



IRC Library for Python 3

<https://github.com/nutjob-laboratories/erkle>

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Summary

Erkle is a low level, event-driven IRC library for Python 3, designed for both quick and dirty [IRC bots](#) or for full blown [IRC clients](#).

Philosophy

Erkle was designed with the following in mind:

- **Little or no boilerplate code.** To write a IRC bot or client, the programmer should only have to write the functionality he or she wants to employ.
- **Modular code.** Most IRC bots or clients will require some common functionality. The programmer shouldn't have to [reinvent the wheel](#) every time they create a new bot or client. Code should be able to be isolated into [modules](#) for repeated use.
- **Little or no software requirements.** The library should use the Python standard library over third party libraries whenever possible.
- **Whenever possible, the library should mirror the protocol.** Having an understanding of how the IRC protocol works should give an understanding of how the library works.
- **General purpose.** The library should be able to be used for IRC bots, IRC clients, or any other IRC-based purpose, with no preference for any one specific function.
- **Multiple clients, multiple connections.** The library should make it easy to create and maintain multiple IRC connections/clients at once, from a single program.
- **Not a "black box".** The library should not prevent the user from using the library to perform functions not envisioned by the library's author. Important internal objects and functionality should be easily available to the user.

Low Level

To use *Erkle*, understanding IRC and the IRC protocol is a necessity. *Erkle* is designed to be low level, meaning its interface is influenced by the protocol itself. Since there's no syntactic sugar to hide the difficult or complex parts of the protocol, *Erkle* code should be easy to understand if you understand the underlying protocol.

The IRC protocol is defined in a series of RFC documents:

- [RFC 1459](#)
- [RFC 2812](#)

Why not use [Twisted](#) or [irclib](#)?

I wanted an IRC library with as few requirements as possible, and didn't require subclassing. I also wanted a client that was small enough to be bundled with an application, rather than requiring a user to install it through **pip** or some other package manager. Last, I wanted a library that wasn't focused on writing IRC bots or writing IRC clients; I wanted a library that would work for both. Since I couldn't find this library, I decided to write *Erkle*.

Requirements

Erkle uses, for the most part, only modules in the Python standard library. To use [SSL/TLS](#) to connect to IRC servers, however, the [pyOpenSSL](#) library must be installed. To install this library via the Python package installer, [pip](#), execute this command:

```
pip install pyOpenSSL
```

Python libraries

Erkle uses the following modules from the standard library:

- `sys`
- `os`
- `socket`
- `collections`
- `string`
- `threading`
- `importlib`
- `ssl` (only if it is available)

Erkle Object

Erkle is an object that creates and manages an IRC connection. *Erkle()* takes a single argument (see below) on creation, a *dict* that configures the IRC client.

Argument	Type	Description
config	<i>dict</i>	<p>Sets the user information the client will use. The dictionary has two mandatory keys, and ten optional ones:</p> <ul style="list-style-type: none">• nickname (string) – Sets the nickname the client will use. The key can be shortened to "nick". Mandatory.• username (string) – Sets the username the client will use. The key can be shortened to "user". Optional; if this key is missing, the client will use the client's nickname as the username.• realname (string) – Sets the real name the client will use. The key can be shortened to "real". Optional; if this key is missing, the client will use the name of the library, the library's version, and "IRC Client" as the realname.• alternate (string) – Sets the nickname the client will use if the initial nickname is already taken. The key can be shortened to "alt". Optional; if this key is missing, the client will use the client's nickname with an underscore appended.• server (string) – Sets the host name or IP address of the IRC server the client will connect to. Mandatory.• port (integer) – Sets the server port the client will connect to. Optional; if this key is missing, port 6667 is used.• password (string) – Sets the password to be used to connect to the IRC server. Optional.• ssl (boolean) – Sets whether SSL/TLS is used to connect to the server. Optional; if this key is missing or is set to <i>False</i>, the client will <i>not</i> use SSL/TLS to connect to the server.• encoding (string) – Sets what string encoding the server uses. Optional; if this key is missing, UTF-8 is used as a default.• flood-protection (boolean) – Sets whether flood protection is used or not. Optional; if this key is missing or is set to <i>True</i>, the client will use flood protection.• flood-rate (integer) – Sets how often messages are sent to the server if flood protection is turned on. Optional; if this key is missing, a flood rate of "2" is used, which will send one message every two seconds.• language (string) – Sets the language <i>Erkle</i> will use for application messages; this must be a two letter ISO 639-1 language code. Optional; if this key is missing, the client will set the language to "en" (English). Supported languages are English ("en"), French ("fr"), and German ("de").

