
# WideStudio
# Programming Guide

# Contents

# Chapter 1

# Event procedure

## 1.1 How to access to the GUI instances

In the event procedures, It Is the most fundamental to access to the instances. So I will explain the various kinds of accessing the instance in this section.

- Accessing of the instance by the parameter of the event procedure

  In the event procedure which the instance has, we use the parameter of the procedure to access the instance,

- Accessing of the instance by using the instance management

  We use the instance management to access the instance except it which the event procedure is set.

- Accessing of the global instance directly

  You can use the global instance to access directly. it is easy to access and is good performance, but it makes the possibility of porting worse.

### 1.1.1 Accessing of the instance by the parameter of the event procedure

```
void event_procedure(WSCbase* object){
  //accessing the instance.
  object->setProperty(WSNlabelString,"HELLO WORLD");
}
```

the pointer: object is the instance which is the client of the event procedure that fired. the type is WSCbase*, so you can access the method of WSCbase, but you must cast the pointer by the method:cast() to access the other subclass: see the chapter of casting sub class.

### 1.1.2 Accessing of the instance by using the instance management

The instance management returns the instance by name.

| The instance management class | The instance acquisition method |
|---|---|
| WSCbaseList | WSCbaseList* WSGIappObjectList() |

To access of the instance as follows:

```
//to access WSGIappObjectList()
#include "WSCbaseList.h"

void event_procedure(WSCbase* object){

  // Acquisition of the instance(1)
  char* class_name = "WSCvlabel"; //Seek from the instance of WSCvlabel class
  char* obj_name   = "newvlab_001";     //the instance name is newvlab_001
  WSCbase* object = WSGIappObjectList()->getInstance(class_name,obj_name);
  object->setProperty(WSNlabelString,"HELLO WORLD");

  //Acquisition of the instance(2)
  char* class_name2 = "WSCbase";  //Seek from all the instances.
  char* obj_name2   = "newvlab_002";     //the instance name is newvlab_002
  WSCbase* object2 = WSGIappObjectList()->getInstance(class_name2,obj_name2);
  object2->setProperty(WSNlabelString,"HELLO WORLD");
```

The variable: object is the sought instance by the specified class name and the specified instance name. If you do not want to specify the class name, you can pass "WSCbase", it seeks from all the instances.

### 1.1.3 Accessing of the global instance directly

Make the instance global,you can access it directly. See the chapter [Setting of global instance] of Application Builder User's Guide to make it global.

```
#include "WSCvlabel.h" //to access WSCvlabel class

void event_procedure(WSCbase* object){
  //extern of the global instance
  extern WSCvlabel* newvlab_001;

  //Access the instance of WSCvlabel*: newvlab_001
  newvlab_001->setProperty(WSNlabelString, "HELLO WORLD");
```

## 1.2 How to access a value of the property of the instance

In the event program, you can access the property of the instance by the method: get/setProperty().

| the access method | Description |
|---|---|
| getProperty() | get a value of the specified property |
| setProperty() | set a value to the specified property |

### 1.2.1 How to get a value of the properties

You can get a value of the property by the method of WSCbase: getProperty().

```
void event_procedure(WSCbase* object){

  //To get a value of the property: WSNx by string type.
  WSCstring x = object->getProperty(WSNx);
  printf("x=%s\n",(char*)x);

  //To get a value of the property: WSNy by short type.
  short y =  object->getProperty(WSNy);

}
```

In the example of WSNx, it gets a value by string type. The WSCstring type manages the buffer of the string automatically, so there is no need to manage it by programmer.

In the example of WSNy, it gets a value by short type. The method: getProperty() returns a value by WSCvariant type. The WSCvariant type can convert the various kind of type automatically. The following example is a some conversion short type into string type.

```
void cbop(WSCbase* object){

  //To get a value of the property: WSNx by string type.
  WSCstring x = object->getProperty(WSNx);
  printf("x=%s\n",(char*)x);

  //To get a value of the property: WSNy by short type.
  short y =  object->getProperty(WSNy);

  //convert into string..
  WSCvariant stry = y;
  printf("y=%s\n",(char*)stry);
  //convert into double.
  printf("y=%fl\n",(double)stry);
}
```

Notice: You can not get the value by char*,if you use it,the pointer will be junk pointer when the method of WSCbase: getProperty() will be done, because the returned value is auto variable of the WSCvariant, so the WSCvariant instance and its internal buffer for string is destroyed when the method is done.

If you want to get the char* pointer, see the following program.

```
void event_procedure(WSCbase* object){

  //To get a value of the property: WSNlabelString by char pointer.
  //Not good! the pointer string will be junk pointer!
  char* string = object->getProperty(WSNlabelString);
```

```
  //To get a value of the property: WSNlabelString by char pointer.
  //Good example. The string1 (WSCstring instance) keeps the string buffer.
  WSCstring string1
  string1 = object->getProperty(WSNlabelString);
  char* str = (char*)string1;

}
```

### 1.2.2 Setting of property

You can set a value to the property by the method of WSCbase: setProperty().

```
void event_procedure(WSCbase* object){

  //To set a value to the property: WSNx by string type.
  char* x="100";
  object->setProperty(WSNx,x);

  //To set a value to the property: WSNy by short type.
  short y=100;
  object->getProperty(WSNy,y);

}
```

In the example of WSNx, it sets a value by string type. In the example of WSNy, it sets a value by short type. The parameter of the method: setProperty() is WSCvariant type, so it converts the value automatically.

### 1.2.3 Updating the instance to reflect the changed value

Use the method: update(),draw(),redraw() to update the instance to reflect the changed value.

```
  obj1->getProperty(WSNlabelString,"string1");
  obj1->update();  //updates the instance
  obj2->getProperty(WSNlabelString,"string2");
  obj2->update();  //updates the instance
```

Usually, it updates automatically when the event procedure is done, but if you want to update right away,you can use the method: update(),draw(),redraw().

The method: update() or draw() updates the instance if needed, but redraw() updates compulsory.

## 1.3 How to cast the WSCbase into the specified class

To access a method of some subclass,it requires that the pointer is subclass. So we must convert(downcast) the pointer of WSCbase* into the subclass with some method. I will explain the acquisition of the casted pointer in this chapter.

- Casting of the casted pointer with the method of WSCbase: cast()

| The method of casting | Description |
|---|---|
| void* WSCbase::cast(char* className) | Returns the pointer of the specified class. |

Usage of the method: WSCbase::cast() is as follows. In the following example, the pointer "object" contains a WSCvtoggle instance, but is a pointer of WSCbase*. and you want to access the WSCvtoggle method: getStatus() which returns the state of the toggle.

In C++ language, it is not allowed to downcast like WSCbase* to WSCvtoggle*. The method: WSCbase::cast() supports this.

```
#include "WSCvtoggle.h" //access WSCvtoggle class.
...

void cbop(WSCbase* object){
  //downcast WSCbase* to WSCvtoggle*.
  WSCvtoggle* tgl = (WSCvtoggle*)object->cast("WSCvtoggle");

  if (tgl == NULL){
    // It fails, because the pointer "object"
    //      is not a WSCvtoggle instance.
  }else{
    // it succeeds, the pointer "object" is a WSCvtoggle instance.
    // access the WSCvtoggle::getStatus()
    WSCbool status = tgl->getStatus();
  }
}
```

The method: WSCbase::cast() returns NULL,if the instance is not a instance of the specified class. if we use this specification well, we can examine the instance whether it is the specified class or not.

```
#include "WSCvbtn.h" //access WSCvbtn class.
#include "WSCvtoggle.h" //access WSCvtoggle class.
...

void cbop(WSCbase* object){
  //examine whether object is a WSCvlabel instance.
  WSCvlabel* btn = (WSCvlabel*)object->cast("WSCvlabel");

  //examine whether object is a WSCvtoggle instance.
  WSCvtoggle* toggle = (WSCvtoggle*)object->cast("WSCvtoggle");

  if (btn == NULL){
    //it is not a WSCvbtn instance.
  }else{
    //it is a WSCvbtn instance or inherits WSCvbtn class.
```

```
  }
  if (toggle == NULL){
    //it is not a WSCvtoggle instance.
  }else{
    //it is a WSCvtoggle instance or inherits WSCvtoggle class.
  }

}
```

If the event procedure is used by some instances of various classes, it is useful to switch the program.

## 1.4 How to access to the method of the specified class

In the chapter: [To cast the WSCbase* into the specified class], you can cast WSCbase* to the pointer of the specified class. Following example shows accessing of the method of WSClist class. WSClist class displays the list of some strings, and the WSClist::addString() method adds the specified string to the list.

```
#include "WSClist.h" //use WSClist class.

void some_function(...){
  //get the instance: name=list001, class=WSClist.
  WSCbase* object;
  object = (WSCbase*)WSGIappObjectList()->getInstance("WSClist","list001");

  //cast to WSClist pointer, and execute WSClist::addItem().
  WSClist* list = (WSClist*)object->cast("WSClist");
  list->addItem("sample string",0)
}
```

In the example, it gets the instance which name is "list001" and which class is WSClist from the instance management. The instance management returns WSCbase*, it casts WSCbase* to WSClist*,and executes the WSClist::addItem() method. In the top of the source, we must include the header file of the class.

## 1.5 How to get the parent instance

You can get the parent instance with the method: WSCbase::getParent().

In the following sample, it acquires the parent instance which places the instance "object", and set False to the visibility of the parent.

```
void event_procedure(WSCbase* object){
  //get the parent instance.
  WSCbase* parent = object->getParent();
  //access the parent instance.
```

```
  parent->setVisible(False);
}
```

### 1.5.1 How to get the parent top level window

You can get the parent window instance with the method: WSCbase::getParentWindow().

In the following sample, it acquires the parent window instance, and pops down the window. Sometimes this scene is found when closing window by a button instance.

```
void event_procedure(WSCbase* object){
  //get the parent window.
  WSCbase* win = object->getParent();
  //pop-down the window.
  win->setVisible(False);
}
```

## 1.6 How to get the children of the instance

You can get the children which the instance contains with the following method.

| The method | Description |
|---|---|
| WSCbase* getChildInstance(char*) | Returns the child by the instance name |
| WSClistData getChildren() | Returns the children |
| long getAllChildren(WSClistData&) | Returns recursively all of the children |

### 1.6.1 How to get the child by the specified name

You can get the child by the specified name with the method: WSCbase::getChildInstance();

```
void event_procedure(WSCbase* object){
  //get the child which name is "newpbtn001"
  WSCbase* child = object->getChildInstance("newpbtn001");
  if (child != NULL){
    //the child exists.
    child->setVisible(True);
  }
}
```

In the example, WSCbase::getChildInstance() seeks the child which name is "newpbtn001" from the instance: "object" recursively, and returns it if finds or returns NULL if not.

### 1.6.2 How to get the children

You can get the children which the instance contains with the method: WSCbase::getChildren();

```
void event_procedure(WSCbase* object){
  //get the list of the children.
  WSClistData children = object->getChildren();
```

```
  //get the number of the children.
  long num = children.getNum();
  long i;
  for(i=0; i<num; i++){
    //get each child from the list.
    WSCbase* child = (WSCbase*)children[i];
//  WSCbase* child = (WSCbase*)children.getData(i); //same as children[i].
    //access the child.
    child->setVisible(False);
  }
}
```

The example shows acquisition of the children which the instance contains. The method: WSCbase::getChildren() returns the list: WSClistData which contains the children of the instance. You can access each child with the method getData(i),array operator[i] of the list, and cast void* to WSCbase*.

### 1.6.3 How to get all of the children recursively

You can get all of the children recursively with the method WSCbase::getAllChildren().

```
void event_procedure(WSCbase* object){
  //the list for the return value of getAllChildren().
  WSClistData children;
  //get all of the children.
  object->getAllChildren(children);
  //get the number of children.
  long num = children.getNum();
  long i;
  for(i=0; i<num; i++){
    //get each child from the list.
    WSCbase* child = (WSCbase*)children[i];
    //access the child.
    child->setVisible(True);
  }
}
```

The example shows acquisition of all of the children. The difference from getChildren() is that it returns recursively all of the children of the instance, of the children,....

### 1.6.4 How to get all of the children of the parent application window

We call the method: WSCbase::getAllChildren() of the parent application window to get all of the children of it.

```
void cbop(WSCbase* object){
  //get the parent application window.
  WSCbase* win = object->getParentWindow();
  //a list for the return value.
```

```
  WSClistData children;
  //get all of the children of the application window.
  win->getAllChildren(children);
  //get the number of the children.
  long num = children.getNum();
  long i;
  for(i=0; i<num; i++){
    //get each child.
    WSCbase* child = (WSCbase*)children[i];
    //access the child.
    child->setVisible(False);
  }
}
```

## 1.7 How to execute the event procedures of the instances

You can execute the event procedures which the instances have with the method: WSCbase::execProcedure .

| Executing the event procedure | Description |
|---|---|
| execProcedure(char*) | Executing by name |
| execProcedure(long) | Executing by trigger |

### 1.7.1 How to execute the event procedures by the specified name

You can execute the event procedures which the instances have by the specified name with the method: WSCbase::execProcedure(char*).

```
void event_procedure(WSCbase* object){
  //Execute the event procedures which name is "setup"
  object->execProcedure("setup");
}
```

If exists the event procedures of the instance: "object", which name is same as the specified one, It executes it,but not , does nothing.

