SOMobjects Base Toolkit

Programmers Reference Manual

Reference material for the classes, methods, functions, and macros provided in the base capabilities of the System Object Model and its basic frameworks

Version 2.0
January 1994

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Second Edition (January 1994)

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SOMobjects Toolkit Programmers Reference Manual

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About This Book

This book gives reference material for the **System Object Model** (**SOM**) of the **SOMobjects Developer Toolkit.** In particular, it contains a reference page for every class, method, function, and macro provided by the SOM run-time library, the DSOM run-time library, the Interface Repository Framework, and the Event Management Framework. It also includes documentation of the utility metaclasses provided by the SOMobjects Developer Toolkit, and each of their methods.

Also, the *SOMobjects Developer Toolkit Quick Reference Guide* shows the syntax and purpose for each entry of the current book, plus SOM Compiler commands/flags. In addition, refer to the *SOMobjects Developer Toolkit Users Guide* for introductory information.

How This Book Is Organized

At the highest level, this book is organized by framework. Within each framework, the reference pages describe the classes in alphabetical order, with the methods of each class given in alphabetical order following their corresponding class. Similarly, related functions and SOM macros are given in separate alphabetical sequences in the corresponding section. The reference page for a SOM **class** contains the following topics:

Description:	A description of the class.
File Stem:	The file stem for the class's IDL interface specification (.idl) file and its usage binding (.h/.xh) files.
Base Class:	The class's direct base (parent) classes.
Ancestor Classes:	The class's ancestor (indirect base) classes.
Metaclass:	The class's metaclass.
New Methods:	The names of the methods that the class introduces (grouped roughly according to purpose). Each new method is documented on a separate reference page.
Overriding Methods:	The names of the methods that the class overrides from ancestor classes

The reference page for a **method** of a SOM class contains the following topics:

Purpose:	The purpose of the method in brief.
Syntax:	The method's C/C++ procedure prototype (which includes the method procedure's return type and the names and types of its parameters). The in/out/inout keywords associated with each of the method's parameters in the method's IDL declaration are also shown. These keywords are shown for information only; they are not actually present in the method procedure prototype.
Description:	A description of the method's use.
Parameters:	A description of each of the method procedure's parameters**.**
Return Value:	A description of the method's return value.
Example:	An example of using or overriding the method, if available. Although methods of SOM classes are language neutral (i.e., they can be invoked from any programming language that can use SOM), the examples given here are written in C.
Original Class:	The name of the class that introduces the method (the class is documented separately in this book)**.**
Related Information:	Related methods and functions (and macros, for the SOM kernel) that can be found in this book.

The reference page for a **function** has the following topics:

Purpose:	The purpose of the function in brief.
Syntax:	The function's prototype (which includes the return type and the names and types of the parameters).
Description:	A description of the function's use.
Parameters:	A description of each of the function's parameters**.**
Return Value:	A description of the function's return value.
Example:	An example of using the function, if available.
Related Information:	Related methods and functions (and macros, for the SOM kernel) that can be found in this book.

The reference page for a **macro** has the following fields:

Purpose:	The purpose of the macro in brief.
Syntax:	The syntax for invoking the macro**.**
Description:	A description of the macro's use**.**
Parameters:	A description of each of the macro's parameters**.**
Expansion:	A description of the macro's expansion (although the exact code expansion is not always given)**.**
Example:	An example of invoking the macro, if available.
Related Information:	Related macros and functions that can be found in this book.

Who Should Use This Book

This book is for the professional programmer using the SOMobjects Developer Toolkit to build object-oriented class libraries or application programs that use SOM class libraries or the frameworks in the SOMobjects Developer Toolkit.

This book assumes that you are an experienced programmer and that you have a general familiarity with the basic notions of object-oriented programming. Practical experience using an object-oriented programming language is helpful, but not essential.

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SOMobjects
System Object Model

For convenience, the acronym “SOM” is used in this publication to reference the technology of the System Object Model, and the term “SOM Compiler” is used to reference the compiler of the System Object Model.

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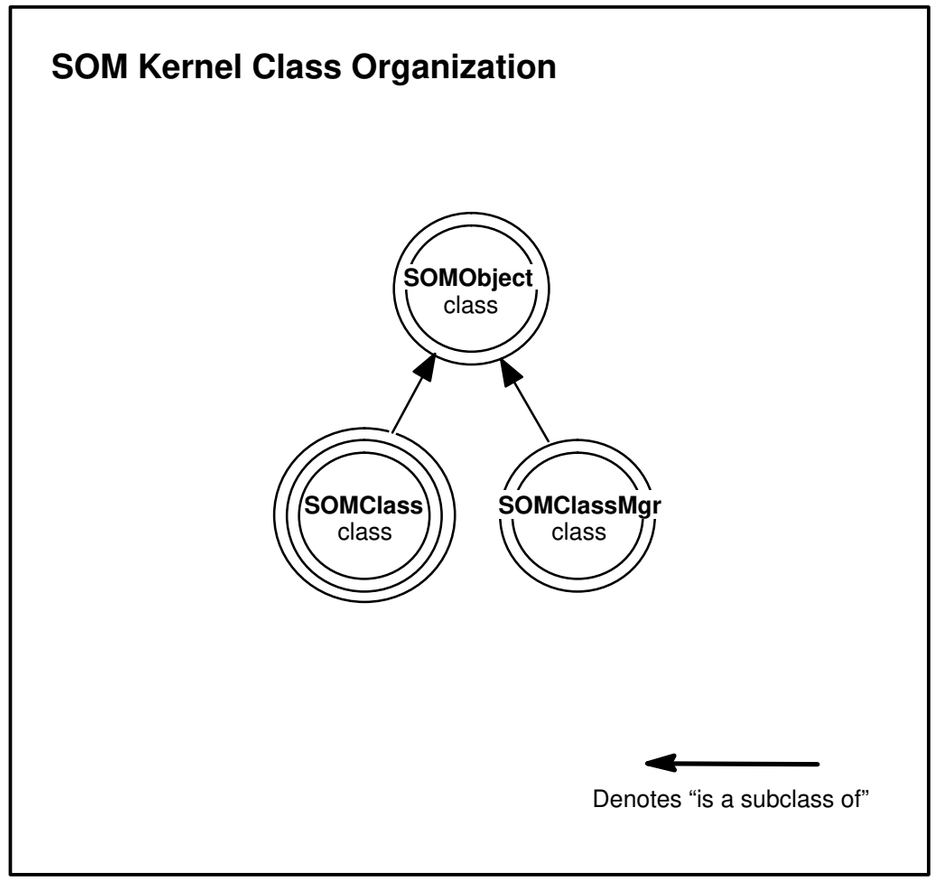
Smalltalk	Digitalk Inc.

The term “ANSI C” used throughout this publication refers to American National Standard X3.159–1989.

The term “CORBA” used throughout this publication refers to the Common Object Request Broker Architecture standards promulgated by the Object Management Group, Inc.

SOM Kernel Reference



somApply Function

Purpose

Invoke an apply stub. Apply stubs are never invoked directly by SOM users, the **somApply** function must be used instead.

Syntax

```
boolean  somApply (
                    SOMObject objPtr,
                    somToken *retPtr,
                    somMethodDataPtr mdPtr,
                    va_list args);
```

Description

somApply provides a single uniform interface through which it is possible to call any method procedure. The interface is based on the caller passing: the object to which the method procedure is to be applied; a return address for the method result; a *somMethodDataPtr* indicating the desired method procedure; and an ANSI standard *va_list* structure containing the method procedure arguments. Different method procedures expect different argument types and return different result types, so the purpose of **somApply** is to select an *apply stub* appropriate for the specific method involved, according to the supplied method data, and then call this apply stub. The apply stub removes the arguments from the va_list, calls the method procedure with these arguments, accepts the returned result, and then copies this result to the location pointed to by retPtr.

The method procedure used by the apply stub is determined by the content of the somMethodData structure pointed to by mdPtr. The class methods **somGetMethodData** and **somGetNthMethodData** are used to load a somMethodData structure. These methods resolve static method procedures based on the receiving class's instance method table.

The SOM API requires that information necessary for selecting an apply stub be provided when a new method is registered with its introducing class (via the methods **somAddStaticMethod** or **somAddDynamicMethod**). This is required because SOM itself needs apply stubs when dispatch method resolution is used. C and C++ implementation bindings for SOM classes support this requirement, but SOM does not terminate execution if this requirement is not met by a class implementor. Thus, it is possible that there may be methods for which **somApply** cannot select an appropriate apply stub. The somMethodData structure for the method can be inspected before calling **somApply** to verify that the method data contains sufficient information to select an appropriate applyStub: either the applyStub component or the stubInfo component of this structure must be non–NULL. If these conditions are met, then **somApply** performs as described above, and a TRUE value is returned; otherwise FALSE is returned.

Parameters

objPtr — A pointer to the object on which the method procedure is to be invoked.

retPtr — A pointer to the memory region into which the result returned by the method procedure is to be copied. This pointer **cannot** be null (even in the case of method procedures whose returned result is void).

mdPtr — A pointer to the somMethodData structure that describes the method whose procedure is to be executed by the apply stub.

args — A pointer to a memory region in which all of the arguments to the method procedure have been laid out in consecutive addresses, according to the protocol implemented by va_lists. The first entry of the va_list **must** be objPtr.

Furthermore, all arguments on the va_list must appear in widened form, as defined by ANSI C. For example, floats must appear as doubles, and chars and shorts must appear as ints.

Return Value

None.

C++ Example

```
#include <somcls.xh>
#include <string.h>
#include <stdarg.h>
main()
{   va_list args = (va_list) SOMMalloc(4);
    va_list push = args;
    string result;
    SOMClass *scObj;
    somMethodData md;

    somEnvironmentNew(); /* Init environment */
    scObj = _SOMClass;   /* The SOMClass object */

    scObj->somGetMethodData(somIdFromString("somGetName"), &md);
    va_arg(push, SOMObject) = scObj;

    somApply(scObj, (somToken*)&result, &md, args);
    SOM_Assert(!strcmp(result,"SOMClass"), SOM_Fatal);
    /* result is "SOMClass" */
}
```

Related Information

Data Structures: SOMObject (somobj.idl), **somMethodData** (somapi.h), **somToken** (somapi.h), **somMethodPtr** (somitype.h), **va_list** (stdarg.h)

Methods: somGetMethodData, somGetNthMethodData, somGetRdStub somAddStaticMethod , **somAddDynamicMethod**(somcls.idl)

somBeginPersistentIds Function

Purpose

Tells SOM to begin a “persistent ID interval.”

Syntax

void somBeginPersistentIds ( );

Description

The **somBeginPersistentIds** function informs the SOM ID manager that strings for any new SOM IDs that are registered will not be freed or modified. This allows the ID manager to use a pointer to the string in the unregistered ID as the master copy of the ID’s string, rather than making a copy of the string. This makes ID handling more efficient.

Parameters

None.

Return Value

None.

Example

C Example

```
#include <som.h>
/* This is the way to create somIds efficiently */
static string id1Name = ”whoami”;
static somId somId_id1 = &id1Name;
/*
   somId_id1 will be registered the first time it is used
   in an operation that takes a somId, or it can be explicitly
   registered using somCheckId.
*/

main()
{
   somId id1, id2;
   string id2Name = ”whereami”;

   somEnvironmentNew();
   somBeginPersistentIds();
   id1 = somCheckId(somId_id1); /* registers the id as persistent */
   somEndPersistentIds();
   id2 = somIdFromString(id2Name); /* registers the id */

   SOM_Assert(!strcmp(”whoami”, somStringFromId(id1)), SOM_Fatal);
   SOM_Assert(!strcmp(”whereami”, somStringFromId(id2)), SOM_Fatal);

   id1Name = ”it does matter”; /* because it is persistent */
   id2Name = ”it doesn’t matter”; /* because it is not persistent */

   SOM_Assert(strcmp(”whoami”, somStringFromId(id1)), SOM_Fatal);
   /* The id1 string has changed */
   SOM_Assert(!strcmp(”whereami”, somStringFromId(id2)), SOM_Fatal);
   /* the id2 string has not */
}
```

Related Information

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somUniqueKey, somSetExpectedIds, somEndPersistentIds

somBuildClass Function

Purpose

Automate the process of building a new SOM class object.

Syntax

```
void  somBuildClass (
                        unsigned long inheritVars,
                        somStaticClassInfoPtr sciPtr,
                        long majorVersion,
                        long minorVersion);
```

Description

The **somBuildClass** function accepts declarative information defining a new class that is be built, and performs the activities required to build and register a correctly functioning class object. The C and C++ implementation bindings use this function to create class objects.

Parameters

inheritVars	a bit mask that determines inheritance from parent classes. A mask containing all ones is an appropriate default.
sciPtr	a pointer to a structure holding static class information
majorVersion	the major version number for the class
minorVersion	the minor version number for the class

Example

See any .ih or .xih implementation binding file for details on construction of the required data structures.

Return Value

None.

Related Information

Data Structures: somStaticClassInfo (somapi.h)

somCheckId Function

Purpose

Registers a som ID.

Syntax

somId somCheckId (somId *id***);**

Description

The **somCheckId** function registers a SOM ID and converts it into an internal representation. The input SOM ID is returned. If the ID is already registered, this function has no effect.

Parameters

id The **somId** to be registered.

Return Value

The registered **somId.**

Example

See function somBeginPersistentIds().

Related Information

Data Structures: somId (sombtype.h)

Functions: somRegisterId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somClassResolve Function

Purpose

Obtains a pointer to the procedure that implements a static method for instances of a particular SOM class.

Syntax

somMethodPtr somClassResolve (SOMClass *cls,* **somMToken** *mToken***);**

Description

The **somClassResolve** function is used to obtain a pointer to the procedure that implements the specified method for instances of the specified SOM class. The returned procedure pointer can then be used to invoke the method. The somClassResolve function is used to support "casted" method calls, in which a method is resolved with respect to a specified class rather than the class of which an object is a direct instance. The **somClassResolve** function can only be used to obtain a method procedure for a static method (a method declared in an IDL specification for a class); dynamic methods do not have method tokens.

The SOM language usage bindings for C and C++ do not support casted method calls, so this function must be used directly to achieve this functionality. Whenever using SOM method procedure pointers, it is necessary to indicate the use of system linkage to the compiler. The way this is done depends on the compiler and the system being used. However, C and C++ usage bindings provide an appropriate typedef for this purpose. The name of the typedef is based on the name of the class that introduces the method, as illustrated in the example below.

Parameters

cls	A pointer to the class object whose instance method procedure is required.
mToken	The method token for the method to be resolved. The SOM API requires that if the class "XYZ" introduces the static method "foo", then the method token for "foo" is found in the class data structure for "XYZ" (called XYZClassData) in the structure member named "foo" (i.e., at XYZClassData.foo). Method tokens can also be obtained using the **somGetMethodToken** method.

Return Value

A pointer to the **somMethodProc** (procedure) that implements the specified method for the specified class of SOM object.

C++ Example

```
// SOM IDL for class A and class B
#include <somobj.idl>
module scrExample {
   interface A : SOMObject { void foo(); implementation {
                             callstyle=oidl; }; };
   interface B : A  {  implementation { foo: override; }; };
};

// Example C++ program to implement and test module scrExample
#define SOM_Module_screxample_Source
#include <scrExample.xih>
#include <stdio.h>

SOM_Scope void SOMLINK scrExample_Afoo(scrExample_A *somSelf);
{  printf("1\n"); }

SOM_Scope void SOMLINK scrExample_Bfoo(scrExample_B *somSelf);
{ printf("2\n"); }

main()
{
   scrExample_B  *objPtr = new scrExample_B;

   // This prints 2
   objPtr->foo();

   // This prints 1
   ((somTD_scrExample_A_foo) /* A necessary method procedure cast */
      somClassResolve(
          _scrExample_A, // the A class object
          scrExample_AClassData.foo) // the foo method token
      ) /* end of method procedure expression */
      (objPtr); /* method arguments */

   // This prints 2
   ((somTD_scrExample_A_foo) /* A necessary method procedure cast */
      somClassResolve(
          _scrExample_B, // the B class object
          scrExample_AClassData.foo) // the foo method token
      ) /* end of method procedure expression */
      (objPtr); /* method arguments */

}
```

Related Information

Data Structures: somMethodPtr (somitype.h), **SOMClass** (somcls.idl), **somMToken** (somitype.h).

Functions: somResolveByName, somParentResolve, somParentNumResolve, somResolve

Methods: somDispatch, somClassDispatch, somFindMethod, somFindMethodOk, somGetApplyStub, somGetMethodToken

Macros: SOM_Resolve, SOM_ResolveNoCheck

somCompareIds Function

Purpose

Determines whether two SOM IDs represent the same string.

Syntax

long somCompareIds (somId *id1,* **somId** *id2***);**

Description

The **somCompareIds** function returns 1 if the two input IDs represent strings that are equal; otherwise, it returns 0.

Parameters

id1	The first SOM ID to be compared.
id2	The second SOM ID to be compared.

Return Value

Returns returns 1 if the two input IDs represent strings that are equal; otherwise, it returns 0.

C Example

```
#include <som.h>
main()
{
   somId id1, id2, id3;

   somEnvironmentNew();
   id1 = somIdFromString("this");
   id2 = somIdFromString("that");
   id3 = somIdFromString("this");

   SOM_Test(somCompareIds(id1, id3));
   SOM_Test(!somCompareIds(id1, id2));
}
```

Related Information

Data Structures: somId (sombtype.h)

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somTotalRegIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somDataResolve Function

Purpose

Accesses instance data within an object.

Syntax

somToken somDataResolve (SOMObject *obj,* **somDToken** *dToken***);**

Description

The **somDataResolve** function is used to access instance data within an object. This function is of use primarily to class implementors (rather than class clients) who are not using the SOM C or C++ language bindings.

For C or C++ programmers with access to the C or C++ implementation bindings for a class, instance data can be accessed using the <className>GetData macro (which expands to a usage of somDataResolve).

Parameters

obj — A pointer to the object whose instance data is required.

dToken — A data token for the required instance data. The SOM API specifies that the data token for accessing the instance data introduced by a class is found in the instanceDataToken component of the auxiliary class data structure for that class. The example below illustrates this.

Return Value

A **somToken** (i.e., a pointer) that points to the data in obj identified by the dToken.

C Example

The following C/C++ expression evaluates to the address of the instance data introduced by class “XYZ” within the object “obj”. This assumes that obj points to an instance of “XYZ” or a subclass of “XYZ”.

```
include <som.h>
somDataResolve(obj, XYZCClassData.instanceDataToken)
```

Related Information

Data Structures: somToken (somitype.h), **SOMObject** (somobj.idl), **somDToken** (somitype.h)

somEndPersistentIds Function

Purpose

Tells SOM to end a “persistent ID interval.”

Syntax

void somEndPersistentIds ( );

Description

The **somEndPersistentIds** function informs the SOM ID manager that strings for any new SOM IDs that are registered might be freed or modified by the client program. Thus, the ID manager must make a copy of the strings.

Parameters

None.

Return Value

None.

Example

See function somBeginPersistentIds.

Related Information

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somUniqueKey, somSetExpectedIds, somBeginPersistentIds

somEnvironmentNew Function

Purpose

Initializes the SOM runtime environment.

Syntax

SOMClassMgr somEnvironmentNew ( );

Description

The **somEnvironmentNew** function creates the four primitive SOM objects (*SOMObject, SOMClass, SOMClassMgr*, and *SOMClassMgrObject*) and initializes global variables used by the SOM run-time environment. This function must be called before using any other SOM functions or methods (with the exception of **somSetExpectedIds**). If the SOM run-time environment has already been initialized, calling this function has no harmful effect.

Although this function must be called before using other SOM functions or methods, it needn't always be called explicitly, because the <*className*>**New** macros, the <*className*>**Renew** macros, the **new** operator, and the <*className*>**NewClass** procedures defined by the SOM C and C++ language bindings call **somEnvironmentNew** if needed.

Parameters

None.

Return Value

A pointer to the single class manager object active at run time. This class manager can be referred by the global variable *SOMClassMgrObject*.

Example

```
somEnvironmentNew();
```

Related Information

Functions: somExceptionId, somExceptionValue, somSetException, somGetGlobalEnvironment

somExceptionFree Function

Purpose

Frees the memory held by the exception structure within an **Environment** structure.

Syntax

void somExceptionFree (Environment ******ev***);**

Description

The **somExceptionFree** function frees the memory held by the exception structure within an **Environment** structure.

Parameters

ev A pointer to the **Environment** whose exception information is to be freed.

Return Value

None.

Example

See function **somSetException**.

Related Information

Data Structures: Environment (somcorba.h)

Functions: somExceptionId, somExceptionValue, somSetException, somGetGlobalEnvironment

somExceptionId Function

Purpose

Gets the name of the exception contained in an **Environment** structure.

Syntax

string somExceptionId (Environment *_ev_);**

Description

The **somExceptionId** function returns the name of the exception contained in the specified **Environment** structure.

Parameters

ev A pointer to an **Environment** structure containing an exception.

Return Value

The **somExceptionId** function returns the name of the exception contained in the specified **Environment** structure, as a string.

Example

See function **somSetException**.

Related Information

Data Structures: string (somcorba.h), **Environment** (somcorba.h)

Functions: somExceptionValue, somExceptionFree, somSetException, somGetGlobalEnvironment

somExceptionValue Function

Purpose

Gets the value of the exception contained in an **Environment** structure.

Syntax

somToken somExceptionValue (Environment ******ev***);**

Description

The **somExceptionValue** function returns the value of the exception contained in the specified **Environment** structure.

Parameters

ev A pointer to an **Environment** structure containing an exception.

Return Value

The **somExceptionValue** function returns a pointer to the value of the exception contained in the specified **Environment** structure.

Example

See function **somSetException**.

Related Information

Data Structures: somToken (somitype.h), **Environment** (somcorba.h)

Functions: somExceptionId, somExceptionFree, somSetException, somGetGlobalEnvironment

somGetGlobalEnvironment Function

Purpose

Returns a pointer to the current global **Environment** structure.

Syntax

Environment *somGetGlobalEnvironment ( );

Description

The **somGetGlobalEnvironment** function returns a pointer to the current global **Environment** structure. This structure can be passed to methods that require an **(Environment *)** argument. The caller can determine if the called method has raised an exception by testing whether

```
ev->exception._major != NO_EXCEPTION
```

If an exception has been raised, the caller can retrieve the name and value of the exception using the **somExceptionId** and **somExceptionValue** methods.

Parameters

None.

Return Value

A pointer to the current global **Environment** structure.

Example

See function **somSetException**.

