```go
package main

import "fmt"

func main() {
	fmt.Println("Hello, World!")
}
```

```go
package main

import (
	"fmt"
	"os"
)

func main() {
	argsAll := os.Args
	argsMinusExePath := os.Args[1:]

	arg3 := os.Args[3]
	fmt.Println(argsAll)
	fmt.Println(argsMinusExePath)
	fmt.Println(arg3)
}
```

Golang

a humble sales pitch to the holdouts

K. Heller

latest slides: https://github.com/pestophagous/works#golang-pitch

Backstory

sales pitch to the skeptics

sales pitch to the curmudgeons

sales pitch to the battle worn, battle weary, fad-resisting graybeards

(also plenty of content for enthusiastic polyglots)

```go
package main

import "fmt"

func main() {
	fmt.Println("Hello, World!")
}
```

```go
package main

import (
	"fmt"
	"os"
)

func main() {
	argsAll := os.Args
	argsMinusExePath := os.Args[1:]

	arg3 := os.Args[3]
	fmt.Println(argsAll)
	fmt.Println(argsMinusExePath)
	fmt.Println(arg3)
}
```

Backstory

Backstory

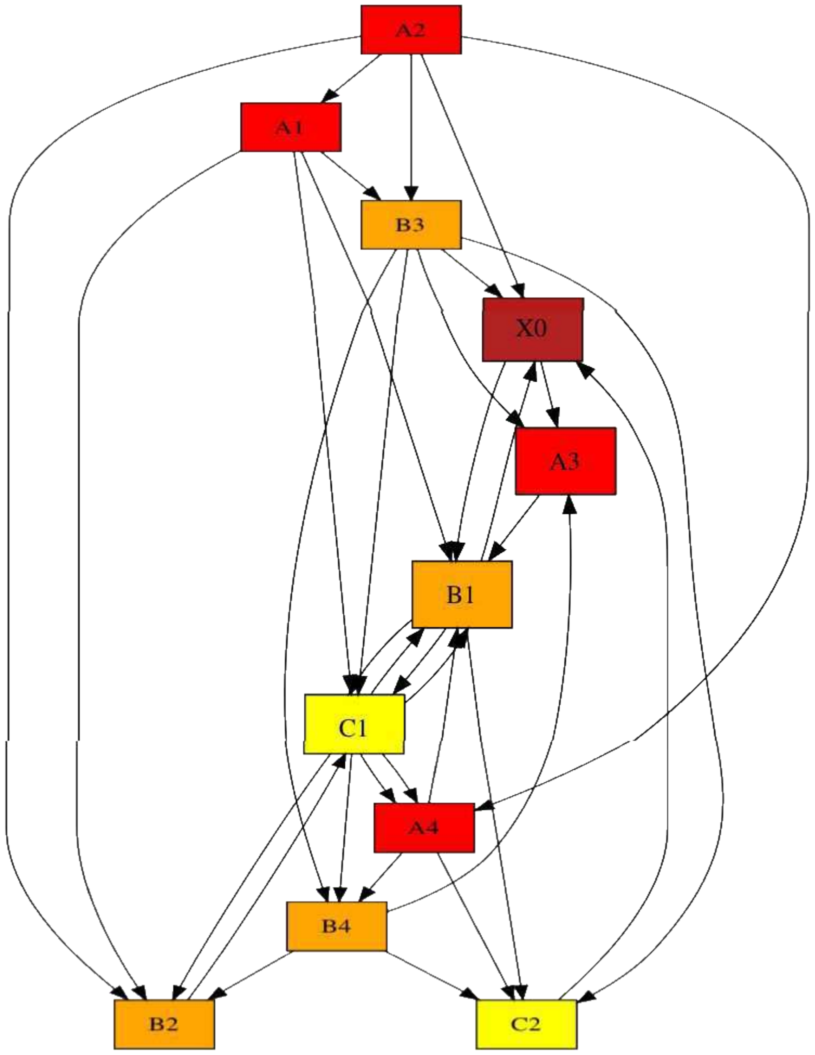
```
#if !defined(NDEBUG)
#define BOOST_MULTI_INDEX_ENABLE_INVARIANT_CHE
#define BOOST_MULTI_INDEX_ENABLE_SAFE_MODE
#endif

#include <boost/multi_index_container.hpp>
#include <boost/multi_index/member.hpp>

using boost::multi_index_container;
using namespace boost::multi_index;
typedef multi_index_container<
  car_model,
  indexed_by<
    ordered_uniq

tag<model>,BOOST
model)
    >,
    ordered_non_unique<
      tag<manufacturer>,
      key_from_key<
        BOOST_MULTI_INDEX_MEMBER(car_manufacturer,const
std::string,name),
        BOOST_MULTI_INDEX_MEMBER(
          car_model,const car_manufacturer *,manufacturer)
      >
    >,
    ordered_non_unique<

tag<price>,BOOST_MULTI_INDEX_MEMBER(car_model,int,price)
    >
  >
> car_table;

int excerpted_code()
```

