INTERACTIVE BROKERS PYTHON API

A Guide for Downloading Data, Managing Accounts, and Trading

IB PYTHON API (IBAPI)

Account Info

- Balances & Positions

Market Data

- Historical & Real-Time

Orders & Execution

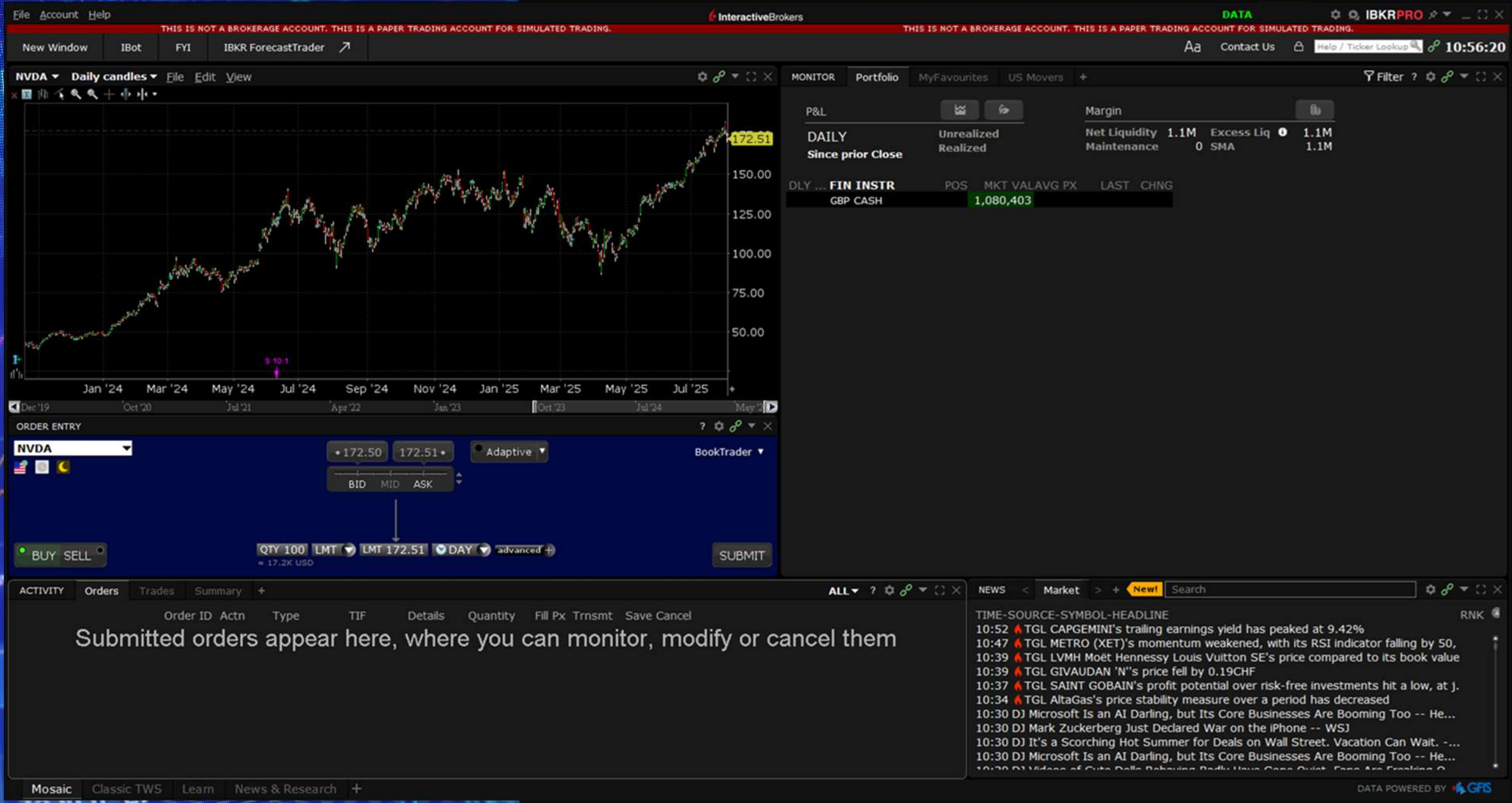
- Place, Modify, Cancel, Track

ENVIRONMENT SET-UP

- IB Account
  - Create IB account & enable API access
  - Install Trader Workstation (TWS) or IB Gateway

- Python Environment
  - Install Python 3.7+
  - Install the IB API Python package: pip install ibapi
  - Optionally, download latest API from: interactivebrokers.github.io

TRADER WORKSTATION (TWS)



THIS IS NOT A BROKERAGE ACCOUNT. THIS IS A PAPER TRADING ACCOUNT FOR SIMULATED TRADING.

