indicators

| **Indicator**    | **NVIDIA (`NVDA`)** | **AMD (`AMD`)** |
|------------------|---------------------|-----------------|
| **Last Price**   | $135.57             | $114.74         |
| **50-Day SMA**   | $113.13             | $99.84          |
| **200-Day SMA**  | $125.57             | $126.92         |
| **RSI**          | 73.04               | 65.28           |
| **6-Month ROC**  | -0.08               | -0.17           |

### Analysis
- **NVIDIA (`NVDA`)** is trading above both its 50-day and 200-day SMAs, indicati
ng a strong upward trend. The RSI of 73.04 suggests it is overbought.
- **AMD (`AMD`)** is trading above its 50-day SMA but below its 200-day SMA, indi
cating mixed signals. The RSI of 65.28 suggests it is approaching overbought terr
itory.

### Recommendation
- **NVIDIA (`NVDA`)**: HOLD, as it is overbought but showing strong momentum.
- **AMD (`AMD`)**: HOLD, as it is approaching overbought levels with mixed trend
signals.

Both companies are strong players in the semiconductor industry, but current tech
nical indicators suggest caution due to overbought conditions.

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Q_7: What is life?
A:I'm here to assist with stock trading information. If you have questions about
stocks or investments, feel free to ask!

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```

Reproducing output:

In [114…

```
for i, result in enumerate(result_list):
    print(f'Q_{i+1}: {queries[i]}')
    print(result.final_output)
    print("\n", 175*"-","\n")
```

```
Q_1: What's the price trend of NVDA?
**NVDA Price Trend**

| Indicator                | Value   |
|--------------------------|---------|
| Last Price               | $135.57 |
| 50-Day SMA               | $113.13 |
| 200-Day SMA              | $125.57 |
| RSI                      | 73.04   |
| 6-Month Price Momentum   | -0.08   |

- **Trend Analysis**:
  - The current price is above both the 50-day and 200-day SMAs, indicating a pot
ential upward trend.
  - The RSI is above 70, suggesting the stock may be overbought.
  - The 6-month price momentum is slightly negative, indicating a recent decline
in price momentum.

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Q_2: What's your view on BTC?
**Nvidia Corporation (`NVDA`) Valuation**

- **Current Price:** $135.57
- **DCF Valuation:** $144.72

**Company Overview:**

NVIDIA Corporation provides graphics, compute, and networking solutions globally.
It operates in two segments:
- **Graphics:** Includes GeForce GPUs for gaming and PCs, Quadro/NVIDIA RTX GPUs
for enterprise workstation graphics, and more.
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**Sector:** Technology
**Industry:** Semiconductors

NVIDIA is headquartered in Santa Clara, California, and was incorporated in 1993.

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Q_3: What's the valuation of Nvidia?
The EU General Data Protection Regulation (GDPR) has significant implications for
asset managers, primarily concerning how they handle personal data. Here are some
key considerations:

1. **Data Protection Principles**: Asset managers must adhere to principles such
as lawfulness, fairness, transparency, purpose limitation, data minimization, acc
uracy, storage limitation, integrity, and confidentiality.

2. **Lawful Basis for Processing**: They need to establish a lawful basis for pro
cessing personal data, such as consent, contract necessity, legal obligation, vit
al interests, public task, or legitimate interests.

3. **Data Subject Rights**: Asset managers must facilitate and respect data subje
```

ct rights, including the right to access, rectification, erasure, restriction of processing, data portability, and objection.

4. **Data Protection Officer (DPO)**: Depending on the scale and nature of data processing, appointing a DPO might be necessary to oversee compliance.

5. **Data Breach Notification**: They are required to report certain types of data breaches to the relevant supervisory authority within 72 hours and, in some cases, to the affected individuals.

6. **Data Processing Agreements**: Contracts with third-party processors must include specific terms to ensure GDPR compliance.

7. **International Data Transfers**: Transfers of personal data outside the EU must comply with GDPR requirements, using mechanisms like Standard Contractual Clauses or adequacy decisions.