### 1.7.2 How to execute the event procedures by the specified trigger

You can execute the event procedures which the instances have by the specified trigger with the method: WSCbase::execProcedure(int).

```
void event_procedure(WSCbase* object){
  // Execute the procedures which trigger is WSEV_ACTIVATE.
  object->execProcedure(WSEV_ACTIVATE);
}
```

If exists the event procedures of the instance: "object", which trigger is same as the specified one, It executes it,but not , does nothing.

## 1.8 How to draw the instances

You can use the following methods to draw the instances.

| To control drawing | Description |
|---|---|
| setAbsoluteDraw(Boolean) | Sets the flag of forced drawing. |
| draw() | draws if needs. |
| redraw() | clears and draws |
| cdraw() | draws the instance and its children. |
| clear() | clears the instance. |
| update() | draws if needs. |

## 1.9 How to update the instance

Usually, it executes updating the instance at the end of the event procedures. If you want to update at once, you can it with the method: update().

```
void event_procedure(WSCbase* object){
  //change a property.
  object->setProperty(WSNlabelString,"new text");
  //updating.
  object->update();
}
```

The method: update() updates the instance, if it needs to reflect the change of the properties.

### 1.9.1 How to draw the instance

There are following cases to draw the instances.

- Drawing compulsory

  You make the flag of forced drawing "True" to draw compulsory, and call the method:draw(), because the method: draw() do not draw if it does not need.

  ```
  object->setAbsoluteDraw(True);
  object->draw();
  ```

- Drawing (ordinary)

  Usually , we use the method: draw() to draw the instance. it has a good performance, because it do not draw if do not need.

  ```
  object->draw();
  ```

- Clearing the instance (no exposed event)

  You can clear the instance with the method: clear(), and draw it with draw(). The method: clear() does not creates the exposed event, so, if the other instance which are overlapped exists, its area is invalidated. In such case, use redraw() method which creates the exposed event.

```
object->clear();
object->setAbsoluteDraw(True);
object->draw();
```

- Clearing the instance (creates the exposed event)

  You can redraw the instance with the method: redraw(). it creates the exposed event so that the other overlapped instances are updated. it can make the performance worse if there are many instances.

```
object->redraw();
```

## 1.10 How to move the position of the instances

You must clear the instances to move the position of it as follows.

```
void event_procedure(WSCbase* object){
  //clear the instance.
  object->clear();
  //set invisible.
  object->setVisible(False);
  //move the position.
  object->setProperty(WSNx,100);
  object->setProperty(WSNy,100);
  //set visible.
  object->setVisible(True);
}
```

There are some cases that an afterimage is left,if you move the position of the instance which has no window resource. Not to left if ,you have to clear the instance before move the position.

The instance which has a window resource is automaticary cleared.

## 1.11 How to create/delete the instances

### 1.11.1 How to create the instance

You can create the instance with the method: WSCbase::getNewInstance().

```
char*     class_name = "WSCvlabel";
char*     obj_name   = "vlabel001";
WSCbase*  parent  //The parent instance which has new instance.

//create a new instance.
WSCbase* object = WSCbase::getNewInstance(class_name,parent,obj_name);
object->initialize(); //initialize the instance.
object->clear();

object->setProperty(WSNx,100);
```

```
object->setProperty(WSNy,100);
object->setProperty(WSNwidth,100);
object->setProperty(WSNheight,100);
object->setVisible(True);
```

You have to call initialize() to initialize before calling the other methods of the created instance.

### 1.11.2 How to delete the instance

You can destroy the instance with the global function: WSGFdestroyWindow().

```
//destroy the instance.
WSGFdestroyWindow(object);
```

Do not call WSGFdestroyWindow() with same instance twice, and do not access the destroyed instance,because it causes a fatal memory error.

## 1.12 How to use of the timer

You can execute the procedure after an interval or in cycles.

| The timer class | Access function |
|---|---|
| WSDtimer | WSGIappTimer() |

## 1.13 How to execute the procedure after an interval

At first, prepare the procedure to execute, and register it to the timer as trigger driven.

| The method | Description |
|---|---|
| addTriggerProc() | adds procedures as trigger driven |
| delTriggerProc() | deletes a added procedures |

```
#include "WSDtimer.h"
//the procedure which is executed by the timer ( trigger driven )
void triggerHandler(unsigned char clock,void* data){
   //The parameter: data is the third parameter
   //               of the method: addTriggerProc().

   //To do:
}

void event_procedure(WSCbase* obj){
  //this parameter is passed to the procedure.
  void*  data = (void*)1234;
```

```
  //add the procedure to the timer (trigger driven)  //after 1000ms
  long id = WSGIappTimer()->addTriggerProc( triggerHandler,WS1000MS,data );
  ...
  //if cancel...
  WSGIappTimer()->delTriggerProc( id );
}
```

You can implements the procedure which you want in "triggerHandler()", and pass some data by the third parameter:void* of WSDtimer::addTriggerProc(). WSDtimer::addTriggerProc() returns a timer id. you can cancel the timer by the id with WSDtimer::delTriggerProc().

Notice: After executing the procedure, it do not update the instances automatically, so you have to do it if needs.

```
//a sample of the trigger procedure.
void timerHandler(unsigned char clock,void* data){
   WSCbase* object = (WSCbase*)data;
   object->setProperty(WSNlabelString,"hello.");
   object->update(); //update the instance.
}
```

## 1.14 How to execute the procedure after in cycles

At first, prepare the procedure to execute, and register it to the timer as cycle driven.

| The method | Description |
|---|---|
| addTimerProc() | adds procedures as cycle driven. |
| delTimerProc() | deletes added procedure. |

```
#include "WSDtimer.h"
//the procedure which is executed by the timer ( cycle driven )
void timerHandler(unsigned char clock,void* data){
   //clock is a counter of the interval of 250ms
   //The parameter: data is the third parameter of the method: addTimerProc().

   //To do:
}

void event_procedure(WSCbase* obj){
  //this parameter is passed to the procedure.
  void*  data = (void*)1234;
  //add the procedure to the timer (cycle driven)  //500ms interval
  long id = WSGIappTimer()->addTimerProc( timerHandler,WS500MS,data );
  ..
  //if cancel..
  WSGIappTimer()->delTimerProc( id );
}
```

You can implements the procedure which you want in "timerHandler()", and pass some data by the third parameter:void* of WSDtimer::addTimerProc(). WSDtimer::addTimerProc() returns a timer id. you can cancel the timer by the id with WSDtimer::delTimerProc().

Notice: After executing the procedure, it do not update the instances automatically, so you have to do it if needs.

The cycles: WS250MS,WS500MS,WS750,WS1000MS,WS1250MS,... (250ms interval)

```
//a sample of the timer procedure.
void timerHandler(unsigned char clock,void* data){
   WSCbase* object = (WSCbase*)data;
   object->setProperty(WSNlabelString,"Hello!");
   object->update(); //update the instance
}
```

## 1.15 How to use the global key hook function

You can use the global key hook to check the keyboard event before dispatching, by adding a hook procedure to the keyboard instance.

| The keyboard class | Access function |
|---|---|
| WSDkeyboard | WSGIappKeyboard() |

```
#include <WSDkeyboard.h>
//A sample of the global key hook
WSCbool keyhandler(long keycode,Boolean onoff){
  // keycode : the key code (see WSkeysym.h)
  // onoff   : True = keypress, False= key release.
  if (keycode == WSK_F1){
    //The key code is  F1...
    //if discard this...
    return False; //return the False: discard.
  }else if (keycode == WSK_F2){
    //The key code is  F2...
    //if dispatch this...
    return True; //return the True: dispatch.
  }
  return True; //return the True: dispatch.
}
void event_procedure(WSCbase* obj){
  //the registration of the global key hook procedure.
  WSGIappKeyboard()->setGlobalKeyHook( keyhandler );
}
```

keyhandler() is the procedure which grabs the key board events to do something specially. You can register it with WSGIappKeyboard()-¿setGlobalKeyHook(),

See the header file: WSkeysym.h if you want the key codes.

## 1.16 How to select the key events on the input field

You can select or reject/convert the key events on the input field with the event procedure by the WSEV_KEY_HOOK trigger.

```
//A WSEV_KEY_HOOK sample procedure.
//Set the input field with the WSEV_KEY_HOOK trigger.
#include "WSDkeyboard.h"
...

void hookop(WSCbase* object){
  //get the pressed key code.
  long key = WSGIappKeyboard()->getKey();
  //Choose the key which is a numerical code.
  if ( (key >= WSK_0    && key <= WSK_9   ) ||
       (key >= WSK_KP_0 && key <= WSK_KP_9) ||
        key == WSK_plus      || key == WSK_minus  ||
        key == WSK_BackSpace || key == WSK_Delete || key == WSK_Insert ||
        key == WSK_space     || key == WSK_Up     || key == WSK_Down   ||
        key == WSK_Left      || key == WSK_Right  || key == WSK_Return ){
    //dispatches..
    return;
  }
  //Reject the other.
  WSGIappKeyboard()->setKey(0);
}
```

This sample of the input field shows how to choose the key event. WSGIappKeyboard()-¿setKey(0) reject the key event which you do not need.

## 1.17 How to add the event procedure on the programs

You can add the event procedure with the method: WSCbase::addProcedure().

| The method | Description |
|---|---|
| addProcedure(WSCprocedure*) | Add the new event procedure. |

Add the event procedure as follows.

- (A), Create the procedure instance with the specified procedure name and a trigger.
- (B), Set a address of the procedure and its name with the method: setFunction().
- (C) Finally, add the procedure instance to the instance.

```
void _new_event_procedure(WSCbase*){
//a sample of the event procedure.
//..
}

void event_procedure(WSCbase* object){
  //Create the procedure instance which name is "new proc".
  //The trigger is  WSEV_MOUSE_IN (MOUSE_IN trigger.)
(A)  WSCprocedure* ep = new WSCprocedure("new proc",WSEV_MOUSE_IN);
(B)  ep->setFunction(_new_event_procedure,"_new_event_procedure");
(C)  object->addProcedure(ep);
}
```

## 1.18 How to access to the arrayed instance.

It is possible to access to an arrayed instance as followings.

```
#include <WSCvlabel.h>

//extern declaration to access to an arrayed instance..
extern WSCvlabel** labelarray;

void event_procedure(WSCbase* object){
  labelarray[0]->setProperty(WSNlabelString,"Label No. 0");
  labelarray[1]->setProperty(WSNlabelString,"Label No. 1");
   ...
}
```

See Chapter 4.[How to define the instances as an array] of [Wide Studio Builder User's Guide] to create an arrayed instance.

## 1.19 How to indicate a dialog on the WSEV_EXIT event procedure

There is the case to need to save data indicate a dialog whether to finish the application, when the application is finished by closing the window. In such a case it is convenient to use the WSEV_EXIT event procedure of the WSCwindow/WSCmainWindow class.

The WSCwindow/WSCmainWindow class generates the WSEV_EXIT trigger when the window is disappeared before finishing the application.

At first set True to the property WSNexit of a WSCwindow/WSCmainWindow instance which is used as main window in the application, and put an event procedure to it with WSEV_EXIT trigger.

We will try to make an event procedure to have the following facility.

- Indicates the dialog whether exit or continue.
- If [OK] is selected,execute some procedure and exit the application.

- If [NO] is selected,exit the application with no process.
- If [CANCEL] is selected,do nothing and does not exit the application.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCmessageDialog.h>
#include <WSDtimer.h>

//The timer procedure which redisplay the window.
void delayproc(unsigned char,void* ptr){
  WSCbase* object = (WSCbase*)ptr;
  object->setVisible(True);
}
//EXIT event procedure
//Indicates a dialog.
void exit_ep(WSCbase* object){
  if (object->getVisible() != False){
    return;
  }
  WSCmessageDialog* msg = WSGIappMessageDialog(); //A
  msg->setProperty(WSNwidth,500);
  msg->setProperty(WSNno,True);
  msg->setProperty(WSNdefaultPosition,True);
  msg->setProperty(WSNlabelString,
  "Exit and save data?\n If you do not want to save and exit,push NO...");
  //Indicates the dialog.
  long ret = msg->popup(); //B

  if (ret == WS_DIALOG_OK){ //When OK is selected.. C
    //saving some data ...
    exit(0);
  }else
  if (ret == WS_DIALOG_NO){ //When NO is selected.. D
    exit(0);
  }else
  if (ret == WS_DIALOG_CANCEL){ //When CANCEL is selected.. E
    WSGIappTimer()->addTriggerProc(delayproc,WS250MS,object);
  }
}
static WSCfunctionRegister  op("exit_ep",(void*)exit_ep);
```

Get the instance of the message dialog (A),indicate it (B). Check the result of the dialog (C)(D)(E).

It need to execute delayed procedure to redisplay the window, because it is required that the exit event is done before the window be redisplayed.


[The exit dialog]

## 1.20 How to examine which mouse button is pressed

There is a case to need to examine which the mouse button is pushed in some event procedure. It is possible to get a information of the mouse pointer from the global mouse instance as following program.

