Getting Started with Blocks

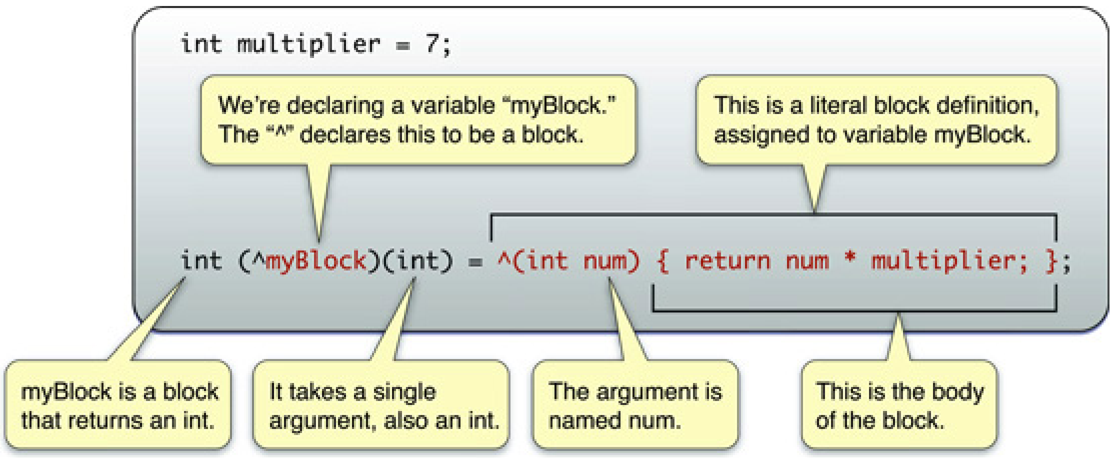
The following sections help you to get started with blocks using practical examples.

Declaring and Using a Block

You use the `^` operator to declare a block variable and to indicate the beginning of a block literal. The body of the block itself is contained within `{}`, as shown in this example (as usual with C, `;` indicates the end of the statement):

```
int multiplier = 7;
int (^myBlock)(int) = ^(int num) {
    return num * multiplier;
};
```

The example is explained in the following illustration:


int multiplier = 7;
We're declaring a variable "myBlock." The "^" declares this to be a block.
This is a literal block definition, assigned to variable myBlock.
int (^myBlock)(int) = ^(int num) { return num * multiplier; };
myBlock is a block that returns an int.
It takes a single argument, also an int.
The argument is named num.
This is the body of the block.

Notice that the block is able to make use of variables from the same scope in which it was defined.

If you declare a block as a variable, you can then use it just as you would a function:

```
int multiplier = 7;
int (^myBlock)(int) = ^(int num) {
    return num * multiplier;
};

printf("%d", myBlock(3));
// prints "21"
```

Using a Block Directly

In many cases, you don't need to declare block variables; instead you simply write a block literal inline where it's required as an argument. The following example uses the `qsort_b` function. `qsort_b` is similar to the standard `qsort_r` function, but takes a block as its final argument.

```
char *myCharacters[3] = { "TomJohn", "George", "Charles Condomine" };

qsort_b(myCharacters, 3, sizeof(char *), ^(const void *l, const void *r) {
    char *left = *(char **)l;
    char *right = *(char **)r;
    return strncmp(left, right, 1);
});

// myCharacters is now { "Charles Condomine", "George", "TomJohn" }
```

Blocks with Cocoa

Several methods in the Cocoa frameworks take a block as an argument, typically either to perform an operation on a collection of objects, or to use as a callback after an operation has finished. The following example shows how to use a block with the `NSArray` method `sortedArrayUsingComparator:`. The method takes a single argument—the block. For illustration, in this case the block is defined as an `NSComparator` local variable:

```
NSArray *stringsArray = @[ @"string 1",
                           @"String 21",
                           @"string 12",
                           @"String 11",
                           @"String 02" ];

static NSStringCompareOptions comparisonOptions = NSCaseInsensitiveSearch |
NSNumericSearch |
        NSWidthInsensitiveSearch | NSForcedOrderingSearch;
NSLocale *currentLocale = [NSLocale currentLocale];

NSComparator finderSortBlock = ^(id string1, id string2) {

    NSRange string1Range = NSMakeRange(0, [string1 length]);
    return [string1 compare:string2 options:comparisonOptions range:string1Range
locale:currentLocale];
};

NSArray *finderSortArray = [stringsArray
sortedArrayUsingComparator:finderSortBlock];
NSLog(@"finderSortArray: %@", finderSortArray);

/*
Output:
finderSortArray: (
    "string 1",
    "String 02",
    "String 11",
    "string 12",
    "String 21"
)
*/
```

__block Variables

A powerful feature of blocks is that they can modify variables in the same lexical scope. You signal that a block can modify a variable using the `__block` storage type modifier. Adapting the example shown in Blocks with Cocoa, you could use a block variable to count how many strings are compared as equal as shown in the following example. For illustration, in this case the block is used directly and uses `currentLocale` as a read-only variable within the block:

```
NSArray *stringsArray = @[ @"string 1",
                          @"String 21", // <-
                          @"string 12",
                          @"String 11",
                          @"Strîng 21", // <-
                          @"Striñg 21", // <-
                          @"String 02" ];


NSLocale *currentLocale = [NSLocale currentLocale];
__block NSUInteger orderedSameCount = 0;


NSArray *diacriticInsensitiveSortArray = [stringsArray
sortedArrayUsingComparator:^(id string1, id string2) {


    NSRange string1Range = NSMakeRange(0, [string1 length]);
    NSComparisonResult comparisonResult = [string1 compare:string2
options:NSDiacriticInsensitiveSearch range:string1Range locale:currentLocale];


    if (comparisonResult == NSOrderedSame) {
        orderedSameCount++;
    }
    return comparisonResult;
}];


NSLog(@"diacriticInsensitiveSortArray: %@", diacriticInsensitiveSortArray);
NSLog(@"orderedSameCount: %d", orderedSameCount);


/*
Output:


diacriticInsensitiveSortArray: (
    "String 02",
    "string 1",
    "String 11",
    "string 12",
    "String 21",
    "Str\U00eeng 21",
    "Stri\U00f1g 21"
)
orderedSameCount: 2
*/
```

This is discussed in greater detail in Blocks and Variables.