P&L		Margin			
DAILY	Unrealized	Net Liquidity	1.1M	Excess Liq	1.1M
Since prior Close	Realized	Maintenance	0	SMA	1.1M

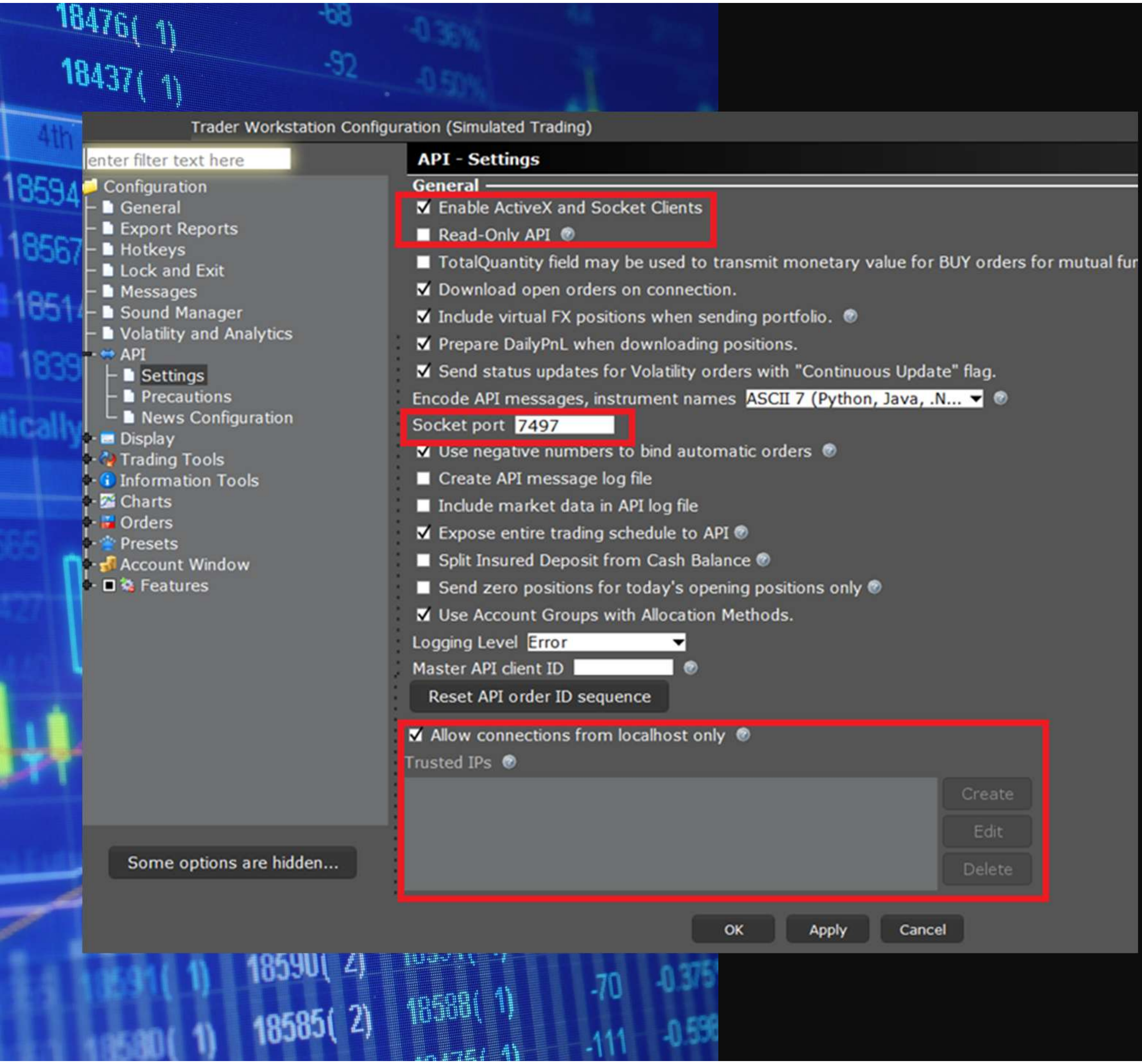
DLY ...	FIN INSTR	POS	MKT VAL	AVG PX	LAST	CHNG
	GBP CASH		1,080,403			

NVDA 172.50 172.51

Order ID Actn Type TIF Details Quantity Fill Px Trnsmt Save Cancel

Submitted orders appear here, where you can monitor, modify or cancel them

TIME-SOURCE-SYMBOL-HEADLINE RNK
10:52 TGL CAPGEMINI's trailing earnings yield has peaked at 9.42%
10:47 TGL METRO (XET)'s momentum weakened, with its RSI indicator falling by 50,
10:39 TGL LVMH Moët Hennessy Louis Vuitton SE's price compared to its book value
10:39 TGL GIVAUDAN 'N''s price fell by 0.19CHF
10:37 TGL SAINT GOBAIN's profit potential over risk-free investments hit a low, at j.
10:34 TGL AltaGas's price stability measure over a period has decreased
10:30 DJ Microsoft Is an AI Darling, but Its Core Businesses Are Booming Too -- He...
10:30 DJ Mark Zuckerberg Just Declared War on the iPhone -- WSJ
10:30 DJ It's a Scorching Hot Summer for Deals on Wall Street. Vacation Can Wait. -...
10:30 DJ Microsoft Is an AI Darling, but Its Core Businesses Are Booming Too -- He...



Trader Workstation Configuration (Simulated Trading)

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- Configuration
  - General
  - Export Reports
  - Hotkeys
  - Lock and Exit
  - Messages
  - Sound Manager
  - Volatility and Analytics
  - API
    - Settings
    - Precautions
    - News Configuration
  - Display
  - Trading Tools
  - Information Tools
  - Charts
  - Orders
  - Presets
  - Account Window
  - Features

Some options are hidden...

API - Settings

General

- ☑ Enable ActiveX and Socket Clients
- ☐ Read-Only API
- ☐ TotalQuantity field may be used to transmit monetary value for BUY orders for mutual fur
- ☑ Download open orders on connection.
- ☑ Include virtual FX positions when sending portfolio.
- ☑ Prepare DailyPnL when downloading positions.
- ☑ Send status updates for Volatility orders with "Continuous Update" flag.

