Lesson 9

clean code

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Coding is for humans

Programming is the art of telling another human what one wants the computer to do.

Donald Knuth

Any fool can write code that a computer can understand. Good programmers write code that humans can understand.

Martin Fowler

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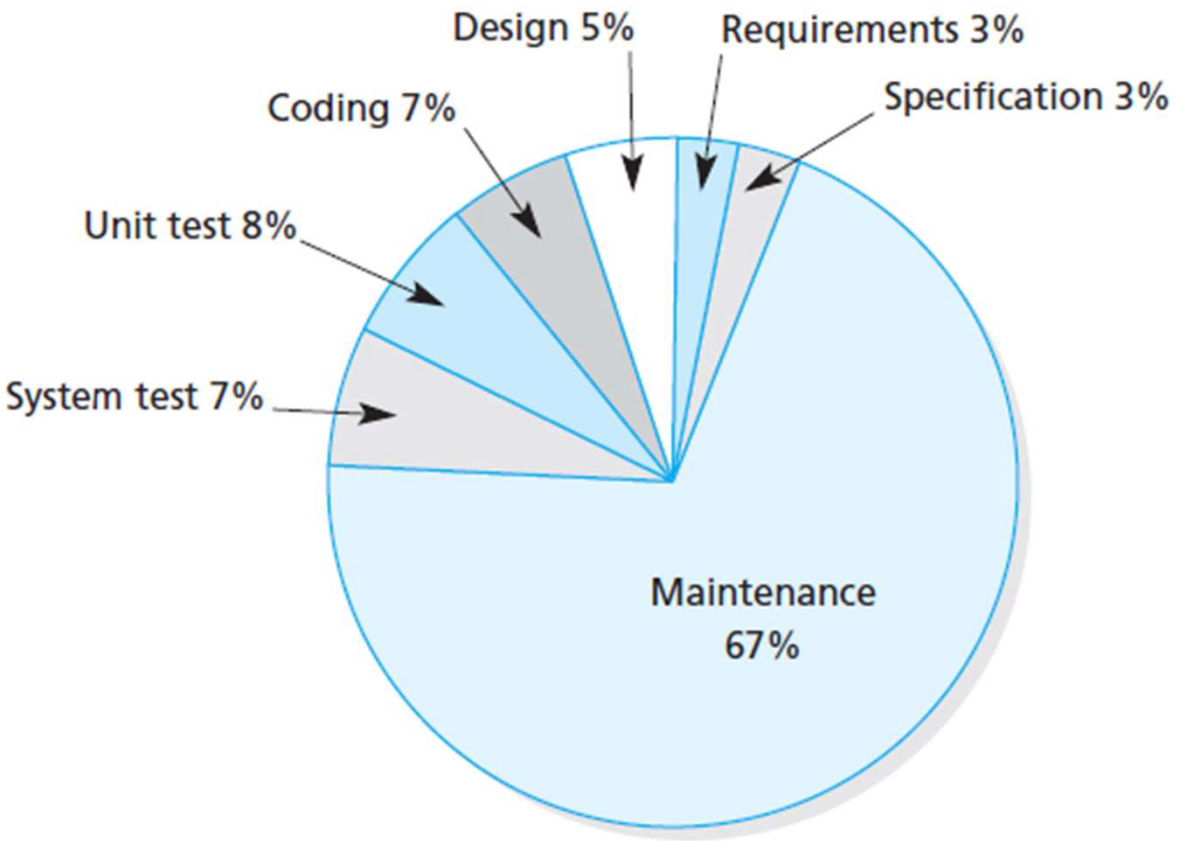
Cost of software development



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Software craftsmanship

- A good craftsperson takes the time and effort to make something of quality which is worthwhile to have and which will still function way after the crafted item has been made.

