tda-api

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This project is on GitHub

CHAPTER 1

Getting Started

Welcome to `tda-api`! Read this page to learn how to install and configure your first TD Ameritrade Python application.

1.1 TD Ameritrade API Access

All API calls to the TD Ameritrade API require an API key. Before we do anything with `tda-api`, you'll need to create a developer account with TD Ameritrade and register an application. By the end of this section, you'll have accomplished the three prerequisites for using `tda-api`:

1. Create an application.
2. Choose and save the callback URL (important for authenticating).
3. Receive an API key.

You can create a developer account here. The instructions from here on out assume you're logged in, so make sure you log into the developer site after you've created your account.

Next, you'll want to create an application. The app name and purpose aren't particularly important right now, but the callback URL is. In a nutshell, the OAuth login flow that TD Ameritrade uses works by opening a TD Ameritrade login page, securely collecting credentials on their domain, and then sending an HTTP request to the callback URL with the token in the URL query.

How you use to choose your callback URL depends on whether and how you plan on distributing your app. If you're writing an app for your own personal use, and plan to run entirely on your own machine, use `https://localhost`. If you plan on running on a server and having users send requests to you, use a URL you own, such as a dedicated endpoint on your domain.

Once your app is created and approved, you will receive your API key, also known as the Client ID. This will be visible in TDA's app listing page. Record this key, since it is necessary to access most API endpoints.

1.2 Installing `tda-api`

This section outlines the installation process for client users. For developers, check out *Contributing to tda-api*.

The recommended method of installing `tda-api` is using `pip` from PyPi in a virtualenv. First create a virtualenv in your project diretory. Here we assume your virtualenv is called `my-venv`:

```
pip install virtualenv
virtualenv -v my-venv
source my-venv/bin/activate
```

You are now ready to install `tda-api`:

```
pip install tda-api
```

That's it! You're done! You can verify the install succeeded by importing the package:

```
import tda
```

If this succeeded, you're ready to move on to *Authentication and Client Creation*.

CHAPTER 2

Authentication and Client Creation

By now, you should have followed the instructions in *Getting Started* and are ready to start making API calls. Read this page to learn how to get over the last remaining hurdle: OAuth authentication.

Before we begin, however, note that this guide is meant to users who want to run applications on their own machines, without distributing them to others. If you plan on distributing your app, or if you plan on running it on a server and allowing access to other users, this login flow is not for you.

2.1 OAuth Refresher

This section is purely for the curious. If you already understand OAuth (wow, congrats) or if you don't care and just want to use this package as fast as possible, feel free to skip this section. If you encounter any weird behavior, this section may help you understand that's going on.

Webapp authentication is a complex beast. The OAuth protocol was created to allow applications to access one anothers' APIs securely and with the minimum level of trust possible. A full treatise on this topic is well beyond the scope of this guide, but in order to alleviate some of the confusion and complexity that seems to surround this part of the API, let's give a quick explanation of how OAuth works in the context of TD Ameritrade's API.

The first thing to understand is that the OAuth webapp flow was created to allow client-side applications consisting of a webapp frontend and a remotely hosted backend to interact with a third party API. Unlike the backend application flow, in which the remotely hosted backend has a secret which allows it to access the API on its own behalf, the webapp flow allows either the webapp frontend or the remotely host backend to access the API *on behalf of its users*.

If you've ever installed a GitHub, Facebook, Twitter, GMail, etc. app, you've seen this flow. You click on the "install" link, a login window pops up, you enter your password, and you're presented with a page that asks whether you want to grant the app access to your account.

Here's what's happening under the hood. The window that pops up is the authentication URL, which opens a login page for the target API. The aim is to allow the user to input their username and password without the webapp frontend or the remotely hosted backend seeing it. On web browsers, this is accomplished using the browser's refusal to send credentials from one domain to another.

Once login here is successful, the API replies with a redirect to a URL that the remotely hosted backend controls. This is the callback URL. This redirect will contain a code which securely identifies the user to the API, embedded in the query of the request.

You might think that code is enough to access the API, and it would be if the API author were willing to sacrifice long-term security. The exact reasons why it doesn't work involve some deep security topics like robustness against replay attacks and session duration limitation, but we'll skip them here.

This code is useful only for fetching a token from the authentication endpoint. *This token* is what we want: a secure secret which the client can use to access API endpoints, and can be refreshed over time.

If you've gotten this far and your head isn't spinning, you haven't been paying attention. Security-sensitive protocols can be very complicated, and you should **never** build your own implementation. Fortunately there exist very robust implementations of this flow, and `tda-api`'s authentication module makes using them easy.

2.2 Fetching a Token and Creating a Client

`tda-api` provides an easy implementation of the client-side login flow in the `auth` package. It uses a selenium webdriver to open the TD Ameritrade authentication URL, take your login credentials, catch the post-login redirect, and fetch a reusable token. It returns a fully-configured *HTTP Client*, ready to send API calls. It also handles token refreshing, and writes updated tokens to the token file.

These functions are webdriver-agnostic, meaning you can use whatever webdriver-supported browser you can available on your system. You can find information about available webdriver on the Selenium documentation.

`tda.auth.`**`client_from_login_flow`**(*webdriver*, *api_key*, *redirect_url*, *token_path*, *redirect_wait_time_seconds=0.1*)

Uses the webdriver to perform an OAuth webapp login flow and creates a client wrapped around the resulting token. The client will be configured to refresh the token as necessary, writing each updated version to `token_path`.

Parameters

- **`webdriver`** – selenium webdriver which will be used to perform the login flow.
- **`api_key`** – Your TD Ameritrade application's API key, also known as the client ID.
- **`redirect_url`** – Your TD Ameritrade application's redirect URL. Note this must *exactly* match the value you've entered in your application configuration, otherwise login will fail with a security error.
- **`token_path`** – Path to which the new token will be written. If the token file already exists, it will be overwritten with a new one. Updated tokens will be written to this path as well.

Once you have a token written on disk, you can reuse it without going through the login flow again.

`tda.auth.`**`client_from_token_file`**(*token_path*, *api_key*)

Returns a session from an existing token file. The session will perform an auth refresh as needed. It will also update the token on disk whenever appropriate.

Parameters

- **`token_path`** – Path to an existing token. Updated tokens will be written to this path. If you do not yet have a token, use *`client_from_login_flow()`* or *`easy_client()`* to create one.
- **`api_key`** – Your TD Ameritrade application's API key, also known as the client ID.

The following is a convenient wrapper around these two methods, calling each when appropriate:

tda.auth.**easy_client**(*api_key*, *redirect_uri*, *token_path*, *webdriver_func=None*)

Convenient wrapper around *client_from_login_flow()* and *client_from_token_file()*. If token_path exists, loads the token from it. Otherwise open a login flow to fetch a new token. Returns a client configured to refresh the token to token_path.

Reminder: You should never create the token file yourself or modify it in any way. If token_path refers to an existing file, this method will assume that file is valid token and will attempt to parse it.

Parameters

- **api_key** – Your TD Ameritrade application's API key, also known as the client ID.
- **redirect_url** – Your TD Ameritrade application's redirect URL. Note this must *exactly* match the value you've entered in your application configuration, otherwise login will fail with a security error.
- **token_path** – Path that new token will be read from and written to. If If this file exists, this method will assume it's valid and will attempt to parse it as a token. If it does not, this method will create a new one using *client_from_login_flow()*. Updated tokens will be written to this path as well.
- **webdriver_func** – Function that returns a webdriver for use in fetching a new token. Will only be called if the token file cannot be found.

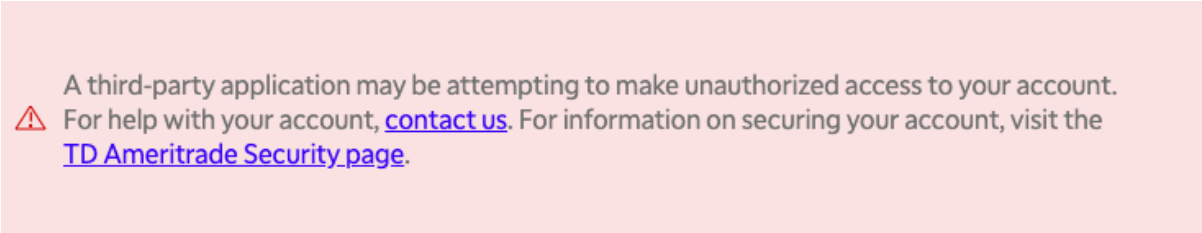
2.3 Troubleshooting

As simple as it seems, this process is complex and mistakes are easy to make. This section outlines some of the more common issues you might encounter. If you find yourself dealing with something that isn't listed here, or if you try the suggested remedies and are still seeing issues, please file a ticket on our issues page.

2.3.1 "A third-party application may be attempting to make unauthorized access to your account"

One attack on improperly implemented OAuth login flows involves tricking a user into submitting their credentials for a real app and then redirecting to a malicious web server (remember the GET request to the redirect URI contains all credentials required to access the user's account). This is especially pernicious because from the user's perspective, they see a real login window and probably never realize they've been sent to a malicious server, especially if the landing page is designed to resemble the target API's landing page.

TD Ameritrade correctly prevents this attack by refusing to allow a login if the redirect URI does not **exactly** match the redirect URI with which the app is configured. If you make *any* mistake in setting your API key or redirect URI, you'll see this instead of a login page:



If this happens, you almost certainly copied your API key or redirect URI incorrectly. Go back to your application list and copy-paste it again.

