

# EXAMPLE: How to build a dYdX Orderbook

Author: Lawrence Chiu ([lawrence@dydx.exchange](mailto:lawrence@dydx.exchange))

Twitter: <https://twitter.com/LawrenceChiu14>

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Tested on: Ubuntu Server 20.04.4 LTS

We will build the dYdX orderbook with 3 programs:

- 1) dydxob.py (the orderbook builder).
- 2) dydxtrades (the last-trade monitor), and
- 3) dydxob2.py (the orderbook displayer)

All programs are available at <https://github.com/chiwalfm/dydxexamples>

## PART 1: dydxob.py

1. First, create a 1GB ramdisk and mount it as /mnt/ramdisk/ as this program will write a LOT of files to it continuously. Set the permissions mask to 777.

```
$ sudo mount -t tmpfs -o rw,size=1G tmpfs /mnt/ramdisk
$ sudo chmod 777 /mnt/ramdisk
```

2. Next, start the dydxob.py program. Invoke the program with the <MARKET> parameter (if omitted, it defaults to 'BTC-USD'). You can get a list of markets from <https://api.dydx.exchange/v3/markets> Markets with status = 'POST\_ONLY' are not open for trading, and this program will not do anything. The -u option tells python not to buffer.

-u Force the stdout and stderr streams to be unbuffered. This option has no effect on the stdin stream.

```
$ nohup python3 -u dydxob.py BTC-USD > /mnt/ramdisk/dydxobBTC-USD.stdout 2>&1 &
```

3. This creates and continuously updates 'price' files in the directories <MARKET>/asks/ and <MARKET>/bids/. These price files each contain four elements: the 'offset' of the price, the 'size' at that price, and the 'date' (yyyy-mm-dd) and 'time' (hh:mm:ss) of the last update. The program logs to and automatically rotates the logfiles /mnt/ramdisk/dydxob<MARKET>.log so that each <MARKET> uses less than 5 MB.

```
vmware@ubuntu20041a:~$ cat /mnt/ramdisk/BTC-USD/asks/42863
12240989790 0 2022-04-10 12:17:37
vmware@ubuntu20041a:~$
```

## PART 2: dydxtrades.py

1. Start the dydxtrades.py program. Involve the program with the <MARKET> parameter (if omitted, it defaults to 'BTC-USD').

```
$ nohup python3 -u dydxtrades.py BTC-USD > /mnt/ramdisk/dydxtradesBTC-USD.stdout 2>&1 &
```

2. This creates and continuously updates the file <MARKET>/lasttrade with the 'date/timestamp', 'price' and 'side' (BUY or SELL) of the last trade. The program logs to and automatically rotates the logfiles /mnt/ramdisk/dydxtrades<MARKET>.log so that each <MARKET> uses less than 5 MB.

```
vmware@ubuntu20041a:~/extra/f$ cat /mnt/ramdisk/BTC-USD/lasttrade  
2022-04-10T17:51:15.687Z 43056 SELL (0.0229)  
vmware@ubuntu20041a:~/extra/f$
```

## PART 3: dydxob2.py

1. Finally, start the dydxob2.py program. Involve the program with the <MARKET> and <DEPTH> parameters. <MARKET> must be first parameter, and <DEPTH> must be second. If <DEPTH> is omitted, it defaults to '10'. If <MARKET> and <DEPTH> are both omitted, it defaults to 'BTC-USD' and '10'. This requires a 103-column terminal to look good.

```
$ python3 -u dydxob2.py BTC-USD 10
```