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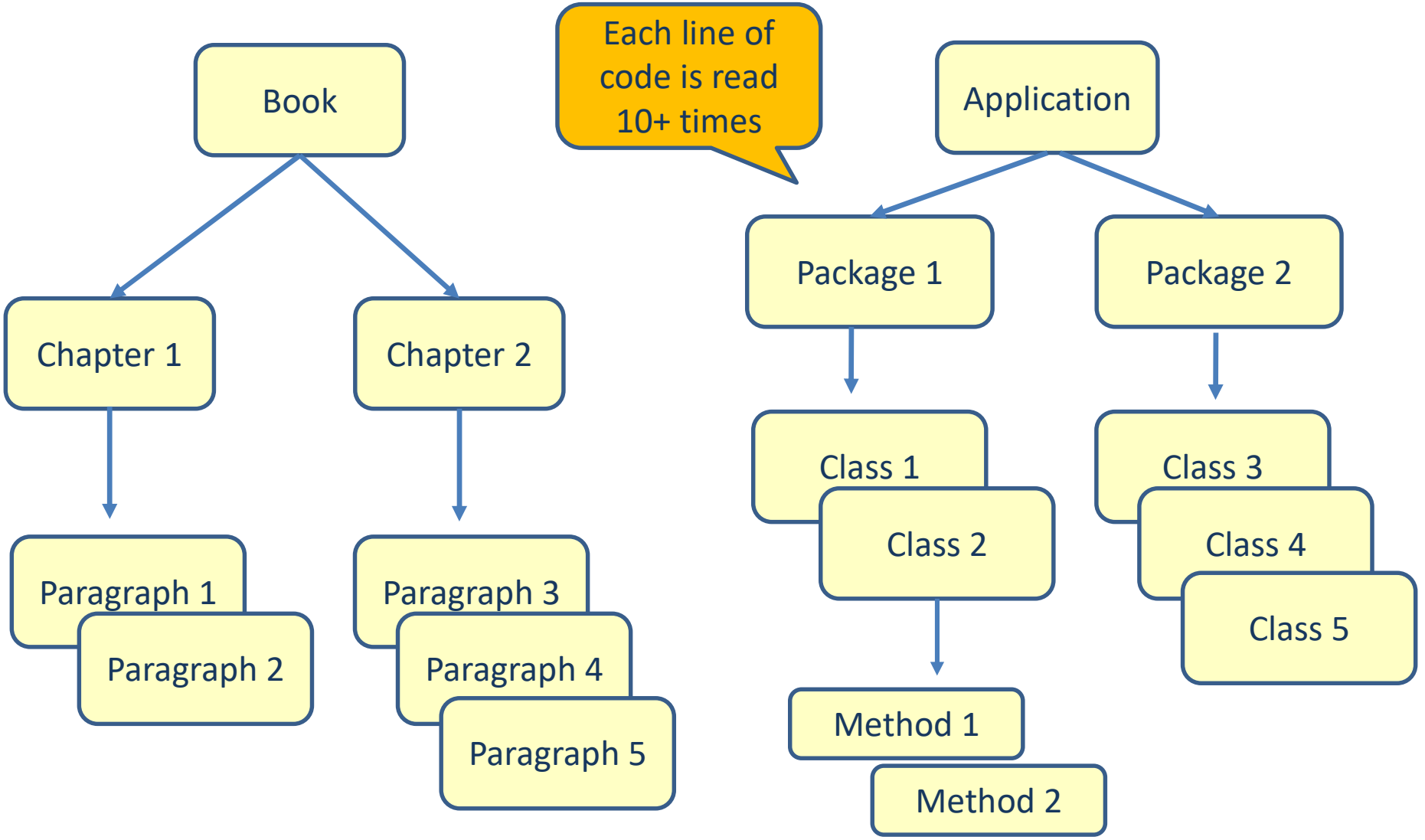
You are an author!