2.3.2 `tda-api` Hangs After Successful Login

After opening the login window, `tda-api` loops and waits until the webdriver's current URL starts with the given redirect URI:

```
callback_url = ''
while not callback_url.startswith(redirect_url):
    callback_url = webdriver.current_url
    time.sleep(redirect_wait_time_seconds)
```

Usually, it would be impossible for a successful post-login callback to not start with the callback URI, but there's one major exception: when the callback URI starts with `http`. Behavior varies by browser and app configuration, but a callback URI starting with `http` can sometimes be redirected to one starting with `https`, in which case `tda-api` will never notice the redirect.

If this is happening to you, consider changing your callback URI to use `https` instead of `http`. Not only will it make your life easier here, but it is *extremely* bad practice to send credentials like this over an unencrypted channel like that provided by `http`.

2.3.3 Token Parsing Failures

`tda-api` handles creating and refreshing tokens. Simply put, *the user should never create or modify the token file*. If you are experiencing parse errors when accessing the token file or getting exceptions when accessing it, it's probably because you created it yourself or modified it. If you're experiencing token parsing issues, remember that:

1. You should never create the token file yourself. If you don't already have a token, you should pass a nonexistent file path to *`client_from_login_flow()`* or *`easy_client()`*. If the file already exists, these methods assume it's a valid token file. If the file does not exist, they will go through the login flow to create one.
2. You should never modify the token file. The token file is automatically managed by `tda-api`, and modifying it will almost certainly break it.
3. You should never share the token file. If the token file is shared between applications, one of them will beat the other to refreshing, locking the slower one out of using `tda-api`.

If you didn't do any of this and are still seeing issues using a token file that you're confident is valid, please file a ticket. Just remember, **never share your token file, not even with `tda-api` developers**. Sharing the token file is as dangerous as sharing your TD Ameritrade username and password.

CHAPTER 3

HTTP Client

A naive, unopinionated wrapper around the TD Ameritrade HTTP API. This client provides access to all endpoints of the API in as easy and direct a way as possible. For example, here is how you can fetch the past 20 years of data for Apple stock:

```
from tda.auth import easy_client
from tda.client import Client

c = easy_client(
        api_key='APIKEY',
        redirect_uri='https://localhost',
        token_path='/tmp/token.pickle')

resp = c.get_price_history('AAPL',
        period_type=Client.PriceHistory.PeriodType.YEAR,
        period=Client.PriceHistory.Period.TWENTY_YEARS,
        frequency_type=Client.PriceHistory.FrequencyType.DAILY,
        frequency=Client.PriceHistory.Frequency.DAILY)
assert resp.ok
history = resp.json()
```

Note we we create a new client using the `auth` package as described in *Authentication and Client Creation*. Creating a client directly is possible, but not recommended.

3.1 Calling Conventions

Function parameters are categorized as either required or optional. Required parameters, such as `'AAPL'` in the example above, are passed as positional arguments. Optional parameters, like `period_type` and the rest, are passed as keyword arguments.

Parameters which have special values recognized by the API are represented by Python enums. This is because the API rejects requests which pass unrecognized values, and this enum wrapping is provided as a convenient mechanism to avoid consternation caused by accidentally passing an unrecognized value.

By default, passing values other than the required enums will raise a `ValueError`. If you believe the API accepts a value that isn't supported here, you can use `set_enforce_enums` to disable this behavior at your own risk. If you *do* find a supported value that isn't listed here, please open an issue describing it or submit a PR adding the new functionality.

3.2 Return Values

All methods return a response object generated under the hood by the requests module. For a full listing of what's possible, read that module's documentation. Most if not all users can simply use the following pattern:

```
r = client.some_endpoint()
assert r.ok, r.raise_for_status()
data = r.json()
```

The API indicates errors using the response status code, and this pattern will raise the appropriate exception if the response is not a success. The data can be fetched by calling the `.json()` method.

Note: Because the author has no relationship whatsoever with TD Ameritrade, this document makes no effort to describe the structure of the returned JSON objects. TDA might change them at any time, at which point this document will become silently out of date. Instead, each of the methods described below contains a link to the official documentation. For endpoints that return meaningful JSON objects, it includes a JSON schema which describes the return value. Please use that documentation or your own experimentation when figuring out how to use the data returned by this API.

3.3 Creating a New Client

99.9% of users should not create their own clients, and should instead follow the instructions outlined in *Authentication and Client Creation*. For those brave enough to build their own, the constructor looks like this:

`Client.__init__`(*api_key*, *session*, *, *enforce_enums=True*)

Create a new client with the given API key and session. Set *enforce_enums=False* to disable strict input type checking.

3.4 Orders

3.4.1 Placing New Orders

Placing new orders can be a complicated task. The *`Client.place_order()`* method is used to create all orders, from equities to options. The precise order type is defined by a complex order spec. TDA provides some example order specs to illustrate the process and provides a schema in the place order documentation, but beyond that we're on our own.

`tda-api` includes some helpers, described in *Creating Order Specifications*, which provide an incomplete utility for creating various order types. While it only scratches the surface of what's possible, we encourage you to use that module instead of creating your own order specs.

`Client.place_order`(*account_id*, *order_spec*)

Place an order for a specific account. If order creation was successful, the response will contain the ID of the generated order. See *`tda.utils.Utils.extract_order_id()`* for more details.

Official documentation.

3.4.2 Accessing Existing Orders

Client.**get_orders_by_path**(*account_id*, *, *max_results=None*, *from_entered_datetime=None*, *to_entered_datetime=None*, *status=None*, *statuses=None*)

Orders for a specific account. At most one of `status` and `statuses` may be set. Official documentation.

Parameters

- **max_results** – The maximum number of orders to retrieve.
- **from_entered_datetime** – Specifies that no orders entered before this time should be returned. Date must be within 60 days from today's date. `toEnteredTime` must also be set.
- **to_entered_datetime** – Specifies that no orders entered after this time should be returned. `fromEnteredTime` must also be set.
- **status** – Restrict query to orders with this status. See *Order.Status* for options.
- **statuses** – Restrict query to orders with any of these statuses. See *Order.Status* for options.

Client.**get_orders_by_query**(*, *max_results=None*, *from_entered_datetime=None*, *to_entered_datetime=None*, *status=None*, *statuses=None*)

Orders for all linked accounts. At most one of `status` and `statuses` may be set. Official documentation.

Parameters

- **max_results** – The maximum number of orders to retrieve.
- **from_entered_datetime** – Specifies that no orders entered before this time should be returned. Date must be within 60 days from today's date. `toEnteredTime` must also be set.
- **to_entered_datetime** – Specifies that no orders entered after this time should be returned. `fromEnteredTime` must also be set.
- **status** – Restrict query to orders with this status. See *Order.Status* for options.
- **statuses** – Restrict query to orders with any of these statuses. See *Order.Status* for options.

Client.**get_order**(*order_id*, *account_id*)

Get a specific order for a specific account by its order ID. Official documentation.

class tda.client.Client.**Order**

class Status

Order statuses passed to *get_orders_by_path()* and *get_orders_by_query()*

ACCEPTED = 'ACCEPTED'

AWAITING_CONDITION = 'AWAITING_CONDITION'

AWAITING_MANUAL_REVIEW = 'AWAITING_MANUAL_REVIEW'

AWAITING_PARENT_ORDER = 'AWAITING_PARENT_ORDER'

AWAITING_UR_OUR = 'AWAITING_UR_OUR'

CANCELLED = 'CANCELLED'

EXPIRED = 'EXPIRED'

FILLED = 'FILLED'

PENDING_ACTIVATION = 'PENDING_ACTIVATION'

PENDING_CANCEL = 'PENDING_CANCEL'

PENDING_REPLACE = 'PENDING_REPLACE'

QUEUED = 'QUEUED'

REJECTED = 'REJECTED'

REPLACED = 'REPLACED'

WORKING = 'WORKING'

3.4.3 Editing Existing Orders

Endpoints for canceling and replacing existing orders. Annoyingly, while these endpoints require an order ID, it seems that when placing new orders the API does not return any metadata about the new order. As a result, if you want to cancel or replace an order after you've created it, you must search for it using the methods described in *Accessing Existing Orders*.

`Client.`**`cancel_order`**(*order_id*, *account_id*)
Cancel a specific order for a specific account. Official documentation.

`Client.`**`replace_order`**(*account_id*, *order_id*, *order_spec*)
Replace an existing order for an account. The existing order will be replaced by the new order. Once replaced, the old order will be canceled and a new order will be created. Official documentation.

3.5 Account Info

These methods provide access to useful information about accounts. An incomplete list of the most interesting bits:

- Account balances, including available trading balance
- Positions
- Order history

See the official documentation for each method for a complete response schema.

`Client.`**`get_account`**(*account_id*, *, *fields=None*)
Account balances, positions, and orders for a specific account. Official documentation.

Parameters **`fields`** – Balances displayed by default, additional fields can be added here by adding values from *`Account.Fields`*.

`Client.`**`get_accounts`**(*, *fields=None*)
Account balances, positions, and orders for all linked accounts. Official documentation.

Parameters **`fields`** – Balances displayed by default, additional fields can be added here by adding values from *`Account.Fields`*.

class `tda.client.Client.`**`Account`**

class Fields
Account fields passed to *`get_account()`* and *`get_accounts()`*

ORDERS = 'orders'

POSITIONS = 'positions'

3.6 Instrument Info

Note: symbol fundamentals (P/E ratios, number of shares outstanding, dividend yield, etc.) is available using the `Instrument.Projection.FUNDAMENTAL` projection.

`Client.`**`search_instruments`**(*symbols*, *projection*)
Search or retrieve instrument data, including fundamental data. Official documentation.

Parameters **`projection`** – Query type. See *`Instrument.Projection`* for options.

`Client.`**`get_instrument`**(*cusip*)
Get an instrument by CUSIP. Official documentation.

