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# NSInvocation Class Reference

[Cocoa > Objective-C Language](#)



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# NSInvocation Class Reference

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<b>Inherits from</b>	NSObject
<b>Conforms to</b>	NSObject (NSObject)
<b>Framework</b>	/System/Library/Frameworks/Foundation.framework
<b>Availability</b>	Available in Mac OS X v10.0 and later.
<b>Companion guide</b>	Distributed Objects Programming Topics
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<b>Related sample code</b>	CubePuzzle DeskPictAppDockMenu

## Overview

An `NSInvocation` is an Objective-C message rendered static, that is, it is an action turned into an object. `NSInvocation` objects are used to store and forward messages between objects and between applications, primarily by `NSTimer` objects and the distributed objects system.

An `NSInvocation` object contains all the elements of an Objective-C message: a target, a selector, arguments, and the return value. Each of these elements can be set directly, and the return value is set automatically when the `NSInvocation` object is dispatched.

An `NSInvocation` object can be repeatedly dispatched to different targets; its arguments can be modified between dispatch for varying results; even its selector can be changed to another with the same method signature (argument and return types). This flexibility makes `NSInvocation` useful for repeating messages with many arguments and variations; rather than retyping a slightly different expression for each message, you modify the `NSInvocation` object as needed each time before dispatching it to a new target.

`NSInvocation` does not support invocations of methods with either variable numbers of arguments or union arguments. You should use the [invocationWithMethodSignature:](#) (page 7) class method to create `NSInvocation` objects; you should not create these objects using `alloc` and `init`.

This class does not retain the arguments for the contained invocation by default. If those objects might disappear between the time you create your instance of `NSInvocation` and the time you use it, you should explicitly retain the objects yourself or invoke the `retainArguments` method to have the invocation object retain them itself.

**Note:** `NSInvocation` conforms to the `NSCoding` protocol, but only supports coding by an `NSPortCoder`. `NSInvocation` does not support archiving.

## Adopted Protocols

### NSCoding

- `encodeWithCoder:`
- `initWithCoder:`

## Tasks

### Creating NSInvocation Objects

- + `invocationWithMethodSignature:` (page 7)  
Returns an `NSInvocation` object able to construct messages using a given method signature.

### Configuring an Invocation Object

- `setSelector:` (page 13)  
Sets the receiver's selector.
- `selector` (page 11)  
Returns the receiver's selector, or 0 if it hasn't been set.
- `setTarget:` (page 13)  
Sets the receiver's target.
- `target` (page 13)  
Returns the receiver's target, or `nil` if the receiver has no target.
- `setArgument:atIndex:` (page 11)  
Sets an argument of the receiver.
- `getArgument:atIndex:` (page 8)  
Returns by indirection the receiver's argument at a specified index.
- `argumentsRetained` (page 7)  
Returns `YES` if the receiver has retained its arguments, `NO` otherwise.
- `retainArguments` (page 11)  
If the receiver hasn't already done so, retains the target and all object arguments of the receiver and copies all of its C-string arguments.
- `setReturnValue:` (page 12)  
Sets the receiver's return value.
- `getReturnValue:` (page 9)  
Gets the receiver's return value.

## Dispatching an Invocation

- [invoke](#) (page 9)  
Sends the receiver's message (with arguments) to its target and sets the return value.
- [invokeWithTarget:](#) (page 10)  
Sets the receiver's target, sends the receiver's message (with arguments) to that target, and sets the return value.

## Getting the Method Signature

- [methodSignature](#) (page 10)  
Returns the receiver's method signature.

## Class Methods

### invocationWithMethodSignature:

Returns an `NSInvocation` object able to construct messages using a given method signature.

```
+ (NSInvocation *)invocationWithMethodSignature:(NSMethodSignature *)signature
```

#### Parameters

*signature*

An object encapsulating a method signature.

#### Discussion

The new object must have its selector set with [setSelector:](#) (page 13) and its arguments set with [setArgumentAtIndex:](#) (page 11) before it can be invoked. Do not use the `alloc/init` approach to create `NSInvocation` objects.

#### Availability

Available in Mac OS X v10.0 and later.

#### Related Sample Code

CubePuzzle

DeskPictAppDockMenu

#### Declared In

`NSInvocation.h`

## Instance Methods

### argumentsRetained

Returns YES if the receiver has retained its arguments, NO otherwise.

- (BOOL)argumentsRetained

#### Availability

Available in Mac OS X v10.0 and later.

#### See Also

- [retainArguments](#) (page 11)

#### Declared In

NSInvocation.h

## getArgumentAtIndex:

Returns by indirection the receiver's argument at a specified index.

```
- (void)getArgument:(void *)buffer atIndex:(NSInteger)index
```

#### Parameters

*buffer*

An untyped buffer to hold the returned argument. See the discussion below relating to argument values that are objects.

