

A Deep Dive Into Hex

Todd Resudek

Todd Resudek



Sr. Software Engineer



supersimple



@sprsmpl

Todd Resudek



Chameleon



What is Hex?

Hex is the package manager for the Erlang ecosystem.

It is analogous to NPM for Node.js, Crates for Rust, and RubyGems for Ruby.

What is Hex?

Hex as a system contains a few codebases;

- ▶ Hex (cli)
- ▶ Hexpm (website/api)
- ▶ Hexdocs (static)
- ▶ Hex Core

mix deps.get

Where Hex
fits in

where hex lives



Where did it
come from?





Hex was authored by
Eric Meadows-Jönsson and first
released December 23, 2013.

*The first release of Elixir (0.5.0)
was May 24, 2012.*

The role of Hex



How does it compare?

Number of packages available:

- ▶ Hex: ~7,000
- ▶ RubyGems: ~9,500
- ▶ Crates: ~18,000
- ▶ NPM: >500,000

Why learn more about Hex?

- ▶ Work faster
- ▶ Prevent issues
- ▶ Easier debugging

Anatomy of a Hex package

```
└── LICENSE.md
└── README.md
└── config
    └── config.exs
└── deps
    └── earmark
        └── ex_doc
└── doc
    ├── 404.html
    ├── Chameleon.html
    ├── api-reference.html
    └── dist
    . . .
```

```
└── doc (cont)
    └── fonts
        └── index.html
        └── search.html
└── lib
    └── chameleon
        └── chameleon.ex
└── mix.exs
└── mix.lock
└── test
    └── chameleon_test.exs
    └── test_helper.exs
```

Anatomy of a Hex package

```
defmodule PackageName.MixProject do
  use Mix.Project
  def project() do
    [
      app: :packagename,
      version: "0.1.0",
      ...
      description: description(),
      package: package(),
      deps: deps(),
      name: "PackageName",
      source_url: "https://github.com/username/packagename"
    ]
  end
  ...
  ...

  defp deps() do
    [
      {:ex_doc, "~> 0.14", only: :dev},
      {:foobar, git: "https://github.com/elixir-lang/foobar.git", tag: "0.1"},
      {:foobar, path: "path/to/foobar"}
    ]
  end

  defp description() do
    "A few sentences (a paragraph) describing the project."
  end

  defp package() do
    [
      name: "packagename",
      files: ["lib", "mix.exs", "README*", "LICENSE*"],
      maintainers: ["John Smith", "Rose Jones"],
      licenses: ["GPL 3.0"],
      links: %{"GitHub" => "https://github.com/org/packagename"},
      organization: "my-org"
    ]
  end
end
```

Anatomy of a Hex package

```
def project() do
  [
    app: :packagename,
version: "0.1.0",
    ...
    description: description(),
    package: package(),
    deps: deps(),
    name: "PackageName",
    source_url: "https://github.com/username/packagename"
  ]
end
```

Anatomy of a Hex package

```
defp description() do
  "A few sentences (a paragraph) describing the project."
end
```

Anatomy of a Hex package

```
defp deps() do
  [
    {:ex_doc, "~> 0.14", only: :dev},
    {:foobar, git: "https://github.com/elixir-lang/foobar.git", tag: "0.1"},
    {:foobar, path: "path/to/foobar"}
  ]
end
```

Anatomy of a Hex package

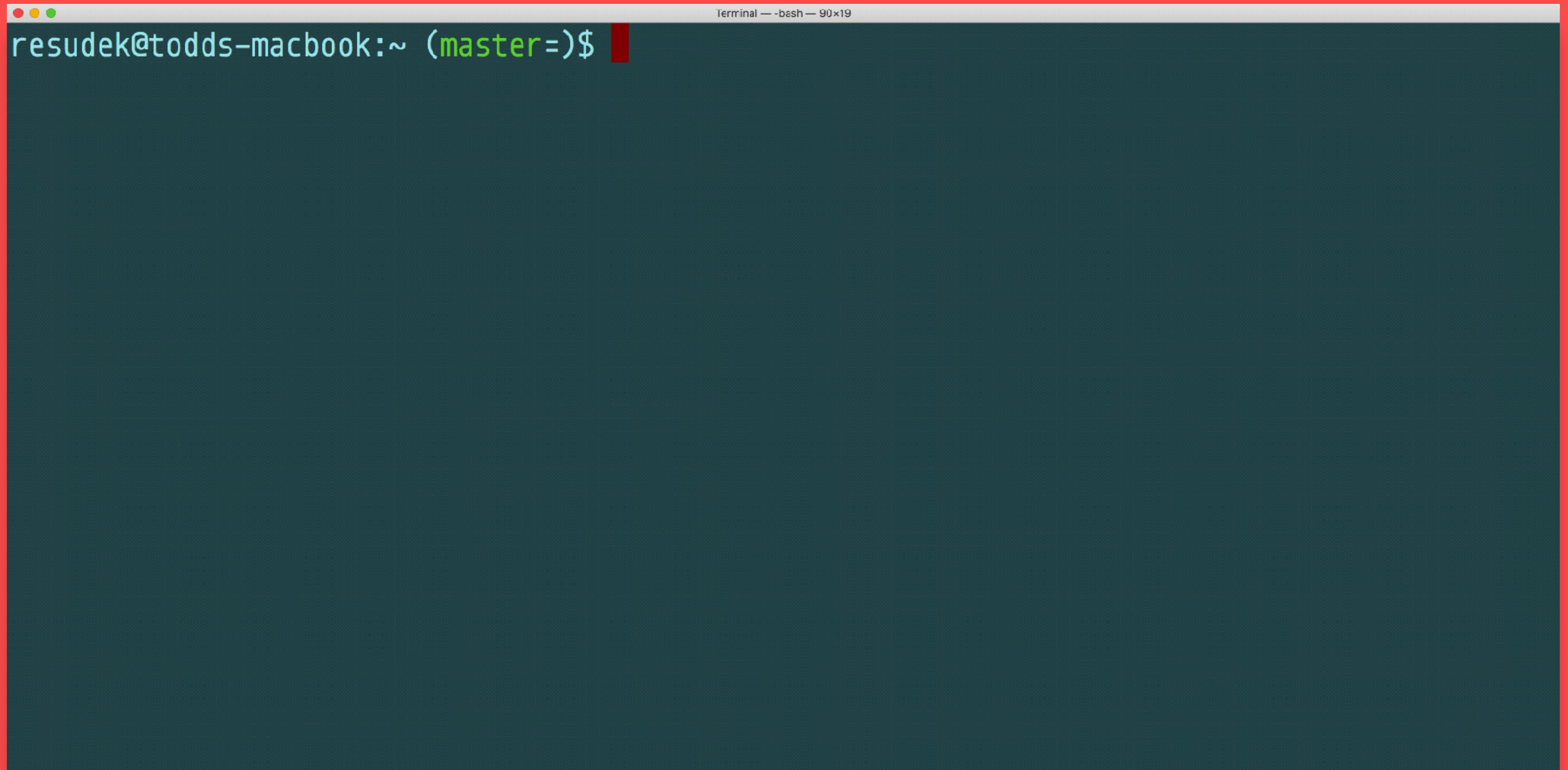
```
defp package() do
  [
    name: "packagename",
    files: ["lib", "mix.exs", "README*", "LICENSE*"],
    maintainers: ["John Smith", "Rose Jones"],
    licenses: ["GPL 3.0"],
    links: %{"GitHub" => "https://github.com/org/packagename"}
    organization: "my-org"
  ]
end
```

Anatomy of a Hex package

```
defp package() do
  [
    name: "packagename",
    files: ["lib", "mix.exs", "README*", "LICENSE*"],
    maintainers: ["John Smith", "Rose Jones"],
    licenses: ["GPL 3.0"],
    links: %{"GitHub" => "https://github.com/org/packagename"},
    organization: "my-org"
  ]
end
```

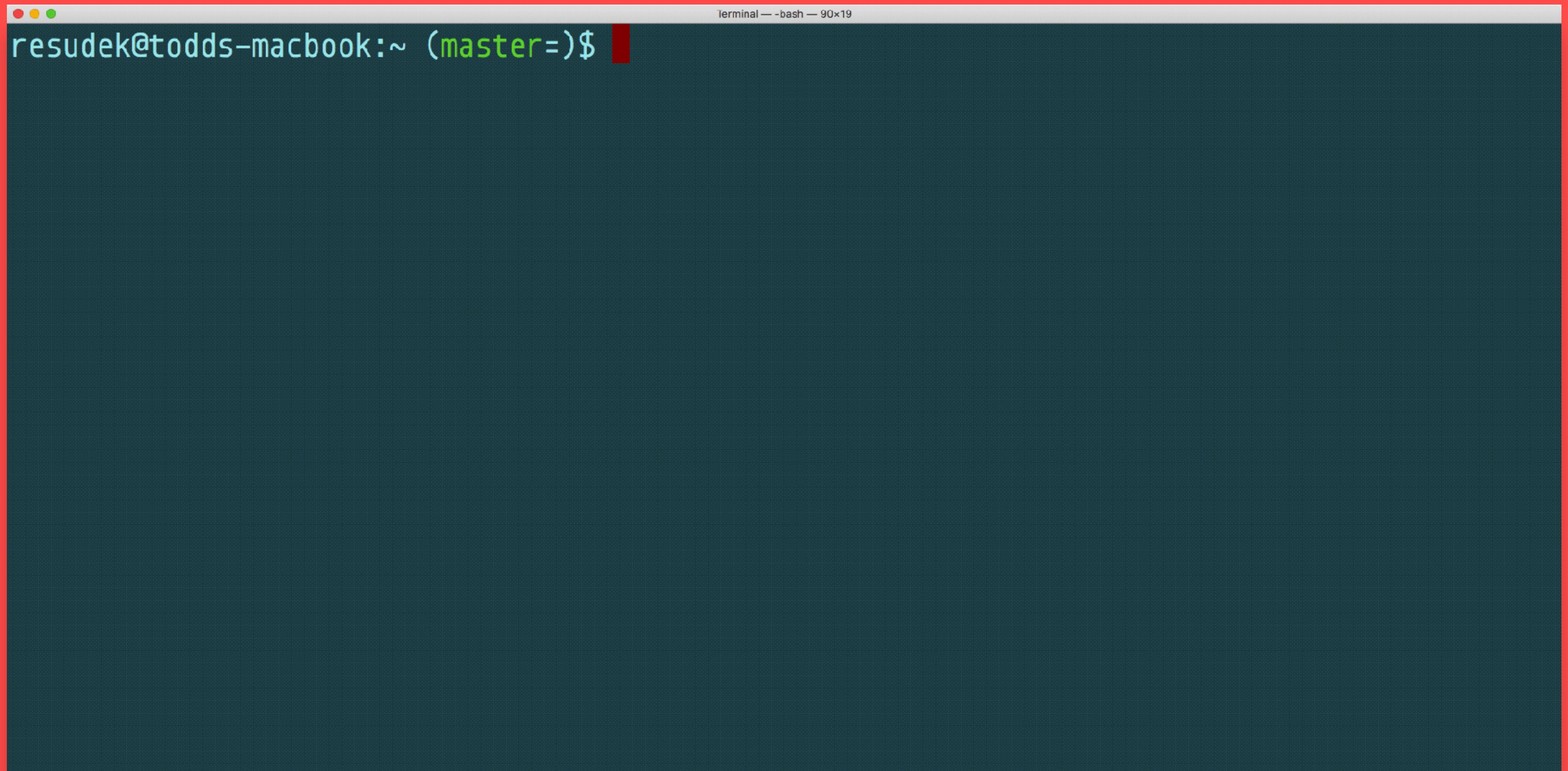
What Hex commands
should I know?