```
#include "WScom.h"
#include "WSCfunctionList.h"
#include "WSCbase.h"
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include "WSDmouse.h" //A

void btn_ep(WSCbase* object){
  long status = WSGIappMouse()->getStatus(); //B
  if (status & WS_MOUSE_BTN1){ //C
    //Left button is pushed..
  }
  if (status & WS_MOUSE_BTN2){ //D
    //Middle button is pushed..
  }
  if (status & WS_MOUSE_BTN3){ //E
    //Right button is pushed..
  }

}
static WSCfunctionRegister  op("exit_ep",(void*)exit_ep);
```

At first,include WSDmouse.h to access the global mouse instance (A). and, get a information of the mouse pointer (B). Check the button of the mouse whether to be pushed (C), (D), (E). It is better that checking value by operator & than ==, because sometime the mouse buttons are pushed in same time.

# Chapter 2

# Samples of the event procedures

## 2.1 The sample of the event procedures for WSCvlabel

### 2.1.1 Making the WSCvlabel instance click-able

In the sample of the event procedures, It is a most basic procedure that makes the label instance to react to the mouse pointer. Here, you will create a procedure to make it counting up clicking of the mouse pointer.

```
#include "WSDmouse.h"
//Set this to a label instance with WSEV_MOUSE_PRESS
//                                  (MOUSE-PRESS trigger)
void cbop(WSCbase* object){

  //(0) Which the mouse button is pressed?
  // btn1 -> fire. btn2 or the other -> return.
  if ( (WSGIappMouse()->getMouseStatus() & WS_MOUSE_BTN1) == 0){
    return;
  }

  //(A)Get the value of the property: WSNuserValue
  long value = object->getProperty(WSNuserValue);
  //(B)Count it up.
  value++;
  //(C)Display the value.
  object->setProperty(WSNlabelString,value);
  //(D)Store the counted value into the property:
  //                          WSNuserValue for the next time.
  object->setProperty(WSNuserValue,value);
}
```

At first, this event procedure uses the property: WSNlabelString to display the number which is counted up. So, The kind of class like WSCvbtn,WSCvlabel

which has it, can be used with WSEV_MOUSE_PRESS trigger. It will be executed by clicking of the mouse pointer.

- (0): It distinguishes whether the mouse btn 1 is pressed. Please refer to it for your implementation.
- (A): It uses the property: WSNuserValue to contain the value of the counter. The default value of the property is 0, and it can be used freely by user. The procedure uses it because it wants to store each counter value of each label instance. the counter value becomes a singleton when the procedure uses the static variable for the counter, even if used by many label instances.
- (B): It increases the counter.
- (C): It stores into the property: WSNlabelString to display it.
- (D): It stores into the property: WSNuserValue for the next time.

If by WSEV_MOUSE_IN trigger is used, it count the number of entering and exiting of the mouse pointer.

### 2.1.2 Making the WSCvlabel instance select-able

Here, you will create a procedure to make the label instance select-able by clicking of the mouse pointer. To display the instance is selected, the procedure changes the back-color of it. This time, the procedure uses the method: set/getUserData() to get/store data instead of the property: WSNuserValue.

```
//Set this to a label instance with WSEV_MOUSE_PRESS
//                                  (MOUSE-PRESS trigger)
void cbop(WSCbase* object){
  //(A) Get the value with getUserData()
  long value =  (long)object->getUserData("STATUS");
  //(B) it makes the instance selected  if value is 0,
  //                               and unselected if 1.
  if (value == 0){
    //(C) Store the backcolor(which is string type) into WSNuserString
    WSCvariant color = object->getProperty(WSNbackColor);
    object->setProperty(WSNuserString,color);
    //(D)Set the backcolor to the selected color.
    object->setProperty(WSNbackColor,"slategray4");
    //(E)Store the state with setUserData().
    value = 1;
    object->setUserData("STATUS",(void*)value);
  }else{
    //(F)Get the original backcolor from WSNuserString.
    WSCvariant color =  object->getProperty(WSNuserString);
    //(G)Store it to WSNbackColor to display with the original color.
    object->setProperty(WSNbackColor,color);
    //(H)Store the state with setUserData().
```

```
    value = 0;
    object->setUserData("STATUS",(void*)value);
  }
}
```

The kind of class like WSCvbtn,WSCvlabel which has the property: WSNbackColor, can be used with WSEV_MOUSE_PRESS trigger. It will be executed by clicking of the mouse pointer.

- (A): It uses the method: set/getUserData() to contain the selected value of the state. The default value of the method is 0, and it can be used freely by user. The procedure uses it because it wants to store each status of each instance.

  You can specify a name of value to store with setUserData(), and can get the value by the specified name with getUserData().

- (B): It distinguishes the state.
- (C): It stores the original back-color to the property: WSNuserString.
- (D): It makes the instance selected.
- (E): It stores the state with setUserData() again.
- (F): It gets the original back-color from WSNuserString.
- (G): It stores the original back-color to WSNbackColor.
- (H): It stores the state with setUserData() again.

### 2.1.3 Making the WSCvlabel instance highlight-able

Here, you will create a procedure with WSEV_MOUSE_IN/OUT to make the instance highlighted. Coming into the area,the instance is highlighted,and Going out of the area, it is returned normal.

An important matter is that you create a procedure which prepares a sub-procedure with WSEV_MOUSE_IN and another with WSEV_MOUSE_OUT. In other words,that procedure with WSEV_INITIALIZE is executed, it adds two sub-procedures to the instance which trigger is WSEV_MOUSE_IN and WSEV_MOUSE_OUT to make the instance highlight-able. One procedure can prepares many procedures. Then you can go with a procedure even if many procedures are needed.

```
//a sub-procedure with WSEV_MOUSE_IN trigger
void subop1(WSCbase* object){
    //(A)Store the original back-color to WSNuserString
    WSCvariant color = object->getProperty(WSNbackColor);
    object->setProperty(WSNuserString,color);
    //(B)highlight the instance.
    object->setProperty(WSNbackColor,"slategray4");
}
//a sub-procedure with WSEV_MOUSE_OUT trigger
```

```
void subop1(WSCbase* object){
    //(C)Get the original back-color from WSNuserString
     WSCvariant color = object->getProperty(WSNuserString);
    //(D)Store the original back color.
    object->setProperty(WSNbackColor,color);
}
//a main-procedure with WSEV_INITIALIZE trigger
void cbop(WSCbase* object){
   //If executed,it add the sub-procedures to the instance.
   //(E) Setup a sub-procedure:WSEV_MOUSE_IN.
   //ProcedureName="Highlight1" Trigger=WSEV_MOUSE_IN Function=subop1
   WSCprocedure* ac1 = new WSCprocedure("Highlight1",WSEV_MOUSE_IN);
   ac1->setFunction(subop1,"subop1");
   object->addProcedure(ac1);
   //(F) Setup a sub-procedure:WSEV_MOUSE_OUT.
   //ProcedureName="Highlight2" Trigger=WSEV_MOUSE_OUT Function=subop2
   WSCprocedure* ac2 = new WSCprocedure("Highlight2",WSEV_MOUSE_OUT);
   ac2->setFunction(subop2,"subop2");
   object->addProcedure(ac2);
}
```

The subop1() is executed by WSEV_MOUSE_IN fired, and makes the instance back-color highlight(A)(B). The subop2() is executed by WSEV_MOUSE_OUT fired, and makes the instance back-color original one(C)(D). The main procedure is executed by WSEV_INITIALIZE only once to setup the sub-procedures (E)(F).

### 2.1.4 Making a group of selectable WSCvlabel instances

Here, you create a event procedure to make a group of the mouse-selectable label instances on the same parent. the procedure make the instance selected by storing WS_SHADOW_IN to the property:WSNshadowType and memorize which instance is selected by storing it to its parent instance.

```
//An event procedure with WSEV_MOUSE_PRESS trigger
void cbop(WSCbase* object){
  //(A)Use the value of WSNuserValue as "instance identifier"
  long val = object->getProperty(WSNuserValue);
  //(B)Make the instance selected: WS_SHADOW_IN state.
  object->setProperty(WSNshadowType,WS_SHADOW_IN);
  //(C)Get the last selected instance which is memorized
       with setUserData() of the parent instance.
  WSCbase* parent = object->getParent();
  WSCbase* target = (WSCbase*)parent->getUserData("SelectedItem");
  //(D)Make it not selected: WS_SHADOW_OUT state.
  if (target != NULL){
    target->setProperty(WSNshadowType,WS_SHADOW_OUT);
  }
```

```
  if (target == object){
    //(E)When clicking the selected instance twice,
    //   clear the selected state.
    parent->setUserData("GroupValue",(void*)0);
    parent->setUserData("SelectedItem",(void*)0);
  }else{
    //(E)The other,store the selected instance to the parent instance.
    parent->setUserData("GroupValue",(void*)val);      //Instance identifier
    parent->setUserData("SelectedItem",(void*)object); //selected instance
  }
}
```

The label instances needs each instance identifier to recognize which instance is selected, then we decide to use the property: WSNuserValue as the instance identifier which has unique value.

- (A): Gets the instance identifier from the property: WSNuserValue.
- (B): Makes the instance selected with WS_SHADOW_IN.
- (C): Gets the last instance which is selected from the parent instance.
- (D): Makes the last one not selected.
- (E): Makes the instance not selected if it is selected twice and clears the value which is memorized in the parent instance.
- (F): Stores the new selected instance to the parent instance.

## 2.2 The sample of the event procedures for WSCvifield

### 2.2.1 Executing some event procedures by return key

You can execute the specified procedures in the event procedure. Here, the following sample shows executing the procedure which name is "InputFixed".

```
//A sample of WSEV_KEY_HOOK trigger.
#include "WSDkeyboard.h"
void cbop(WSCbase* object){
  (A)Get the pressed key.
  long key = WSGIappKeyboard()->getKey();
  (B)If the key is return..
  if (key == WSK_Return){
    //Execute the procedure which name is "InputFixed".
    object->execProcedure("InputFixed");
  }
}
```

- (A): Get the key code which is pressed from the keyboard.
- (B): if it is return key, do (C).

- (C): Execute the procedure which name is "InputFixed".

This procedure sometimes is used to execute some procedure on the end of key input.

### 2.2.2 Clearing the last input string on starting of next input

Here, you create a procedure which clears the last input string on starting of the next. the procedure clears the string the first key input since the input field instance is focused or clicked by the mouse pointer. The clear process is as follows:

- (1)It sets the clear flag True,if the input field is focused.
- (2)It sets the clear flag True,if the input field is clicked.
- (3)It clears the string if the clear flag is True.
- (4)It initializes the sub-procedures (1),(2),(3).

```
#include <WSDkeyboard.h>
//To contain the last focused input field.
static WSCbase* _focus_if = NULL;
//(1)A sub-procedure with WSEV_FOCUS_CH
static void _focus_on_(WSCbase* object){
  //(A) Examine whether the instance is focused.
  if (_focus_if != object && object->getFocus() != False){
    //(B)It need to clear the string!
    //Set the clear flag True.
    object->setUserData("CLEAR TIMING",(void*)1);
    //(C)store that the last focused one is.
    _focus_if = object;
  }
}
//(2)A sub-procedure with WSEV_MOUSE_PRESS
static void _btn_press_(WSCbase* object){
  //(D) if clicked by the mouse pointer,
  // it needs to clear the string!
  //  Set the clear flag True.
  object->setUserData("CLEAR TIMING",(void*)1);
  object->setProperty(WSNcursorPos,0);
  //(E)store that the last focused one is.
  _focus_if = object;
}
//(3)A sub-procedure with WSEV_KEY_PRESS
static void _key_hook_(WSCbase* object){
  //(F) See the clear flag to clear the last input string.
  long fl =(long)object->getUserData("CLEAR TIMING");
  if (fl == 1){
```

```
    long key = WSGIappKeyboard()->getKey();
    //(G) Clear the string,if the key is not cursor key.
    if (key != WSK_Tab &&
        key != WSK_Up &&
        key != WSK_Down &&
        key != WSK_Left &&
        key != WSK_Right ){
      //(H)Clear...
      object->setProperty(WSNlabelString,"");
    }else{
      return;
    }
  }
  //(I)Set the clear flag False.
  object->setUserData("CLEAR TIMING",(void*)0);
}

//The main-procedure.
//(4)Set the input field instance with WSEV_INITIALIZE trigger.
void ifdclr(WSCbase* object){
  //Setup the sub-procedure(1) with WSEV_FOCUS_CH
  WSCprocedure* ac1 = new WSCprocedure("ac1",WSEV_FOCUS_CH);
  ac1->setFunction(_focus_ch_,"_focus_ch_");
  object->addProcedure(ac1);

  //Setup the sub-procedure(2) with WSEV_MOUSE_PRESS
  WSCprocedure* ac2 = new WSCprocedure("ac2",WSEV_MOUSE_PRESS);
  ac2->setFunction(_btn_press_,"_btn_press_");
  object->addProcedure(ac2);

