```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

(aircraft carrier)

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()
```

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

```
  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)
  >

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?

(dependency graph)

What Do I Care About?

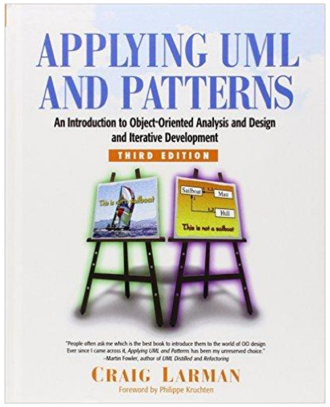
- Multi-Paradigm
    - Procedural
    - Object Oriented
    - Functional Programming (closures, function composition)
- Type Safety (static types, compiler checked)
- Data Hiding
    - Hide subsets of methods within a class (private data)
    - Hide sets of helper classes within a module (export control)

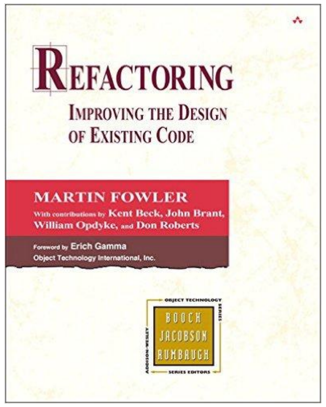
(Bonus: immutability)

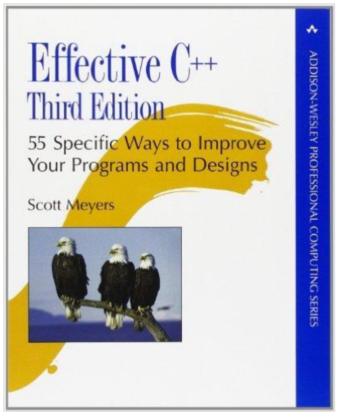
power tools

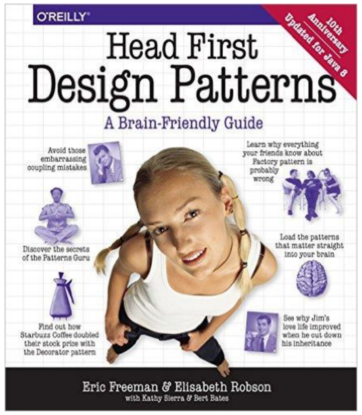
Applying The Tools

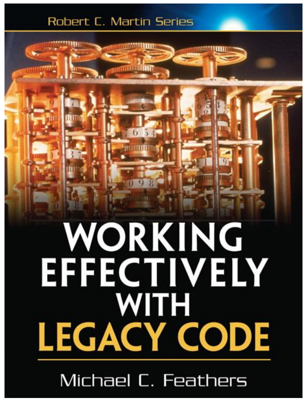
(a talk unto itself...)

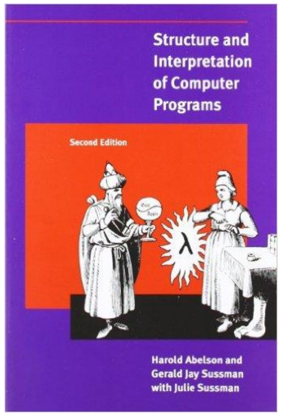

APPLYING UML AND PATTERNS
An Introduction to Object-Oriented Analysis and Design and Iterative Development
THIRD EDITION
CRAIG LARMAN
Foreword by Philippe Kruchten

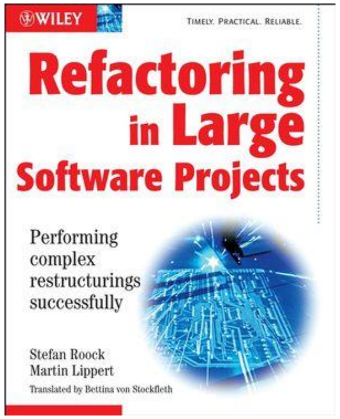

REFACTORING
IMPROVING THE DESIGN OF EXISTING CODE
MARTIN FOWLER
With contributions by Kent Beck, John Brant, William Opdyke, and Don Roberts
Foreword by Erich Gamma
Object Technology International, Inc.
BOOCH JACOBSON RUMBAUGH

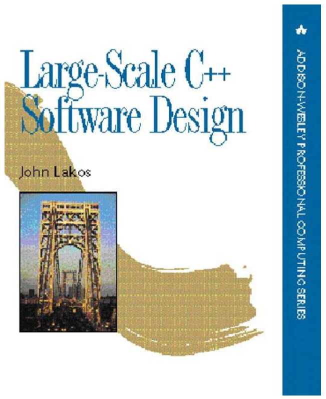

Effective C++
Third Edition
55 Specific Ways to Improve Your Programs and Designs
Scott Meyers
ADDISON-WESLEY PROFESSIONAL COMPUTING SERIES


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

Go giveth...

- Multi-Paradigm
  - Procedural
  - Object Oriented
  - Functional Programming
- Type Safety
- Data Hiding
  - Hide subsets of methods within a class (private data)
  - Hide sets of helper classes within a module (export control)

(Bonus: immutability)

power tools

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

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...

Function 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())
}
```

https://play.golang.org/p/b2NDPPjFph

Go giveth...

Function 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

```
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

```go
// 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")
	}
}
```

```go
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 taketh away...

Style Nitpicking

```
//    - 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
}
```

```
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

```
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

```
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
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.

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

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