Embracing the Go Standard Library

A Hero's Quest

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Today's agenda

- An introduction
- My standard library manifesto
- A rant
- No cat pictures
- Some code
- Some new stuff you might not have known
- Some old stuff you may have known
- Pop Quiz!
- Some kind of wrap up. Maybe? Maybe Not.
- 5 minutes of esoteric questions for Bryan

whoami:

☁️engineer
@bryanl
@digitalocean

polyglot, lover
of fine hiphop

Why is the Go standard library so important?

Code Reading

patterns in structure

import
const
var
type
constructors
functions

how terse is too terse?

patterns with errors

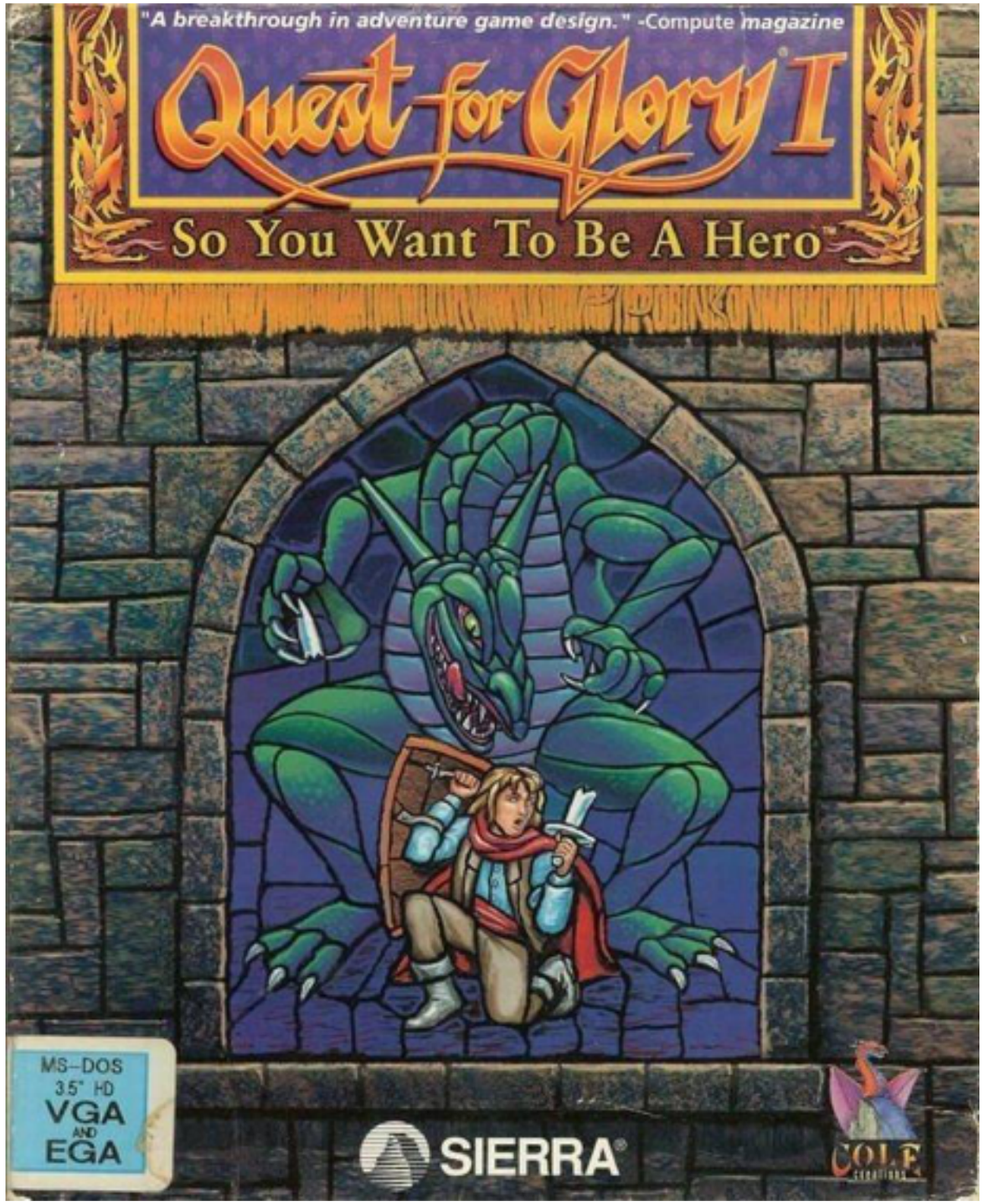
error is an interface

```
type error interface {
    Error() string
}
```

use type switching to differentiate between errors

```
if err != nil {
    return err
}
```

```
if err != nil {
    switch e : err.(type) {
        case *encodingError:
        case *transportError:
        case *gravityError:
        case *omgWTFBBQError:
        default:
    }
}
```



Using the standard library

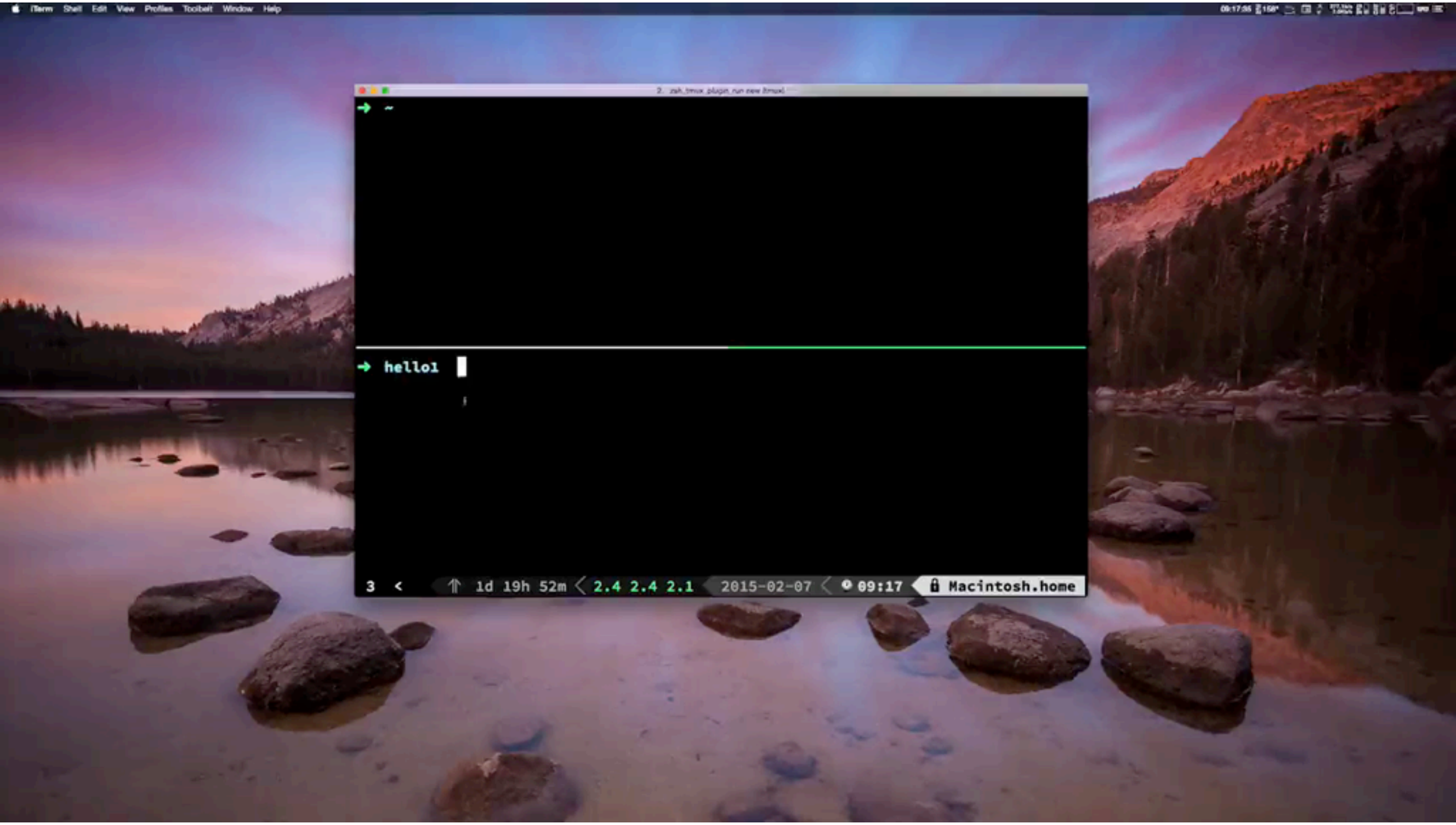
http client

```go
package main

import (
    "fmt"
    "net/http"
)

func handler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprintf(w, "hi!")
}

func main() {
    http.HandleFunc("/", handler)
    http.ListenAndServe(":8080", nil)
}
```


iTerm Shell Edit View Profiles Toolbelt Window Help
~
hello1
3 < 1d 19h 52m 2.4 2.4 2.1 2015-02-07 09:17 Macintosh.home


