

# Software Quality Metrics

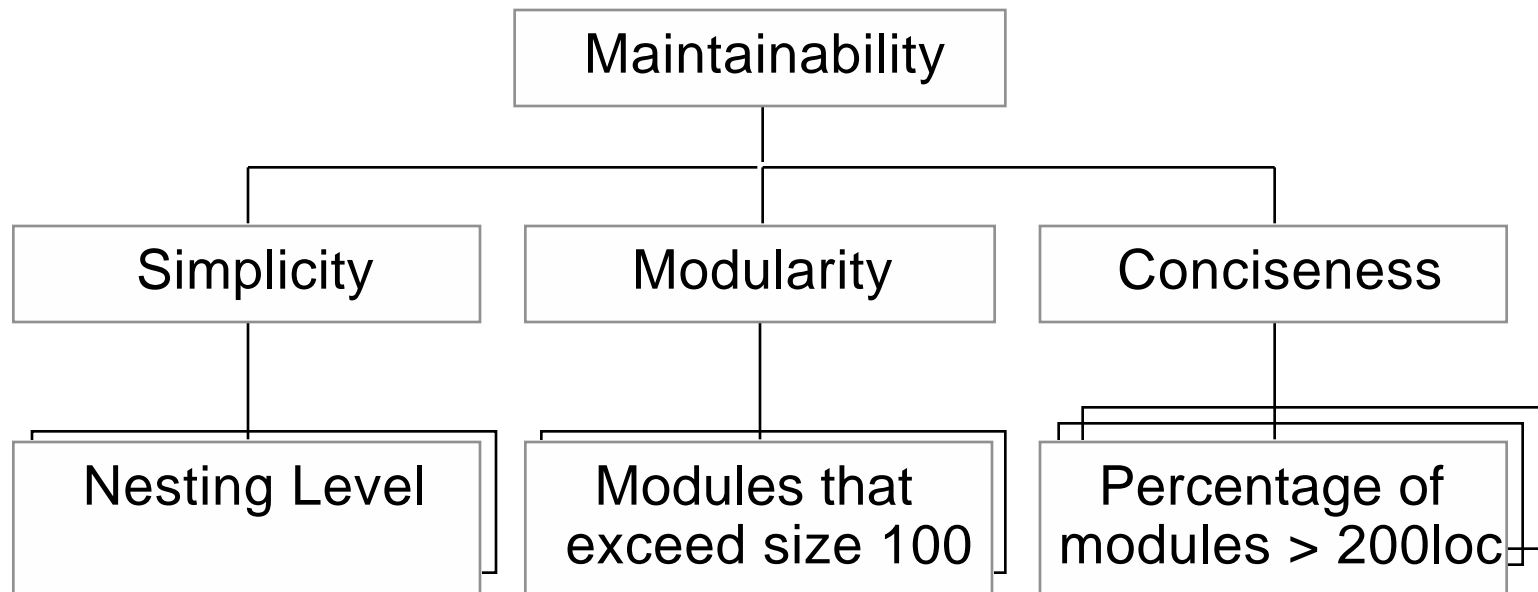
What does software quality mean?

and

How is it measured?

# Factors in Software Quality

Factor Criteria Metric



# Elements of Software Science

- Halstead's Program length - Measure of design or modularity

X:=+3;

IF X>B THEN

A:=B;

B:=X;

ELSE A:=X;

$N_1 = 10$  (# of operands)

$N_2 = 10$  (# of operators)

$n_1 = 4$  (# of unique operands)

$n_2 = 4$  (# of unique operators)

$N = N_1 + N_2$

Threshold Value: 350

# Elements of Software Science

- Halstead's Difficulty - measure of how difficult the component was to create

$$\text{Program Volume}(V) = N \log_2 n$$

$$\text{Potential volume}(V^*) = (2+n_2) \log_2(2+n_2)$$

$$\text{Program level}(L) = \frac{V^*}{V}$$

$$\text{Effort} = \frac{V^2}{V^*}$$

Threshold Value: 50

# Complexity Metrics

- **Cyclomatic number** - measures the difficulty and feasibility of testing
  - A measure of the number of testable paths in a module
  - Threshold value: 15
- **Essential complexity** - measures the structure of testable paths in a component
  - A graph should contain only the four basic simple structured constructs
  - Threshold value: 7

# Complexity Metrics

- **Design Complexity** - Measures the control flow implemented by the design
  - measures the minimum number of integration tests
  - Threshold value: 10

# Software Quality

- Do the metrics provide indicators of software quality?
- Design versus Code metrics
- Commercial products and generated code
- Language dependencies
- Source Lines of Code

# Follow on Topics

- Object Oriented design metrics
- Other quality frameworks
- Design metrics
- Software reusability