8. **Privacy by Design and Default**: Implementing appropriate technical and organizational measures to ensure data protection principles are integrated into processing activities.

9. **Accountability and Governance**: Asset managers must demonstrate compliance through documentation, policies, and regular audits.

10. **Penalties**: Non-compliance can result in significant fines, up to €20 million or 4% of annual global turnover, whichever is higher.

Asset managers should conduct thorough assessments and implement robust data protection strategies to ensure compliance with GDPR.

Q_4: What are the implications of EU GDPR for an asset manager?
Market Sensitivity of NVIDIA (`NVDA`)

- **Beta:** 2.114

This indicates that NVIDIA's stock is more volatile than the market. A beta greater than 1 suggests that the stock tends to move more than the market.

Q_5: What's the market sensitivity of NVDA aka beta?
Investment Comparison: NVIDIA (`NVDA`) vs. AMD (`AMD`)

Company Overview
- **NVIDIA (`NVDA`)**
  - **Sector:** Technology
  - **Industry:** Semiconductors
  - **Description:** Provides graphics, compute, and networking solutions.
  - **DCF Valuation:** $144.72

- **AMD (`AMD`)**
  - **Sector:** Technology
  - **Industry:** Semiconductors
  - **Description:** Operates as a semiconductor company with a focus on micropro

```
cessors and GPUs.
  - **DCF Valuation:** $53.97

### Technical Indicators

| **Indicator**    | **NVIDIA (`NVDA`)** | **AMD (`AMD`)** |
|------------------|---------------------|-----------------|
| **Last Price**   | $135.57             | $114.74         |
| **50-Day SMA**   | $113.13             | $99.84          |
| **200-Day SMA**  | $125.57             | $126.92         |
| **RSI**          | 73.04               | 65.28           |
| **6-Month ROC**  | -0.08               | -0.17           |

### Analysis
- **NVIDIA (`NVDA`)** is trading above both its 50-day and 200-day SMAs, indicati
ng a strong upward trend. The RSI of 73.04 suggests it is overbought.
- **AMD (`AMD`)** is trading above its 50-day SMA but below its 200-day SMA, indi
cating mixed signals. The RSI of 65.28 suggests it is approaching overbought terr
itory.

### Recommendation
- **NVIDIA (`NVDA`)**: HOLD, as it is overbought but showing strong momentum.
- **AMD (`AMD`)**: HOLD, as it is approaching overbought levels with mixed trend
signals.

Both companies are strong players in the semiconductor industry, but current tech
nical indicators suggest caution due to overbought conditions.

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Q_6: What is a better investment NVDA or AMD?
I'm here to assist with stock trading information. If you have questions about st
ocks or investments, feel free to ask!

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```

Once again, the output is not perfect but starts to resemble to desired outputs.

We can check if the queries are able to trigger the different flags (btc, compliance, etc) using OpenAI dashboard

A more complex Agent system could be using a Compliance Agent using a fine-tunned compliance-specific model that allows to provide a very specific answer customizable to each organization needs.

Remember we can also trigger this Agent system using a chat bot interactive system:

In [102…

```python
async def agent_bot():
    print("Hi! I'm your stock trading Assistant. Ask me about any stock. Type 'e
    while True:
        user_input = input("\nYou: ")
        if user_input.lower() in ["exit", "quit"]:
            print("Assistant: The discussion is terminated.")
```

```
            break
        try:
            result = await Runner.run(trading_assistant, user_input, run_config=
            print(f'Query: {user_input}')
            print(f"Assistant:\n{result.final_output}")
        except InputGuardrailTripwireTriggered as e:
            reason = e.guardrail_result.output.output_info.reason
            print(f"Guardrail blocked input: {reason}")
            continue
        except Exception as e:
            print(f"Unexpected error: {str(e)}")
            continue
```

In [103…

```
# A) this only runs in py scripts, not in notebooks:
# if __name__ == "__main__":
#     asyncio.run(agent_bot())