IT BUILDS? SHIP IT!
WE'LL JUST BLAME ALIENS
TROLL.ME

```go
package main

import (
    "fmt"
    "log"
    "net/http"
)

func stats(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        h.ServeHTTP(w, r)
        log.Println("(request stats)")
    })
}

func hiHandler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprintf(w, "hi!")
}

func main() {
    hi := http.HandlerFunc(hiHandler)
    http.Handle("/", stats(hi))
    http.ListenAndServe(":8080", nil)
}
```

```go
package main

import (
    "fmt"
    "log"
    "net/http"
)

func stats(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        h.ServeHTTP(w, r)
        log.Println("(request stats)")
    })
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    http.Handle("/", stats(hi))
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package main

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    "fmt"
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        h.ServeHTTP(w, r)
        log.Println("(request stats)")
    })
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func hiHandler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprintf(w, "hi!")
}

func main() {
    hi := http.HandlerFunc(hiHandler)
    http.Handle("/", stats(hi))
    http.ListenAndServe(":8080", nil)
}
```

```go
package main

import (
    "fmt"
    "log"
    "net/http"
)

func stats(h http.Handler) http.Handler {
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        h.ServeHTTP(w, r)
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    })
}

func hiHandler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprintf(w, "hi!")
}

func main() {
    hi := http.HandlerFunc(hiHandler)
    http.Handle("/", stats(hi))
    http.ListenAndServe(":8080", nil)
}
```

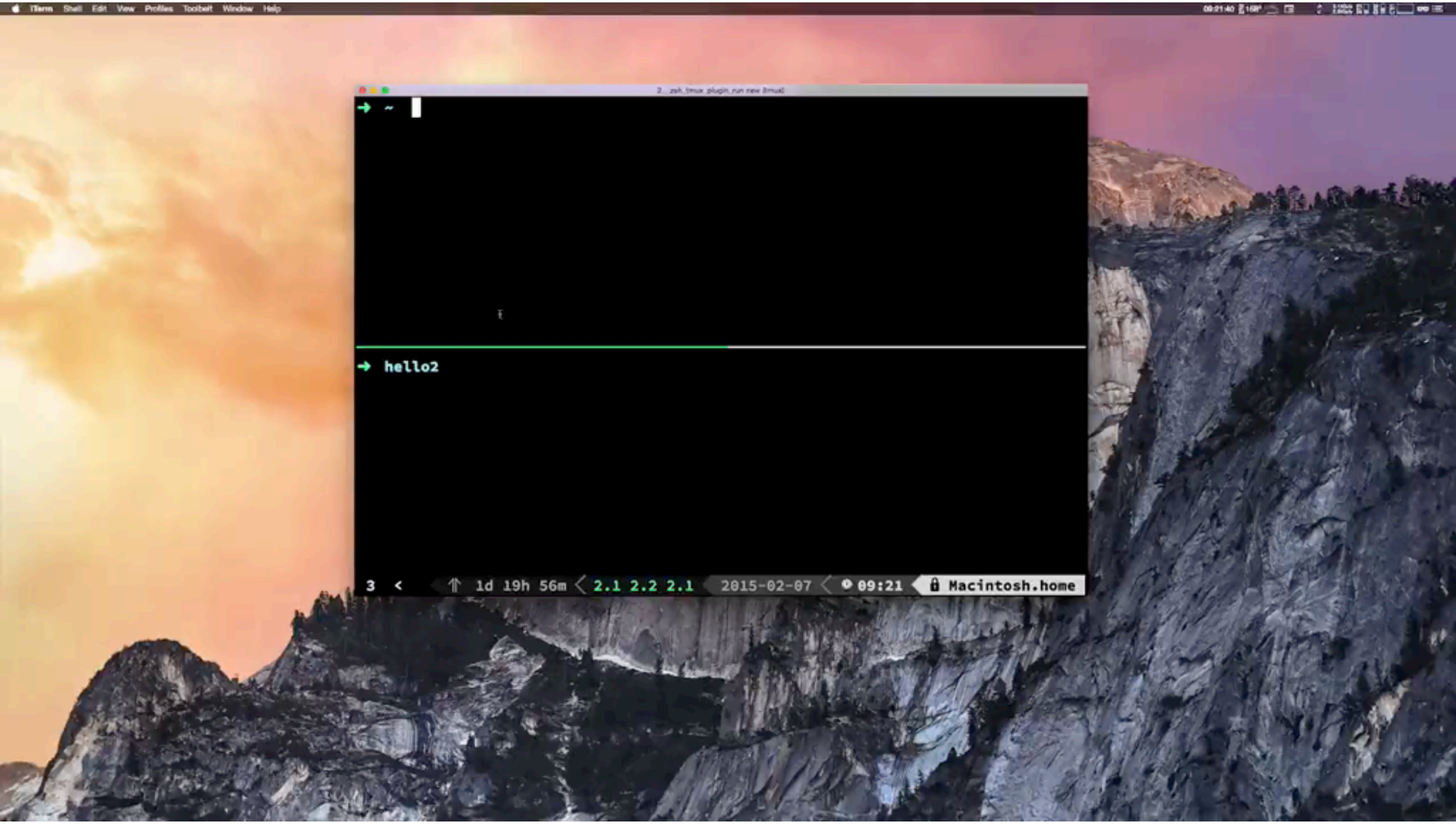
iTerm Shell Edit View Profiles Toolbelt Window Help
2. zsh tmux plugin run new (tmux)
~
hello2
3 < 1d 19h 56m 2.1 2.2 2.1 2015-02-07 09:21 Macintosh.home

```
func main() {
    hi := http.HandlerFunc(hiHandler)
    http.Handle("/", m1(m2(m3(m4(m5(m6(m7(m8(m9(hi)))))))))
}
```

```
type app struct{ handler http.Handler }
type handler func(http.Handler) http.Handler

func newApp(h http.Handler) *app {
    return &app{handler: h}
}

func (a *app) middleware(h handler) {
    a.handler = h(a.handler)
}
```

```
func (a *app) ServeHTTP(w http.ResponseWriter, r *http.Request) {
    a.handler.ServeHTTP(w, r)
}
```

```go
type app struct{ handler http.Handler }
type handler func(http.Handler) http.Handler

func newApp(h http.Handler) *app {
    return &app{handler: h}
}

func (a *app) middleware(h handler) {
    a.handler = h(a.handler)
}

func (a *app) ServeHTTP(w http.ResponseWriter, r *http.Request) {
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}
```

```
type app struct{ handler http.Handler }
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func newApp(h http.Handler) *app {
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}

func (a *app) middleware(h handler) {
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}

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```
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type handler func(http.Handler) http.Handler

func newApp(h http.Handler) *app {
    return &app{handler: h}
}

func (a *app) middleware(h handler) {
    a.handler = h(a.handler)
}
```

