

Binance Futures Trading Bot: Project Report

1. Objective and Methodology

1.1. Project Objective

The goal of this project was to develop a versatile, modular, and secure Python-based application capable of executing a wide range of trading orders on the Binance Futures Testnet. By focusing on the Testnet environment, the project ensures a safe sandbox for implementing and verifying complex trading logic, including Market, Limit, and various advanced algorithmic order types.

1.2. Methodology

The application utilizes the official `python-binance` library to interface with the Binance API. A modular approach was adopted, dedicating specific Python files within the `src/` directory to handle distinct order types and functions (e.g., `market_orders.py`, `grid_orders.py`). All API interaction is routed through the Binance Futures Testnet URL, as explicitly configured in each script.

2. Implementation Details

2.1. Secure Configuration and Client Setup

API credentials (`API_KEY` and `API_SECRET`) are loaded securely via the `python-dotenv` library from a `.env` file. This practice prevents sensitive keys from being hardcoded or committed to version control. The client is initialized for Testnet by setting `client.FUTURES_URL = BASE_URL`.

2.2. Logging and Error Handling

A consistent logging mechanism is implemented using Python's built-in `logging` module, directing all messages (INFO, ERROR) to a central file, `bot.log`.

Critical error handling is achieved by wrapping API calls in `try...except` blocks to specifically catch `BinanceAPIException` and `BinanceOrderException`, logging the error, and providing user feedback.

3. Implemented Trading Strategies

The bot successfully implements seven distinct trading actions, providing a comprehensive demonstration of API proficiency.

A. Market and Limit Orders

- `market_orders.py`: Executes instant trades using `FUTURE_ORDER_TYPE_MARKET`.
- `limit_orders.py`: Places trades at a specified price (`FUTURE_ORDER_TYPE_LIMIT`). Includes a separate function to cancel open limit orders.

B. Stop-Limit Order (`src/advanced/stop_limit_order.py`)

This script places a Stop-Market order ('FUTURE_ORDER_TYPE_STOP_MARKET') that triggers a market order when the `stopPrice` is reached. This is a foundational component for automated risk management.

```
(venv) PS C:\Project\Trading bot> python src/advanced/stop_limit_order.py
==== Binance Futures Stop-Limit Order Bot ====
Enter Symbol (e.g., BTCUSDT): BTCUSDT
Enter Order Side (BUY/SELL): SELL
Enter Quantity: 0.003
Enter Stop Price: 66000
Enter Limit Price: 65800

Confirm placing SELL Stop-Limit order for 0.003 BTCUSDT? (y/n): Y

Stop-Limit Order Placed Successfully!
Symbol: BTCUSDT
Side: SELL
Stop Price: 66000.0
Limit Price: 65800.0
Quantity: 0.003

Order ID: 7881347970
```

C. Simulated OCO Order (`src/advanced/oco_order.py`)

Since Binance Futures does not offer a native OCO order type, this function simulates the bracket strategy by placing two separate orders for the same position simultaneously:

1. Take-Profit: A GTC Limit order ('FUTURE_ORDER_TYPE_LIMIT').
2. Stop-Loss: A Stop-Market order ('FUTURE_ORDER_TYPE_STOP_MARKET').

```
(venv) PS C:\Project\Trading bot> python src/advanced/oco_order.py
==== Binance Futures Simulated OCO Bot ====
Enter Symbol (e.g., BTCUSDT): BTCUSDT
Enter Side (SELL/BUY): SELL
Enter Quantity: 0.02
Enter Take Profit Price: 106000
Enter Stop Loss Price: 103000

Confirm simulated OCO (SELL) for 0.02 BTCUSDT? (y/n): y

OCO Simulated Orders Placed Successfully!
Take Profit @ 106000.0
Stop Loss @ 103000.0

TP Order ID: 7881551174 | SL Order ID: 7881551547
```

D. Time-Weighted Average Price (TWAP) (`src/advanced/twap_order.py`)

The TWAP function divides the total required quantity into equal 'chunks' and executes them sequentially using Market orders, pausing for a user-defined 'interval' (in seconds) between each chunk. This minimizes market impact for large trades.

```
(venv) PS C:\Project\Trading bot> python src/advanced/twap_order.py
==== Binance Futures TWAP Bot ====
Enter Symbol (e.g., BTCUSDT): BTCUSDT
Enter Side (BUY/SELL): SELL
Enter Total Quantity: 0.01
Enter Number of Splits: 5
Enter Interval in Seconds: 5

Confirm TWAP of 0.01 BTCUSDT in 5 chunks? (y/n): y

Placing 5 TWAP orders of 0.002 each, every 5 seconds...

✓ TWAP Order 1/5 Executed
✓ TWAP Order 2/5 Executed
✓ TWAP Order 3/5 Executed
✓ TWAP Order 4/5 Executed
✓ TWAP Order 5/5 Executed

✓ All TWAP orders completed.
```