Methods

Usable before connecting to an IRC server

Once the *Erkle* object is created, use the `connect()` or `spawn()` methods to cause the object to connect to the IRC server.

Method	Arguments	Description
<code>connect</code>	<i>None.</i>	Connects to the IRC server.
<code>spawn</code>	<i>None.</i>	Spawns a new thread, and connects to IRC using that thread. A reference to the created thread is stored in the <i>Erkle</i> object, which can be retrieved with the <code>thread()</code> method.
<code>disable</code>	<ul style="list-style-type: none">• tag (string)• ...	Prevents any hooked functions tagged with tag from executing. Any number of tags can be enabled, as long as they are passed as individual arguments. See <i>Tags</i> , page 9. This method can be called while the client is connected.
<code>enable</code>	<ul style="list-style-type: none">• tag (string)• ...	Removes tag from the list of disabled tags; hooked functions with this tag will be executed as normal. Any number of tags can be enabled, as long as they are passed as individual arguments. See <i>Tags</i> , page 9. This method can be called while the client is connected.
<code>tag</code>	<ul style="list-style-type: none">• tag (string)• ...	Adds a tag to the <i>Erkle</i> object. Only hooked functions with that tag will be called when an event is triggered. See <i>Tags</i> , page 9. This method can be called while the client is connected. This method can be called while the client is connected.
<code>untag</code>	<ul style="list-style-type: none">• tag (string)• ...	Removes a tag from the <i>Erkle</i> object. See <i>Tags</i> , page 9. This method can be called while the client is connected. This method can be called while the client is connected.

Usable after connecting to an IRC server

The following methods can only be used after the *Erkle* object's `connect()` or `spawn()` method has been called. If flood protection is turned on (the default), any outgoing messages to the server are added to a queue and sent at a rate of one message every two seconds.

Method	Arguments	Description
<code>thread</code>	<i>None.</i>	If <i>Erkle</i> 's connection was started with the <code>spawn()</code> method, the object's <i>Thread</i> object (see the Python documentation for the Threading library) will be returned; otherwise, <code>None</code> is returned.
<code>kill</code>	<i>None.</i>	If <i>Erkle</i> 's connection was started with the <code>spawn()</code> method, this will terminate the object's thread.
<code>socket</code>	<i>None.</i>	Returns the socket the <i>Erkle</i> object is using for the IRC connection.
<code>send</code>	<ul style="list-style-type: none">• data (string)	Sends a "raw" message to the IRC server; the message will not be processed in any way before being sent.
<code>privmsg</code>	<ul style="list-style-type: none">• target (string)• message (string)	Sends a chat message to a channel or user. This can also be called via an alias: <code>msg()</code>
<code>action</code>	<ul style="list-style-type: none">• target (string)• message (string)	Sends a CTCP action message to a channel or user. This can also be called via an alias: <code>me()</code>
<code>notice</code>	<ul style="list-style-type: none">• target (string)• message (string)	Sends a notice to a user or channel.