Encode API messages, instrument names: ASCII 7 (Python, Java, .N...

Socket port: 7497

- ☑ Use negative numbers to bind automatic orders
- ☐ Create API message log file
- ☐ Include market data in API log file
- ☑ Expose entire trading schedule to API
- ☐ Split Insured Deposit from Cash Balance
- ☐ Send zero positions for today's opening positions only
- ☑ Use Account Groups with Allocation Methods.

Logging Level: Error

Master API client ID:

Reset API order ID sequence

- ☑ Allow connections from localhost only

Trusted IPs

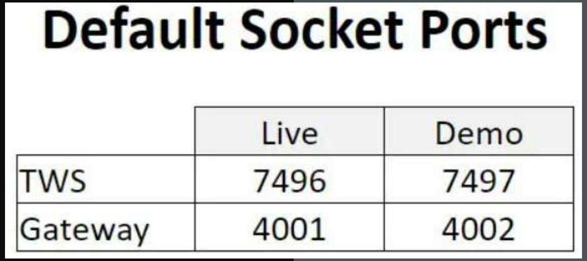
Create | Edit | Delete

OK | Apply | Cancel

API SETTINGS

CONNECTION FRAMEWORK

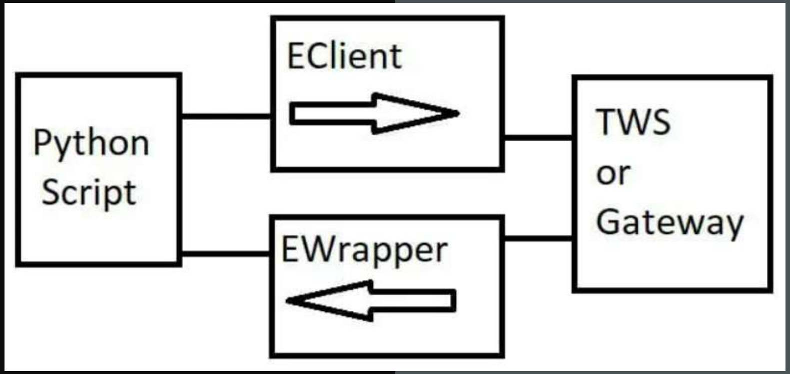
- Connects through TWS or IB Gateway via TCP socket



Default Socket Ports

	Live	Demo
TWS	7496	7497
Gateway	4001	4002

- Combines sending requests (EClient) and receiving callbacks (EWrapper)



ASYNCHRONOUS EVENTS

- API is event-driven and asynchronous
- Requests are non-blocking; responses come via callbacks
- Common patterns:
  - Run API client in separate thread or event loop
  - Use synchronization methods (e.g., flags, events) to wait for data
  - Requires non-blocking programming mindset

TWS CONNECTION

TWS Connection Code

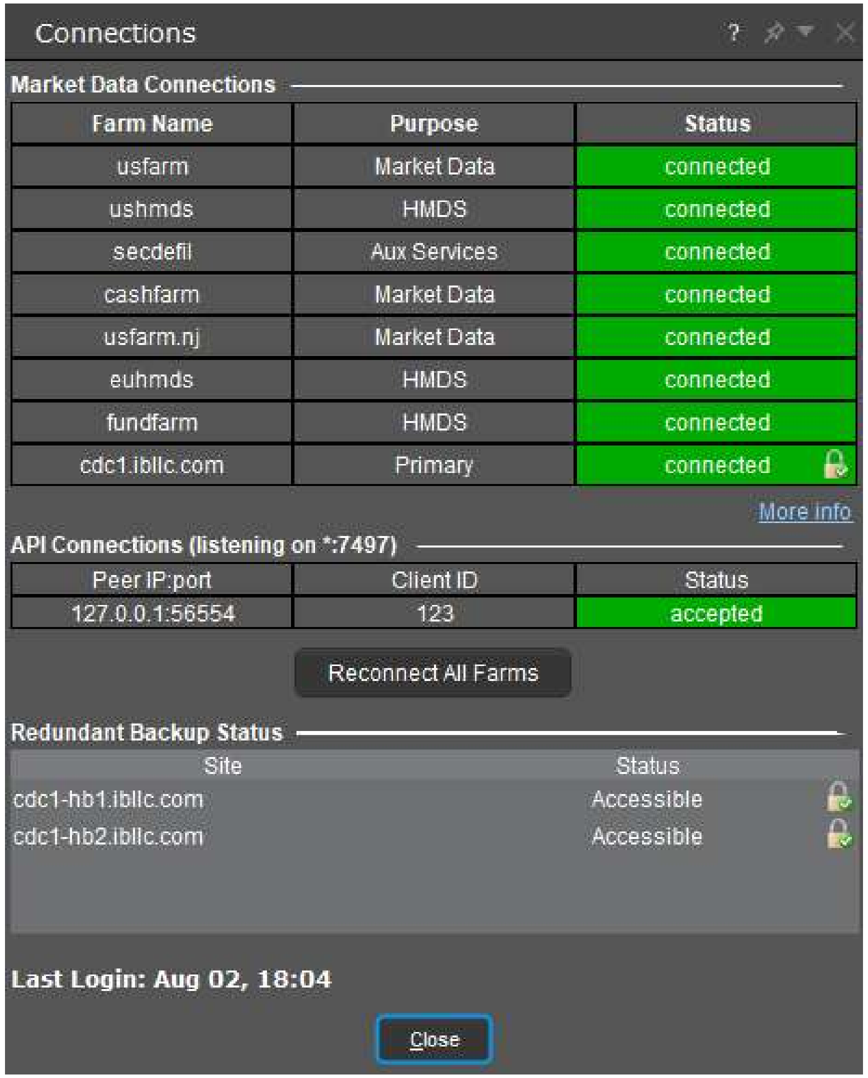
```python
from ibapi.client import EClient
from ibapi.wrapper import EWrapper
import threading
import time
```

```python
# Basic Code Structure
class IBApp(EWrapper, EClient):
    def __init__(self):
        EClient.__init__(self, self)

    def nextValidId(self, orderId):
        time.sleep(1) # pause for connection
        print(f"Connected - Next Order ID: {orderId}")
```

```python
# Connect
app = IBApp()
app.connect('127.0.0.1', 7497, 123) # host, port, clientID

# Call app.run as a background thread
thread = threading.Thread(target=app.run)
thread.start()
```