Related Information

Data Structures: Environment (somcorba.h)

Functions: somExceptionId, somExceptionValue, somExceptionFree, somSetException

somIdFromString Function

Purpose

Returns the SOM ID corresponding to a given text string.

Syntax

somId somIdFromString (string *aString***);**

Description

The **somIdFromString** function returns the SOM ID that corresponds to a given text string.

Ownership of the **somId** returned by **somIdFromString** passes to the caller, which has the responsibility to subsequently free the **somId** using **SOMFree**.

Parameters

aString The string to be converted to a SOM ID.

Return Value

Returns the SOM ID corresponding to the given text string.

Example

See function **somBeginPersistentIds**.

Related Information

Data Structures: somId (sombtype.h), **string** (somcorba.h)

Functions: somCheckId, somRegisterId, somStringFromId, somCompareIds, somTotalRegIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somIsObj Function

Purpose

Failsafe routine to determine whether a pointer references a valid SOM object.

Syntax

boolean somIsObj (somToken *memPtr);*

Description

The **somIsObj**ect function returns 1 if its argument is a pointer to a valid SOM object, or returns 0 otherwise. The function handles address faults, and does extensive consistency checking to guarantee a correct result.

Parameters

memPtr A **somToken** (a pointer) to be checked.

Return Value

The **somIsObj** function returns 1 if *obj* is a pointer to a valid SOM object, and 0 otherwise.

C++ Example

```
#include <stdio.h>
#include <som.xh>

void example(void *memPtr)
{
   if (!somIsObj(memPtr))
     printf("memPtr is not a valid SOM object.\n");
   else
     printf("memPtr points to an object of class %s\n",
             ((SOMObject *)memPtr)->somGetClassName());
}
```

Related Information

Data Structures: boolean (somcorba.h), **somToken** (somitype.h)

somLPrintf Function

Purpose

Prints a formatted string in the manner of the C printf function, at the specified indentation level.

Syntax

long somLPrintf (long *level,* **string** *fmt, ...***);**

Description

The **somLPrintf** function prints a formatted string using SOMOutCharRoutine, in the same manner as the C printf function. The implementation of SOMOutCharRoutine determines the destination of the output, while the C printf function is always directed to stdout. (The default output destination for SOMOutCharRoutine is stdout also, but this can be modified by the user.) The output is prefixed at the indicated level, by preceding it with 2*level spaces.

Parameters

level	The level at which output is to be placed.
fmt	The format string to be output.
varargs	The values to be substituted into the format string.

Return Value

Returns the number of characters written.

C Example

```
#include <somobj.h>
somLPrintf(5, "The class name is %s.\n", _somGetClassName(obj));
```

Related Information

Data Structures: string (somcorba.h)

Functions: somVprintf, somPrefixLevel, somPrintf, SOMOutCharRoutine

somParentNumResolve Function

Purpose

Obtains a pointer to a procedure that implements a method, given a list of method tables.

Syntax

```
somMethodPtr  somParentNumResolve (
                                    somMethodTabs parentMtab,
                                    int parentNum,
                                    somMToken mToken);
```

Description

The **somParentNumResolve** function is used to make parent method calls by the C and C++ language implementation bindings. The **somParentNumResolve** function returns a pointer to a procedure for performing the specified method. This pointer is selected from the specified method table, which is intended to be the method table corresponding to a parent class.

For C and C++ programmers, the implementation bindings for SOM classes provide convenient macros for making parent method calls (the “parent_” macros).

Parameters

parentMtab A list of method tables for the parents of the class being implemented. The SOM API specifies that the list of parent method tables for a given class be stored in the auxiliary class data structure of the class, in the *parentMtab* component. Thus, for the class “XYZ”, the parent method table list is found in location *XYZCClassData.parentMtab.* Parent method table lists are available from class objects via the method call **somGetPClsMtabs**.

parentNum The position of the parent for which the method is to be resolved. The order of a class’s parents is determined by the order in which they are specified in the interface statement for the class. (The first parent is number 1.)

mToken The method token for the method to be resolved. The SOM API requires that if the class “XYZ” introduces the static method “foo”, then the method token for “foo” is found in the class data structure for “XYZ” (called XYZClassData) in the structure member named “foo” (i.e., at XYZClassData.foo). Method tokens can also be obtained using the **somGetMethodToken** method.

Return Value

A pointer to a **somMethodProc** (procedure) that implements the specified method, selected from the specified method table.

C++ Example

```
// SOM IDL for class A and class B
#include <somobj.idl>
module spnrExample {
   interface A : SOMObject  { void foo();  implementation {
                              callstyle=oidl; }; };
   interface B : A  {  implementation { foo: override; }; };
};

// Example C++ program to implement and test  module scrExample
#define SOM_Module_spnrexample_Source
#include <spnrExample.xih>
#include <stdio.h>

SOM_Scope void SOMLINK spnrExample_Afoo(spnrExample_A *somSelf);
{  printf("1\n"); }

SOM_Scope void SOMLINK spnrExample_Bfoo(spnrExample_B *somSelf);
{ printf("2\n"); }

main()
{
   spnrExample_B  *objPtr = new spnrExample_B;

   // This prints  2
   objPtr->foo();

   // This prints 1
   ((somTD_spnrExample_A_foo) /* This method procedure expression cast
                                 is necessary */
      somParentNumResolve(
           objPtr->somGetClass()->somGetPClsMtabs(),
           1,
           spnrExample_AClassData.foo) // the foo method token
      ) /* end of method procedure expression */
      (objPtr); /* method arguments */
}
```

Related Information

Data Structures: somMethodPtr (somitype.h), **somMethodTabs** (somitype.h), **somMToken** (somitype.h)

Functions: somResolveByName, somResolve, somParentNumResolve, somClassResolve

Methods: somGetPClsMtab, somGetPClsMtabs, somGetMethodToken

Macros: SOM_ParentNumResolve, SOM_Resolve, SOM_ResolveNoCheck

somParentResolve Function

Purpose

Obtains a pointer to a procedure that implements a method, given a list of method tables. Obsolete but still supported.

Syntax

somMethodPtr somParentResolve (somMethodTabs *parentMtab,*
somMToken *mToken);*

Description

The **somParentResolve** function is used by old, single-parent class binaries to make parent method calls. The function is obsolete, but is still supported. The **somParentResolve** function returns a pointer to the procedure that implements the specified method. This pointer is selected from the first method table in the parentMtab list.

Parameters

parentMtab A list of parent method tables, the first of which is the method table for the parent class for which the method is to be resolved. The SOM API specifies that the list of parent method tables for a given class be stored in the auxiliary class data structure of the class, in the *parentMtab* component. Thus, for the class "XYZ", the parent method table list is found in location XYZCClassData.parentMtab. Parent method table lists are available from class objects via the method call **somGetPClsMtabs**.

mToken The method token for the method to be resolved. The SOM API requires that if the class "XYZ" introduces the static method "foo", then the method token for "foo" is found in the class data structure for "XYZ" (called XYZClassData) in the structure member named "foo" (i.e., at XYZClassData.foo). Method tokens can also be obtained using the **somGetMethodToken** method.

Return Value

A pointer to the **somMethodProc** (procedure) that implements the specified method, selected from the first method table.

Related Information

Data Structures: somMethodPtr (somitype.h), **somMethodTabs** (somitype.h), **somMToken** (somitype.h).

Functions: somResolveByName, somResolve, somParentNumResolve, somClassResolve

Methods: somDispatch, somClassDispatch, somFindMethod, somFindMethodOk, somGetApplyStub, somGetMethodToken

Macros: SOM_Resolve, SOM_ResolveNoCheck

somPrefixLevel Function

Purpose

Outputs blanks to prefix a line at the indicated level.

Syntax

void somPrefixLevel (long *level***);**

Description

The **somPrefixLevel** function outputs blanks (via the **somPrintf** function) to prefix the next line of output at the indicated level. (The number of blanks produces is 2*level.) This function is useful when overriding the **somDumpSelfInt** method, which takes the level as an argument.

Parameters

level The level at which the next line of output is to start.

Return Value

None.

C/C++ Example

```
#include <som.h>
somPrefixLevel(5);
```

Related Information

Functions: somPrintf, somVprintf, somLPrintf, SOMOutCharRoutine

somPrintf Function

Purpose

Prints a formatted string in the manner of the C printf function.

Syntax

long somPrintf (string *fmt,* ...**);**

Description

The **somPrintf** function prints a formatted string using function **SOMOutCharRoutine**, in the same manner as the C printf function. The implementation of **SOMOutCharRoutine** determines the destination of the output, while the C printf function is always directed to stdout. (The default output destination for **SOMOutCharRoutine** is stdout also, but this can be modified by the user.)

Parameters

fmt	The format string to be output.
varargs	The values to be substituted into the format string.

Return Value

Returns the number of characters written.

C Example

```
#include <somcls.h>
somPrintf("The class name is %s.\n", _somGetClassName(obj));
```

Related Information

Functions: somVprintf, somPrefixLevel, somLPrintf, SOMOutCharRoutine

somRegisterId Function

Purpose

Registers a SOM ID and determines whether or not it was previously registered.

Syntax

long somRegisterId (somId *id);*

Description

The **somRegisterId** function registers a SOM ID and converts it into an internal representation. If the ID is already registered, **somRegisterId** returns 0 and has no effect. Otherwise, s**omRegisterId** returns 1.

Parameters

id The **somId** to be registered.

Return Value

If the ID is already registered, **somRegisterId** returns 0. Otherwise, s**omRegisterId** returns 1.

C Example

```
#include <som.h>
static string s = "unregistered";
static somId sid = &s;
main()
{
   somEnvironmentNew();
   SOM_Test(somRegisterId(sid) == 1);
   SOM_Test(somRegisterId(somIdFromString("registered")) == 0);
}
```

Related Information

Data Structures: somId (sombtype.h).

Functions: somCheckId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somResolve Function

Purpose

Obtains a pointer to the procedure that implements a method for a particular SOM object.

Syntax

somMethodPtr somResolve (SOMObject *obj,* **somMTokenmToken);**

Description

The **somResolve** function returns a pointer to the procedure that implements the specified method for the specified SOM object. This pointer can then be used to invoke the method. The **somResolve** function can only be used to obtain a method procedure for a static method (one declared in an IDL or OIDL specification for a class); dynamic methods are not supported by method tokens.

For C and C++ programmers, the SOM usage bindings for SOM classes provide more convenient mechanisms for invoking methods. These bindings use the **SOM_Resolve** and **SOM_ResolveNoCheck** macros, which construct a method token expression from the class name and method name, and call **somResolve**.

Parameters

obj A pointer to the object whose method procedure is required.

mToken The method token for the method to be resolved. The SOM API requires that if the class “XYZ” introduces the static method “foo”, then the method token for “foo” is found in the class data structure for “XYZ” (called XYZClassData) in the structure member named “foo” (i.e., at XYZClassData.foo). Method tokens can also be obtained using the **somGetMethodToken** method.

Return Value

A pointer to the **somMethodProc** (procedure) that implements the specified method for the specified SOM object.

C Example

```
// SOM IDL for class A and class B
#include <somobj.idl>
module srExample {
   interface A : SOMObject  { void foo();  implementation {
                              callstyle=oidl; }; };
   interface B : A  {  implementation { foo: override; }; };
};

// Example C++ program to implement and test  module scrExample
#define SOM_Module_srexample_Source
#include <srExample.ih>
#include <stdio.h>

SOM_Scope void SOMLINK srExample_Afoo(srExample_A *somSelf);
{  printf("1\n"); }

SOM_Scope void SOMLINK srExample_Bfoo(srExample_B *somSelf);
{ printf("2\n"); }

main()
{
   srExample_B  objPtr = srExample_BNew();

   /* This prints  2 */
   ((somTD_srExample_A_foo)   /* this method procedure expression cast
                                 is necessary */
       somResolve(objPtr, srExample_AClassData.foo)
       )     /* end of method procedure expression */
    (objPtr);
}
```

Related Information

Data Structures: somMethodPtr (somitype.h), **somMToken** (somitype.h).

Functions: somResolveByName, somParentResolve, somParentNumResolve, somClassResolve

Methods: somDispatch, somClassDispatch, somFindMethod, somFindMethodOk, somGetMethodToken

Macros: SOM_Resolve, SOM_ResolveNoCheck

somResolveByName Function

Purpose

Obtains a pointer to the procedure that implements a method for a particular SOM object.

Syntax

somMethodPtr somResolveByName (SOMObject *obj,* **string** *methodName**);***

Description

The **somResolveByName** function is used to obtain a pointer to the procedure that implements the specified method for the specified SOM object. The returned procedure pointer can then be used to invoke the method. The C and C++ usage bindings use this function to support name–lookup methods.

This function can be used for invoking dynamic methods. However, the C and C++ usage bindings for SOM classes do not support dynamic methods, thus typedefs necessary for the use of dynamic methods are not available as with static methods. The function somApply provides an alternative mechanism for invoking dynamic methods that avoids the need for casting procedure pointers.

Parameters

obj	A pointer to the object whose method procedure is required.
methodName	A character string representing the name of the method to be resolved.

Return Value

A pointer to the **somMethodProc** (procedure) that implements the specified method for the specified SOM object.

C Example

Assuming the static method “setSound,” is introduced by the class ”Animal”, the following example will correctly invoke this method on an instance of ”Animal” or one of its descendent classes.

```
#include <animal.h>
example(Animal myAnimal)
{
somTD_Animal_setSound
   setSoundProc = somResolveByName(myAnimal, ”setSound”);
setSoundProc(myAnimal, ”Roar!”);
}
```

Related Information

Data Structures: somMethodPtr (somitype.h), **SOMObject** (somobj.idl), **string** (somcorba.h)

Functions: somResolve, somParentResolve, somParentNumResolve, somClassResolve

Methods: somDispatch, somClassDispatch, somFindMethod, somFindMethodOk, somGetApplyStub

Macros: SOM_Resolve, SOM_ResolveNoCheck

somSetException Function

Purpose

Sets an exception value in an **Environment** structure.

Syntax

```
void  somSetException (Environment *ev,
                       enum exception_type major,
                       string exceptionName,
                       void *params);
```

Description

The **somSetException** function sets an exception value in an **Environment** structure.

Parameters

ev A pointer to the **Environment** structure in which to set the exception. This value must be either NULL or a value formerly obtained from the function **somGetGlobalEnvironment**.

major An integer representing the type of exception to set.

exceptionName The qualified name of the exception to set. The SOM Compiler defines, in the header files it generates for an interface, a constant whose value is the qualified name of each exception defined within the interface. This constant has the name "ex_<*exceptionName*>", where <*exceptionName*> is the qualified (scoped) exception name. Where unambiguous, the usage bindings also define the short form "ex_<exceptionName>", where <exceptionName> is unqualified.

params A pointer to an initialized exception structure value. No copy is made of this structure; hence, the caller cannot free it. The **somExceptionFree** function should be used to free the **Environment** structure that contains it.

Return Value

None.

C Example

```
/* IDL declaration of class X:  */
   interface X : SOMObject {
      exception OUCH {long code1; long code2; };
      void foo(in long arg) raises (OUCH);
   };

/* implementation of foo method */
SOM_Scope void SOMLINK foo(X somSelf, Environment *ev, long arg)
{
   X_OUCH *exception_params; /* X_OUCH struct is defined
                                    in X's usage bindings    */

   if (arg > 5) /* then this is a very bad error */
   {
      exception_params = (X_OUCH*)SOM_Malloc(sizeof(X_OUCH));
      exception_params->code1 = arg;
      exception_params->code2 = arg-5;
      somSetException(ev, USER_EXCEPTION, ex_X_OUCH,
                          exception_params);
      /* the Environment ev now contains an X_OUCH exception, with
       * the specified exception_params struct. The constant
       * ex_X_OUCH is defined in foo.h. Note that exception_params
       * must be malloced.
       */
      return;
    }
...
}

main()
{
   Environment *ev;
   X x;

   somEnvironmentNew();
   x = Xnew();
   ev = somGetGlobalEnvironment();
   X_foo(x, ev, 23);
   if (ev->_major != NO_EXCEPTION) {
        printf("foo exception = %s\n", somExceptionId(ev));
        printf("code1 = %d\n",
                ((X_OUCH*)somExceptionValue(ev))->code1);
        /* finished handling exception. */
        /* free the copied id and the original X_OUCH structure: */
        somExceptionFree(ev);
   }
...
}
```

Related Information

Data Structures: Environment, exception_type, string (somcorba.h)

Functions: somExceptionId, somExceptionValue, somExceptionFree, somGetGlobalEnvironment

somSetExpectedIds Function

Purpose

Tells SOM how many unique SOM IDs a client program expects to use.

Syntax

void somSetExpectedIds (**unsigned long** *numIds*);

Description

The **somSetExpectedIds** function informs the SOM run-time environment how many unique SOM IDs a client program expects to use during its execution. This has the potential of slightly improving the program's space and time efficiency, if the value specified is accurate. This function, if used, must be called prior to any explicit or implicit invocation of the **somEnvironmentNew** function to have any effect.

Parameters

numIds The number of SOM IDs the client program expects to use.

Return Value

None.

C Example

```
#include <som.h>
somSetExpectedIds(1000);
```

Related Information

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somStringFromId Function

Purpose

Returns the string that a SOM ID represents.

Syntax

string somStringFromId (somId *id**);***

Description

The **somStringFromId** function returns the string that a given SOM ID represents.

Parameters

id The SOM ID for which the corresponding string is needed.

Return Value

Returns the string that the given SOM ID represents.

Example

See function **somBeginPersistentIds**.

Related Information

Data Structures: string (somcorba.h), **somId** (sombtype.h).

Functions: somCheckId, somRegisterId, somIdFromString, somCompareIds, somTotalRegIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somTotalRegIds Function

Purpose

Returns the total number of SOM IDs that have been registered.

Syntax

unsigned long somTotalRegIds ( );

Description

The **somTotalRegIds** function returns the total number of SOM IDs that have been registered so far. This value can be used as a parameter to the **somSetExpectedIds** function to advise SOM about expected ID usage in later executions of a client program.

Parameters

None.

Return Value

Returns the total number of SOM IDs that have been registered.

C Example

```
#include <som.h>
main()
{ int i;
  somId id;
  somEnvironmentNew();
  id = somIdFromString(”abc”)
  i = somTotalRegIds();
  id = somIdFromString(”abc”);
  SOM_Test(i == somTotalRegIds);
}
```

Related Information

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somCompareIds, somSetExpectedIds, somUniqueKey, somBeginPersistentIds, somEndPersistentIds

somUniqueKey Function

Purpose

Returns the unique key associated with a SOM ID.

Syntax

unsigned long somUniqueKey (somID *id);*

Description

The **somUniqueKey** function returns the unique key associated with a SOM ID. The unique key for a SOM ID is a number that uniquely represents the string that the SOM ID represents. The unique key for a SOM ID is the same as the unique key for another SOM ID only if the two SOM IDs represent the same string.

Parameters

id The SOM ID for which the unique key is needed.

Return Value

An **unsigned long** representing the unique key of the specified SOM ID.

C Example

```
#include <som.h>
main()
{
   unsigned long k1, k2;
   k1 = somUniqueKey(somIdFromString("abc"));
   k2 = somUniqueKey(somIdFromString("abc"));
   SOM_Test(k1 == k2);
}
```

Related Information

Data Structures: somId (sombtype.h)

Functions: somCheckId, somRegisterId, somIdFromString, somStringFromId, somCompareIds, somTotalRegIds, somSetExpectedIds, somBeginPersistentIds, somEndPersistentIds

somVprintf Function

Purpose

Prints a formatted string in the manner of the C vprintf function.

Syntax

long somVprintf (string *fmt,* **va_list** *ap***);**

Description

The **somVprintf** function prints a formatted string using SOMOutCharRoutine, in the same manner as the C vprintf function. The implementation of SOMOutCharRoutine determines the destination of the output, while the C printf function is always directed to stdout. (The default output destination for SOMOutCharRoutine is stdout also, but this can be modified by the user.)

Parameters

fmt	The format string to be output.
ap	A **va_list** representing the values to be substituted into the format string.

Return Value

Returns the number of characters written.

C Example

```
#include <som.h>
main()
{
   va_list args = (va_list) SOMCalloc(20);
   va_list push = args;
   float f = 3.1415
   char c = 'a';

   va_arg(push, int) = 1;
   va_arg(push, double) = f; /* note ANSI widening */
   va_arg(push, int) = c; /* here, too */
   va_arg(push, char*) = "this is a test";

   somVprintf("%d, %f, %c, %s\n", args);
}
```

Related Information

Data Structures: string (somcorba.h), **va_list** (stdarg.h).

Functions: somPrintf, somPrefixLevel, somLPrintf, SOMOutCharRoutine

SOMCalloc Function

Purpose

Allocates sufficient memory for an array of objects of a specified size.

Syntax

somToken (*SOMCalloc) (size_t *num,* **size_t** *size***);**

Description

The **SOMCalloc** function allocates an amount of memory equal to *num*size* (sufficient memory for an array of *num* objects of size *size).* The **SOMCalloc** function has the same interface as the C **calloc** function. It performs the same basic function as **calloc** with some supplemental error checking. If an error occurs, the **SOMError** function is called. This routine is replaceable by changing the value of the global variable **SOMCalloc.**

Parameters

num	The number of objects for which space is to be allocated.
size	The size of the objects for which space to is to be allocated.

Return Value

A pointer to the first byte of the allocated space.

Example

See function somVprintf.

Related Information

Data Structures: somToken (somitype.h)

Functions: SOMMalloc, SOMRealloc, SOMFree

SOMClassInitFuncName Function

Purpose

Returns the name of the function used to initialize classes in a DLL.

Syntax

string (*SOMClassInitFuncName) ( );

Description

The **SOMClassInitFuncName** function is called by the SOM Class Manager to determine what function to call to initialize the classes in a DLL. The default version returns the string "SOMInitModule." The function can be replaced (so that the Class Manager will invoke a different function to initialize classes in a DLL) by changing the value of the global variable **SOMClassInitFuncName**.

Parameters

None.

Return Value

Returns the name of the function that should be used to initialize classes in a DLL.

C Example

```
#include <som.h>
string XYZFuncName() { return "XYZ"; }
main()
{
   SOMClassInitFuncName = XYZFuncName;
   ...
}
```

Related Information

Data Structures: string (somcorba.h)

Functions: SOMLoadModule, SOMDeleteModule

SOMDeleteModule Function

Purpose

Unloads a dynamically linked library (DLL).

