UCT Department of Computer Science
Computer Science 1015F

Debugging and Testing

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Debugging

- **Debugging** is the process of finding **errors** or **bugs** in the code.
- A **debugger** is a tool for executing an application where the programmer can carefully control execution and inspect data.
- Features include:
  - step through code one instruction at a time
  - viewing variables
  - insert and remove breakpoints to pause execution

Test Cases

- Based on Input:
  - Choose one value in each **equivalence classes** – sets of input values that behave similarly.
  - Choose values on either side of and at **boundary values** – values between equivalence classes.
- Based on Code:
  - **Path coverage**: choose values that test every possible path through the statements at least once.
  - **Statement coverage**: Choose values that test every possible statement at least once.

Assertions

- In Java a programmer can specify conditions that must always be satisfied at particular points (**invariants**) or the program produces an error. This is an **assertion**.

- Example:

```
assert (input > 0);
```


Tracing

- Insert temporary statements into code to output values during calculation.
- Very useful when there is no debugger!

- Example:

```
int x = y*y*2;
int z = x+5;

System.out.println (z);
if (z == 13)
{
    …
}
```