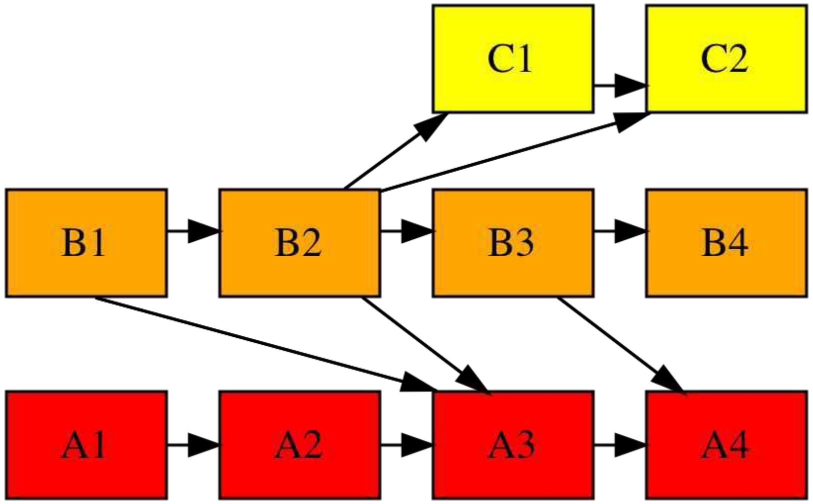
```
    ordered_non_unique<
      <manufacturer>,
      _from_key<
        OST_MULTI_INDEX_MEMBER(car_manufacturer,const
std::string,name),
        BOOST_MULTI_INDEX_MEMBER(
          car_model,const car_manufacturer *,manufacturer)
      >
    >,
    ordered_non_unique<

tag<price>,BOOST_MULTI_INDEX_MEMBER(car_model,int,price)
    >
```

http://www.boost.org/doc/libs/1_63_0/libs/multi_index/example/complex_structs.cpp

```
int excerpted_code()
{
  const car_manufacturer * cadillac=
    &*(cmt.insert(car_manufacturer("Cadillac")).first);
  const car_manufacturer * ford     =
    &*(cmt.insert(car_manufacturer("Ford")).first);

  car_table ct;
  ct.insert(car_model("XLR",cadillac,76200));

    car_table_manufacturer_view::iterator ictmv0,ictmv1;
    std::cout<<"listing by method 2"<<std::endl;
    while(ictmv0!=ictmv1){
      std::cout<<**ictmv0;
      ++ictmv0;
    }
    std::cout<<std::endl;

  return 0;
```

What Do I Care About?





latest slides: https://github.com/pestophagous/works#golang-pitch

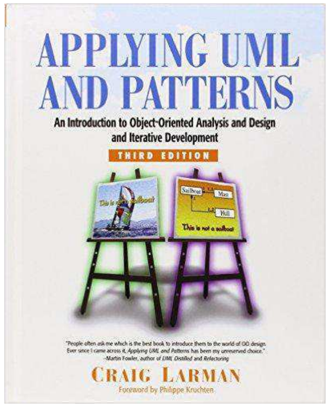
What Do I Care About?

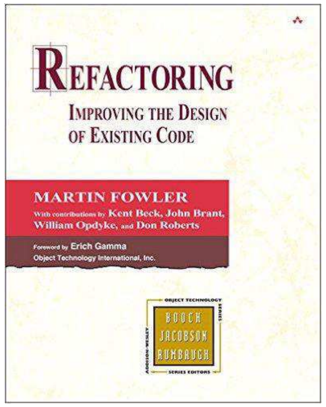
(Bonus: immutability)