join	<ul style="list-style-type: none"> • channel (string) • key (string) 	Joins a channel.
part	<ul style="list-style-type: none"> • channel (string) • reason (string) 	Leaves a channel.
kick	<ul style="list-style-type: none"> • target (string) • channel (string) • reason (string) 	Kicks a user from a channel (the client must be a channel operator in the channel).
ban	<ul style="list-style-type: none"> • channel (string) • mask (string) 	Bans any user who's nick/host/username matches a mask from a channel (the client must be a channel operator in the channel). See RFC 1459 for more information on masks.
unban	<ul style="list-style-type: none"> • channel (string) • mask (string) 	Removes a channel ban from a channel (the client must be a channel operator in the channel).
lock	<ul style="list-style-type: none"> • channel (string) • key (string) 	Sets a channel key on a channel (the client must be a channel operator in the channel).
unlock	<ul style="list-style-type: none"> • channel (string) • key (string) 	Removes a channel key from a channel (the client must be a channel operator in the channel).
mode	<ul style="list-style-type: none"> • target (string) • mode (string) 	Sets a mode on a channel or user. See RFC 1459 for more information on modes.
invite	<ul style="list-style-type: none"> • user (string) • channel (string) 	Sends a channel invitation to a user.
away	<ul style="list-style-type: none"> • message (string) 	Sets the client to "away" on the IRC server.
back	<i>None.</i>	Sets the client to "back" on the IRC server.
whois	<ul style="list-style-type: none"> • user (string) 	Requests WHOIS data on a user from the server. When the WHOIS data is received, the whois event will be triggered.
list	<i>None.</i>	Requests a list of channels from the server. When the channel list is received, the list event will be triggered.
quit	<ul style="list-style-type: none"> • reason (string) 	Disconnects from the IRC server. If <i>Erkle</i> 's connection was started with the spawn() method, this will terminate the object's thread.

Attributes

An *Erkle* object also has a number of attributes that store information about the server, client, and the *Erkle* object. Not all of these values will be available immediately; the values are populated as the server sends the appropriate data to the client. Most of these values should be available by the time the **registered** event is triggered.

Attribute	Type	Description
nickname	<i>string</i>	The client's nickname.
username	<i>string</i>	The client's username.
realname	<i>string</i>	The client's realname.
server	<i>string</i>	The server's address.
port	<i>integer</i>	The server's port.
password	<i>string</i>	The password used to connect to the server, if there is one.
usessl	<i>boolean</i>	Whether SSL is being used for this connection or not.
hostname	<i>string</i>	The server's hostname.
software	<i>string</i>	The server's software.
options	<i>list</i>	A list of the options the server supports.
network	<i>string</i>	The network the server belongs to.
commands	<i>list</i>	A list of commands supported by the server.
maxchannels	<i>integer</i>	The maximum number of channels a client can join on the server.
maxnicklen	<i>integer</i>	The maximum number of characters allowed for a nickname on the server.
channellen	<i>integer</i>	The maximum number of characters allowed for a channel name on the server.
topiclen	<i>integer</i>	The maximum number of characters allowed for a channel topic on the server.
kicklen	<i>integer</i>	The maximum number of characters allowed for a kick message on the server.
awaylen	<i>integer</i>	The maximum number of characters allowed for an away message on the server.
maxtargets	<i>integer</i>	The maximum number of targets a message can be sent to on a server.
modes	<i>integer</i>	The maximum number of channel modes that can be set on the server.
chantypes	<i>list</i>	What channel types the server uses.
prefix	<i>list of lists</i>	What channel status prefixes the server uses; each entry contains a list with the first value being the status type, and the second value being the prefix used for that type.
chanmodes	<i>list</i>	What channel modes the server uses.
casemapping	<i>string</i>	The casemapping the server uses.
spoofed	<i>string</i>	If the client's host is spoofed by the server, then the spoofed host name will be stored here.