Syntax

long (*SOMDeleteModule) (somToken *modHandle***);**

Description

The **SOMDeleteModule** function unloads the specified dynamically linked library (DLL). This routine is called by the SOM Class Manager to unload DLLs. **SOMDeleteModule** can be replaced (thus changing the way the Class Manager unloads DLLS) by changing the value of the global variable **SOMDeleteModule.**

Parameters

modHandle The **somToken** for the DLL to be unloaded. This token is supplied by the **SOMLoadModule** function when it loads the DLL.

Return Value

Returns 0 if successful or a non-zero system-specific error code otherwise.

Related Information

Data Structures: somToken (somitype.h).

Functions: SOMLoadModule, SOMClassInitFuncName

SOMError Function

Purpose

Handles an error condition.

Syntax

void (*SOMError) (int *errorCode*, **string** *fileName*, **int** *lineNum***);**

Description

The **SOMError** function inspects the specified error code and takes appropriate action, depending on the severity of the error. The last digit of the error code indicates whether the error is classified as SOM_Fatal (9), SOM_Warn (2), or SOM_Ignore (1). The default implementation of **SOMError** prints a message that includes the specified error code, filename, and line number, and terminates the current process if the error is classified as SOM_Fatal. The *fileName* and *lineNum* arguments specify where the error occurred. This routine can be replaced by changing the value of the global variable **SOMError.**

For C and C++ programmers, SOM defines a convenience macro, **SOM_Error**, which invokes the **SOMError** function and supplies the last two arguments.

Parameters

errorCode	An integer representing the error code of the error.
fileName	The name of the file in which the error occurred.
lineNum	The line number where the error occurred.

Return Value

None.

Related Information

Macros: SOM_Test, SOM_TestC, SOM_WarnMsg, SOM_Assert, SOM_Expect, SOM_Error

SOMFree Function

Purpose

Frees the specified block of memory.

Syntax

void (*SOMFree) (somToken *ptr***);**

Description

The **SOMFree** function frees the block of memory pointed to by *ptr.* SOMFree should only be called with a pointer previously allocated by **SOMMalloc** or **SOMCalloc.** The **SOMFree** function has the same interface as the C **free** function. It performs the same basic function as **free** with some supplemental error checking. If an error occurs, the **SOMError** function is called. This routine is replaceable by changing the value of the global variable **SOMFree.**

To free an *object* (rather than a block of memory), use the **somFree** method, rather than this function.

Parameters

ptr A pointer to the block of storage to be freed.

Return Value

None.

C Example

```
#include <som.h>
main()
{
   somToken ptr = SOMMalloc(20);
   somFree(ptr);
}
```

Related Information

Functions: SOMCalloc, SOMRealloc, SOMMalloc

Methods: somFree

SOMLoadModule Function

Purpose

Loads the dynamically linked library (DLL) containing a SOM class.

Syntax

long (*SOMLoadModule)
(string *className*,
string *fileName,*
string *functionName,*
long *majorVersion,*
long *minorVersion,*
somToken **modHandle**);*

Description

The **SOMLoadModule** function loads the dynamically linked library (DLL) containing a SOM class. This routine is called by the SOM Class Manager to load DLLs. **SOMLoadModule** can be replaced (thus changing the way the Class Manager loads DLLS) by changing the value of the global variable **SOMLoadModule.**

Parameters

className The name of the class whose DLL is to be loaded.

fileName The name of the DLL library file.
This can be either a simple name or a fully-qualified pathname.

functionName The name of the routine to be called after the DLL is loaded. The routine is responsible for creating a class object for each class in the DLL. Typically, this argument will have the value **SOMInitModule,** obtained from the **SOMClassInitFuncName** function. If no **SOMInitModule** entry exists in the DLL, the default version of **SOMLoadModule** looks for a routine named <className>NewClass instead. If neither entry point is found, the default version of **SOMLoadModule** fails.

majorVersion The expected major version number of the class, to be passed to the initialization routine of the DLL.

minorVersion The expected minor version number of the class, to be passed to the initialization routine of the DLL.

modHandle The address where **SOMLoadModule** should place a token that can be subsequently used by the **SOMDeleteModule** routine to unload the DLL.

Return Value

Returns 0 if successful or a non-zero system-specific error code otherwise.

Related Information

Functions: SOMDeleteModule, SOMClassInitFuncName

SOMMalloc Function

Purpose

Allocates the specified amount of memory.

Syntax

somToken SOMMalloc (size_t *size***);**

Description

The **SOMMalloc** function allocates *size* bytes of memory. The **SOMMalloc** function has the same interface as the C **malloc** function. It performs the same basic function as **malloc** with some supplemental error checking. If an error occurs, the **SOMError** function is called. This routine is replaceable by changing the value of the global variable **SOMMalloc.**

Parameters

size The amount of memory to be allocated, in bytes.

Return Value

A pointer to the first byte of the allocated space.

Example

See function SOMFree.

Related Information

Functions: SOMCalloc, SOMRealloc, SOMFree

SOMOutCharRoutine Function

Purpose

Prints a character. This function is replaceable.

Syntax

int SOMOutCharRoutine (char *c***);**

Description

SOMOutCharRoutine is a replaceable character output routine. It is invoked by SOM whenever a character is generated by one of the SOM error-handling or debugging macros. The default implementation outputs the specified character to stdout. To change the destination of character output, store the address of a user-written character output routine in global variable **SOMOutCharRoutine**.

Parameters

c	The character to be output.

Return Value

Returns 0 if an error occurs and 1 otherwise.

Related Information

Functions: somVprintf, somPrefixLevel, somLPrintf, somPrintf

SOMRealloc Function

Purpose

Changes the size of a previously allocated region of memory.

Syntax

somToken SOMRealloc (somToken *ptr,* **size_t** *size***);**

Description

The **SOMRealloc** function changes the size of the previously allocated region of memory pointed to by *ptr* so that it contains *size* bytes. The new size may be greater or less than the original size. The **SOMRealloc** function has the same interface as the C **realloc** function. It performs the same basic function as **realloc** with some supplemental error checking. If an error occurs, the **SOMError** function is called. This routine is replaceable by changing the value of the global variable **SOMRealloc.**

Parameters

ptr	A pointer to the previously allocated region of memory. If NULL, a new region of memory of *size* bytes is allocated.
size	The size in bytes for the re-allocated storage. If zero, the memory pointed to by *ptr* is freed.

Return Value

A pointer to the first byte of the re-allocated space. (A pointer is returned because the block of storage may need to be moved to increase its size.)

Related Information

Functions: SOMCalloc, SOMMalloc, SOMFree

SOM_Assert Macro

Purpose

Asserts that a **boolean** condition is true.

Syntax

SOM_Assert *(condition, errorCode*)**;**

Description

The **SOM_Assert** macro is used to place **boolean** assertions in a program:

- If *condition* is FALSE, and *errorCode* indicates a warning-level error and **SOM_WarnLevel** is set to be greater than zero, then a warning message is output.
- If *condition* is FALSE and *errorCode* indicates a fatal error, an error message is output and the process is terminated.
- If *condition* is TRUE and **SOM_AssertLevel** is set to be greater than zero, then an informational message is output.

External (Global) Data

long SOM_WarnLevel; /* default = 0 */

long SOM_AssertLevel; /* default 0 */

Parameters

condition	A **boolean** expression that is expected to be TRUE (nonzero).
errorCode	The integer error code for the error to be raised if *condition* is FALSE.

Expansion

If *condition* is FALSE, and *errorCode* indicates a warning-level error and **SOM_WarnLevel** is set to be greater than zero, then a warning message is output. If *condition* is FALSE and *errorCode* indicates a fatal error, an error message is output and the process is terminated. If *condition* is TRUE and **SOM_AssertLevel** is set to be greater than zero, then an information message is output.

Example

```
#include <som.h>
main()
{
   SOM_WarnLevel = 1;
   SOM_Assert(2==2, 29);
}
```

Related Information

Macros: SOM_Expect, SOM_Test, SOM_TestC

SOM_CreateLocalEnvironment Macro

Purpose

Creates and initializes a local **Environment** structure.

Syntax

Environment * SOM_CreateLocalEnvironment ( );

Description

The **SOM_CreateLocalEnvironment** macro creates a local **Environment** structure. This **Environment** structure can be passed to methods as the **Environment** argument so that exception information can be returned without affecting the global environment.

Parameters

None.

Expansion

The **SOM_CreateLocalEnvironment** expands to an expression of type (**Environment ***).

C Example

```
Environment *ev;
ev = SOM_CreateLocalEnvironment();
_myMethod(obj, ev);
...
SOM_DestroyLocalEnvironment(ev);
```

Related Information

Data Structures: Environment (somcorba.h)

Macros: SOM_DestroyLocalEnvironment, SOM_InitEnvironment, SOM_UninitEnvironment

Functions: somGetGlobalEnvironment

SOM_DestroyLocalEnvironment Macro

Purpose

Destroys a local **Environment** structure.

Syntax

SOM_DestroyLocalEnvironment (Environment * *ev*);

Description

The **SOM_DestroyLocalEnvironment** macro destroys a local **Environment** structure, such as one created using the **SOM_CreateLocalEnvironment** macro.

Parameters

ev A pointer to the **Environment** structure to be discarded.

Expansion

The **SOM_DestroyLocalEnvironment** function first invokes the **somExceptionFree** method on the **Environment** structure; then it invokes **SOMFree** on it to free the memory it occupies.

Example

```
Environment *ev;
ev = SOM_CreateLocalEnvironment();
_myMethod(obj, ev);
....
SOM_DestroyLocalEnvironment(ev);
```

Related Information

Macros: SOM_CreateLocalEnvironment, SOM_UninitEnvironment

Functions: somExceptionFree

SOM_Error Macro

Purpose

Reports an error condition.

Syntax

SOM_Error (*errorCode***);**

Description

The **SOM_Error** macro invokes the **SOMError** error handling procedure with the specified error code, supplying the filename and line number where the macro was invoked. The default implementation of **SOMError** outputs a message containing the error code, filename, and line number. Additionally, if the last digit of the error code indicates a serious error (that is, value SOM_Fatal), the process is terminated.

Parameters

errorCode The integer error code for the error to be reported.

Expansion

The **SOM_Error** macro invokes the **SOMError** error handler, supplying the filename and line number where the macro was invoked.

Related Information

Functions: SOMError

SOM_Expect Macro

Purpose

Asserts that a **boolean** condition is expected to be true.

Syntax

SOM_Expect (*condition***);**

Description

The **SOM_Expect** macro is used to place **boolean** assertions that are expected to be true into a program:

- If *condition* is FALSE and **SOM_WarnLevel** is set to be greater than zero, then a warning message is output.
- If *condition* is TRUE and **SOM_AssertLevel** is set to be greater than zero, then an informational message is output.

Parameters

condition A boolean expression that is expected to be TRUE (nonzero).

Expansion

If *condition* is FALSE and **SOM_WarnLevel** is set to be greater than zero, then a warning message is output. If *condition* is TRUE and **SOM_AssertLevel** is set to be greater than zero, then an information message is output.

Example

```
SOM_Expect(2==2, 29);
```

Related Information

Macros: SOM_Assert, SOM_Test, SOM_TestC

SOM_GetClass Macro

Purpose

Returns the class object of which a SOM object is an instance.

Syntax

SOMClass SOM_GetClass (SOMObject *obj***);**

Description

The **SOM_GetClass** macro returns the class object of which *obj* is an instance. This is done without recourse to a method call on the object. The **somGetClass** method introduced by SOMObject is also intended to return the class of which an object is an instance, and the default implementation provided for this method by SOMObject uses the macro.

Important Note: It is generally recommended that the somGetClass method call be used, since it cannot be known whether the class of an object wishes to provide special handling when its address is requested from an instance. But, there are (rare) situations where a method call cannot be made, and this macro can then be used. If you are unsure as to whether to use the method or the macro, you should use the method.

Parameters

obj The object for which the class is needed.

C++ Example

```
#include <somcls.xh>
#include <animal.xh>
main()
{
   Animal *a = new Animal;
   SOMClass cls1 = SOM_GetClass(a);
   SOMClass cls2 = a->somGetClass();
   if (cls1 == cls2)
      printf("macro and method for getClass the same for Animal\n");
   else
      printf("macro and method for getClass not same for Animal\n");
}
```

Related Information

Methods: somGetClass

SOM_InitEnvironment Macro

Purpose

Initializes a local **Environment** structure.

Syntax

SOM_InitEnvironment (Environment * *ev***);**

Description

The **SOM_InitEnvironment** macro initializes a locally declared **Environment** structure. This **Environment** structure can then be passed to methods as the **Environment** argument so that exception information can be returned without affecting the global environment.

Parameters

ev A pointer to the **Environment** structure to be initialized.

Expansion

The **SOM_InitEnvironment** initializes an **Environment** structure to zero.

C Example

```
Environment ev;
SOM_InitEnvironment(&ev);
_myMethod(obj, &ev);
....
SOM_UninitEnvironment(&ev);
```

Related Information

Macros: SOM_DestroyLocalEnvironment, SOM_CreateLocalEnvironment, SOM_UninitEnvironment

Functions: somGetGlobalEnvironment

SOM_NoTrace Macro

Purpose

Used to turn off method debugging.

Syntax

SOM_NoTrace (*className, methodName***);**

Description

The **SOM_NoTrace** macro is used to turn off method debugging. Within an implementation file for a class, before #including the implementation (.ih or .xih) header file for the class, #define the <*className*>**MethodDebug** macro to be **SOM_NoTrace**. Then, <*className*>**MethodDebug** will have no effect.

Parameters

className	The name of the class for which tracing will be turned off.
methodName	The name of the method for which tracing will be turned off.

Expansion

The **SOM_NoTrace** macro has a null (empty) expansion.

Example

Within an implementation file:

```
#define AnimalMethodDebug(c,m) SOM_NoTrace(c,m)
#include <animal.ih>
/* Now AnimalMethodDebug does nothing */
```

SOM_Resolve Macro

Purpose

Obtains a pointer to a method procedure.

Syntax

SOM_Resolve (*object, className, methodName***);**

Description

The **SOM_Resolve** macro invokes the **somResolve** function to obtain a pointer to the static method procedure that implements the specified method for the specified object. This pointer can be used for efficient repeated casted method invocations on instances of the class of the object on which the resolution is done, or instances of subclasses of this class. The name of the class that introduces the method and the name of the method must be known to use this macro. Otherwise, use the **somResolveByName, somFindMethod** or **somFindMethodOk** method.

The **SOM_Resolve** macro can only be used to obtain a method procedure for a static method (one defined in the IDL specification for a class); not a dynamic method. Unlike the **SOM_ResolveNoCheck** macro, the **SOM_Resolve** macro performs several consistency checks on *object.*

Parameters

object	The object to which the resolved method procedure will be applied.
className	The name of the class that introduces *methodName*. This name should be given as a simple token, rather than a quoted string (for example, *Animal* rather than "*Animal*").
methodName	The name of the method to be resolved. This name should be given as a simple token, rather than a quoted string (for example, *setSound* rather than "*setSound*").

Expansion

The **SOM_Resolve** macro uses the *className* and *methodName* to construct the method token for the specified method, then invokes the **somResolve** function. Thus, the macro expands to an expression that represents the entry-point address of the method procedure. This value can be stored in a variable and used for subsequent invocations of the method.

Example

```
Animal myObj = AnimalNew();
somMethodProc *procPtr;
procPtr = SOM_Resolve(myObj, Animal, setSound);
/* note that procPtr will need to be typecast when it is used */
```

Related Information

Macros: SOM_ResolveNoCheck

Functions: somResolve, somClassResolve, somResolveByName

Methods: somFindMethod, somFindMethodOk, somDispatch, somClassDispatch

SOM_ResolveNoCheck Macro

Purpose

Obtains a pointer to a method procedure.

Syntax

SOM_ResolveNoCheck (*object, className, methodName***);**

Description

The **SOM_ResolveNoCheck** macro invokes the **somResolve** function to obtain a pointer to the method procedure that implements the specified method for the specified object. This pointer can be used for efficient repeated invocations of the same method on the same type of objects. The name of the class that introduces the method and the name of the method must be known at compile time. Otherwise, use the **somFindMethod** or **somFindMethodOk** method.

The **SOM_ResolveNoCheck** macro can only be used to obtain a method procedure for a static method (one defined in the IDL specification for a class) and not a method added to a class at run time. Unlike the **SOM_Resolve** macro, the **SOM_ResolveNoCheck** macro does not perform any consistency checks on *object.*

Parameters

object The object to which the resolved method procedure will be applied.

className The name of the class that introduces *methodName*. This name should be given as a simple token, rather than a quoted string (for example, *Animal* rather than "*Animal*").

methodName The name of the method to be resolved. This name should be given as a simple token, rather than a quoted string (for example, *setSound* rather than "*setSound*").

Expansion

The **SOM_ResolveNoCheck** macro uses the *className* and *methodName* to construct an expression whose value is the method token for the specified method, then invokes the **somResolve** function. Thus, the macro expands to an expression that represents the entry-point address of the method procedure. This value can be stored in a variable and used for subsequent invocations of the method.

Example

```
Animal myObj = AnimalNew();
somMethodProc *procPtr;
procPtr = SOM_ResolveNoCheck(myObj, Animal, setSound)
```

Related Information

Macros: SOM_Resolve

Functions: somResolve, somClassResolve, somResolveByName

Methods: somDispatch, somClassDispatch, somFindMethod, somFindMethodOk

SOM_Test Macro

Purpose

Tests whether a **boolean** condition is true; if not, a fatal error is raised.

Syntax

SOM_Test (*expression***);**

Description

The **SOM_Test** macro tests the specified **boolean** expression:

- If the expression is TRUE and **SOM_AssertLevel** is set to a value greater than zero, then an information message is output.
- If the expression is FALSE, an error message is output and the process is terminated. Note: The **SOM_TestC** macro is similar, except that it only outputs a warning message in this situation.

Parameters

expression The **boolean** expression to test.

External (Global) Data

long SOM_AssertLevel; /* default is 0 */

Expansion

The **SOM_Test** macro tests the specified boolean expression. If the expression is TRUE and **SOM_AssertLevel** is set to a value greater than zero, then an information message is output. If the expression is FALSE, an error message is output and the process is terminated.

C Example

```
#include <som.h>
main()
{
   SOM_AssertLevel = 1;
   SOM_Test(1=1);
}
```

Related Information

Macros: SOM_Expect, SOM_Assert, SOM_TestC

SOM_TestC Macro

Purpose

Tests whether a **boolean** condition is true; if not, a warning message is output.

Syntax

SOM_TestC (*expression***);**

Description

The **SOM_TestC** macro tests the specified **boolean** expression:

- If the expression is TRUE and **SOM_AssertLevel** is set to a value greater than zero, then an information message is output.
- If the expression is FALSE and **SOM_WarnLevel** is set to a value greater than zero, then a warning message is output. Note: The **SOM_Test** macro is similar, except that it raises a fatal error in this situation.

Parameters

expression The **boolean** expression to test.

External (Global) Data

long SOM_AssertLevel; /* default is 0 */

long SOM_WarnLevel; /* default is 0 */

Expansion

The **SOM_TestC** macro tests the specified **boolean** expression. If the expression is TRUE and **SOM_AssertLevel** is set to a value greater than zero, then an information message is output. If the expression is FALSE and **SOM_WarnLevel** is set to a value greater than zero, a warning message is output.

C Example

```
#include <som.h>
main()
{
   SOM_WarnLevel = 1;
   SOM_TestC(1=1);
}
```

Related Information

Macros: SOM_Expect, SOM_Assert, SOM_Test

SOM_UninitEnvironment Macro

Purpose

Uninitializes a local **Environment** structure.

Syntax

SOM_UninitEnvironment (Environment * *ev*);

Description

The **SOM_UninitEnvironment** macro uninitializes a locally declared **Environment** structure.

Parameters

ev A pointer to the **Environment** structure to be uninitialized.

Expansion

The **SOM_UninitEnvironment** invokes the **somExceptionFree** function on the specified **Environment** structure.

C Example

```
Environment ev;
SOM_InitEnvironment(&ev);
_myMethod(obj, &ev);
...
SOM_UninitEnvironment(&ev);
```

Related Information

Macros: SOM_DestroyLocalEnvironment, SOM_InitEnvironment

SOM_WarnMsg Macro

Purpose

Reports a warning message.

Syntax

SOM_WarnMsg (*msg***);**

Description

If **SOM_WarnLevel** is set to a value greater than zero, the **SOM_WarnMsg** macro prints the specified message, along with the filename and line number where the macro was invoked.

Parameters

msg The warning message to be output.

Expansion

If **SOM_WarnLevel** is set to a value greater than zero, the **SOM_WarnMsg** macro prints the specified message, along with the filename and line number where the macro was invoked.

Related Information

Macros: SOM_Error

SOMClass Class

Description

SOMClass is the root class for all SOM metaclasses. That is, all SOM metaclasses must be subclasses of **SOMClass** or some other class derived from it. It defines the essential behavior common to all SOM classes. In particular, it provides a suite of methods for initializing class objects, generic methods for manufacturing instances of those classes, and methods that dynamically obtain or update information about a class and its methods at run time.

Just as all SOM classes are expected to have **SOMObject** (or a class derived from **SOMObject**) as their base class, all SOM classes are expected to have **SOMClass** or a class derived from **SOMClass** as their metaclass. Metaclasses define "class" methods (sometimes called "factory" methods or "constructors") that manufacture objects from any class object that is defined as an instance of the metaclass.

To define your own class methods, define your own metaclass by subclassing **SOMClass** or one of its subclasses. Three methods that **SOMClass** inherits and overrides from **SOMObject** are typically overridden by any metaclass that introduces instance data — **somInit**, **somUninit**, and **somDumpSelfInt**. The new methods introduced in **SOMClass** that are frequently overridden are **somNew**, **somRenew**, and **somClassReady**. (See the descriptions of these methods for further information.)

Other reasons for creating a new metaclass include tracking object instances, automatic garbage collection, interfacing to a persistent object store, or providing/managing information that is global to a set of object instances.

File Stem

somcls

Base

SOMObject

Metaclass

SOMClass (**SOMClass** is the only class with itself as metaclass.)

Ancestor Classes

SOMObject

Types

```
typedef sequence <SOMClass> SOMClassSequence;

struct  somOffsetInfo  {
    SOMClass            cls;
    long                offset
    };
typedef sequence <somOffsetInfo> SOMOffsets;
```

New Methods

Attributes:

readonly attribute somOffsets somInstanceDataOffsets

_get_somInstanceDataOffsets returns a sequence of structures, each of which indicates an ancestor of the receiver class (or the receiver class itself) and the offset to the beginning of the instance data introduced by the indicated class in an instance of the receiver class. The somOffsets information can be used in conjunction with information derived from calls to a *SOM Interface Repository* to completely determine the layout of SOM objects at runtime.