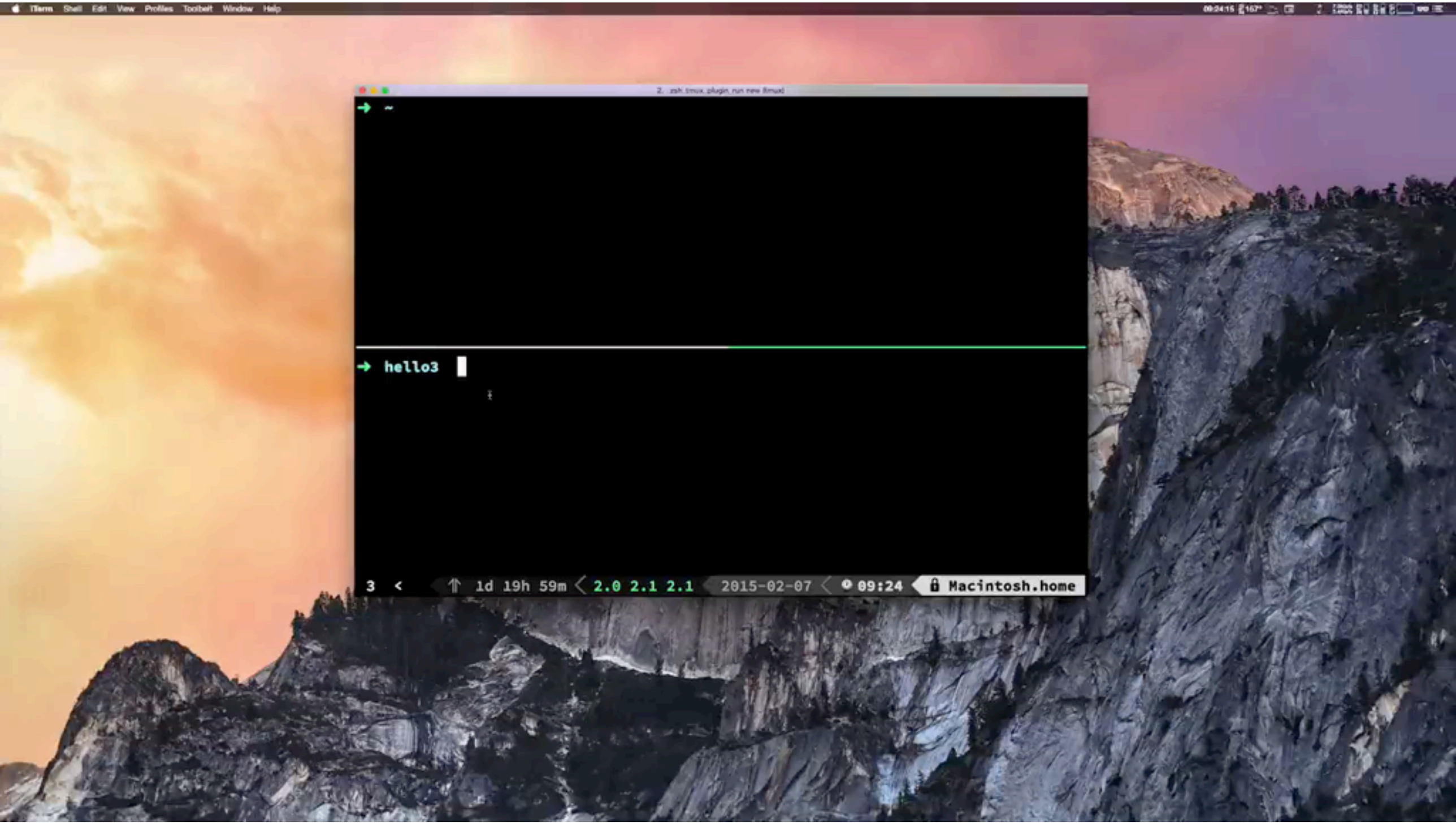
```
func (a *app) ServeHTTP(w http.ResponseWriter, r *http.Request) {
    a.handler.ServeHTTP(w, r)
}
```

```
func auth(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        log.Println("(doing auth)")
        h.ServeHTTP(w, r)
    })
}
```

```
func stats(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        h.ServeHTTP(w, r)
        log.Println("(request stats)")
    })
}
```

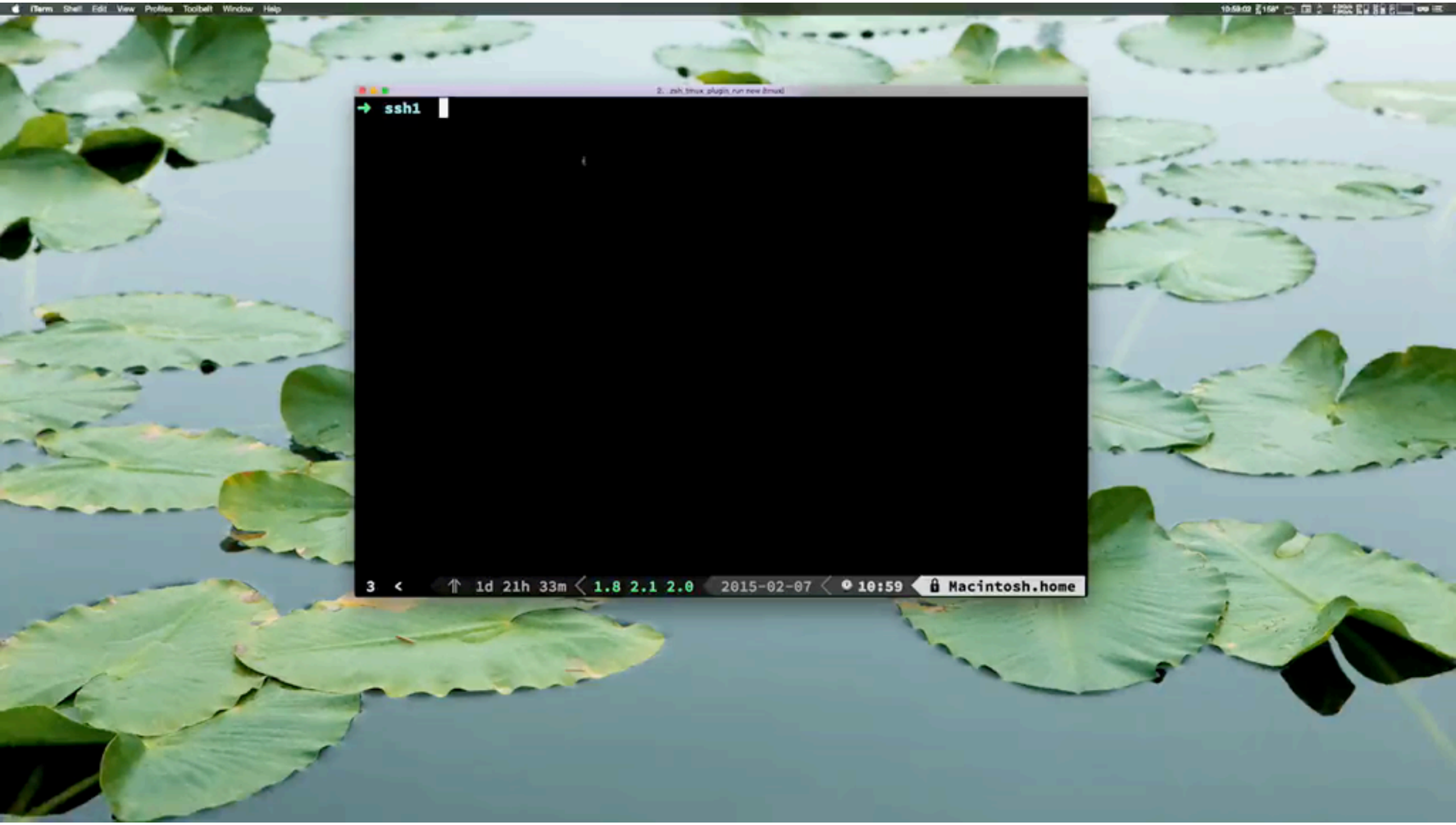
```go
func auth(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        log.Println("(doing auth)")
        h.ServeHTTP(w, r)
    })
}

func stats(h http.Handler) http.Handler {
    return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
        h.ServeHTTP(w, r)
        log.Println("(request stats)")
    })
}
```

```
func hiHandler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprintf(w, "hi!")
}

func main() {
    hi := newApp(http.HandlerFunc(hiHandler))
    hi.middleware(auth)
    hi.middleware(stats)

    http.Handle("/", hi)
    http.ListenAndServe(":8080", nil)
}
```


iTerm Shell Edit View Profiles Toolbelt Window Help
2. zsh tmux plugin run new $tmux
~
hello3
3 < 1d 19h 59m 2.0 2.1 2.1 2015-02-07 09:24 Macintosh.home

building a ssh client

```go
package main

import (
    "fmt"
    "log"
    "os/exec"
)

func main() {
    output, err := exec.Command("ssh",
        "root@104.131.9.72",
        "hostname").Output()
    if err != nil {
        log.Fatalf("run: %v", err)
    }

    fmt.Println(string(output))
}
```