Connection Response
ERROR means console output

```
ERROR -1 2104 Market data farm connection is OK:usfarm.nj
ERROR -1 2104 Market data farm connection is OK:eufarm
ERROR -1 2104 Market data farm connection is OK:cashfarm
ERROR -1 2104 Market data farm connection is OK:usfarm
ERROR -1 2106 HMDS data farm connection is OK:euhmds
ERROR -1 2106 HMDS data farm connection is OK:ushmds
ERROR -1 2158 Sec-def data farm connection is OK:secdefil
Connected - Next Order ID: 1
```


Connections

Market Data Connections

Farm Name	Purpose	Status
usfarm	Market Data	connected
ushmds	HMDS	connected
secdefil	Aux Services	connected
cashfarm	Market Data	connected
usfarm.nj	Market Data	connected
euhmds	HMDS	connected
fundfarm	HMDS	connected
cdc1.ibllc.com	Primary	connected

More info

API Connections (listening on *:7497)

Peer IP:port	Client ID	Status
127.0.0.1:56554	123	accepted

Reconnect All Farms

Redundant Backup Status

Site	Status
cdc1-hb1.ibllc.com	Accessible
cdc1-hb2.ibllc.com	Accessible

Last Login: Aug 02, 18:04

Close

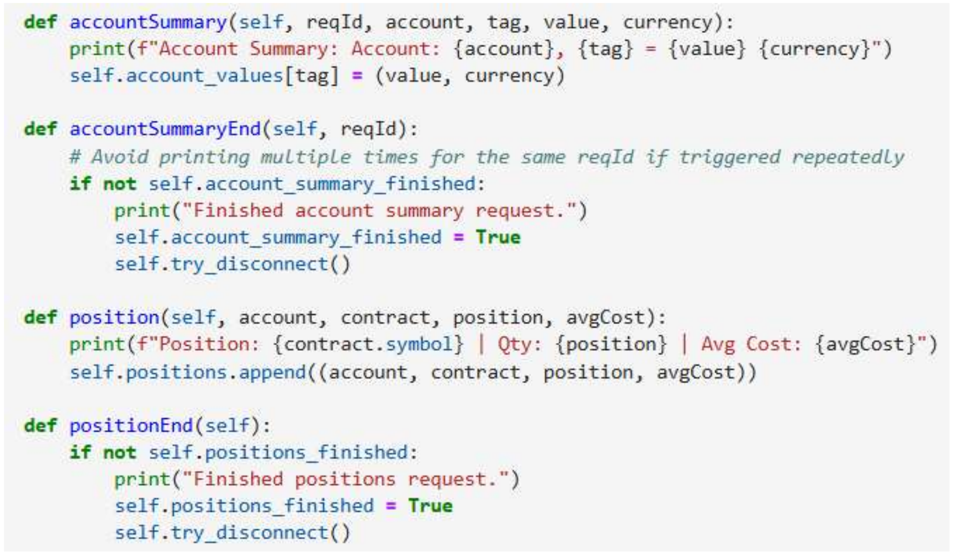
TWS CONNECTION

ACCOUNT SUMMARY & POSITIONS

- Use reqAccountSummary or reqAccountUpdates to get balances/cash
- Use reqPositions() to get held positions
- Important callbacks:
  - accountSummary(...) — for balances
  - position(account, contract, position, avgCost) — for positions
  - positionEnd() — signals completion

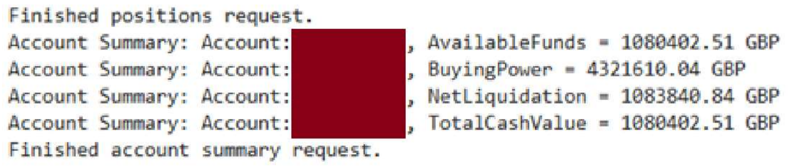
A/C SUMMARY & POSITIONS

Account Summary & Positions Code



```python
def accountSummary(self, reqId, account, tag, value, currency):
    print(f"Account Summary: Account: {account}, {tag} = {value} {currency}")
    self.account_values[tag] = (value, currency)

def accountSummaryEnd(self, reqId):
    # Avoid printing multiple times for the same reqId if triggered repeatedly
    if not self.account_summary_finished:
        print("Finished account summary request.")
        self.account_summary_finished = True
        self.try_disconnect()

def position(self, account, contract, position, avgCost):
    print(f"Position: {contract.symbol} | Qty: {position} | Avg Cost: {avgCost}")
    self.positions.append((account, contract, position, avgCost))

def positionEnd(self):
    if not self.positions_finished:
        print("Finished positions request.")
        self.positions_finished = True
        self.try_disconnect()
```

