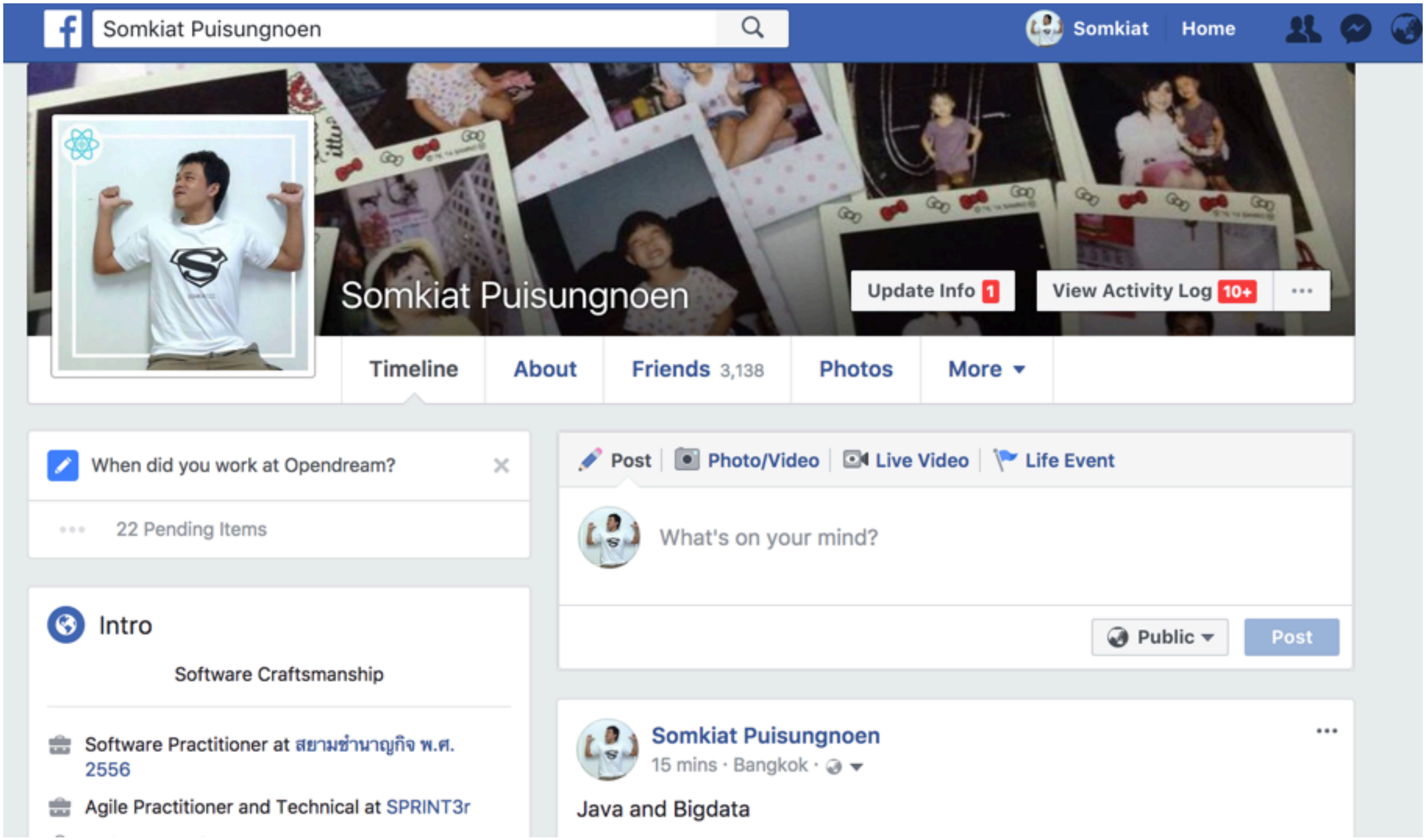
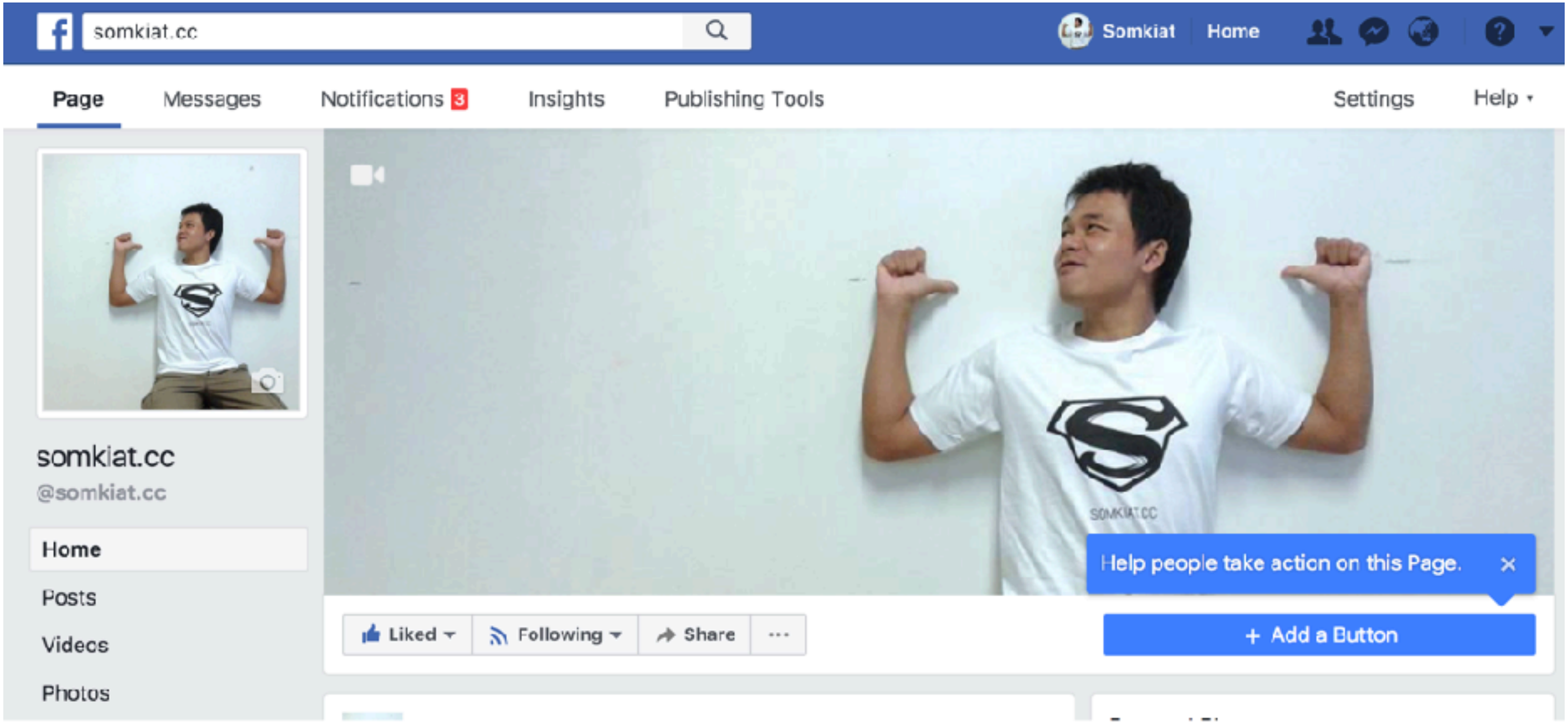
สยามชำนาญกิจ
SIAM CHAMNAN KIT

Basic of Java





Agenda Day 1

- All about Java Programmer mistakes
- Object-Oriented Design
- SOLID
- Workshop

Mistake of Java Programmer

Set JAVA_HOME

How to build and compile ?