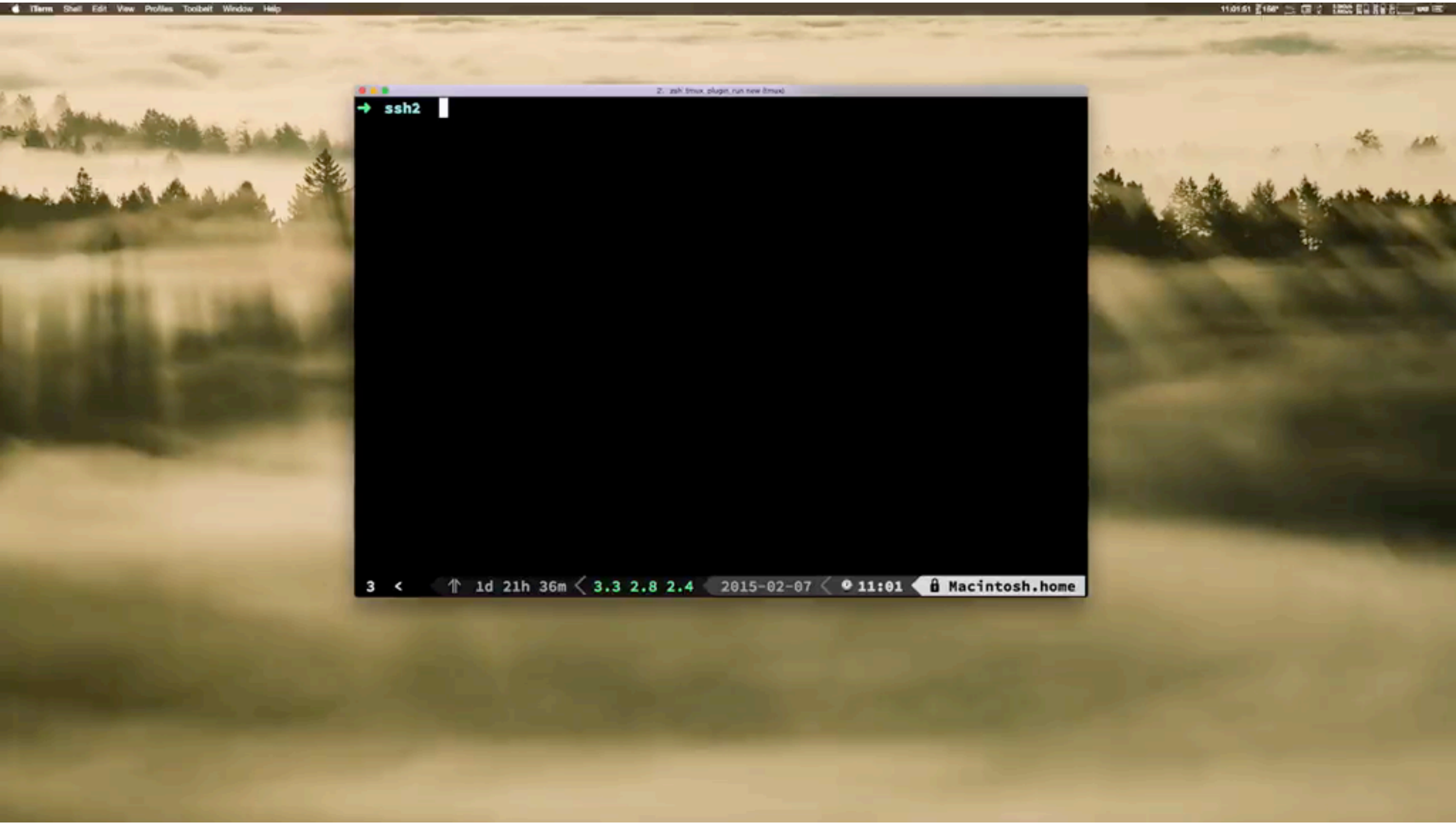

iTerm Shell Edit View Profiles Toolbelt Window Help
2. zsh tmux plugin run new tmux
➜ ssh1
3 < 1d 21h 33m 1.8 2.1 2.0 2015-02-07 10:59 Macintosh.home

```go
func parseKey() (ssh.Signer, error) {
    b, err := ioutil.ReadFile(os.Getenv("KEY_PATH"))
    if err != nil {
        return nil, fmt.Errorf("load private key: %v", err)
    }

    key, err := ssh.ParsePrivateKey(b)
    if err != nil {
        return nil, fmt.Errorf("parse private key: %v", err)
    }

    return key, nil
}
```

```
config := &ssh.ClientConfig{
    User: "root",
    Auth: []ssh.AuthMethod{
        ssh.PublicKeys(signer),
    },
}
```

```
client, err := ssh.Dial("tcp", "104.131.9.72:22", config)
if err != nil {
    log.Fatalf("dial: %v", err)
}

sess, err := client.NewSession()
if err != nil {
    log.Fatalf("create session: %v", err)
}

defer sess.Close()
```

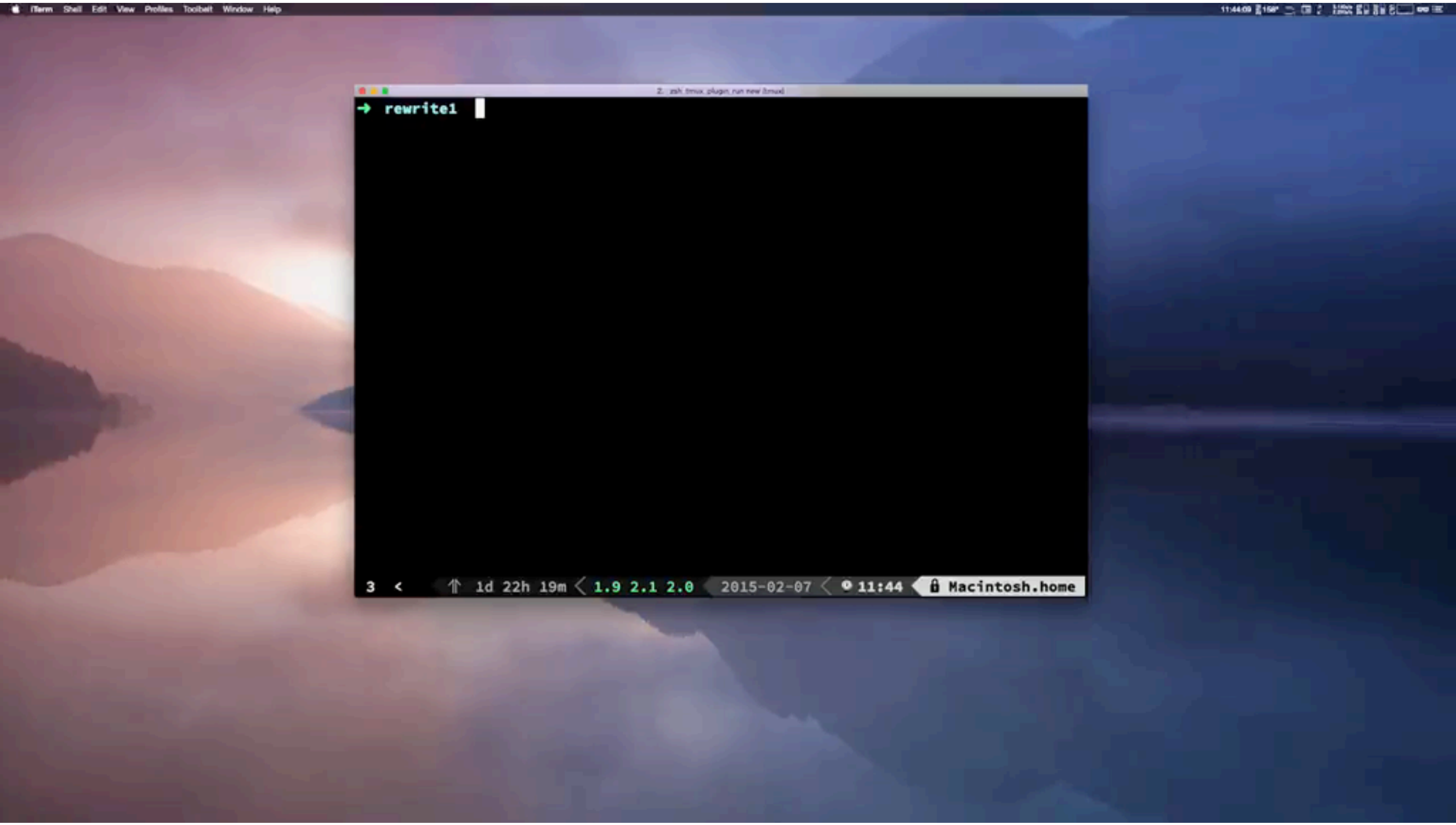
```
b := bytes.Buffer{}
sess.Stdout = &b
if err := sess.Run("hostname"); err != nil {
    log.Fatalf("run command: %v", err)
}

fmt.Println(b.String())
```


iTerm Shell Edit View Profiles Toolbelt Window Help
11:01:51
2: zsh tmux_plugin_run new (tmux)
➜ ssh2
3 < 1d 21h 36m 3.3 2.8 2.4 2015-02-07 11:01 Macintosh.home