`class` `tda.client.Client.`**`Instrument`**

`class Projection`
Search query type for *`search_instruments()`*. See the official documentation for details on the semantics of each.

`DESC_REGEX = 'desc-regex'`

`DESC_SEARCH = 'desc-search'`

`FUNDAMENTAL = 'fundamental'`

`SYMBOL_REGEX = 'symbol-regex'`

`SYMBOL_SEARCH = 'symbol-search'`

3.7 Option Chains

Unfortunately, option chains are well beyond the ability of your humble author. You are encouraged to read the official API documentation to learn more.

If you *are* knowledgeable enough to write something more substantive here, please follow the instructions in *Contributing to tda-api* to send in a patch.

`Client.`**`get_option_chain`**(*symbol*, ***, *contract_type=None*, *strike_count=None*, *include_quotes=None*, *strategy=None*, *interval=None*, *strike=None*, *strike_range=None*, *strike_from_date=None*, *strike_to_date=None*, *volatility=None*, *underlying_price=None*, *interest_rate=None*, *days_to_expiration=None*, *exp_month=None*, *option_type=None*)
Get option chain for an optionable Symbol. Official documentation.

Parameters

- **`contract_type`** – Type of contracts to return in the chain. See *`Options.ContractType`* for choices.
- **`strike_count`** – The number of strikes to return above and below the at-the-money price.
- **`include_quotes`** – Include quotes for options in the option chain?
- **`strategy`** – If passed, returns a Strategy Chain. See *`Options.Strategy`* for choices.
- **`interval`** – Strike interval for spread strategy chains (see `strategy` param).
- **`strike`** – Return options only at this strike price.
- **`strike_range`** – Return options for the given range. See *`Options.StrikeRange`* for choices.

- **strike_from_date** – Only return expirations after this date. For strategies, expiration refers to the nearest term expiration in the strategy. Accepts `datetime.date` and `datetime.datetime`.
- **strike_to_date** – Only return expirations before this date. For strategies, expiration refers to the nearest term expiration in the strategy. Accepts `datetime.date` and `datetime.datetime`.
- **volatility** – Volatility to use in calculations. Applies only to `ANALYTICAL` strategy chains.
- **underlying_price** – Underlying price to use in calculations. Applies only to `ANALYTICAL` strategy chains.
- **interest_rate** – Interest rate to use in calculations. Applies only to `ANALYTICAL` strategy chains.
- **days_to_expiration** – Days to expiration to use in calculations. Applies only to `ANALYTICAL` strategy chains
- **exp_month** – Return only options expiring in the specified month. See *Options.ExpirationMonth* for choices.
- **option_type** – Types of options to return. See *Options.Type* for choices.

class tda.client.Client.**Options**

class ContractType
An enumeration.

ALL = 'ALL'

CALL = 'CALL'

PUT = 'PUT'

class ExpirationMonth
An enumeration.

APRIL = 'APR'

AUGUST = 'AUG'

DECEMBER = 'DEC'

FEBRUARY = 'FEB'

JANUARY = 'JAN'

JULY = 'JUL'

JUN = 'JUN'

MARCH = 'MAR'

MAY = 'MAY'

NOVEMBER = 'NOV'

OCTOBER = 'OCT'

SEPTEMBER = 'SEP'

class Strategy
An enumeration.

ANALYTICAL = 'ANALYTICAL'

BUTTERFLY = 'BUTTERFLY'

CALENDAR = 'CALENDAR'

COLLAR = 'COLLAR'

CONDOR = 'CONDOR'

COVERED = 'COVERED'

DIAGONAL = 'DIAGONAL'

ROLL = 'ROLL'

SINGLE = 'SINGLE'

STRADDLE = 'STRADDLE'

STRANGLE = 'STRANGLE'

VERTICAL = 'VERTICAL'

class StrikeRange

An enumeration.

ALL = 'ALL'

IN_THE_MONEY = 'ITM'

NEAR_THE_MONEY = 'NTM'

OUT_OF_THE_MONEY = 'OTM'

STRIKES_ABOVE_MARKET = 'SAK'

STRIKES_BELOW_MARKET = 'SBK'

STRIKES_NEAR_MARKET = 'SNK'

class Type

An enumeration.

ALL = 'ALL'

NON_STANDARD = 'NS'

STANDARD = 'S'

3.8 Price History

Fetching price history is somewhat complicated due to the fact that only certain combinations of parameters are valid. To avoid accidentally making it impossible to send valid requests, this method performs no validation on its parameters. If you are receiving empty requests or other weird return values, see the official documentation for more details.

Client.**get_price_history**(*symbol*, ***, *period_type=None*, *period=None*, *frequency_type=None*, *frequency=None*, *start_datetime=None*, *end_datetime=None*, *need_extended_hours_data=None*)

Get price history for a symbol. Official documentation.

Parameters

- **period_type** – The type of period to show.

- **period** – The number of periods to show. Should not be provided if `start_datetime` and `end_datetime`.
- **frequency_type** – The type of frequency with which a new candle is formed.
- **frequency** – The number of the frequencyType to be included in each candle.
- **start_datetime** – End date. Default is previous trading day.
- **end_datetime** – Start date.
- **need_extended_hours_data** – If true, return extended hours data. Otherwise return regular market hours only.

class tda.client.Client.**PriceHistory**

class Frequency
An enumeration.

DAILY = 1

EVERY_FIFTEEN_MINUTES = 15

EVERY_FIVE_MINUTES = 5

EVERY_MINUTE = 1

EVERY_TEN_MINUTES = 10

EVERY_THIRTY_MINUTES = 30

MONTHLY = 1

WEEKLY = 1

class FrequencyType
An enumeration.

DAILY = 'daily'

MINUTE = 'minute'

MONTHLY = 'monthly'

WEEKLY = 'weekly'

class Period
An enumeration.

FIFTEEN_YEARS = 15

FIVE_DAYS = 5

FIVE_YEARS = 5

FOUR_DAYS = 4

ONE_DAY = 1

ONE_MONTH = 1

ONE_YEAR = 1

SIX_MONTHS = 6

TEN_DAYS = 10

TEN_YEARS = 10

THREE_DAYS = 3

THREE_MONTHS = 3

THREE_YEARS = 3

TWENTY_YEARS = 20

TWO_DAYS = 2

TWO_MONTHS = 2

TWO_YEARS = 2

YEAR_TO_DATE = 1

class PeriodType

An enumeration.

DAY = 'day'

MONTH = 'month'

YEAR = 'year'

YEAR_TO_DATE = 'ytd'

3.9 Current Quotes

Client.**get_quote**(*symbol*)

Get quote for a symbol. Note due to limitations in URL encoding, this method is not recommended for instruments with symbols symbols containing non-alphanumeric characters, for example as futures like `/ES`. To get quotes for those symbols, use *Client.get_quotes()*.

Official documentation.

Client.**get_quotes**(*symbols*)

Get quote for a symbol. This method supports all symbols, including those containing non-alphanumeric characters like `/ES`. Official documentation.

3.10 Other Endpoints

Note If your account limited to delayed quotes, these quotes will also be delayed.

3.10.1 Transaction History

Client.**get_transaction**(*account_id*, *transaction_id*)

Transaction for a specific account. Official documentation.

Client.**get_transactions**(*account_id*, ***, *transaction_type=None*, *symbol=None*, *start_date=None*, *end_date=None*)

Transaction for a specific account. Official documentation.

Parameters

- **transaction_type** – Only transactions with the specified type will be returned.
- **symbol** – Only transactions with the specified symbol will be returned.

- **start_date** – Only transactions after this date will be returned. Note the maximum date range is one year. Accepts `datetime.date` and `datetime.datetime`.
- **end_date** – Only transactions before this date will be returned Note the maximum date range is one year. Accepts `datetime.date` and `datetime.datetime`.

class tda.client.Client.**Transactions**

class TransactionType

An enumeration.

ADVISORY_FEES = 'ADVISORY_FEES'

ALL = 'ALL'

BUY_ONLY = 'BUY_ONLY'

CASH_IN_OR_CASH_OUT = 'CASH_IN_OR_CASH_OUT'

CHECKING = 'CHECKING'

DIVIDEND = 'DIVIDEND'

INTEREST = 'INTEREST'

OTHER = 'OTHER'

SELL_ONLY = 'SELL_ONLY'

TRADE = 'TRADE'

3.10.2 Saved Orders

Client.**create_saved_order**(*account_id*, *order_spec*)

Save an order for a specific account. Official documentation.

Client.**delete_saved_order**(*account_id*, *order_id*)

Delete a specific saved order for a specific account. Official documentation.

Client.**get_saved_order**(*account_id*, *order_id*)

Specific saved order by its ID, for a specific account. Official documentation.

Client.**get_saved_orders_by_path**(*account_id*)

Saved orders for a specific account. Official documentation.

Client.**replace_saved_order**(*account_id*, *order_id*, *order_spec*)

Replace an existing saved order for an account. The existing saved order will be replaced by the new order. Official documentation.

3.10.3 Market Hours

Client.**get_hours_for_multiple_markets**(*markets*, *date*)

Retrieve market hours for specified markets. Official documentation.

Parameters

- **markets** – Market to return hours for. Iterable of *Markets*.
- **date** – The date for which market hours information is requested. Accepts `datetime.date` and `datetime.datetime`.

Client.**get_hours_for_single_market**(*market*, *date*)
Retrieve market hours for specified single market. Official documentation.

Parameters

- **markets** – Market to return hours for. Instance of *Markets*.
- **date** – The date for which market hours information is requested. Accepts `datetime.date` and `datetime.datetime`.

class tda.client.Client.**Markets**
Values for *get_hours_for_multiple_markets()* and *get_hours_for_single_market()*.

