11.10 Preconditions and Postconditions

Programmers spend significant amounts of time maintaining and debugging code. To facilitate these tasks and to improve the overall design, you can specify the expected states before and after a method's execution. These states are called preconditions and postconditions, respectively.

Preconditions

A **precondition** must be true when a method is *invoked*. Preconditions describe constraints on method parameters and any other expectations the method has about the current state of a program *just before it begins executing*. If the preconditions are *not* met, then the method's behavior is *undefined*—it may *throw an exception, proceed with an illegal value* or *attempt to recover* from the error. You should not expect consistent behavior if the preconditions are not satisfied.

Postconditions

A **postcondition** is true *after the method successfully returns*.

Postconditions describe *constraints on the return value* and any other *side effects* the method may have. When defining a method, you should document all postconditions so that others know what to expect when they call your method, and you should make certain that your method honors all its postconditions if its preconditions are indeed met.

Throwing Exceptions When Preconditions or Postconditions Are Not Met

When their preconditions or postconditions are not met, methods typically throw exceptions. As an example, examine `String` method `charAt`, which has one `int` parameter—an index in the `String`. For a precondition, method `charAt` assumes that `index` is greater than or equal to zero and less than the length of the `String`. If the precondition is met, the postcondition states that the method will return the character at the position in the `String` specified by the parameter `index`. Otherwise, the method throws an `IndexOutOfBoundsException`. We trust that method `charAt` satisfies its postcondition, provided that we meet the precondition. We need not be concerned with the details of how the method actually retrieves the character at the index.

Typically, a method's preconditions and postconditions are described as part of its specification. When designing your own methods, you typically state the preconditions and

postconditions in a comment before the method declaration.