Compile and Run

$javac -version
$java -version

How to read the Java document ?

https://docs.oracle.com/javase/8/docs/

Build tools

IDE WARs

Trust in your code ?

Your code not break anything ?

Write Unit tests

Hello with Unit testing

Basic of Java

Basic of Java

Working with String
if-else statement
Looping => for/for each, while and do-while

Basic of Java

if-else statement
Looping => for/for each, while and do-while

Workshop online

CyberDojo

http://www.cyber-dojo.org/

Day 2

Run your code/test in command line

Check before run !!

For Windows OS

$echo %JAVA_HOME%

For Mac/Linux

$echo $JAVA_HOME

Run test with maven

$mvnw clean test

Build JAR file with maven

$mvnw clean package

Try to compile and win without Apache Maven

Compile

$javac **-s** src/main/java **-d** your_target src/main/java/com/example/demo/HelloDay2.java

-s = folder of source code

-d = folder of class files (destination)

Run

$java **-cp** your_target
com.example.demo.HelloDay2

-cp = classpath of class/JAR files

Code Smell & Refactoring

https://sourcemaking.com/refactoring/smells

Code Smell

Code Smell

Code Smell Workshop

https://github.com/emilybache/Tennis-Refactoring-Kata

Composition over Inheritance

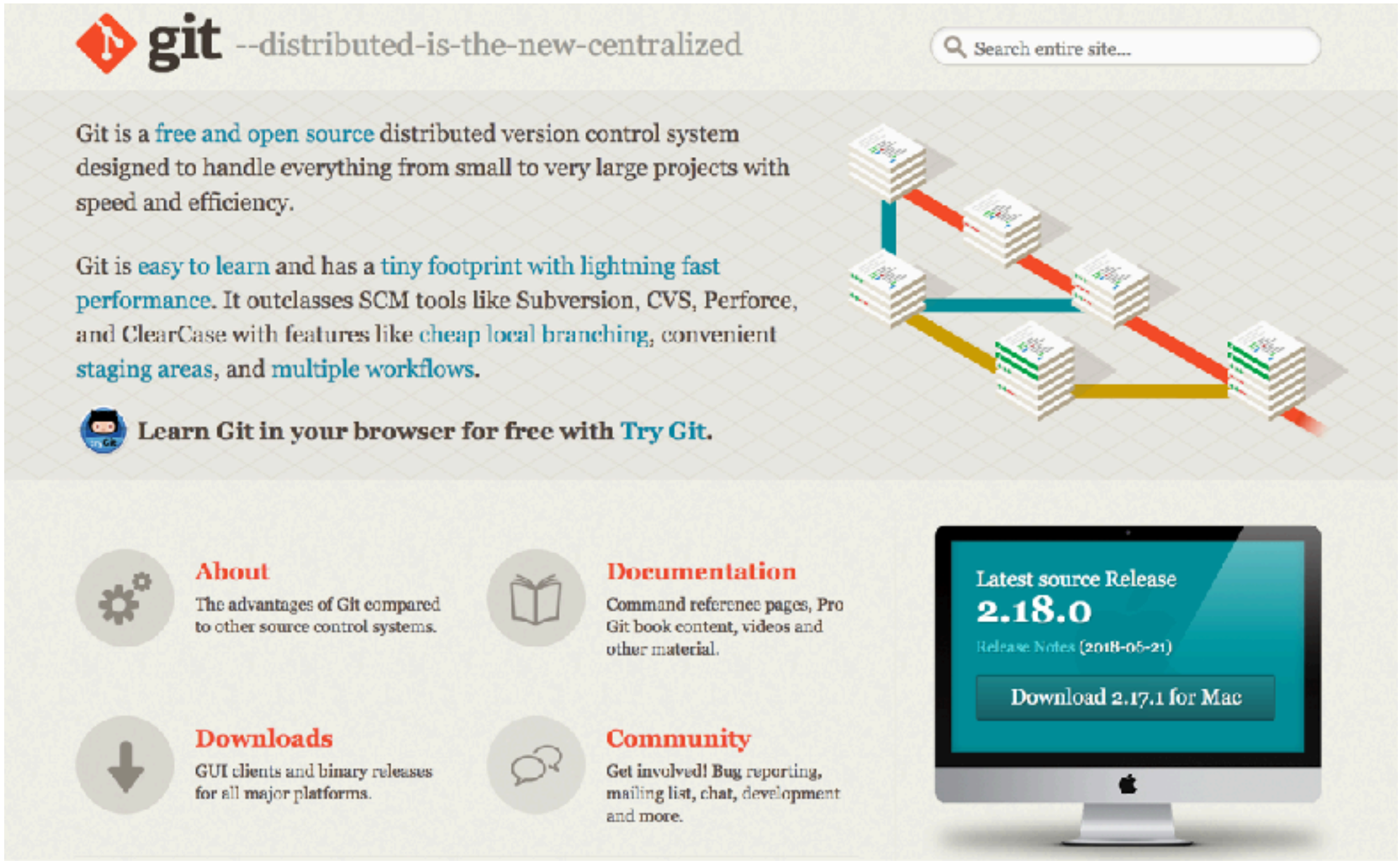
https://en.wikipedia.org/wiki/Composition_over_inheritance