users	<i>dictionary of lists</i>	An in-memory database of channel users. The dictionary uses channel names for keys, and each dictionary entry is a list of the named channel's users. The list will only contain users in channels the <i>Erkle</i> object has joined and is still present in.
topic	<i>dictionary</i>	An in-memory database of channel topics. The dictionary uses channel names for keys, and each dictionary entry is a string containing the named channel's topic (or <i>None</i> if the topic is blank or unknown).
channels	<i>list of lists</i>	An in-memory database of all the channels on a server. This attribute starts empty by default; it will only be populated if the <i>Erkle list()</i> method is called. Each entry in the list a list that contains, in this order: <ul style="list-style-type: none"> 0. channel name (string) 1. number of users in the channel (integer) 2. channel topic (string) (<i>None</i> if there's no topic)
uptime	<i>integer</i>	Reflects how many seconds have elapsed since the <i>Erkle</i> object's connect() or spawn() methods were called.
tags	<i>list</i>	A list of tags that has been applied to the <i>Erkle</i> object.
language	<i>string</i>	What language the <i>Erkle</i> object is using for application messages.
encoding	<i>string</i>	The string encoding scheme the <i>Erkle</i> object is using.

The "irc" decorator, tags, and events

Included with the *Erkle* object is the *irc* decorator. The *irc* decorator is used to [decorate functions](#) that should be executed when specific events occur; this is called "hooking" an event. *irc* exposes one method: **event**. To hook an event, pass the name of the event (as a string) as the only argument to the **event** method. For example, to hook an event named "connect", the decorator required would look like:

```
@irc.event("connect")
```

Events can be hooked to an unlimited number of functions. Function hooks will be executed in the order in which they were hooked.

Tags

Hooked functions can also have **tags**, which are any number of strings attached to the hooked function's event. To add tags to a hooked function, pass them as additional arguments (after the event) to the function's decorator. For example, to add the tags "myfunc" and "chat" to a function hooked to the "public" event, you would use:

```
@irc.event("public", "myfunc", "chat")
```

Tags are used with *Erkle*'s **disable()** and **enable()** methods (see *Methods on page 5*).

Hooked functions can have any number of tags, and tags do not have to be unique. Hooked functions that do *not* have any tags cannot be disabled with the **disable()** method.

The *Erkle* object can be tagged as well by using *Erkle*'s **tag()** and **untag()** methods. When a tag is added to the *Erkle* object, only hooked functions with that tag will be called when an event is triggered. *Erkle* objects can have multiple tags. By default, *Erkle* objects have no tags and will call every hooked function triggered by an event.

Events

There are 28 IRC events that can be hooked. The hooked function can take a number of different arguments, depending on the event. The first (and sometimes only) argument passed to every hooked function is **connection**, which is the *Erkle* object running the IRC connection.

Event	Arguments	Description
connecting	• Erkle object	Triggered when the <i>Erkle</i> object starts the connection process.
connect	• Erkle object	Triggered when the <i>Erkle</i> object connects to IRC.
motd	• Erkle object • message (string)	Triggered when the server's message of the day (MOTD) is received.
registered	• Erkle object	Triggered when registration with the IRC server is complete.
nick-taken	• Erkle object • nickname (string)	Triggered when <i>Erkle</i> 's nickname is already taken during registration; nickname contains the new nickname.
ping	• Erkle object	Triggered when the IRC server sends <i>Erkle</i> a PING command.
join	• Erkle object • nickname (string) • host (string) • channel (string)	Triggered whenever a user joins a channel <i>Erkle</i> is in. nickname contains the user's nickname, host contains the user's host, and channel contains the name of the channel joined. This event will trigger when the <i>Erkle</i> object joins a channel as well.