mix hex.info



```
resudek@todds-macbook:~ (master=)$
```

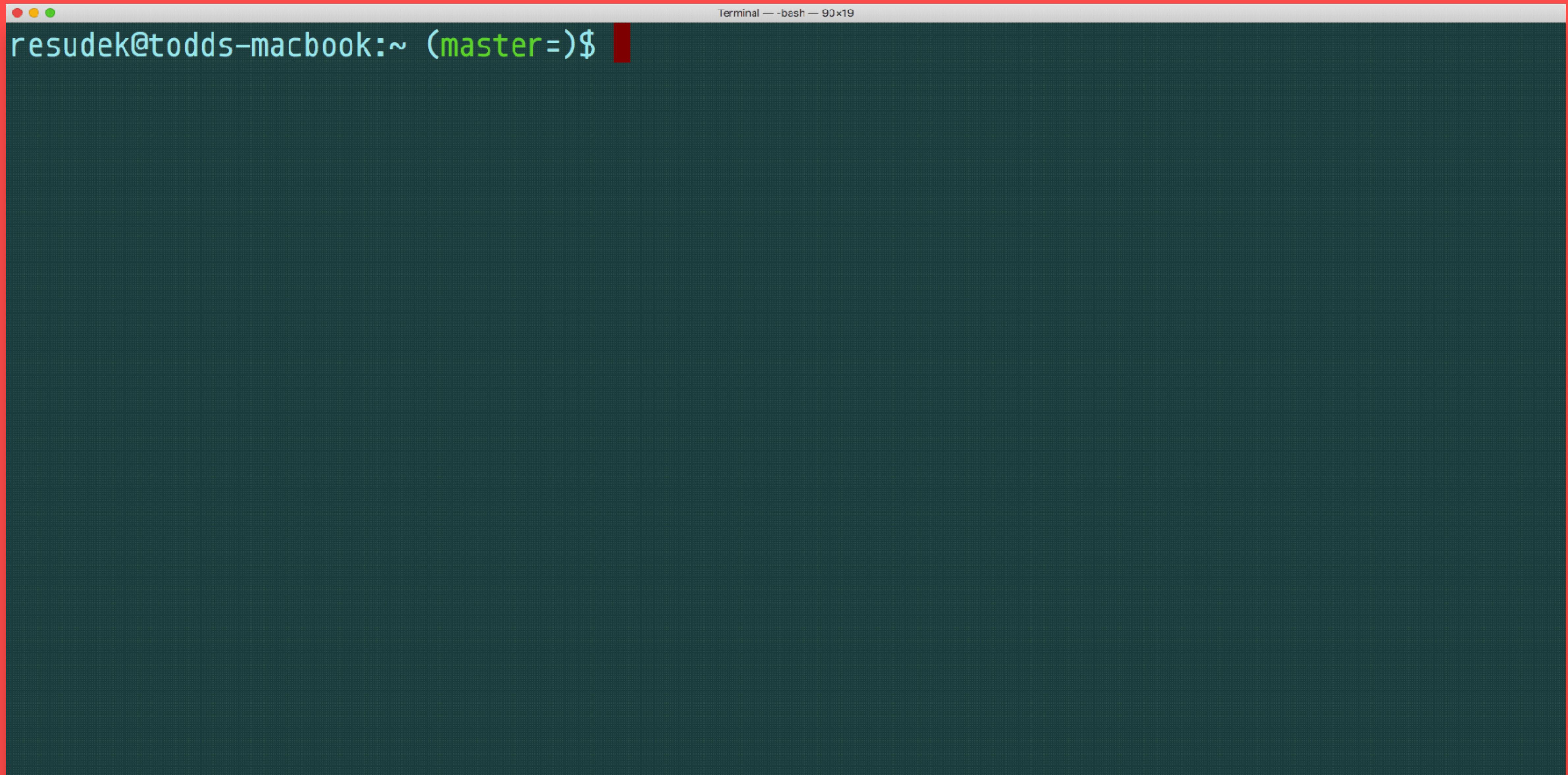
mix hex.info <package>



A screenshot of a macOS Terminal window. The title bar reads "Terminal — bash — 90x19". The window contains a single line of text: "resudek@todds-macbook:~ (master=)\$". The background of the terminal is dark green.

```
resudek@todds-macbook:~ (master=)$
```

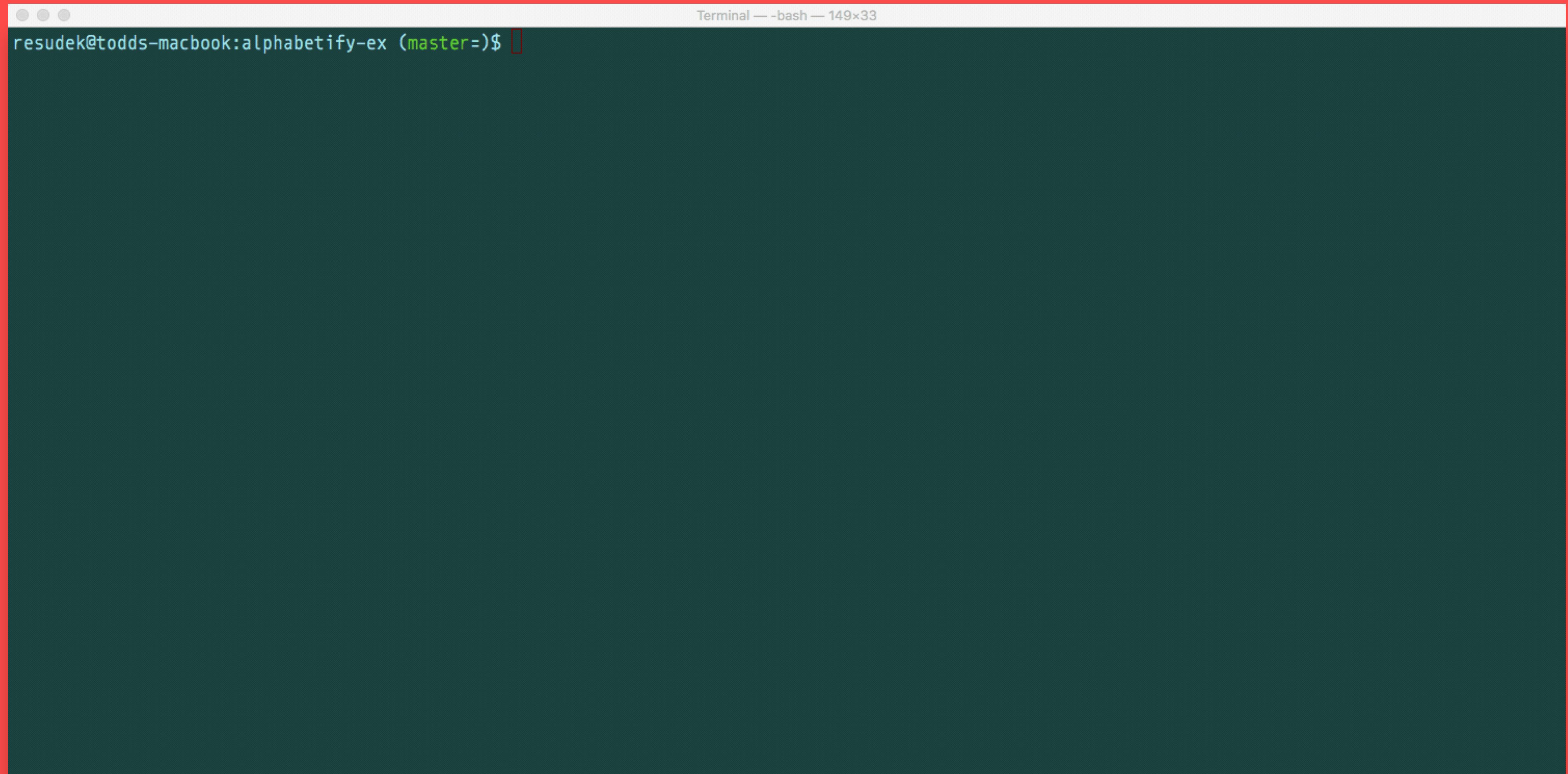
mix hex.info <package> <version>



A screenshot of a Mac OS X terminal window titled "Terminal — bash — 90x19". The window has a dark green background with a light gray border. In the top left corner, there are three colored window control buttons (red, yellow, green). The title bar displays the window name and dimensions. The main area of the terminal shows a command prompt: "resudek@todds-macbook:~ (master=)\$". The cursor is located at the end of the command line.

```
resudek@todds-macbook:~ (master=)$
```

mix hex.search <term>



A screenshot of a terminal window titled "Terminal — -bash — 149x33". The window has a dark green background and a light gray header bar. In the header bar, there are three small circular icons on the left, the title "Terminal — -bash — 149x33" in the center, and a red close button on the right. The main area of the terminal shows a command prompt: "resudek@todds-macbook:alphabetify-ex (master=)\$". The text is white on a dark background.

```
resudek@todds-macbook:alphabetify-ex (master=)$
```



Fetching Documentation

Photo by: Karen Wilkinson

Fetching documentation

- ▶ `["eex", "elixir", "ex_unit", "iex", "logger", "mix"]` retrieve the version that matches your current elixir version.
- ▶ Dependencies in your app will open app version.
- ▶ Defaults to latest version unless you specify.

mix hex.docs online <package>

The screenshot shows a web browser window titled "Jason - jason v1.1.1". The URL in the address bar is <https://hexdocs.pm/jason/readme.html>. The browser's toolbar includes various icons for productivity and communication. The main content area displays the Jason library documentation. On the left, there is a sidebar with navigation links: "jason v1.1.1", "Search" (with a magnifying glass icon), "PAGES", "MODULES", "EXCEPTIONS", "API Reference", "Jason" (which is currently selected, indicated by a purple border), and a list of sub-links: "Top", "Installation", "Basic Usage", "Use with other libraries", "Benchmarks", "Differences to Poison", and "License". The main content area has a dark background. The title "Jason" is prominently displayed in large white font. Below the title is a subtitle: "A blazing fast JSON parser and generator in pure Elixir." A paragraph follows: "The parser and generator are at least twice as fast as other Elixir/Erlang libraries (most notably [Poison](#)). The performance is comparable to [jiffy](#), which is implemented in C as a NIF. Jason is usually only twice as slow." Another paragraph states: "Both parser and generator fully conform to [RFC 8259](#) and [ECMA 404](#) standards. The parser is tested using [JSONTestSuite](#)". Below this is a section titled "Installation" with a sub-section: "The package can be installed by adding `jason` to your list of dependencies in `mix.exs`:

```
def deps do
  [{:jason, "~> 1.1"}]
end
```

At the bottom of the page, the word "Basic Usage" is visible.

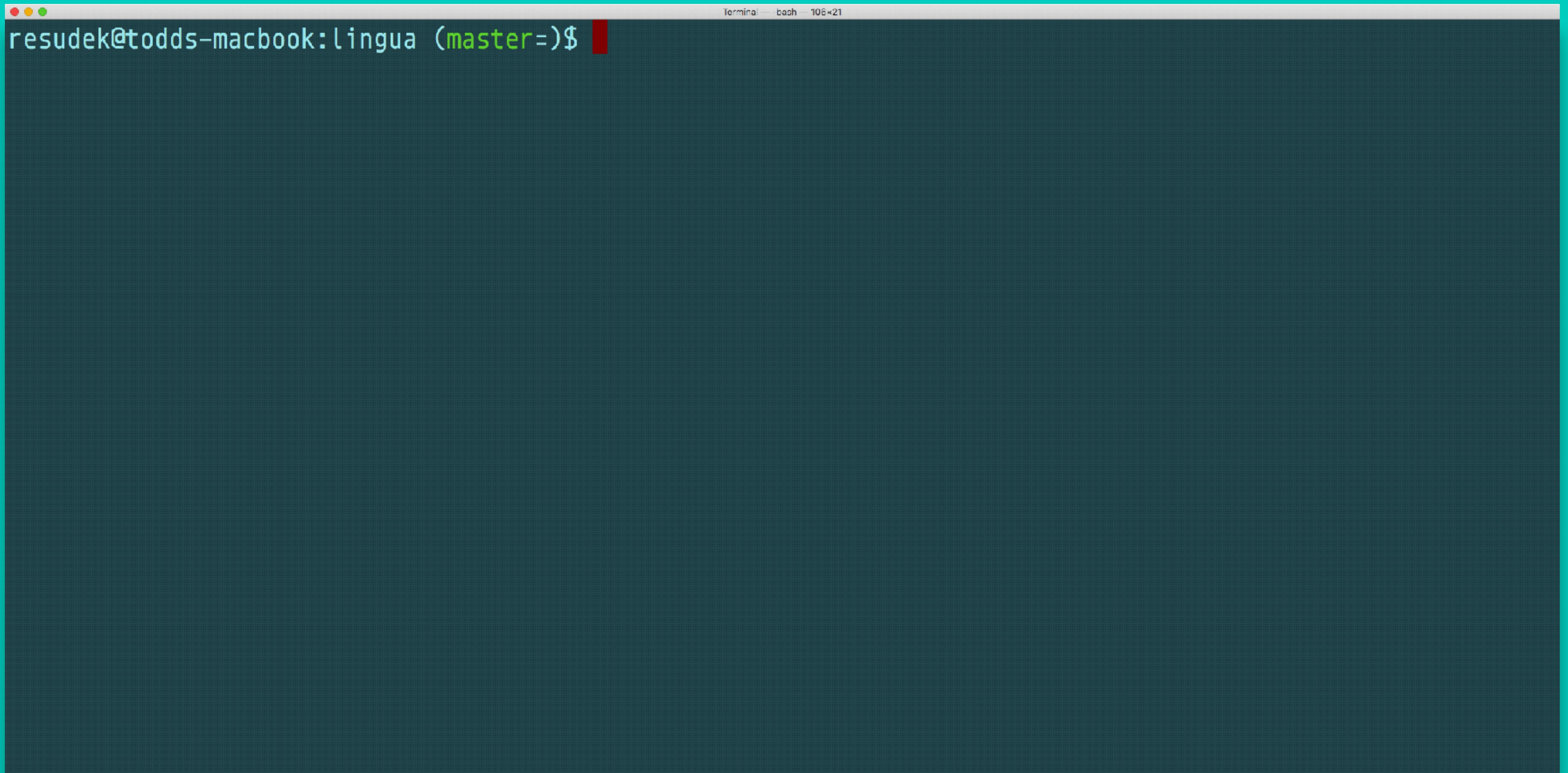
mix hex.docs fetch



A screenshot of a Mac OS X terminal window titled "Terminal — bash — 98x21". The window has red and green title bar buttons. The text area shows the command "mix hex.docs fetch" entered at the prompt "resudek@todds-macbook:lingua (master=)\$". The background of the terminal is dark, and the text is white.

```
resudek@todds-macbook:lingua (master=)$
```

mix hex.docs fetch <package>



A screenshot of a Mac OS X Terminal window. The title bar says "Terminal — bash — 108x21". The command "mix hex.docs fetch <package>" is typed at the prompt "resudek@todds-macbook:lingua (master=)\$". The rest of the window is blank.

```
resudek@todds-macbook:lingua (master=)$
```

mix hex.docs offline <package>

The screenshot shows a web browser window titled "StreamData - StreamData v0.4". The address bar indicates the page is "file:///Users/resudek/.hex/docs/hexpm/stream_data/0.4.2/StreamData.html". The left sidebar has a dark blue background and contains the following navigation items:

- StreamData** v0.4.2
- search
- PAGES
- MODULES**
- EXCEPTIONS
- ExUnitProperties
- StreamData
 - Top
 - Summary
 - + Types
 - + Functions

The main content area has a white background and features the following text and code example:

StreamData

Functions to create and combine generators.