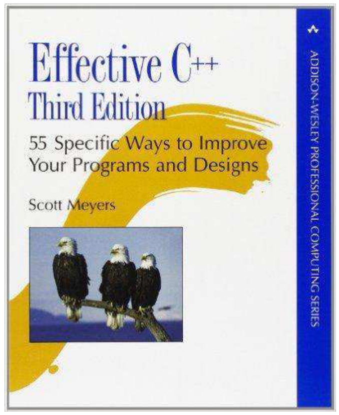
- Multi-Paradigm
  - Procedural
  - Object Oriented
  - Functional Programming (closures, function composition)
- Type Safety (static types, compiler checked)
- Data Hiding
  - Hide subsets of methods within a class (private data)
  - Hide sets of helper classes within a module (export control)

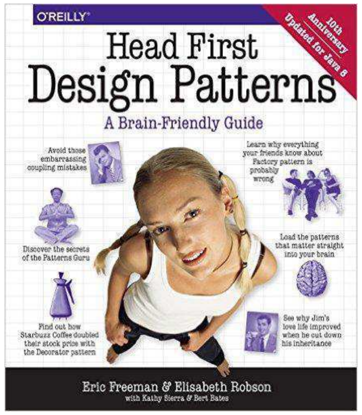
Applying The Tools

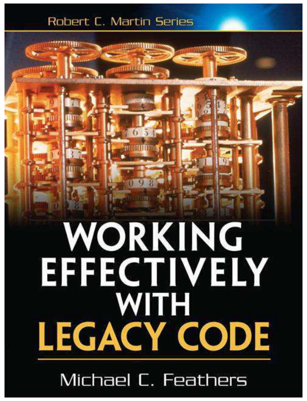
(a talk unto itself...)

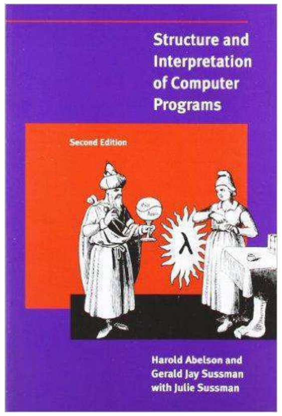

APPLYING UML AND PATTERNS
An Introduction to Object-Oriented Analysis and Design and Iterative Development
THIRD EDITION
CRAIG LARMAN
Foreword by Philippe Kruchten

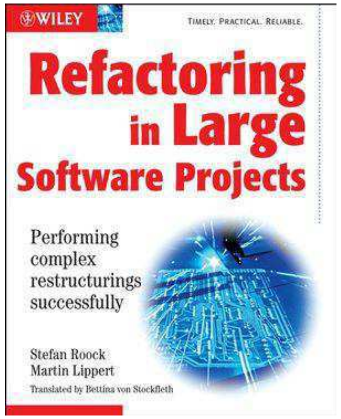

REFACTORING
IMPROVING THE DESIGN OF EXISTING CODE
MARTIN FOWLER
With contributions by Kent Beck, John Brant, William Opdyke, and Don Roberts
Foreword by Erich Gamma
Object Technology International, Inc.
BOOCH JACOBSON RUMBAUGH

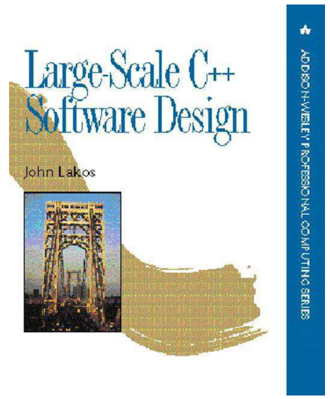

Effective C++
Third Edition
55 Specific Ways to Improve Your Programs and Designs
Scott Meyers
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES


O'REILLY
Head First Design Patterns
A Brain-Friendly Guide
10th Anniversary
Updated for Java 8
Eric Freeman & Elisabeth Robson
with Kathy Sierra & Bert Bates




Structure and Interpretation of Computer Programs
Second Edition
Harold Abelson and Gerald Jay Sussman with Julie Sussman


WILEY
TIMELY. PRACTICAL. RELIABLE.
Refactoring in Large Software Projects
Performing complex restructurings successfully
Stefan Roock
Martin Lippert
Translated by Bettina von Stockfleth


Large-Scale C++ Software Design
John Lakos
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES

(complete book information at end of slide deck)

What Do I Care About?

(Bonus: immutability)

- Multi-Paradigm
  - Procedural
  - Object Oriented
  - Functional Programming
- Type Safety
- Data Hiding
  - Hide subsets of methods within a class (private data)
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Go giveth...