joined	<ul style="list-style-type: none"> • Erkle object • channel (string) 	Triggered whenever <i>Erkle</i> joins a channel. channel contains the name of the joined channel.
part	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) • reason (string) 	Triggered whenever a user leaves a channel <i>Erkle</i> is in. nickname contains the nickname of the user, host contains the user's host, channel contains the name of the channel, and reason contains the reason why the user quit. If no reason has been provided, reason will be set to None .
parted	<ul style="list-style-type: none"> • Erkle object • channel (string) 	Triggered whenever <i>Erkle</i> leaves a channel. channel contains the name of the parted channel.
quit	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • reason (string) 	Triggered when a user quits the IRC server. nickname contains the user's nickname, host contains the user's host, and reason contains the reason why the user quit. If no reason has been provided, reason will be set to None .
nick	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • new_nickname (string) 	Triggered when a user changes their nickname. nickname contains the user's original nickname, host contains the user's host, and new_nickname contains the user's new nickname.
names	<ul style="list-style-type: none"> • Erkle object • channel (string) • users (list) 	<p>Triggered when <i>Erkle</i> generates a list of users in a specific channel. This list will be regenerated every time a user changes their nick, quits IRC, or leaves a channel. channel contains the name of the channel, and users contains a list of users in that channel. If the server is configured for it, each user entry will contain the user's nickname and host, in the form nickname!username@hostname; otherwise, the entry will only contain the user's nickname. Channel status symbols ('@' for channel operators, '+' for voiced users, etc.) are prefixed to each user's nickname.</p> <p>Generated user lists are stored in the <i>Erkle</i> object, accessible in the users attribute.</p>
public	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) • message (string) 	Triggered when <i>Erkle</i> receives a public message. nickname contains the sender's nickname, host contains the sender's host, channel contains the name of the channel the message was sent to, and message contains the message contents.
private	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • message (string) 	Triggered when <i>Erkle</i> receives a private message. nickname contains the sender's nickname, host contains the sender's host, and message contains the message contents.
notice	<ul style="list-style-type: none"> • Erkle object • sender (string) • message (string) 	Triggered when <i>Erkle</i> receives a notice message. sender contains the nickname of the sender, and message contains the message contents.
action	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • target (string) • message (string) 	Triggered when <i>Erkle</i> receives a CTCP action message. nickname contains the sender's nickname, host contains the sender's host, target contains the name of the channel or username the message was sent to, and message contains the message contents.
away	<ul style="list-style-type: none"> • Erkle object • nickname (string) • reason (string) 	Triggered when <i>Erkle</i> receives an "away" notification.
back	<ul style="list-style-type: none"> • Erkle object 	Triggered when <i>Erkle</i> unsets itself as "away".

topic	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) • topic (string) 	Triggered when <i>Erkle</i> receives a channel topic update. nickname contains the topic setter's nickname, host contains the setter's host, channel contains channel name, and topic contains the channel's topic. If the topic is set to an empty string, topic is set to <i>None</i> .
mode	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • target (string) • mode (string) 	Triggered when <i>Erkle</i> receives a channel or user mode change notification. nickname contains the mode setter's nickname, host contains the setter's host, target contains the user or channel the mode applies to, and mode contains the modes (and mode parameters) being set. If the mode is being set by the server, nickname and host will be set to the server's hostname.
kick	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) • target (string) • reason (string) 	Triggered whenever <i>Erkle</i> receives a kick notification. nickname contains the kicker's nickname, host contains the kicker's host, channel contains the channel being kicked from, target contains the nickname of the user being kicked, and reason contains the reason given for the kick. If no reason is provided, reason will be set to <i>None</i> .
kicked	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) • reason (string) 	Triggered whenever <i>Erkle</i> is kicked from a channel. nickname contains the kicker's nickname, host contains the kicker's host, channel contains the channel being kicked from, and reason contains the reason given for the kick. If no reason is provided, reason will be set to <i>None</i> .
invite	<ul style="list-style-type: none"> • Erkle object • nickname (string) • host (string) • channel (string) 	Triggered whenever <i>Erkle</i> receives a channel invitation. nickname contains the inviter's nickname, host contains the inviter's host, and channel contains the channel <i>Erkle</i> is being invited to.
whois	<ul style="list-style-type: none"> • Erkle object • nickname (string) • username (string) • host (string) • realname (string) • server (string) • idle (integer) • signon (string) • channels (list) • privileges (string) 	Triggered whenever <i>Erkle</i> receives WHOIS data from the server. nickname contains the user's nickname, username contains the user's username, host contains the user's host, realname contains the user's realname, server contains the server the user is connected to, idle contains the number of seconds the user has been idle, signon contains the timestamp of when the user signed on to the server, channels contains a list of channels (with status) the user is in, and privileges contains any special privileges the user has (or <i>None</i> if the user has none).
list	<ul style="list-style-type: none"> • Erkle object • channels (list of lists) 	Triggered whenever <i>Erkle</i> receives a channel list from the server. Each entry in channels is a list that contains, in this order: <ol style="list-style-type: none"> 0. channel name (string) 1. number of users in the channel (integer) 2. channel topic (string) (<i>None</i> if there's no topic)
line	<ul style="list-style-type: none"> • Erkle object • line (string) 	Triggered whenever <i>Erkle</i> receives a line of data from the server.
error	<ul style="list-style-type: none"> • Erkle object • code (string) • subject (string) • reason (string) 	Triggered whenever <i>Erkle</i> receives an error message from the server. code is the error's code (from the IRC RFC documents), subject is the "subject" of the error (if there is no "target", subject will be set to <i>None</i>), and reason contains a short description of the error.