code rewriting

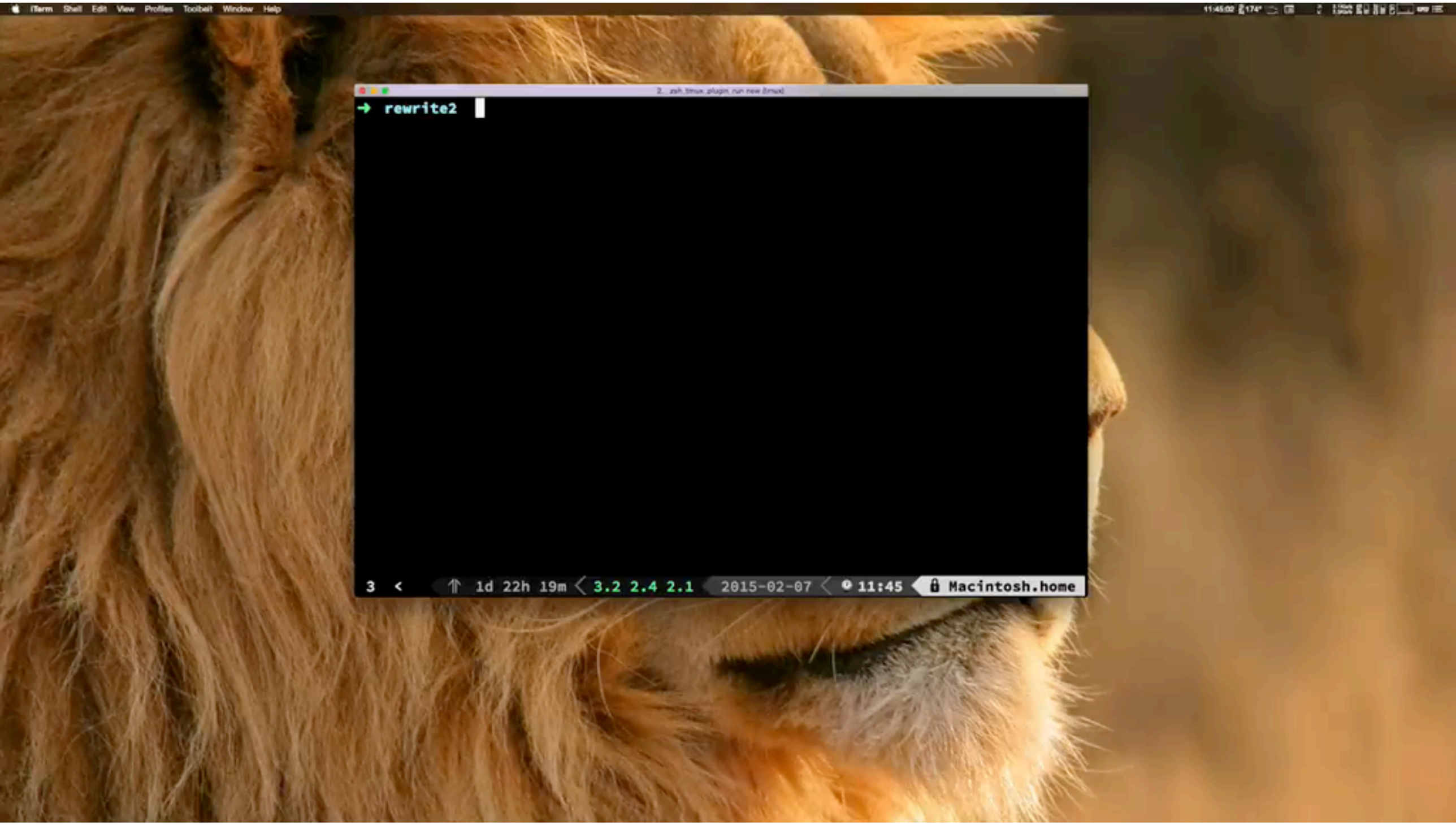
```
var src = `
// Package main is main package.
package main

// we need the fmt
import "fmt"

// main is main
func main() {
    // this prints hello, world
    fmt.Println("hello, world") // all done!
}

`
```

```
func main() {
    fset := token.NewFileSet()
    f, err := parser.ParseFile(fset, "", src,
        parser.ParseComments)
    if err != nil {
        log.Fatalf("ParseFile: %v", err)
    }

    for _, c := range f.Comments {
        for _, l := range c.List {
            fmt.Printf("%+v: %s\n", l.Slash, l.Text)
        }
    }
}
```

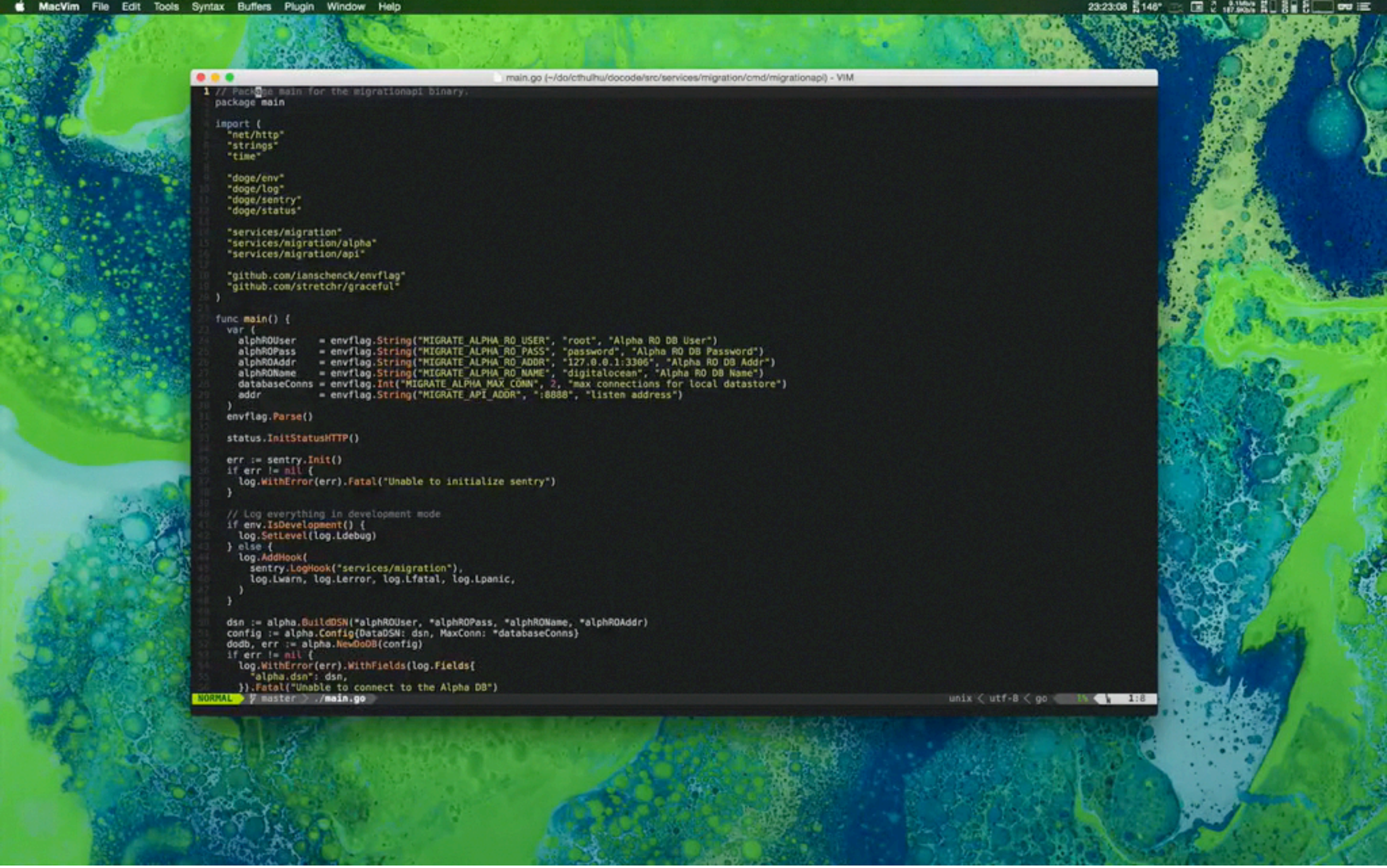

iTerm Shell Edit View Profiles Toolbelt Window Help
11:44:09
2. zsh: tmux -plugin_run new [tmux]
➜ rewrite1
3 < 1d 22h 19m 1.9 2.1 2.0 2015-02-07 11:44 Macintosh.home

```
var src = `
// Package main is main package.
package main

// we need the fmt
import "fmt"

// main is main
func main() {
    // this prints hello, world
    fmt.Println("hello, world") // all done!
}

`
```

```go
func main() {
    fset := token.NewFileSet()
    f, err := parser.ParseFile(fset, "", src,
        parser.ParseComments)
    if err != nil {
        log.Fatalf("ParseFile: %v", err)
    }

    f.Comments = nil

    var b bytes.Buffer
    if err := format.Node(&b, fset, f); err != nil {
        log.Fatalf("Format: %v", err)
    }

    fmt.Println(b.String())
}
```


iTerm Shell Edit View Profiles Toolbelt Window Help
2. zsh tmux_plugin_run new (tmux)
rewrite2
3 < 1d 22h 19m 3.2 2.4 2.1 2015-02-07 11:45 Macintosh.home

but wait, there’s more!