A generator is a `StreamData` struct. Generators can be created through the functions exposed in this module, like `constant/1`, and by combining other generators through functions like `bind/2`.

Similar to the `Stream` module, the functions in this module returns a lazy construct. We can get values out of a generator by enumerating the generator. Generators always generate an infinite stream of values (which are randomized most of the time).

For example, to get an infinite stream of integers that starts with small integers and progressively grows the boundaries, you can use `integer/0`:

```
Enum.take(StreamData.integer(), 10)
#=> [-1, 0, -3, 4, -4, 5, -1, -3, 5, 8]
```

As you can see above, values emitted by a generator are not unique.

In many applications of generators, the longer the generators runs the larger the generated values will be. For integers, a larger integer means a bigger number. For lists, it may mean a list with more elements. This is controlled by a parameter that we call the generation size (see the “Generation size” section below).

Hex User

- ▶ Usernames must be at least 3 characters
- ▶ Password must be at least 7 characters
- ▶ Usernames can only contain a-z, A-Z, 0-9, _, -, .
- ▶ Some names are reserved (me, hex, hexpm, elixir, erlang, otp)

mix hex.user register

```
resudek@todds-macbook:hex (user-register=)$
```

mix hex.user reset_password local

```
resudek@todds-macbook:hex (reset-local-password=)$
```

mix hex.user reset_password account

```
resudek@todds-macbook:hex (reset-local-password=)$
```

mix hex.user auth

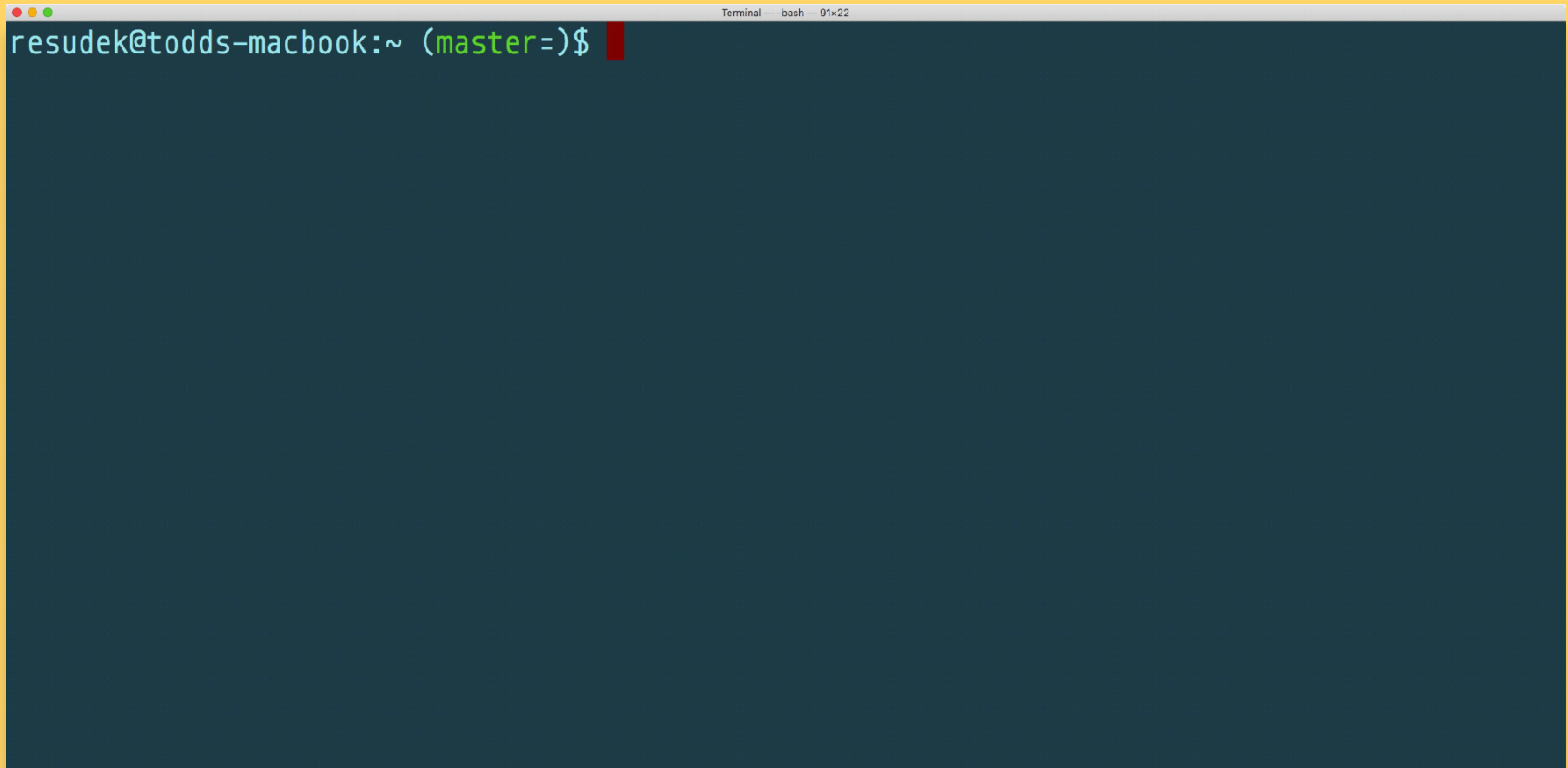
```
resudek@todds-macbook:hex (master=)$
```

Keys



Photo by: Carlos Lowry

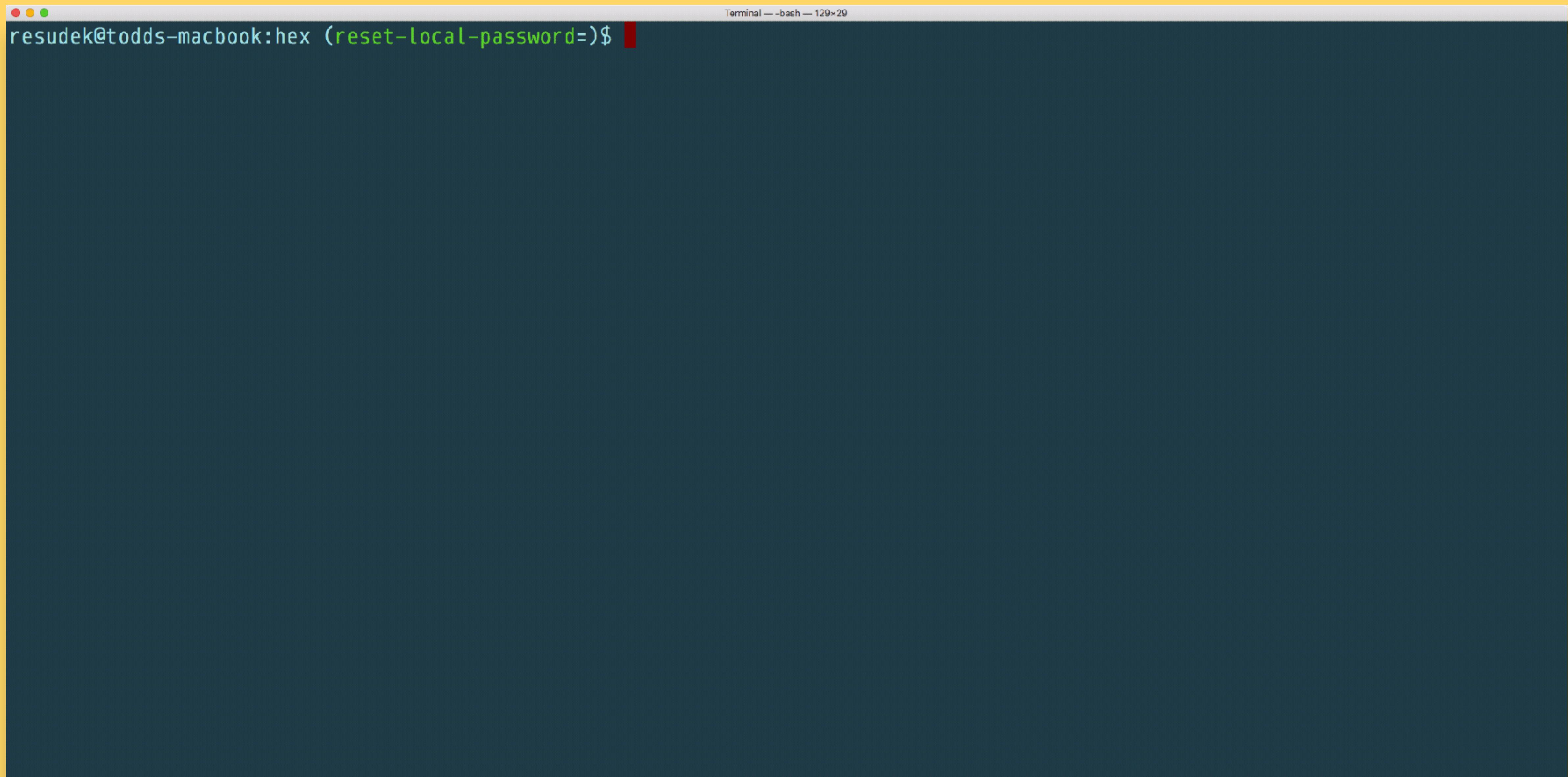
mix hex.user key list



A screenshot of a macOS Terminal window. The window title bar says "Terminal — bash — 91x22". The terminal prompt is "resudek@todds-macbook:~ (master=)\$". Below the prompt, there is a blank dark blue terminal window area.

```
resudek@todds-macbook:~ (master=)$
```