Composition over Inheritance

HAS-A
IS-A

Source code management

Download and Install Git



https://git-scm.com/

Git command line

$git status

$git init

$git add <file>

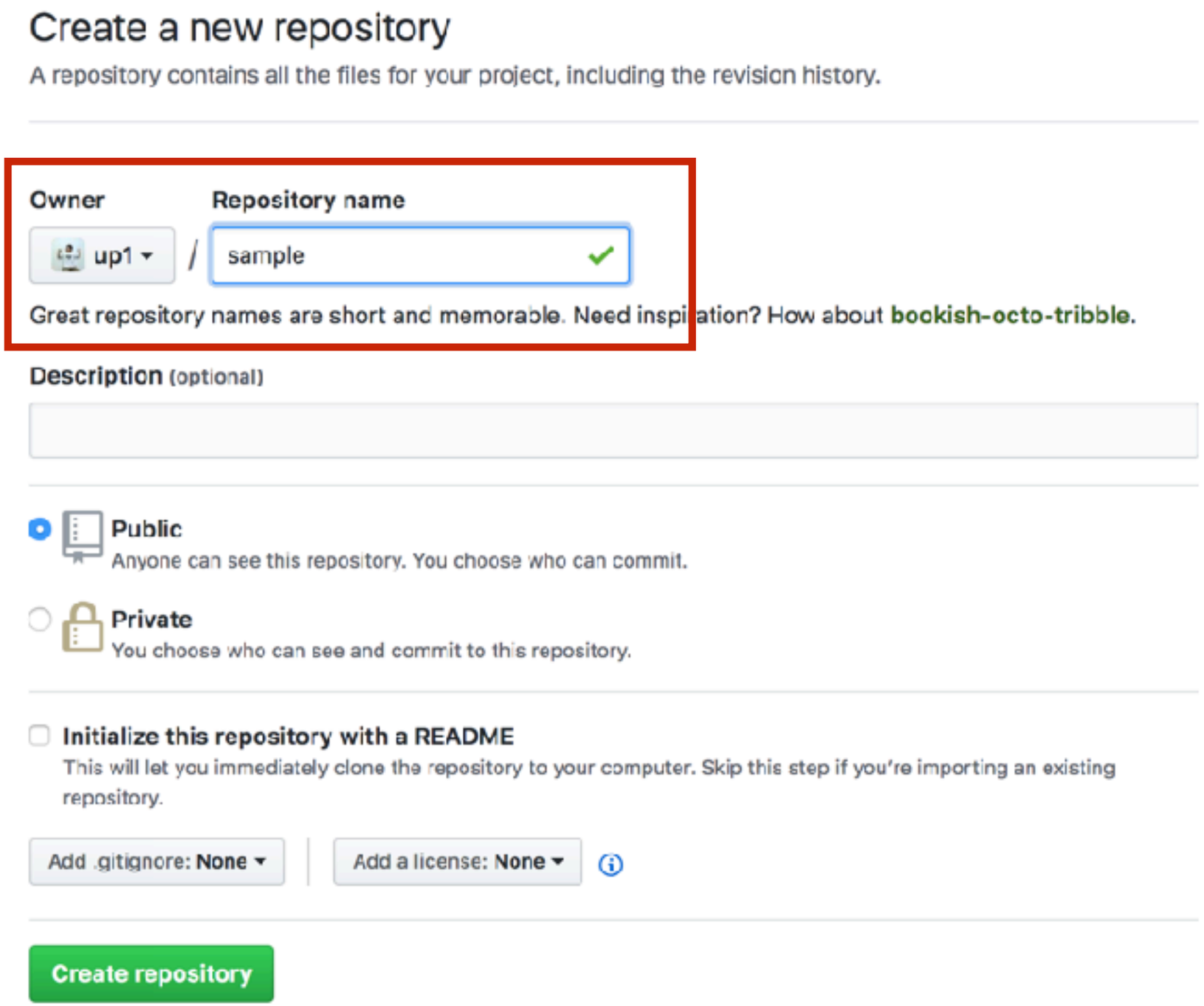
$git commit -m “Reason to commit”

$git push <remote> <local branch>

$git pull <remote> <local branch>

$git remote add <name> <url>

Create repository at Github



Create already

up1 / sample

Unwatch 1

Code | Issues 0 | Pull requests 0 | Projects 0 | Wiki | Insights | Settings

Quick setup — if you've done this kind of thing before

Set up in Desktop or HTTPS SSH https://github.com/up1/sample.git

We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# sample" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/up1/sample.git
git push -u origin master
```

Working with Git

1. Create repos on your folder

$git init

2. Add file/folder to git repos

$git add <filename>

$git add <folder>

3. Commit your change

$git commit -m “<message>”

4. Add remote repository

$git remote add <name> <remote url>

$git remote add **origin** **https://github.com/up1/sample.git**

5. Push your change to remote repos

$git push origin master

And check your code at github.com

Day 3

OOP with Harry Potter

Design

Book

BookItem

Order

PriceCalculator

DiscountCalculator

Properties/Behaviors

Book

BookItem

Order

PriceCalculator

DiscountCalculator

Relationships ?

Develop

Develop

1. Create book class
2. Create Order class
3. Create BookItem class
4. Create Price Calculator
5. Create Discount Calculator

1. Create Book

How to create instance ?

1. With constructor
2. With Creation Method
3. With Builder pattern

Create Book

```java
@Test
public void createBookWithConstructor() {
    Book book1 = new Book("H1", 8, 2);
}

@Test
public void createBookWithCreationMethod() {
    Book book1 = Book.createHarryPotterOne();
    Book book2 = Book.createHarryPotterTwo();
}

@Test
public void createBookWithBuilderPattern() {
    Book book1 = new BookBuilder()
                        .setPrice(8)
                        .setName("H1")
                        .build();
```

2. Create Order

Create Order

One order can have 0-N item(s)

Start with Empty Order

```java
@Test
public void createEmptyOrder() {
    Order order = new Order();
    order.process();
    assertEquals(0, order.getBookAmount());
    assertEquals(0, order.getTotalPrice(), 0.00);
    assertEquals(0, order.getDiscount(), 0.00);
    assertEquals(0, order.getNetPrice(), 0.00);
}
```

Order with 1 item

```java
@Test
public void createOrderWithOneBook() {
    Book book1 = new Book("H1", 8, 2);
    BookItem bookItem = new BookItem(book1, 1);
    Order order = new Order();
    order.addItem(bookItem);
    order.process();

    assertEquals(1, order.getBookAmount());
    assertEquals(8, order.getTotalPrice(), 0.00);
    assertEquals(0, order.getDiscount(), 0.00);
    assertEquals(8, order.getNetPrice(), 0.00);
}
```

Order with 2 item = 5%

```
@Test
public void createOrderWithTwoBook() {
    Book book1 = new Book("H1", 8, 2);
    Book book2 = new Book("H2", 8, 2);
    BookItem bookItem1 = new BookItem(book1, 1);
    BookItem bookItem2 = new BookItem(book2, 1);
    Order order = new Order();
    order.addItem(bookItem1);
    order.addItem(bookItem2);
    order.process();