*index*

An integer specifying the index of the argument to get.

Indices 0 and 1 indicate the hidden arguments *self* and *\_cmd*, respectively; these values can be retrieved directly with the `target` and `selector` methods. Use indices 2 and greater for the arguments normally passed in a message.

#### Discussion

This method copies the argument stored at *index* into the storage pointed to by *buffer*. The size of *buffer* must be large enough to accommodate the argument value.

When the argument value is an object, pass a pointer to the variable (or memory) into which the object should be placed:

```
NSArray *anArray;
[invokee getArgument:&anArray atIndex:3];
```

This method raises `NSInvalidArgumentException` if *index* is greater than the actual number of arguments for the selector.

#### Availability

Available in Mac OS X v10.0 and later.

#### See Also

- [setArgumentAtIndex:](#) (page 11)

- `numberOfArguments` (NSMethodSignature)

#### Declared In

NSInvocation.h



## getReturnValue:

Gets the receiver's return value.

- (void)getReturnValue:(void \*)*buffer*

### Parameters

*buffer*

An untyped buffer into which the receiver copies its return value. It should be large enough to accommodate the value. See the discussion below for more information about *buffer*.

### Discussion

Use the `NSMethodSignature` method `methodReturnLength` to determine the size needed for *buffer*:

```
NSUInteger length = [[myInvocation methodSignature] methodReturnLength];
buffer = (void *)malloc(length);
[invocation getReturnValue:buffer];
```

When the return value is an object, pass a pointer to the variable (or memory) into which the object should be placed:

```
id anObject;
NSArray *anArray;
[invocation1 getReturnValue:&anObject];
[invocation2 getReturnValue:&anArray];
```

If the `NSInvocation` object has never been invoked, the result of this method is undefined.

### Availability

Available in Mac OS X v10.0 and later.

### See Also

- [setReturnValue:](#) (page 12)
- `methodReturnType` (`NSMethodSignature`)

### Related Sample Code

CubePuzzle

### Declared In

`NSInvocation.h`

## invoke

Sends the receiver's message (with arguments) to its target and sets the return value.

- (void)invoke

### Discussion

You must set the receiver's target, selector, and argument values before calling this method.

### Availability

Available in Mac OS X v10.0 and later.

### See Also

- [getReturnValue:](#) (page 9)

- [selector:](#) (page 13)
- [target:](#) (page 13)
- [argumentAtIndex:](#) (page 11)

**Related Sample Code**

CubePuzzle

**Declared In**

NSInvocation.h

**invokeWithTarget:**

Sets the receiver's target, sends the receiver's message (with arguments) to that target, and sets the return value.

```
- (void)invokeWithTarget:(id)anObject
```

**Parameters***anObject*

The object to set as the receiver's target.

**Discussion**

You must set the receiver's selector and argument values before calling this method.

**Availability**

Available in Mac OS X v10.0 and later.

**See Also**

- [returnValue:](#) (page 9)
- [invoke](#) (page 9)
- [selector:](#) (page 13)
- [target:](#) (page 13)
- [argumentAtIndex:](#) (page 11)

**Declared In**

NSInvocation.h

**methodSignature**

Returns the receiver's method signature.

```
- (NSMethodSignature *)methodSignature
```

**Availability**

Available in Mac OS X v10.0 and later.

**Declared In**

NSInvocation.h

## retainArguments

If the receiver hasn't already done so, retains the target and all object arguments of the receiver and copies all of its C-string arguments.

- (void)retainArguments

### Discussion

Before this method is invoked, [argumentsRetained](#) (page 7) returns NO; after, it returns YES.

For efficiency, newly created NSInvocations don't retain or copy their arguments, nor do they retain their targets or copy C strings. You should instruct an NSInvocation to retain its arguments if you intend to cache it, since the arguments may otherwise be released before the NSInvocation is invoked. NSTimers always instruct their NSInvocations to retain their arguments, for example, because there's usually a delay before an NSTimer fires.

### Availability

Available in Mac OS X v10.0 and later.

### Declared In

NSInvocation.h

## selector

Returns the receiver's selector, or 0 if it hasn't been set.

- (SEL)selector

### Availability

Available in Mac OS X v10.0 and later.

### See Also

- [setSelector:](#) (page 13)

### Declared In

NSInvocation.h

## setArgumentAtIndex:

Sets an argument of the receiver.

- (void)setArgument:(void \*)*buffer* atIndex:(NSInteger)*index*

### Parameters

*buffer*

An untyped buffer containing an argument to be assigned to the receiver. See the discussion below relating to argument values that are objects.

*index*

An integer specifying the index of the argument.