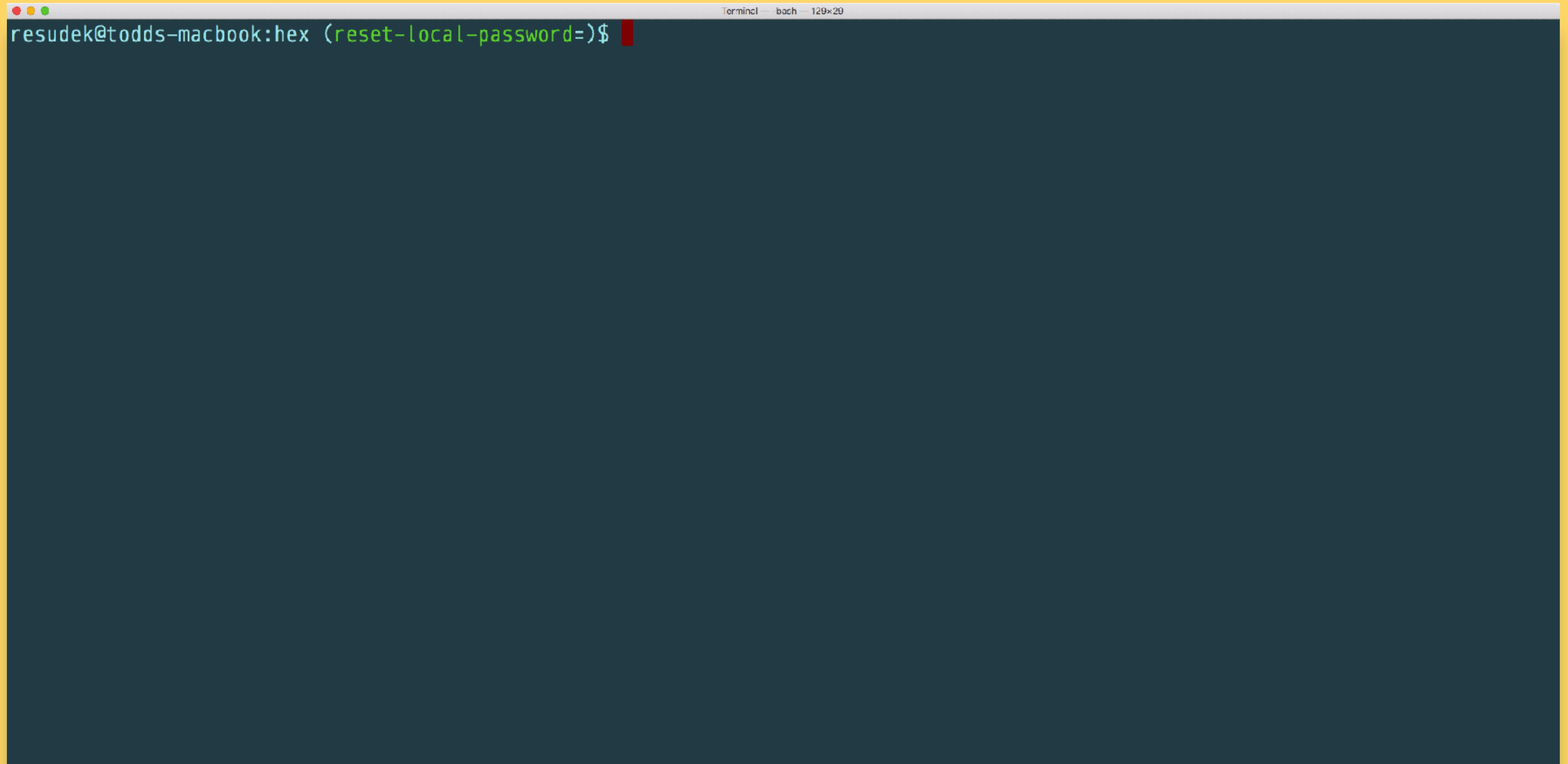
mix hex.user key revoke <keyname>



A screenshot of a macOS Terminal window. The title bar reads "Terminal — bash — 129x29". The command "mix hex.user key revoke <keyname>" is typed into the terminal, with the placeholder "<keyname>" highlighted in green. The user's name "resudek" and the host "todd's-macbook" are visible at the top left of the terminal window.

```
resudek@todd's-macbook:hex (reset-local-password=)$
```

mix hex.user key revoke --all



A screenshot of a macOS Terminal window titled "Terminal - bach - 129x29". The window has a dark green background and white text. In the top left corner, it shows the user's name "resudek" and the host "todd's-macbook". The prompt "hex (reset-local-password=)\$" is visible. The main body of the terminal is empty, indicating that the command has been run but no output is displayed.

```
resudek@todd's-macbook:hex (reset-local-password=)$
```

Config

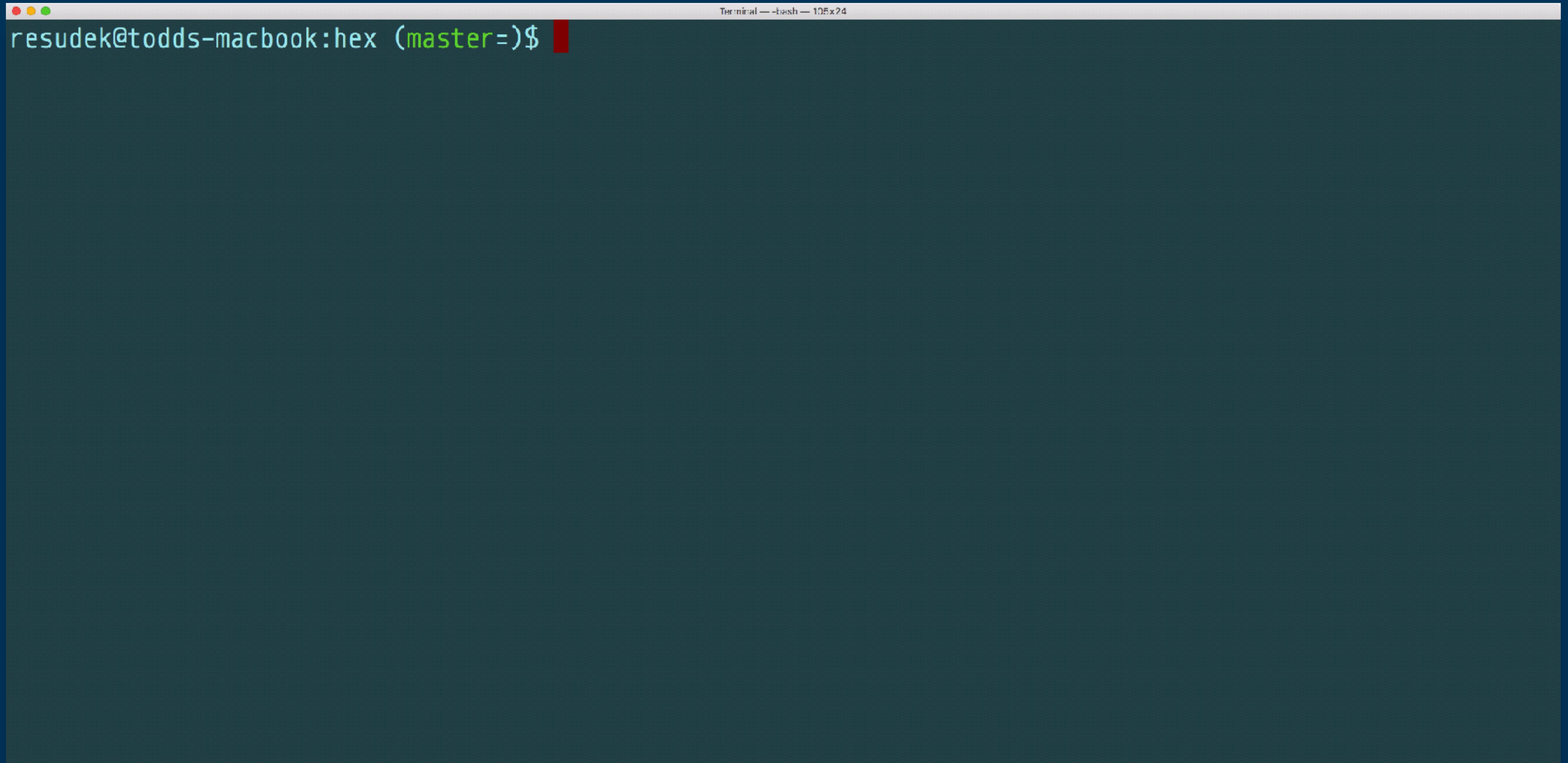
File Edit Search Options CONFIG.SYS

```
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
COUNTRY=049,850,C:\DOS\COUNTRY.SYS
DEVICE=C:\DOS\DISPLAY.SYS CON=(EGA,,1)
FILES=30
DEVICEHIGH=\CDROM\CDROM.SYS
STACKS=9,256
```

Image By: kleiner_baum

MS-DOS Editor <F1=Help> Press ALT to activate

mix hex.config

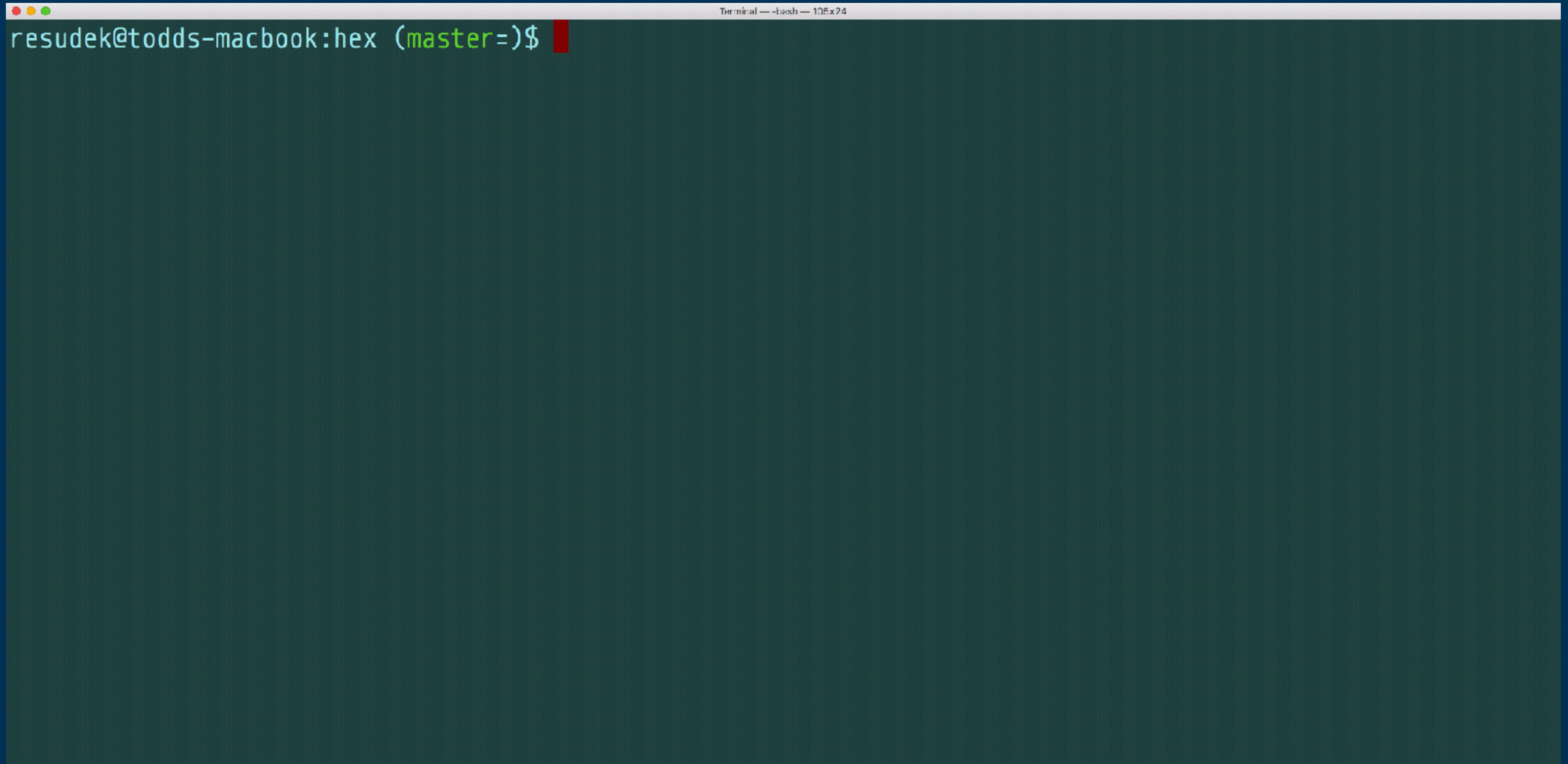


A screenshot of a macOS Terminal window titled "Terminal — bash — 105x24". The window has three colored window control buttons (red, yellow, green) at the top left. The title bar shows the window name and its dimensions. The main pane of the terminal is dark gray and contains the following text:

```
resudek@todds-macbook:hex (master=)$
```

The cursor is positioned at the end of the command line, indicated by a small red vertical bar.

