Scope of Variables

Hui Chen

Department of Computer & Information Science

Brooklyn College

Objectives

- To determine the scope of variables (§6.9).

Outline

- Discussed
  - Defining and invoking value-returning methods
  - Defining and invoking void methods
  - Parameter passing and passing by value
  - Using method to modularize several example problems (including converting hexadecimal to decimal)
  - Method overload,
  - Pitfalls and errors (including ambiguous method invocation)
- To discuss
  - Scope of variables
  - Local variables and scope of local variables

Scope of Variables

- The part of the program where the variable can be referenced

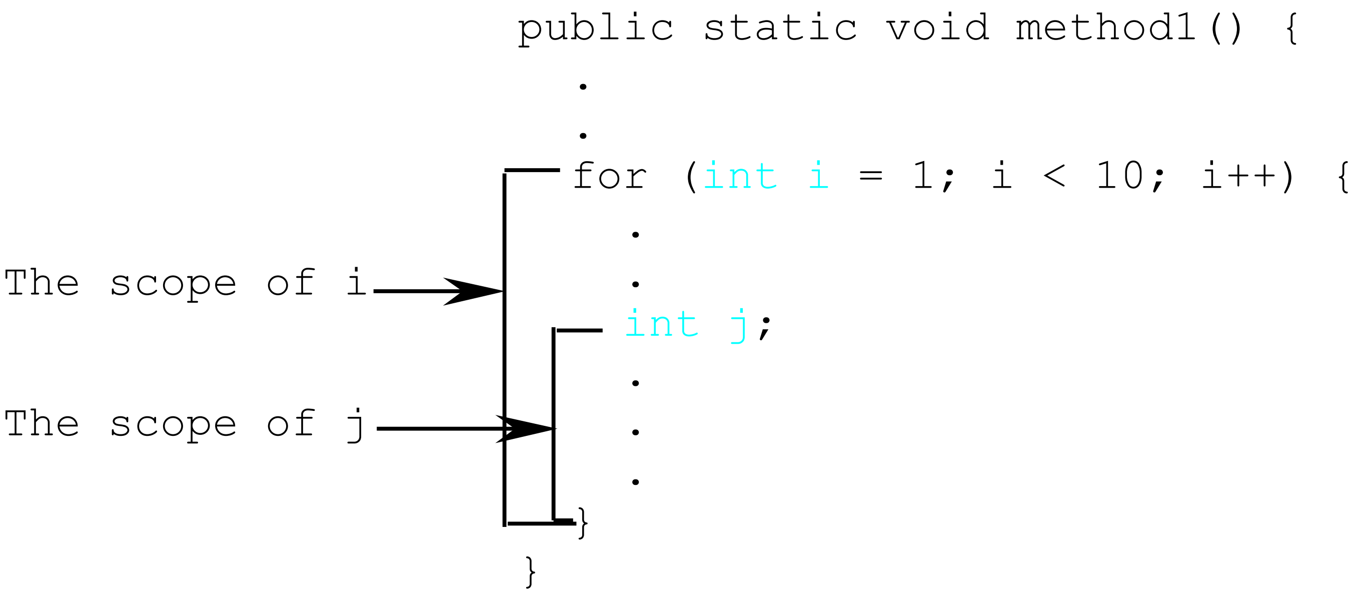
Scope of Local Variables

- A local variable: a variable defined inside a method
- The scope of a local variable starts from its declaration and continues to the end of the block that contains the variable.
- A local variable must be declared before it can be used.
- You can declare a local variable with the same name multiple times in different non-nesting blocks in a method, but you cannot declare a local variable twice in nested blocks.