(Bonus: immutability)

- Multi-Paradigm
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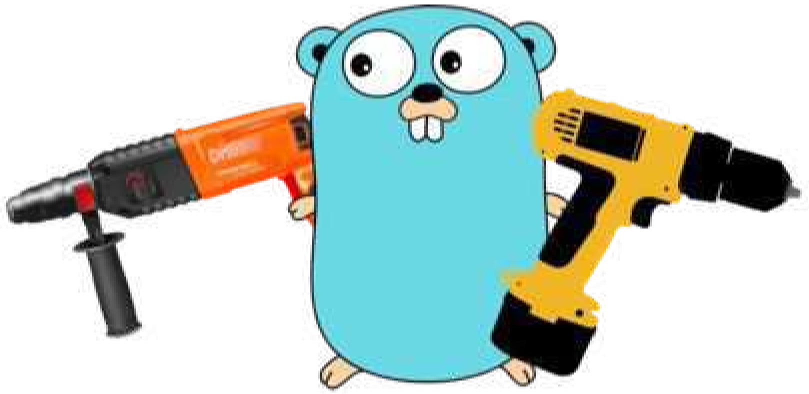


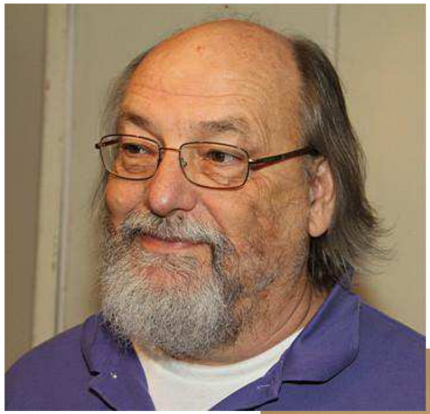
gopher by Takuya Ueda
(https://twitter.com/tenntenn)
based on art by Renee French

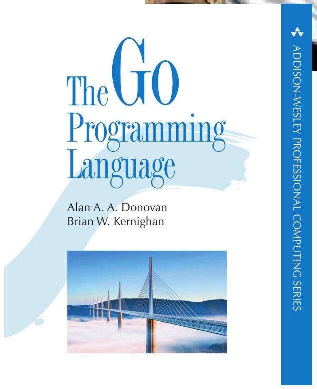
Go taketh away...

Go taketh away...

- tabs versus spaces
- brace-indent style debate
- protected visibility
- compiler warning levels
- overloading
- implementation inheritance
- deep spaghetti inheritance
- composition versus inheritance
- exceptions versus return code
- telescoping constructors
- test harness contortions
- circular module dependencies

Ken Thompson Rob Pike Robert Griesemer




The Go Programming Language
Alan A. A. Donovan
Brian W. Kernighan
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES

The Go Programming Language
by Alan A. A. Donovan,
Brian W. Kernighan

ISBN-10: 0134190440
https://books.google.com/books?id=SJHvCgAAQBAJ

Warm ups...

```go
package main

import (
	"fmt"
	"strings"
)

// HasContent is true if there are any
// non-whitespace characters in the input.
func HasContent(text string) bool {
	text = strings.TrimSpace(text)
	isNotBlank := text != ""
	return isNotBlank
}

func HasAnyContent(lines []string) bool {

	for i := 0; i < len(lines); i++ {
		if HasContent(lines[i]) {
			return true
		}
	}

	return false
}
```

```go
func main() {

	var someBoolean bool = true
	var someString1 string = "text"
	var someInteger int = 32

	fmt.Println("Hello, playground")
	fmt.Println(someBoolean, someString1, someInteger)

	fmt.Println("result of calling HasContent: ", HasContent("  -  "))

	lines := []string{"  ", "   ", ""}
	fmt.Println("calling HasAnyContent: ", HasAnyContent(lines))

	lines = append(lines, " x ")
	fmt.Println("how about now: ", HasAnyContent(lines))
}
```

starting: https://play.golang.org/p/a-z_fg-7YK
finished: https://play.golang.org/p/SlKwc2xBwg

Go giveth...