C++ Example

```
#include <somcls.xh>
main()
{
   int i;
   SOMClassMgr *scm = somEnvironmentNew();
   somOffsets so = _SOMClass->_get_somInstanceDataOffsets();
   for (i=0; i<so._length; i++)
      printf("In an instance of SOMClass, %s data starts at %d\n",
                so._buffer[i]->cls->somGetName(),
                so._buffer[i]->offset);
}
```

Introduced Methods

Group: Instance Creation (Factory)

somAllocate
somDeallocate
somNew
somNewNoInit
somRenew
somRenewNoInit
somRenewNoInitNoZero
somRenewNoZero

Group: Initialization/Termination

somInitClass
somInitMIClass
somAddDynamicMethod
somAddStaticMethod
somClassReady
somOverrideSMethod

Group: Access

somGetApplyStub
somGetClassData
somGetClassMtab
somGetInstanceOffset
somGetInstancePartSize
somGetInstanceSize
somGetInstanceToken
somGetMemberToken
somGetMethodData,
somGetMethodDescriptor
somGetMethodIndex
somGetMethodOffset
somGetMethodToken
somGetName

somGetNthMethodData
somGetNthMethodInfo
somGetNumMethods
somGetNumStaticMethods
somGetParent
somGetParents
somGetPClsMtab
somGetPClsMtabs
somGetRdStub,
somGetVersionNumbers,
somSetClassData
somSetMethodDescriptor

Group: Testing

somCheckVersion
somDescendedFrom
somSupportsMethod

Group: Dynamic

somFindMethod
somFindMethodOk
somFindSMethod
somFindSMethodId
somFindSMethodOk
somLookupmethod
somOverrideMtab

Overridden Methods

somDumpSelfInt
somInit
somUninit

somAddDynamicMethod Method

Purpose

Adds a new dynamic instance method to a class. Dynamic methods are not part of the declared interface to a class of objects, and are therefore not supported by implementation and usage bindings. Instead, dynamic methods provide a way to dynamically add new methods to a class of objects during execution. SOM provides no standard protocol for informing a user of the existence of dynamic methods and the arguments they take. Dynamic methods must be invoked using name-lookup or dispatch resolution.

IDL Syntax

```
void somAddDynamicMethod (
                                    in somId methodId,
                                    in somId  methodDescriptor,
                                    in somMethodPtr method,
                                    in somMethodPtr applyStub);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

If a static method with the same *methodId* has already been added to an ancestor of the receiving class, **somAddDynamicMethod** performs exactly as **somOverrideSMethod**. Otherwise, **somAddDynamicMethod** adds a new dynamic instance method to the receiving class. This involves recording the method's ID, descriptor, method procedure (specified by *method*), and apply stub in the receiving class's method data.

The arguments to **somAddDynamicMethod** should be non-null and obey the requirements expressed below. This is the responsibility of the implementor of a class, who in general has no knowledge of whether clients of this class will require use of the *applyStub* argument.

Parameters

receiver A pointer to a SOM class object.

methodId A **somId** that names the method.

methodDescriptor
A **somId** appropriate for requesting information concerning the method from the SOM IR. This is currently of the form <className>::<methodName>.

method A pointer to the procedure that will implement the new method. The first argument of this procedure is the address of the object on which it is being invoked.

applyStub A pointer to a procedure that returns nothing and receives as arguments: a method receiver; an address where the return value from the method call is to be stored; a pointer to a method procedure; and a va_list containing the arguments to the method. The applyStub procedure (which is usually called by **somDispatch**) must unload its va_list argument into separate variables of the correct type for the method, invoke its procedure argument on these variables, and then copy the result of the procedure invocation to the address specified by the return value argument.

Return Value

none

C Example

```
/* New dynamic method "newMethod1" for class "XXX" */
static char *somMN_newMethod1 = "newMethod1";
static somId somId_newMethod1 = &somMN_newMethod1;
static char *somDS_newMethod1 = "XXX::newMethod1";
static somId somDI_newMethod1 = &somDS_newMethod1;

static void SOMLINK somAP_newMethod1(SOMObject somSelf,
                                     void *__retVal,
                                     somMethodProc *__methodPtr,
                                     va_list __ap)
{
   void* __somSelf = va_arg(__ap, SOMObject);
   int arg1 = va_arg(__ap, int);
   SOM_IgnoreWarning(__retVal);
   ((somTD_SOMObject_newMethod1) __methodPtr) (__somSelf, arg1);
}

main()
{
   _somAddDynamicMethod (
   XXXClassData.classObject,           /* Receiver (class object) */
   somId_newMethod1,                   /* method name somId       */
   somDI_newMethod1,                   /* method descriptor somId */
   (somMethodProc *) newMethod1,       /* method procedure        */
   (somMethodProc *) somAP_newMethod1); /* method apply stub      */
}
```

Original Class

SOMClass

Related Information

Methods: somAddStaticMethod, somOverrideSMethod, somGetMethodDescriptor

somAddStaticMethod Method

Purpose

Adds a new static instance method to a class. Static methods are those indicated in the IDL or OIDL declaration of the class.

IDL Syntax

```
somMToken  somAddStaticMethod (
                                    in somId methodId,
                                    in somId methodDescriptor,
                                    in somMethodPtr method,
                                    in somMethodPtr redispatchStub,
                                    in somMethodPtr applyStub);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somAddStaticMethod** method adds a new static instance method to a class (the *receiver*). This involves recording the method's name, description, redispatchStub and applyStub, and entering the method procedure (specified by *method*) into the receiving class's instance method table. If the method has been already added to the instance method table of the receiving class (perhaps due to inheritance from an ancestor of this class during execution of **somInitMIClass**), the new method procedure replaces the previous method table entry (thus "overriding" it). **somAddStaticMethod** returns the method access token that must be used when resolving the method on an object (see **somResolve**).

The arguments to **somAddStaticMethod** must be non-null and obey the requirements expressed below. This is the responsibility of the implementor of a class, who in general has no knowledge of whether clients of this class will require use of the redispatchStub and applyStub arguments. For classes declared using IDL (as opposed to OIDL), SOM can generate the necessary redispatch and apply stubs dynamically. The redispatch and apply stub values necessary to allow this are described in somapi.h, along with the definition of the *somMethodData* structure.

somAddStaticMethod is intended for use by the code that initializes class objects. C and C++ programmers using SOM language bindings do not normally need to use this method explicitly; the C and C++ implementation bindings build structures containing the necessary information and call the function **somBuildClass** to create and initialize class objects.

Parameters

receiver A pointer to the SOM class object that is being initialized.

methodId A **somId** that names the method.

methodDescriptor
A **somId** that describes the types of the arguments and the return type of the method, or which provides access to such a description.

method A pointer to the procedure that will implement the new method. The first argument of this procedure is the address of the object on which it is being invoked.

redispatchStub A pointer to a procedure with the same signature as the method procedure. The redispatchStub procedure must package the method arguments that it receives (except the receiver object) into a va_list, use somDispatch to dispatch the method call, and then return the method result to the caller. Alternative

possibilities for this value are described in somapi.h, along with the definition of the *somMethodData* structure.

applyStub A pointer to a procedure that returns nothing and receives as arguments: a method receiver; an address where the return value from the method call is to be stored; a pointer to a method procedure; and a va_list containing the arguments to the method. The applyStub procedure (which is usually called by somDispatch) must unload its va_list argument into separate variables of the correct type for the method, invoke its procedure argument on these variables, and then copy the result of the procedure invocation to the address specified by the return value argument. Alternative possibilities for this value are described in somapi.h, along with the definition of the *somMethodData* structure.

Return Value

somMToken The **somAddStaticMethod** method returns a method-access token. As specified by the SOM API, C and C++ implementation bindings for SOM classes place this value in the ClassData structure for the receiver class, where it can be accessed by users for performing static method calls.

C Example

```
/* New static method "newMethod1" for class "XXX" */
static char *somMN_newMethod1 = "newMethod1";
static somId somId_newMethod1 = &somMN_newMethod1;
static char *somDS_newMethod1 = "XXX::newMethod1";
static somId somDI_newMethod1 = &somDS_newMethod1;

static void SOMLINK somAP_newMethod1(SOMObject somSelf,
                                     void *__retVal,
                                     somMethodProc *__methodPtr,
                                     va_list __ap)
{
   int arg1 = va_arg(__ap, int);
   SOM_IgnoreWarning(__retVal);
   ((somTD_SOMObject_newMethod1) __methodPtr) (somSelf, arg1);
}
static void  SOMLINK somRD_newMethod1(SOMObject somSelf, int arg1)
{
   va_somDispatch(somSelf, (void **)NULL, somId_newMethod1, arg1);
}

main()
{
   XXXClassData.newMethod1 = _somAddStaticMethod (
   XXXClassData.classObject,            /* Receiver (class object) */
   somId_newMethod1,                    /* method name somId       */
   somDI_newMethod1,                    /* method descriptor somId */
   (somMethodProc *) newMethod1,        /* method procedure        */
   (somMethodProc *) somRD_newMethod1,  /* method redispatch stub  */
   (somMethodProc *) somAP_newMethod1); /* method apply stub       */
}
```

Original Class

SOMClass

Related Information

Methods: somAddDynamicMethod, somInitMIClass, **somOverrideSMethod, somGetMethodDescriptor**

Functions: somIdFromString

somAllocate Method

Purpose

Supports class-specific memory allocation for class instances. Designed to be overridden.

IDL Syntax

string somAllocate (in long *size***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The default method provided by **SOMClass** for this method simply uses the **SOMMalloc** macro. Users of this method should be sure to use the dual method, **somDeallocate** to free allocated storage. Also, these two methods should always be overridden as a pair.

Parameters

receiver	A pointer to the class object whose memory allocation method is desired.
size	The number of bytes to be allocated.

Return Value

string	A pointer to the first byte of the allocated memory region, or NULL if sufficient memory is not available.

C++ Example

```
#include <som.xh>
#include <somcls.xh>
main()
{
   SOMClassMgr *cm = somEnvironmentNew();
   /* Use SOMClass's instance allocation method */
   string newRegion = _SOMClass->somAllocate(20);
}
```

Original Class

SOMClass

Related Information

Methods: somDeallocate

somCheckVersion Method

Purpose

Checks a class for compatibility with the specified major and minor version numbers. Not generally overridden.

IDL Syntax

boolean somCheckVersion (
In integer4 *majorVersion*,
In integer4 *minorVersion*);

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somCheckVersion** method checks the receiving class for compatibility with the specified major and minor version numbers. An implementation is compatible with the specified version numbers if it has the same major version number and a minor version number that is equal to or greater than *minorVersion*. The version number pair (0,0) is considered to match any version.

This method is called automatically after creating a class object to verify that a dynamically loaded class definition is compatible with a client application.

Parameters

receiver A pointer to the SOM class whose version information should be checked.

majorVersion This value usually changes only when a significant enhancement or incompatible change is made to a class.

minorVersion This value changes whenever minor enhancements or fixes are made to a class. Class implementors usually maintain downward compatibility across changes in the *minorVersion* number.

Return Value

Returns 1 (true) if the implementation of this class is compatible with the specified major and minor version number, and 0 (false) otherwise.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  myAnimal = AnimalNew();

  if (_somCheckVersion(_Animal, 0, 0))
     somPrintf("Animal IS compatible with 0.0\n");
  else
     somPrintf("Animal IS NOT compatible with 0.0\n");

  if (_somCheckVersion(_Animal, 1, 1))
     somPrintf("Animal IS compatible with 1.1\n");
  else
     somPrintf("Animal IS NOT compatible with 1.1\n");

  _somFree(myAnimal);
}
```

Assuming that the implementation of Animal is version 1.0, this program produces the following output:

```
Animal IS compatible with 0.0
Animal IS NOT compatible with 1.1
```

Original Class

SOMClass

Related Information

Methods: somInitMIClass

somClassReady Method

Purpose

Indicates that a class has been constructed and is ready for normal use. Designed to be overridden.

IDL Syntax

```
void  somClassReady ( );
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somClassReady** method is invoked automatically by the **somBuildClass** function after constructing and initializing a class object. The default implementation of this method provided by SOMClass simply registers the newly constructed class with **SOMClassMgrObject**. Metaclasses can override this method to augment class construction with additional registration protocol.

To have special processing done when a class object is created, you must define a metaclass for the class that overrides **somClassReady**. The final statement in any overriding method should invoke the parent method to ensure that the class is properly registered with **SOMClassMgrObject**. Users of the C and C++ implementation bindings for SOM classes should never invoke the **somClassReady** method directly; it is invoked automatically during class construction.

Parameters

receiver A pointer to the class object that should be registered.

Return Value

None.

Original Class

SOMClass

Related Information

Methods: somInitMIClass

somDeallocate Method

Purpose

Frees memory originally allocated by the **somAllocate** method from the same class object. Designed to be overridden.

IDL Syntax

void somDeallocate (string *memPtr***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The somDeallocate method is intended for use to free memory allocated using its dual method, **somAllocate**.

Parameters

receiver	A pointer to the class object whose somAllocate was originally used to allocate the memory now to be freed.
memPtr	A pointer to the first byte of the region of memory that is to be freed.

Return Value

None.

Original Class

SOMClass

Related Information

Methods: somAllocate

somDescendedFrom Method

Purpose

Tests whether one class is derived from another. Not generally overridden.

IDL Syntax

boolean somDescendedFrom (in SOMClass *aClassObj***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

Tests whether the receiver class is derived from a given class. For programs that use classes as types, this method can be used to ascertain whether the type of one object is a subtype of another.

This method considers a class object to be descended from itself.

Parameters

receiver	A pointer to the class object to be tested.
aClassObj	A pointer to the potential ancestor class.

Return Value

Returns 1 (true) if *receiver* is derived from *aClassObj,* and 0 (false) otherwise.

C Example

```
#include <dog.h>
/* ------------------------------------------------
   Note: Dog is a subclass of Animal.
   ------------------------------------------------ */
main()
{
  AnimalNewClass(0,0);
  DogNewClass(0,0);

  if (_somDescendedFrom (_Dog, _Animal))
     somPrintf("Dog IS descended from Animal\n");
  else
     somPrintf("Dog is NOT descended from Animal\n");
  if (_somDescendedFrom (_Animal, _Dog))
     somPrintf("Animal IS descended from Dog\n");
  else
     somPrintf("Animal is NOT descended from Dog\n");
```

This program produces the following output:

```
Dog IS descended from Animal
Animal is NOT descended from Dog
```

Original Class

SOMClass

Related Information

Methods: somIsA, **somIsInstanceOf**

somFindMethod, somFindMethodOk Methods

Purpose

Finds the method procedure for a method and indicate whether it represents a static method or a dynamic method. Not generally overridden.

IDL Syntax

```
boolean  somFindMethod (
                        in somId methodId,
                        out somMethodPtr m);
boolean  somFindMethodOk (
                        in somId methodId,
                        out somMethodPtr m);
```

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somFindMethod** and **somFindMethodOk** methods perform name–lookup method resolution, determine the method procedure appropriate for performing the indicated method on instances of the receiving class, and load *m* with the method procedure address. For static methods, method procedure resolution is done using the instance method table of the receiving class.

Name-lookup resolution must be used to invoke dynamic methods. Also, name–lookup can be useful when different classes introduce methods of the same name, signature, and desired semantics, but it is not known until runtime which of these classes should be used as a type for the objects on which the method is to be invoked. If the signature of a method is a not known, then method procedures cannot be be used directly, and the **somDispatch** method can be used after dynamically discovering the signature to allow the correct arguments can be placed on a va_list.

As with any methods that return procedure pointers, these methods allow repeated invocations of the same method procedure to be programmed. If this is done, it up to the programmer to prevent runtime errors by assuring that each invocation is performed either on an instance of the class used to resolve the method procedure or of some class derived from it. Whenever using SOM method procedure pointers, it is necessary to indicate the arguments to be passed and the use of system linkage to the compiler, so it can generate a correct procedure call. The way this is done depends on the compiler and the system being used. However, C and C++ usage bindings provide an appropriate typedef for static methods. The name of the typedef is based on the name of the class that introduces the method, as illustrated in the example below.

Unlike the **somFindMethod** method, if the class does not support the specified method, the **somFindMethodOk** method raises an error and halts execution.

If the class does not support the specified method, then **m* is set to NULL and the return value is meaningless. Otherwise, the returned result is true if the indicated method was a static method.

Parameters

receiver	A pointer to the class object whose method is desired.
methodId	An ID that represents the name of the desired method. The **somIdFromString** function can used to obtain an ID from the method's name.
m	A pointer to the location in memory where a pointer to the specified method's procedure should be stored**.** Both methods store a NULL pointer in this location (if the method does not exist) or a value that can be called.

Return Value

The **somFindMethod** and **somFindMethodOk** methods return TRUE when the method procedure can be called directly and FALSE when the method procedure is a dispatch function.

C Example

Assuming that the *Animal* class introduces the method *setSound*, the type name for the *setSound* method procedure type will be *somTD_Animal_setSound*, as illustrated below:

```
#include <animal.h>
void main()
{
   Animal myAnimal;
   somId somId_setSound;
   somTD_Animal_setSound methodPtr;
   Environment *ev = somGetGlobalEnvironment();

   myAnimal = AnimalNew();
/* ---------------------------------------
   Note: Next three lines are equivalent to
       _setSound(myAnimal, ev, "Roar!!!");
   --------------------------------------- */
   somId_setSound = somIdFromString("setSound");
   _somFindMethod (_somGetClass(myAnimal),
                   somId_setSound, &methodPtr);
   methodPtr(myAnimal, ev, "Roar!!!");
/* --------------------------------------- */
   _display(myAnimal, ev);
   _somFree(myAnimal);
}
/*
Program Output:
This Animal says
Roar!!!
*/
```

Original Class

SOMClass

Related Information

Methods: somFindSMethod, somFindSMethodOK, somSupportsMethod, somDispatch, somClassDispatch

Functions: somApply, somResolve, somClassResolve, somResolveByName, somParentNumResolve

Macros: SOM_Resolve, SOM_ResolveNoCheck, SOM_ParentNumResolve

somFindSMethod, somFindSMethodOk Methods

Purpose

Finds the method procedure for a static method. Not generally overridden.

IDL Syntax

somMethodPtr somFindSMethod (in somId *methodId***);**

somMethodPtr somFindSMethodOk (in somId *methodId***);**

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somFindSMethod** and **somFindSMethodOk** methods perform name–lookup resolution in a similar fashion to **somFindMethod** and **somFindMethodOK**, but are restricted to static methods. See the description of somFindMethod for a discussion of name–lookup method resolution. Because these methods are restricted to resolving static methods, their interface is slightly different from the somFindMethod interfaces; a method procedure pointer is returned when lookup is successful; otherwise NULL is returned.

The **somFindSMethodOk** method is identical to **somFindSMethod**, except that an error is raised if the indicated static method is not defined for the receiving class.

Parameters

receiver	A pointer to a class object.
methodId	A somId representing the name of the desired method.

Return Value

The **somFindSMethod** and **somFindSMethodOk** methods return a pointer to the method procedure that supports the specified method for the class.

Example

See the **somFindMethod** method example.

Original Class

SOMClass

Related Information

Methods: somFindMethod, **somFindMethodOk**, **somOverrideMtab**

somGetApplyStub Method *(Obsolete)*

Purpose

Returns an apply stub for a method supported by the receiving class. This method is obsolete. Use function **somApply** instead.

IDL Syntax

somMethodPtr somGetApplyStub (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

When possible, the **somGetApplyStub** method returns a pointer to an old–style *apply stub* for the indicated method which has the following interface. An old–style apply stub is a procedure that takes as arguments an object on which the method is to be invoked, a pointer to the location in memory where the method's result should be stored, a pointer to the method's procedure, and the arguments for the desired method invocation in the form of a **va_list** data structure. The apply stub extracts the arguments, invokes the method, and stores its result in the specified location. Apply stubs are useful when a static method invocation cannot be constructed at compile time (i.e., when the name and signature of a method is not known until run time). When an old–style apply stub of the kind described here is not available for supporting a method, a NULL is returned.

For SOM classes described using IDL, the functionality originally provided by apply stubs is now provided by a small set of generic assembly code routines that can handle all possible method procedure argument and return types. These routines are not public, but, along with the old–style apply stubs described here, are accessed through a single uniform interface provided by the the **somApply** function.

The calling sequence for the old-style apply stub is illustrated below.

```
#include <stdarg.h>

somMethodPtr applyStub; /* get using somGetApplyStub          */
SOMObject receiver;     /* object to respond to the method    */
somToken *retval;       /* where the result should be stored  */
somMethodPtr methodPtr; /* the method's procedure, obtained
                           using SOM_Resolve or somFindMethod */
va_list arglist;        /* the method's arguments, constructed
                           using the va_arg library routine   */
(*applyStub)(receiver, retval, methodPtr, arglist);
```

Parameters

receiver A pointer to the class object that supports the indicated method.

methodId An ID that represents the name of the desired method.

Return Value

The **somGetApplyStub** method returns a pointer to an old–style apply stub for the specified method for the specified class. NULL is returned if the method is not supported by an apply stub having the interface described here.

Original Class

SOMClass

Related Information

Functions: **somApply**

somGetClassData Method

Purpose

Returns a pointer to the global <*className*>**ClassData** structure associated with a class. Not generally overridden.

IDL Syntax

somClassDataStructurePtr somGetClassData ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetClassData** method returns a pointer to the global <*className*>**ClassData** structure associated with a class. Every SOM class has an external data structure named <*className*>**ClassData** that holds a pointer to the class object followed by a somMToken for each method introduced by the class. This structure is used for efficient offsets–based method resolution.

This method is not generally overridden. C and C++ programmers generally don't invoke this method, since the <*className*>**ClassData** structure for is an external data structure declared by and statically linked into the C and C++ usage bindings for <className>.

Parameters

receiver A pointer to the class object whose **ClassData** structure is desired.

Return Value

The **somGetClassData** method returns a pointer to the **ClassData** structure for the specified class.

Original Class

SOMClass

Related Information

Methods: somSetClassData

somGetClassMtab Method

Purpose

Returns a pointer to a class's method table. Not generally overridden.

IDL Syntax

somMethodTabPtr somGetClassMtab ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetClassMtab** method returns the address of the instance method table for a class. The instance method table is a structure containing a pointer to the class object followed by private information that only the SOM kernel deals with. In the future, it is possible that more information about the structure of SOM method tables may be made part of the public SOM API, but currently there is little or no use for this method by SOM users.