config file

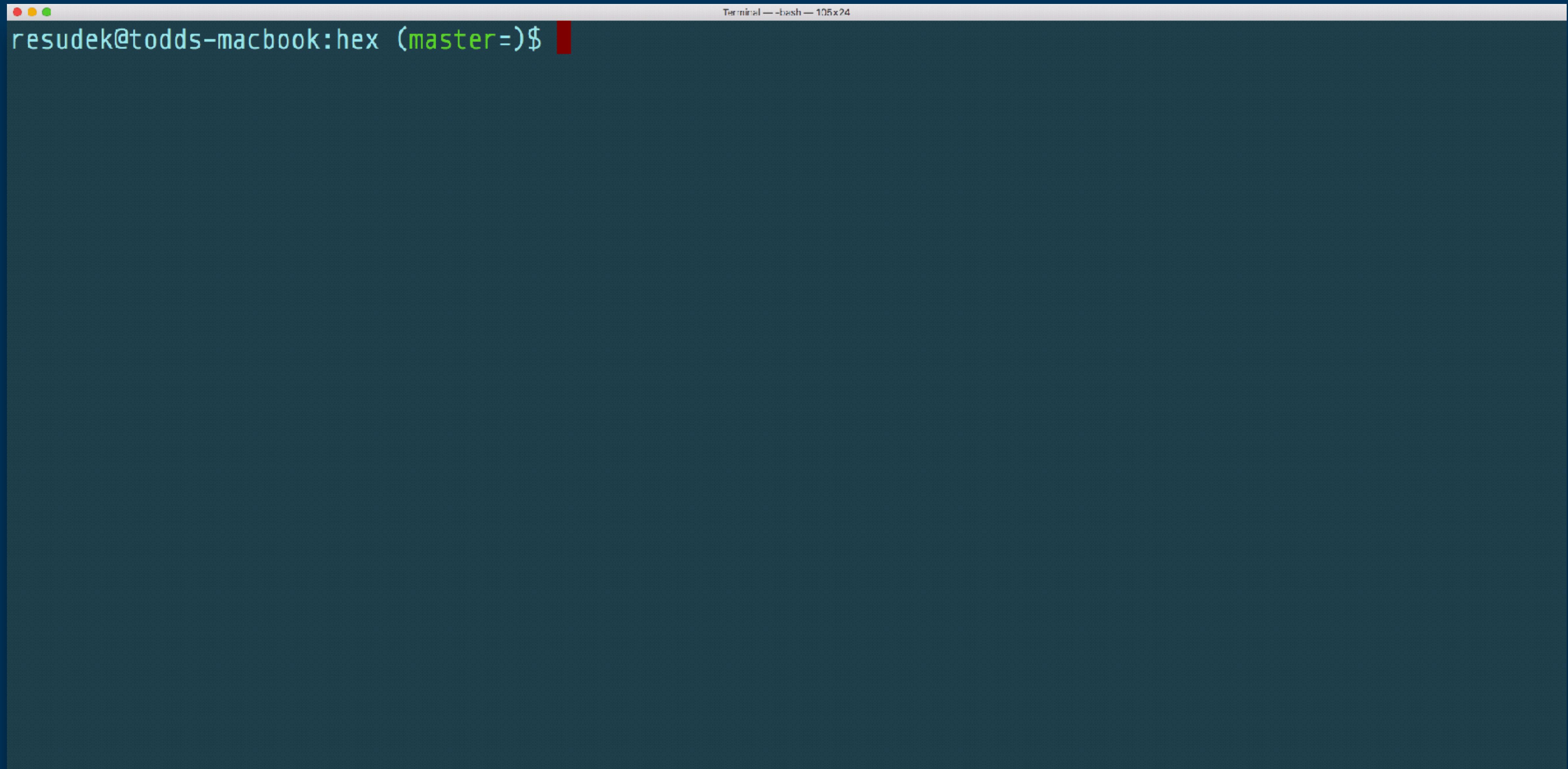


```
resudek@todds-macbook:hex (master=)$
```

Hex Config Keys

- ▶ api_url
- ▶ offline
- ▶ unsafe_https
- ▶ unsafe_registry
- ▶ http_proxy
- ▶ https_proxy
- ▶ http_concurrency
- ▶ http_timeout

mix hex.config <key> <value>



A screenshot of a macOS Terminal window titled "Terminal — bash — 105x24". The window has three colored title bar buttons (red, yellow, green) on the top-left. The main area shows a dark blue terminal background with white text. At the top left of the terminal area, it says "resudek@toddsmacbook:hex (master=)\$". A vertical red cursor bar is positioned on the right side of the terminal window.

```
resudek@toddsmacbook:hex (master=)$
```

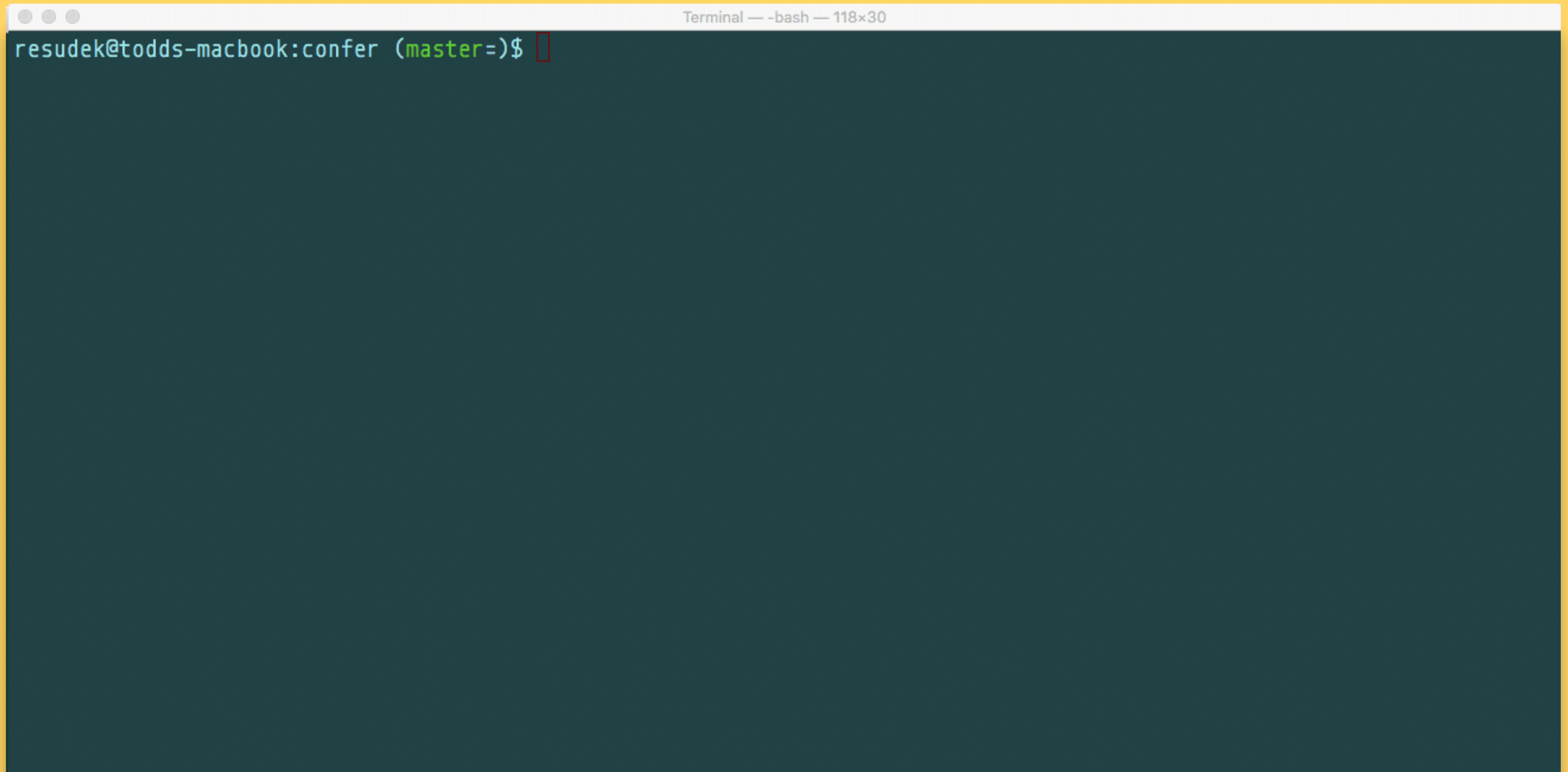
mix hex.config <key> --delete

```
resudek@todd$ mix hex.config --delete
```

Housekeeping



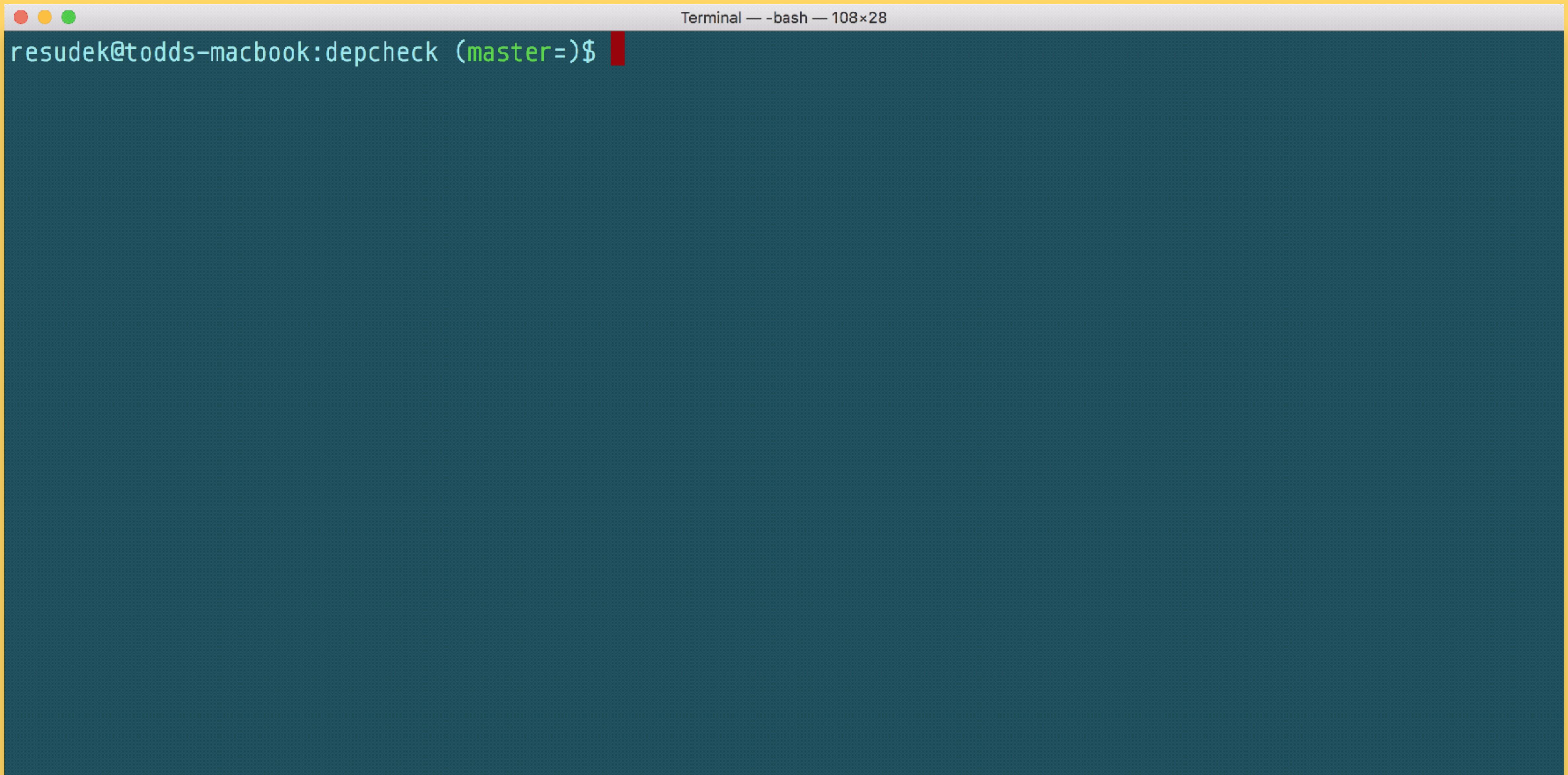
mix hex.outdated



A screenshot of a macOS Terminal window titled "Terminal — -bash — 118x30". The window has three gray circular close buttons in the top-left corner. The text area shows the command "resudek@todds-macbook:confer (master=)\$" followed by a red cursor placeholder. The background of the terminal is dark teal.

```
resudek@todds-macbook:confer (master=)$
```