Type Safety (Compiler Type Checks)

```go
func Salutation(name string, dog bool) string {
	s := fmt.Sprint("To: ", name)

	if dog {
		s += " and Dog"
	}

	return s
}

func main() {
	greeting := Salutation("Mary", true)

	// cannot use true (type bool) as type int in
	//    argument to Salutation2
	// greeting = Salutation2("Mary", true)

	fmt.Println(greeting)
}
```

```go
func Salutation2(name string, dogs int) string {
	s := fmt.Sprint("To: ", name)

	if dogs > 0 {
		s += fmt.Sprint(" and ", dogs, " dogs")
	}

	return s
}
```

starting: https://play.golang.org/p/c5LruL7UaE
finished: https://play.golang.org/p/khUC-xYfcK

Go giveth...

Functional Programming (Closures. First-class Functions.)

```
func MakeCounter() func() int {
	counterValue := 0
	return func() int {
		counterValue++
		return counterValue
	}
}

func main() {
	counter := MakeCounter()
	fmt.Println(counter())
	fmt.Println(counter())
	fmt.Println(counter())
}
```

Go giveth...

Functional Programming (Closures. First-class Functions.)

```go
func romanNumeralDict() func(int) string {
	// innerMap is captured in the closure below
	innerMap := map[int]string{
		1000: "M",
		900:  "CM",
		500:  "D",
		400:  "CD",
		100:  "C",
	}

	return func(key int) string {
		return innerMap[key]
	}
}

func main() {
	fmt.Println(romanNumeralDict()(1000))

	dict := romanNumeralDict()
	fmt.Println(dict(400))
}
// http://stackoverflow.com/a/27457144/10278
```

https://play.golang.org/p/B8I_mfPlue

Go giveth...

Object Oriented Programming

```go
type Classroom struct {
	deskCount int
}

func (c Classroom) AddOneDesk() { // this needs refinement!
	c.deskCount++
}

func main() {
	room := &Classroom{deskCount: 2}
	fmt.Println(room)

	room.AddOneDesk() // probably doesn't do what you expect
	fmt.Println(room)
}
```

starting: https://play.golang.org/p/6VDzSiz-JG
finished: https://play.golang.org/p/3a00EesJyA

Go giveth...

Object Oriented Programming

```go
type Classroom struct { // Note: no declaration of
implemented base interfaces.
	deskCount int
}

type Office struct {
	deskCount int
}

func (c *Classroom) AddOneDesk() {
	c.deskCount++
}

func (o *Office) AddOneDesk() {
	o.deskCount++
}

// DeskHolder interface is implemented
// by Classroom and Office.
type DeskHolder interface {
	AddOneDesk()
}
```

```go
// AddDeskTo accepts any object that fulfills the
DeskHolder interface.
func AddDeskTo(holder DeskHolder) {
	holder.AddOneDesk()
}

func main() {
	room := &Classroom{deskCount: 2}
	fmt.Println(room)

	room.AddOneDesk()
	fmt.Println(room)

	office := &Office{deskCount: 0}
	fmt.Println(office)

	office.AddOneDesk()
	fmt.Println(office)

	AddDeskTo(office)
	AddDeskTo(room)
}
```

starting: https://play.golang.org/p/6VDzSiz-JG
finished: https://play.golang.org/p/3a00EesJyA

Go giveth...

Automated Testing

```
// Running this test code relies on the following prereqs:
//   Create a directory that only contains two files.
//   One file is named classroom.go and contains the content
//       of https://play.golang.org/p/3a00EesJyA
//   The other is named classroom_test.go and contains this.
//
// Then navigate inside the directory and run:
//   go test -v -bench=.
package main

import (
	"fmt"
	"testing"
)

func TestClassroom(t *testing.T) {
	const startVal = 2
	room := &Classroom{deskCount: startVal}
	room.AddOneDesk()
	if startVal == room.deskCount {
		t.Error("AddOneDesk did not change desk count")
	}
}
```

```
func ExampleAddOneDesk() {
	room := &Classroom{deskCount: 20}
	room.AddOneDesk()
	fmt.Println(room.deskCount)
	// Output:
	// 21
}


func BenchmarkAddOneDesk(t *testing.B) {
	const startVal = 2
	room := &Classroom{deskCount: startVal}
	room.AddOneDesk()
}
```

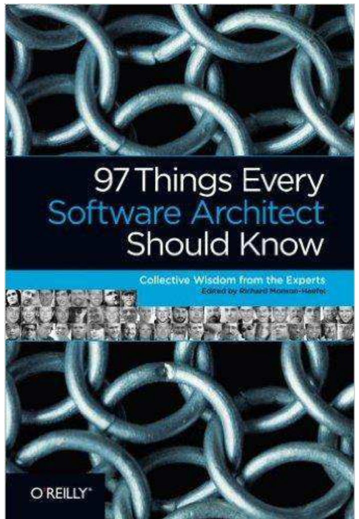
Go giveth...