  //Setup the sub-procedure(3) with WSEV_KEY_PRESS
  WSCprocedure* ac3 = new WSCprocedure("ac3",WSEV_KEY_HOOK);
  ac3->setFunction(_key_hook_,"_key_hook_");
  object->addProcedure(ac3);
}
```

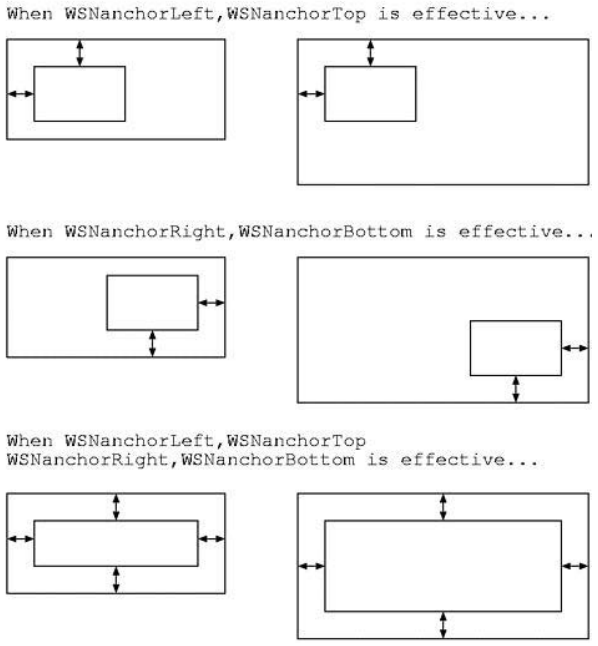
In the focus_ch event procedure, To examine the instance is focused afresh, It uses the static variable which is stored the last focused instance.

- (A): It checks whether the instance is equal to the last focused one. if it differs and it focused (not lost), it means that the instance is focused afresh.
- (B): It sets the clear flag True.
- (C): It stores the instance to the static variable for the next.
- (D): It sets the clear flag True and move the cursor to the top.
- (E): It stores the instance to the static variable for the next.

- (F): It sees the clear flag to clear the last string.
- (G): It is too sad to clear the string with the cursor key, so it sees what it is.
- (H): It clears the string if it is not.
- (I): It sets the clear flag False.

## 2.3 Automatic geometry adjustment with the anchors

The object of WideStudio which has geometry has automatic geometry adjustment by the property WSNanchor. The anchor keeps the distance of the border of parent instance and coordinates the geometry of oneself.




[Action of the anchors]

## 2.4 The pull-down menu and the menu area

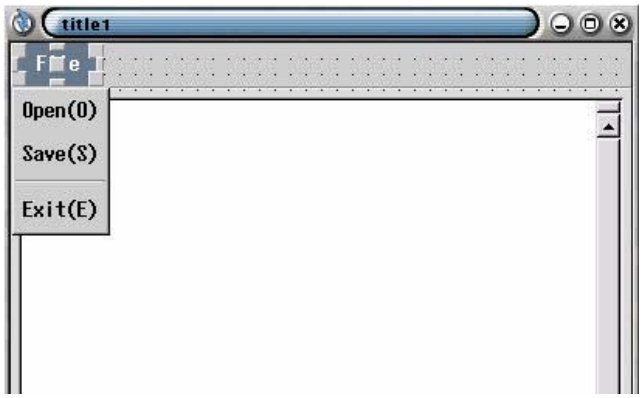
### 2.4.1 What is the menu area

The menu area: WSCmenuArea is a form which secures an area for the pull-down menus. This class keeps constant area the upper part. And its geometry is automatically adjusted when the parent window is resized.

[A sample which has a menu area(WSCmenuArea)]

### 2.4.2 Try to use the pull-down menu

Now try to create a sample application which has pull-down menu.



[A sample application which has pull-down menu]

The sample has [File] menu such as picture and the [File] menu has these items as follows.

- Open
- Save
- Exit

At first, create an application window and drop an instance of WSCmenuArea from the section [Forms] of object box dialog. Next, drop an instance

of WSCpulldownMenu from the section [Commands] to it. Set the property as follows.

- Label string: File
- Menu items: Open(O):open_ep:o,Save(S):save_ep:s,SP,Exit(E):exit_ep:e

To the menu items property,set value which is punctuated with comma every one item.

One item consists of the following format. It indicates a separator with an item: SP.

```
item string:event procedure name:short cut key,...
```

For example, in an above-mentioned example, an event procedure which title is open_ep is executed when the menu [Open(0)] selected. You can set event procedures which title is open_ep with NONE trigger to the pull-down menu instance.

You can assign ID to each menu item, and you can process the all triggers of each menu with an event procedure to use the ID.

In the case with ID, one item consists of the following format. In the procedure,you can get the ID with getValue() method.

```
item string:event procedure name:short cut key:id,...
```

### 2.4.3 Notice of the pull-down menu

It is no allowed that using WSCpulldownMenu class and other WSCvXXXX class on a same form. Place instances of WSCpulldownMenu class only on a menu area.

## 2.5 The list

### 2.5.1 Setting of the items by the method

Use addItem method to add items to the list with an string and position.

If the position is omitted,add it to the last of the list. The following program is a sample adding item to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSClist.h>
extern WSClist* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Add an item to the last of the list.
```

```
  newlist_001->addItem("item1");
  newlist_001->addItem("item2");
  newlist_001->addItem("item3");
  newlist_001->addItem("item4");
  //Add an item to the specified position of the list.
  newlist_001->addItem("item0",0);//0 :top
  newlist_001->addItem("item5",-1);//-1 :last

  //Update the modified list.
  newlist_001->updateList();
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

### 2.5.2 Setting of the items by the property

the property WSNdata can be used for setting the items of the list, if it is a comparatively little number of the items. In such case, set the property WSNdataSource to WS_DATA_SOURCE_NONE, and set the items which is punctuated with comma every one item to the property WSNdata.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSClist.h>
extern WSClist* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Set the items of the list by the property
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_NONE);
  newlist_001->setProperty(WSNdata,"item0\nitem1\nitem2\nitem3\nitem4");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

It is possible to indicate the specified ICON by icon file name as following program. Set True to the property WSNuseIcon and Set the items as following format. If it is omitted,the value of WSNiconPixmap is used for default icon.

```
  format:
  ICON1filename,string1ofTheItem\n ICON2filename,string2ofTheItem\n...

void btnep1(WSCbase* object){
  //Delete all the list of the list
  newlist_001->delAll();
  //Set the items of the list by the property
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_NONE);
  newlist_001->setProperty(WSNdata,
     "$(WSDIR)/sys/pixmaps/bi16.xpm,item1\nitem2\nitem3");
```

```
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

### 2.5.3 Setting of the items from the file directly

It is possible to set the items from the file directly. In such case at first,set WS_DATA_SOURCE_FILE to the property WSNdataSource, and set the file name to the property WSNdataSourceName as following program.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSClist.h>
extern WSClist* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from file directly
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_FILE);
  newlist_001->setProperty(WSNdataSourceName,"data.txt");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);

//data.txt contains...
$(WSDIR)/sys/pixmaps/bi16.xpm,item1
item2
item3
item4
$(WSDIR)/sys/pixmaps/bi16.xpm,item5
item6
item7
item8
```

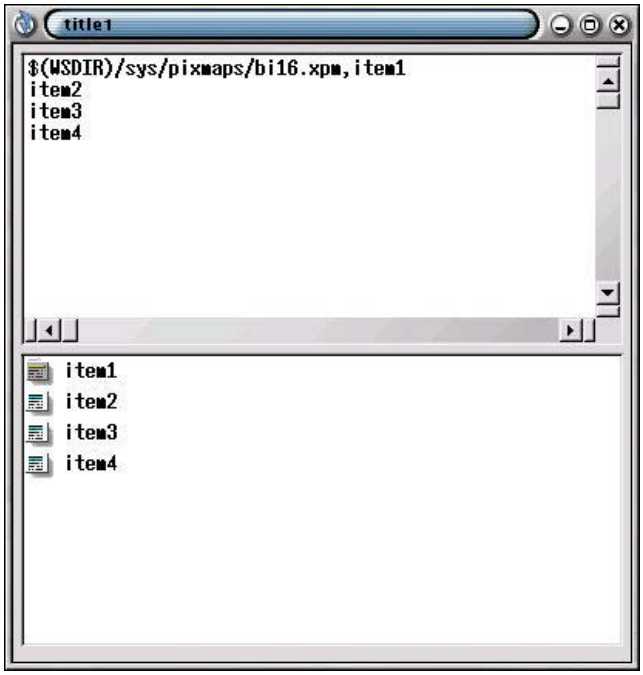
### 2.5.4 Setting of the items from the other instance

It is possible to set the items from the data source target property of the other instances. In such case, set WS_DATA_SOURCE_INSTANCE to the property WSNdataSource, and set the instance name to the property WSNdataSource-Name. In the following example, a WSCtextField instance are specified to the property WSNdataSourceName and then it sets the string data of it to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
```

```
//-------------------------------------------------------
#include <WSClist.h>
extern WSClist* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from the other instances
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_INSTANCE);
  newlist_001->setProperty(WSNdataSourceName,"newtext_000");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

The following picture indicates the list(lower side) from the other instance of WSCtextField class( upper side).

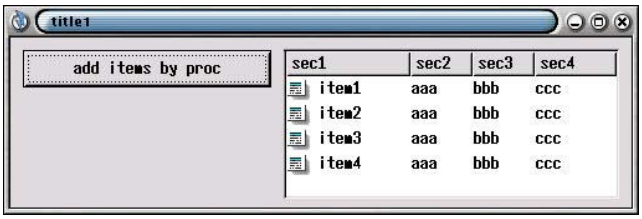



[The list data from the other instance]

## 2.6 The verbose list

### 2.6.1 Setting of the items by the method

Use addItem method to add items to the list which property WSNtype is WS_VERBOSE with an string and position. If the position is omitted,add it to the last of the list. The following program is a sample adding item to the list. The difference from the list is the item which is punctuated with comma.




[The verbose list]

Set 50,100,150 to the property WSNbarValue to make the list 4-sections like above picture. This property appoints a position of separator of title. Please pay attention, because number of section is fixed by this property.

The following program is a sample adding item to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCverbList.h>
extern WSCverbList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Add an item to the last of the list.
  newlist_001->addItem("item1,aaa,bbb,ccc");
  newlist_001->addItem("item2,aaa,bbb,ccc");
  newlist_001->addItem("item3,aaa,bbb,ccc");
  newlist_001->addItem("item4,aaa,bbb,ccc");

  //Add an item to the specified position of the list.
  newlist_001->updateList();
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

### 2.6.2 Setting of the items by the property

the property WSNdata can be used for setting the items of the list, if it is a comparatively little number of the items. In such case, set the property WSNdataSource to WS_DATA_SOURCE_NONE, and set the items which is punctuated with comma every one item to the property WSNdata.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCverbList.h>
extern WSCverbList* newlist_001;
```

```
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Set the items of the list by the property
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_NONE);
  newlist_001->setProperty(WSNdata,
     "item1,aaa,bbb,ccc\nitem2,aaa,bbb,ccc\nitem3,aaa,bbb,ccc");

static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

It is possible to indicate the specified ICON by icon file name as following program. Set True to the property WSNuseIcon and Set the items as following format. If it is omitted,the value of WSNiconPixmap is used for default icon.

```
  format:
  ICON1filename,str11,str12,str13,..\nICON2filename,str21,str22,str23,...\n...

void btnep1(WSCbase* object){
  //Delete all the list of the list
  newlist_001->delAll();
  //Set the items of the list by the property
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_NONE);
  newlist_001->setProperty(WSNdata,
  "$(WSDIR)/sys/pixmaps/bi16.xpm,item1,aaa,bbb,ccc\nitem2,aaa,bbb,ccc\nitem3,aaa,bbb,ccc")
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

### 2.6.3 Setting of the items from the file directly

It is possible to set the items from the file directly. In such case at first,set WS_DATA_SOURCE_FILE to the property WSNdataSource, and set the file name to the property WSNdataSourceName as following program.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCverbList.h>
extern WSCverbList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from file directly
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_FILE);
  newlist_001->setProperty(WSNdataSourceName,"data.txt");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);

//data.txt contains...
```

```
$(WSDIR)/sys/pixmaps/bi16.xpm,item1,aaa,bbb,ccc
item2,aaa,bbb,ccc
item3,aaa,bbb,ccc
item4,aaa,bbb,ccc
$(WSDIR)/sys/pixmaps/bi16.xpm,item5,aaa,bbb,ccc
item6,aaa,bbb,ccc
item7,aaa,bbb,ccc
item8,aaa,bbb,ccc
```

### 2.6.4 Setting of the items from the other instance

It is possible to set the items from the data source target property of the other instances. In such case, set WS_DATA_SOURCE_INSTANCE to the property WSNdataSource, and set the instance name to the property WSNdataSourceName. In the following example, a WSCtextField instance are specified to the property WSNdataSourceName and then it sets the string data of it to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCverbList.h>
extern WSCverbList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from the other instances
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_INSTANCE);
  newlist_001->setProperty(WSNdataSourceName,"newtext_000");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

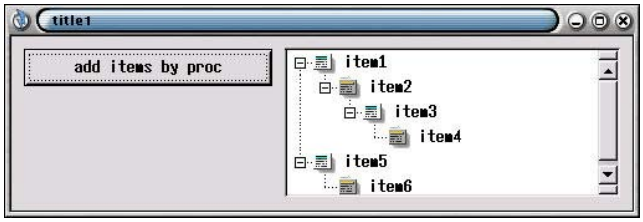
## 2.7 The tree list

### 2.7.1 Setting of the items by the method

Use addItem method to add items to the list which property WSNtype is WS_TREE with an string and position. If the position is omitted,add it to the last of the list. The following program is a sample adding item to the list. The difference from the list is the item which is punctuated with comma. In addition,it is possible to set the nest floor of list item with the setItemValue method. In its argument,set the position of the item and WS_INDENT_LEVEL to the value type,and indent level. If it is omitted,the indent level is 0.

