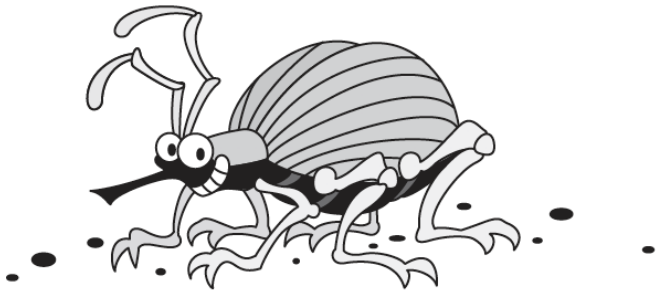
Debugging

What is Debugging?

Indranil Saha

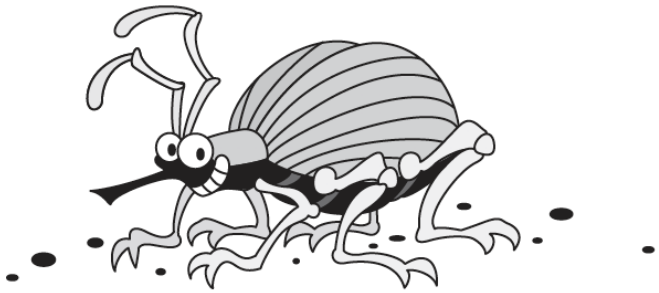
Department of Computer Science and Engineering
Indian Institute of Technology Kanpur

Software Bug



- Mistakes in the code, more technically referred as “errors”, “defects”, or “faults”

Software Bug



- Mistakes in the code, more technically referred as “errors”, “defects”, or “faults”

What is Debugging?

- The process of identifying the root cause of an error and correcting it
- Generally interleaved with *Testing*, which is the process of detecting an error

Debugging and Testing

- Testing finds errors, debugging localizes and repairs them
- Together these form the “testing/debugging cycle”: we test, then debug, then repeat
- Any debugging should be followed by a reapplication of all relevant tests, particularly regression tests. This avoids (reduces) the introduction of new bugs when debugging
- Testing and debugging need not be done by the same people (and often should not be)

Variations in Debugging Performance

	Fastest Three Programmers	Slowest Three Programmers
Average debug time (minutes)	5.0	14.1
Average number of defects not found	0.7	1.7
Average number of defects made correcting defects	3.0	7.7

Source: "Some Psychological Evidence on How People Debug Computer Programs" (Gould 1975)

Results of a classic study that examined how effectively professional programmers with at least four years of experience debugged a program with 12 defects

The Devil's Guide to Debugging

- Find the defect by guessing
- Fix the bug by trail and error
- Fix the error with the most obvious fix

```
x = Compute( y )
// Compute() doesn't work for y = 17, fixed it
if ( y = 17 )
    x = 25.15
```

Debugging

What is Debugging?

Indranil Saha

Department of Computer Science and Engineering
Indian Institute of Technology Kanpur