    assertEquals(2, order.getBookAmount());
    assertEquals(16, order.getTotalPrice(), 0.00);
    assertEquals("Discount not correct", 16 * 0.05, order.getDiscount(), 0.00);
    assertEquals(16 - (16 * 0.05), order.getNetPrice(), 0.00);
}
```

3. Create BookItem

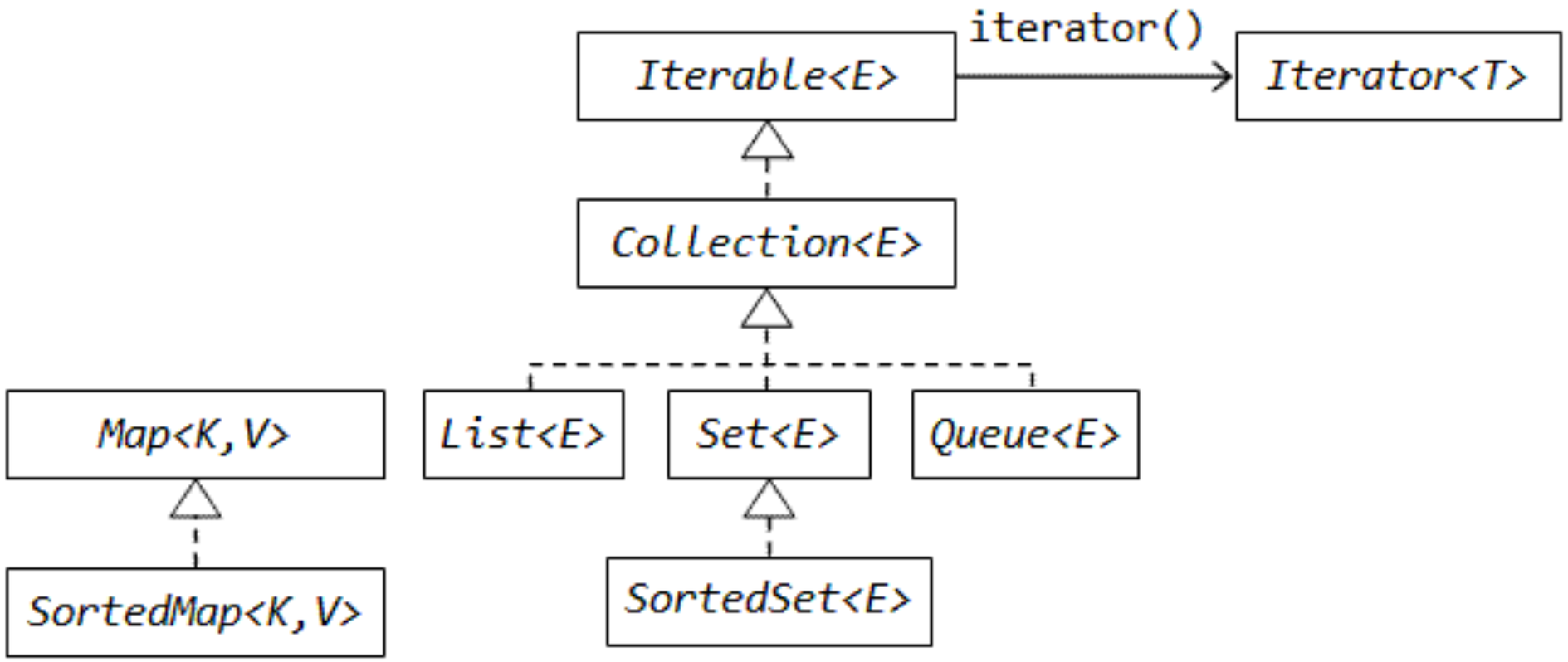
4. Price Calculation

5. Discount Calculation

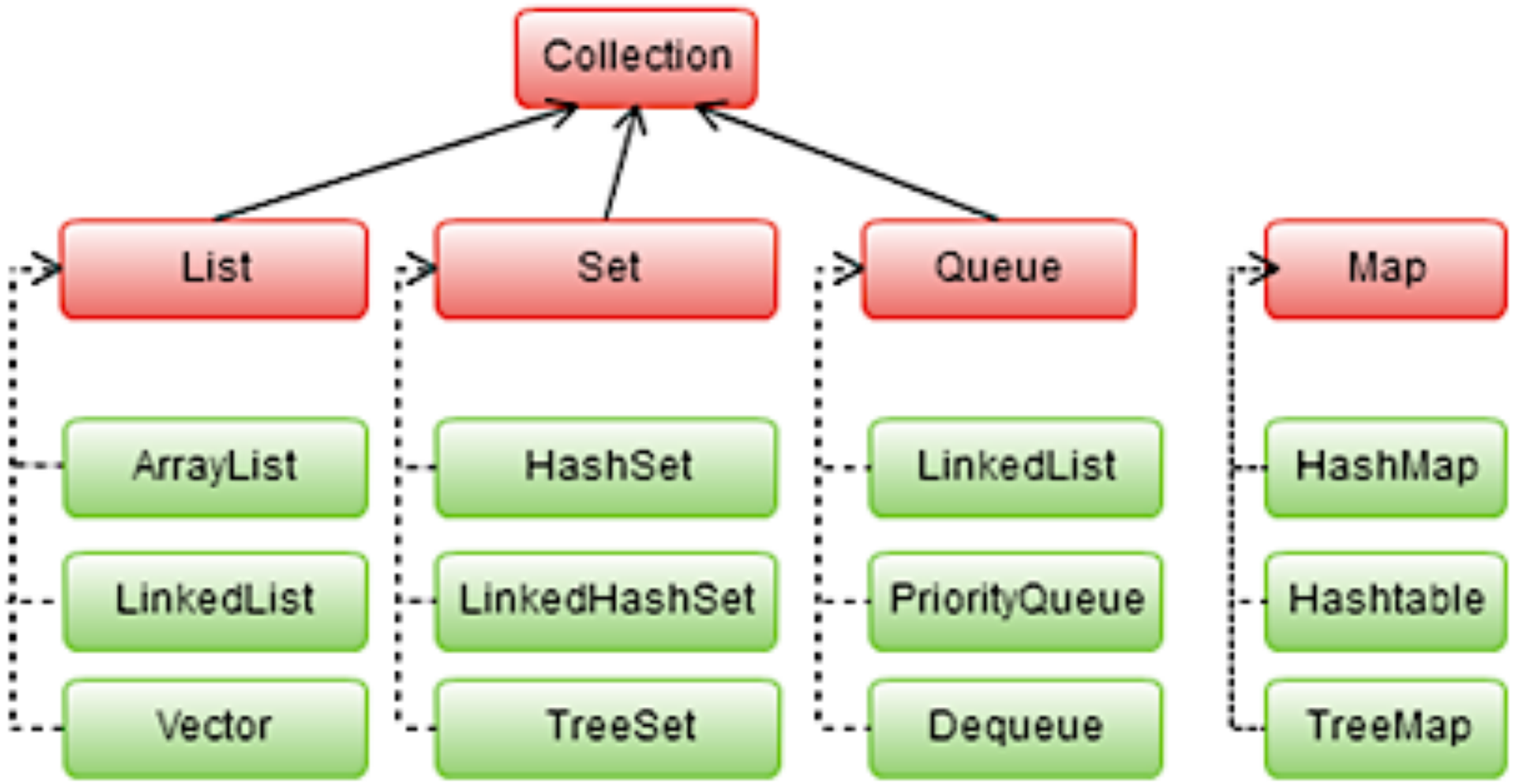
Java Collection Framework

https://docs.oracle.com/javase/8/docs/technotes/guides/collections/overview.html

Java Collection Framework



Java Collection Framework



Java Collections Cheat Sheet

REBELLABS by ZEROTURNAROUND

Notable Java collections libraries

Fastutil

http://fastutil.di.unimi.it/

Fast & compact type-specific collections for Java

Great default choice for collections of primitive types, like int or long. Also handles big collections with more than 2^{31} elements well.

Guava

https://github.com/google/guava

Google Core Libraries for Java 6+

Perhaps the default collection library for java projects. Contains a magnitude of convenient methods for creating collection, like fluent builders, as well as advanced collection types.

Eclipse Collections

https://www.eclipse.org/collections/

Features you want with the collections you need

Previously known as gs-collections, this library includes almost any collection you might need: primitive type collections, multimaps, bidirectional maps and so on.

JCTools

https://github.com/JCTools/JCTools

Java Concurrency Tools for the JVM.

If you work on high throughput concurrent applications and need a way to increase your performance, check out JCTools.

What can your collection do for you?

Collection class	Thread-safe alternative	Your data				Operations on your collections						
						Order of iteration				Random access		
		Individual elements	Key-value pairs	Duplicate element support	Primitive support	FIFO	Sorted	LIFO	Performant 'contains' check	By key	By value	By index
HashMap	ConcurrentHashMap	✗	✓	✗	✗	✗	✗	✗	✓	✓	✗	✗
HashBiMap (Guava)	Maps.synchronizedBiMap (new HashBiMap())	✗	✓	✗	✗	✗	✗	✗	✓	✓	✓	✗
ArrayListMultimap (Guava)	Maps.synchronizedMultiMap (new ArrayListMultimap())	✗	✓	✓	✗	✗	✗	✗	✓	✓	✗	✗
LinkedHashMap	Collections.synchronizedMap (new LinkedHashMap())	✗	✓	✗	✗	✓	✗	✗	✓	✓	✗	✗
TreeMap	ConcurrentSkipListMap	✗	✓	✗	✗	✗	✓	✗	✓*	✓*	✗	✗
Int2IntMap (Fastutil)		✗	✓	✗	✓	✗	✗	✗	✓	✓	✗	✓
ArrayList	CopyOnWriteArrayList	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗	✓
HashSet	Collections.newSetFromMap (new ConcurrentHashMap<>())	✓	✗	✗	✗	✗	✗	✗	✓	✗	✓	✗
IntArrayList (Fastutil)		✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓
PriorityQueue	PriorityBlockingQueue	✓	✗	✓	✗	✗	✓**	✗	✗	✗	✗	✗
ArrayDeque	ArrayBlockingQueue	✓	✗	✓	✗	✓**	✗	✓**	✗	✗	✗	✗

** O(log(n)) complexity, while all others are O(1) - constant time*

*** when using Queue interface methods: offer() / poll()*

How fast are your collections?

Collection class	Random access by index / key	Search / Contains	Insert
ArrayList	O(1)	O(n)	O(n)
HashSet	O(1)	O(1)	O(1)
HashMap	O(1)	O(1)	O(1)
TreeMap	O(log(n))	O(log(n))	O(log(n))

Remember, not all operations are equally fast. Here's a reminder of how to treat the Big-O complexity notation:

O(1) - constant time, really fast, doesn't depend on the size of your collection

O(log(n)) - pretty fast, your collection size has to be extreme to notice a performance impact

O(n) - linear to your collection size: the larger your collection is, the slower your operations will be

BROUGHT TO YOU BY JRebel

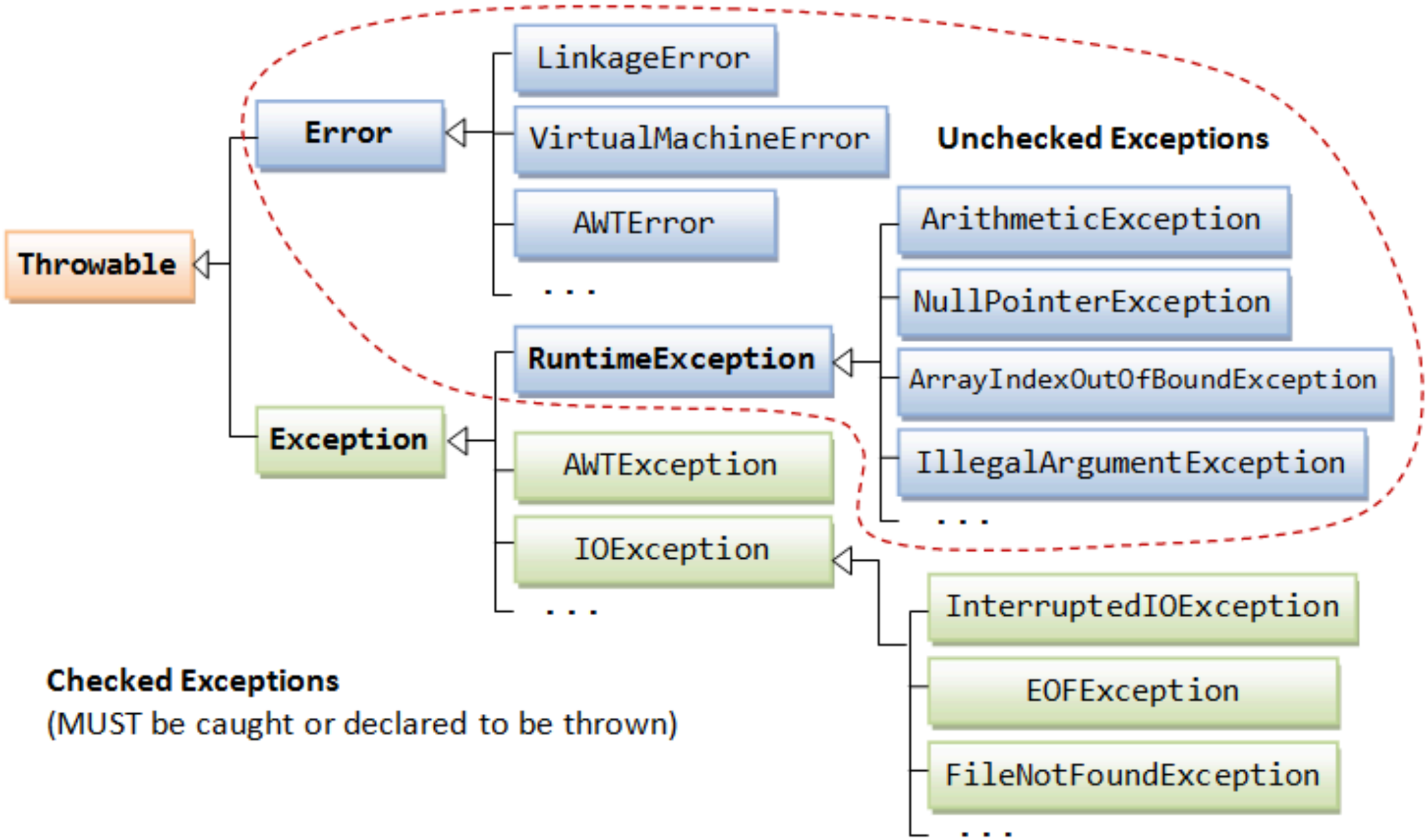
http://files.zeroturnaround.com/pdf/zt_java_collections_cheat_sheet.pdf

Types of Error in Java

Types of Errors

- Compile-time errors
- Runtime errors
- Logical errors

Exception classes



Checked Exceptions
(MUST be caught or declared to be thrown)

Day 4

Features in Java 8

Java 5 (Tiger) in 2005

Largest change of Java
Generic
Enhance for-loop
Annotation
Type-safe enumeration
Concurrency enhancement (AtomicInteger)

10 years later …

Java 8 is Massive changes !!

Java 8 Best Practices Cheat Sheet

REBELLABS by ZEROTURNAROUND

BROUGHT TO YOU BY JRebel

Default methods

Evolve interfaces & create traits