BOND = 'BOND'

EQUITY = 'EQUITY'

FOREX = 'FOREX'

FUTURE = 'FUTURE'

OPTION = 'OPTION'

3.10.4 Movers

Client.**get_movers**(*index*, *direction*, *change*)
Top 10 (up or down) movers by value or percent for a particular market. Official documentation.

Parameters

- **direction** – See *Movers.Direction*
- **change** – See *Movers.Change*

class tda.client.Client.**Movers**

class Change
Values for *get_movers()*

PERCENT = 'percent'

VALUE = 'value'

class Direction
Values for *get_movers()*

DOWN = 'down'

UP = 'up'

3.10.5 User Info and Preferences

Client.**get_preferences**(*account_id*)
Preferences for a specific account. Official documentation.

Client.**get_user_principals**(*fields=None*)
User Principal details. Official documentation.

Client.**update_preferences**(*account_id*, *preferences*)
Update preferences for a specific account.

Please note that the directOptionsRouting and directEquityRouting values cannot be modified via this operation. Official documentation.

class tda.client.Client.**UserPrincipals**

class Fields
An enumeration.

PREFERENCES = 'preferences'

STREAMER_CONNECTION_INFO = 'streamerConnectionInfo'

STREAMER_SUBSCRIPTION_KEYS = 'streamerSubscriptionKeys'

SURROGATE_IDS = 'surrogateIds'

3.10.6 Watchlists

Client.**create_watchlist**(*account_id*, *watchlist_spec*)
'Create watchlist for specific account.This method does not verify that the symbol or asset type are valid. Official documentation.

Client.**delete_watchlist**(*account_id*, *watchlist_id*)
Delete watchlist for a specific account. Official documentation.

Client.**get_watchlist**(*account_id*, *watchlist_id*)
Specific watchlist for a specific account. Official documentation.

Client.**get_watchlists_for_multiple_accounts**()
All watchlists for all of the user's linked accounts. Official documentation.

Client.**get_watchlists_for_single_account**(*account_id*)
All watchlists of an account. Official documentation.

Client.**replace_watchlist**(*account_id*, *watchlist_id*, *watchlist_spec*)
Replace watchlist for a specific account. This method does not verify that the symbol or asset type are valid. Official documentation.

Client.**update_watchlist**(*account_id*, *watchlist_id*, *watchlist_spec*)
Partially update watchlist for a specific account: change watchlist name, add to the beginning/end of a watchlist, update or delete items in a watchlist. This method does not verify that the symbol or asset type are valid. Official documentation.

CHAPTER 4

Streaming Client

A wapper around the TD Ameritrade Streaming API. This API is a websockets-based streaming API that provides to up-to-the-second data on market activity. Most impressively, it provides realtime data, including Level Two and time of sale data for major equities, options, and futures exchanges.

Here's an example of how you can receive book snapshots of `GOOG` (note if you run this outside regular trading hours you may not see anything):

```
from tda.auth import easy_client
from tda.client import Client
from tda.streaming import StreamClient

import asyncio
import json

client = easy_client(
        api_key='APIKEY',
        redirect_uri='https://localhost',
        token_path='/tmp/token.pickle')
stream_client = StreamClient(client, account_id=1234567890)

async def read_stream():
    await stream_client.login()
    await stream_client.quality_of_service(StreamClient.QOSLevel.EXPRESS)
    await stream_client.nasdaq_book_subs(['GOOG'])
    stream_client.add_timesale_options_handler(
            lambda msg: print(json.dumps(msg, indent=4)))

    while True:
        await stream_client.handle_message()

asyncio.get_event_loop().run_until_complete(read_stream())
```

This API uses Python coroutines to simplify implementation and preserve performance. As a result, it requires Python 3.8 or higher to use. `tda.stream` will not be available on older versions of Python.

4.1 Use Overview

The example above demonstrates the end-to-end workflow for using `tda.stream`. There's more in there than meets the eye, so let's dive into the details.

4.1.1 Logging In

Before we can perform any stream operations, the client must be logged in to the stream. Unlike the HTTP client, in which every request is authenticated using a token, this client sends unauthenticated requests and instead authenticates the entire stream. As a result, this login process is distinct from the token generation step that's used in the HTTP client.

Stream login is accomplished simply by calling *`StreamClient.login()`*. Once this happens successfully, all stream operations can be performed. Attemping to perform operations that require login before this function is called raises an exception.

`StreamClient.`**`login`**`()`
Official Documentation

Performs initial stream setup:

- Fetches streaming information from the HTTP client's *`get_user_principals()`* method
- Initializes the socket
- Builds and sends and authentication request
- Waits for response indicating login success

All stream operations are available after this method completes.

4.1.2 Setting Quality of Service

By default, the stream's update frequency is set to 1000ms. The frequency can be increased by calling the `quality_of_service` function and passing an appropriate `QOSLevel` value.

`StreamClient.`**`quality_of_service`**`(`*qos_level*`)`
Official Documentation

Specifies the frequency with which updated data should be sent to the client. If not called, the frequency will default to every second.

Parameters **`qos_level`** – Quality of service level to request. See *`QOSLevel`* for options.

`class` `StreamClient.`**`QOSLevel`**
Quality of service levels

`EXPRESS = '0'`
500ms between updates. Fastest available

`REAL_TIME = '1'`
750ms between updates

`FAST = '2'`
1000ms between updates. Default value.

`MODERATE = '3'`
1500ms between updates

SLOW = '4'
3000ms between updates

DELAYED = '5'
5000ms between updates

4.1.3 Subscribing to Streams

These functions have names that follow the pattern `SERVICE_NAME_subs`. These functions send a request to enable streaming data for a particular data stream. They are *not* thread safe, so they should only be called in series.

When subscriptions are called multiple times on the same stream, the results vary. What's more, these results aren't documented in the official documentation. As a result, it's recommended not to call a subscription function more than once for any given stream.

Some services, notably *Equity Charts* and *Futures Charts*, offer `SERVICE_NAME_add` functions which can be used to add symbols to the stream after the subscription has been created. For others, calling the subscription methods again seems to clear the old subscription and create a new one. Note this behavior is not officially documented, so this interpretation may be incorrect.

4.1.4 Registering Handlers

By themselves, the subscription functions outlined above do nothing except cause messages to be sent to the client. The `add_SERVICE_NAME_handler` functions register functions that will receive these messages when they arrive. When messages arrive, these handlers will be called serially. There is no limit to the number of handlers that can be registered to a service.

4.1.5 Handling Messages

Once the stream client is properly logged in, subscribed to streams, and has handlers registered, we can start handling messages. This is done simply by awaiting on the `handle_message()` function. This function reads a single message and dispatches it to the appropriate handler or handlers.

If a message is received for which no handler is registered, that message is ignored.

Handlers should take a single argument representing the stream message received:

```
import json

def sample_handler(msg):
    print(json.dumps(msg, indent=4))
```

4.1.6 Data Field Relabeling

Under the hood, this API returns JSON objects with numerical key representing labels:

```
{
    "service": "CHART_EQUITY",
    "timestamp": 1590597641293,
    "command": "SUBS",
    "content": [
        {
            "seq": 985,
```

(continues on next page)

(continued from previous page)

```
            "key": "MSFT",
            "1": 179.445,
            "2": 179.57,
            "3": 179.4299,
            "4": 179.52,
            "5": 53742.0,
            "6": 339,
            "7": 1590597540000,
            "8": 18409
        },
    ]
}
```

These labels are tricky to decode, and require a knowledge of the documentation to decode properly. `tda-api` makes your life easier by doing this decoding for you, replacing numerical labels with strings pulled from the documentation. For instance, the message above would be relabeled as:

```
{
    "service": "CHART_EQUITY",
    "timestamp": 1590597641293,
    "command": "SUBS",
    "content": [
        {
            "seq": 985,
            "key": "MSFT",
            "OPEN_PRICE": 179.445,
            "HIGH_PRICE": 179.57,
            "LOW_PRICE": 179.4299,
            "CLOSE_PRICE": 179.52,
            "VOLUME": 53742.0,
            "SEQUENCE": 339,
            "CHART_TIME": 1590597540000,
            "CHART_DAY": 18409
        },
    ]
}
```

This documentation describes the various fields and their numerical values. You can find them by investigating the various enum classes ending in `***Fields`.

Some streams, such as the ones described in *Level One Quotes*, allow you to specify a subset of fields to be returned. Subscription handlers for these services take a list of the appropriate field enums the extra `fields` parameter. If nothing is passed to this parameter, all supported fields are requested.

4.1.7 Interpreting Sequence Numbers

Many endpoints include a `seq` parameter in their data contents. The official documentation is unclear on the interpretation of this value: the time of sale documentation states that messages containing already-observed values of `seq` can be ignored, but other streams contain this field both in their metadata and in their content, and yet their documentation doesn't mention ignoring any `seq` values.

This presents a design choice: should `tda-api` ignore duplicate `seq` values on users' behalf? Given the ambiguity of the documentation, it was decided to not ignore them and instead pass them to all handlers. Clients are encouraged to use their judgment in handling these values.

4.1.8 Unimplemented Streams

This document lists the streams supported by `tda-api`. Eagle-eyed readers may notice that some streams are described in the documentation but were not implemented. This is due to complexity or anticipated lack of interest. If you feel you'd like a stream added, please file an issue here or see the contributing guidelines to learn how to add the functionality yourself.

4.2 Enabling Real-Time Data Access

By default, TD Ameritrade delivers delayed quotes. However, as of this writing, real time streaming is available for all streams, including quotes and level two depth of book data. It is also available for free, which in the author's opinion is an impressive feature for a retail brokerage. For most users it's enough to sign the relevant exchange agreements, although your mileage may vary.