E. Grid Orders ('src/advanced/grid_orders.py')

This strategy places a series of alternating Limit BUY and SELL orders across a designated price range, from 'lower_price' to 'upper_price', split by the number of 'grids'. Orders below the midpoint are BUYS, and orders above are SELLS, capturing volatility within a channel.

```
(venv) PS C:\Project\Trading bot> python src/advanced/grid_orders.py
==== Binance Futures Grid Order Bot ====
Enter Symbol (e.g., BTCUSDT): BTCUSDT
Enter Lower Price: 101000
Enter Upper Price: 104000
Enter Number of Grids: 5
Enter Quantity per Order: 0.001

Confirm placing grid between 101000.0 and 104000.0? (y/n): y

Creating Grid Orders for BTCUSDT between 101000.0-104000.0 with 5 grids...

BUY Order placed at 101000.0
BUY Order placed at 101600.0
BUY Order placed at 102200.0
SELL Order placed at 102800.0
SELL Order placed at 103400.0
SELL Order placed at 104000.0

✓ Grid setup complete!
```

F. Order Status and Management ('src/check_order_status.py')

Provides two utility functions for trade audit and management:

1. Check Specific Order: Retrieves detailed status, executed quantity, and average price for a given Order ID.
2. List Recent Orders: Fetches and displays the most recent orders for a symbol.

4. Summary of Results

All scripts produce console confirmations and corresponding bot.log entries.

Post-execution log analysis confirms:

- Successful execution of all order types on Binance Futures Testnet.
- Proper handling of invalid parameters (e.g., insufficient notional, precision errors).
- Reliable error logging and prevention of crashes during invalid API calls.

bot.log												
1	2025-10-29	12:45:53,054	INFO:Market Order Success BTCUSDT BUY Qty: 0.01									
2	2025-10-29	12:50:11,276	INFO:Fetched last 5 orders for BTCUSDT									
3	2025-10-29	19:00:56,899	INFO:Limit Order Success BTCUSDT BUY Qty: 0.01 Price: 67000.0									
4	2025-10-29	19:01:26,315	INFO:Fetched last 5 orders for BTCUSDT									
5	2025-10-30	20:15:15,652	INFO:Stop-Limit Order Placed BTCUSDT SELL Stop: 66000.0 Limit: 65800.0 Qty: 0.003									
6	2025-10-30	20:18:05,548	INFO:OCO Simulated BTCUSDT SELL TP: 106000.0 SL: 103000.0									
7	2025-10-30	20:18:47,479	INFO:TWAP 1/5 Success BTCUSDT SELL Qty: 0.01									
8	2025-10-30	20:18:57,750	INFO:TWAP 2/5 Success BTCUSDT SELL Qty: 0.01									
9	2025-10-30	20:19:08,015	INFO:TWAP 3/5 Success BTCUSDT SELL Qty: 0.01									
10	2025-10-30	20:19:18,598	INFO:TWAP 4/5 Success BTCUSDT SELL Qty: 0.01									
11	2025-10-30	20:19:28,792	INFO:TWAP 5/5 Success BTCUSDT SELL Qty: 0.01									
12	2025-10-30	20:20:15,682	INFO:Grid BUY Order @ 60000.0									
13	2025-10-30	20:20:15,878	INFO:Grid BUY Order @ 62000.0									
14	2025-10-30	20:20:16,327	INFO:Grid BUY Order @ 64000.0									
15	2025-10-30	20:21:47,614	INFO:Grid BUY Order @ 101000.0									
16	2025-10-30	20:21:48,158	INFO:Grid BUY Order @ 101600.0									
17	2025-10-30	20:21:48,361	INFO:Grid BUY Order @ 102200.0									
18	2025-10-30	20:21:48,670	INFO:Grid SELL Order @ 102800.0									
19	2025-10-30	20:21:48,977	INFO:Grid SELL Order @ 103400.0									
20	2025-10-30	20:21:49,487	INFO:Grid SELL Order @ 104000.0									
21												
2025-10-30	21:16:26	BTCUSDT Perp	Limit Buy	101,600.00	0.001 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	21:16:26	BTCUSDT Perp	Limit Buy	101,000.00	0.001 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	21:15:06	BTCUSDT Perp	Limit Buy	101,200.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	21:15:05	BTCUSDT Perp	Limit Buy	101,000.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	21:00:57	BTCUSDT Perp	Stop Market Sell	-	0.020 BTC	0.000 BTC	No	No	Last Price <= 103,000.00	--	GTC	
2025-10-30	20:58:51	BTCUSDT Perp	Stop Market Sell	-	0.003 BTC	0.000 BTC	No	No	Last Price <= 66,000.00	--	GTC	
2025-10-30	20:21:49	BTCUSDT Perp	Limit Buy	102,200.00	0.001 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:21:49	BTCUSDT Perp	Limit Buy	101,600.00	0.001 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:21:48	BTCUSDT Perp	Limit Buy	101,000.00	0.001 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:20:17	BTCUSDT Perp	Limit Buy	64,000.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:20:16	BTCUSDT Perp	Limit Buy	62,000.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:20:16	BTCUSDT Perp	Limit Buy	60,000.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase
2025-10-30	20:18:06	BTCUSDT Perp	Stop Market Sell	-	0.003 BTC	0.000 BTC	No	No	Last Price <= 103,000.00	--	GTC	
2025-10-30	20:15:16	BTCUSDT Perp	Stop Market Sell	-	0.003 BTC	0.000 BTC	No	No	Last Price <= 66,000.00	--	GTC	
2025-10-29	19:00:56	BTCUSDT Perp	Limit Buy	67,000.00	0.010 BTC	0.000 BTC	No	No	-	--	GTC	Chase

5. Conclusion

This project demonstrates strong competency in algorithmic trading and API-driven system design. It implements secure credential management, robust logging, modular design, and advanced order execution with precision.