2. This will display and continuously update the order book on your screen.

```
vmware@ubuntu20041a:~/extra/fs$ python3 -u dydxob2.py BTC-USD 10
2022-04-10 12:59:42 Last trade: 2022-04-10T17:59:41.580Z 43119 BUY (0.0463)
Bid | Ask
43118 (5.2829) 12243272344 2022-04-10 12:59:40 | 43115 (1.1615) 12243272866 2022-04-10 12:59:41
43117 (1.6726) 12243270829 2022-04-10 12:59:38 | 43120 (1.1842) 12243272958 2022-04-10 12:59:41
43116 (1.141) 12243271365 2022-04-10 12:59:39 | 43121 (2.3684) 12243272795 2022-04-10 12:59:41
43115 (2.2525) 12243272118 2022-04-10 12:59:40 | 43122 (1.4324) 12243272816 2022-04-10 12:59:41
43114 (1.1842) 12243270741 2022-04-10 12:59:38 | 43123 (2.9421) 12243272376 2022-04-10 12:59:40
43113 (0.4638) 12243270818 2022-04-10 12:59:38 | 43124 (1.6613) 12243272130 2022-04-10 12:59:40
43112 (0.1005) 12243270846 2022-04-10 12:59:38 | 43125 (0.1848) 12243272750 2022-04-10 12:59:41
43110 (0.3756) 12243272381 2022-04-10 12:59:40 | 43127 (0.1403) 12243272139 2022-04-10 12:59:40
43107 (3.807) 12243272572 2022-04-10 12:59:40 | 43129 (0.3062) 12243256096 2022-04-10 12:59:35
43106 (24.1628) 12243272961 2022-04-10 12:59:41 | 43130 (2.1548) 12243268747 2022-04-10 12:59:37
bidvolume: 40.4429
askvolume: 13.536
minoffset: 12243256096
maxoffset: 12243272961 (+16865)
2022-04-10 12:59:43 Last trade: 2022-04-10T17:59:41.580Z 43119 BUY (0.0463)
Bid | Ask
43118 (4.5509) 12243273306 2022-04-10 12:59:42 | 43115 (2.3457) 12243273472 2022-04-10 12:59:43
43117 (1.6726) 12243270829 2022-04-10 12:59:38 | 43120 (1.1842) 12243273299 2022-04-10 12:59:42
43116 (1.141) 12243271365 2022-04-10 12:59:39 | 43121 (1.1842) 12243273164 2022-04-10 12:59:42
43115 (2.2525) 12243272118 2022-04-10 12:59:40 | 43122 (1.4324) 12243272816 2022-04-10 12:59:41
43114 (1.1842) 12243270741 2022-04-10 12:59:38 | 43123 (1.7579) 12243273438 2022-04-10 12:59:43
43113 (1.1295) 12243273315 2022-04-10 12:59:42 | 43124 (0.4771) 12243273170 2022-04-10 12:59:42
43112 (0.1005) 12243270846 2022-04-10 12:59:38 | 43125 (0.1848) 12243272750 2022-04-10 12:59:41
43110 (0.3756) 12243272381 2022-04-10 12:59:40 | 43127 (0.1403) 12243272139 2022-04-10 12:59:40
43107 (2.727) 12243273262 2022-04-10 12:59:42 | 43129 (0.3062) 12243256096 2022-04-10 12:59:35
43106 (24.1628) 12243272961 2022-04-10 12:59:41 | 43130 (2.1548) 12243268747 2022-04-10 12:59:37
bidvolume: 39.2966000000000005
askvolume: 11.167599999999999
minoffset: 12243256096
maxoffset: 12243273472 (+17376)
2022-04-10 12:59:44 Last trade: 2022-04-10T17:59:44.240Z 43118 SELL (0.2)
Bid | Ask
43118 (4.0754) 12243273786 2022-04-10 12:59:44 | 43119 (4.2246) 12243273729 2022-04-10 12:59:44
43117 (1.6726) 12243270829 2022-04-10 12:59:38 | 43120 (1.1842) 12243273299 2022-04-10 12:59:42
43116 (1.0276) 12243273815 2022-04-10 12:59:40 | 43121 (1.1842) 12243273164 2022-04-10 12:59:42
43115 (2.2525) 12243272118 2022-04-10 12:59:40 | 43122 (1.4324) 12243272816 2022-04-10 12:59:41
43114 (1.1842) 12243270741 2022-04-10 12:59:38 | 43123 (2.9421) 12243273674 2022-04-10 12:59:43
43113 (1.1295) 12243273315 2022-04-10 12:59:42 | 43124 (0.4771) 12243273170 2022-04-10 12:59:42
43112 (0.1005) 12243270846 2022-04-10 12:59:38 | 43125 (0.1848) 12243272750 2022-04-10 12:59:41
43110 (0.3756) 12243272381 2022-04-10 12:59:40 | 43127 (0.1403) 12243272139 2022-04-10 12:59:40
43107 (2.727) 12243273262 2022-04-10 12:59:42 | 43129 (0.4593) 12243273700 2022-04-10 12:59:44
43106 (24.1628) 12243272961 2022-04-10 12:59:41 | 43130 (2.1548) 12243268747 2022-04-10 12:59:37
bidvolume: 38.7077
askvolume: 14.383799999999999
minoffset: 12243268747
maxoffset: 12243273815 (+5068)
2022-04-10 12:59:45 Last trade: 2022-04-10T17:59:45.165Z 43119 BUY (0.0232)
Bid | Ask
43118 (0.5349) 12243274291 2022-04-10 12:59:45 | 43115 (6.9283) 12243274307 2022-04-10 12:59:45
43117 (1.6726) 12243270829 2022-04-10 12:59:38 | 43120 (1.1842) 12243273299 2022-04-10 12:59:42
43116 (2.2118) 12243274164 2022-04-10 12:59:44 | 43121 (1.1842) 12243273164 2022-04-10 12:59:42
43115 (2.2525) 12243272118 2022-04-10 12:59:40 | 43122 (1.452) 12243274362 2022-04-10 12:59:45
43114 (2.3684) 12243274028 2022-04-10 12:59:44 | 43123 (0.7115) 12243273700 2022-04-10 12:59:44
43113 (1.1295) 12243274358 2022-04-10 12:59:45 | 43124 (0.4771) 12243273170 2022-04-10 12:59:42
43110 (0.3756) 12243272381 2022-04-10 12:59:40 | 43125 (0.1848) 12243272750 2022-04-10 12:59:41
43107 (3.967) 12243274089 2022-04-10 12:59:44 | 43127 (0.1403) 12243272139 2022-04-10 12:59:40
43106 (24.1628) 12243272961 2022-04-10 12:59:41 | 43129 (0.4593) 12243273700 2022-04-10 12:59:44
43105 (1.3038) 12243271774 2022-04-10 12:59:39 | 43130 (2.1548) 12243268747 2022-04-10 12:59:37
bidvolume: 40.0689
askvolume: 17.107100000000003
minoffset: 12243268747
maxoffset: 12243274362 (+5615)
```

a = bid/ask price  
b = size  
c = offset  
d = date  
e = time of last update

last trade

bid/ask is highlighted if it matches the last trade

bidvolume = sum of all bid sizes  
askvolume = ask sizes  
minoffset = lowest offset  
maxoffset = highest offset and delta between highest and lowest