```
//Default methods in interfaces
@FunctionalInterface
interface Utilities {
  default Consumer<Runnable> m() {
    return (r) -> r.run();
  }
  // default methods, still functional
  Object function(Object o);
}
class A implements Utilities { // implement
  public Object function(Object o) {
    return new Object();
  }
  {
    // call a default method
    Consumer<Runnable> n = new A().m();
  }
}
```

Lambdas

Syntax:
(parameters) -> expression
(parameters) -> { statements; }

```
// takes a Long, returns a String
Function<Long, String> f = (l) -> l.toString();
// takes nothing gives you Threads
Supplier<Thread> s = Thread::currentThread;
// takes a string as the parameter
Consumer<String> c = System.out::println;

// use them with streams
new ArrayList<String>().stream().
// peek: debug streams without changes
peek(e -> System.out.println(e)).
// map: convert every element into something
map(e -> e.hashCode()).
// filter: pass some elements through
filter(e -> ((e.hashCode() % 2) == 0)).
// collect all values from the stream
collect(Collectors.toCollection(TreeSet::new))
```

java.util. Optional

A container for possible null values

```
// Create an optional
Optional<String> optional =
Optional.ofNullable(a);
// process the optional
optional.map(s -> "RebelLabs:" + s);
// map a function that returns Optional
optional.flatMap(s -> Optional.ofNullable(s));

// run if the value is there
optional.ifPresent(System.out::println);
// get the value or throw an exception
optional.get();