```
  setItemValue(pos,WS_INDENT_LEVEL,level);
  pos = 0,1,2,...,-1(last one)
```

```
  level = 0(top),1,2,3...
```




[The tree list]

The following program is a sample adding item to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCtreeList.h>
extern WSCtreeList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Add an item to the last of the list.
  newlist_001->addItem("item1");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,0);
  newlist_001->addItem("item2");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,1);
  newlist_001->addItem("item3");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,2);
  newlist_001->addItem("item4");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,3);
  newlist_001->addItem("item5");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,0);
  newlist_001->addItem("item6");
  newlist_001->setItemValue(-1,WS_INDENT_LEVEL,1);

  //Add an item to the specified position of the list.
  newlist_001->updateList();
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

As for the point that you should pay attention to in tree list, there is not special relational as membership between item at all. and then each item is merely indicated by status appointed indent. So by deleting the item of the upper level, the item of floor following it is not disappeared. The difference of upper level is only +1. If it is grater than +1,it is adjusted to +1 automatically.

### 2.7.2 Setting of the items by the property

the property WSNdata can be used for setting the items of the list, if it is a comparatively little number of the items. In such case, set the property WSNdataSource to WS_DATA_SOURCE_NONE, and set the items which is punctuated with comma every one item to the property WSNdata.

```
  Format:(the property WSNuseIcon is True)
    icon_filename,indent_level,1=open/0=close,the string\n...
  Format:(the property WSNuseIcon is False)
    indent_level,1=open/0=close,the string\n...
```

If the icon is omitted in the case that the property WSNuseIcon is True, the value of WSNiconPixmap is used for the icon.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCtreeList.h>
extern WSCtreeList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list.
  newlist_001->delAll();
  //Set the items of the list by the property
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_NONE);
  newlist_001->setProperty(WSNdata,",0,1,item1\n,1,1,item2\n,2,1,item3");

static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

### 2.7.3 Setting of the items from the file directly

It is possible to set the items from the file directly. In such case at first,set WS_DATA_SOURCE_FILE to the property WSNdataSource, and set the file name to the property WSNdataSourceName as following program.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCtreeList.h>
extern WSCtreeList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from file directly
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_FILE);
```

```
  newlist_001->setProperty(WSNdataSourceName,"data.txt");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);

//data.txt contains...
$(WSDIR)/sys/pixmaps/bi16.xpm,0,1,item1
1,1,item2
2,1,item3
3,1,item4
$(WSDIR)/sys/pixmaps/bi16.xpm,0,1,item5
1,1,item6
2,1,item7
3,1,item8
```

### 2.7.4 Setting of the items from the other instance

It is possible to set the items from the data source target property of the other instances. In such case, set WS_DATA_SOURCE_INSTANCE to the property WSNdataSource, and set the instance name to the property WSNdataSourceName. In the following example, a WSCtextField instance are specified to the property WSNdataSourceName and then it sets the string data of it to the list.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCtreeList.h>
extern WSCtreeList* newlist_001;
void btnep1(WSCbase* object){
  //Delete all the items of the list
  newlist_001->delAll();
  //Set the items from the other instances
  newlist_001->setProperty(WSNdataSource,WS_DATA_SOURCE_INSTANCE);
  newlist_001->setProperty(WSNdataSourceName,"newtext_000");
}
static WSCfunctionRegister  op("btnep1",(void*)btnep1);
```

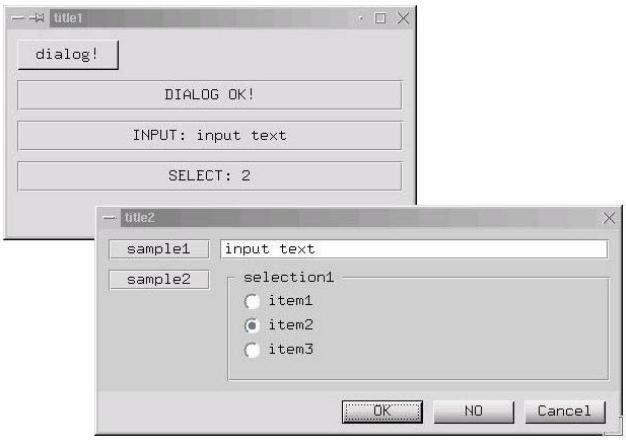
## 2.8 The user dialog

### 2.8.1 How to make a simple user dialog

Try to make a simple user dialog with WSCdialog class. and the application has as following functions.

- Pushing some button of the application,indicates this user dialog.
- This dialog has an input field and a radio group.

- The end of input of the dialog,check the input value whether it is right.
- Indicates the result of input of the dialog on the label.



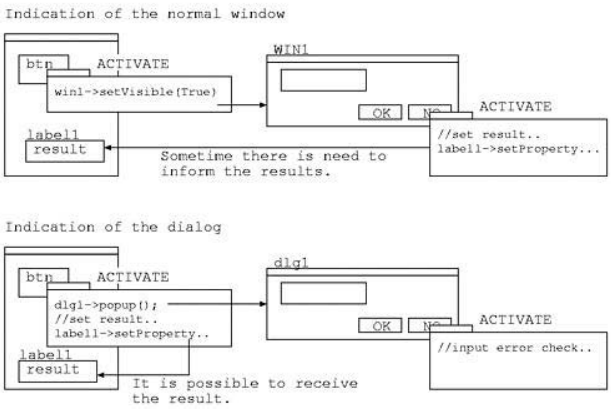

[A sample of the user dialog]

This sample is provided by ws/samples/share/dialog/ .

### 2.8.2 Controlling to indicate the user dialog

It is easy to see to control indicating the user dialog by a sample ws/samples/share/dialog/ . The dialog is often used as exclusive window to do the input and indicating some informations. So there is a bad case when it is implemented as usual window. For example,when it requires that the same dialog is called from more than on event procedure,if the dialog is usual window, it becomes complicated that receiving of the input value from it. But it is easy to receive it when it is as dialog,not as usual window, because the pop-up method of dialog returns the end of input in order to receive the input value form it.

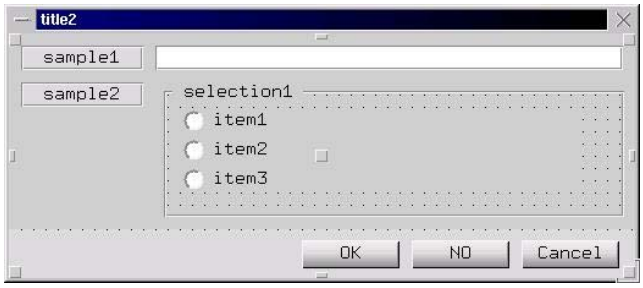
The following picture shows the difference of the indicating and receiving the input data between the usual window and the dialog.




[The difference of the usual window and the dialog]

See the following program, At first, make a user dialog instance by dropping from the [Window] section of the object box dialog and put the following instances on it.

- WSCvifield* newvifi_003
- WSCradioGroup* newradi_006




[A sample of the user dialog]

The next,implement the procedure when the button [OK],[NO],[CANCEL] is pushed, and put it the dialog with WSEV_ACTIVATE trigger. In this procedure, check the input values whether they are right and indicates an error dialog if they are wrong.

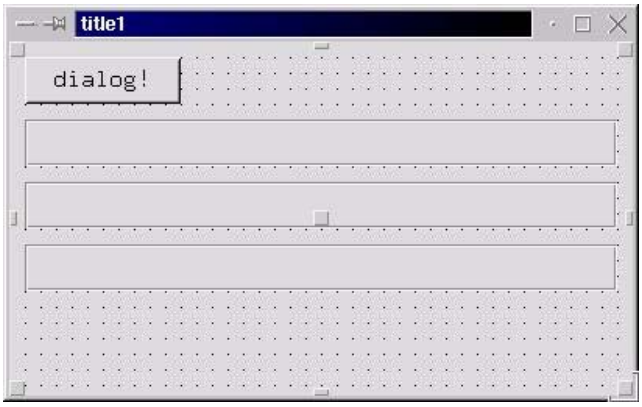
```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCdialog.h>
#include <WSCvifield.h>
#include <WSCradioGroup.h>
#include <WSCmessageDialog.h>
extern WSCvifield* newvifi_003;
extern WSCradioGroup* newradi_006;

void dialogep(WSCbase* object){
  WSCdialog* dialog = (WSCdialog*)object->cast("WSCdialog");
  if (dialog == NULL){ //A
    return;
  }
  if (dialog->getStatus() != WS_DIALOG_OK){ //B
    object->setVisible(False);
    return;
  }

  WSCstring str;
  str = newvifi_003->getProperty(WSNlabelString);
  if (!strcmp{\sffamily{((char*)str,"")}}{                          //C
    WSCmessageDialog* msg = WSGIappMessageDialog();
```

```
    msg->setProperty(WSNdefaultPosition,True);
    msg->setProperty(WSNwidth,500);
    msg->setProperty(WSNlabelString,
                     "Please input some string to the input field.");
    msg->popup();                          //D
    return;
  }
  long val = newradi_006->getProperty(WSNvalue);
  if (val == 0){                          //E
    WSCmessageDialog* msg = WSGIappMessageDialog();
    msg->setProperty(WSNdefaultPosition,True);
    msg->setProperty(WSNwidth,500);
    msg->setProperty(WSNlabelString,
                     "Please select a item of the radio group.");
    msg->popup();                          //F
    return;
  }
  object->setVisible(False);               //E
}
static WSCfunctionRegister  op("dialogep",(void*)dialogep);
```

At first, get the class native pointer to access the original method of the WSCdialog class. and call the getStatus method to receive an information which button [OK],[NO],[CANCEL] is pushed. At A,exits the procedure if the instance is not WSCdialog class. At B,checks which the button is pushed. Puts the dialog out when the button is not [OK]. At C, checks the input of the instance: newvifi_003, and indicates an message dialog when its input is wrong at D and exits, At C, checks the input of the instance: newradi_006, and indicates an message dialog when its input is wrong at F and exits.

Then puts the dialog out and the method popup() which is called to indicate this dialog and called this event procedure by pushing the buttons of dialog returns. It is important that to make the dialog disappeared, because if not,the method popup() will never return.

The following program is an example to call the method popup() in order to indicate the dialog.




[A sample window to indicate the user dialog]

If the button [dialog!] is pushed, indicates the user dialog and receive the input values from the dialog, put them to the labels.

The first label: The pushed button [OK],NO],[CANCEL].

The second label: The input of newvifi_003.

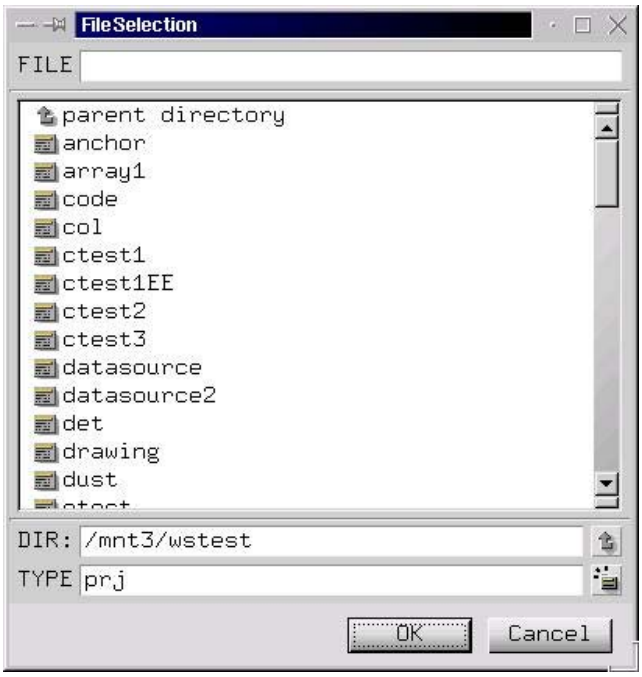
The third label: The selection of newradi_006.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCdialog.h>
#include <WSCvifield.h>
#include <WSCradioGroup.h>
#include <WSCvlabel.h>
extern WSCdialog* newdial_001;
extern WSCvifield* newvifi_003;
extern WSCradioGroup* newradi_006;
extern WSCvlabel* newvlab_007;
extern WSCvlabel* newvlab_010;
extern WSCvlabel* newvlab_011;

void btnep(WSCbase* object){
  long val = newdial_001->popup();
  if (val == WS_DIALOG_OK){
     newvlab_007->setProperty(WSNlabelString,"DIALOG OK!");
  }else
  if (val == WS_DIALOG_NO){
     newvlab_007->setProperty(WSNlabelString,"DIALOG NO!");
  }else
  if (val == WS_DIALOG_CANCEL){
     newvlab_007->setProperty(WSNlabelString,"DIALOG CANCEL!");
  }
  WSCstring tmp;
  tmp = newvifi_003->getProperty(WSNlabelString);
  WSCstring tmp2;
  tmp2 << "INPUT: " << tmp;
  newvlab_010->setProperty(WSNlabelString,tmp2);

  val = newradi_006->getProperty(WSNvalue);
  tmp2 = "SELECT: ";
  tmp2 << val;
  newvlab_011->setProperty(WSNlabelString,tmp2);
}
static WSCfunctionRegister  op("btnep",(void*)btnep);
```

## 2.9 The file selection dialog

### 2.9.1 Indication of the file selection dialog

To get the instance of the file selection dialog, call the global function: WSGIappFileSelect(). and call the dialog method: popup() to indicate it.