Please remember that your use of this API is subject to agreeing to TDAmeritrade's terms of service. Please don't reach out to us asking for help enabling real-time data. Answers to most questions are a Google search away.

4.3 OHLCV Charts

These streams summarize trading activity on a minute-by-minute basis for equities and futures, providing OHLCV (Open/High/Low/Close/Volume) data.

4.3.1 Equity Charts

Minute-by-minute OHLCV data for equities.

`StreamClient.`**`chart_equity_subs`**(*symbols*)
Official documentation

Subscribe to equity charts. Behavior is undefined if called multiple times.

Parameters **`symbols`** – Equity symbols to subscribe to.

`StreamClient.`**`chart_equity_add`**(*symbols*)
Official documentation

Add a symbol to the equity charts subscription. Behavior is undefined if called before *`chart_equity_subs()`*.

Parameters **`symbols`** – Equity symbols to add to the subscription.

`StreamClient.`**`add_chart_equity_handler`**(*handler*)
Adds a handler to the equity chart subscription. See *Handling Messages* for details.

class `StreamClient.`**`ChartEquityFields`**
Official documentation

Data fields for equity OHLCV data. Primarily an implementation detail and not used in client code. Provided here as documentation for key values stored returned in the stream messages.

`SYMBOL = 0`
Ticker symbol in upper case. Represented in the stream as the `key` field.

`OPEN_PRICE = 1`
Opening price for the minute

HIGH_PRICE = 2
Highest price for the minute

LOW_PRICE = 3
Chart's lowest price for the minute

CLOSE_PRICE = 4
Closing price for the minute

VOLUME = 5
Total volume for the minute

SEQUENCE = 6
Identifies the candle minute. Explicitly labeled "not useful" in the official documentation.

CHART_TIME = 7
Milliseconds since Epoch

CHART_DAY = 8
Documented as not useful, included for completeness

4.3.2 Futures Charts

Minute-by-minute OHLCV data for futures.

StreamClient.**chart_futures_subs**(*symbols*)
Official documentation

Subscribe to futures charts. Behavior is undefined if called multiple times.

Parameters **symbols** – Futures symbols to subscribe to.

StreamClient.**chart_futures_add**(*symbols*)
Official documentation

Add a symbol to the futures chart subscription. Behavior is undefined if called before *chart_futures_subs()*.

Parameters **symbols** – Futures symbols to add to the subscription.

StreamClient.**add_chart_futures_handler**(*handler*)
Adds a handler to the futures chart subscription. See *Handling Messages* for details.

class StreamClient.**ChartFuturesFields**
Official documentation

Data fields for equity OHLCV data. Primarily an implementation detail and not used in client code. Provided here as documentation for key values stored returned in the stream messages.

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

CHART_TIME = 1
Milliseconds since Epoch

OPEN_PRICE = 2
Opening price for the minute

HIGH_PRICE = 3
Highest price for the minute

LOW_PRICE = 4
Chart's lowest price for the minute

CLOSE_PRICE = 5
Closing price for the minute

VOLUME = 6
Total volume for the minute

4.4 Level One Quotes

Level one quotes provide an up-to-date view of bid/ask/volume data. In particular they list the best available bid and ask prices, together with the requested volume of each. They are updated live as market conditions change.

4.4.1 Equities Quotes

Level one quotes for equities traded on NYSE, AMEX, and PACIFIC.

`StreamClient.`**`level_one_equity_subs`**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to level one equity quote data.

Parameters

- **symbols** – Equity symbols to receive quotes for
- **fields** – Iterable of *LevelOneEquityFields* representing the fields to return in streaming entries. If unset, all fields will be requested.

`StreamClient.`**`add_level_one_equity_handler`**(*handler*)
Register a function to handle level one equity quotes as they are sent. See *Handling Messages* for details.

class `StreamClient.`**`LevelOneEquityFields`**
Official documentation

Fields for equity quotes.

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

BID_PRICE = 1
Current Best Bid Price

ASK_PRICE = 2
Current Best Ask Price

LAST_PRICE = 3
Price at which the last trade was matched

BID_SIZE = 4
Number of shares for bid

ASK_SIZE = 5
Number of shares for ask

ASK_ID = 6
Exchange with the best ask

BID_ID = 7
Exchange with the best bid

TOTAL_VOLUME = 8
Aggregated shares traded throughout the day, including pre/post market hours. Note volume is set to zero at 7:28am ET.

LAST_SIZE = 9
Number of shares traded with last trade, in 100's

TRADE_TIME = 10
Trade time of the last trade, in seconds since midnight EST

QUOTE_TIME = 11
Trade time of the last quote, in seconds since midnight EST

HIGH_PRICE = 12
Day's high trade price. Notes:

- According to industry standard, only regular session trades set the High and Low.
- If a stock does not trade in the AM session, high and low will be zero.
- High/low reset to 0 at 7:28am ET

LOW_PRICE = 13
Day's low trade price. Same notes as `HIGH_PRICE`.

BID_TICK = 14
Indicates Up or Downtick (NASDAQ NMS & Small Cap). Updates whenever bid updates.

CLOSE_PRICE = 15
Previous day's closing price. Notes:

- Closing prices are updated from the DB when Pre-Market tasks are run by TD Ameritrade at 7:29AM ET.
- As long as the symbol is valid, this data is always present.
- This field is updated every time the closing prices are loaded from DB

EXCHANGE_ID = 16
Primary "listing" Exchange.

MARGINABLE = 17
Stock approved by the Federal Reserve and an investor's broker as being suitable for providing collateral for margin debt?

SHORTABLE = 18
Stock can be sold short?

ISLAND_BID_DEPRECATED = 19
Deprecated, documented for completeness.

ISLAND_ASK_DEPRECATED = 20
Deprecated, documented for completeness.

ISLAND_VOLUME_DEPRECATED = 21
Deprecated, documented for completeness.

QUOTE_DAY = 22
Day of the quote

TRADE_DAY = 23
Day of the trade

VOLATILITY = 24
Option Risk/Volatility Measurement. Notes:

- Volatility is reset to 0 when Pre-Market tasks are run at 7:28 AM ET
- Once per day descriptions are loaded from the database when Pre-Market tasks are run at 7:29:50 AM ET.

DESCRIPTION = 25
A company, index or fund name

LAST_ID = 26
Exchange where last trade was executed

DIGITS = 27
Valid decimal points. 4 digits for AMEX, NASDAQ, OTCBB, and PINKS, 2 for others.

OPEN_PRICE = 28
Day's Open Price. Notes:

- Open is set to ZERO when Pre-Market tasks are run at 7:28.
- If a stock doesn't trade the whole day, then the open price is 0.
- In the AM session, Open is blank because the AM session trades do not set the open.

NET_CHANGE = 29
Current Last-Prev Close

HIGH_52_WEEK = 30
Highest price traded in the past 12 months, or 52 weeks

LOW_52_WEEK = 31
Lowest price traded in the past 12 months, or 52 weeks

PE_RATIO = 32
Price to earnings ratio

DIVIDEND_AMOUNT = 33
Dividen earnings Per Share

DIVIDEND_YIELD = 34
Dividend Yield

ISLAND_BID_SIZE_DEPRECATED = 35
Deprecated, documented for completeness.

ISLAND_ASK_SIZE_DEPRECATED = 36
Deprecated, documented for completeness.

NAV = 37
Mutual Fund Net Asset Value

FUND_PRICE = 38
Mutual fund price

EXCHANGE_NAME = 39
Display name of exchange

DIVIDEND_DATE = 40
Dividend date

IS_REGULAR_MARKET_QUOTE = 41
Is last quote a regular quote

IS_REGULAR_MARKET_TRADE = 42
Is last trade a regular trade

REGULAR_MARKET_LAST_PRICE = 43
Last price, only used when `IS_REGULAR_MARKET_TRADE` is `True`

REGULAR_MARKET_LAST_SIZE = 44
Last trade size, only used when `IS_REGULAR_MARKET_TRADE` is `True`

REGULAR_MARKET_TRADE_TIME = 45
Last trade time, only used when `IS_REGULAR_MARKET_TRADE` is `True`

REGULAR_MARKET_TRADE_DAY = 46
Last trade date, only used when `IS_REGULAR_MARKET_TRADE` is `True`

REGULAR_MARKET_NET_CHANGE = 47
`REGULAR_MARKET_LAST_PRICE` minus `CLOSE_PRICE`

SECURITY_STATUS = 48
Indicates a symbols current trading status, Normal, Halted, Closed

MARK = 49
Mark Price

QUOTE_TIME_IN_LONG = 50
Last quote time in milliseconds since Epoch

TRADE_TIME_IN_LONG = 51
Last trade time in milliseconds since Epoch

REGULAR_MARKET_TRADE_TIME_IN_LONG = 52
Regular market trade time in milliseconds since Epoch

4.4.2 Options Quotes

Level one quotes for options. Note you can use *`Client.get_option_chain()`* to fetch available option symbols.

`StreamClient.`**`level_one_option_subs`**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to level one option quote data.

Parameters

- **symbols** – Option symbols to receive quotes for
- **fields** – Iterable of *`LevelOneOptionFields`* representing the fields to return in streaming entries. If unset, all fields will be requested.

`StreamClient.`**`add_level_one_option_handler`**(*handler*)
Register a function to handle level one options quotes as they are sent. See *Handling Messages* for details.

class `StreamClient.`**`LevelOneOptionFields`**
Official documentation

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

DESCRIPTION = 1
A company, index or fund name

BID_PRICE = 2
Current Best Bid Price

ASK_PRICE = 3
Current Best Ask Price

LAST_PRICE = 4
Price at which the last trade was matched

HIGH_PRICE = 5
Day's high trade price. Notes:

- According to industry standard, only regular session trades set the High and Low.
- If an option does not trade in the AM session, high and low will be zero.
- High/low reset to 0 at 7:28am ET.