Parameters

receiver A pointer to the class object whose method table is desired.

Return Value

The **somGetClassMtab** method returns a pointer to the method table of the specified class.

Original Class

SOMClass

Related Information

Methods: somGetNumStaticMethods, **somGetPClsMtab**

somGetInstanceOffset Method *(Obsolete)*

Purpose

Returns the offset to the instance variables introduced by a class in instances of the class. This method is obsolete, and is not useful in a multiple inheritance context.

IDL Syntax

long somGetInstanceOffset ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetInstanceOffset** method returns the offset of the instance variables introduced by a class in the body of all objects of exactly that class. This method is not generally overridden, and is obsolete.

Parameters

receiver A pointer to the class object whose instance variable offset is desired.

Return Value

The **somGetInstanceOffset** method returns the offset (within any object of the receiving class) to the instance data. The offset is given as the distance in bytes along the leftmost derivation path of the class.

If a class introduces no instance variables, the value 0 is returned. Use the method **somGetInstancePartSize** to determine the size of introduced instance data.

Original Class

SOMClass

Related Information

Methods: somGetInstancePartSize, **somGetInstanceSize**

somGetInstancePartSize Method

Purpose

Returns the total size of the instance data structure introduced by a class. Not generally overridden.

IDL Syntax

long somGetInstancePartSize ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetInstancePartSize** method returns the amount of space needed in an object of the specified class or any of its subclasses to contain the instance variables introduced by the class.

Parameters

receiver A pointer to the class object whose instance data size is desired.

Return Value

The **somGetInstancePartSize** method returns the size, in bytes, of the instance variables introduced by this class. This does not include the size of instance variables introduced by this class's ancestor or descendent classes. If a class introduces no instance variables, 0 is returned.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  SOMClass animalClass;
  int instanceSize;
  int instanceOffset;
  int instancePartSize;

  myAnimal = AnimalNew ();
  animalClass = _somGetClass (myAnimal);
  instanceSize = _somGetInstanceSize (animalClass);
  instanceOffset = _somGetInstanceOffset (animalClass);
  instancePartSize = _somGetInstancePartSize (animalClass);
  somPrintf ("Instance Size: %d\n", instanceSize);
  somPrintf ("Instance Offset: %d\n", instanceOffset);
  somPrintf ("Instance Part Size: %d\n", instancePartSize);
  _somFree (myAnimal);
}
/*
Output from this program:
Instance Size: 8
Instance Offset: 0
Instance Part Size: 4
*/
```

Original Class

SOMClass

Related Information

Methods: somGetInstanceOffset, **somGetInstanceSize**

somGetInstanceSize Method

Purpose

Returns the size of an instance of a class. Not generally overridden.

IDL Syntax

long somGetInstanceSize ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetInstanceSize** method returns the total amount of space needed in an instance of the specified class.

Parameters

receiver A pointer to the class object whose instance size is desired.

Return Value

The **somGetInstanceSize** method returns the size, in bytes, of each instance of this class. This includes the space required for instance variables introduced by this class and all of its ancestor classes.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  SOMClass animalClass;
  int instanceSize;
  int instanceOffset;
  int instancePartSize;

  myAnimal = AnimalNew ();
  animalClass = _somGetClass (myAnimal);
  instanceSize = _somGetInstanceSize (animalClass);
  instanceOffset = _somGetInstanceOffset (animalClass);
  instancePartSize = _somGetInstancePartSize (animalClass);
  somPrintf ("Instance Size: %d\n", instanceSize);
  somPrintf ("Instance Offset: %d\n", instanceOffset);
  somPrintf ("Instance Part Size: %d\n", instancePartSize);
  _somFree (myAnimal);
}
/*
Output from this program:
Instance Size: 8
Instance Offset: 0
Instance Part Size: 4
*/
```

Original Class

SOMClass

Related Information

Methods: somGetInstanceOffset, **somGetInstancePartSize**

somGetInstanceToken Method

Purpose

Returns a data access token for the instance data introduced by a class. Not generally overridden.

IDL Syntax

somDToken somGetInstanceToken ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

Returns a data token "pointing" to the beginning of the instance data introduced by the receiving class. This token can be passed to the function **somDataResolve** to locate this instance data within an an instance of the receiver class or any class derived from it. Also the instance data token for a class can be passed to the class method **somGetMemberToken** to get a data token for a specific instance variables introduced by the class (if the relative offset of this instance variable is known). This approach is used by C and C++ implementation bindings to support public instance data for OIDL classes (IDL classes currently have no public instance data).

A data token for the instance data introduced by a class is required by method procedures that access data introduced by the method procedure's defining class. For classes declared using OIDL and IDL, the needed token is stored in the auxiliary class data structure, which is an external data structure made statically available by the C and C++ language bindings as *<className>*CClassData.instanceToken. Thus, this method call is not generally used by C and C++ class implementors of classes declared using OIDL or IDL.

Parameters

receiver A pointer to a **SOMClass** object.

Return Value

Returns a data token for the beginning of the instance data introduced by the receiver.

Original Class

SOMClass

Related Information

Functions: somDataResolve

Methods: somGetInstanceSize, somGetInstancePartSize, somGetInstanceOffset, somGetMemberToken

somGetMemberToken Method

Purpose

Returns an access token for an instance variable. This is method is not generally overridden.

IDL Syntax

```
somDToken  somGetMemberToken (
                                integer4 memberOffset,
                                somDToken instanceToken);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMemberToken** method returns an access token for the data member at offset *memberOffset* within the block of instance data identified by instance token. The returned token can subsequently be passed to the **somDataResolve** function to locate the data member.

Typically, only the code that implements a class declared using OIDL requires access to this method, and this code is normally provided by implementation bindings. Thus C and C++ programmers do not normally invoke this method.

Parameters

receiver	A pointer to a **SOMClass** object.
memberOffset	A 32-bit integer representing the offset of the required data member.
instanceToken	A token, obtained from **somGetInstanceToken**, that identifies the introduced portion of the class.

Return Value

Returns an access token for the specified data member.

Original Class

SOMClass

Related Information

Functions: somDataResolve

Methods: somGetInstanceSize, somGetInstancePartSize, somGetInstanceOffset, somGetInstanceToken

somGetMethodData Method

Purpose

Returns method information for a method known to the receiver class as having a given name. Not generally overridden.

IDL Syntax

```
boolean  somGetMethodData (
                                    in somId methodId,
                                    out somMethodData md);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMethodData** method loads a *somMethodData* structure with data describing the method identified by the passed *methodId*. If *methodId* does not identify a method known to the receiver, then false is returned; otherwise, true is returned after loading the *somMethodData* structure with data corresponding to the indicated method.

Parameters

receiver	A pointer to the class that produced the index value.
methodId	A **somId** for the method's name.
md	A pointer to a *somMethodData* structure.

Return Value

Boolean true if successful; otherwise false.

Example

See method **somGetMethodIndex.**

Related Information

Data Structures: somMethodData (somapi.h)

Methods: somGetMethodIndex, somGetMethodData, somGetNthMethodInfo

somGetMethodDescriptor Method

Purpose

Returns the method descriptor for a method. Not generally overridden.

IDL Syntax

somId somGetMethodDescriptor (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMethodDescriptor** method returns the method descriptor for a specified method of a class. (A method descriptor is a somId that represents the identifier of an attribute definition or a method definition in the SOM Interface Repository. It contains information about the method's return type and the types of its arguments.) If the class object does not support the indicated method, NULL is returned.

Parameters

receiver	A pointer to a **SOMClass** object.
methodId	A **somId** method descriptor.

Return Value

The **somGetMethodDescriptor** method returns a **somId** method descriptor.

Example

```
somId myMethodDescriptor;
myMethodDescriptor = _somGetMethodDescriptor(_Animal,
                                    somIdFromString("setSound"));
```

Original Class

SOMClass

Related Information

Methods: somAddDynamicMethod, somGetMethodInfo, somGetNthMethodInfo, somGetMethodData, somGetNthMethodData

somGetMethodIndex Method

Purpose

Returns a class-specific index for a method. Not generally overridden.

IDL Syntax

long somGetMethodIndex (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMethodIndex** method returns an index that can be used in subsequent calls to the same receiving class to determine information about the indicated (static or dynamic) method, via the methods **somGetNthMethodData** and **somGetNthMethodInfo**. The method must be appropriate for use on an instance of the receiver class; otherwise, a –1 is returned. The index of a method can change over time if dynamic methods are added to the receiver class or its ancestors. Thus, in dynamic multi-threaded environments, a critical region should be used to bracket the use of this method and of subsequent requests for method information based on the returned index.

Parameters

receiver	A pointer to a **SOMClass** object.
methodId	A somId method id.

Return Value

The **somGetMethodIndex** method returns a positive long if successful, and a –1 otherwise.

C++ Example

```
#include <somcls.xh>
main
{
   somEnvironmentNew();
   somId gmiId = somIdFromString("somGetMethodIndex");
   long index = _SOMClass->somGetMethodIndex(gmiId);
   somMethodData md;
   boolean rc = _SOMClass->somGetNthMethodData(index,&md);
   SOM_Test(rc && somCompareIds(gmiId, md.id));
}
```

Original Class

SOMClass

Related Information

Data Structures: somMethodData (somapi.h)

Methods: somGetNthMethodData, somGetNthMethodInfo

somGetMethodOffset Method *(Obsolete)*

Purpose

Returns the offset (in the receiver class's instance method table) of a static method. This method is obsolete, and not generally overridden.

IDL Syntax

long somGetMethodOffset (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMethodOffset** method returns the specified method's offset in the receiver class's instance method table, or returns zero if the indicated method is not a static method.

Parameters

receiver	A pointer to the class object whose method table offset is desired.
methodId	The ID that designates the name of the method.

Return Value

If the specified method is not a static method, zero is returned; otherwise the method's offset in the **somMethodTab** structure for the class is returned.

Original Class

SOMClass

somGetMethodToken Method

Purpose

Returns a method access token for static method. Not generally overridden.

IDL Syntax

somMToken somGetMethodToken (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetMethodToken** method returns a method access token for a static method with the specified id that was introduced by the receiver class or an ancestor of the receiver class. This method token can be passed to the **somResolve** function (or one of the other offset–based method resolution functions) to select a method procedure pointer from a method table of an object whose class is the same as, or is derived from the class that introduced the method.

Parameters

receiver	A pointer to a **SOMClass** object.
methodId	A **somId** identifying a method.

Return Value

The **somGetMethodToken** method returns a **somMToken** method access token.

C Example

Assuming that the class *Animal* introduces the method *setSound*,

```
#include <animal.h>
main() {
  somMToken tok;
  Animal myAnimal;
  somTD_Animal_setSound methodPtr; /* use typedef from animal.h */
  Environment *ev = somGetGlobalEnvironment();
  myAnimal = AnimalNew();
  /*next 3 lines equivalent to _setSound(myAnimal, ev, "Roar!!!");*/
  tok = _somGetMethodToken(_Animal, somIdFromString("setSound"));
  methodPtr = (somTD_Animal_setSound)somResolve(myAnimal, tok);
  methodPtr(myAnimal, ev, "Roar!!!");
  _display(myAnimal, ev);
  _somFree(myAnimal);
}
```

Original Class

SOMClass

Related Information

Functions: somResolve, somClassResolve, somParentNumResolve

Methods: somGetNthMethodInfo, somGetMethodData,

somGetName Method

Purpose

Returns the name of a class. Not generally overridden.

IDL Syntax

string somGetName ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetName** method returns the address of a zero-terminated string that gives the name of the receiving class. This name may be used as a RepositoryId in the **Repository_lookup_id** method (described in the SOM Interface Repository Framework section) to obtain the IDL interface definition that corresponds to the receiving class.

The returned name is not necessarily the same as the statically known class name used by a programmer to gain access to the class object (e.g., via the method **somFindClass**). This is because the method **somSubstituteClass** may have been used to ”shadow” the class having the static name used by the programmer. Also, when the interface to a class’s instances is defined within an IDL module, the returned name will not directly correspond to the names of the procedures and macros made available by C and C++ usage bindings for accessing class objects (e.g., the **<classNameNewClass** procedure, or the **_<className>** macro). This is because , the <className> token used in constructing the names of these procedures and macros uses an underscore character to separate the module name from the interface name, while the actual name of the corresponding class uses two colon characters instead of an underscore for this purpose.

The **somGetName** method is not generally overridden. The returned address is valid until the class object is unregistered or freed.

Parameters

receiver The class whose name is desired.

Return Value

The **somGetName** method returns a pointer to the name of the class.

C++ Example

```
#include <animal.xh> /* assume Animal defined in the Zoo module */
#include <string.h>
main()
{
  string className = Zoo_AnimalNewClass(0,0)->somGetName();
  SOM_Test(!strcmp(className, ”Zoo::Animal”));
}
```

Original Class

SOMClass

Related Information

Methods: Repository_lookup_id, **somSubstituteClass, somFindClass**

somGetNthMethodData Method

Purpose

Returns method information for the *n*th (static or dynamic) method known to a given class. Not generally overridden.

IDL Syntax

boolean somGetNthMethodData (
in long *index*,
out somMethodData *md*)

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetNthMethodData** method loads a *somMethodData* structure with data describing the method identified by the passed index. The index must have been produced by a previous call to exactly the same receiver class; the same method will in general have different indexes in different classes. If the index does not identify a method known to this class, then false is returned; otherwise, true is returned after loading the *somMethodData* structure with data corresponding to the indicated method.

Parameters

receiver	A pointer to the class that produced the index value.
index	An index returned as a result of a previous call of **somGetMethodIndex**.
md	A pointer to a *somMethodData* structure.

Return Value

Boolean true if successful; otherwise false.

Example

See method **somGetMethodIndex.**

Related Information

Data Structures: somMethodData (somapi.h)

Methods: somGetMethodIndex, somGetMethodData, somGetNthMethodInfo

somGetNthMethodInfo Method

Purpose

Returns the **somId** of the *n*th (static or dynamic) method known to a given class. Also loads a **somId** with a descriptor for the method. Not generally overridden.

IDL Syntax

somId somGetNthMethodInfo (
in long *index,*
out somId *descriptor***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetNthMethodInfo** method returns the identifier of a method, and loads the **somId** whose address is passed with the **somId** of the method descriptor. Method descriptors are used to support access to information stored in a SOM Interface Repository.

Parameters

receiver	A pointer to the class from which the *index* was obtained using method **somGetMethodIndex**.
index	The *n*th method known to this class, whose method descriptor is desired.
descriptor	A pointer to a **somId** that will be loaded with a **somId** for the descriptor.

Return Value

The **somId** for the indicated method, if a method with the indicated index is known to the receiver; otherwise NULL.

C++ Example

```
#include <somcls.xh>
main()
{
   somEnvironmentNew();
   somId descriptor, icId = somIdFromString("somInitClass");
   long ndx = _SOMClass->somGetMethodIndex(icId);
   SOM_Test(
      somCompareIds(
        icId,
        _SOMClass->somGetNthMethodInfo(ndx,&descriptor));
   SOMFree(icId);
   SOMFree(descriptor);
}
```

Original Class

SOMClass

Related Information

Classes: Repository (repostry.idl)

Methods: somGetMethodIndex, somGetNthMethodData

somGetNumMethods Method

Purpose

Returns the number of methods available for a class of objects. Not generally overridden.

IDL Syntax

long somGetNumMethods ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetNumMethods** method returns the number of methods currently supported by the specified class, including inherited methods (both static and dynamic).

The value that the **somGetNumMethods** method returns is the total number of methods currently known to the receiving class as being applicable to its instances. This includes both static and dynamic methods, whether defined in this class or inherited from an ancestor class.

Parameters

receiver A pointer to the class object whose instance method count is desired.

Return Value

The **somGetNumMethods** method returns the total number of methods that are currently available for the receiving class.

C Example

```
#include <animal.h>
main()
{
    int numMethods;

    AnimalNewClass(Animal_MajorVersion, Animal_MinorVersion);
    numMethods = _somGetNumMethods(_Animal);
    somPrintf("Number of methods supported by class: %d\n",
                                                    numMethods);
}
```

Original Class

SOMClass

Related Information

Methods: somGetNumStaticMethods

somGetNumStaticMethods Method

Purpose

Obtains the number of static methods available for a class of objects. Not generally overridden.

IDL Syntax

int somGetNumStaticMethods ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetNumStaticMethods** method returns the number of static methods available in the specified class, including inherited ones. Static methods are those that are represented by entries in the class's instance method table, and which can be invoked using method tokens and offset resolution.

Parameters

receiver A pointer to the class object whose static method count is desired.

Return Value

The **somGetNumStaticMethods** method returns the total number of static methods that are available for instances of the receiving class.

C Example

```
#include <animal.h>
main()
{
    int numMethods;

    AnimalNewClass(Animal_MajorVersion, Animal_MinorVersion);
    numMethods = _somGetNumStaticMethods(_Animal);
    somPrintf("Number of static methods supported by class: %d\n",
                numMethods);
}
```

Original Class

SOMClass

Related Information

Methods: somGetNumMethods

somGetParent, somGetParents Methods

Purpose

Gets a pointer to a class's parent (direct base) class(es). Not generally overridden.

IDL Syntax

SOMClass somGetParent ( ); ***// Obsolete***

SOMClassSequence somGetParents ( );

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somGetParent** method obtains a pointer to the *receiver*'s leftmost parent class. This method is obsolete, and has little or no utility in a multiple inheritance context.

The **somGetParents** method returns a sequence containing pointers to the parents of the receiver.

Parameters

receiver A pointer to the class whose parent (base) classes are desired.

Return Value

The **somGetParent** method returns a pointer to the leftmost parent of the receiver, if one exists, and NULL otherwise (in the case of SOMObject). The **somGetParents** method returns a sequence of pointers to the parents of the receiver.

C Example

```
/* Note: Dog is a single-inheritance subclass of Animal. */
#include <dog.h>
main()
{
  Dog myDog;
  SOMClass dogClass;
  SOMClassSequence parents;
  char *parentName;
  int i;

  myDog = DogNew();
  dogClass = _somGetClass(myDog);
  parents = _somGetParents(dogClass);
  for (i=0; i<parents._length; i++)
     somPrintf("-- parent %d is %s\n", i,
                 _somGetName(parents._buffer[i]));
  _somFree(myDog);
}
/*
Output from this program:
-- parent 0 is Animal
*/
```

Original Class

SOMClass

Related Information

Methods: somGetClass, somInitMIClass

somGetPClsMtab, somGetPClsMtabs Methods

Purpose

Obtains a list of the method tables to be used to support parent method calls. By default, these are the instance-method tables of a class's parent (base) classes.

IDL Syntax

somMethodTabs somGetPClsMtab ( ); *// Obsolete*

somMethodTabs somGetPClsMtabs ( );

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somGetPClsMtab** and **somGetPClsMtabs** methods return a list of the method tables to be used to support parent-method calls within a class's implementation. Normally, the result lists the instance-method tables of a class's parent (base) classes. If the class is a root class (i.e., **SOMObject**), the method returns NULL. The two methods are equivalent except for their names.

Typically, only the code that implements parent-method calls for a class requires access to this method, and this code is provided automatically by implementation bindings. Thus, C and C++ programmers do not normally invoke this method.

Parameters

receiver A pointer to the class object whose parent's method tables are desired.

Return Value

The method returns a pointer to the method tables to be used for performing parent-method calls from the receiving class's implementation. If this class is a root class (**SOMObject**), NULL is returned.

Original Class

SOMClass

Related Information

Data Structures: somMethodTabs (somapi.h)

Methods: somGetClassMtab

somGetRdStub

Purpose

Returns a redispatch stub for the static method known to the receiver class as having the specified ID. Not generally overridden.

IDL Syntax

somMethodPtr somGetRdStub (somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The purpose of a redispatch stub is to provide a call interface identical to that of the method procedure that supports a given static method, thereby allowing a user to call the stub as if it were a normal method procedure. But, when a redispatch stub receives control, it calls **somDispatch**, thus invoking dispatch-method resolution for the method call. By using the method **somOverrideMtab** to replace the method procedure pointers in a method table with their redispatch stubs, and then overriding the **somDispatch** entry in the method table, it is possible to get control of every method invocation on a class of objects, thus providing specialized handling for each method call.

The use of **somGetRdStub** allows finer control over method table manipulation than is possible with **somOverrideMtab**, since individual methods can be overridden with their redispatch stubs when method tables are built. The construction of method tables is performed by **somInitMIClass**, which is generally overridden by metaclasses to achieve these effects. Redispatch stubs are registered for static methods when they are introduced using **somAddStaticMethod**.

The default implementation of **somDispatch** provided by **SOMObject** simply invokes an apply stub for the method after doing offset resolution to chose a method procedure. Thus, use of a redispatch stub without also overriding the **somDispatch** method produces behavior identical to that which would be produced using offset resolution. This is illustrated by the example below.

Parameters

receiver — A pointer to the class object whose known static methods are to be searched for a method having the indicated ID. Once such a method is found, its method data will be used to provide the desired redispatch stub. Redispatch stubs are not available for dynamic methods.

methodId — A **somId** for the method whose redispatch stub is desired.

Return Value

A redispatch stub procedure pointer whose type is identical to that of the original method.

C++ Example

```
#include <somcls.xh>
#include <somcm.xh>
main()
{
  somId getrdId = somIdFromString("somGetRdStub");
  SOMClassMgr *cm = somEnvironmentNew();
  somTD_SOMClass_somGetRdStub rd1 = (somTD_SOMClass_somGetRdStub)
         (_SOMClass->somGetRdStub(getrdId));
  somTD_SOMClass_somGetRdStub rd2 = (somTD_SOMClass_somGetRdStub)
         (rd1(_SOMClass, getrdId));
  SOM_Test(rd1 == rd2);
  somFree(getrdId);
}
```

Original Class

SOMClass

Related Information

Functions: somApply

Methods: somOverrideMtab, somInitMIClass, somOverrideSMethod, somDispatch

somGetVersionNumbers Method

Purpose

Gets the major and minor version numbers of a class. Not generally overridden.

IDL Syntax

void somGetVersionNumbers (
out long *majorVersion,*
out long *minorVersion***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetVersionNumbers** method returns, via its output parameters, the major and minor version numbers of the class specified by *receiver*. The class object must have already been created (because the class object is the receiver of the method).

Parameters

receiver	A pointer to a class object .
majorVersion	A pointer where the major version number is to be stored.
minor Version	A pointer where the minor version number is to be stored.

Return Value

None.