[The file selection dialog]

The method popup() returns the result of the dialog status when the selection is done. And get the selected file name by the getFileName() method.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
#include <WSCfileSelect.h> //(A)
#include <WSCmessageDialog.h> //(B)
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
void btnep2(WSCbase* object){
  //Access to the global instance of the WSCfileSelect class.
  WSCfileSelect* fs = WSGIappFileSelect(); //(C)
  fs->setProperty(WSNmaskFileName,"cpp");  //(D)
  fs->setProperty(WSNdefaultPosition,True); //(E)
  long ret = fs->popup();                  //(F)

  //Access to the global instance of the WSCmessageDialog class.
  WSCmessageDialog* msg = WSGIappMessageDialog(); //(G)
  msg->setProperty(WSNwidth,500);                 //(H)
```

```
  msg->setProperty(WSNheight,120);                //(I)
  msg->setProperty(WSNdefaultPosition,True);      //(J)

  if (ret == WS_DIALOG_OK){           //(K)
    WSCstring  str;
    str << fs->getFileName() << " is selected.";
    msg->setProperty(WSNlabelString,str);
    msg->popup();
  }else if (ret == WS_DIALOG_NO){     //(L)
    msg->setProperty(WSNlabelString,"Nothing is selected.");
    msg->popup();
  }else if (ret == WS_DIALOG_CANCEL){
    msg->setProperty(WSNlabelString,"The selection is canceled.");
    msg->popup();                     //(M)
  }
}
```

At first, include the header,WSCfileSelect.h, access to them. A global instance of WSCfileSelect class is already prepared, and it is possible to access by the global function WSGIappFileSelect() at (C). Set the property of it at (D),(E), and indicate it by the popup() method at (F), and then the popup() method returns that selection is done.

To see the result the file selection dialog,try to indicates the result by the message dialog. At (G),(H),(I),(J),get the global instance of the message dialog and set its property up. At (K),indicate the selected file name. At (L),indicate [Nothing is selected]. At (M),indicate [The selection is canceled ]

## 2.10 The scrolled form

### 2.10.1 How to use the virtual scrolling

The large scrolling area uses huge window resource. In such case, it requires to use the virtual scrolling which function uses no window resource.

The virtual scrolling has the following function.

- it requires no window resource for any scrolling size.

The virtual scrolling has the following week points.

- Drawing performance is worse than normal scrolling mode.
- The instances which have a window resource can not be placed on the virtual scrolling mode. The does not move by scrolling the area.

It is possible to use the instances which have no window resource and which class name is WSCvxxxx on the virtual scrolling.

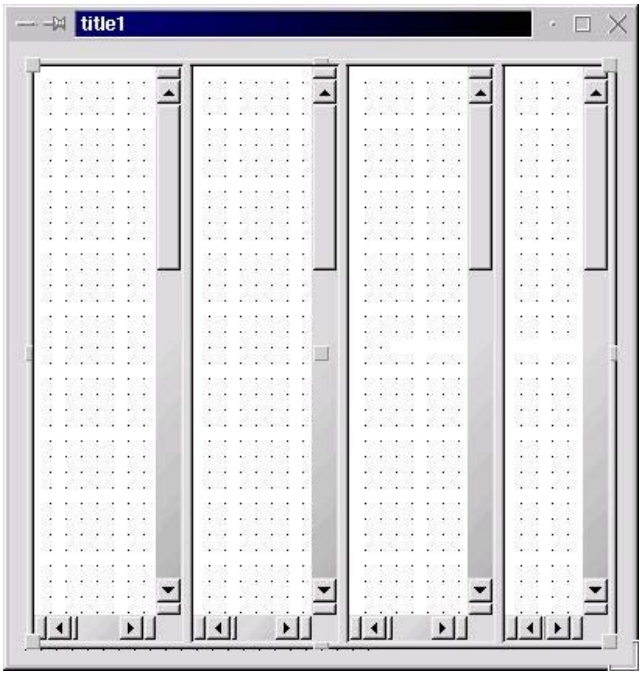
## 2.11 The separated form

The separated form has some area separated by some separators which can be move by the mouse pointer.

## 2.12 How to set the width of the separated area

At first, decide a direction to divide horizontal and vertical, set it to the property WSNorientation. Next, set the position the separators to the property WSNbarValue.

For example,if the direction is vertical,and 3 separators are available,in other words,4 areas are available, to set the position of the separators 100,200,300 dots from left side, specify the property WSNbarValue 100,200,300.




[The separated form with 3 separators which position is 100,200,300 which contains the scrolled form on each area]

## 2.13 The drawing area

### 2.13.1 How to draw pictures on the drawing area

It it possible to draw pictures freely by the drawing area. It has the methods to draw various pictures which can be used on the event procedure with exposure event WSEV_EXPOSE.

The following program shows a basic method to draw pictures by the drawing area.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdrawingArea.h>
```

```
#include <WSCvslider.h>

void drawep(WSCbase* object){
  //drawing_a is same as newvdra_000...
  //You can get it extern WSCvdrawingArea* newvdra000; also.
  WSCvdrawingArea* drawing_a =
         (WSCvdrawingArea*)object->cast("WSCvdrawingArea"); //(A)
  if (drawing_a == NULL){ //(B)
    return;
  }

  drawing_a->setForeColor("\#ff0000"); //(C)
  drawing_a->drawLine(0,0,100,100);  //(D)

}
static WSCfunctionRegister  op("drawep",(void*)drawep);
```

At first access to the method of the drawing area, include the header WSCvdrawingArea.h of the WSCvdrawingArea class and get the native class pointer of the WSCvdrawingArea class at (A). It is impossible to access the native method of WSCvdrawingArea class with the pointer of WSCbase class. If the pointer drawing_a is NULL at (B), the instance is not WSCvdrawingArea, so exit the event procedure. Next, it is the sample to set the color to the drawing area which is used to the other methods for drawing pictures (C). At (D),draws the line from (0,0) to (100,100).

The drawing area class has the following methods.

- The rectangle and the filled rectangle
- The circle,filled circle,arc,chord,oval.
- The polygon,filled polygon.
- The string.
- The image of JPG,BMP.

### 2.13.2 How to draw images(JPG,BMP) on the drawing area

It is possible to draw images of JPG,BMP by the method: drawImage(), drawStretchedImage().

The method: drawImage() draws the image as is, and the method: drawStretchedImage() draws the image as specified size.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdrawingArea.h>
```

```
#include <WSCvslider.h>

void drawep(WSCbase* object){
  //drawing_a is same as newvdra_000...
  //You can get it extern WSCvdrawingArea* newvdra000; also.
  WSCvdrawingArea* drawing_a =
         (WSCvdrawingArea*)object->cast("WSCvdrawingArea");
  if (drawing_a == NULL){
    return;
  }
  WSCushort w = drawing_a->getProperty(WSNwidth);
  WSCushort h = drawing_a->getProperty(WSNheight);
  drawing_a->drawStretchedImage(0,0,w,h,"001.jpg");  //(A)

}
static WSCfunctionRegister  op("drawep",(void*)drawep);
```

At (A), draws the image by size as same as the drawing area.

## 2.14 The indexed form

The indexed form switches the own area by its index tabs. At first, it requires to set the property: WSNmenuItems in order to define the index tabs. For example,if there are [tab1],[tab2],[tab3], set value as follows.

```
the property: WSNmenuItems
  tab1,tab2,tab3
```

Next,select one of the tabs and put instances on the selected area. It is possible to know which tab selected to see the property:WSNvalue. The above-mentioned example, it becomes the tab1:0, tab2:1, tab3:2.

## 2.15 The balloon help

### 2.15.1 How to indicate the balloon help

Drop an instance of the WSCvballoonHelp class on the section [NonGUI] of the object box dialog on some window or some form, and specify the instance name to the property WSNclient, which instance indicates a balloon help. Specify the string to indicate to the property WSNlabelString of the balloon help instance.

## 2.16 The timer

### 2.16.1 How to use the timer

Drop an instance of the WSCvtimer class on the section [NonGUI] of the object box dialog on some window or some form, and set the interval of firing by milli second. It will fires the event WSEV_ACTIVATE after the interval. So set the event procedure with WSEV_ACTIVATE to the timer.

There are two kind of the timers. One fires only once, another continuously fires every interval. If the property:WSNcont is True, it will continuously fires. It is possible to start or stop the timer by the property: WSNrunning. If the property: WSNcont is False,after firing,the timer will stop, and the property: WSNrunning will become False.

## 2.17 The wizard dialog

The wizard dialog is used for making the interactive dialog. It has an indexed form internal which tabs are disabled, and switch the scene by pushing the buttons [¡Back] or [Next¿] in order.

At first specify the number of the scene to the property: WSNmenuItems.

```
The property: WSNmenuItems
   the number of the scene
```

For example, set 5 to it,if the dialog has 5 scenes. Next about settings of the buttons, if you want the title of them are [¡Back],[Next¿] on usual scene and are [¡Back],[Finish] on last scene, set the following value to the property: WSNlabelString.

```
The property: WSNlabelString
    <Back,Next>,Finish
```

It is possible to see the property: WSNvalue which scene is indicated now. The first scene is 0,the next one is 1,2... And it is possible to specify the number to indicate a scene which you want to indicate. On editing the dialog, in order to indicate the scene on which you put instances, you must set the number of it to this property:WSNvalue.

```
The property: WSNvalue
  The number of the scene
  (Notice) This property must be specified the number of the scene
           when you want to edit the scene on the application builder.
```

## 2.18 The controlling of the position of the instances by the offset

### 2.18.1 The offset of X,Y coordinate

It is possible to control the position of the instances of WSCvXXX class which has no window resource by the method: setXOffsetPtr and setYOffsetPtr.

For example, the following event procedure with initializing trigger shows setting the offset.

```
extern short xoffset; //A
extern short yoffset; //A
void initep(WSCbase* object){
  object->setXOffsetPt(&xoffset); //B
  object->setYOffsetPt(&yoffset); //B
}
```

At first,define a global short variable somewhere and do extern to access it at (A). set it as offset to the instance at B. Then the instance will be indicated at the position of the coordinate which is added the offset variable.

It is possible to set same variable to many instances and to control their position by it at once.

### 2.18.2 The scaling offset of the size of the instance

It is possible to control the size of the instances of WSCvXXX class by the method: setScaleOffsetPtr.

For example, the following event procedure with initializing trigger shows setting the scaling offset.

```
extern double scaleoffset; //A
void initep(WSCbase* object){
  object->setScaleOffsetPt(&scaleoffset); //B
}
```

At first,define a global double variable somewhere and do extern to access it at (A). set it as scaling offset to the instance at B. Then the instance will be indicated at the size which is multiplied by the scaling offset variable.

It is possible to set same variable to many instances and to control their size by it at once.

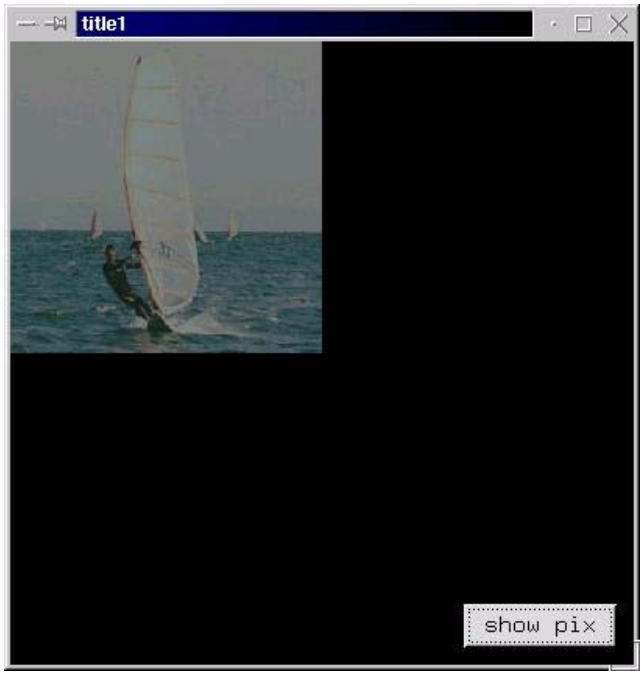
## 2.19 The memory device class

### 2.19.1 How to create the memory device class

It is possible to operate the data of the image directly by the memory device class. The memory device has the following facilities.

- Drawing some pictures on the device.
- Drawing some images(jpg,bmp) on the device.
- Direct referencing and direct manipulation of the image data.
- Transferring of the image data to the window.

By the sample: ws/sampes/share/memdev/newproject.prj, See the usage of the memory device class. This sample read the image ”001.jpg” and indicates it gradually.


title1
show pix


title1
show pix


[The sample which indicates the image gradually.]

This sample does the following.

- Creates two the memory devices(mdev,mdev2).
- Draws the image "001.jpg" on mdev.
- (1)Transfers the data changed brightness up from mdev from mdev2
- (2)Transfers the data from mdev2 to the window.
- Loops (1),(2).

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSDappDev.h>
#include <WSCcolorSet.h>
#include <WSCimageSet.h>
#include <WSCmainWindow.h>
extern WSCmainWindow* newwin000;

#include <WSDmwindowDev.h>
WSDmwindowDev* mdev = NULL;
WSDmwindowDev* mdev2 = NULL;

void btnep(WSCbase* object){
```

```
  WSDdev* dev = newwin000->getdev(); //A

  if (mdev == NULL){ //B
    mdev = WSDmwindowDev::getNewInstance();
    mdev2 = WSDmwindowDev::getNewInstance();
  }

  mdev->createPixmap(200,200); //C
  mdev->beginDraw(0,0,200,200);  //D
  WSDimage* image = WSGIappImageSet()->getImage("001.jpg"); //E
  mdev->drawStretchedImage(0,0,200,200,image); //F
  mdev->endDraw(); //G

  mdev2->createPixmap(200,200);  //H

  mdev->initBuffer();           //I
  mdev2->initBuffer();          //J

  long i,x,y;
  for(i=0;i<100; i++){
    for(x=0; x<200; x++){
      for(y=0; y<200; y++){
        WSCuchar r,g,b;
        mdev->getBufferRGB(x,y,&r,&g,&b); //K
        r = (WSCushort){\sffamily{((double)(r*i)/100); //L
        g = (WSCushort){\sffamily{((double)(g*i)/100); //L
        b = (WSCushort){\sffamily{((double)(b*i)/100); //L
        mdev2->setBufferRGB(x,y,r,g,b);     //M
      }
    }
    mdev2->putBufferToPixmap();  //N
    mdev2->copyToWindow(dev,0,0,200,200,0,0); //P
  }
}
static WSCfunctionRegister  op("btnep",(void*)btnep);
```

It acquires the window device from the instance at (A) and creates the memory devices at the first click by the method: getNewInstance which creates an appropriate instance(B). It is impossible with new operator to create an instance of the memory device class, because this class depends the window system.