LOW_PRICE = 6
Day's low trade price. Same notes as `HIGH_PRICE`.

CLOSE_PRICE = 7
Previous day's closing price. Closing prices are updated from the DB when Pre-Market tasks are run at 7:29AM ET.

TOTAL_VOLUME = 8
Aggregated shares traded throughout the day, including pre/post market hours. Reset to zero at 7:28am ET.

OPEN_INTEREST = 9
Open interest

VOLATILITY = 10
Option Risk/Volatility Measurement. Volatility is reset to 0 when Pre-Market tasks are run at 7:28 AM ET.

QUOTE_TIME = 11
Trade time of the last quote in seconds since midnight EST

TRADE_TIME = 12
Trade time of the last quote in seconds since midnight EST

MONEY_INTRINSIC_VALUE = 13
Money intrinsic value

QUOTE_DAY = 14
Day of the quote

TRADE_DAY = 15
Day of the trade

EXPIRATION_YEAR = 16
Option expiration year

MULTIPLIER = 17
Option multiplier

DIGITS = 18
Valid decimal points. 4 digits for AMEX, NASDAQ, OTCBB, and PINKS, 2 for others.

OPEN_PRICE = 19
Day's Open Price. Notes:

- Open is set to ZERO when Pre-Market tasks are run at 7:28.
- If a stock doesn't trade the whole day, then the open price is 0.
- In the AM session, Open is blank because the AM session trades do not set the open.

BID_SIZE = 20
Number of shares for bid

ASK_SIZE = 21
Number of shares for ask

LAST_SIZE = 22
Number of shares traded with last trade, in 100's

NET_CHANGE = 23
Current Last-Prev Close

STRIKE_PRICE = 24

CONTRACT_TYPE = 25

UNDERLYING = 26

EXPIRATION_MONTH = 27

DELIVERABLES = 28

TIME_VALUE = 29

EXPIRATION_DAY = 30

DAYS_TO_EXPIRATION = 31

DELTA = 32

GAMMA = 33

THETA = 34

VEGA = 35

RHO = 36

SECURITY_STATUS = 37
Indicates a symbols current trading status, Normal, Halted, Closed

THEORETICAL_OPTION_VALUE = 38

UNDERLYING_PRICE = 39

UV_EXPIRATION_TYPE = 40

MARK = 41
Mark Price

4.4.3 Futures Quotes

Level one quotes for futures.

`StreamClient.`**`level_one_futures_subs`**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to level one futures quote data.

Parameters

- **`symbols`** – Futures symbols to receive quotes for
- **`fields`** – Iterable of *`LevelOneFuturesFields`* representing the fields to return in streaming entries. If unset, all fields will be requested.

StreamClient.**add_level_one_futures_handler**(*handler*)
Register a function to handle level one futures quotes as they are sent. See *Handling Messages* for details.

class StreamClient.**LevelOneFuturesFields**
Official documentation

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

BID_PRICE = 1
Current Best Bid Price

ASK_PRICE = 2
Current Best Ask Price

LAST_PRICE = 3
Price at which the last trade was matched

BID_SIZE = 4
Number of shares for bid

ASK_SIZE = 5
Number of shares for ask

ASK_ID = 6
Exchange with the best ask

BID_ID = 7
Exchange with the best bid

TOTAL_VOLUME = 8
Aggregated shares traded throughout the day, including pre/post market hours

LAST_SIZE = 9
Number of shares traded with last trade

QUOTE_TIME = 10
Trade time of the last quote in milliseconds since epoch

TRADE_TIME = 11
Trade time of the last trade in milliseconds since epoch

HIGH_PRICE = 12
Day's high trade price

LOW_PRICE = 13
Day's low trade price

CLOSE_PRICE = 14
Previous day's closing price

EXCHANGE_ID = 15
Primary "listing" Exchange. Notes: * I → ICE * E → CME * L → LIFFEUS

DESCRIPTION = 16
Description of the product

LAST_ID = 17
Exchange where last trade was executed

OPEN_PRICE = 18
Day's Open Price

NET_CHANGE = 19
Current Last-Prev Close

FUTURE_PERCENT_CHANGE = 20
Current percent change

EXCHANGE_NAME = 21
Name of exchange

SECURITY_STATUS = 22
Trading status of the symbol. Indicates a symbol's current trading status, Normal, Halted, Closed.

OPEN_INTEREST = 23
The total number of futures ontracts that are not closed or delivered on a particular day

MARK = 24
Mark-to-Market value is calculated daily using current prices to determine profit/loss

TICK = 25
Minimum price movement

TICK_AMOUNT = 26
Minimum amount that the price of the market can change

PRODUCT = 27
Futures product

FUTURE_PRICE_FORMAT = 28
Display in fraction or decimal format.

FUTURE_TRADING_HOURS = 29
Trading hours. Notes:

- days: 0 = monday-friday, 1 = sunday.
- 7 = Saturday
- 0 = [-2000,1700] ==> open, close
- 1 = [-1530,-1630,-1700,1515] ==> open, close, open, close
- 0 = [-1800,1700,d,-1700,1900] ==> open, close, DST-flag, open, close
- If the DST-flag is present, the following hours are for DST days: http://www.cmegroup.com/trading_hours/

FUTURE_IS_TRADEABLE = 30
Flag to indicate if this future contract is tradable

FUTURE_MULTIPLIER = 31
Point value

FUTURE_IS_ACTIVE = 32
Indicates if this contract is active

FUTURE_SETTLEMENT_PRICE = 33
Closing price

FUTURE_ACTIVE_SYMBOL = 34
Symbol of the active contract

FUTURE_EXPIRATION_DATE = 35
Expiration date of this contract in milliseconds since epoch

4.4.4 Forex Quotes

Level one quotes for foreign exchange pairs.

`StreamClient.`**`level_one_forex_subs`**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to level one forex quote data.

Parameters

- **`symbols`** – Forex symbols to receive quotes for
- **`fields`** – Iterable of *`LevelOneForexFields`* representing the fields to return in streaming entries. If unset, all fields will be requested.

`StreamClient.`**`add_level_one_forex_handler`**(*handler*)
Register a function to handle level one forex quotes as they are sent. See *Handling Messages* for details.

`class` `StreamClient.`**`LevelOneForexFields`**
Official documentation

`SYMBOL = 0`
Ticker symbol in upper case. Represented in the stream as the `key` field.

`BID_PRICE = 1`
Current Best Bid Price

`ASK_PRICE = 2`
Current Best Ask Price

`LAST_PRICE = 3`
Price at which the last trade was matched

`BID_SIZE = 4`
Number of shares for bid

`ASK_SIZE = 5`
Number of shares for ask

`TOTAL_VOLUME = 6`
Aggregated shares traded throughout the day, including pre/post market hours

`LAST_SIZE = 7`
Number of shares traded with last trade

`QUOTE_TIME = 8`
Trade time of the last quote in milliseconds since epoch

`TRADE_TIME = 9`
Trade time of the last trade in milliseconds since epoch

`HIGH_PRICE = 10`
Day's high trade price

`LOW_PRICE = 11`
Day's low trade price

`CLOSE_PRICE = 12`
Previous day's closing price

`EXCHANGE_ID = 13`
Primary "listing" Exchange

DESCRIPTION = 14
Description of the product

OPEN_PRICE = 15
Day's Open Price

NET_CHANGE = 16
Current Last-Prev Close

EXCHANGE_NAME = 18
Name of exchange

DIGITS = 19
Valid decimal points

SECURITY_STATUS = 20
Trading status of the symbol. Indicates a symbols current trading status, Normal, Halted, Closed.

TICK = 21
Minimum price movement

TICK_AMOUNT = 22
Minimum amount that the price of the market can change

PRODUCT = 23
Product name

TRADING_HOURS = 24
Trading hours

IS_TRADABLE = 25
Flag to indicate if this forex is tradable

MARKET_MAKER = 26

HIGH_52_WEEK = 27
Higest price traded in the past 12 months, or 52 weeks

LOW_52_WEEK = 28
Lowest price traded in the past 12 months, or 52 weeks

MARK = 29
Mark-to-Market value is calculated daily using current prices to determine profit/loss

4.4.5 Futures Options Quotes

Level one quotes for futures options.

`StreamClient.`**`level_one_futures_options_subs`**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to level one futures options quote data.

Parameters

- **`symbols`** – Futures options symbols to receive quotes for
- **`fields`** – Iterable of *`LevelOneFuturesOptionsFields`* representing the fields to return in streaming entries. If unset, all fields will be requested.

`StreamClient.`**`add_level_one_futures_options_handler`**(*handler*)
Register a function to handle level one futures options quotes as they are sent. See *Handling Messages* for details.

class StreamClient.**LevelOneFuturesOptionsFields**

Official documentation

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

BID_PRICE = 1
Current Best Bid Price

ASK_PRICE = 2
Current Best Ask Price

LAST_PRICE = 3
Price at which the last trade was matched

BID_SIZE = 4
Number of shares for bid

ASK_SIZE = 5
Number of shares for ask

ASK_ID = 6
Exchange with the best ask

BID_ID = 7
Exchange with the best bid

TOTAL_VOLUME = 8
Aggregated shares traded throughout the day, including pre/post market hours

LAST_SIZE = 9
Number of shares traded with last trade

QUOTE_TIME = 10
Trade time of the last quote in milliseconds since epoch

TRADE_TIME = 11
Trade time of the last trade in milliseconds since epoch

HIGH_PRICE = 12
Day's high trade price

LOW_PRICE = 13
Day's low trade price

CLOSE_PRICE = 14
Previous day's closing price

EXCHANGE_ID = 15
Primary "listing" Exchange. Notes: * I → ICE * E → CME * L → LIFFEUS

DESCRIPTION = 16
Description of the product

LAST_ID = 17
Exchange where last trade was executed

OPEN_PRICE = 18
Day's Open Price

NET_CHANGE = 19
Current Last-Prev Close

FUTURE_PERCENT_CHANGE = 20
Current percent change

EXCHANGE_NAME = 21
Name of exchange

SECURITY_STATUS = 22
Trading status of the symbol. Indicates a symbols current trading status, Normal, Halted, Closed.

