

# a Practical Theory of Programming

theory = formalism + rules of proof, calculation, manipulation

formal  $\neq$  careful, detailed

informal  $\neq$  sloppy, sketchy

formal = using formulas (mathematical expressions)

informal = using a natural language (English)

theory  $\Rightarrow$  proof, calculation, precision, understanding

start informal (with discussion)

end formal (with program)

## Other theories

Hoare triples  $P\{S\}R$  or  $\{P\}S\{R\}$

Dijkstra's weakest preconditions  $wp(S, R)$

Communicating Sequential Processes (CSP)

Vienna Development Method (VDM)

Z

temporal logic  $\square$   $\diamond$

process algebra

event traces

interleaved histories

...

## This theory

simpler and more general

includes terminating and nonterminating computation

includes sequential and parallel computation

includes stand-alone and interactive computation

includes time and space bounds and real time

includes probabilistic computations