About indicating the image 001.jpg to mdev1, at first,initialize mdev1 by the method: createPixmap with the geometry (C). To begin draw pictures,call the method: beginDraw() of the device class(D). Acquire the image instance from the global image management class(E) and put the image instance to the memory device(F). If drawing pictures is over,call the method: endDraw().

Initialize mdev2 too at (H). and initialize the memory buffer for direct operation (I)(J),this time it transfers the internal image data on the frame buffer to the memory buffer. At(K), get the RGB value from mdev1. At(L), increase the brightness of the RGB value and set it to mdev2 (M). It transfers the memory

data to the frame buffer(N). and indicates it by transferring to window(P).

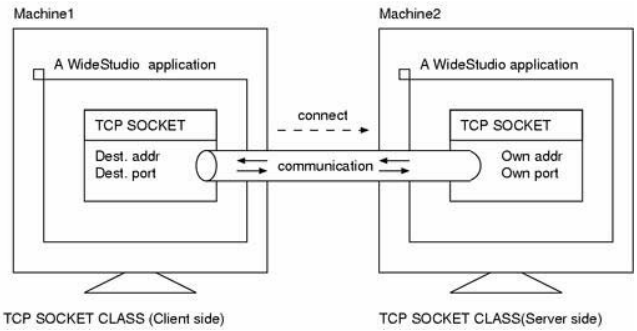
## 2.20 Network communication using TCP/IP

### 2.20.1 How to use network communication using TCP sockets

TCP network communication is used in client-server oriented communications. Server side socket, WSCvssocket class can accept from client side socket, WSCvcsocket.

Usually, in handling TCP sockets by C/C++ language, connection is established after accept, listen or connect procedures but in WideStudio, the processes related to establishing TCP socket connection are automatically done in an object library to conceal these processes and users do not need to write these processes.

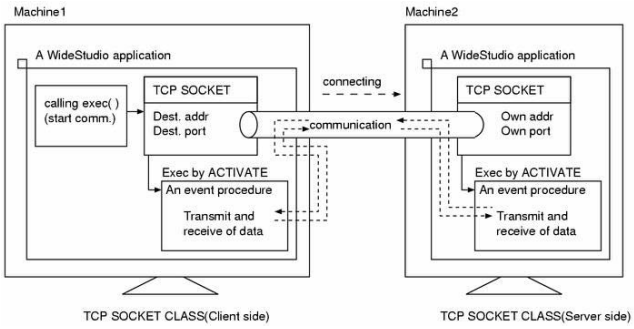
The TCP socket libraries have a property regarding IP address or PORT number, in which you can use just setting these values to transmit data using TCP socket libraries. TCP socket libraries contains connecting side(client) and connected side(server)




Client side and server side is different on operation mainly in connecting. Comparing a client side connecting at a specific IP address and port number existing over the network, a server side wait for being connected. Thus, in using TCP connection, WSCvcsocket (Client side) should always connect to WSCvssocket (Server side) which is waiting for connection.

For the client side property settings, the referral server TCP/IP address is set in WSNip and the port in WSNport. For the server side property settings, the awaiting socket port is set in WSNport and turn "ON" WSNrunning. Though usually WSNip is not set, it should be set when the awaiting IP address have to be specified.

By invoking WSCvsocket::exec method in the client side, connection is established to the server side WSCvssocket. Once the connection is established, an ACTIVATE event arises on both client and server side to communicate in the event procedure.




Here is a sample of the event procedure starting in the ACTIVATE followed by success of connection which sends/receives client-side data.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCvcsocket.h>

void com_ep(WSCbase* object){
  //do something...
  WSCvcsocket* sock = (WSCvcsocket*)object->cast("WSCvcsocket");
  char buffer[128];
  sprintf(buffer,"test!!! %d",cnt);
  cnt++;

  //send data;
  long send_len = sock->write{\sffamily{((WSCuchar*)buffer,128);
  if (send_len == 128){
    //success! do something..
  }else{
    //error!
    return;
  }

  //receive data;
  buffer[0] = 0;
  long recv_len = sock->read{\sffamily{((WSCuchar*)buffer,128);
  if (recv_len == 128){
    //success! do something..
  }else{
    //error!
    return;
  }
}
static WSCfunctionRegister  op("com_ep",(void*)com_ep);
```

Next sample is the procedure for transmitting server-side data starting by

ACTIVATE in establishing a connection.

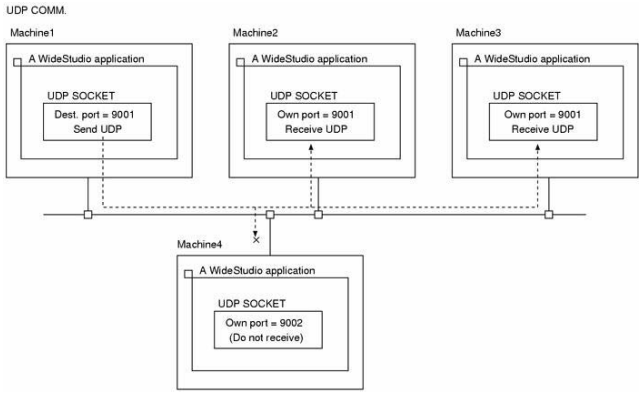
```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-----------------------------------------------------------
//Function for the event procedure
//-----------------------------------------------------------
#include <WSCvssocket.h>

void com_ep(WSCbase* object){
  //do something...
  WSCvssocket* obj = (WSCvssocket*)object->cast("WSCvssocket");
  char buffer[128];

  //receive data:
  //Store data from a client into buffer
  obj->read{\sffamily{((WSCuchar*)buffer,128);

  //send data:
  //Store data for a client into buffer to send it
  strcpy(buffer,"send data...");
  obj->write{\sffamily{((WSCuchar*)buffer,128);
}
static WSCfunctionRegister  op("com_ep",(void*)com_ep);
```

Next is an client-side event procedure which transmits data after establishing connection.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-----------------------------------------------------------
//Function for the event procedure
//-----------------------------------------------------------
#include <WSCvcsocket.h>
extern WSCvcsocket* newvcso_000;

void btnop(WSCbase* object){
  //Initiate connection and exchange data after connection
  long ret = newvcso_000->exec();
  if (ret != WS_NO_ERR){ //connection failed
    return;
  }
}
static WSCfunctionRegister  op("btnop",(void*)btnop);
```

### 2.20.2 How to use a broadcast network communication using UDP socket

By using UDP, data can be sent to unspecified number of recipients (broadcast address: usu., xxx.xxx.xxx.255) The data can be received by processes who wait in the port specified in sending.




For the setting in sending, referral socket port should be specified in WSNport. Also broadcast address, usually this is 255.255.255.255 is set in WSNip. In the system which is not allowed 255.255.255.255, the referral network address but with 255 in its last digit can be specified. For example, when you want to send to unspecified number of machines on the network:10.20.30.0, 10.20.30.255 can be specified.

For the recipient's property settings, the awaiting socket port is set in WSNport and turn WSNrunning "ON". As for the sender side, since connection is not being established, it becomes simple comparing TCP. It is as simple as sending data calling WSCvudpsocket::write.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//------------------------------------------------------------
//Function for the event procedure
//------------------------------------------------------------
#include <WSCvudpsocket.h>
extern WSCvudpsocket* newvudp_000;

void btnop(WSCbase* object){
  static long cnt = 0;
  WSCuchar buffer[64];
  //send data in buffer
  strcpy(buffer,"send data..");
  long ret = newvudp_000->write(buffer,64);
  if (ret < 64){
    //failed.
  }else{
    //success
  }
```

```
}
static WSCfunctionRegister  op("btnop",(void*)btnop);
```

As for the recipient side, it receives in the event procedure which starts by ACTIVATE as the same as TCP's server side.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCvudpsocket.h>
extern WSCvudpsocket* newvudp_000;

void recvop(WSCbase* object){
  WSCuchar buffer[64];
  //Receiving data
  newvudp_000->read(buffer,64);
}
static WSCfunctionRegister  op("recvop",(void*)recvop);
```

## 2.21 Database access using the database class

### 2.21.1 Database access through ODBC

Using WSCvdb class enables to access a database through ODBC. In order to access ODBC, set WS_DB_ODBC in WSNtype property and specify the DSN, the user name and the password.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  long ret = newvdb__000->open("dn","user","passwd");
  if (ret == WS_NO_ERR){
    //Connecting
  }else{
    //Connection failed with getting an error message.
    char buffer[1024];
    newvdb__000->getErrorMsg(buffer,1024);
  }
}
```

In order to access ODBC, DSN should set into WSNhostname, username in WSNusername, password in WSNpassword and call WSCvdb::open without arguments.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  long ret = newvdb__000->open();
  if (ret == WS_NO_ERR){
    //Connecting.
  }else{
    //Connection failure with getting an error message.
    char buffer[1024];
    newvdb__000->getErrorMsg(buffer,1024);
  }
}
```

### 2.21.2 Database access through PostgreSQL interface

By using WSCvdb class, you can access a PostgreSQL database directly through the PostgreSQL interface.

When accessing through the PostgreSQL interface, WS_DB_POSTGRES should be set in WSNtype and specify hostname, user name, password, database name, and port number into WSCvdb::open to call.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  long ret = newvdb__000->open("dn","user","passwd","dbname","5432");
  if (ret == WS_NO_ERR){
    //Connecting.
  }else{
    //Connection failure with getting an error message.
    char buffer[1024];
    newvdb__000->getErrorMsg(buffer,1024);
  }
}
```

In order to access PostgreSQL, the hostname that have the database should be set into WSNhostname, and user name in WSNusername, password in WSNpassword, database name in WSNdbname and port number in WSNport to execute WSCvdb::open without arguments.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  long ret = newvdb__000->open();
  if (ret == WS_NO_ERR){
    //Connecting.
  }else{
    //Connection failure with getting an error message.
    char buffer[1024];
    newvdb__000->getErrorMsg(buffer,1024);
  }
}
```

### 2.21.3 Creating the table

When the access to the database by WSCvdb::open is succeeded, you can issue SQL syntax to operate the database.

Next example shows how to create a table(shinamono) on the database

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  char buf1[512];
  strcpy(buf1,
         "create table shinamono(code int, hinmei char(20), nedan float)");
  newvdb__000->sqlExecute(buf1);

  if (ret == WS_NO_ERR){
    //Success
  }else{
    //Connection failure with getting an error message
```

```
    char buffer[1024];
    newvdb__000->getErrorMsg(buffer,1024);
  }
}
```

### 2.21.4 Store data in the table

You can store data into the table by issuing SQL syntax when connection to the database is succeeded by WSCvdb::open and there exists an operable table.

Next example shows how to store data in the table named shinamono on the database.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-----------------------------------------------------------
//Function for the event procedure
//-----------------------------------------------------------
#include <WSCvdb.h>
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  newvdb__000->beginTran();
  strcpy(buf1, "insert into shinamono values(1, 'Orange', 100)");
  newvdb__000->sqlExecute(buf1);
  strcpy(buf1, "insert into shinamono values(2, 'Apple', 200)");
  newvdb__000->sqlExecute(buf1);
  strcpy(buf1, "insert into shinamono values(3, 'Banana', 300)");
  newvdb__000->sqlExecute(buf1);
  strcpy(buf1, "insert into shinamono values(4, 'Melon', 0)");
  newvdb__000->sqlExecute(buf1);

  newvdb__000->commitTran();

}
```

### 2.21.5 Referring data on the table

You can store data into the table by issuing SQL syntax when connection to the database is succeeded by WSCvdb::open and there exists an operable table.

Next example shows how to refer to/update the data on the table named shinamono on the database.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-----------------------------------------------------------
//Function for the event procedure
//-----------------------------------------------------------
#include <WSCvdb.h>
```

```
extern WSCvdb* newvdb__000;

void db_ep(WSCbase* object){
  newvdb__000->beginTran();
  WSCdbRecord rs(newvdb__000);
  if(rs.open("select * from shinamono order by code") == WS_NO_ERR) {
    while (!rs.isEOF())}} {
      rs.getColValue("code", &var);
      int code = (int)var;
      cout << "code:" << (int)var << " ";
      rs.getColValue("hinmei", &var);
      cout << "hinmei:" << (char*)var << " ";
      rs.getColValue("nedan", &var);
      char buf[80];
      double nedan = (float)var + 10;

      sprintf(buf, "%f", (float)var);
      cout << "nedan:" << buf << "\n";

      if(nedan != 0) {
        sprintf(buf1, "update shinamono set nedan = %f where code = %d",
                nedan, code);
      } else {
        sprintf(buf1, "delete from shinamono where code = %d", code);
      }
      newvdb__000->sqlExecute(buf1);
      rs.moveNext();
    }
  }
  rs.close();
  newvdb__000->commitTran();
}
```

# Chapter 3

# User defined classes

## 3.1 How to access to the member instances

### 3.1.1 How to access to the member instances in the class event procedures

To access to the member instance, it needs that the instance is defined as "member" of the user defined class. See [Class application window: chapter[How to make a instance be member]]

The following shows a sample of a user defined class: sample.

The variable: sample* base is the pointer of the sample class. Then you can access to the member instance: base-¿newvlab000 which name is newvlab000 for example.