// return the value or the given value
optional.orElse("Hello world!");
// return empty Optional if not satisfied
optional.filter(s -> s.startsWith("RebelLabs"));
```

Rules of Thumb

Traits: 1 default method per interface
Don't enhance functional interfaces
Only conservative implementations

Expressions over statements
Refactor to use method references
Chain lambdas rather than growing them

Fields - use plain objects
Method parameters, use plain objects
Return values - use Optional
Use *orElse()* instead of *get()*

http://files.zeroturnaround.com/pdf/zt_java8_best_practices.pdf

Lambda expression

Lambda expression

Functionality as a method arguments
Code as data
Help code more compact

Demo with Sorting data

Sorting data in List with Comparator

```
Employee  id=1 name=First
```

```
Employee  id=2 name=Second
```

```
Employee  id=3 name=Third
```

Create class Employee

```
class Employee {
    private int id;
    private String name;
    private double salary;

     //Setter and Getter methods
```

Sorting with java.util.Comparator

```
Comparator<Employee> sortByName = new Comparator<Employee>() {
            @Override
            public int compare(Employee e1, Employee e2) {
                return e1.getName().compareTo(e2.getName());
            }
        };
```

Using with Collections.sort()

```
List<Employee> list = new ArrayList<>();
list.add(new Employee(500, "First", 150000));
list.add(new Employee(504, "Second", 120000));
list.add(new Employee(503, "Third", 100000));
list.add(new Employee(730, "Forth", 45000));

Collections.sort(list, sortByName);
list.forEach(System.out::println);
```

Run and see output

```
demo.java8.lambda.Employee@e9e54c2
demo.java8.lambda.Employee@65ab7765
demo.java8.lambda.Employee@1b28cdfa
demo.java8.lambda.Employee@eed1f14
```

Try to improve format of output !!
more readable

Overide toString()

```
class Employee {
    private int id;
    private String name;
    private double salary;

    @Override
    public String toString() {
        return "Employee [id=" + id + ", name=" + name + ", salary=" +
salary + "]";
    }
```

```
Employee [id=500, name=First, salary=150000.0]
Employee [id=504, name=Second, salary=120000.0]
Employee [id=503, name=Third, salary=100000.0]
Employee [id=730, name=Forth, salary=45000.0]
```

Sorting with Lambda expression

```
Comparator<Employee> sortByNameWithLambda =
                    (Employee e1, Employee e2) ->
                                e1.getName().compareTo(e2.getName());

Collections.sort(list, sortByName);
list.forEach(System.out::println);
```

Workshop

Sort by name (Z to A)
Sort by ID (0 to 9)

Java Stream API

Java Stream API

A new package **java.util.stream**

New functionality which contains classes for processing sequences of elements

Java Stream API

Working with List and Array

```
String[] datas = new String[] {"P", "U", "I"};
Stream<String> streams = Arrays.stream(datas);
streams.forEach(System.out::println);
```

```
Stream<String> streams2 = Stream.of("P", "U", "I");
streams2.forEach(System.out::println);
```

Java Stream API

Sequential and Parallel

```
List<String> myList = Arrays.asList("P", "U", “I");

myList.stream().forEach(System.out::println);

myList.parallelStream().forEach(System.out::println);
```

Operations

Iterating
Filtering
Mapping
Matching
Collecting

Iterating

```
myList.stream().forEach(System.out::println);
```

Filtering

```
myList.stream()
                .filter(element -> element.contains("P"))
                .forEach(System.out::println);
```

Matching

Try to validate all elements of sequence

```
boolean isValid = myList.stream()
                        .anyMatch(element -> element.contains("P"));

out.println(isValid);
```

Mapping

Try to convert elements by apply a special function