Scope of Local Variables and For Loops

- A variable declared in the *initial action* part of a for loop header has its scope in the entire loop.
- But a variable declared inside a for loop body has its scope limited in the loop body from its declaration and to the end of the block that contains the variable

For Loop Example

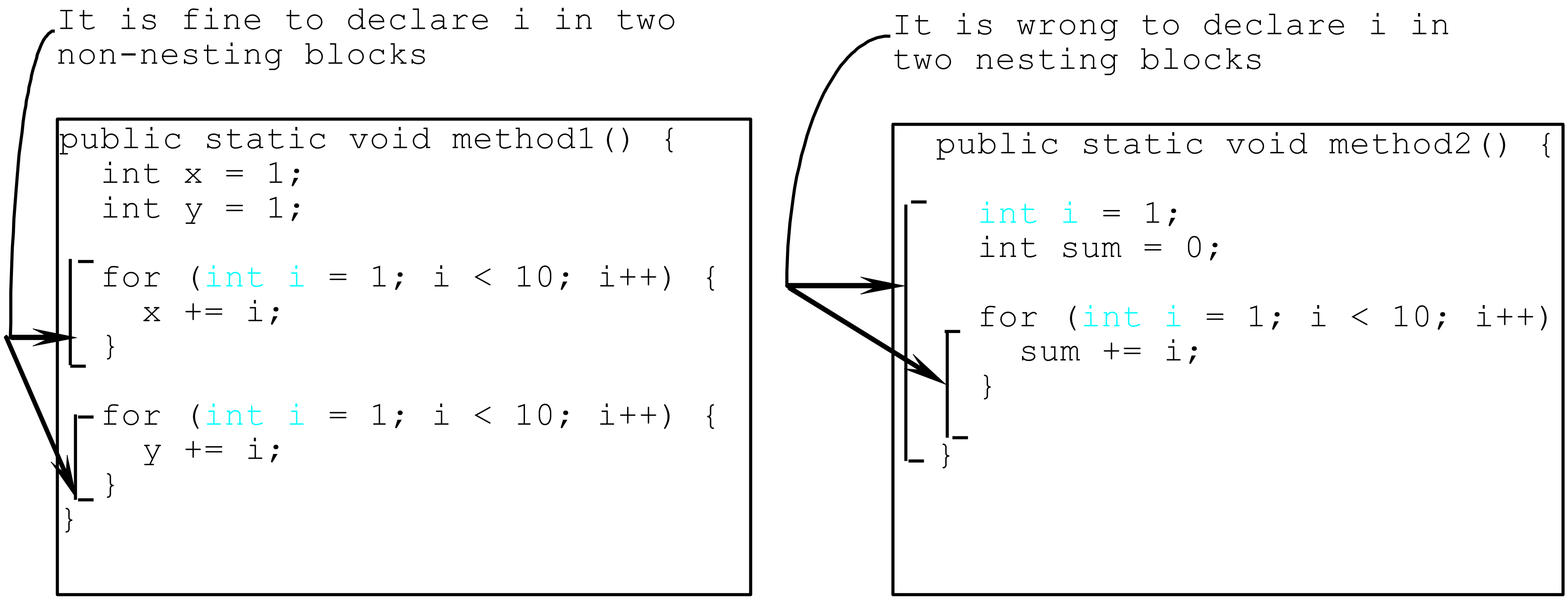


```
public static void method1() {
  .
  .
  for (int i = 1; i < 10; i++) {
    .
    .
    int j;
    .
    .
    .
  }
}
```

The scope of i

The scope of j

Multiple Variables, Same Name



It is fine to declare i in two non-nesting blocks

```
public static void method1() {
  int x = 1;
  int y = 1;

  for (int i = 1; i < 10; i++) {
    x += i;
  }

  for (int i = 1; i < 10; i++) {
    y += i;
  }
}
```

It is wrong to declare i in two nesting blocks

```
public static void method2() {

  int i = 1;
  int sum = 0;

  for (int i = 1; i < 10; i++)
    sum += i;
  }

}
```

How about this example?
Compilation error or not?

```
public static void correctMethod() {
  int x = 1;
  int y = 1;
  // i is declared
  for (int i = 1; i < 10; i++) {
    x += i;
  }
  // i is declared again
  for (int i = 1; i < 10; i++) {
    y += i;
  }
}
```

How about this example?

Compilation error or not?

```
public static void incorrectMethod() {
  int x = 1;
  int y = 1;
  for (int i = 1; i < 10; i++) {
    int x = 0;
    x += i;
  }
}
```

Questions