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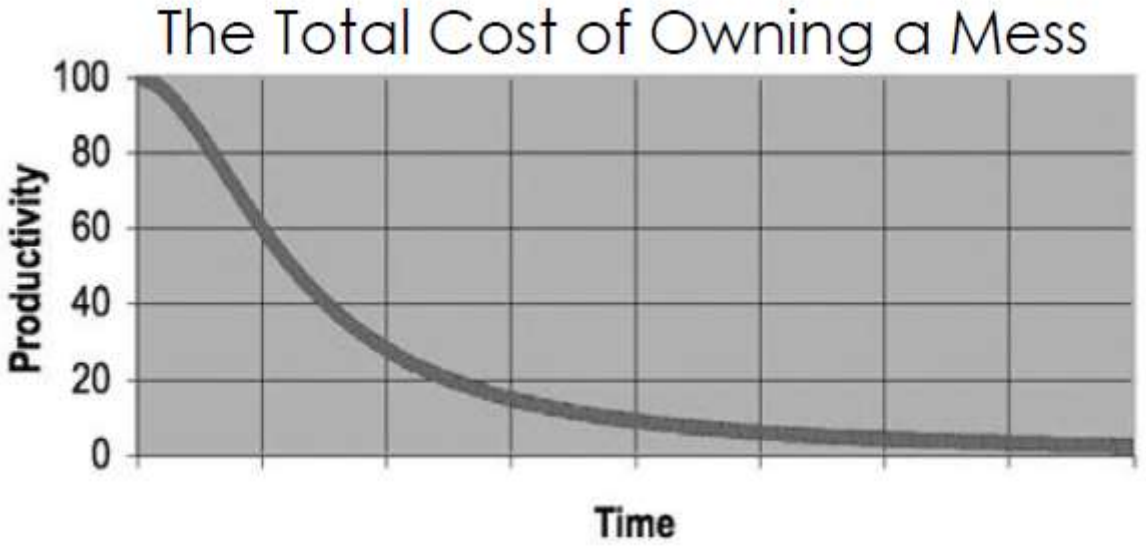
Why clean code



"Any one can write code that a computer can understand, the trick is to write code that humans can understand."

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Boy scout rule

- Leave the campground cleaner than you found it

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Ugly code

```
public class Inventory {
    List<Product> sl = new ArrayList<>();

    boolean isInStock(String n) {
        Product s = new Product(n);
        int k = 0;
        int h = sl.size() - 1;

        while (k <= h) {
            int m = k + (h - k) / 2;
            int c = sl.get(m).compareTo(s);

            if (c < 0) {
                k = m + 1;
            } else if (c > 0) {
                h = m - 1;
            } else {
                return true;
            }
        }
        return false;
    }
}
```

NOT OK

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Clean code

```
public class Inventory {
    List<Product> sortedList = new ArrayList<>();

    boolean isInStock(String name) {
        Product supply = new Product(name);
        int low = 0;
        int high = sortedList.size() - 1;

        while (low <= high) {
            int middle = low + (high - low) / 2;
            int comparison = sortedList.get(middle).compareTo(supply);

            if (comparison < 0) {
                low = middle + 1;
            } else if (comparison > 0) {
                high = middle - 1;
            } else {
                return true;
            }
        }

        return false;
    }
}
```

OK

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MEANINGFUL NAMES

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Use Intention Revealing Names

- Choosing good names takes time but saves more than it takes
- If a name requires a comment, then the name does not reveal its intent.

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Use Intention Revealing Names

NOT OK

```
public List<int[]> getThem() {
  List<int[]> list1 = new ArrayList<int[]>();
  for (int[] x : theList) {
    if (x[0] == 4)
      list1.add(x);
  }
return list1;
}
```

What is the significance of the zeroth item in the list?

What kind of things are in theList?

What is the significance of the value 4?

What does this method do?