```
List<String> results =
    myList.stream().map(element -> element.toLowerCase())
                   .collect(Collectors.toList());
out.println(results);
```

Collecting

Try to convert stream to collection or map

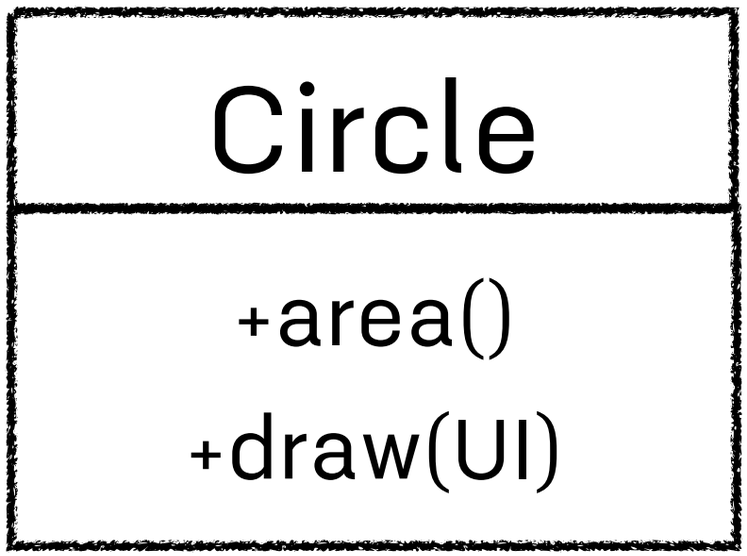
```
List<String> results =
    myList.stream().map(element -> element.toLowerCase())
                   .collect(Collectors.toList());
out.println(results);
```

SOLID principle

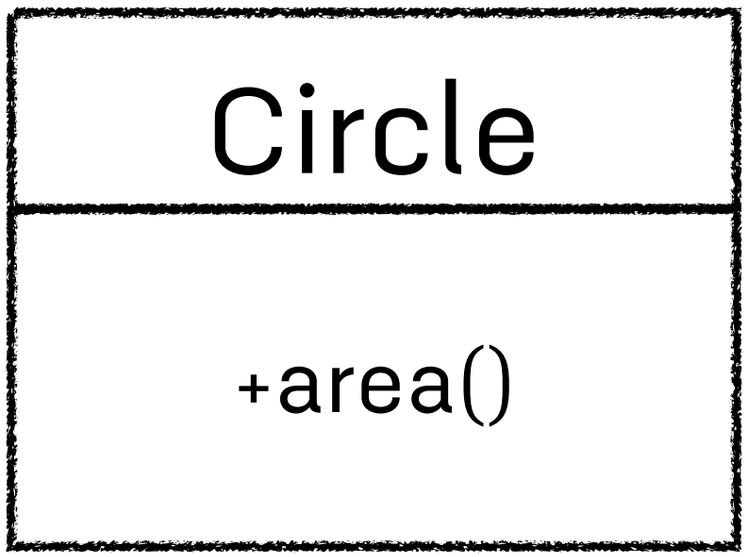
SOLID principle

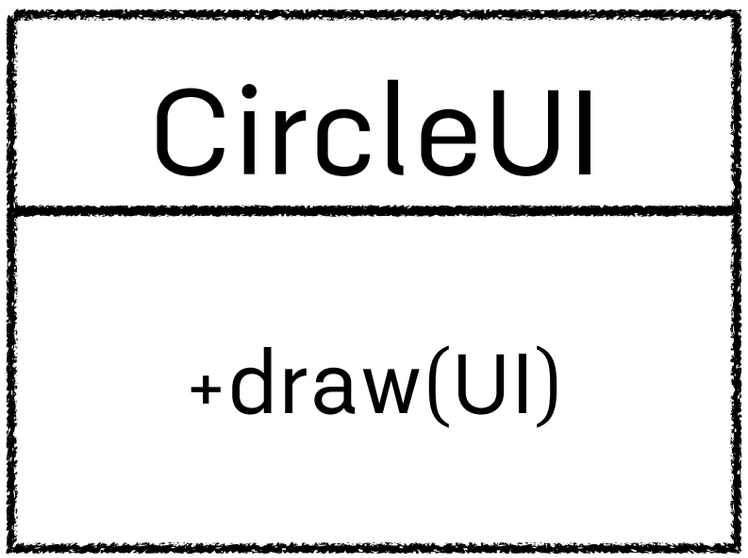
1. Single Responsibility Principle

Example



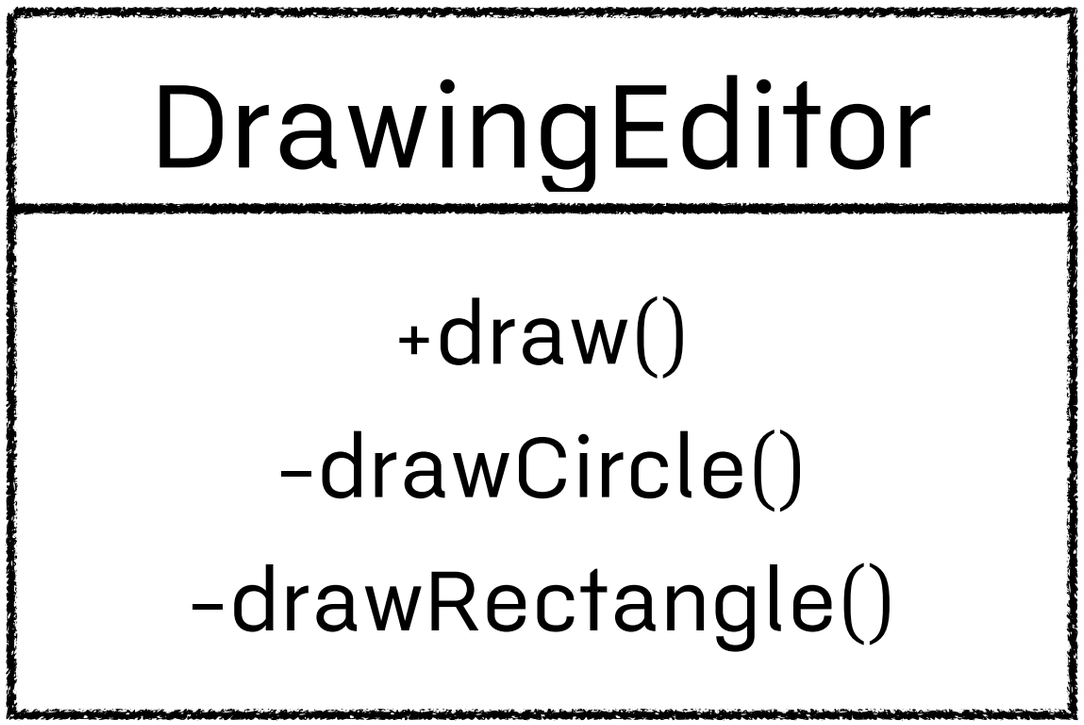