Account Summary Response
Simulation account has no positions and a cash balance



```
Finished positions request.
Account Summary: Account:[redacted], AvailableFunds = 1080402.51 GBP
Account Summary: Account:          , BuyingPower = 4321610.04 GBP
Account Summary: Account:          , NetLiquidation = 1083840.84 GBP
Account Summary: Account:          , TotalCashValue = 1080402.51 GBP
Finished account summary request.
```

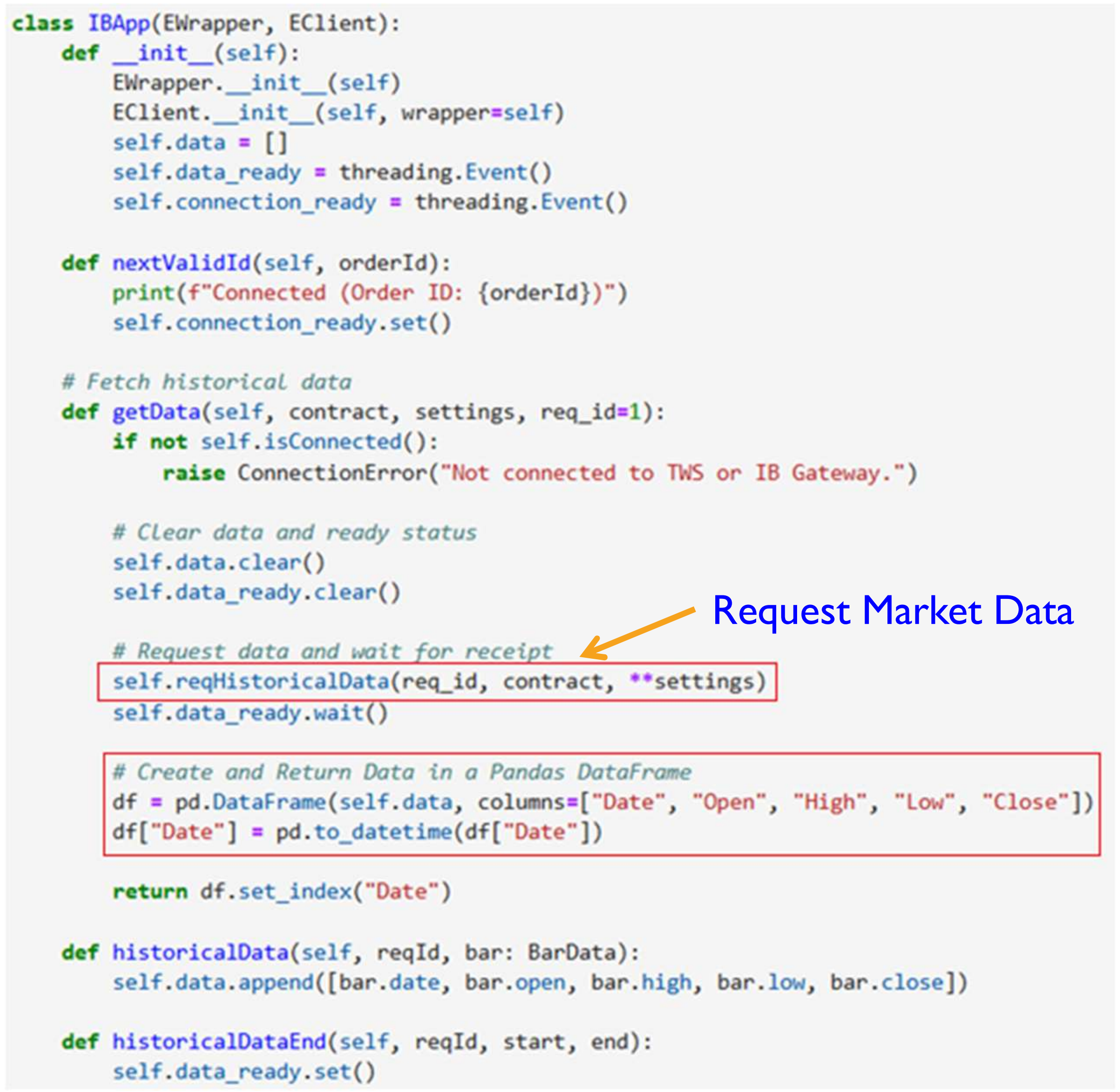
DOWNLOADING MARKET DATA

- Create a Contract object (specify symbol, exchange, secType, currency)

- Use reqHistoricalData method to request historical data

- Parameters to specify:
  - durationStr (e.g., '1 M' for 1 month)
  - barSizeSetting (e.g., '1 hour')
  - whatToShow ('TRADES' for trade data)