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Use Intention Revealing Names

```
public List<int[]> getThem() {
  List<int[]> list1 = new ArrayList<int[]>();
  for (int[] x : theList) {
    if (x[0] == 4)
      list1.add(x);
  }
return list1;
}
```

NOT OK

```
public List<Cell> getFlaggedCells() {
  List<Cell> flaggedCells = new ArrayList<Cell>();
  for (Cell cell : gameBoard) {
    if (cell.isFlagged())
      flaggedCells.add(cell);
  }
return flaggedCells;
}
```

OK

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Avoid abrevations

```
int d; // elapsed time in days
int ds;
int dsm;
int faid;
```

NOT OK

```
int elapsedTimeInDays;
int daysSinceCreation;
int daysSinceModification;
int fileAgeInDays;
```

OK

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Avoid disinformation

- Avoid leaving false clues that obscure the meaning of code.
  - Do not refer to a grouping of accounts as an ***accountList*** unless it's actually a List.
    - The word **list** means something specific to programmers.
    - Plain ***accounts*** would be better.
- Beware of using names which vary in small ways.
  - XYZControllerForEfficientHandlingOfStrings
  - XYZControllerForEfficientStorageOfStrings

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Avoid disinformation

```
Customer[] customerList;
Table theTable;
```

NOT OK

```
Customer[] customers;
Table customers;
```

OK

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Avoid disinformation

Avoid variable names like lowercase L or uppercase O

```
int a = l;
if (O == 1)
  a = O1;
else
  l = O1;
```

NOT OK

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Make meaningful distinctions

```
public static void copyChars(char a1[], char a2[]) {
  for (int i = 0; i < a1.length; i++) {
    a2[i] = a1[i];
  }
}
```

NOT OK

```
public static void copyChars(char source[], char destination[]) {
  for (int i = 0; i < source.length; i++) {
    destination[i] = source[i];
  }
}
```

OK

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Use Pronounceable Names

- If you can't pronounce it, you can't discuss it without sounding like an idiot.
- This matters because programming is a social activity.

```
class DtaRcrd102 {
  private Date genymdhms;
  private Date modymdhms;
  private string s1 = "102";
  /*.....*/
}
```

NOT OK

```
class Customer {
  private Date generationTimestamp;
  private Date modificationTimestamp;
  private string recordId = "102";
  /*.....*/
}
```

OK

Intelligent conversation is now possible: *"Hey, Mikey, take a look at this record! The generation timestamp is set to tomorrow's date! How can that be?"*

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Use searchable names

- Single-letter names and numeric constants have a particular problem in that they are not easy to locate across a body of text.
  - `MAX_CLASSES_PER_STUDENT` vs. `7`
- `e` is a poor choice for any variable

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Use searchable names

```
for (int j = 0; j < 34; j++) {
  s += (t[j] * 4) / 5;
}
```

NOT OK

```
int realDaysPerIdealDay = 4;
const int WORK_DAYS_PER_WEEK = 5;
int sum = 0;
for (int j = 0; j < NUMBER_OF_TASKS; j++) {
  int realTaskDays = taskEstimate[j] *   realDaysPerIdealDay;
  int realTaskWeeks = (realdays / WORK_DAYS_PER_WEEK);
  sum += realTaskWeeks;
}
```

OK

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Avoid Encodings

```
public class Part {
  private String m_dsc; // The textual description
  void setName(String name) {
    m_dsc = name;
  }
}
```

NOT OK

```
PhoneNumber phoneString;
// name not changed when type changed!
```

```
public class Part {
  private String description;
  void setDescription(String description) {
    this.description = description;
  }
}
```

```
PhoneNumber phone;
```

OK

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Avoid mental mapping

- Readers shouldn’t have to mentally translate your names into other names they already know.

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Class names

- Classes and objects should have noun or noun phrase names
  - Customer, WikiPage, Account, and AddressParser.
- Use names from the problem domain
  - Customer, Bookmark, Document, Measurement
- A class should have a single responsibility
  - The class name should convey its purpose
- Use compound names if necessary
  - Example: TextStyle, LevelEditor
  - Use no more than two or three words
- Avoid words like Manager, Processor, Data, Object or Info in the name of a class.
- A class name should not be a verb.

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