Erkle's `connect()` is a blocking function, so hooked functions should be declared *before* `connect()` is called.

For programs with multiple IRC connections (and, thus, multiple *Erkle* objects), understand that hooked events apply to *every* connection. So, if you hook the "public" event to a function, that function will be called when *every connection triggers a "public" event*. To restrict some hooked functions to a specific *Erkle* object, add a tag to the object with the `tag()` method, and add that tag to any hooked functions you'd like the object to call.

Event sets

Erkle contains a few sets of pre-written event handlers; they reside in the **erkle.events** package. To use an event set, simply import it.

<i>Package</i>	erkle.events.dump
<i>Hooks</i>	action, away, back, connect, join, kick, kicked, mode, motd, names, nick, nick-taken, notice, part, ping, private, public, quit, topic, welcome
<i>Description</i>	Prints event-specific data from every Erkle event to the console.

<i>Package</i>	erkle.events.messages
<i>Hooks</i>	action, notice, private, public
<i>Description</i>	Prints incoming messages to the console.

Examples

Greeter Bot

Here's an example bot that connect to an IRC server, join a channel, and greets everyone who joins that channel by name:

```
from erkle import *

CHANNEL = "#erklebot"

config = {
    'nickname': 'greetbot',
    'server': 'irc.efnet.org'
}

@irc.event("welcome")
def welcomed(connection):
    connection.join(CHANNEL)

@irc.event("join")
def joined(connection, nickname, host, channel):
    connection.msg("Welcome to "+CHANNEL+", "+nickname+"!")

bot = Erkle(config)
bot.connect()
```

Auto-Op Bot

This bot will automatically grant channel operator status to any user in a list of nicknames contained in the script. The bot will have to be granted channel operator status by another channel operator, however.

```
from erkle import *

CHANNELS = [ "#erklebot", "#erklesupport", "#pythonfans" ]
OPERATORS = [ "alice", "bob", "carol", "dave" ]

config = {
    'nick': 'greetbot',
    'server': 'irc.efnet.org', 'port': 6667
}

@irc.event("welcome")
def welcomed(connection):
    for channel in CHANNELS:
        connection.join(channel)

@irc.event("join")
def joined(connection, nickname, host, channel):
    if nickname in OPERATORS:
        connection.mode(channel, "+o "+nickname)
        connection.privmsg(nickname, "Welcome back, "+nickname)

bot = Erkle(config)
bot.connect()
```

...

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