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Don’t underestimate the tooling you have

Don’t forget about the new stuff

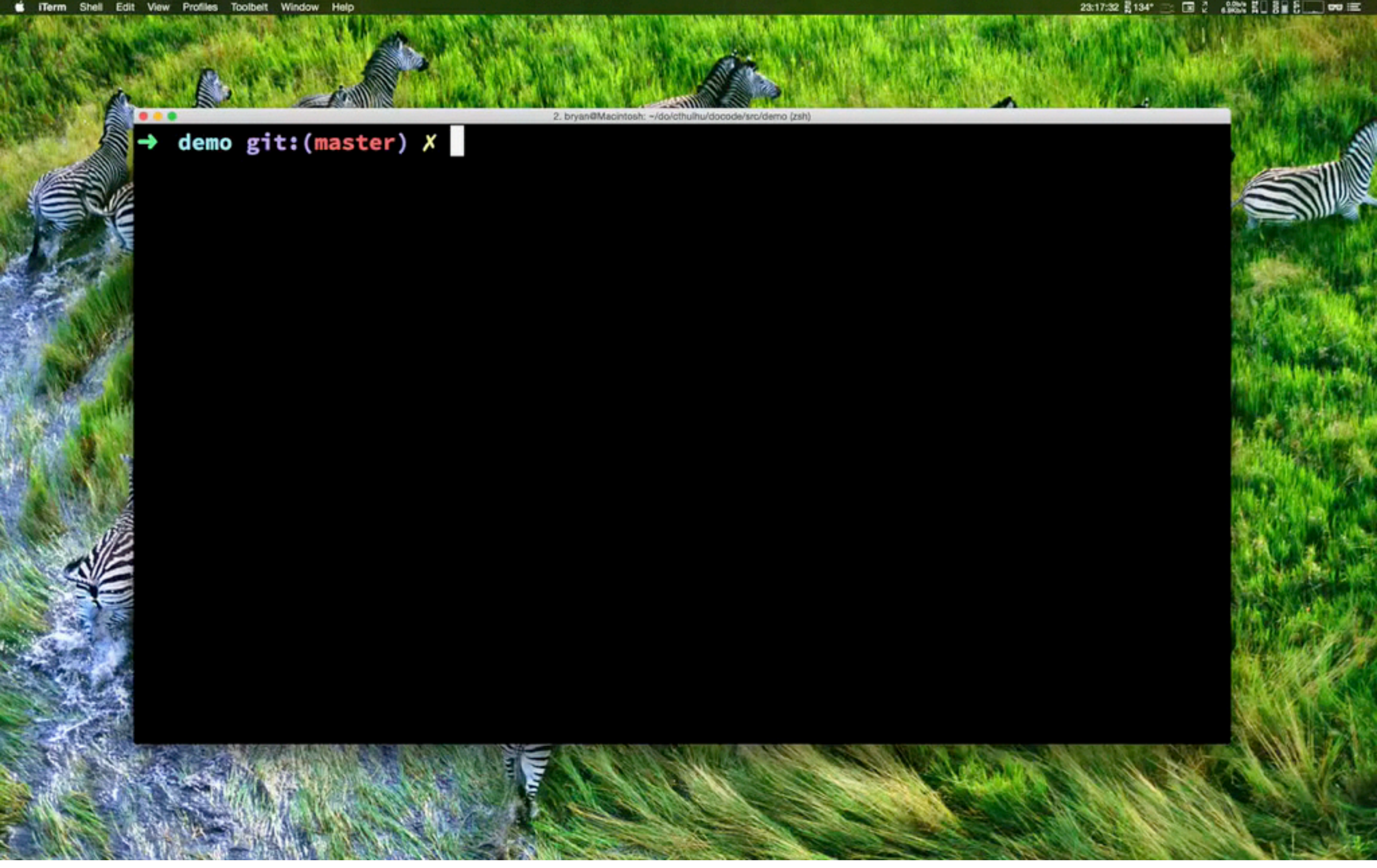

So You Want To Be A Hero [score 13 of 500]
Hero Status
HP
SP
Enemy Status
HP

TestMain

```
func TestMain(m *testing.Main) { os.Exit(m.Run()) }
```

```go
func TestMain(m *testing.Main) {
    setup()
    exitCode := m.Run()
    shutdown()
    os.Exit(exitCode)
}
```

Code generation


iTerm Shell Edit View Profiles Toolbelt Window Help
23:17:32
2. bryan@Macintosh: ~/do/cthulhu/docode/src/demo (zsh)
➜ demo git:(master) ✗


Quest for Glory I
[Score: 21 of 500]
Hero Status
HP
SP
MP
Enemy Status
HP

Go isn’t boring...

*Go could be compared to your **soulmate**. It understands you as a **developer**, but also expects you to understand it as a **programming language**. Go will love you as well as any programming language can by offering **simple constructs** and a **stable standard library**. It also isn't difficult to learn. It will push back when you try to bend its boundaries, but that's a good thing. **You don't want your programming language partner to allow you to bend it to your will.***

http://blil.es/go-is-not-boring/

productivity over features

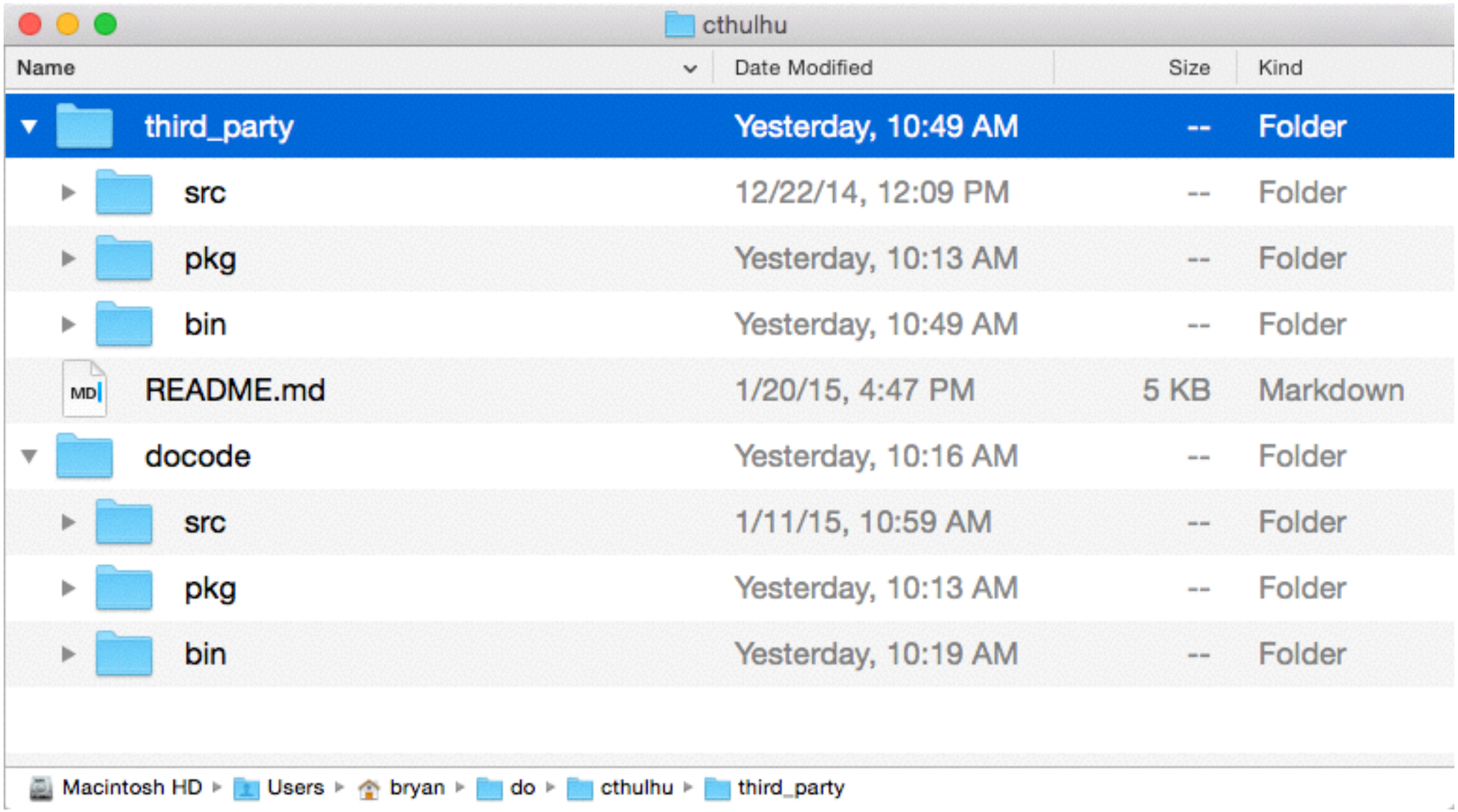
Lessons for neophytes...