C Example

```
#include <som.h>

main() {

  long major, minor;
  SOMClass myClass;

  somEnvironmentNew();
  myClass = _somFindClass(SOMClassMgrObject,
                    somIdFromString("Animal"), 0, 0);
  _somGetVersionNumbers(myClass, &major, &minor);
  somPrintf("The version numbers are %i and %i.\n", major, minor);
}
```

Original Class

SOMClass

Related Information

Methods: somCheckVersionNumbers

somInitClass Method

Purpose

Performs the first step of initializing a single–inheritance class object: creates and initializes the class's instance method table by inheriting default methods from the parent class, and determines the size of the new class's instances. Obsolete but still useful for single-inheritance classes. Designed to be overridden.

IDL Syntax

```
void  somInitClass (
                    in string className,
                    in SOMClass parentClass,
                    long dataSize,
                    long maxStaticMethods,
                    long majorVersion,
                    long minorVersion);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somInitClass** method performs the first step of initializing a single–inheritance class object: create and initialize the class's instance method table by inheriting default methods from the parent class, and determine the size of the new class's instances. For classes having multiple parents, the **somInitMIClass** method is used instead.

Once this method has been executed, it is necessary to add new static methods to the receiving class's instance method table, using the method **somAddStaticMethod**, and override the default implementation inherited from the parent class for any methods overridden by the new class, using the method **somOverrideSMethod**.

C and C++ programmers using the implementation language bindings generated by the SOM Compiler for classes declared using OIDL or IDL don't invoke this method directly, because implementation bindings use the somBuildClass function, which first calls somInitMIClass and then adds new static methods and performs any necessary overrides.

Parameters

receiver A pointer to the class object to be initialized.

className A string representing the name of the class.

parentClass The parent (base) class of the newly created class. If NULL is specified, this value defaults to **SOMObject**. Parent (base) classes must be created prior to the creation of their derived classes.

dataSize The amount of space needed to hold the instance variables introduced by the newly created class. This value should *not* include any space required by parent (base) classes.

maxStaticMethods
The number of static methods defined for the new class. It should *not* include any static methods defined in the parent (base) classes, even if some of them have been overridden in this class.

majorVersion The major version number of the current implementation of the new class.

minorVersion The minor version number of the current implementation of the new class.

Return Value

None.

Example

```
#include <som.h>
SOMClass myParentClass;
struct {
   int a, b, c;
} myClassInstanceData;
#define MyClass_MaxMethods 4
#define MyClass_MajorVersion 2
#define MyClass_MinorVersion 1
extern struct MyClassClassDataStructure {
     SOMAny *classObject;
     somMOffset myMethod1;
     somMOffset myMethod2;
     somMOffset myMethod3;
     somMOffset myMethod4;
} MyClassClassData;

/* ... */
_somInitClass (MyClassClassData.classObject,
            "Animal",
            myParentClass,
            sizeof (myClassInstanceData),
            MyClass_MaxMethods,
            MyClass_MajorVersion,
            MyClass_MinorVersion);
```

Original Class

SOMClass

Related Information

Methods: somInitMIClass, somAddStaticMethod, somOverrideSMethod

somInitMIClass Method

Purpose

Performs the first step of initializing a class object: creates and initializes the class's instance method table by inheriting default methods from the parent classes, and determines the size of the new class's instances. Designed to be overridden

IDL Syntax

```
void somInitMIClass (
                        in unsigned long inherit_vars,
                        in string className,
                        in SOMClassSequence parentClasses,
                        in long dataSize,
                        in long maxStaticMethods,
                        in long majorVersion,
                        in long minorVersion);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somInitMIClass** method performs the first step of initializing a class object: create and initialize the class's instance method table by inheriting default methods from the parent classes, and determine the size of the new class's instances. The method can be overridden, to change the way that class objects are initialized (see the example below).

C and C++ programmers using the implementation language bindings generated by the SOM Compiler for classes declared using OIDL or IDL don't invoke this method directly, because implementation bindings use the **somBuildClass** function, which first calls **somInitMIClass** and then adds new static methods and performs any necessary overrides.

Once the parent's **somInitMIClass** method has been executed, **somAddStaticMethod** can be used to add new static methods to the receiving class's instance method table, or **somOverrideSMethod** can be used to override the default implementation inherited from the parent class for any methods overridden by the new class.

Parameters

receiver A pointer to the class object to be initialized.

inherit_vars An 32-bit vector used to control inheritance of instance data from parent classes. This feature is used within the SOM implementation, but is not currently documented. It is not enabled for classes declared using IDL. A word containing all ones is an appropriate value to pass to inherit instance data from all parent classes.

className A NULL terminated character string representing the name of the class to be created. The string is copied, so it may be freed upon return to the caller.

parentClasses A pointer to a sequence of parent (base) classes. The sequence is copied, so it may be freed upon return to the caller if this is desired.

dataSize A 32-bit integer representing the space needed for the instance variables introduced by this class.

maxStaticMethods
An integer indicating the maximum number of static methods that will be added to the initialized class using **somAddStaticMethod**.

majorVersion A 32-bit integer indicating the major version number for this implementation of the class definition.

minorVersion A 32-bit integer indicating the minor version number.

Return Value

None

Example

A user-defined metaclass “MyMetaclass” might override the **somInitMIClass** method as follows, to have all method invocations go through function “MyDispatch”. “MyMetaclass” defines an internal instance variable, “saveMethods,” of type “MyMetaclass.”

```
SOM_Scope void SOMLINK somInitMIClass(MyMetaclass somSelf,
                        unsigned long inherit_vars,
                        string className,
                        SOMClassSequence parentClasses,
                        long dataSize, long maxStaticMethods,
                        long majorVersion, long minorVersion)
{
   MyMetaclassData *somThis = MyMetaclassGetData( somSelf );

  /* Normal class initialization, before somOverrideMtab: */
  parent_SOMClass_somInitMIClass(somSelf, inherit_vars, className,
                parentClasses, dataSize,
                maxStaticMethods, majorVersion, minorVersion);

  /* create another class just like somSelf, in whose instance
     method table we will save the original method procedures for
     somSelf instance. MyDispatch will be able to use this to access
     the original method procedures when they are needed.
  */
  _saveMethods = MyMetaclassNew();
  parent_SOMClass_somInitMIClass(_saveMethods, inherit_vars,
                inherit_vars, ”mtabClass”, parentClasses,
                dataSize, maxStaticMethods, majorVersion,
                minorVersion);

  /* Now overwrite somSelf’s method table with redispatch stubs: */
  _somOverrideMtab(somSelf);

  /* override the dispatch procedure: */
  _somOverrideSMethod(somSelf, somIdFromString(”somDispatch”),
                        (somMethodPtr)Mydispatch);
}
```

Original Class

SOMClass

Related Information

Methods: somInitClass, somOverrideMtab, somOverrideSMethod

somLookupMethod Method

Purpose

Performs name-look method resolution. Not generally overridden.

IDL Syntax

somMethodPtr somLookupMethod (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somLookupMethod** method uses name-lookup resolution to return the address of the method procedure that supports the indicated method on instances of the receiver class. The method may be either static or dynamic. If the method is not supported by the receiving class, then NULL is returned. The SOM C and C++ usage bindings support name-lookup method resolution by invoking **somLookupMethod** on the class of the object on which a name-lookup method invocation is made.

As always, in order to use a method procedure pointer such as that returned by **somLookupMethod**, it is necessary to typecast the procedure pointer so that the compiler can create the correct procedure call. This means that a programmer making explicit use of this method must either know the signature of the identified method, and from this create a typedef indicating system linkage and the appropriate argument and return types, or make use of an existing typedef provided by C or C++ usage bindings for a SOM class that introduces a static method with the desired signature.

Parameters

receiver	A pointer to the class whose instance method for the indicated method is desired.
methodId	A **somId** of the method whose method-procedure pointer is needed.

Return Value

A pointer to the method procedure that supports the method indicated by *methodId.*

C++ Example

```
#include <somcls.xh>
#include <somcm.xh>
void main()
{
   somId fcpId = somIdFromString("somFindClass")
   somId animalId = somIdFromString("Animal");
   SOMClassMgr *cm = somEnvironmentNew();
   somTD_SOMClassMgr_somFindClass findclassproc =
         (somTD_SOMClassMgr_somFindClass)
             _SOMClassMgr->somLookupMethod(fcpId);
   SOMClass *aCls = findclassproc(cm,animalId,0,0);
   ...
   somFree(fcpId);
   somFree(animalId);
 }
```

Original Class

SOMClass

Related Information

Methods: somFindSMethod, somFindSMethodOK, somFindMethod, somFindMethodOK

somNew, somNewNoInit Methods

Purpose

Creates a new instance of a class.

IDL Syntax

SOMAny *somNew ( );

SOMAny *somNewNoInit ( );

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somNew** and **somNewNoInit** methods create a new instance of the receiving class. Space is allocated as necessary to hold the new object.

When either of these methods is applied to a class, the result is a new instance of that class. If the receiver class is **SOMClass** or a class derived from SOMClass, the new object will be a class object; otherwise, the new object will not be a class object. The **somNew** method invokes the **somInit** method on the newly created object. The **somNewNoInit** method does not.

If the creation of the new object instance fails, an error condition is raised, and the **SOMError** routine is called.

The SOM Compiler generates convenience macros for creating instances of each class, for use by C and C++ programmers. These macros can be used in place of this method.

Parameters

receiver A pointer to the class object that is to create a new instance.

Return Value

A pointer to the newly created object.

Example

```
#include <animal.h>

void main()
{    Animal myAnimal;
/* ------------------------------------------------
Note: next 2 lines are functionally equivalent to
        myAnimal = AnimalNew();
------------------------------------------------ */
    /* Create class object:. */
    AnimalNewClass(Animal_MajorVersion, AnimalMinorVersion);
    myAnimal = _somNew(_Animal);  /* Create instance of Animal cls */
    /* ... */
    _somFree(myAnimal);       /* Free instance of Animal */
 }
```

Original Class

SOMClass

Related Information

Methods: somRenew

somOverrideMtab Method

Purpose

Replaces the method procedure pointers in a class's instance method table with pointers to the corresponding method redispatch stubs. As the single exception, the method procedure pointer for **somDispatch** is left unchanged.

IDL Syntax

```
void  somOverrideMtab ( );
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somOverrideMtab** method replaces the method procedure pointers in a class's instance method table with pointers to the corresponding method redispatch stubs. (The method procedure pointer for **somDispatch**, however, is left unchanged.) This replacement does not change the procedures that ultimately execute methods unless **somDispatch** is overridden by the class. This is because the redispatch stubs invoke methods via **somDispatch**, and the default implementation of **somDispatch,** which is not overridden, simply uses static method resolution to invoke the original method procedure.

The **somOverrideMtab** method is useful for creating metaclasses that change the behavior of an entire class of objects, by (1) using **somOverrideMtab** to insure that all method invocations on class instances go through the redispatch stubs (and hence, through **somDispatch**), and (2) using **somOverrideSMethod** to override **somDispatch** so that each method invocation is treated specially for the new class of objects. This is generally done by having the metaclass of the receiver class override **somInitMIClass**, the method that initializes class objects' instance method tables, so that it does a parent method call to get the method table of the newly created class object, invokes **somOverrideMtab** on the class object to replace the method pointers in the method table with pointers to the corresponding redispatch stubs, and then invokes **somOverrideSMethod** to override **somDispatch** for the class object. (See the example below.) By using this technique, metaclasses can change the way method resolution is done for instances of their classes.

Client programs cannot tell whether **somOverrideMtab** has been used on a class object; the way methods are invoked on the class's instances by users does not change.

Parameters

receiver A pointer to a class object whose instance method table is to be overridden.

Return Value

None.

Example

A user-defined metaclass "MyMetaclass" might override the **somInitMIClass** method inherited from **SOMClass** as follows, to have all method invocations go through function "MyDispatch". "MyMetaclass" defines an attribute "sister" of type "MyMetaclass." (See Chapter 5 of the *SOM Toolkit User's Guide*, in the section entitled "Customizing Method Resolution," for a complete example.)

```
SOM_Scope void SOMLINK somInitMIClass(MyMetaclass somSelf,
                        long inherit_vars, string className,
                        somclassList* parentClasses,
                        somClassList* contextParentClasses,
                        long instanceSize, int maxStaticMethods,
                        long majorVersion, long minorVersion) {

  MyMetaclassData *somThis = MyMetaclassGetData(somSelf);

  /* Normal class initialization, before somOverrideMtab: */
  parent_SOMClass_somInitMIClass(somSelf, inherit_vars, className,
                parentClasses, contextParentClasses, instanceSize,
                maxStaticMethods, majorVersion, minorVersion);

  /* load "sister" attribute with original methods, for use
   * by MyDispatch:
   */
  __set_sister(somSelf, MyMetaclassNew());
  parent_SOMClass_somInitMIClass(__get_sister(somSelf),
                inherit_vars, "mtabClass", parentClasses,
                contextParentClasses, instanceSize,
                maxStaticMethods, majorVersion, minorVersion);

  /* overwrite somSelf's method table with redispatch stubs: */
  somOverrideMtab(somSelf);

  /* override the dispatch procedure: */
  somOverrideSMethod(somSelf, somIdFromString("somDispatch"),
                        (somMethodProc *)MyDispatch);
}
```

Original Class

SOMClass

Related Information

Methods: somDispatch, somInitMIClass, somOverrideSMethod

somOverrideSMethod Method

Purpose

Overrides an inherited static method. Not generally overridden.

IDL Syntax

```
void  somOverrideSMethod (
                                in somId methodId,
                                in somMethodPtr method);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somOverrideSMethod** method is used instead of **somAddStaticMethod** to replace the inherited procedure for executing a method when it is known that a parent of the class already supports the method. Unlike **somAddStaticMethod,** this method does not require method descriptor and stub methods parameters. The original descriptor and stub values, registered by the class that introduced the method, are still appropriate.

Programmers using the C/C++ implementation bindings for classes declared using IDL or OIDL will not usually invoke the **somOverrideSMethod** method directly, because it is invoked automatically when a class object is created.

Parameters

receiver A pointer to the class whose instance method table is to be modified by replacing an inherited method procedure.

methodId An ID specifying the the method to be overridden.

method The method procedure to be used for supporting the indicated method on instances of the receiver.

Return Value

None.

Original Class

SOMClass

Related Information

Methods: somAddDynamicMethod, somAddStaticMethod, **somInitClass, somInitMIClass**

somRenew, somRenewNoInit, somRenewNoInitNoZero, somRenewNoZero Methods

Purpose

Creates a new object instance using a passed block of storage.

IDL Syntax

SOMObject somRenew (in somToken *memPtr***);**

SOMObject somRenewNoInit (in somToken *memPtr***);**

SOMObject somRenewNoInitNoZero (in somToken *memPtr***);**

SOMObject somRenewNoZero (in somToken *memPtr***);**

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somRenew** method creates a new instance of the receiving class by setting the appropriate location in the passed memory block to the receiving class's instance method table. Unlike **somNew**, these "Renew" methods use the space pointed to by *memPtr* rather than allocating new space for the object. The **somRenew** method automatically re-initializes the object by first zeroing the object's memory, and then invoking **somInit**; **somRenewNoInit** zeros memory, but does not invoke **somInit**. **somRenewNoInitNoZero** only sets the method table pointer; while **somRenewNoZero** calls **somInit**, but does not zero memory first.

No check is made to ensure that the passed pointer addresses enough space to hold an instance of the receiving class. The caller can determine the amount of space necessary by using the **somGetInstanceSize** method.

The C bindings produced by the SOM Compiler contain a macro that is a convenient shorthand for **_somRenew(**_*className*).

Parameters

receiver	A pointer to the class object that is to create the new instance.
memPtr	A pointer to the space to be used to construct a new object.

Return Value

The value of *newObject* is returned, which is now a pointer to a valid, initialized object.

Example

```
#include <animal.h>

main()
{
  void *myAnimalCluster;
  Animal animals[5];
  SOMClass animalClass;
  int animalSize, i;

  animalClass =
      AnimalNewClass(Animal_MajorVersion,Animal_MinorVersion);
  animalSize = _somGetInstanceSize (animalClass);
  /* Round up to double-word multiple */
  animalSize = ((animalSize+3)/4)*4;
  /*
   * Next line allocates room for 5 objects
   * in a &odq.cluster" with a single memory-
   * allocation operation.
   */
  myAnimalCluster = SOMMalloc (5*animalSize);
  /*
   * The for-loop that follows creates 5 initialized
   * Animal instances within the memory cluster.
   */
  for (i=0; i<5; i++)
     animals[i] =
      _somRenew(animalClass, myAnimalCluster+(i*animalSize));
  /* Uninitialize the animals explicitly: */
  for (i=0; i<5; i++)
     _somUninit(animals[i]);
  /*
   * Finally, the next line frees all 5 animals
   * with one operation.
   */
  SOMFree (myAnimalCluster);
}
```

Original Class

SOMClass

Related Information

Methods: somGetInstanceSize, **somInit**, **somNew**

somSetClassData Method

Purpose

Sets a class variable of the receiver to point to the **ClassData** structure for the receiver class. Not generally overridden.

IDL Syntax

void somSetClassData (
in somClassDataStructure *xyzClassData***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somSetClassData** method sets a class variable of the receiver to point to the **ClassData** structure of the receiving class. Every SOM class has an external data structure named <*className*>**ClassData** that holds a pointer to the class object plus the method tokens for the static methods introduced by the class. The class implementation code is responsible for giving this structure external linkage to support static access, and for informing a class object of this location to support dynamic access to the method tokens should this be useful for clients of the class.

C and C++ programmers using implementation bindings to create classes do not need to invoke this method directly; it is invoked by somBuildClass, which is called by the C and C++ implementation bindings.

Parameters

receiver	A pointer to the class object whose **ClassData** structure pointer is to be set.
xyzClassData	A pointer to the **ClassData** structure for the class.

Return Value

None.

Original Class

SOMClass

Related Information

Methods: somGetClassData

somSupportsMethod Method

Purpose

Returns a boolean indicating whether instances of a class respond to a given (static or dynamic) method.

IDL Syntax

boolean somSupportsMethod (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somSupportsMethod** method determines if instances of the specified class respond to the specified (static or dynamic) method.

Parameters

receiver	A pointer to the class object to be tested.
methodId	An ID that represents the name of the method.

Return Value

The **somSupportsMethod** method returns 1 (true) if instances of the specified class support the specified method, and 0 (false) otherwise.

Example

```
/* ------------------------------------------------
   Note: animal supports a setSound method;
         animal does not support a doTrick method.
   ------------------------------------------------ */
#include <animal.h>
main()
{
  SOMClass animalClass;
  char *methodName1 = "setSound";
  char *methodName2 = "doTrick";
  animalClass =
      AnimalNewClass(Animal_MajorVersion, Animal_MinorVersion);
  if (_somSupportsMethod(animalClass,
                         somIdFromString(methodName1)))
     somPrintf("Animals respond to %s\n", methodName1);
  if (_somSupportsMethod(animalClass,
                         somIdFromString(methodName2)))
     somPrintf("Animals respond to %s\n", methodName2);
}

/*
Output from this program:
Animals respond to setSound
*/
```

Original Class

SOMClass

Related Information

Methods: somRespondsTo

SOMClassMgr Class

Description

One instance of **SOMClassMgr** is created automatically during SOM initialization. This instance (pointed to by the global variable, **SOMClassMgrObject**) acts as a run-time registry for all SOM class objects that exist within the current process and assists in the dynamic loading and unloading of class libraries.

You can subclass **SOMClassMgr** to augment the functionality of its registry. To have an instance of your subclass replace the SOM-supplied **SOMClassMgrObject**, use the **somMergeInto** method to place the existing registry information from **SOMClassMgrObject** into your new class-manager object.

File Stem

somcm

Base

SOMObject

Metaclass

SOMClass

Ancestor Classes

SOMObject

Types

interface Repository;
SOMClass *SOMClassArray;

Attributes

Listed below is each available attribute with its corresponding type in parentheses, followed by a description of its purpose.

somInterfaceRepository (Repository)
The SOM Interface Repository object. If the Interface Repository is not available or cannot be initialized, this attribute returns NULL. The object reference returned by this attribute is owned by the **SOMClassMgr** and should not be freed.

somRegisteredClasses (sequence<SOMClass>)
This is a “readonly” attribute that returns a sequence containing all of the class objects registered in the current process. When you have finished using the returned sequence, you should free the sequence’s buffer using **SOMFree**. Here is a fragment of code written in C that illustrates the proper use of this attribute:

```
sequence(SOMClass) clsList;

clsList = SOMClassMgr__get_somRegisteredClasses (SOMClassMgrObject);
somPrintf (”Currently registered classes:\n”);
for (i=0; i<clsList._length; i++)
    somPrintf (”\t%s\n”, SOMClass_somGetName (clsList._buffer[i]));
SOMFree (clsList._buffer);
```

New Methods

Group: Basic Functions

somLoadClassFile
somLocateClassFile
somRegisterClass
somUnloadClassFile
somUnregisterClass

Group: Access

somGetInitFunction
somGetRelatedClasses

Group: Dynamic

somClassFromId
somFindClass
somFindClsInFile
somMergeInto
somSubstituteClass

Overridden Methods

somDumpSelfInt
somInit
somUninit

somClassFromId Method

Purpose

Finds a class object, given its somId, if it already exists. Does not load the class.

IDL Syntax

SOMClass somClassFromId (in somId *classId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

Finds a class object, given its somId, if it already exists. Does not load the class.

Use the **somClassFromId** method instead of **somFindClass** when you do *not* want the class to be automatically loaded if it does not already exist in the current process.

Parameters

receiver Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).

classId The somId of the class. This can be obtained from the name of the class using the **somIdFromString** function.

Return Value

Returns a pointer to the class, or NULL if the class object does not yet exist.

C Example

```
#include <som.h>

main () {
    SOMClass myClass;
    char *myClassName = "Animal";
    somId animalId;

    somEnvironmentNew ();
    animalId = somIdFromString (myClassName);
    myClass = SOMClassMgr_somClassFromId (SOMClassMgrObject,
                                          animalId);
    if (!myClass)
        somPrintf ("Class %s has not been loaded.\n", myClassName);
    SOMFree (animalId);
    }
```

This program produces the following output:

```
Class Animal has not yet been loaded.
```

Original Class

SOMClassMgr

Related Information

Methods: somFindClass, **somFindClsInFile**

somFindClass Method

Purpose

Finds the class object for a class.