OPEN_INTEREST = 23
The total number of futures ontracts that are not closed or delivered on a particular day

MARK = 24
Mark-to-Market value is calculated daily using current prices to determine profit/loss

TICK = 25
Minimum price movement

TICK_AMOUNT = 26
Minimum amount that the price of the market can change

PRODUCT = 27
Futures product

FUTURE_PRICE_FORMAT = 28
Display in fraction or decimal format

FUTURE_TRADING_HOURS = 29
Trading hours

FUTURE_IS_TRADEABLE = 30
Flag to indicate if this future contract is tradable

FUTURE_MULTIPLIER = 31
Point value

FUTURE_IS_ACTIVE = 32
Indicates if this contract is active

FUTURE_SETTLEMENT_PRICE = 33
Closing price

FUTURE_ACTIVE_SYMBOL = 34
Symbol of the active contract

FUTURE_EXPIRATION_DATE = 35
Expiration date of this contract, in milliseconds since epoch

4.5 Level Two Order Book

Level two streams provide a view on continuous order books of various securities. The level two order book describes the current the current bids and asks on the market, and these streams provide snapshots of that state.

Due to the lack of official documentation, these streams are largely reverse engineered. While the labeled data represents a best effort attempt to interpret stream fields, it's possible that something is wrong or incorrectly labeled.

The documentation lists more book types than are implemented here. In particular, it also lists `FOREX_BOOK`, `FUTURES_BOOK`, and `FUTURES_OPTIONS_BOOK` as accessible streams. All experimentation has resulted in these streams refusing to connect, typically returning errors about unavailable services. Due to this behavior and the lack of official documentation for book streams generally, `tda-api` assumes these streams are not actually implemented, and so excludes them. If you have any insight into using them, please let us know.

4.5.1 Equities Order Books: NYSE and NASDAQ

`tda-api` supports level two data for NYSE and NASDAQ, which are the two major exchanges dealing in equities, ETFs, etc. Stocks are typically listed on one or the other, and it is useful to learn about the differences between them:

- "The NYSE and NASDAQ: How They Work" on Investopedia
- "Here's the difference between the NASDAQ and NYSE" on Business Insider
- "Can Stocks Be Traded on More Than One Exchange?" on Investopedia

You can identify on which exchange a symbol is listed by using *`Client.search_instruments()`*:

```
r = c.search_instruments(['GOOG'], projection=c.Instrument.Projection.FUNDAMENTAL)
assert r.ok, r.raise_for_status()
print(r.json()['GOOG']['exchange'])  # Outputs NASDAQ
```

However, many symbols have order books available on these streams even though this API call returns neither NYSE nor NASDAQ. The only sure-fire way to find out whether the order book is available is to attempt to subscribe and see what happens.

Note to preserve equivalence with what little documentation there is, the NYSE book is called "listed." Testing indicates this stream corresponds to the NYSE book, but if you find any behavior that suggests otherwise please let us know.

`StreamClient.`**`listed_book_subs`**(*symbols*)
: Subscribe to the NYSE level two order book. Note this stream has no official documentation.

`StreamClient.`**`add_listed_book_handler`**(*handler*)
: Register a function to handle level two NYSE book data as it is updated See *Handling Messages* for details.

`StreamClient.`**`nasdaq_book_subs`**(*symbols*)
: Subscribe to the NASDAQ level two order book. Note this stream has no official documentation.

`StreamClient.`**`add_nasdaq_book_handler`**(*handler*)
: Register a function to handle level two NASDAQ book data as it is updated See *Handling Messages* for details.

4.5.2 Options Order Book

This stream provides the order book for options. It's not entirely clear what exchange it aggregates from, but it's been tested to work and deliver data. The leading hypothesis is that it is bethe order book for the Chicago Board of Exchange options exchanges, although this is an admittedly an uneducated guess.

`StreamClient.`**`options_book_subs`**(*symbols*)
: Subscribe to the level two order book for options. Note this stream has no official documentation, and it's not entirely clear what exchange it corresponds to. Use at your own risk.

`StreamClient.`**`add_options_book_handler`**(*handler*)
: Register a function to handle level two options book data as it is updated See *Handling Messages* for details.

4.6 Time of Sale

The data in *Level Two Order Book* describes the bids and asks for various instruments, but by itself is insufficient to determine when trades actually take place. The time of sale streams notify on trades as they happen. Together with the level two data, they provide a fairly complete picture of what is happening on an exchange.

All time of sale streams uss a common set of fields:

class StreamClient.**TimesaleFields**
Official documentation

SYMBOL = 0
Ticker symbol in upper case. Represented in the stream as the `key` field.

TRADE_TIME = 1
Trade time of the last trade in milliseconds since epoch

LAST_PRICE = 2
Price at which the last trade was matched

LAST_SIZE = 3
Number of shares traded with last trade

LAST_SEQUENCE = 4
Number of shares for bid

4.6.1 Equity Trades

StreamClient.**timesale_equity_subs**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to time of sale notifications for equities.

Parameters **symbols** – Equity symbols to subscribe to

StreamClient.**add_timesale_equity_handler**(*handler*)
Register a function to handle equity trade notifications as they happen See *Handling Messages* for details.

4.6.2 Futures Trades

StreamClient.**timesale_futures_subs**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to time of sale notifications for futures.

Parameters **symbols** – Futures symbols to subscribe to

StreamClient.**add_timesale_futures_handler**(*handler*)
Register a function to handle futures trade notifications as they happen See *Handling Messages* for details.

4.6.3 Options Trades

StreamClient.**timesale_options_subs**(*symbols*, *, *fields=None*)
Official documentation

Subscribe to time of sale notifications for options.

Parameters **symbols** – Options symbols to subscribe to

StreamClient.**add_timesale_options_handler**(*handler*)
Register a function to handle options trade notifications as they happen See *Handling Messages* for details.

4.7 News Headlines

TD Ameritrade supposedly supports streaming news headlines. However, we have yet to receive any reports of successful access to this stream. Attempts to read this stream result in messages like the following, followed by TDA-initiated stream closure:

```
{
    "notify": [
        {
            "service": "NEWS_HEADLINE",
            "timestamp": 1591500923797,
            "content": {
                "code": 17,
                "msg": "Not authorized for all quotes."
            }
        }
    ]
}
```

The current hypothesis is that this stream requires some permissions or paid access that so far no one has had.If you manage to get this stream working, or even if you manage to get it to fail with a different message than the one above, please report it. In the meantime, `tda-api` provides the following methods for attempting to access this stream.

`StreamClient.`**`news_headline_subs`**(*symbols*)
Official documentation

Subscribe to news headlines related to the given symbols.

`StreamClient.`**`add_news_headline_handler`**(*handler*)
Register a function to handle news headlines as they are provided. See *Handling Messages* for details.

`class` `StreamClient.`**`NewsHeadlineFields`**
Official documentation

`SYMBOL = 0`
Ticker symbol in upper case. Represented in the stream as the `key` field.

`ERROR_CODE = 1`
Specifies if there is any error

`STORY_DATETIME = 2`
Headline's datetime in milliseconds since epoch

`HEADLINE_ID = 3`
Unique ID for the headline

`STATUS = 4`

`HEADLINE = 5`
News headline

`STORY_ID = 6`

`COUNT_FOR_KEYWORD = 7`

`KEYWORD_ARRAY = 8`

`IS_HOT = 9`

`STORY_SOURCE = 10`

4.8 Account Activity

This stream allows you to monitor your account activity, including order execution/cancellation/expiration/etc. `tda-api` provide utilities for setting up and reading the stream, but leaves the task of parsing the response XML object to the user.

`StreamClient.`**`account_activity_sub`**`()`
Official documentation

Subscribe to account activity for the account id associated with this streaming client. See *`AccountActivityFields`* for more info.

`StreamClient.`**`add_account_activity_handler`**`(`*`handler`*`)`
Adds a handler to the account activity subscription. See *Handling Messages* for details.

`class` `StreamClient.`**`AccountActivityFields`**
Official documentation

Data fields for equity account activity. Primarily an implementation detail and not used in client code. Provided here as documentation for key values stored returned in the stream messages.

`SUBSCRIPTION_KEY = 0`
Subscription key. Represented in the stream as the `key` field.

`ACCOUNT = 1`
Account # subscribed

`MESSAGE_TYPE = 2`
Refer to the message type table in the official documentation

`MESSAGE_DATA = 3`
The core data for the message. Either XML Message data describing the update, `NULL` in some cases, or plain text in case of `ERROR`.

CHAPTER 5

Creating Order Specifications

The *Client.place_order()* method expects a rather complex JSON object that describes the desired order. TDA provides some example order specs to illustrate the process and provides a schema in the place order documentation, but beyond that we're on our own.