Automated Testing

If you aren't looking at performance until late in the project cycle, you have lost an incredible amount of information as to when performance changed. If performance is going to be an important architectural and design criterion, then performance testing should begin as soon as possible. ...

... Instead of having to think about the entire architecture when you encounter performance problems, you can focus on the most recent changes.

—Rebecca Parsons



97 Things Every Software Architect Should Know
Edited by Richard Monson-Haefel

ISBN-10: 059652269X
https://books.google.com/books?id=HDknEjQJkbUC
]

Go giveth...

Go taketh away...

Go taketh away...

Style Nitpicking

```
go fmt
```

Go taketh away...

Style Nitpicking

```
IndentationError: unindent does not match any outer
                  indentation level
```

Go taketh away...

Style Nitpicking

```
IndentationError: unindent does not match any outer
                  indentation level

IndentationError: expected an indented block
```

Go taketh away...

Style Nitpicking

```
IndentationError: unindent does not match any outer
                  indentation level

IndentationError: expected an indented block

IndentationError: unexpected indent
```

Go taketh away...

Style Nitpicking

```go
//    - CR/LF becomes LF.
//    - Go prefers tabs, not spaces.
package main

// out of order: fmt math log errors io
import (
       "fmt"
       "math"
       "log"
       "errors" // the imported package names will be
                // sorted alphabetically by go fmt
       "io"
)

type Address struct {
       heading string
       street string // members of the struct will
                     // be column-aligned by go fmt
       apt string
       code int
       isUSA bool
}
```

```go
func main() {
       flag := true
       if(flag){ // parentheses will be removed
              fmt.Println("true"); // semicolon
          } // indentation will be repaired

fmt.Println("another thing") //   indentation


       x := []int{1, 2, 3} // the 2 blank lines above here
                           //  will be reduced to 1 by go fmt

       fmt.Println(x)
}
```

starting: https://play.golang.org/p/CS8LIfLHPM
finished: https://play.golang.org/p/faSgHYhhgd

Go taketh away...

Style Nitpicking

```go
type Point struct {
	x int
	y int
}

var points = [2]Point{
	Point{x: 2, y: 3},
	Point{x: 3, y: 4},
}
```

```
gofmt -s -w file.go
```

```go
type Point struct {
	x int
	y int
}

var points = [2]Point{
	{x: 2, y: 3},
	{x: 3, y: 4},
}
```

```go
x := []int{1, 2, 3}

for _, _ = range x {
	fmt.Println("hello")
}
```

```go
x := []int{1, 2, 3}

for range x {
	fmt.Println("hello")
}
```

```go
x := []int{1, 2, 3}

y := x[1:len(x)]
```

```go
x := []int{1, 2, 3}

y := x[1:]
```

Go taketh away...

Compiler Warnings

```go
func compute() bool {
	result := true
	if 2 > 1 {
		result := false
	}
	return result
}

func main() {
	x := 0
	fmt.Println(compute())
	fmt.Println("done!")
}
```

https://play.golang.org/p/21YRH26mrV

Go taketh away...

Compiler Warnings

```go
package main

import (
	"fmt"
	"math" //            error: imported and not used: "math"
)

const b byte = 256 //       error: constant 256 overflows byte

func decider(i int, j int) bool {
	if i < j {
	}
} //                        error: missing return at end of function

func main() {

	numbers := []int{1, 2, 3}

	var idx bool = true
	x := numbers[idx] //     error: non-integer slice index idx

	fmt.Println("Hello")
}
```

https://play.golang.org/p/w1KGwifTo6

latest slides: https://github.com/pestophagous/works#golang-pitch

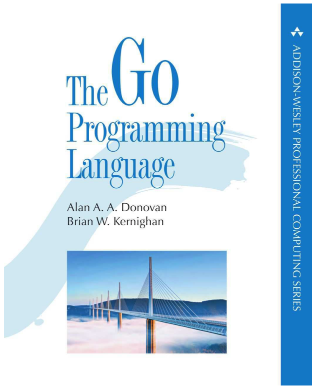
Go taketh away...

Exceptions & Throw/Catch

Go taketh away...