3. (Optional) There are a few optional parameters to customize the display to your preference.
  - a. compact – Removes 'offset' values from the display (67-column terminal required)
  - b. ultracompact – Removes 'offset' and year part of the 'date' values (39-column terminal required)
  - c. noansi – Removes colored values (this must be the last parameter)

```
vmware@ubuntu20041a:~/extra/f$ python3 -u dydxob2.py BTC-USD 10 compact
2022-04-10 13:28:18 2022-04-10T18:28:18.381Z 43206 SELL (0.2)
Bid | Ask
43206 (4.6253) 04-10 13:28:18 | 43207 (1.5398) 04-10 13:28:18
43205 (1.7342) 04-10 13:28:16 | 43209 (1.1842) 04-10 13:28:17
43204 (1.1842) 04-10 13:28:16 | 43210 (3.2944) 04-10 13:28:18
43203 (2.4384) 04-10 13:28:18 | 43211 (1.4844) 04-10 13:28:17
43202 (1.16) 04-10 13:28:16 | 43212 (0.2636) 04-10 13:28:17
43201 (1.0909) 04-10 13:28:17 | 43213 (0.2179) 04-10 13:28:17
43200 (2.2496) 04-10 13:28:16 | 43214 (0.7333) 04-10 13:28:17
43199 (3.6899) 04-10 13:28:17 | 43216 (0.6727) 04-10 13:28:18
43196 (0.7406) 04-10 13:28:17 | 43217 (5.3617) 04-10 13:28:18
43195 (0.6412) 04-10 13:28:15 | 43218 (0.3056) 04-10 13:28:16
bidvolume: 19.554300000000005
askvolume: 15.057600000000003
minoffset: 12244538054
maxoffset: 12244540983 (+2929)
```

```
vmware@ubuntu20041a:~/extra/f$ python3 -u dydxob2.py BTC-USD 10 ultracompact
04-10T18:28:58.481Z 43197 BUY (0.0462)
Bid | Ask
43196 (6.932) | 43197 (3.9598)
43195 (2.9314) | 43198 (1.1842)
43194 (3.4008) | 43199 (1.1842)
43193 (1.1842) | 43200 (0.7081)
43192 (0.1274) | 43201 (0.55)
43191 (1.1842) | 43207 (0.5206)
43190 (0.6459) | 43208 (0.1389)
43187 (27.5577) | 43210 (0.463)
43186 (2.7433) | 43211 (0.3002)
43185 (29.2198) | 43212 (0.6019)
bidvolume: 75.9267
askvolume: 9.610899999999999
minoffset: 12244551304
maxoffset: 12244560171 (+8867)
```

```
vmware@ubuntu20041a:~/extra/f$ python3 -u dydxob2.py BTC-USD 10 ultracompact noansi
04-10T18:29:23.831Z 43203 SELL (0.1)
Bid | Ask
43203 (4.1436) | 43204 (0.6842)
43202 (2.0784) | 43205 (1.1311)
43201 (1.6726) | 43206 (1.1842)
43200 (4.7994) | 43207 (0.4528)
43199 (1.1842) | 43210 (0.6158)
43198 (4.3342) | 43211 (0.3002)
43195 (0.563) | 43212 (3.6438)
43194 (2.3556) | 43213 (0.4957)
43192 (1.1508) | 43217 (1.7619)
43191 (0.278) | 43218 (2.0317)
bidvolume: 22.559799999999996
askvolume: 12.301400000000001
minoffset: 12244558946
maxoffset: 12244572834 (+13888)
```

## PART 4: (Optional) Launching multiple orderbooks

1. You can launch this program for multiple dYdX markets with this simple command.

```
for s1 in 1INCH-USD AAVE-USD ADA-USD ALGO-USD ATOM-USD AVAX-USD BCH-USD BTC-USD COMP-USD \  
    CRV-USD DOGE-USD DOT-USD ENJ-USD EOS-USD ETC-USD ETH-USD FIL-USD LINK-USD LTC-USD \  
    MATIC-USD MKR-USD SNX-USD SOL-USD SUSHI-USD UMA-USD UNI-USD XLM-USD XMR-USD YFI-USD \  
    ZEC-USD ZRX-USD  
do  
    nohup python3 -u dydxob.py $s1 > /mnt/ramdisk/dydxob$s1.stdout 2>&1 &  
    nohup python3 -u dydxtrades.py $s1 > /mnt/ramdisk/dydxob$s1.stdout 2>&1 &  
    sleep 1  
done
```

<END>