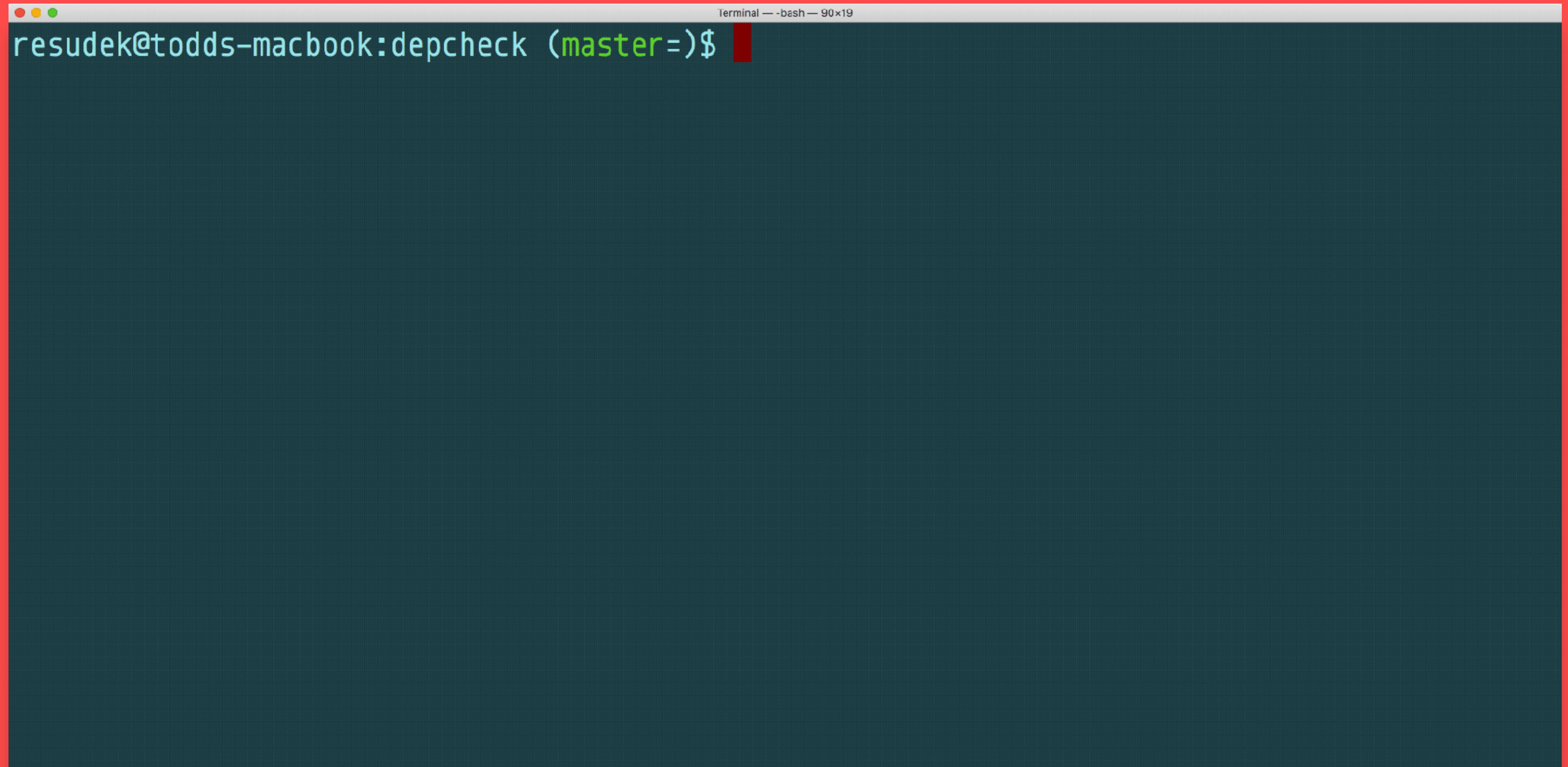
mix hex.outdated <package>



A screenshot of a macOS Terminal window titled "Terminal — -bash — 108x28". The window has red, yellow, and green title bar buttons. The terminal prompt shows the user's name "resudek" followed by the path "todd@macbook:depcheck (master)" and a dollar sign "\$". The background of the terminal is dark blue.

```
resudek@todd@macbook:depcheck (master)$
```

mix hex.audit

A screenshot of a macOS Terminal window titled "Terminal - bash - 90x19". The window has the standard OS X title bar with red, yellow, and green buttons. The main area of the terminal is dark gray with a light gray grid pattern. At the top left, the text "resudek@todds-macbook:depcheck (master=)\$" is visible in white. A small red vertical bar is positioned to the right of the prompt, likely indicating the cursor's position.

Publishing

- ▶ Requires you to be a registered hex user.
- ▶ Generates and publishes docs by default.
- ▶ Use `--organization` flag to publish privately.
- ▶ Watch out for pre-release dependencies.

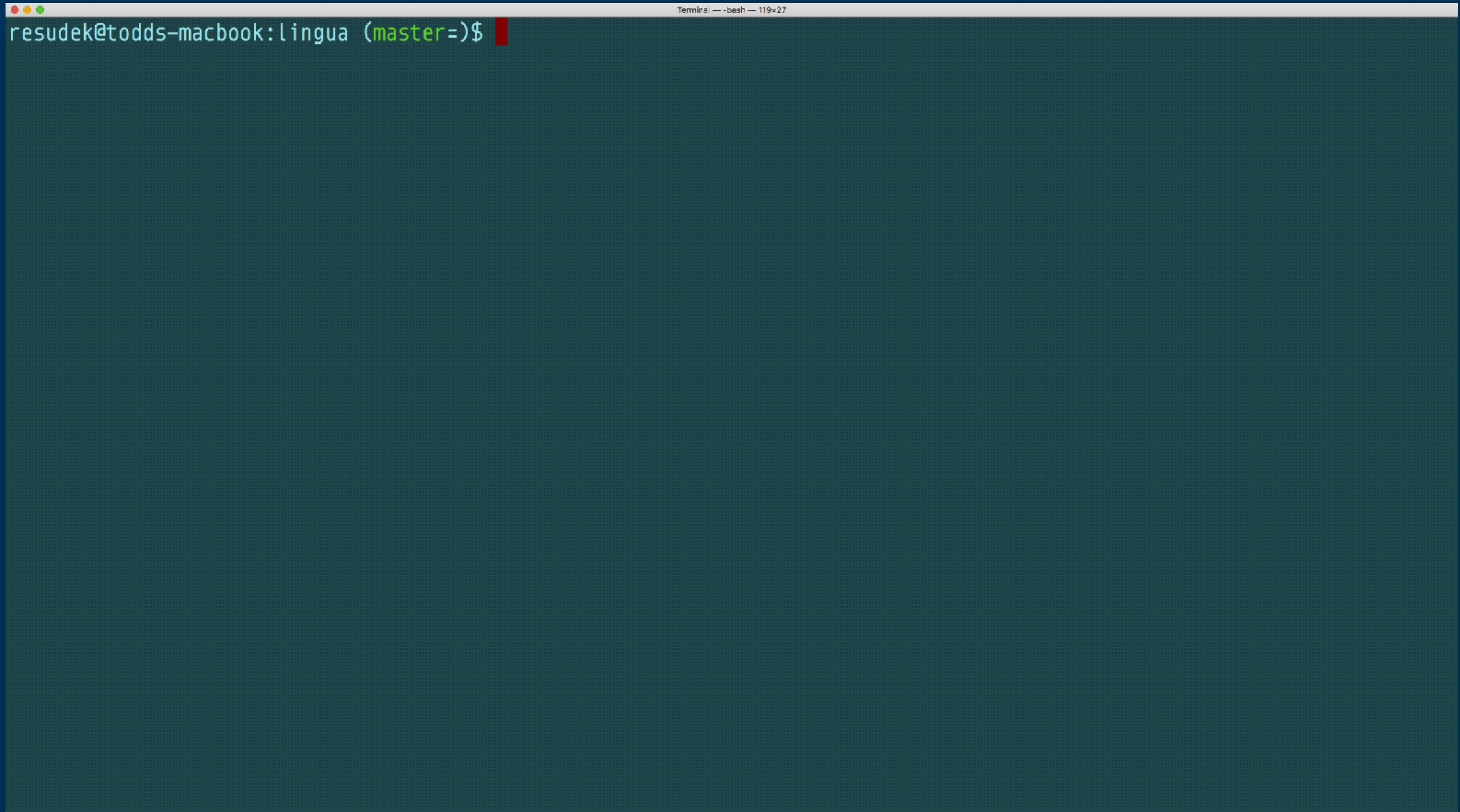
Package Naming

Avoid using offensive or harassing package names, nicknames, or other identifiers that might detract from a friendly, safe, and welcoming environment for all.

Naming Conventions

- ▶ When adding functionality to an existing package, use that packages name in your package name.
- ▶ Avoid namespace conflicts with existing packages.
- ▶ When porting a library from another ecosystem, add “ex” to the name.
- ▶ First come first serve
- ▶ Squatting is not allowed

mix hex.publish



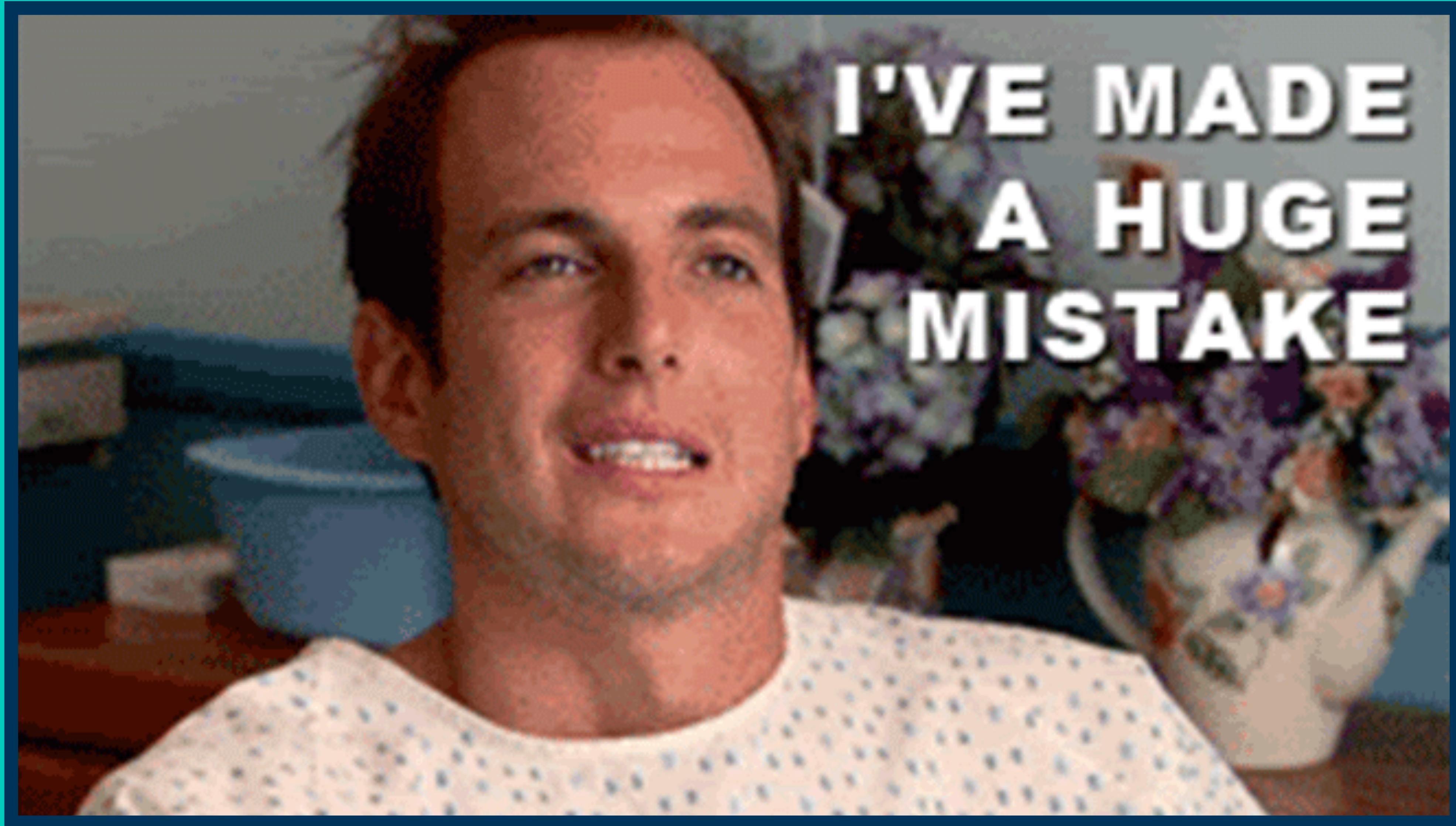
A screenshot of a Mac OS X terminal window titled "Terminal - bash - 119x27". The window has three colored window control buttons (red, yellow, green) at the top left. The title bar shows the path "resudek@todds-macbook:lingua (master=)" followed by a dollar sign (\$) and a red cursor. The main pane of the terminal is completely blank, showing only the grid pattern of the dark background.

```
resudek@todds-macbook:lingua (master=)$
```

Typo Squatting

New package names are checked for similarity
with existing packages.