Market Data Requests



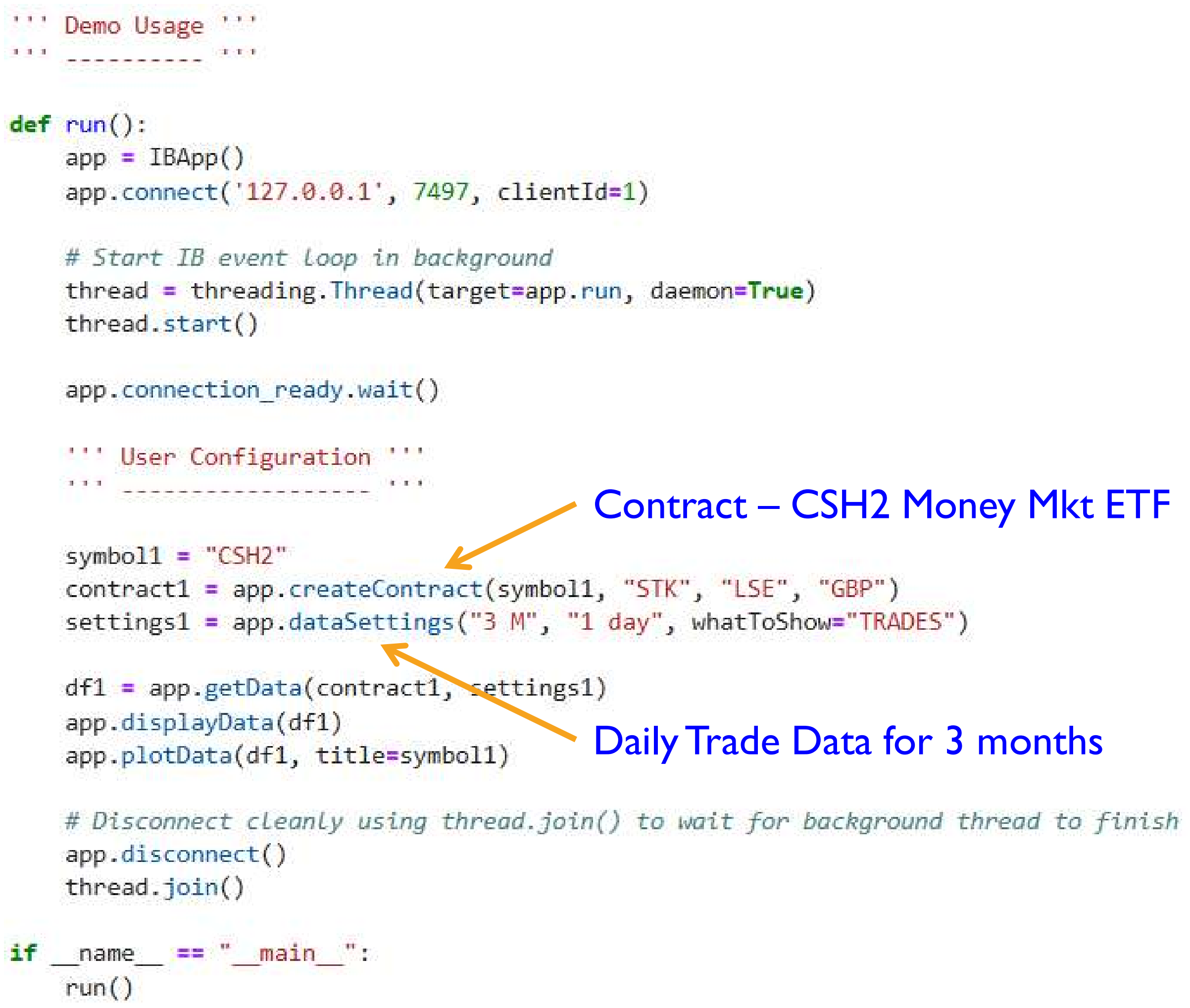
```python
class IBApp(EWrapper, EClient):
    def __init__(self):
        EWrapper.__init__(self)
        EClient.__init__(self, wrapper=self)
        self.data = []
        self.data_ready = threading.Event()
        self.connection_ready = threading.Event()

    def nextValidId(self, orderId):
        print(f"Connected (Order ID: {orderId})")
        self.connection_ready.set()

    # Fetch historical data
    def getData(self, contract, settings, req_id=1):
        if not self.isConnected():
            raise ConnectionError("Not connected to TWS or IB Gateway.")

        # Clear data and ready status
        self.data.clear()
        self.data_ready.clear()

        # Request data and wait for receipt
        self.reqHistoricalData(req_id, contract, **settings)
        self.data_ready.wait()

        # Create and Return Data in a Pandas DataFrame
        df = pd.DataFrame(self.data, columns=["Date", "Open", "High", "Low", "Close"])
        df["Date"] = pd.to_datetime(df["Date"])

        return df.set_index("Date")

    def historicalData(self, reqId, bar: BarData):
        self.data.append([bar.date, bar.open, bar.high, bar.low, bar.close])

    def historicalDataEnd(self, reqId, start, end):
        self.data_ready.set()
```

