

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