Example



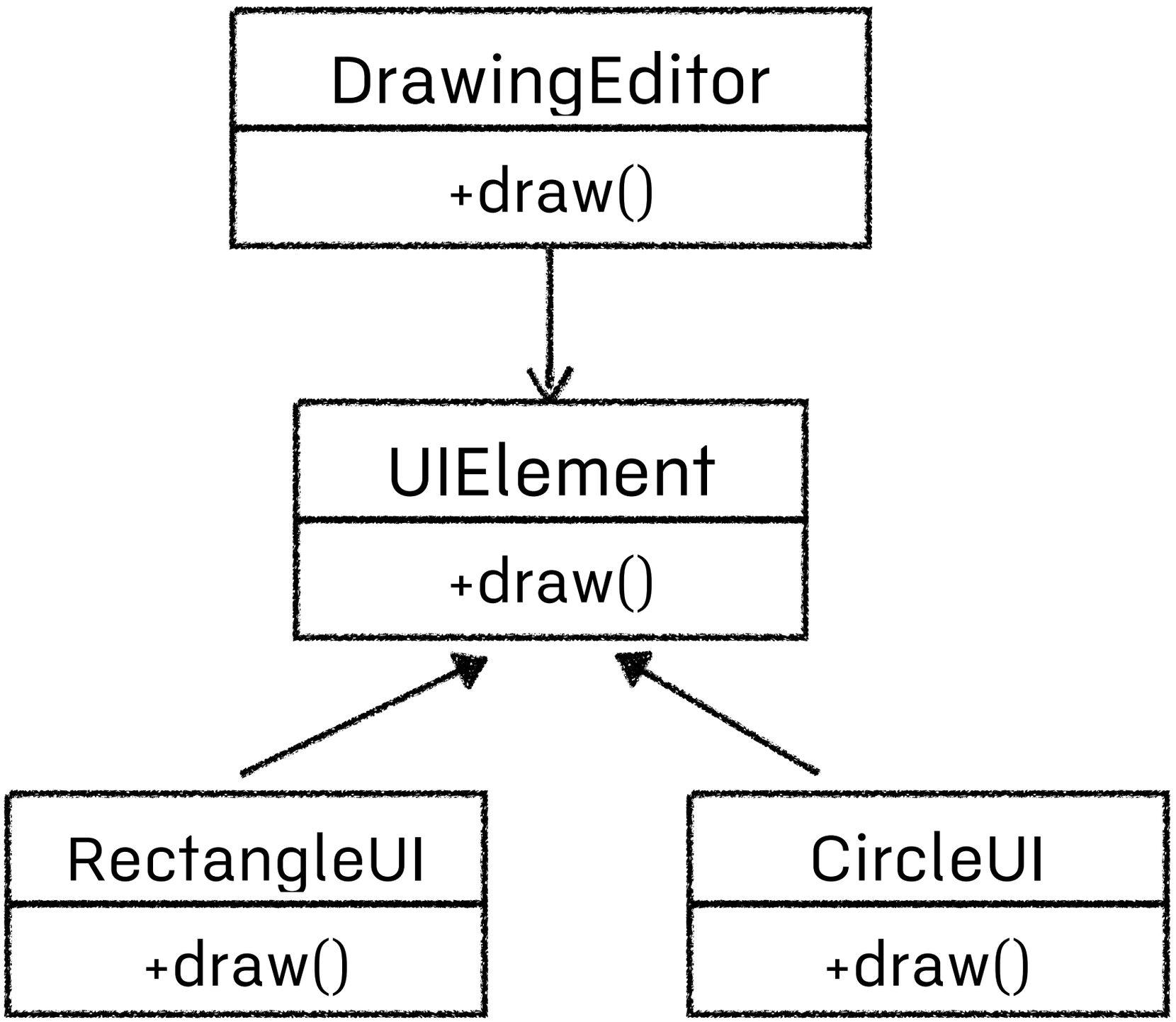


2. Open-Closed Principle

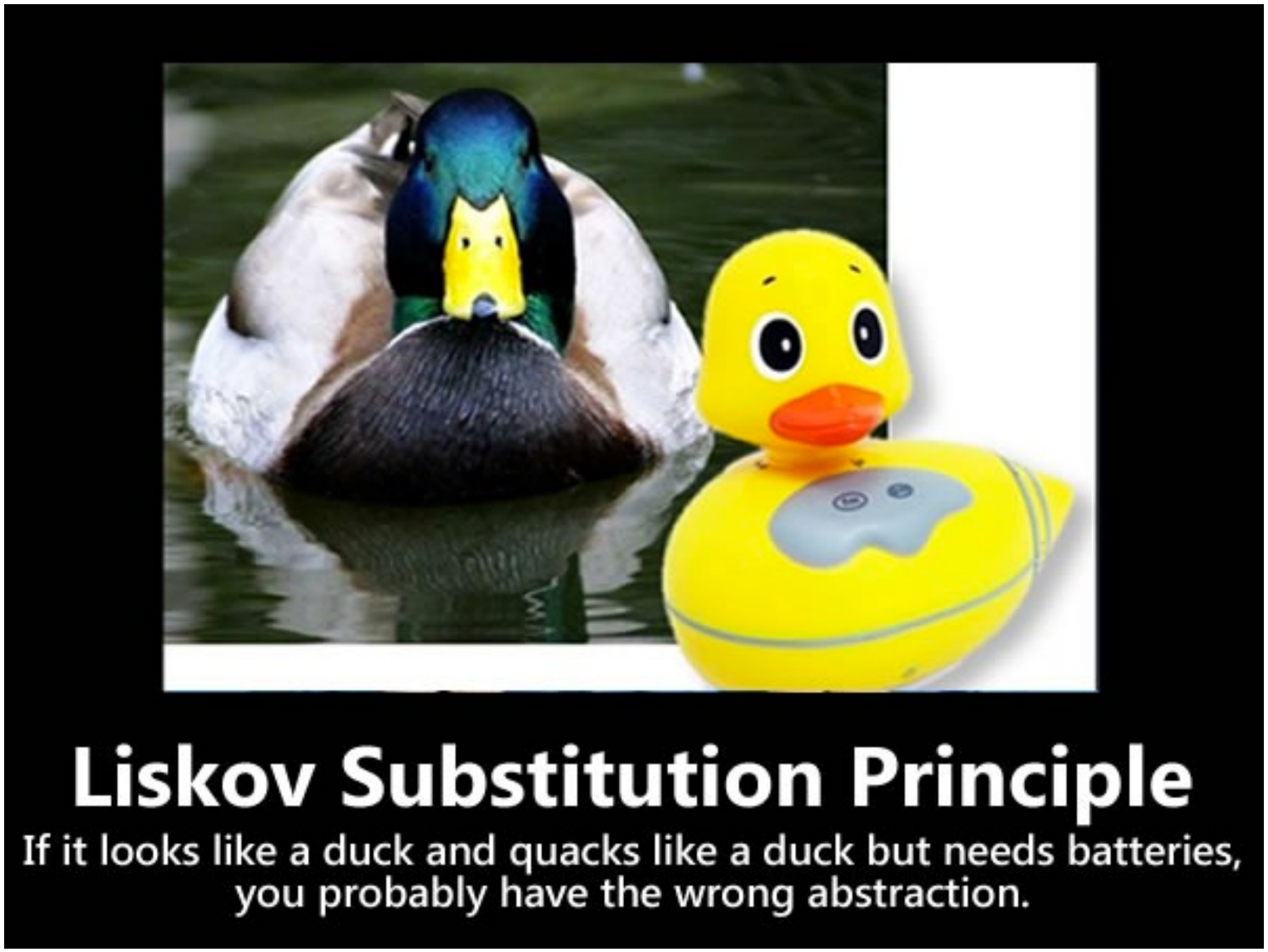
Example



Example

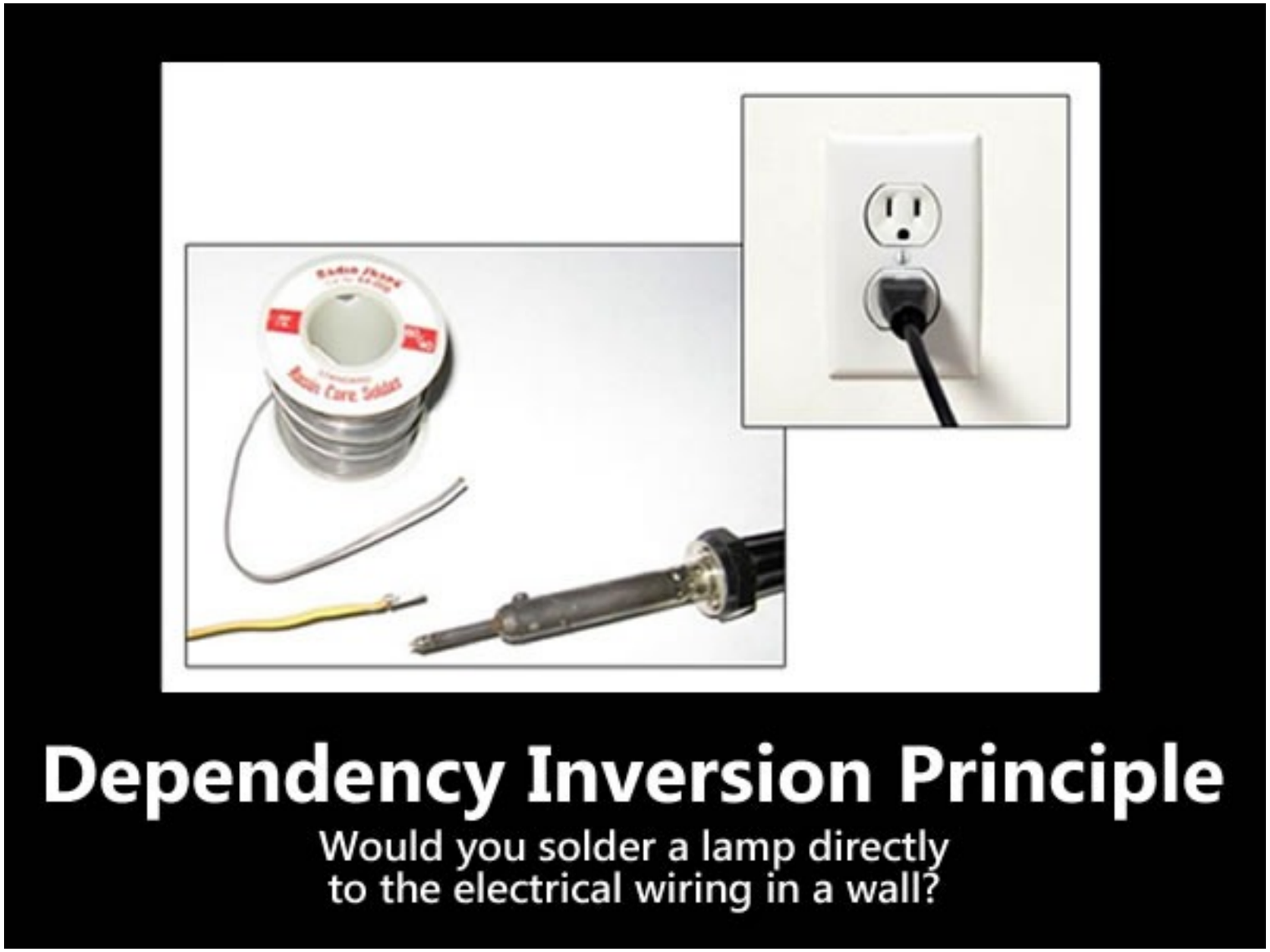


3. Liskov Substitution Principle



4. Interface Segregation Principle

5. Dependency Inversion Principle



Day 5

Java Developer should learn 2018

https://dzone.com/articles/5-things-java-programmer-should-learn-in-2018

Coding everyday (2 hours)

Participate coding challenges

Try new version of Java

Learn Java performance tuning

Learn Spring Framework

Write Unit tests

Profiling your app once a month

Learn new JVM languages