Request Market Data

MARKET DATA REQUESTS

MARKET DATA CONFIGURATION

Market Data User Configuration



```python
''' Demo Usage '''
''' ---------- '''

def run():
    app = IBApp()
    app.connect('127.0.0.1', 7497, clientId=1)

    # Start IB event loop in background
    thread = threading.Thread(target=app.run, daemon=True)
    thread.start()

    app.connection_ready.wait()

    ''' User Configuration '''
    ''' ------------------ '''

    symbol1 = "CSH2"
    contract1 = app.createContract(symbol1, "STK", "LSE", "GBP")
    settings1 = app.dataSettings("3 M", "1 day", whatToShow="TRADES")

    df1 = app.getData(contract1, settings1)
    app.displayData(df1)
    app.plotData(df1, title=symbol1)

    # Disconnect cleanly using thread.join() to wait for background thread to finish
    app.disconnect()
    thread.join()

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

Contract – CSH2 Money Mkt ETF

Daily Trade Data for 3 months

Market Data Request

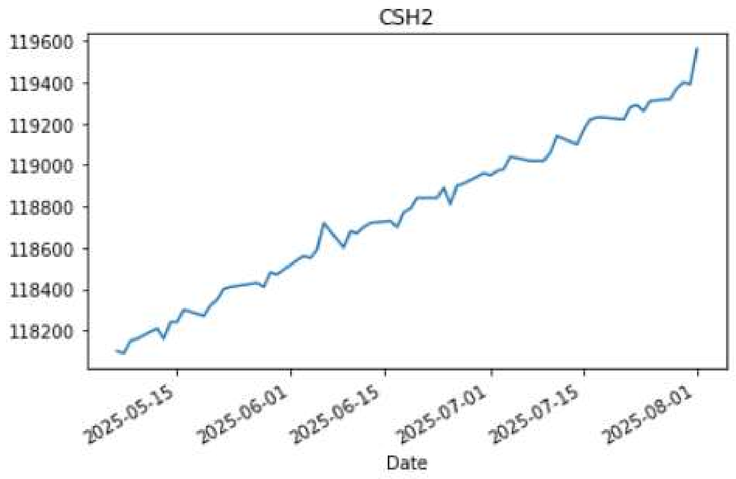
Contract – CSH2 Money Mkt ETF

```
symbol1 = "CSH2"
contract1 = app.createContract(symbol1, "STK", "LSE", "GBP")
settings1 = app.dataSettings("3 M", "1 day", whatToShow="TRADES")

df1 = app.getData(contract1, settings1)
app.displayData(df1)
app.plotData(df1, title=symbol1)
```

Daily Trade Data for 3 months

Market Data Results

```
                Open      High       Low     Close
Date
2025-07-28  119310.0  119450.0  119310.0  119320.0
2025-07-29  119400.0  119400.0  119320.0  119370.0
2025-07-30  119380.0  119420.0  119350.0  119400.0
2025-07-31  119400.0  119440.0  119380.0  119390.0
2025-08-01  119420.0  119560.0  119380.0  119560.0
```



MARKET DATA RESULTS

PLACING ORDERS

- Build an Order object specifying:
  - action (BUY/SELL)
  - orderType (e.g., MARKET, LMT)
  - totalQuantity
- Submit order via Python
  - app.placeOrder(orderId, contract, order)
- Track orders using callbacks:
  - orderStatus(...)
  - openOrder(...)
  - execDetails(...)

PLACING ORDERS

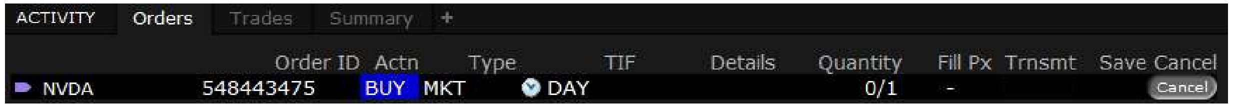
Placing Orders

```python
# === Order Management ===
def createOrder(self, action="BUY", quantity=100, order_type="MKT", limit_price=None):
    order = Order()
    order.action = action
    order.orderType = order_type.upper()
    order.totalQuantity = quantity
    if order.orderType == "LMT" and limit_price:
        order.lmtPrice = limit_price
    # Send Order Immediately
    order.transmit = True
    # Ensure these legacy fields are NOT set
    order.eTradeOnly = False  # <- you can omit this entirely in new APIs
    order.firmQuoteOnly = False
    return order

def placeOrderNow(self, contract, order):
    if self.nextOrderId is None:
        raise Exception("nextValidId not received yet.")
    order_id = self.nextOrderId
    self.nextOrderId += 1
    self.placeOrder(order_id, contract, order)
    print(f"New Order ID {order_id}: {order.action} {order.totalQuantity} {contract.symbol} ({order.orderType})")
    return order_id
```

```python
# --- Place MKT Order ---
# =======================
print(f"\n--- Place MKT Order ---")
order = app.createOrder(action="BUY", quantity=1, order_type="MKT")
order_id = app.placeOrderNow(contract, order)
```

TWS Order Screen

```
--- Place MKT Order ---
New Order ID 27: BUY 1 NVDA (MKT)
```



	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/1	-			Cancel

ORDER MANAGEMENT

MODIFY

- Modify by re-submitting order with same orderId and new parameters

CANCEL

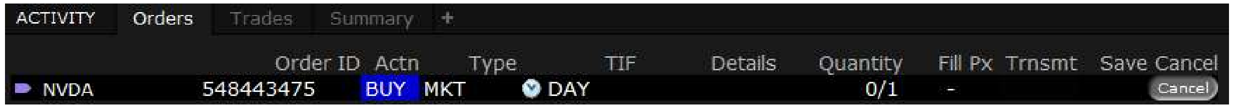
- Cancel pending orders using cancelOrder method
- app.cancelOrder(orderId)

STATUS

- Get live order status using 'orderStatus' callback method
- Receive execution updates using 'execDetails' callback method

TWS Order Screen BEFORE

