Structural Based Testing Strategies

Data Flow Testing

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Objective

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Develop test cases to achieve data flow coverage

Approach

- Annotate control flow graph with 3 sets for each node
- Def(i) – set of variables defined in node I
- C-Use(i) – set of variables used in a computation in node I
- P-Use(i) – set of variables used in a test predicate

Example

```
Get x,z;
y := 0;
If x > 10
    then y := 15;
If z > 0
    then w := y+1
    else  w := y-1;
```

Definition Clear Path

A definition clear path from node “i” to node “j” for a variable x is a path where x is defined in node j and either used in a test predicate or computation in node j and there is no re-definition of x between node i and node j

Example

```
get x,y;
a := 0;
b := 0;
if x > 10
    then w := a+1
              b := 4
    else  w := b+1
             a := 4;
If y > 10
    then   z := a+w
    else    z := b+w;
```

Definition Use (DU path) Coverage

- For each definition of a variable, develop test cases to execute all DU paths
- DU path starts with the definition of the variable and ends with either a computational or predicate use of the variable along a def-clear path

Example

```
get x,y;
a := 0;
b := 0;
if x > 10
    then w := a+1
            b := 4
    else  w := b+1
          a := 4;
If y > 10
    then   z := a+w
    else    z := b+w;
```

Summary