The `tda.orders` module provides an incomplete set of helpers for building these order specs. The aim is to make it impossible to build an invalid JSON object. For example, here is how you might use this module to place a market order for ten shares of Apple common stock:

```
from tda.orders import EquityOrderBuilder, Duration, Session

builder = EquityOrderBuilder('AAPL', 10)
builder.set_instruction(EquityOrderBuilder.Instruction.SELL)
builder.set_order_type(EquityOrderBuilder.OrderType.MARKET)
builder.set_duration(Duration.DAY)
builder.set_session(Session.NORMAL)

client = ...  # Get a client however you see fit
account_id = 12345678

resp = client.place_order(account_id, builder.build())
assert resp.ok
```

5.1 Common Values

class tda.orders.**Duration**

An enumeration.

DAY = 'DAY'

GOOD_TILL_CANCEL = 'GOOD_TILL_CANCEL'

FILL_OR_KILL = 'FILL_OR_KILL'

class tda.orders.**Session**
An enumeration.

NORMAL = 'NORMAL'

AM = 'AM'

PM = 'PM'

SEAMESS = 'SEAMLESS'

exception tda.orders.**InvalidOrderException**
Raised when attempting to build an incomplete order

5.2 Equity Orders

class tda.orders.**EquityOrderBuilder**(*symbol*, *quantity*)
Helper class to construct equity orders.

__init__(*symbol*, *quantity*)
Create an order for the given symbol and quantity. Note all unspecified parameters must be set prior to building the order spec.

Parameters

- **symbol** – Symbol for the order
- **quantity** – Quantity of the order

class Instruction
Order instruction

BUY = 'BUY'

SELL = 'SELL'

set_instruction(*instruction*)
Set the order instruction

class OrderType
Order type

MARKET = 'MARKET'

LIMIT = 'LIMIT'

set_order_type(*order_type*)
Set the order type

set_price(*price*)
Set the order price. Must be set for LIMIT orders.

set_duration(*duration*)
Set the order duration

set_session(*session*)
Set the order's session

build()
Build the order spec.

Raises ***InvalidOrderException*** – if the order is not fully specified

matches(*order*)

Takes a real object, as might be returned from the TD Ameritrade API, and indicates whether this order object matches it. Returns true if the given order if the given order *could have* been placed by calling `Client.place_order()` with this order.

This method may be called on incomplete orders builders (builders whose `build()` method would fail if called. In such a case, unset values are ignored and have no effect on filtering.

CHAPTER 6

Utilities

This section describes miscellaneous utility methods provided by `tda-api`. All utilities are presented under the `Utils` class:

class tda.utils.**Utils**(*client*, *account_id*)

Helper for placing orders on equities. Provides easy-to-use implementations for common tasks such as market and limit orders.

__init__(*client*, *account_id*)

Creates a new `Utils` instance. For convenience, this object assumes the user wants to work with a single account ID at a time.

set_account_id(*account_id*)

Set the account ID used by this `Utils` instance.

6.1 Get the Most Recent Order

For successfully placed orders, *tda.client.Client.place_order()* returns the ID of the newly created order, encoded in the *r.headers['Location']* header. This method inspects the response and extracts the order ID from the contents, if it's there. This order ID can then be used to monitor or modify the order as described in the *Client documentation*. Example usage:

```
# Assume client and order already exist and are valid
account_id = 123456
r = client.place_order(account_id, order)
assert r.ok, raise_for_status()
order_id = Utils(account_id, client).extract_order_id(r)
assert order_id is not None
```

Utils.**extract_order_id**(*place_order_response*)

Attempts to extract the order ID from a response object returned by *Client.place_order()*. Return `None` if the order location is not contained in the response.

Parameters **place_order_response** – Order response as returned by *Client.place_order()*. Note this method requires that the order was successful.

Raises **ValueError** – if the order was not succesful or if the order's account ID is not equal to the account ID set in this `Utils` object.

For orders that were rejected or whose order responses for whatever other reason might not contain the order ID, we can do a best-effort lookup using this method:

`Utils.`**find_most_recent_order**(*, *symbol=None*, *quantity=None*, *instruction=None*, *order_type=None*, *lookback_window=datetime.timedelta(days=1)*)

When placing orders, the TDA API does not always return the order ID of the newly placed order, especially when the order was rejected. You can use *Utils.extract_order_id()* to extract order numbers from responses representing successful order creation, but if that method fails then you can use this method to fetch the most recently-placed order that matches the given order signature.

Note: This method cannot guarantee that the calling process was the one which placed an order. This means that if there are multiple sources of orders, this method may return an order which was placed by another process.

Parameters

- **symbol** – Limit search to orders for this symbol.
- **quantity** – Limit search to orders of this quantity.
- **instruction** – Limit search to orders with this instruction. See *tda.orders.EquityOrderBuilder.Instruction*
- **order_type** – Limit search to orders with this order type. See *tda.orders.EquityOrderBuilder.OrderType*
- **lookback_window** – Limit search to orders entered less than this long ago. Note the TDA API does not provide orders older than 60 days.

CHAPTER 7

Example Application

To illustrate some of the functionality of `tda-api`, here is an example application that finds stocks that pay a dividend during the month of your birthday and purchases one of each.

```
from urllib.request import urlopen

import atexit
import datetime
import dateutil
import sys
import tda

API_KEY = 'YOUR_API_KEY@AMER.OAUTHAP'
REDIRECT_URI = 'YOUR_REDIRECT_URI'
TOKEN_PATH = '/YOUR/TOKEN/PATH'
YOUR_BIRTHDAY = datetime.datetime(year=1969, month=4, day=20)


def make_webdriver():
    # Import selenium here because it's slow to import
    from selenium import webdriver

    driver = webdriver.Chrome()
    atexit.register(lambda: driver.quit())
    return driver


# Create a new client
client = tda.auth.easy_client(
    API_KEY,
    REDIRECT_URI,
    TOKEN_PATH,
    make_webdriver)

# Load S&P 500 composition from documentation
```

(continues on next page)

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```
sp500 = urlopen(
    'https://tda-api.readthedocs.io/en/latest/_static/sp500.txt').read().decode().
↪split()

# Fetch fundamentals for all symbols and filter out the ones with ex-dividend
# dates in the future and dividend payment dates on your birth month. Note we
# perform the fetch in two calls because the API places an upper limit on the
# number of symbols you can fetch at once.
today = datetime.datetime.today()
birth_month_dividends = []
for s in (sp500[:250], sp500[250:]):
    r = client.search_instruments(
        s, tda.client.Client.Instrument.Projection.FUNDAMENTAL)
    assert r.ok, r.raise_for_status()

    for symbol, f in r.json().items():

        # Parse ex-dividend date
        ex_div_string = f['fundamental']['dividendDate']
        if not ex_div_string.strip():
            continue
        ex_dividend_date = dateutil.parser.parse(ex_div_string)

        # Parse payment date
        pay_date_string = f['fundamental']['dividendPayDate']
        if not pay_date_string.strip():
            continue
        pay_date = dateutil.parser.parse(pay_date_string)

        # Check dates
        if (ex_dividend_date > today
                and pay_date.month == YOUR_BIRTHDAY.month):
            birth_month_dividends.append(symbol)

if not birth_month_dividends:
    print('Sorry, no stocks are paying out in your birth month yet. This is ',
          'most likely because the dividends haven\'t been announced yet. ',
          'Try again closer to your birthday.')
    sys.exit(1)

# Purchase one share of each the stocks that pay in your birthday month.
account_id = int(input(
    'Input your TDA account number to place orders (<Ctrl-C> to quit): '))
for symbol in birth_month_dividends:
    print('Buying one share of', symbol)

    # Build the order spec and place the order
    builder = tda.orders.EquityOrderBuilder(symbol, 1)
    builder.set_instruction(builder.Instruction.BUY)
    builder.set_order_type(builder.OrderType.MARKET)
    builder.set_duration(tda.orders.Duration.DAY)
    builder.set_session(tda.orders.Session.NORMAL)
    order = builder.build()

    r = client.place_order(account_id, order)
    assert r.ok, r.raise_for_status()
```

CHAPTER 8

Contributing to `tda-api`

Fixing a bug? Adding a feature? Just cleaning up for the sake of cleaning up? Great! No improvement is too small for me, and I'm always happy to take pull requests. Read this guide to learn how to set up your environment so you can contribute.

8.1 Setting up the Dev Environment

Dependencies are listed in the *requirements.txt* file. These development requirements are distinct from the requirements listed in *setup.py* and include some additional packages around testing, documentation generation, etc.

Before you install anything, I highly recommend setting up a *virtualenv* so you don't pollute your system installation directories:

```
pip install virtualenv
virtualenv -v virtualenv
source virtualenv/bin/activate
```

Next, install project requirements:

```
pip install -r requirements.txt
```

Finally, verify everything works by running tests:

```
make test
```

At this point you can make your changes.

8.2 Development Guidelines

8.2.1 Test your changes

This project aims for high test coverage. All changes must be properly tested, and we will accept no PRs that lack appropriate unit testing. We also expect existing tests to pass. You can run your tests using:

```
make test
```

8.2.2 Document your code

Documentation is how users learn to use your code, and no feature is complete without a full description of how to use it. If your PR changes external-facing interfaces, or if it alters semantics, the changes must be thoroughly described in the docstrings of the affected components. If your change adds a substantial new module, a new section in the documentation may be justified.

Documentation is built using Sphinx. You can build the documentation using the *Makefile.sphinx* makefile. For example you can build the HTML documentation like so:

```
make -f Makefile.sphinx
```

CHAPTER 9

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Disclaimer: *tda-api is an unofficial API wrapper. It is in no way endorsed by or affiliated with TD Ameritrade or any associated organization. Make sure to read and understand the terms of service of the underlying API before using this package. This authors accept no responsibility for any damage that might stem from use of this package. See the LICENSE file for more details.*

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