



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.



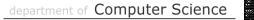
### Assertions

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)
{
...
}
```