Exceptions & Throw/Catch

"Errors are…an important part of a package's API or an application's user interface, and failure is just one of several expected behaviors. This is the approach Go takes to error handling."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https://books.google.com/books?id=SJHvCgAAQBAJ

Go taketh away...

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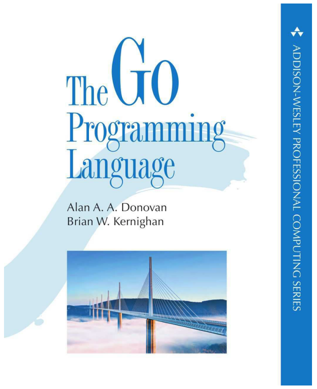
"Errors are…an important part of a package's API or an application's user interface, and failure is just one of several expected behaviors. This is the approach Go takes to error handling."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https://books.google.com/books?id=SJHvCgAAQBAJ

Go taketh away...

Exceptions & Throw/Catch

```go
package main

import (
	"fmt"
	"net/mail"
	"os/user"
	"time"
)

func ConvertToStringWeWant(group *user.Group) string {
	return "TODO"
}

func GetGroupInformation(groupName string) (string, error) {
	var grp *user.Group
	var err error
	if grp, err = user.LookupGroup(groupName); err != nil {
		return "", err
	}

	s := ConvertToStringWeWant(grp)
	// Do other arbitrary logic here...
	return s, nil
}
```

```go
func main() {
	var loc *time.Location
	var addr *mail.Address

	var err error

	loc, err = time.LoadLocation("America/N_Yorkia")
	fmt.Println(err)

	addr, err = mail.ParseAddress("xyz@lm@jk@rs")
	fmt.Println(err)

	s, err := GetGroupInformation("defghijklmnop")
	fmt.Println(err)

	if err == nil {
		fmt.Println(loc, addr, s)
	}
}
```

starting: https://play.golang.org/p/bdAEISB1Nj
finished: https://play.golang.org/p/U8zKlrarek

Go taketh away...

Test Harness Contortions

```go
import (
	"errors"
	"fmt"
	"os"
)

type FakeTesterFileInfo struct {
	os.FileInfo
}

func (f FakeTesterFileInfo) Size() int64 {
	return 70000
}

func ProcessFile(fileInfo os.FileInfo) error {
	if fileInfo.Size() > 65535 {
		return errors.New("file too big")
	}

	// do some kind of processing here

	return nil
}
```

```go
func main() {
	err := ProcessFile(FakeTesterFileInfo{})
	fmt.Println(err)
	fmt.Println("done")
}


/*
https://golang.org/pkg/os/#FileInfo

type FileInfo interface {
        Name() string       // base name of the file
        Size() int64        // length in bytes for regular files
        Mode() FileMode     // file mode bits
        ModTime() time.Time // modification time
        IsDir() bool        // abbreviation for Mode().IsDir()
        Sys() interface{}   // underlying data source (or nil)
}
*/
```

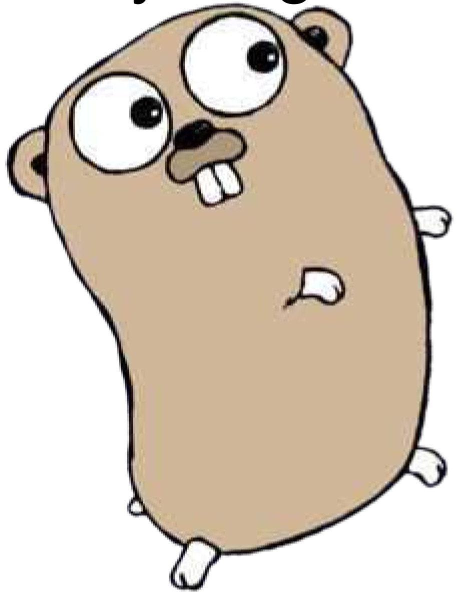
starting: https://play.golang.org/p/xhpImxN5HV
finished: https://play.golang.org/p/m-2Ne2WE-t

Parting Words

The cleanest code is the code not written.

Parting Words

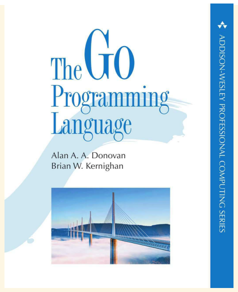
The cleanest code is the code not written.
For everything else, there's Go.



