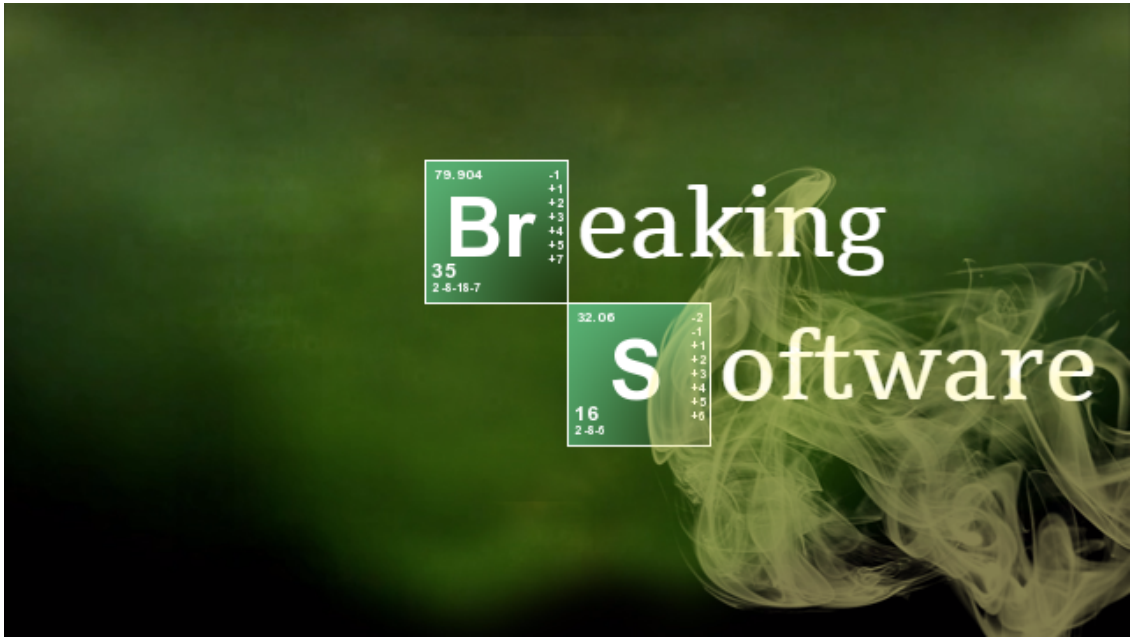
CS1632, Lecture 6



Wonsun ahn

Software tends not to break much on the "happy path"

- Happy Path: a case where user inputs valid, usual values; expected usage
- It breaks on the unexpected cases.
  - Corner cases.
  - Systems going down.
  - Malicious users.
  - When you're off in the wilderness.

Logic Errors:
The logic of the program is incorrect

- Requirement: Driving while drunk shall get a student a DUI.
- Code:

```
if (student.isDrunk() || student.isDriving()) {
   student.setDUI(true);
} else {
   student.setDUI(false);
}
```

OFF-by-one error: a subset of logic errors where values are specified incorrectly by one unit

- Requirement: The minimum drinking age for student shall be 21.
- Code:

```
if (student.getAge() > 21) {
   student.setCanDrink(true);
} else {
   student.setCanDrink(false);
}
```

Rounding/floating point errors: rounding or floating point display give incorrect results.

```
double oneVal = 1.0 / 857.0;
double total = oneVal * 857.0;

System.out.println("Should be 1.0, actually = " + total);

boolean areEqual = (total == 1.0);
System.out.println("Are equal? " + areEqual);
```

Integration errors:
Errors at boundaries between systems/subsystems.

```
int startDistanceInKilometers = 14;
spacecraft.setDistance(startDistanceInKilometers);

...

public class Spacecraft
   public void setDistance(int distanceInMiles) {
      ...
   }
}
```

Errors of assumption:
developer or system makes an assumption which turns out to be incorrect, or at odds with other assumptions.

```
OutputFile.write(TAB_DELIMITED);

...

InputFile.read(COMMA_DELIMITED);
```

MISSING DATA ERRORS:
An error occurs because needed data is missing and the system cannot operate properly without it.

```
public static void main(String[] args) {
    System.out.println(args[3]);
}
```

BAD DATA ERRORS:
System cannot handle improperly formatted or invalid data.

```
Enter two numbers to divide: 7 0
Exception in thread "main“
    java.lang.ArithmeticException: / by zero
```

DISPLAY ERRORS:
The data is correct but not displayed properly.

```
double pi = Math.PI;
System.out.printf("Pi is equal to %.1f", pi);
```

Null pointer error:
The program dereferences a null pointer.

```
String oneILove = null;
oneILove = oneILove.toUpperCase();

System.out.printf("This one goes out to
the one I love," + oneILove);
```

I/O Errors:
The system encounters an unexpected state of disk, network, or other I/O and cannot handle it.

```
try {
    // read in file
} catch (FileNotFoundException e) {
    // AAARGH WHAT DO I DO
    System.exit(1);
}
```

Configuration error:
The system could work correctly, but it was not configured to work correctly.

```
'javac' is not recognized as an internal
or external command, operable program or
batch file.
```

The list goes on…

- Data type errors
  - Error arising due to incorrect implicit / explicit data type conversion
- Permission errors
  - No permission to access a required resource (file, database table, etc.)
- Version mismatch errors
  - Library version not the same version software was intended to be used with
- Distributed system errors
  - Error while communicating between different parts of distributed system
  - E.g. Error in data marshalling / demarshalling between client / server
- Interface errors
  - Error arising from developer misunderstanding behavior of an API

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