TFW



mix hex.publish --revert <version>

```
resudek@todds-macbook:lingua (master=)$
```

mix hex.publish docs

```
resudek@todds-macbook:lingua (master=)$
```

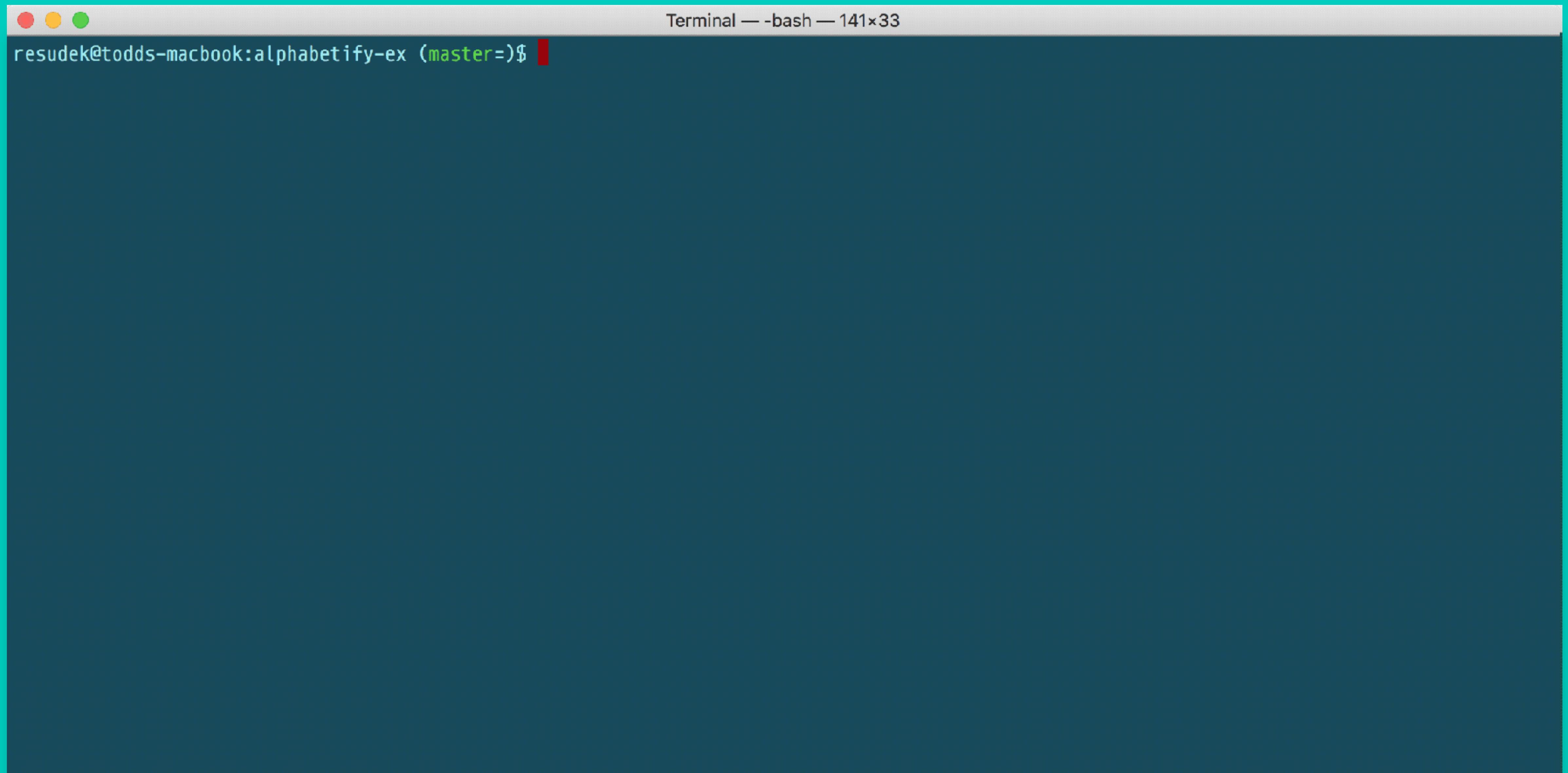


Retirement

Retire

- ▶ Added in v0.15.0 (released Dec 24, 2016)
- ▶ Signifies a package is no longer recommended.
- ▶ Retirement must include a valid reason:
 - Renamed
 - Deprecated
 - Security
 - Invalid
 - Other

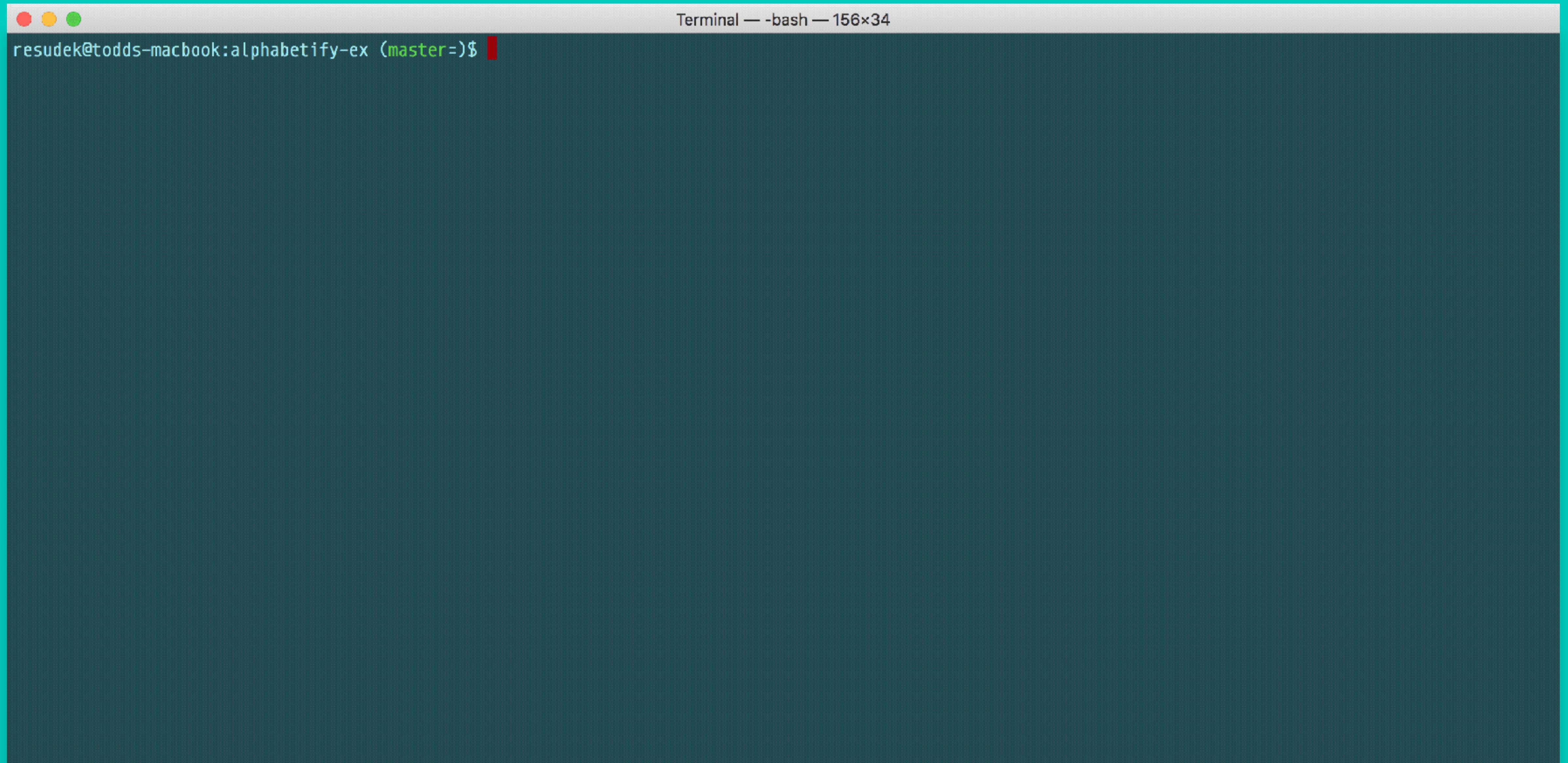
mix hex.retire



Terminal — -bash — 141x33

```
resudek@todds-macbook:alphabetify-ex (master=)$
```

mix hex.retire <pkg> <ver> --unretire



```
resudek@todds-macbook:alphabetify-ex (master=)$
```

Organizations

Members

Here you control your organization members and their roles. Mouse-over the role for more details.

 supersimple	Admin ▾	Remove
<input type="text" value="Username or email address"/>	Admin ▾	Add member

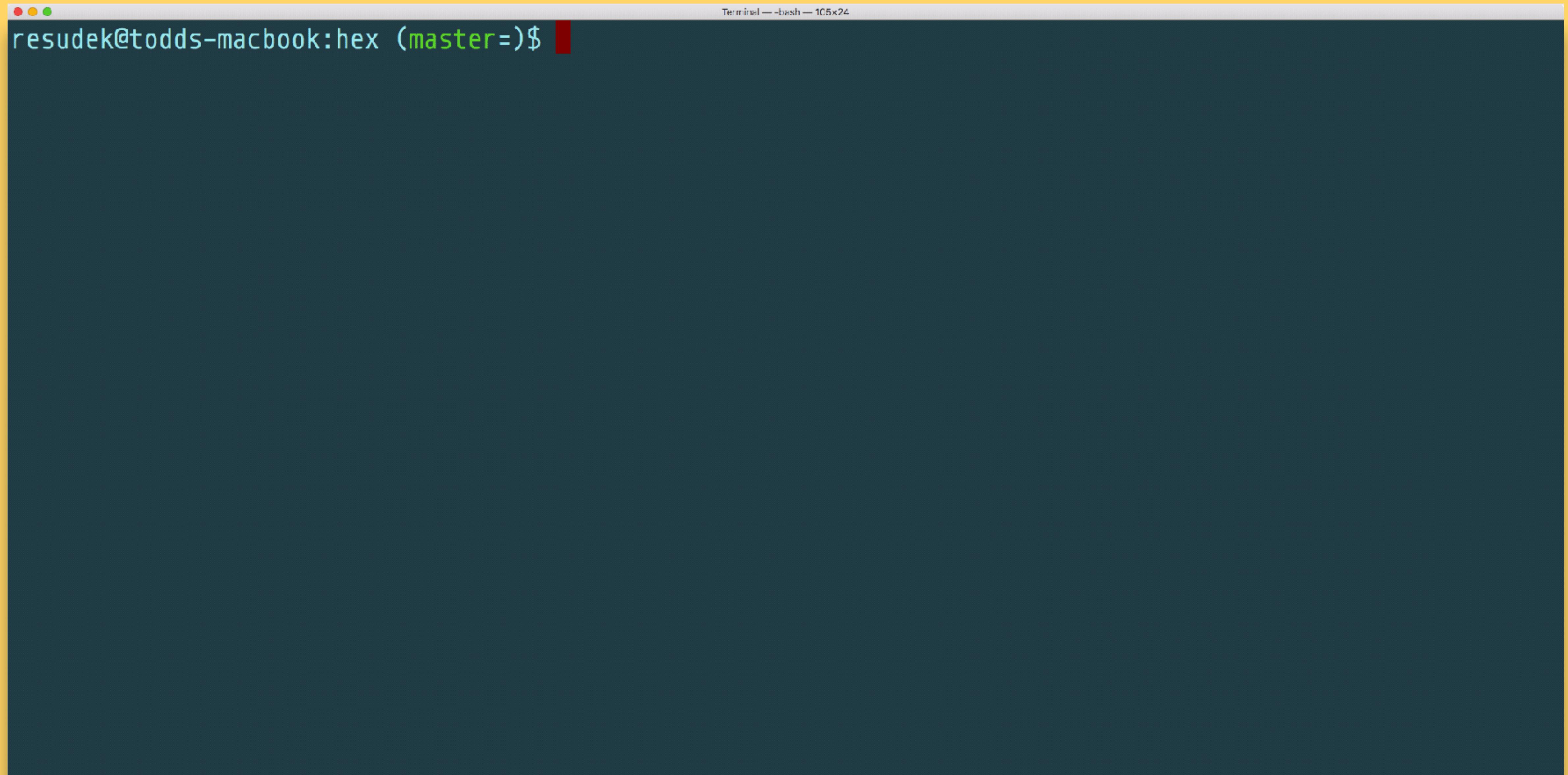
Packages

alphabetify
chameleon

Organizations

- ▶ Added in v0.17.1 (released Aug 29, 2017)
- ▶ \$7 per month per user
- ▶ Not subject to the same rules as public packages

