

At-Most-Once Property

Andrews defined a condition called at-most-once under which expression evaluations and assignments will appear to be atomic.

A critical reference in an expression is a reference to a variable that is changed by another thread.

- (1) An assignment statement $x = e$ satisfies the at-most-once property if either:
 - (1-1) e contains at most one critical reference and x is neither read nor written by another thread, or
 - (1-2) e contains no critical references, in which case x may be read or written by other threads.
- (2) An expression that is not in an assignment satisfies at-most-once property if it contains no more than one critical reference.

This condition is called at-most-once because there can be at most one shared variable, and the shared variable can be referenced at most one time. Assignment statements that satisfy at-most-once property appear to execute atomically even though they are not atomic. That is, we would get the same results from executing these assignment statements even if we were to somehow prevent the interleaving of their machine instructions so that the assignment statements were forced to execute atomically.