# B) this should work in scripts and notebooks
try:
    await agent_bot()
except RuntimeError:
    asyncio.run(agent_bot())
```

```
Hi! I'm your stock trading Assistant. Ask me about any stock. Type 'exit' to qui
t.
Query: What is your view on politics?
Assistant:
I'm here to assist with stock trading and investment-related queries. If you have
any questions about stocks or financial data, feel free to ask!
Query: answer
Assistant:
Please provide a specific query or request related to stock trading or company da
ta, and I'll be happy to assist you.
Query: What is your view on MSFT?
Assistant:
**Microsoft Corporation (`MSFT`) Overview**

- **Sector**: Technology
- **Industry**: Software - Infrastructure
- **Description**: Microsoft develops and supports software, services, devices, a
nd solutions worldwide, with segments in Productivity and Business Processes, Int
elligent Cloud, and More Personal Computing.

**Technical Indicators**

| Indicator        | Value   |
|------------------|---------|
| Last Price       | $458.87 |
| 50-Day SMA       | $396.79 |
| 200-Day SMA      | $413.23 |
| RSI              | 78.47   |
| 6-Month Momentum | 0.08    |

**Valuation**

- **DCF Valuation**: $353.95

**Analysis**

- The current price of `MSFT` is significantly above both the 50-day and 200-day
SMAs, indicating a strong upward trend.
- The RSI is at 78.47, suggesting that the stock is in overbought territory.
- The DCF valuation is below the current market price, which may indicate that th
e stock is overvalued based on discounted cash flow analysis.

**Recommendation**

Given the technical indicators and valuation, the stock appears to be overbought
and potentially overvalued. A **SELL** recommendation might be appropriate if you
are looking to capitalize on current gains, but consider your investment strategy
and risk tolerance.
Query: answer
Assistant:
Could you please specify the stock symbol or the information you need?
Query: What are the implications of EU GDPR for wealth managers?
Assistant:
The EU General Data Protection Regulation (GDPR) has significant implications for
wealth managers, primarily concerning how they handle personal data. Here are som
e key points:

1. **Data Protection Principles**: Wealth managers must adhere to principles such
as lawfulness, fairness, transparency, purpose limitation, data minimization, acc
uracy, storage limitation, integrity, and confidentiality.
```

```
2. **Consent**: They need to obtain clear and explicit consent from clients for d
ata processing, ensuring that clients understand what their data will be used fo
r.

3. **Data Subject Rights**: Clients have enhanced rights, including access to the
ir data, the right to rectification, erasure (right to be forgotten), and data po
rtability.

4. **Data Breach Notification**: Wealth managers are required to report certain t
ypes of data breaches to the relevant supervisory authority within 72 hours and,
in some cases, to the affected individuals.

5. **Data Protection Officer (DPO)**: Depending on the scale and nature of data p
rocessing, they may need to appoint a DPO to oversee compliance.

6. **Impact Assessments**: They must conduct Data Protection Impact Assessments
(DPIAs) for high-risk processing activities.

7. **Third-party Management**: Wealth managers must ensure that any third-party s
ervice providers comply with GDPR standards.

8. **Record Keeping**: They need to maintain detailed records of data processing
activities.

9. **International Transfers**: Transfers of personal data outside the EU must co
mply with GDPR requirements, often requiring additional safeguards.

Non-compliance can result in significant fines, making it crucial for wealth mana
gers to integrate GDPR requirements into their operations and client interaction
s.
Query:
Assistant:
Hello! How can I assist you with stock trading today?
Assistant: The discussion is terminated.
```

4. Learning Resources

You can continue learning about Agents with the following resources:

- Citi – Agentic AI Report
- OpenAI SDK Agents Intro & Documentation
- Free Course - AI Agents with LangGraph
- Free Course - Multi-Agents Systems with CrewAI
- Book - Building Agentic AI Systems. Biswas, Talukdar, 2025