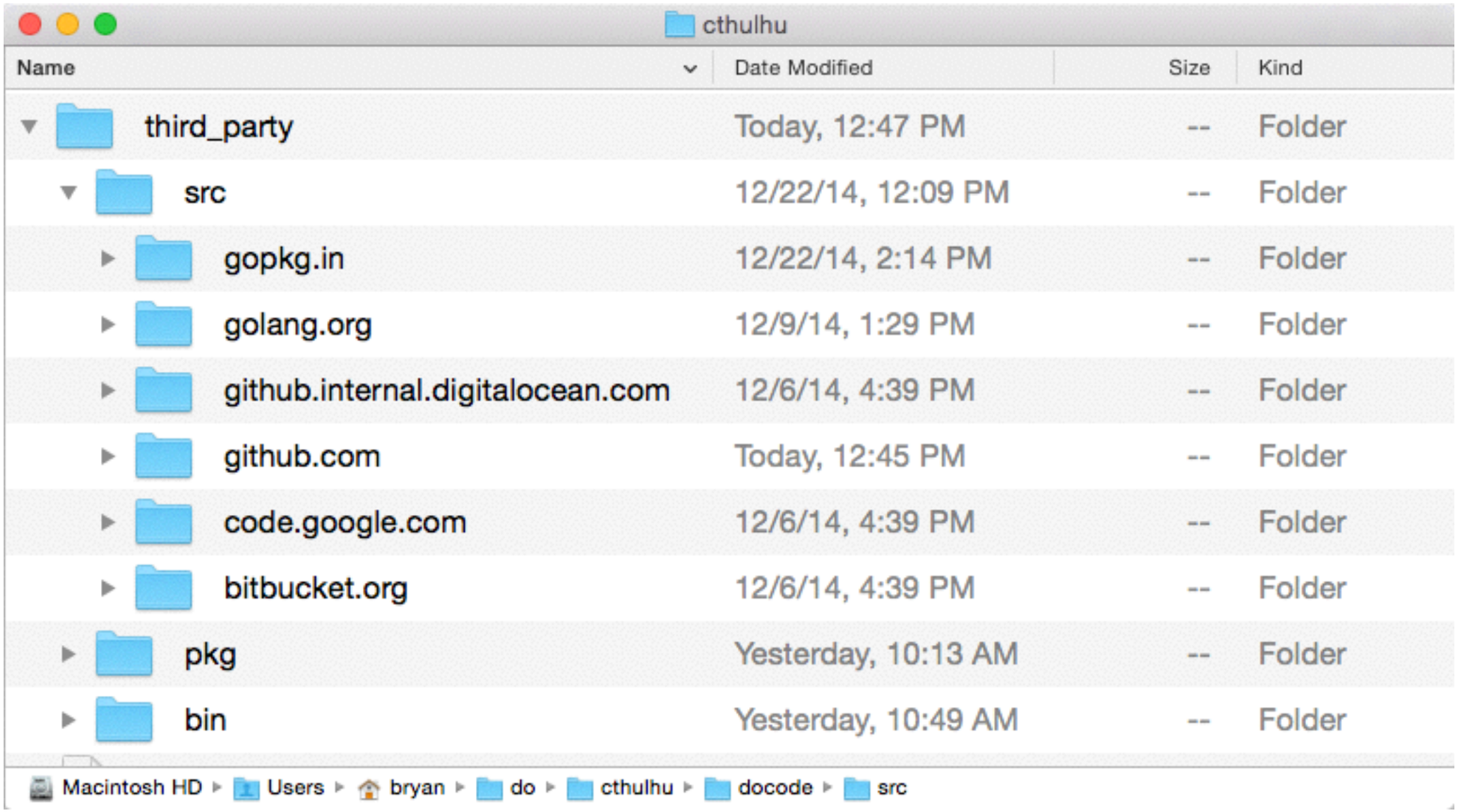

THIS IS MY
RIFLE
THERE ARE MANY OTHERS LIKE IT,
BUT THIS ONE IS MINE.
MY RIFLE IS MY BEST FRIEND.
IT IS MY LIFE.

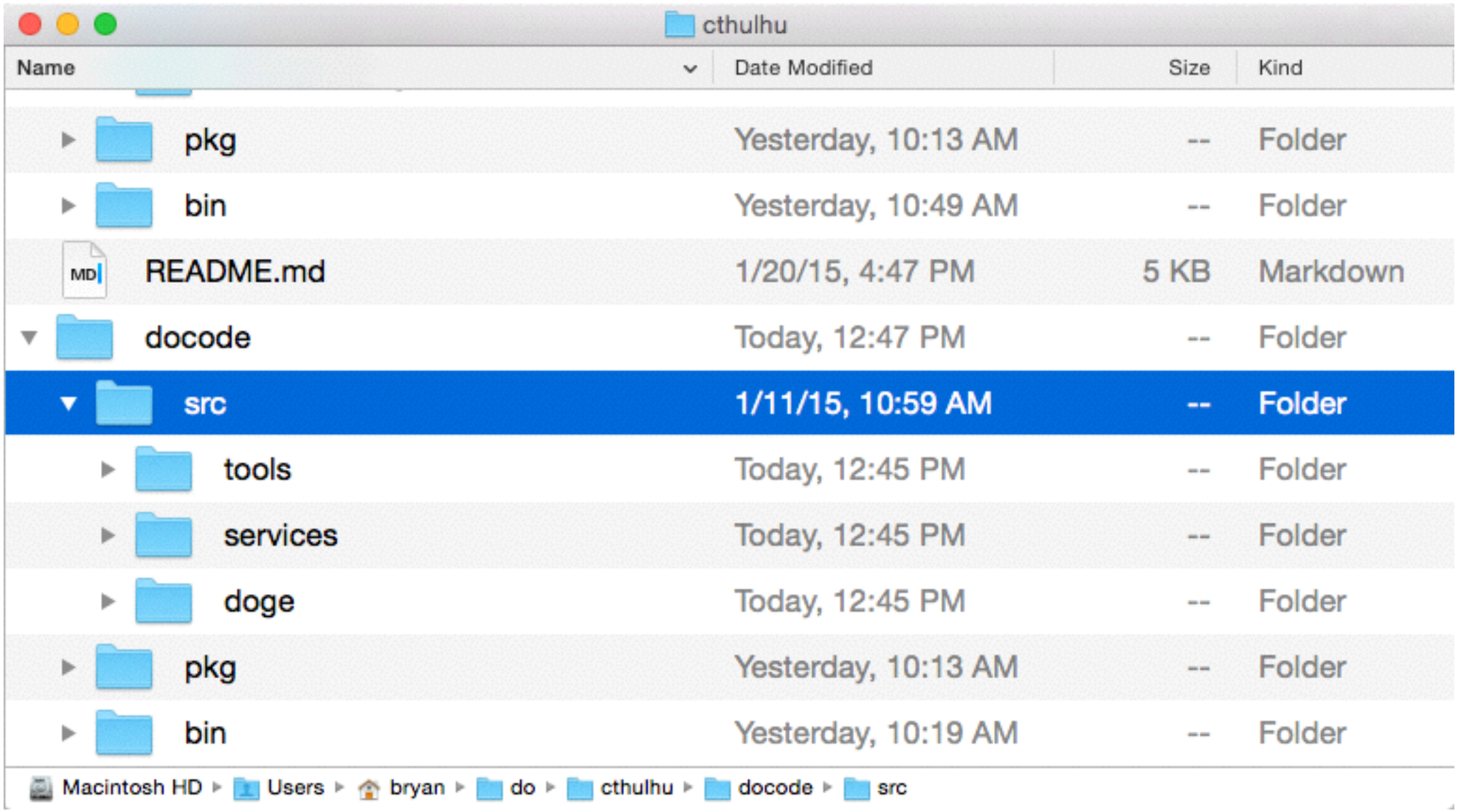
editing environment

shell environment

2 minutes on how DigitalOcean does Go


cthulhu
Name
Date Modified
Size
Kind
third_party
Yesterday, 10:49 AM
--
Folder
src
12/22/14, 12:09 PM
--
Folder
pkg
Yesterday, 10:13 AM
--
Folder
bin
Yesterday, 10:49 AM
--
Folder
README.md
1/20/15, 4:47 PM
5 KB
Markdown
docode
Yesterday, 10:16 AM
--
Folder
src
1/11/15, 10:59 AM
--
Folder
pkg
Yesterday, 10:13 AM
--
Folder
bin
Yesterday, 10:19 AM
--
Folder
Macintosh HD
Users
bryan
do
cthulhu
third_party