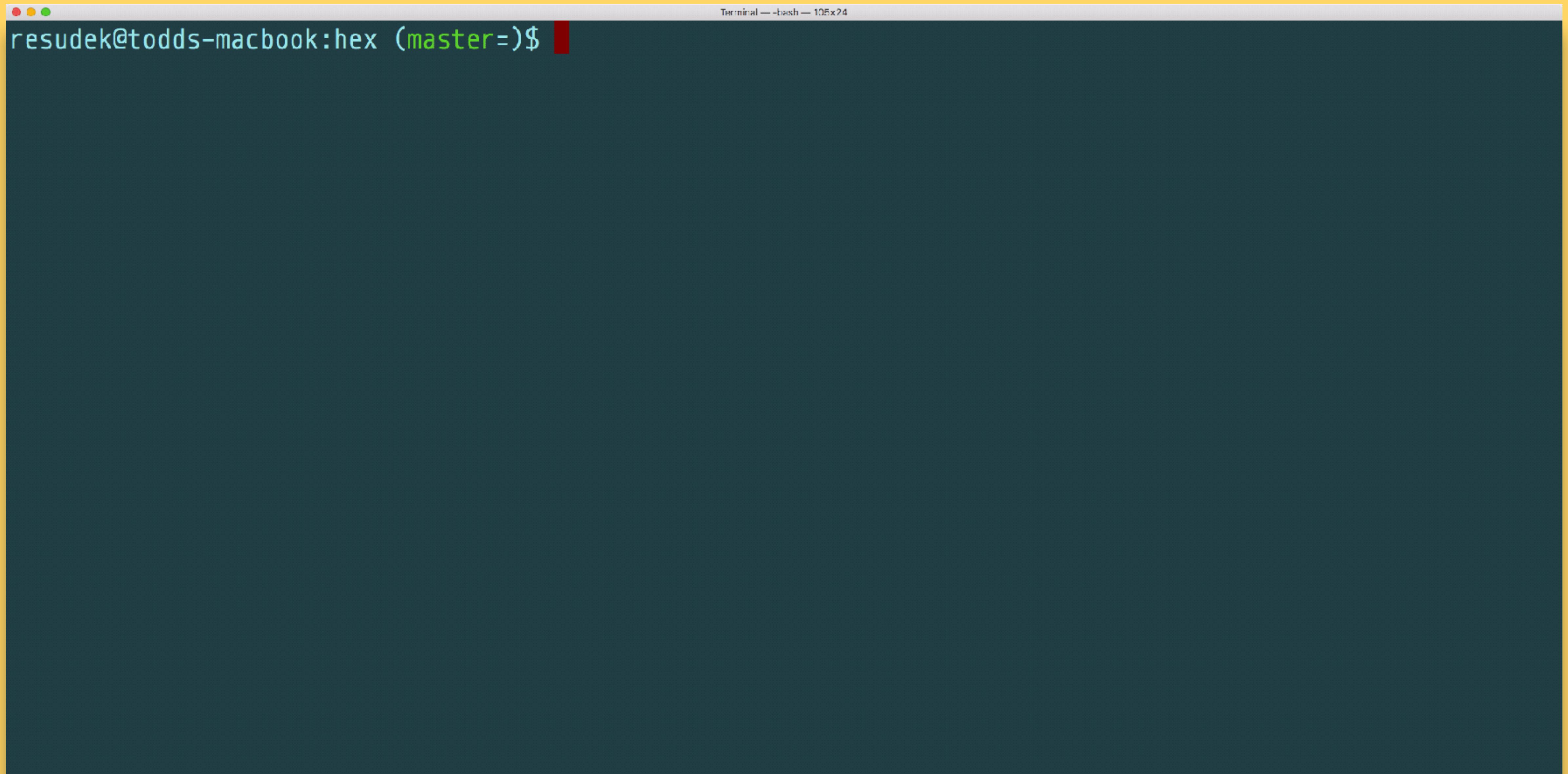
mix hex.organization auth <org>



A screenshot of a macOS Terminal window. The window title is "Terminal — bash — 10.5x24". The prompt shows the user's name "resudek" followed by "todd's-macbook:hex (master=)" and a red terminal cursor. The command "mix hex.organization auth <org>" is typed at the end of the line.

```
resudek@todd's-macbook:hex (master=)$ mix hex.organization auth <org>
```

mix hex.organization deauth <org>



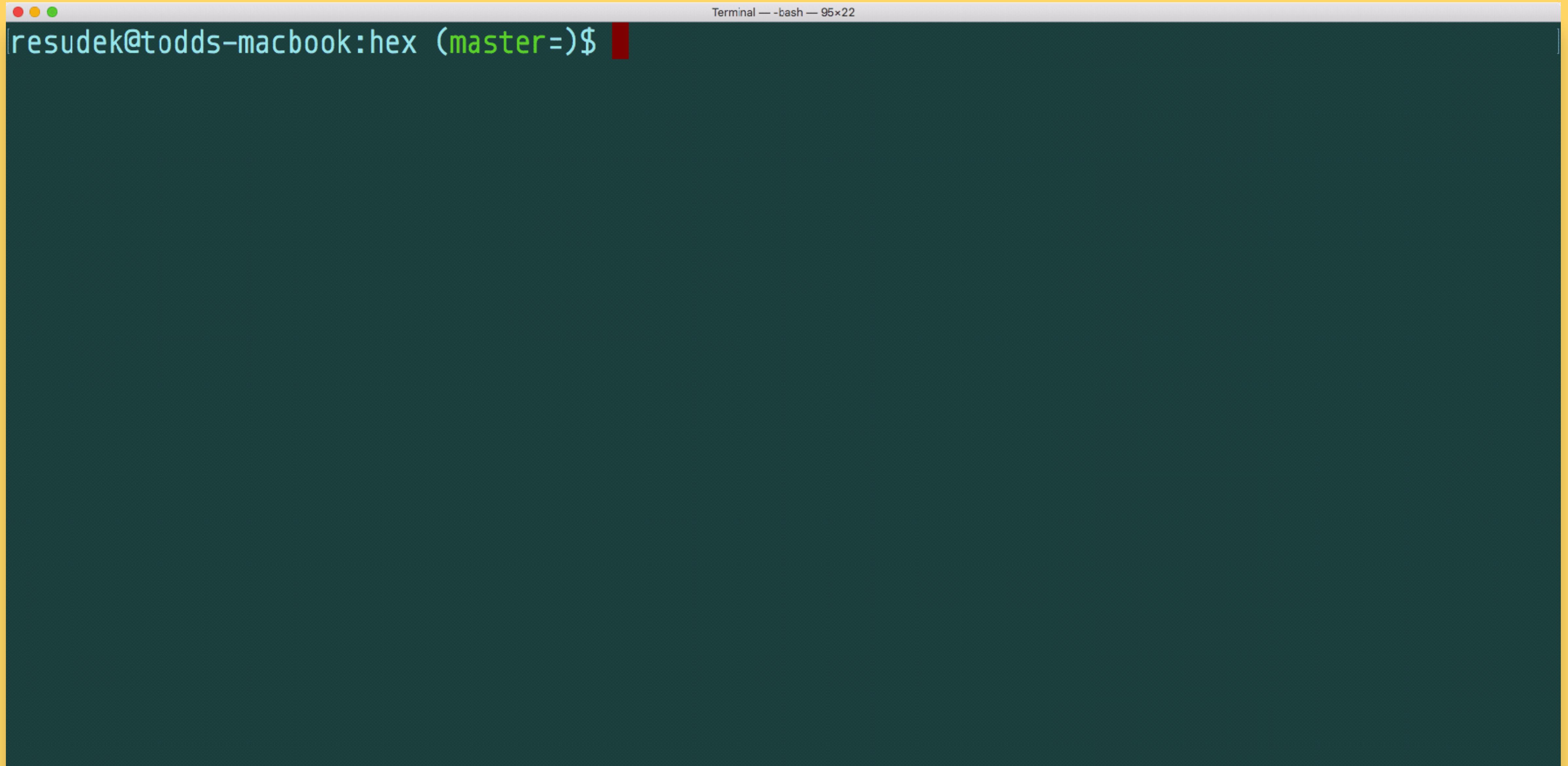
A screenshot of a macOS Terminal window. The title bar reads "Terminal — bash — 105x24". The command "mix hex.organization deauth <org>" is typed at the prompt "resudek@todds-macbook:hex (master=)\$". The terminal has a dark background with light blue text.

```
resudek@todds-macbook:hex (master=)$
```

Configuring CI Tools

Hex allows you to pre-generate keys for use with CI servers or similar systems.

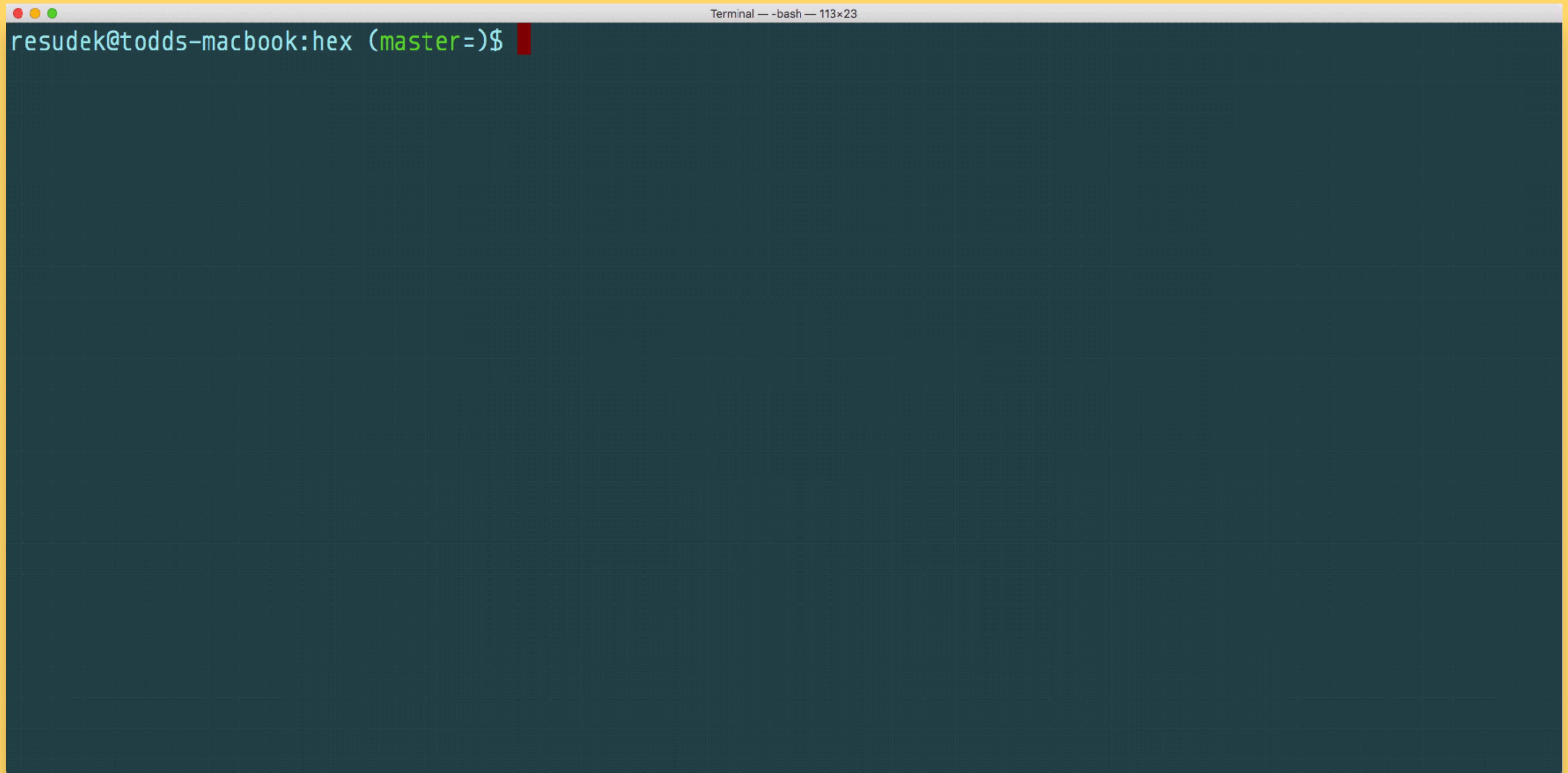
mix hex.organization key <org> generate



A screenshot of a macOS Terminal window. The title bar reads "Terminal — -bash — 95x22". The command "mix hex.organization key <org> generate" is typed at the prompt "resudek@todds-macbook:hex (master=)\$". The terminal has a dark green background and a red cursor bar.

```
resudek@todds-macbook:hex (master=)$ mix hex.organization key <org> generate
```

```
mix hex.organization key <org>  
generate --key-name <name>
```



A screenshot of a Mac OS X terminal window titled "Terminal — -bash — 113x23". The window has three colored window control buttons (red, yellow, green) at the top left. The title bar shows the path "resudek@todds-macbook:hex (master=)\$" and the window size "113x23". The main pane is dark teal with a light gray grid pattern. There is no text or other content in the terminal.

mix hex.organization key <org>
generate --permission <permission>

A screenshot of a Mac OS X terminal window titled "Terminal - bash - 113x23". The window has the characteristic red, yellow, and green title bar buttons. The main pane is dark gray with white text. At the top left, it shows the user's name "resudek" and the host "toddsmacbook" followed by the directory "hex (master)". A red cursor bar is visible at the bottom of the terminal window.

Get Involved!

- ▶ Star or follow the repo on github.
- ▶ Submit an issue.
- ▶ Open a pull request to fix a current issue.

weedmaps



github.com/hexpm/hex