IDL Syntax

```
SOMClass  somFindClass (
                        in somId classId,
                        in long majorVersion,
                        in long minorVersion);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somFindClass** method returns the class object for the specified class. This method first uses **somLocateClassFile** to obtain the name of the file where the class's code resides, then uses **somFindClsInFile**.

If the requested class has not yet been created, the **somFindClass** method attempts to load the class dynamically by loading its dynamically linked library and invoking its "new class" procedure.

If *majorVersion* and *minorVersion* are not both zero, they are used to check the class version information against the caller's expectations.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
classId	The **somId** representing the name of the class.
majorVersion	The class's major version number.
minorVersion	The class's minor version number.

Return Values

A pointer to the requested class object, or NULL if the class could not be found or created.

C Example

```
#include <som.h>

/*
 *  This program creates a class object
 *  (from a DLL) without requiring the
 *  usage binding file (.h or .xh) for
 *  the class.
 */

void main ()
{
    SOMClass myClass;
    somId animalId;

    somEnvironmentNew ();
    animalId = somIdFromString ("Animal");

/*  The next statement is equivalent to:
 *    #include "animal.h"
 *    myClass = AnimalNewClass (0, 0);
 */
    myClass = SOMClassMgr_somFindClass (SOMClassMgrObject,
                                        animalId, 0, 0);
    if (myClass)
        somPrintf ("myClass: %s\n", SOMClass_somGetName (myClass));
    else
        somPrintf ("Class %s could not be dynamically loaded\n",
                                       somStringFromId (animalId));
    SOMFree (animalId);
}
```

This program produces the following output:

```
myClass: Animal
```

Original Class

SOMClassMgr

Related Information

Methods: somFindClsInFile, **somLocateClassFile**

somFindClsInFile Method

Purpose

Finds a class object for a class.

IDL Syntax

```
SOMClass  somFindClsInFile (
                                    in somId classId,
                                    in long majorVersion,
                                    in long minorVersion,
                                    in string file);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somFindClsInFile** method returns the class object for the specified class. This method is the same as **somFindClass** except that the caller provides the filename to be used if dynamic loading is needed.

If the requested class has not yet been created, the **somFindClsInFile** method attempts to load the class dynamically by loading the specified library and invoking its "new class" procedure.

If *majorVersion* and *minorVersion* are not both zero, they are used to check the class version information against the caller's expectations.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
classId	The somId representing the name of the class.
majorVersion	The class's major version number.
minorVersion	The class's minor version number.
file	A string representing the filename to be used if dynamic loading is required.

Return Value

A pointer to the requested class object, or NULL if the class could not be found or created.

C Example

```
#include <som.h>
/*
 *  This program loads a class and creates
 *  an instance of it without requiring the
 *  binding (.h) file for the class.
 *
 */
void main()
{
   SOMObject myAnimal;
   SOMClass animalClass;
   char *animalName = "Animal";
        /*
         * Filenames will be different for AIX and OS/2
         *
         * Set animalfile to "C:\\MYDLLS\\ANIMAL.DLL" for OS/2.
         * Set animalfile to "/mydlls/animal.dll" for AIX.
         *
         */

   char *animalFile = "/mydlls/animal.dll";  /* AIX filename */

   somEnvironmentNew();
   animalClass = _somFindClsInFile (SOMClassMgrObject,
                                    somIdFromString(animalName),
                                    0, 0,
                                    animalFile);
   myAnimal = _somNew (animalClass);
   somPrintf("The class of myAnimal is %s.\n",
       _somGetClassName(myAnimal));
   _somFree(myAnimal);
}
/*
Output from this program:
The class of myAnimal is Animal.
*/
```

Original Class

SOMClassMgr

Related Information

Methods: somFindClass

somGetInitFunction Method

Purpose

Obtains the name of the function that initializes the SOM classes in a class library.

IDL Syntax

string somGetInitFunction ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetInitFunction** method supplies the name of the initialization function for OS/2 class libraries (DLLs) that contain more than one SOM class. The default implementation returns the value of the global variable **SOMClassInitFuncName**, which by default is set to the value "SOMInitModule".

For AIX, the name of the class initialization function is not important, since AIX class libraries should always be constructed as shared libraries with a designated entry point which can be executed automatically by the loader when the class is loaded. Consequently, the result of this method is not significant on AIX.

Similarly, if an OS/2 class library (DLL) has been constructed with a DLL initialization function assigned by the linker, you can choose to invoke the <*className*>**NewClass** functions for all of the classes in the DLL during DLL initialization. In this case (as on AIX), there is no need to export a "SOMInitModule" function. On the other hand, if your compiler does not provide a convenient mechanism for creating a DLL initialization function, you can elect to export a function named "SOMInitModule" (or whatever name is ultimately returned by the **somGetInitFunction** method).

The OS/2 **SOMClassMgrObject**, after loading a class library, will invoke the method **somGetInitFunction** to obtain the name of a possible initialization function. If this name has been exported by the class library just loaded, the **SOMClassMgrObject** calls this function to initialize the classes in the library. If the name has not been exported by the DLL, the **SOMClassMgrObject** then looks for an exported name of the form <*className*>**NewClass**, where <*className*> is the name of the class supplied with the method that caused the DLL to be loaded. If the DLL exports this name, it is invoked to create the named class.

Regardless of the technique employed, the **SOMClassMgrObject** expects that all classes packaged in a single class library will be created during this sequence.

This method is generally not invoked directly by users. User-defined subclasses of **SOMClassMgr**, however, can override this method.

Parameters

receiver Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).

Return Value

The **somGetInitFunction** method returns a zero-terminated string that names the initialization function of class libraries. By default, this name is the value of the global variable **SOMClassInitFuncName**, the default value of which is **SOMInitModule**.

Original Class

SOMClassMgr

Related Information

Methods: somFindClass, **somFindClsInFile**

somGetRelatedClasses Method

Purpose

Returns an array of class objects that were all registered during the dynamic loading of a class.

IDL Syntax

SOMClassArray somGetRelatedClasses (in SOMClass *classObj***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetRelatedClasses** method returns an array of class objects that were all registered during the dynamic loading of the specified class. These classes are considered to define an affinity group. Any class is a member of at most one affinity group. The affinity group returned by this call is the one containing the class identified by the *classObj* parameter.

The first element in the array is either the class that caused the group to be loaded, or the special value –1, which means that the class manager is currently in the process of unregistering and deleting the affinity group (only class-manager objects would ever see this value). The remainder of the array consists of pointers to class objects, ordered in reverse chronological sequence to that in which they were originally registered. This list includes the given argument, *classObj*, as one of its elements, as well as the class that caused the group to be loaded (also given by the first element of the array). The array is terminated by a NULL pointer as the last element.

Use **SOMFree** to release the array when it is no longer needed. If the supplied class was not dynamically loaded, it is not a member of any affinity group and NULL is returned.

Parameters

receiver Usually a pointer to **SOMClassMgrObject**, or a pointer to an instance of a user-defined subclass of **SOMClassMgr**.

classObj A pointer to a **SOMClass** object.

Return Value

The **somGetRelatedClasses** method returns a pointer to an array of pointers to class objects, or NULL, if the specified class was not dynamically loaded.

Example

```
#include <som.h>
SOMClass myClass, *relatedClasses;
string className;
long i;

className = SOMClass_somGetName (myClass));
relatedClasses = SOMClassMgr_somGetRelatedClasses
                                    (SOMClassMgrObject, myClass);
if (relatedClasses && *relatedClasses) {
    somPrintf ("Class=%s, related classes are: ", className);
    for (i=1; relatedClasses[i]; i++)
        somPrintf ("%s ",SOMClass_somGetName (relatedClasses[i]));
    somPrintf ("\n");
    somPrintf ("Class that caused loading was %s\n",
        relatedClasses[0] == (SOMClass) -1 ? "-1" :
            SOMClass_somGetName (relatedClasses[0]));
    SOMFree (relatedClasses);
} else
    somPrintf ("No classes related to %s\n", className);
```

Original Class

SOMClassMgr

Related Information

Methods: somGetInitFunction

somLoadClassFile Method

Purpose

Dynamically loads a class.

IDL Syntax

```
SOMClass  somLoadClassFile (
                                    in somId classId,
                                    in long majorVersion,
                                    in long minorVersion,
                                    in string file);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **SOMClassMgr** object uses the **somLoadClassFile** method to load a class dynamically during the execution of **somFindClass** or **somFindClsInFile**. A SOM class object representing the class is expected to be created and registered as a result of this method.

The **somLoadClassFile** method can be overridden to load or create classes dynamically using your own mechanisms. If you simply wish to change the name of the procedure that is called to initialize the classes in a library, override **somGetInitFunction** instead.

This method is generally not invoked directly by users. Instead, use **somFindClass** or **somFindClsInFile**.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
classId	The somId representing the name of the class to load.
majorVersion	The major version number used to check the compatibility of the class's implementation with the caller's expectations.
minorVersion	The minor version number used to check the compatibility of the class's implementation with the caller's expectations.
file	The name of the dynamically linked library file containing the class. The name can be either an unqualified name, without any extension or a fully-qualified file name.

Return Value

The **somLoadClassFile** method returns a pointer to the class object, or NULL if the class could not be loaded or the class object could not be created.

Original Class

SOMClassMgr

Related Information

Methods: somFindClass, **somFindClsInFile**, **somGetInitFunction**, **somUnloadClassFile**

somLocateClassFile Method

Purpose

Determines the file that holds a class to be dynamically loaded.

IDL Syntax

```
string  somLocateClassFile (
                                in somId classId,
                                in long majorVersion,
                                in long minorVersion);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **SOMClassMgr** object uses the **somLocateClassFile** method when executing **somFindclass** to obtain the name of a file to use when dynamically loading a class. The default implementation consults the Interface Repository for the value of the *dllname* modifier of the class; if no *dllname* modifier was specified, the method simply returns the class name as the expected filename.

If you override the **somLocateClassFile** method in a user-supplied subclass of **SOMClassMgr,** the name you return can be either a simple, unqualified name without any extension or a fully-qualified file name. Generally speaking, you would not invoke this method directly. It is provided to permit customization of subclasses of **SOMClassMgr** through overriding.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
classId	The somId representing the name of the class to locate.
majorVersion	The major version number used to check the compatibility of the class's implementation with the caller's expectations.
minorVersion	The minor version number used to check the compatibility of the class's implementation with the caller's expectations.

Return Value

The **somLocateClassFile** method returns the name of the file containing the class.

Original Class

SOMClassMgr

Related Information

Methods: somFindClass, **somFindClsInFile**, **somGetInitFunction**, **somLoadClassFile**, **somUnloadClassFile**

somMergeInto Method

Purpose

Transfers SOM class registry information to another **SOMClassMgr** instance.

IDL Syntax

void somMergeInto (in SOMClassMgr *target***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somMergeInto** method transfers the **SOMClassMgr** registry information from one object to another. The target object is required to be an instance of **SOMClassMgr** or one of its subclasses. At the completion of this operation, the target object can function as a replacement for the receiver. The receiver object (which is then in a newly uninitialized state) is placed in a mode where all methods invoked on it will be delegated to the target object. If the receiving object is the instance pointed to by the global variable **SOMClassMgrObject**, then **SOMClassMgrObject** is reassigned to point to the target object.

Subclasses of **SOMClassMgr** that override the **somMergeInto** method should transfer their section of the class manager object from the target to the receiver, then invoke their parent's **somMergeInto** method as the final step.

Invoke this method only if you are creating your own subclass of **SOMClassMgr**. Invoke **somMergeInto** from your override of the **SOMClassMgr somNew** method.

Parameters

receiver Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).

target A pointer to another instance of **SOMClassMgr** or one of its subclasses.

Return Value

None.

C Example

```
/*
 * The following example is a hypothetical
 * implementation of an override of the somNew method
 * in a subclass of SOMClassMgr.  It illustrates the
 * proper use of the somMergeInto method.
 */
SOM_Scope SOMAny * SOMLINK somNew (MySOMClassMgr somSelf)
{
    SOMAny *newInstance;
    static int firstTime = 1;
    /*
     * Permit only one instance of MySOMClassMgr to be created.
     */
    if (!firstTime)
        return (SOMClassMgrObject);
    newInstance = parent_SOMClassMgr_somNew (somSelf);
    /*
     * The next line will transfer the class registry
     * information from SOMClassMgrObject into our
     * new instance.
     */
    _somMergeInto (SOMClassMgrObject, newInstance);
    /* As a result of the above operation
     * SOMClassMgrObject is now set to point to the
     * new instance of MySOMClassMgr.
     */
    firstTime = 0;
    return (newInstance);
}
```

Original Class

SOMClassMgr

somRegisterClass Method

Purpose

Adds a class object to the SOM run-time class registry.

IDL Syntax

void somRegisterClass (in SOMClass *classObj***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somRegisterClass** method adds a class object to the SOM run-time class registry maintained by **SOMClassMgrObject**.

All SOM run-time class objects should be registered with the **SOMClassMgrObject**. This is done automatically during the execution of the **somClassReady** method as class objects are created.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
classObj	A pointer to the class object to add to the SOM class registry.

Return Value

None.

Original Class

SOMClassMgr

Related Information

Methods: somUnregisterClass

somSubstituteClass Method

Purpose

Causes the **somFindClass**, **somFindClsInFile**, and **somClassFromId** methods to substitute one class for another.

IDL Syntax

```
long  somSubstituteClass (
                          in string origClassName,
                          in string newClassName);
```

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somSubstituteClass** method causes the **somFindClass**, **somFindClsInFile**, and **somClassFromId** methods to return the class named *newClassName* whenever they would normally return the class named *origClassName*. This effectively results in class *newClassName* replacing or substituting for class *origClassName*. Some restrictions are enforced to ensure that this works well. Both class *origClassName* and class *newClassName* must have been already registered before issuing this method, and *newClass* must be an immediate child of *origClass*. In addition (although not enforced), no instances should exist of either class at the time this method is invoked.

A convenience macro (**SOM_SubstituteClass**) is provided for C or C++ users. In one operation, it creates both the old and the new class and then substitutes the new one in place of the old. The use of both the **somSubstituteClass** method and the **SOM_SubstituteClass** macro is illustrated in the example below.

Parameters

receiver Usually **SOMClassMgrObject** or a pointer to an instance of a user-defined subclass of **SOMClassMgr**.

origClassName
A NULL terminated string containing the old class name.

newClassName
A NULL terminated string containing the new class name.

Return Value

The **somSubstituteClass** method returns a value of zero to indicate success; a non-zero value indicates an error was detected.

C Example

```
#include ”student.h”
#include ”mystud.h”

/* Macro form */
SOM_SubstituteClass (Student, MyStudent);

/* Direct use of the method, equivalent to
 * the macro form above.
 */
{
SOMClass origClass, replacementClass;

origClass = StudentNewClass (Student_MajorVersion,
                                        Student_MinorVersion);
replacementClass = MyStudentNewClass (MyStudent_MajorVersion,
                                       MyStudent_MinorVersion);
SOMClassMgr_somSubstituteClass (
    SOMClass_somGetName (origClass),
    SOMClass_somGetName (replacementClass));
}
```

Original Class

SOMClassMgr

Related Information

Methods: somClassFromID, **somFindClass**, **somFindClsInFile**, **somMergeInto**, **somSubstituteClassObj**

somUnloadClassFile Method

Purpose

Unloads a dynamically loaded class and frees the class's object.

IDL Syntax

long somUnloadClassFile (in SOMClass *class***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somUnregisterClass** method uses the **somUnloadClassFile** method to unload a dynamically loaded class. This releases the class's code and unregisters all classes in the same affinity group. (Use **somGetRelatedClasses** to find out which other classes are in the same affinity group.)

The class object is freed whether or not the class' s shared library could be unloaded. If the class was not registered, an error condition is raised and **SOMError** is invoked. This method is provided to permit user-created subclasses of **SOMClassMgr** to handle the unloading of classes by overriding this method. Do not invoke this method directly; instead, invoke **somUnregisterClass**.

Parameters

receiver	Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).
class	A pointer to the class to be unloaded.

Return Value

The **somUnloadClassFile** method returns 0 if the class was successfully unloaded; otherwise, it returns a system-specific non-zero error code from either the OS/2 **DosFreeModule** or the AIX **unload** system call.

Original Class

SOMClassMgr

Related Information

Methods: somLoadClassFile, **somRegisterClass**, **somUnregisterClass, somGetRelatedClasses**

somUnregisterClass Method

Purpose

Removes a class object from the SOM run-time class registry.

IDL Syntax

long somUnregisterClass (in SOMClass *class***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somUnregisterClass** method unregisters a SOM class and frees the class object. If the class was dynamically loaded, it is also unloaded using **somUnloadClassFile** (which causes its entire affinity group to be unloaded as well).

Parameters

receiver Usually **SOMClassMgrObject** (or a pointer to an instance of a user-supplied subclass of **SOMClassMgr**).

class A pointer to the class to be unregistered.

Return Value

The **somUnregisterClass** method returns 0 for a successful completion, or non-zero to denote failure.

Example

```
#include <som.h>

void main ()
{
    long rc;  /* Return code */
    SOMClass animalClass;

    /* The next 2 lines declare a static form of somId */
    string animalClassName = "Animal";
    somId animalId = &animalClassName;

    somEnvironmentNew ();
    animalClass = SOMClassMgr_somFindClass (SOMClassMgrObject,
                                            animalId, 0, 0);
    if (!animalClass) {
        somPrintf ("Could not load class.\n");
        return;
    }
    rc = SOMClassMgr_somUnregisterClass (SOMClassMgrObject,
                                         animalClass);
    if (rc)
        somPrintf ("Could not unregister class, error code: %ld.\n",
                                                              rc);
    else
        somPrintf ("Class successfully unloaded.\n");
}
```

Original Class

SOMClassMgr

Related Information

Methods: somLoadClassFile, **somRegisterClass**, **somUnloadClassFile**

SOMObject Class

SOMObject is the root class for all SOM classes. That is, all SOM classes must be subclasses of **SOMObject** or of some other class derived from **SOMObject**. **SOMObject** introduces no instance data, so objects whose classes inherit from **SOMObject** incur no size increase. They do inherit a suite of methods that provide the behavior required of all SOM objects. Three of these methods are typically overridden by any subclass that has instance data — **somInit**, **somUninit**, and **somDumpSelfInt**. See the descriptions of these methods for further information.

File Stem

somobj

Base

None

Metaclass

SOMClass

Ancestor Classes

None

New Methods

Group: Initialization/Termination

somFree
somInit
somUninit

Group: Access

somGetClass
somGetClassName
somGetSize

Group: Testing

somIsA
somIsInstanceOf
somRespondsTo

Group: Dynamic

somDispatchA
somDispatchD
somDispatchL
somDispatchV
somDispatch
somClassDispatch

Group: Development Support

somDumpSelf
somDumpSelfInt
somPrintSelf

Overridden Methods

None

somDispatch, somClassDispatch Methods

Purpose

Invokes a method using dispatch method resolution. The **somDispatch** method is designed to be overridden. The **somClassDispatch** method is not generally overridden.

IDL Syntax

```
boolean  somDispatch (
                    out somToken retValue,
                    in somId methodId,
                    in va_list args);

boolean  somClassDispatch (
                    in SOMClass clsObj,
                    out somToken retValue,
                    in somId methodId,
                    in va_list args);
```

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

somDispatch and **somClassDispatch** perform method resolution to select a method procedure, and then invoke this procedure on *args*. The somSelf argument for the selected method procedure (called the *target object*, below, to distinguish it from the receiver of the **somDispatch** or **somClassDispatch** method call) is the first argument included in the va_list, *args*. For **somDispatch**, method resolution is performed using the class of the receiver; for **somClassDispatch**, method resolution is performed using the argument class, *clsObj*. Because **somClassDispatch** uses *clsObj* for method resolution, a programmer invoking **somDispatch** or **somClassDispatch** should assure that the class of the target object is either derived from or is identical to the class used for method resolution; otherwise, a runtime error will likely result when the target object is passed to the resolved procedure. Although not necessary, the receiver is usually also the target object.

somDispatch is not generally used by object clients; instead, it is overridden by a class implementor to provide specialized class–specific method dispatching, and is invoked by redispatch stubs that are placed in a method table by a class implementor during class initialization (often through use of the method **somOverrideMtab**). Although **somDispatch** and **somClassDispatch** can be used by object clients for dispatching methods whose names are not known until runtime, the function **somApply** can also be used for this purpose, and is more efficient.

The **somDispatch** and **somClassDispatch** methods supersede the **somDispatch***X* methods. Unlike the **somDispatch***X* methods, which are restricted to few return types, the **somDispatch** and **somClassDispatch** methods make no assumptions concerning the result returned by the method to be invoked. Thus, **somDispatch** and **somClassDispatch** can be used to invoke methods that return structures. The **somDispatch***X* methods now invoke **somDispatch**, so overriding **somDispatch** serves to override the **somDispatch***X* methods as well.

Parameters

receiver — A pointer to the object whose class will be used for method resolution by **somDispatch**.

clsObj — A pointer to the class that will be used for method resolution by **somClassDispatch**.

retValue The address of the area in memory where the result of the invoked method procedure is to be stored. The caller is responsible for allocating enough memory to hold the result of the specified method. When dispatching methods that return no result (i.e., void), a NULL may be passed as this argument.

methodId A **somId** identifying the method to be invoked. A string representing the method name can be converted to a **somId** using the **somIdFromString** function.

args A **va_list** containing the arguments to be passed to the method identified by *methodId*. The arguments must include a pointer to the target object as the first entry. As a convenience for C and C++ programmers, SOM's language bindings provide a varargs invocation macro for va_list methods (such as **somDispatch** and **somClassDispatch).** The example below illustrates this.

Return Value

A boolean representing whether or not the method was successfully dispatched is returned. The reason for this is that **somDispatch** and **somClassDispatch** use the function **somApply** to invoke the resolved method procedure, and **somApply** requires an apply stub for successful execution. In support of old class binaries SOM does not consider a NULL apply stub to be an error. As a result, somApply may fail. If this happens, then false is returned; otherwise true is returned.

