CMPT 473
Software Testing, Reliability and Security

Intro to Testing

Nick Sumner

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Testing (informally):

Running the program to see if it behaves as expected

Simple idea, but…

- More than half of development cost
- Still cheaper than not testing
- Testing well is hard

Ideas?

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A primitive example of *fuzz testing*.

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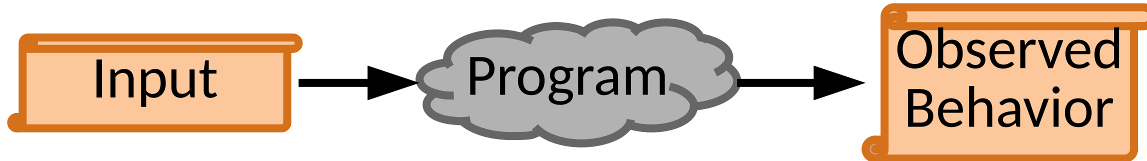

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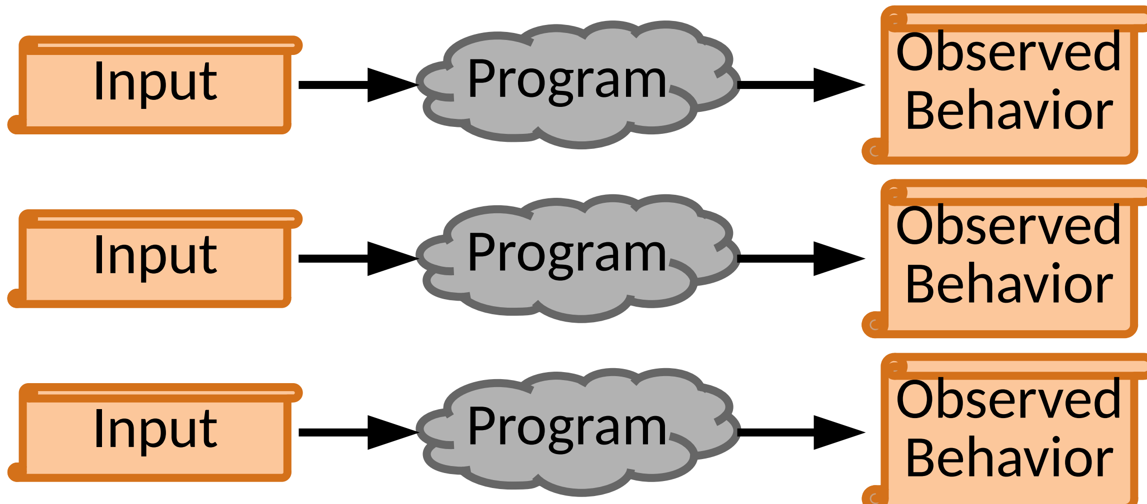

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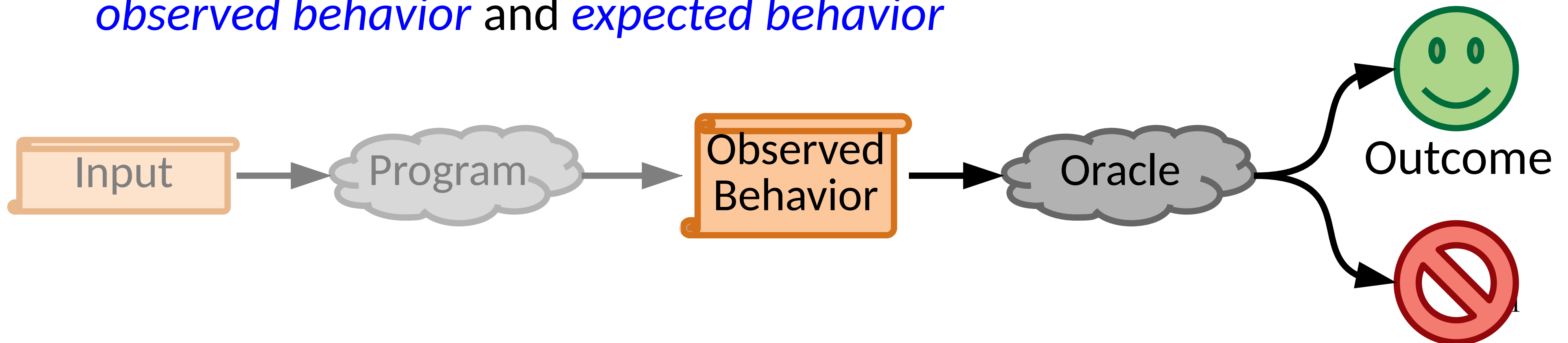

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We can use this framework to refine how we test

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We'll start this semester by looking at functional goals.

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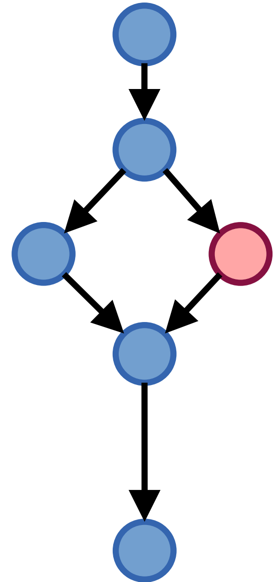
  - Flaws in static software (e.g. incorrect code)