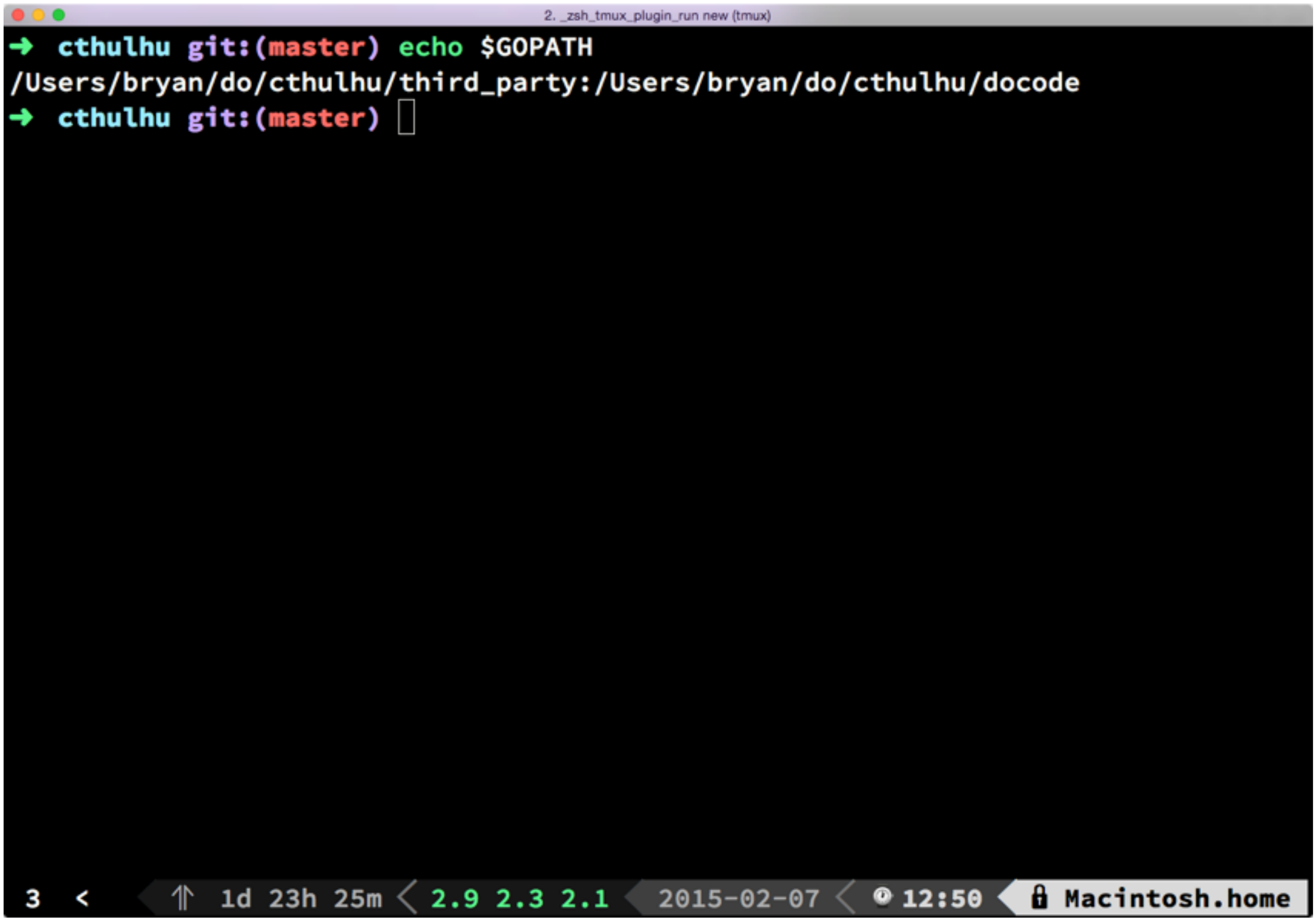

cthulhu
Name
Date Modified
Size
Kind
third_party
Today, 12:47 PM
--
Folder
src
12/22/14, 12:09 PM
--
Folder
gopkg.in
12/22/14, 2:14 PM
--
Folder
golang.org
12/9/14, 1:29 PM
--
Folder
github.internal.digitalocean.com
12/6/14, 4:39 PM
--
Folder
github.com
Today, 12:45 PM
--
Folder
code.google.com
12/6/14, 4:39 PM
--
Folder
bitbucket.org
12/6/14, 4:39 PM
--
Folder
pkg
Yesterday, 10:13 AM
--
Folder
bin
Yesterday, 10:49 AM
--
Folder
Macintosh HD
Users
bryan
do
cthulhu
docode
src


cthulhu
Name
Date Modified
Size
Kind
pkg
Yesterday, 10:13 AM
--
Folder
bin
Yesterday, 10:49 AM
--
Folder
README.md
1/20/15, 4:47 PM
5 KB
Markdown
docode
Today, 12:47 PM
--
Folder
src
1/11/15, 10:59 AM
--
Folder
tools
Today, 12:45 PM
--
Folder
services
Today, 12:45 PM
--
Folder
doge
Today, 12:45 PM
--
Folder
pkg
Yesterday, 10:13 AM
--
Folder
bin
Yesterday, 10:19 AM
--
Folder
Macintosh HD
Users
bryan
do
cthulhu
docode
src

```
#!/bin/bash
SCRIPT=`python -c "import os,sys;
print(os.path.realpath(os.path.expanduser(sy
s.argv[1])))" "${0}"`
CTHULHU_DIR=$(dirname $SCRIPT)

DOCODE=$CTHULHU_DIR/docode
THIRDPARTY=$CTHULHU_DIR/third_party

export TEST_DB_USER=root
export TEST_DB_ADDR=127.0.0.1:3306
export GOPATH="$THIRDPARTY:$DOCODE"
export PATH="$DOCODE/bin:$THIRDPARTY/bin:
$PATH"
```


2. _zsh_tmux_plugin_run new (tmux)
➜ cthulhu git:(master) echo $GOPATH
/Users/bryan/do/cthulhu/third_party:/Users/bryan/do/cthulhu/docode
➜ cthulhu git:(master)
3 < 1d 23h 25m 2.9 2.3 2.1 2015-02-07 12:50 Macintosh.home

Back to the Standard Library ...

It isn’t all roses

```
input := "May 31, 2015 17:35"
format := "Jan 2, 2006 15:04"
t, err := time.Parse(format, input)
```

```
1/2 3:04:05 2006 -0700
```

1/2 3:04:05 2006 -0700

Month

1

01

Jan

January

1/2 3:04:05 2006 -0700

Day of month

2

02

1/2 3:04:05 2006 -0700

Hour

3

15

1/2 3:**04**:05 2006 -0700

Minute
04

1/2 3:04:05 2006 -0700

Seconds

05

1/2 3:04:05 2006 -0700

Year
06
2006
Jan
January

1/2 3:04:05 2006 -0700

Time Zone

-0700

if it hurts, don’t do it

except for checking errors. always
check for errors.

https://github.com/kisielk/errcheck

Finally!


So You've Become A Hero!
[Score: 504 of 500]

Go and download Quest for Glory!

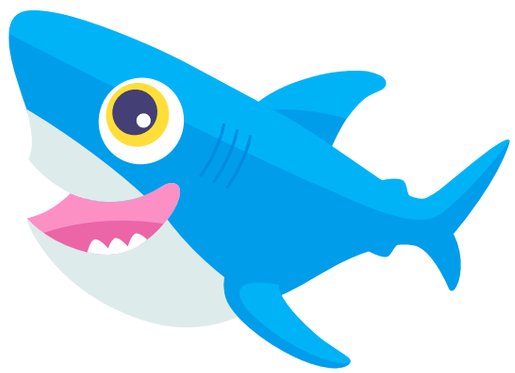
Go and ~~download~~ Quest for Glory!

Go and ~~steal~~
Quest for Glory!

Go and buy
Quest for Glory!

PS.

Consider the standard library as an adequate solution, not necessarily a highly performant one.



The End.