```
--- Place MKT Order ---
New Order ID 27: BUY 1 NVDA (MKT)
```



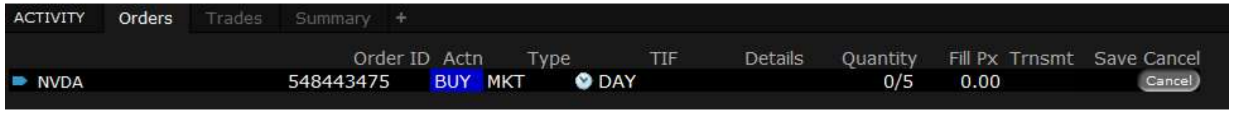
	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/1	-			Cancel

Modify Order

```python
# --- Modify MKT Order --- Use List Live Orders then update modify_order_id
# =========================
print(f"\n--- Modify Order ---")
modify_order_id = 27
new_order = app.createOrder(action="BUY", quantity=5, order_type="MKT")
app.modifyOrder(modify_order_id, contract, new_order)
```

TWS Order Screen AFTER

```
--- Modify Order ---
Modified order 27
```



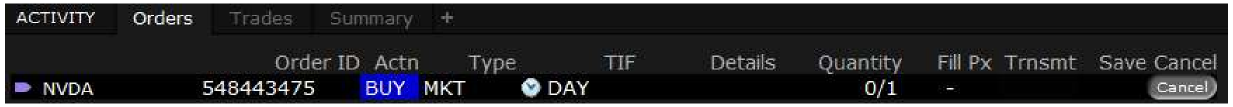
	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/5	0.00			Cancel

MODIFY ORDER

CANCEL ORDER

TWS Order Screen BEFORE

```
--- Place MKT Order ---
New Order ID 27: BUY 1 NVDA (MKT)
```

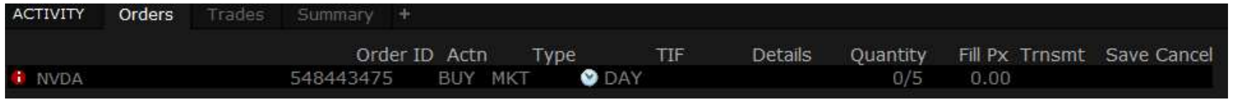


	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/1	-			Cancel

Cancel Order

```python
# === Cancel Order --- Use List Live Orders then update cancel_order_id
# ========================
print(f"\n--- Cancel Order ---")
cancel_order_id = 27
app.cancelOrderById(cancel_order_id)
```

TWS Order Screen AFTER

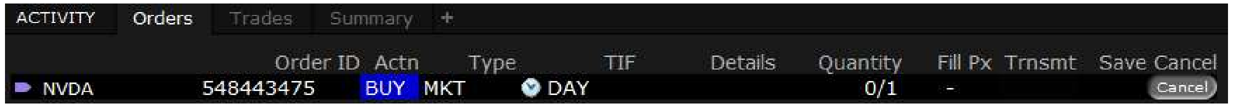


	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/5	0.00			

ORDER STATUS

TWS Order Screen

```
--- Place MKT Order ---
New Order ID 27: BUY 1 NVDA (MKT)
```



	Order ID	Actn	Type	TIF	Details	Quantity	Fill Px	Trnsmt	Save	Cancel
NVDA	548443475	BUY	MKT	DAY		0/1	-			Cancel

Order Status & Execution Details – Python Callback Code

```python
#=== Order Status Updates ===
def orderStatus(self, orderId, status, filled, remaining, avgFillPrice, permId, parentId,
                lastFillPrice, clientId, whyHeld, mktCapPrice):
    print(f"[OrderStatus] ID {orderId} | Status: {status} | "
          f"Filled: {filled}/{filled + remaining} | Avg Fill Price: {avgFillPrice}")

# === Executed Trade Details ===
def execDetails(self, reqId, contract, execution):
    print(f"[Execution] ID {execution.orderId} | Symbol: {contract.symbol} | "
          f"Side: {execution.side} | Price: {execution.price} | Qty: {execution.shares}")
```

Python Result

```
--- Place MKT Order ---
New Order ID 29: BUY 1 NVDA (MKT)

--- Disconnect ---

[OrderStatus] ID 29 | Status: PreSubmitted | Filled: 0.0/1.0 | Avg Fill Price: 0.0
```

KEY METHODS & CALLBACKS

Task	Callback Method
Connect	connect(host, port, client_id)
Historical Data	reqHistoricalData(), historicalData()
Real-time Data	reqMktData(), tickPrice(), tickSize()
Account Summary	reqAccountSummary(), accountSummary()
Positions	reqPositions(), position(), positionEnd()
Place Orders	placeOrder(), orderStatus(), execDetails()
Modify Orders	placeOrder() with same orderId
Cancel Orders	cancelOrder()

RESOURCES

- **Example Python Source Code**

  https://github.com/nburgessx/QuantResearch/tree/main/IB%20Python%20API

- **IB Official API Documentation**
  https://interactivebrokers.github.io/tws-api/index.html

- **Algotrading101 IB Python API Guide**
  https://algotrading101.com/learn/interactive-brokers-python-api-native-guide/

- **Interactive Brokers Campus - Python TWS API Course**
  https://www.interactivebrokers.com/campus/trading-course/python-tws-api/

CLOSING REMARKS

- Tips
  - First, try on a simulation account (demo account)
  - Start small and do plenty of testing before placing real orders
- Subscribe for more info and resources
  - Quant YouTube Channel: www.youtube.com/@algoquanthub
  - Quant Newsletter: https://algoquanthub.beehiiv.com/subscribe
- Follow me on Linked-In www.linkedin.com/in/nburgessx