C Example

Given class *Key* that has an attribute *keyval* of type **long** and an overridden method for **somPrintSelf** that prints the value of the attribute (as well as the information printed by **SOMObject**'s implementation of **somPrintSelf**), the following client code invokes methods on *Key* objects using **somDispatch** and **somClassDispatch**. (The *Key* class was defined with the **callstyle=oidl** class modifier, so the **Environment** argument is not required of its methods.)

```
#include <key.h>

main()
{
  SOMObject obj;
  long k1 = 7, k2;
  Key myKey = KeyNew();
  va_list push, args = SOMMalloc(8);
  somId setId = somIdFromString("_set_keyval");
  somId getId = somIdFromString("_get_keyval");
  somId prtId = somIdFromString("_somPrintSelf");

  /* va_list invocation of setkey and getkey : */
  push = args;
  va_arg(push, SOMObject) = myKey;
  va_arg(push, long) = k1;
  SOMObject_somDispatch(myKey,(somToken*)0,setId,args);
  push = args;
  va_arg(push, SOMObject) = myKey;
  SOMObject_somDispatch(myKey,(somToken*)&k2,getId,args);
  printf("va_list _set_keyval and _get_keyval: %i\n", k2);

  /* varargs invocation of setkey and getkey : */
  _somDispatch(myKey, (somToken*)0, setId, myKey, k1);
  _somDispatch(myKey, (somToken*)&k2, getId, myKey);
  printf("varargs _set_keyval and _get_keyval: %i\n", k2);

  /* illustrate somclassDispatch "casting" (use varargs form) */
  printf("somPrintSelf on myKey as a Key:\n");
  _somClassDispatch(myKey,_Key,(somToken*)&obj2,prtId,myKey,0);

  printf("somPrintSelf on myKey as a SOMObject:\n");
  _somClassDispatch(myKey,_SOMObject,(somToken*)&obj,prtId,myKey,0);
  SOMFree(args); SOMFree(setId); SOMFree(getId); SOMFree(prtId);
 _somFree(myKey);
}
```

This program produces the following output:

```
va_list _set_keyval and _get_keyval: 7
varargs _set_keyval and _get_keyval: 7
somPrintSelf on myKey as a Key:
{An instance of class Key at address 2005B2F8}
    -- with key value 7
somPrintSelf on myKey as a SOMObject:
{An instance of class Key at address 2005B2F8}
```

Original Class

SOMObject

Related Information

Functions: somApply

Methods: somOverrideMtab

somDispatch*X* Methods *(Obsolete)*

Purpose

Invoke a method using dispatch method resolution. These methods are obsolete.

IDL Syntax

```
somToken somDispatchA (
                    in somId methodId,
                    in somId descriptor,
                    in va_list args);

double  somDispatchD (
                    in somId methodId,
                    in somId descriptor,
                    in va_list args);

long  somDispatchL (
                    in somId methodId,
                    in somId descriptor,
                    in va_list args);

void  somDispatchV (
                    SOMObject receiver,
                    in somId methodId,
                    in somId descriptor,
                    in va_list args);
```

Note: For backward compatibility, these methods do *not* take an **Environment** parameter.

Description

The **somDispatch*X*** methods are superseded by the more general **somDispatch** method, and are retained solely for backward compatibility.

The **somDispatch*X*** methods invoke on the receiving object the method identified by *methodId*, with arguments specified by *args*. The target object for the method invocation is the receiving object, which is *not* included in the arguments.

Parameters

receiver	A pointer to the object that on which the dispatched method is invoked.
methodId	A **somId** that represents the method to be invoked.
descriptor	A **somId** that represents the types of the arguments being passed in the *args* **va_list**. This parameter is not used in the current implementation, so a NULL value can be substituted.
args	A **va_list** containing the arguments to be passed to the method identified by *methodId*. The arguments do not include the target for the dispatched method..

Return Value

Four families of return values are supported, corresponding to the four forms of the **somDispatch***X* method. The **somDispatch***X* method chosen should have a return type com-

patible with the result of the method identified by *methodId*. Within each of the four families, only the largest representation is supported. The four families are:

Pointer	**somDispatchA** returns an address as a **somToken**.
Floating point	**somDispatchD** returns a floating point number as a **double.**
Integer	**somDispatchL** returns an integer as a **long**.
Void	**somDispatchV** returns void. It is used for methods that do not return a result.

Original Class

SOMObject

Related Information

Functions: somApply

Methods: somDispatch

somDumpSelf Method

Purpose

Writes out a detailed description of the receiving object. Intended for use by object clients. Not generally overridden.

IDL Syntax

void somDumpSelf (in long *level***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somDumpSelf** method performs some initial setup, and then invokes the **somDumpSelfInt** method to write a detailed description of the receiver, including its state.

Parameters

receiver A pointer to the object to be dumped.

level The nesting level for describing compound objects. It must be greater than or equal to 0. All lines in the description will be preceded by “2 * level” spaces.

Return Value

None.

Example

See **somDumpSelfInt.**

Original Class

SOMObject

Related Information

Methods: somDumpSelfInt

somDumpSelfInt Method

Purpose

Outputs the internal state of an object. Intended to be overridden by class implementors. Not intended to be directly invoked by object clients.

IDL Syntax

void somDumpSelfInt (in long *level***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somDumpSelfInt** method should be overridden by a class implementor, to write out the instance data stored in an object. This method is invoked by the **somDumpSelf** method, which is used by object clients to output the state of an object.

The procedure used to override this method for a new class should begin by calling the parent class form of this method on each of the class parents, and should then write a description of the instance variables introduced by new class. This will result in a description of all the class's instance variables. The C and C++ implementation bindings provide a convenient macro for performing parent method calls on all parents, as illustrated below.

The character output routine pointed to by **SOMOutCharRoutine** should be used for output. The **somLPrintf** function is especially convenient for this, since level is handled appropriately.

Parameters

receiver A pointer to the object to be dumped.

level The nesting level for describing compound objects. It must be greater than or equal to 0. All lines in the description should be preceded by "2 * level" spaces.

Return Value

None.

C Example

Below is a method overriding **somDumpSelfInt** for class "List", which has two attributes, *val* (which is a **long**) and *next* (which is a pointer to a "List" object).

```
SOM_Scope void   SOMLINK somDumpSelfInt(List somSelf, int level)
{
    ListData *somThis = ListGetData(somSelf);
    Environment *ev = somGetGlobalEnvironment();

    List_parents_somDumpSelfInt(somSelf, level);
    somLPrintf(level, "This item: %i\n", __get_val(somSelf, ev);
    somLPrintf(level, "Next item: \n");
    if (__get_next(somSelf, ev) != (List) NULL)
        _somDumpSelfInt(__get_next(somSelf, ev), level+1);
    else
        somLPrintf(level+1, "NULL\n");
}
```

Below is a client program that invokes the **somDumpSelf** method on “List” objects:

```
#include <list.h>

main()
{
   List L1, L2;
   long x = 7, y = 13;
   Environment *ev = somGetGlobalEnvironment();

   L1 = ListNew();
   L2 = ListNew();
   __set_val(L1, ev, x);
   __set_next(L1, ev, (List) NULL);
   __set_val(L2, ev, y);
   __set_next(L2, ev, L1);

   _somDumpSelf(L2,0);

   _somFree(L1);
   _somFree(L2);
}
```

Below is the output produced by this program:

```
{An instance of class List at 0x2005EA8
 This item: 13
 Next item:
   1 This item: 7
   1 Next item:
     2 NULL
}
```

Original Class

SOMObject

Related Information

Methods: somDumpSelf, **somPrintSelf**

somFree Method

Purpose

Releases the storage used by an object. Intended for use by object clients. Not generally overridden.

IDL Syntax

void somFree ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somFree** method releases the storage containing the receiver object by calling the method **somDeallocate**. No future references should be made to the receiver once this is done. Before releasing storage, **somFree** calls **somUninit** to allow storage pointed to the object to be freed.

The **somFree** method should not be called on objects created by **somRenew**, thus the method is normally only used by code that also created the object.

Note: SOM also supplies a macro, **SOMFree**, which is used to free a block of memory. This macro should not be used on objects.

Parameters

receiver A pointer to the object to be freed.

Return Value

None.

C Example

```
#include <animal.h>

void main()
{
   Animal myAnimal;
   /*
    * Create an object.
    */
   myAnimal = AnimalNew();

   /* ... */

   /* Free it when finished. */
   _somFree(myAnimal);
}
```

Original Class

SOMObject

Related Information

Methods: somNew, **somNewNoInit**, **somUninit**

Functions: SOMFree

somGetClass Method

Purpose

Returns a pointer to an object's class object. Not generally overridden.

IDL Syntax

SOMClass somGetClass ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

somGetClass obtains a pointer to the receiver's class object. The **somGetClass** method is typically not overridden.

Important Note: For C and C++ programmers, SOM provides a **SOM_GetClass** macro that performs the same function. This macro should only be used **only** when absolutely necessary (i.e., when a method call on the object is not possible), since it bypasses whatever semantics may be intended for the somGetClass method by the implementor of the receiver's class. Even class implementors do not know whether a special semantics for this method is inherited from ancestor classes. If you are unsure of whether the method or the macro is appropriate, you should use the method call.

Parameters

receiver A pointer to the object whose class is desired.

Return Value

A pointer to the object's class object.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  int numMethods;
  SOMClass animalClass;

  myAnimal = AnimalNew ();
  animalClass = _somGetClass (myAnimal);
  SOM_Test(animalClass == _Animal);
}
```

Original Class

SOMObject

Related Information

Macros: SOM_GetClass

somGetClassName Method

Purpose

Returns the name of the class of an object. Not generally overridden.

IDL Syntax

string somGetClassName ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetClassName** method returns a pointer to a zero-terminated string that gives the name of the class of an object.

This method is not generally overridden; it simply invokes **somGetName** on the class of the receiver. Refer to **somGetName** for more information on the returned string,

Parameters

receiver A pointer to the object whose class name is desired.

Return Value

The **somGetClassName** method returns a pointer to the name of the class.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  SOMClass animalClass;
  char *className;

  myAnimal = AnimalNew();
  className = _somGetClassName(myAnimal);
  somPrintf("Class name: %s\n", className);
  _somFree(myAnimal);
}
/*
Output from this program:
Class name: Animal
*/
```

Original Class

SOMObject

Related Information

Methods: somGetName

somGetSize Method

Purpose

Returns the size of an object. Not generally overridden.

IDL Syntax

long somGetSize ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somGetSize** method returns the total amount of contiguous space used by the receiving object.

The value returned reflects only the amount of storage needed to hold the SOM representation of the object. The object might actually be using or managing additional space outside of this area.

The **somGetSize** method is not generally overridden.

Parameters

receiver A pointer to the object whose size is desired.

Return Value

The **somGetSize** method returns the size, in bytes, of the receiver.

C Example

```
#include <animal.h>
void main()
{
  Animal myAnimal;
  int animalSize;
  myAnimal = AnimalNew();
  animalSize = _somGetSize(myAnimal);
  somPrintf("Size of animal (in bytes): %d\n", animalSize);
  _somFree(myAnimal);
}
/*
Output from this program:
Size of animal (in bytes): 8
*/
```

Original Class

SOMObject

Related Information

Methods: somGetInstancePartSize, **somGetInstanceSize**

somInit Method

Purpose

Initializes instance variables or attributes in a newly created object. Designed to be overridden.

IDL Syntax

void somInit ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somInit** method is invoked to cause a newly created object to initialize its instance variables or attributes.

Because instances of **SOMObject** do not have any instance data, the default implementation does nothing. It is provided as a convenience to class implementors so that initialization of objects can be done in a uniform way across all classes (by overriding **somInit**). This method is called automatically by **somNew** during object creation.

A companion method, **somUninit**, is called whenever an object is freed. These two methods should be designed to work together, with **somInit** priming an object for its first use, and **somUninit** preparing the object for subsequent release.

If objects of your class contain instance variables or attributes, override the **somInit** method to initialize the instance variables or attributes when instances of the class are created. When overriding this method, always call all parent (base) classes' versions of this method *before* doing your own initialization, as follows:

1. The overriding implementation should invoke the parent method for *each* parent. For users of the C or C++ implementation bindings, this can be done in either of two ways:
   (a) by calling a <*className*>**_parents_**<*methodName*> macro (which automatically invokes all parent methods) or
   (b) by calling the <*className*>**_parent_**<*parentName*>_<*methodName*> macro on each parent separately.

   For more information on parent method calls, see the topic "Extending the Implementation Template" in Chapter 4, "Implementing Classes in SOM," of the *SOM Toolkit User's Guide*.

2. The code must be written so that it can be executed multiple times without harm on the same object. This is necessary because, under multiple inheritance, parent method calls that progress up the inheritance hierarchy may encounter the same ancestor class more than once (where different inheritance paths "join" when followed backward). A check can be made to determine whether a particular invocation of **somInit** is the first on a given object by examining the contents of its instance variables; all the instance variables of a newly created SOM object are set to zero before **somInit** is invoked on that object.

More information and examples are given in the topic "Initializing and Deinitializing Objects" in Chapter 4, "Implementing Classes in SOM," of the *SOM Toolkit User's Guide.*

Parameters

receiver A pointer to the object to be initialized.

Return Value

None

C Example

Below is the implementation for a class *Animal* that introduces an attribute *sound* of type *string* and overrides **somInit** and **somUninit**, along with a main program that creates and then frees an instance of class *Animal*:

```
#define Animal_Class_Source
 #include <animal.ih>
 #include <string.h>

 SOM_Scope void SOMLINK somInit (Animal somSelf)
  {
      AnimalData *somThis = AnimalGetData (somSelf);
      Environment *ev = somGetGlobalEnvironment();
      Animal_parents_somInit (somSelf);
      if (!__get_sound(somSelf, ev)) {
         __set_sound(somSelf, ev, SOMMalloc(100));
         strcpy (__get_sound(somSelf, ev), "Unknown Noise");
         somPrintf ("New Animal Initialized\n");
      }
  }

 SOM_Scope void SOMLINK somUninit (Animal somSelf)
  {
      AnimalData *somThis = AnimalGetData (somSelf);
      Environment *ev = somGetGlobalEnvironment();
      if (__get_sound(somSelf, ev)) {
        SOMFree(__get_sound(somSelf, ev);
        __set_sound(somSelf, ev, (char*)0);
        somPrintf ("Animal Uninitialized\n");
        Animal_parents_somUninit (somSelf);
      }
  }

/* main program */
   #include <animal.h>
   void main()
   {
      Animal myAnimal;
      myAnimal = Animal2New ();
      _somFree (myAnimal);
   }

/*
Program output:
New Animal Initialized
Animal Uninitialized
*/
```

Original Class

SOMObject

Related Information

Methods: somNew, **somRenew**, **somUninit**

somIsA Method

Purpose

Tests whether an object is an instance of a given class or of one of its descendant classes. Not generally overridden.

IDL Syntax

boolean somIsA (in SOMClass *aClass***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

Use the **somIsA** method to determine if an object can be treated like an instance of *aClass*. SOM guarantees that if somIsA returns true, then the receiver will respond to all (static or dynamic) methods supported by *aClass*.

Parameters

receiver	A pointer to the object to be tested.
aClass	A pointer to the class that the object should be tested against.

Return Value

The **somIsA** methods returns 1 (true) if the receiving object is an instance of the specified class or (unlike **somIsInstanceOf**) of any of its descendant classes, and 0 (false) otherwise.

C Example

```
#include <dog.h>
/* --------------------------------
   Note: Dog is derived from Animal.
   -------------------------------- */
main()
{
  Animal myAnimal;
  Dog myDog;
  SOMClass animalClass;
  SOMClass dogClass;

  myAnimal = AnimalNew();
  myDog = DogNew();
  animalClass = _somGetClass (myAnimal);
  dogClass = _somGetClass (myDog);
  if (_somIsA (myDog, animalClass))
     somPrintf ("myDog IS an Animal\n");
  else
     somPrintf ("myDog IS NOT an Animal\n");
  if (_somIsA (myAnimal, dogClass))
     somPrintf ("myAnimal IS a Dog\n");
  else
     somPrintf ("myAnimal IS NOT a Dog\n");
  _somFree (myAnimal);
  _somFree (myDog);
}
/*
Output from this program:
myDog IS an Animal
myAnimal IS NOT a Dog
*/
```

Original Class

SOMObject

Related Information

Methods: somIsDescendedFrom, somIsInstanceOf, somRespondsTo, somSupportsMethod

somIsInstanceOf Method

Purpose

Determines whether an object is an instance of a specific class. Not generally overridden.

IDL Syntax

boolean somIsInstanceOf (in SOMClass *aClass***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

Use the **somIsInstanceOf** method to determine if an object is an instance of a specific class. This method tests an object for inclusion in one specific class. It is equivalent to the expression:

```
(aClass == somGetClass (receiver))
```

Parameters

receiver	A pointer to the object to be tested.
aClass	A pointer to the class that the object should be an instance of.

Return Value

The **somIsInstanceOf** method returns 1 (true) if the receiving object is an instance of the specified class, and 0 (false) otherwise.

C Example

```
#include <dog.h>
/* --------------------------------
   Note: Dog is derived from Animal.
   -------------------------------- */
main()
{
  Animal myAnimal;
  Dog myDog;
  SOMClass animalClass;
  SOMClass dogClass;

  myAnimal = AnimalNew ();
  myDog = DogNew ();
  animalClass = _somGetClass (myAnimal);
  dogClass = _somGetClass (myDog);
  if (_somIsInstanceOf (myDog, animalClass))
     somPrintf ("myDog is an instance of Animal\n");
  if (_somIsInstanceOf (myDog, dogClass))
     somPrintf ("myDog is an instance of Dog\n");
  if (_somIsInstanceOf (myAnimal, animalClass))
     somPrintf ("myAnimal is an instance of Animal\n");
  if (_somIsInstanceOf (myAnimal, dogClass))
     somPrintf ("myAnimal is an instance of Dog\n");
  _somFree (myAnimal);
  _somFree (myDog);
}
/*
Output from this program:
myDog is an instance of Dog
myAnimal is an instance of Animal
*/
```

Original Class

SOMObject

Related Information

Methods: somIsDescendedFrom, **somIsA**

somPrintSelf Method

Purpose

Outputs a brief description that identifies the receiving object. Designed to be overridden.

IDL Syntax

SOMObject somPrintSelf ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

somPrintSelf should output a brief string containing key information useful to identify the receiver object, rather than a complete dump of the receiver object state as provided by **somDumpSelfInt**. The **somPrintSelf** method should use the character output routine **SOMOutCharRoutine** (or any of the **somPrintf** functions) for this purpose. The default implementation outputs the name of the receiver object's class and the receiver's address in memory.

Because the most specific identifying information for an object will often be found within instance data introduced by the class of an object, it is likely that a class implementor that overrides this method will not need to invoke parent methods in order to provide a useful string identifying the receiver object.

Parameters

receiver A pointer to the object to be described.

Return Value

The **somPrintSelf** method returns a pointer to the receiver object as its result.

C Example

```
#include <animal.h>
main()
{
  Animal myAnimal;
  myAnimal = AnimalNew ();
  /* ... */
  _somPrintSelf (myAnimal);
  _somFree (myAnimal);
}
/*
Output from this program:

{An instance of class Animal at address 0001CEC0}
*/
```

Original Class

SOMObject

Related Information

Methods: somDumpSelf, **somDumpSelfInt**

somRespondsTo Method

Purpose

Tests whether the receiving object supports a given method. Not generally overridden.

IDL Syntax

boolean somRespondsTo (in somId *methodId***);**

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somRespondsTo** method tests whether a specific (static or dynamic) method can be invoked on the receiver object. This test is equivalent to determining whether the class of the receiver *supports* the specified method on its instances.

Parameters

receiver	A pointer to the object to be tested.
methodId	A **somId** that represents the name of the desired method.

Return Value

The **somRespondsTo** method returns TRUE if the specified method can be invoked on the receiving object, and FALSE otherwise.

C Example

```
/* ------------------------------------------------
   Note: Animal supports a setSound method;
         Animal does not support a doTrick method.
   ------------------------------------------------ */
#include <animal.h>
main()
{
  Animal myAnimal;
  char *methodName1 = "setSound";
  char *methodName2 = "doTrick";

  myAnimal = AnimalNew();
  if (_somRespondsTo(myAnimal, SOM_IdFromString(methodName1)))
     somPrintf("myAnimal responds to %s\n", methodName1);
  if (_somRespondsTo(myAnimal, SOM_IdFromString(methodName2)))
     somPrintf("myAnimal responds to %s\n", methodName2);
  _somFree(myAnimal);
}
/*
Output from this program:
myAnimal responds to setSound
*/
```

Original Class

SOMObject

Related Information

Methods: somSupportsMethod

somUninit Method

Purpose

Un-initializes the receiving object. Designed to be overridden by class implementors. Not normally invoked directly by object clients.

IDL Syntax

void somUninit ( );

Note: For backward compatibility, this method does *not* take an **Environment** parameter.

Description

The **somUninit** method performs the inverse of object initialization. Class implementors that introduce instance data that points to allocated storage should override somUninit so allocated storage can be freed when an object is freed.

This method is called automatically by **somFree** to clean up anything necessary (such as extra storage dynamically allocated to the object) before **somFree** releases the storage allocated to the object itself.

Code responsible for freeing an object must first know that there will be no further references to this object. Once this is known, this code would normally invoke **somFree** (which calls **somUninit**). In cases where **somRenew** was used to create an object instance, however, **somFree** cannot be called (e.g., the storage containing the object may simply be a location on the stack), and in this case, **somUninit** must be called explicitly.

When overriding this method, always call the parent-class versions of this method *after* doing your own un-initialization. Furthermore, just as with **somInit**, because your method may be called multiple times (due to multiple inheritance), you should zero out references to memory that is freed, and check for zeros before freeing memory and calling the parent methods.

Parameters

receiver A pointer to the object to be un-initialized.

Return Value

None

C Example

Following is the implementation for a class *Animal* that introduces an attribute *sound* of type *string* and overrides **somInit** and **somUninit**, along with a main program that creates and then frees an instance of class *Animal*:

```
#define Animal_Class_Source
 #include <animal.ih>
 #include <string.h>

 SOM_Scope void SOMLINK somInit (Animal somSelf)
  {
      AnimalData *somThis = AnimalGetData (somSelf);
      Environment *ev = somGetGlobalEnvironment();
      Animal_parents_somInit (somSelf);
      if (!__get_sound(somSelf, ev)) {
         __set_sound(somSelf, ev, SOMMalloc(100));
         strcpy (__get_sound(somSelf, ev), "Unknown Noise");
         somPrintf ("New Animal Initialized\n");
      }
  }

 SOM_Scope void SOMLINK somUninit (Animal somSelf)
  {
      AnimalData *somThis = AnimalGetData (somSelf);
      Environment *ev = somGetGlobalEnvironment();
      if (__get_sound(somSelf, ev)) {
        SOMFree(__get_sound(somSelf, ev);
        __set_sound(somSelf, ev, (char*)0);
        somPrintf ("Animal Uninitialized\n");
        Animal_parents_somUninit (somSelf);
      }
  }

/* main program */
   #include <animal.h>
   void main()
   {
      Animal myAnimal;
      myAnimal = AnimalNew ();
      _somFree (myAnimal);
   }

/*
Program output:
New Animal Initialized
Animal Uninitialized
*/
```

Original Class

SOMObject

Related Information

Methods: somInit, **somNew**, **somRenew**