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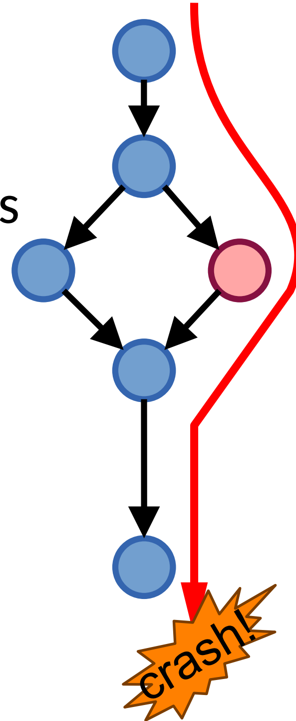

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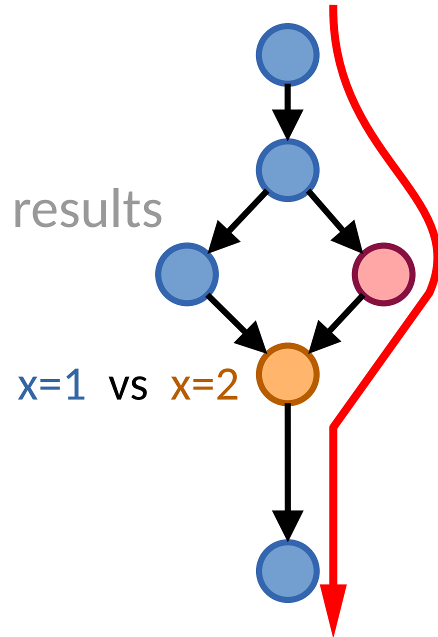

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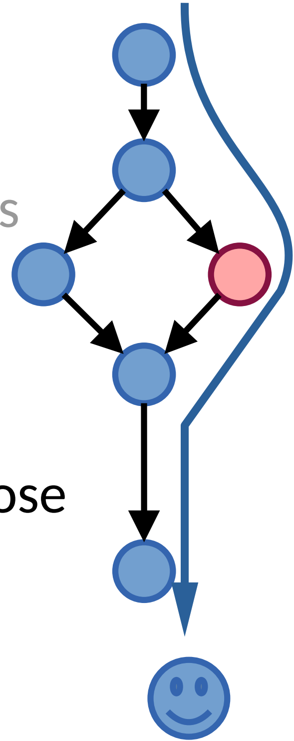

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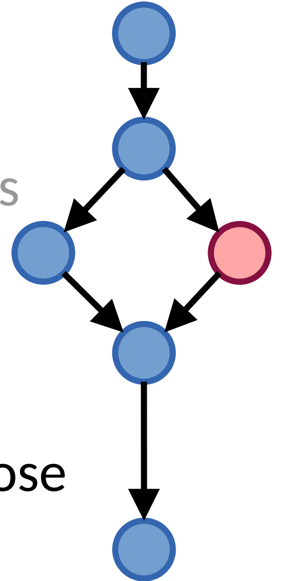

The later a defect is found, the more it costs to fix. ***Why?***

A Simple Example

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void toUppercase(char *str) {
  for (int i = 0, e = strlen(str) - 1; i < e; ++i) {
    if (isletter(str[i]) && islower(str[i])) {
      str[i] = str[i] - 32;
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  }
  printf(“%s\n”, str);
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What exactly do we mean by test case?

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Test cases need

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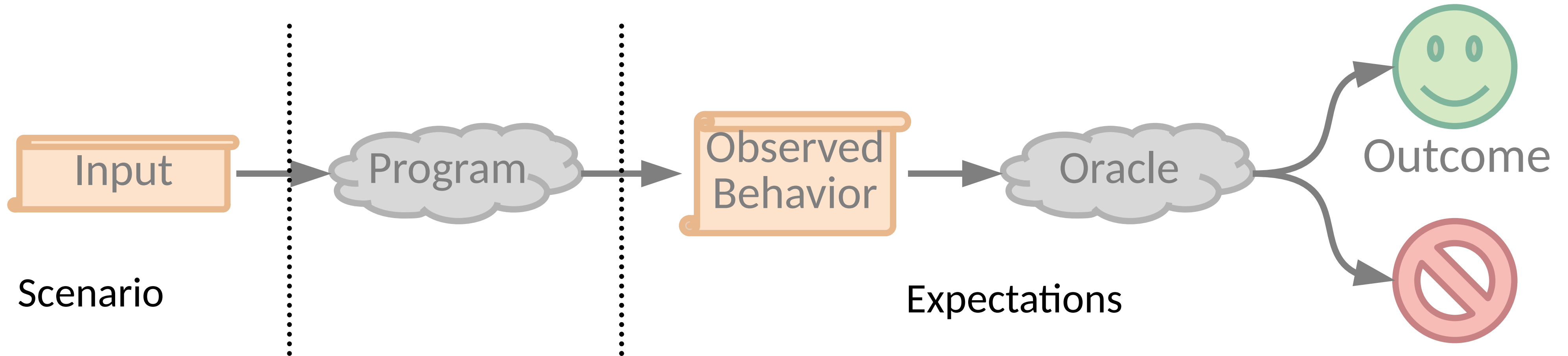

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But where does the expected behavior come from?

- An *oracle*

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- Sometimes tricky
  - Is result strictly specified? (content,order, timing,…)
  - Is the program deterministic?
- Sometimes requires a person
  - Expensive and undesirable
  - “Does this software meet my needs?”

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Key Idea:

- Find a finite test suite that is *representative* of our goals

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- Identify
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No approach covers everything you want!

Need to combine them for a balanced approach toward the desired goals.

Where we will go with testing

In the future, we will look at:

- Different types of testing (Unit, UI, Performance, …)
- How to measure testing
- How to create new tests automatically
- How to test challenging scenarios (ML? Simulations?)

Next Up…

Revisit the basics of unit testing.