Indices 0 and 1 indicate the hidden arguments *self* and *\_cmd*, respectively; you should set these values directly with the [setTarget:](#) (page 13) and [setSelector:](#) (page 13) methods. Use indices 2 and greater for the arguments normally passed in a message.

**Discussion**

This method copies the contents of *buffer* as the argument at *index*. The number of bytes copied is determined by the argument size.

When the argument value is an object, pass a pointer to the variable (or memory) from which the object should be copied:

```
NSArray *anArray;
[invocation setArgument:&anArray atIndex:3];
```

This method raises `NSInvalidArgumentException` if the value of *index* is greater than the actual number of arguments for the selector.

**Availability**

Available in Mac OS X v10.0 and later.

**See Also**

- [getArgumentAtIndex:](#) (page 8)
- `numberOfArguments` (NSMethodSignature)

**Related Sample Code**

CubePuzzle

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**Declared In**

`NSInvocation.h`

**setReturnValue:**

Sets the receiver's return value.

```
- (void)setReturnValue:(void *)buffer
```

**Parameters**

*buffer*

An untyped buffer whose contents are copied as the receiver's return value.

**Discussion**

This value is normally set when you send an [invoke](#) (page 9) or [invokeWithTarget:](#) (page 10) message.

**Availability**

Available in Mac OS X v10.0 and later.

**See Also**

- [getReturnValue:](#) (page 9)
- `methodReturnLength` (NSMethodSignature)
- `methodReturnType` (NSMethodSignature)

**Declared In**

`NSInvocation.h`

## setSelector:

Sets the receiver's selector.

- (void)setSelector:(SEL)*selector*

### Parameters

*selector*

The selector to assign to the receiver.

### Availability

Available in Mac OS X v10.0 and later.

### See Also

- [selector](#) (page 11)

### Related Sample Code

CubePuzzle

DeskPictAppDockMenu

### Declared In

NSInvocation.h

## setTarget:

Sets the receiver's target.

- (void)setTarget:(id)*anObject*

### Parameters

*anObject*

The object to assign to the receiver as target. The target is the receiver of the message sent by [invoke](#) (page 9).

### Discussion

### Availability

Available in Mac OS X v10.0 and later.

### See Also

- [target](#) (page 13)

- [invokeWithTarget:](#) (page 10)

### Related Sample Code

CubePuzzle

DeskPictAppDockMenu

### Declared In

NSInvocation.h

## target

Returns the receiver's target, or `nil` if the receiver has no target.

- (id)target

#### Availability

Available in Mac OS X v10.0 and later.

#### See Also

- [setTarget:](#) (page 13)

#### Declared In

NSInvocation.h

## Constants

### Parameter Type Constants

Method argument types. (**Deprecated.** These constants are used internally by `NSInvocation`—you should not use them directly.)

```
enum _NSObjCValueType {
    NSObjCNoType = 0,
    NSObjCVoidType = 'v',
    NSObjCCharType = 'c',
    NSObjCShortType = 's',
    NSObjCLongType = 'l',
    NSObjCLonglongType = 'q',
    NSObjCFloatType = 'f',
    NSObjCDoubleType = 'd',

    NSObjCBoolType = 'B',

    NSObjCSelectorType = ':',
    NSObjCObjectType = '@',
    NSObjCStructType = '{',
    NSObjCPointerType = '^',
    NSObjCStringType = '*',
    NSObjCArrayType = '[',
    NSObjCUnionType = '(',
    NSObjCBitfield = 'b'
};
```

#### Constants

NSObjCNoType

No type information. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCVoidType

The `void` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCCharType

The `char` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCShortType

The `short` integer type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCLongType

The `long` integer type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCLonglongType

The `long long` integer type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCFloatType

The `float` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCDoubleType

The `double` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCBoolType

The `BOOL` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.2 and later.

Declared in `NSInvocation.h`.

NSObjCSelectorType

The `SEL` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCObjectType

The `id` type. (**Deprecated.** Used internally by `NSInvocation`—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in `NSInvocation.h`.

NSObjCStructType

The struct type. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

NSObjCPointerType

The void\* type. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

NSObjCStringType

The char\* type. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

NSObjCArrayType

A C-style array of items. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

NSObjCUnionType

A union union type. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

NSObjCBitfield

A bit field. (**Deprecated.** Used internally by NSInvocation—do not use it directly)

Available in Mac OS X v10.0 and later.

Declared in NSInvocation.h.

**Declared In**

NSInvocation.h



# Document Revision History

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This table describes the changes to *NSInvocation Class Reference*.

Date	Notes
2008-10-15	Updated code examples to use NSInteger instead of raw types.
2007-04-19	Updated for Mac OS X version 10.5 and moved recent changes in v10.4 version.
2006-11-07	Added caveat about using alloc/init to create NSInvocation objects.
2006-05-23	First publication of this content as a separate document.

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