Go gopher by Renee French

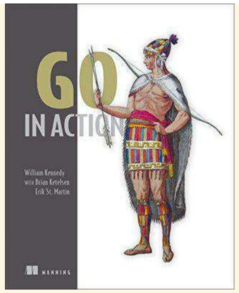
latest slides: https://github.com/pestophagous/works#golang-pitch

Your next dose of Go:


The Go Programming Language
Alan A. A. Donovan
Brian W. Kernighan
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES

The Go Programming Language
by Alan A. A. Donovan,
Brian W. Kernighan
ISBN-10: 0134190440
https://books.google.com/books?id=SJHvCgAAQBAJ

Comprehensive. Authoritative.
A joy to read.



Go in Action
by William Kennedy, Brian Ketelsen,
Erik St. Martin
ISBN-10: 1617291781
https://books.google.com/books?id=HDMmrgEACAAJ

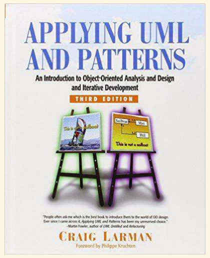
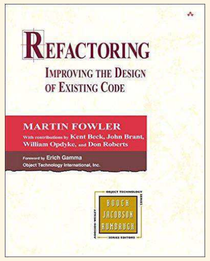
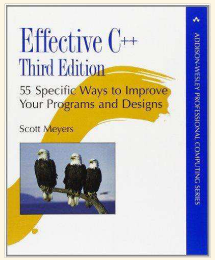
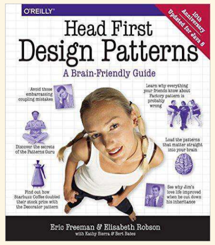
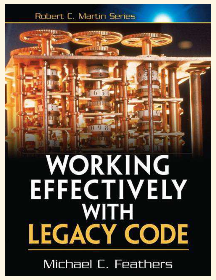
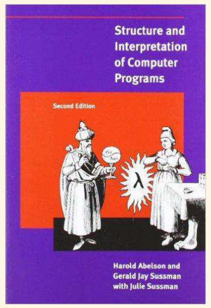
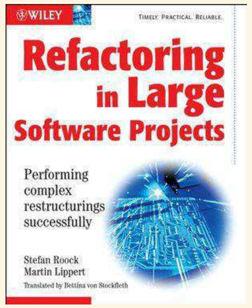
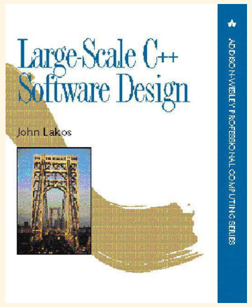
Excellent quick-start on goroutines.
Clear, deep treatment of slices.

Surprisingly gritty, creepy art from the Go artist:
https://twitter.com/reneefrench

- Go for C++ devs: https://talks.golang.org/2015/go4cpp.slide
- Go for Javaneros: https://talks.golang.org/2014/go4java.slide
- Go for Pythonistas: https://talks.golang.org/2013/go4python.slide

Interview with Go co-creator Robert Griesemer:
https://www.youtube.com/watch?v=on5DeUyWDqI
- probing questions on exceptions & generics
- interesting language design & comparative language topics

Books featured on the *Applying The Tools* slide:

Applying UML and Patterns by Craig Larman ISBN-10: 0131489062 https://books.google.com/books?id=tuxQAAAAMAAJ 	**Refactoring** by Martin Fowler ISBN-10: 0201485672 https://books.google.com/books?id=UTgFCAAAQBAJ 	**Effective C++** by Scott Meyers ISBN-10: 0321334876 https://books.google.com/books?id=eQq9AQAAQBAJ 	**Head First Design Patterns** by Eric Freeman & Elisabeth Robson ISBN-10: 0596007124 https://books.google.com/books?id=NbCNAQAAQBAJ 
Working Effectively with Legacy Code by Michael Feathers ISBN-10: 0131177052 https://books.google.com/books?id=vlo_nWophSYC 	**Structure and Interpretation of Computer Programs** by Harold Abelson, Gerald Jay Sussman, Julie Sussman ISBN-10: 0262510871 https://books.google.com/books?id=6QOXQgAACAAJ 	**Refactoring in Large Software Projects** by Martin Lippert, Stephen Roock ISBN-10: 0470858923 https://books.google.com/books?id=erBQAAAAMAAJ 	**Large-Scale C++ Software Design** by John Lakos ISBN-10: 0201633620 https://books.google.com/books?id=AuMpAQAAMAAJ 

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