```
#include <sample.h>
void sample::event_procedure(WSCbase* object){
  sample* base = (sample*)object->getUserData(WS_BASE_CLASS);
  ...

  //Access the member instance...
  WSCvariant val = base->newvlab000->getProperty(WSNuserValue);
   ...
}
```

### 3.1.2 How to access to the member instances in the method

To access to the member instance in the class event procedure, it needs "base-¿", but in the method, it does no need "base-¿".

The following is the sample of a user defined class: sample. Then you can access to the member instance directly: newvlab000 which name is newvlab000 for example.

```
//a sample of the method.
void sample::method1(long data){
```

```
  newvlab000->setProperty(WSNuserValue,data);
  ...
}
```

# Chapter 4

# Store function

## 4.1 How to load the stored application window directly from the program

### 4.1.1 How to load the stored application window directly from the program

You can load the stored application window with following functions.

| The function for loading | Description |
|---|---|
| WSGFloadWindow(p1,p2,p3,p4) | Loading of the stored application window |
| char* p1 | Specify the store Attributes: "FILE" = from the file. |
| char* p2 | Specify the store data name: if p1 = "FILE",specify the file name |
| WSCbase** p3 | Specify the pointer for returned value: the loaded a window |
| WSCbase* p4 | Specify the parent instance for the partial application window |
| long (function returns) | WS_NO_ERR = success / the other = fail |

The following shows to load the stored application window directly from the program.

```
  #include "WSCconductor.h"
...

  WSCbase* window   = NULL;             //for returned value:
  char*    field    = "FILE";           //from FILE.
  char*    fname    = "newpic001.oof";  //FILE name.
  char*    path     = "/usr1/win/data"; //specify the directory.

  //Specify the directory.
  WSGIconductor()->setSerializePath(path);
```

```
//Loading of the stored application window.
long ret = WSGFloadWindow(field,fname,&window,NULL);
if (ret == WS_NO_ERR){
  //success
  window->setVisible(True); //display the window.
}
```

Specify the storing attributes for the "field". The store function supports "FILE" now. In the future,it will support a RDB, an interprocess communication,a networking field, and so on...

Specify the directory for the "path" to the conductor which controls the storing function. The default value is the current directory. Specify the file name for the "fname".and you can load the stored application window with WSGFloadWindow(). WSGFloadWindow() creates the instances when if it succeeds, so if you call it several times,it creates several instances.

Please check the directory,the file name,the permission of the specified file,if it fails.

### 4.1.2 How to load the stored partial application window directly from the program

The following shows to load the stored partial application window.

```
  #include "WSCconductor.h"
...

  WSCbase* window   = NULL;      //for returned value:
  WSCbase* parent   = newwin000; //the parent instance for
                                 //the partial application window.
  char*    field    = "FILE";    //from FILE.
  char*    fname    = "newpic001.oof";  //FILE name.
  char*    path     = "/usr1/win/data"; //specify the directory.


  //Specify the directory.
  WSGIconductor()->setSerializePath(path);

  //Loading of the stored partial application window.
  long ret = WSGFloadWindow(field,fname,&window,parent);
  if (ret == WS_NO_ERR){
    //success
    window->setVisible(True); //display the window.
  }
```

It is same as the loading of the stored application window fundamentally, but it requires the parent instance in this case, for the partial application window, because it is not a window and needs a parent window to display. You can

specify the parent window like, WSCwindow, WSCform,WSCscrForm which has the management function of child instances.

## 4.2 How to delete the loaded application window

### 4.2.1 How to delete the loaded application window

The following shows to delete the loaded application window directly from the program.

```
//delete the application window
WSGFdestroyWindow(window);
```

Specify the application window to delete. You can delete the partial application window or the normal instance also, but you can not delete the same instance twice because it causes memory fault. After deleting,you can not access the deleted instance.

### 4.2.2 How to delete the loaded partial application window

The following shows to delete the loaded partial application window directly from the program.

```
//delete the partial window
WSGFdestroyWindow(object);
```

It is same as the loading of the stored application window fundamentally, but you specify the partial application window in this case,

# Chapter 5

# Remote instance

## 5.1 Accessing a remote instance

### 5.1.1 Accessing a remote instance

You can get a remote instance by requesting to the object management instance which exists one per a load module.

| Object management class | Instance retrieving class |
|---|---|
| WSCbaseList | WSCbaseList* WSGIappObjectList() |

The way to retrieve the object to access is as follows:

```
#include "WSCbaseList.h" //Access WSGIappObjectList()
#include "WSCRbase.h"    //Use the virtual remote instance class
...
void event_procedure(WSCbase* object){

  //Get WSCRbase point by the object management
  char* obj_name   = "newvlab_001";     //Remote instance named newvlab_001
  WSCRbase* rinstance = WSGIappObjectList()->getRemoteInstance(obj_name);

  //Access to the remote instance by the virtual remote instance
  rinstance->setProperty(WSNlabelString,"HELLO WORLD");
```

rinstance is the instance to access the remote instance. It requires the object name as its argument. You can access remote instances through the virtual remote instance as well as you can access usual instances(objects)

### 5.1.2 Casting a remote instance

You can use the virtual remote instance acquired through the object management by casting to original class as well as usual objects. Casting is required when you need to call methods existing in the original class. Next example is to cast WSCRlist type virtual remote instance in order to call WSClist::addItem() from WSCRbase type virtual remote instance.

```
#include "WSCbaseList.h" //Access to WSGIappObjectList()
#include "WSCRlist.h"    //Use the virtual remote instance class
...
void event_procedure(WSCbase* object){

  //Getting a WSCRbase pointer by the object management
  char* obj_name   = "newlist_001";     //Remote instance named newlist_001
  WSCRbase* rinstance = WSGIappObjectList()->getRemoteInstance(obj_name);

  //Cast WSClist class remote instance to the virtual remote class
  //  WSCRlist that corresponds to the original WSClist class
  WSCRlist* rlist = (WSCRlist*)rinstance->cast("WSCRlist");
  if (rlist == NULL){
    //Not WSCRlist class
    return;
  }

  //Call a WSClist class method
  //n through WSCRlist virtual remote instance class
  rlist->addItem("item..");
```

# Chapter 6

# Samples and demonstrations

## 6.1 Sample:1 (Hello World)

Here, you create a project,an application window and event procedures. The following is a rudimentary sample which displays "Hello World" by pushing the button of the window,

The source code is ws/samples/C/hello/hello.prj. You can load the project and build by the application builder.

- Creating a project

  Select the [New project] of the [Project] menu, and input "hello" for the project name,and check the [Normal application].

- Creating a application window

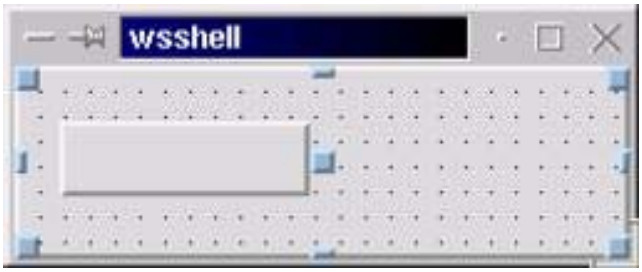
  Select the [New window] of the [File] menu, and Check the [Normal window],and check [Add to project], and input the window name "newwin000".

- Placing the instances

  Place the WSCvbtn instance on the created application window. Select the [ObjectBox] of the [View] menu, to display the object box dialog.

  The next, clicking the [Commands] tab on the object box dialog,and dragging and dropping the WSCvbtn class shown as BTN from the dialog to the application window, it creates the new instance of WSCvbtn.

  you can adjust the properties of the instance by the inspector.




[A view of the application window]

- Creating the event procedure

  At first, select the button instance by the inspector, and select [Mew procedures] of sub-menu:[Procedures] of [Edit] menu.

  Here, set "btn_proc" for the function name and WSEV_ACTIVATE trigger.

  To create a template file of the event procedure, push the button [Template].

- Editing the event procedure

  The next, you edit the template event procedure. you can execute the source code editor by selecting [Edit] of sub-menu:[Procedures] of [Edit] menu to edit the event procedure which is focused on the inspector. Here, the following procedure shows that it shows "Hello World" at the first clicking, it exits the application at the second clicking.

```
#include <WScom.h>
#include <WSCfunctionList.h>
#include <WSCbase.h>
//-------------------------------------------------------------
//Function for the event procedure
//-------------------------------------------------------------
void btn_proc(WSCbase* object){
  //do something...
  static long cnt = 0;
  if (cnt == 0){
    object->setProperty(WSNlabelString,"Hello World.");
    cnt++;
  }else{
    exit(0);
  }
}
static WSCfunctionRegister  op("btn_proc",(void*)btn_proc);
```

- Saving the project

  You can save the project by [Save project] of [Project] menu.

- Building the project

  You can build the project by [Build all] of [Build] menu. After building, execute the application!


[Executing the application]

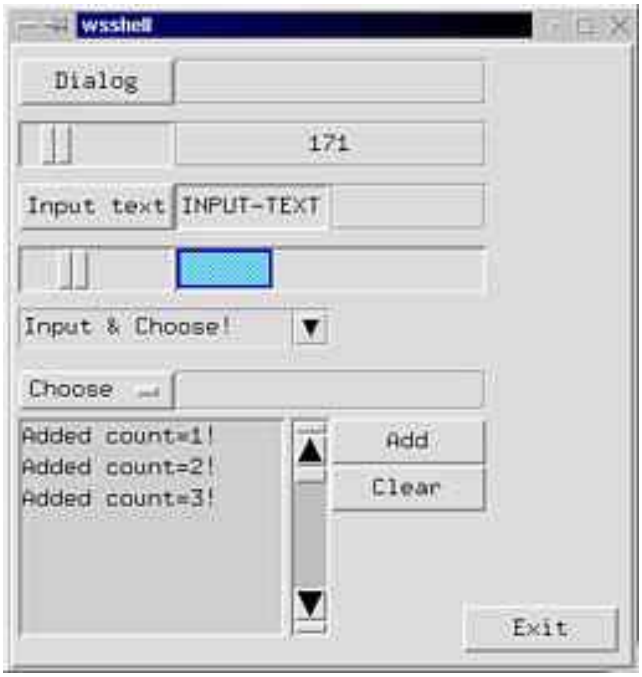
## 6.2 Sample:2 (Various kinds of classes)

Here,the following show the instances of the various kinds of WideStudio classes.

The source code is ws/samples/C/sample/sample.prj. Please load it and build it by the application builder.

this sample shows the following things.

- To display sample dialogs.
- To display value by the slider.
- To display the text input demonstrations.
- To display the combo-box demonstrations
- To select a value by option menu.
- To display a list of texts.




[A view of the application window]

- To display the dialogs

  The button which displays "Dialog" has a event procedure which trigger is WSEV_ACTIVATE and which function is btn1_ep(). This procedure is executed by clicking of the button,and pops up the message dialog: [newmess_002] and displays the return value from it on the label:[newvlab_001].

- To display the value of the slider

  The slider: [newvsli_000] has a event procedure which trigger is WSEV_VALUE_CH and which function is slider1_ep(). This procedure is executed by sliding of the slider,and displays the slider value on the label:[newvlab_002].

- To input strings

  The button which displays "Input text" has a event procedure which trigger is WSEV_ACTIVATE and which function is btn2_ep(). This procedure is executed by clicking of the button,and gets the string from the input field:[newvifi_004] and display it on the label:[newvlab_005].

- To display the value of the slider (2)

  The slider2: [newvsli_006] has a event procedure which trigger is WSEV_VALUE_CH and which function is slider2_ep(). This procedure is executed by sliding of the slider,and displays the slider value on the meter:[newvmet_008].

- A demonstration of the combo box

  It shows the demonstration of the combo box.

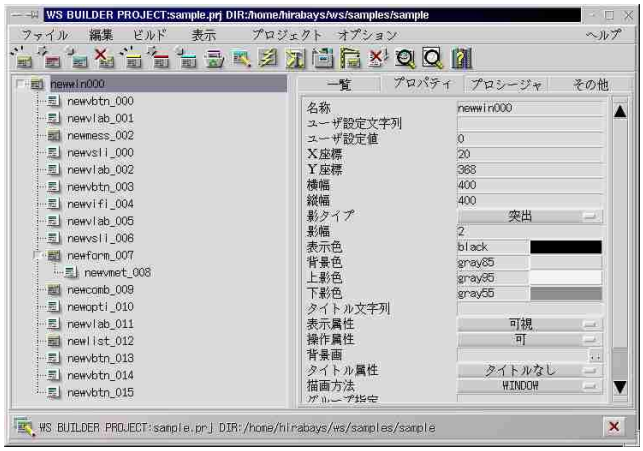
- A demonstration of the option menu

  The option menu which displays "Choose" has a event procedure which trigger is WSEV_VALUE_CH and which function is opt1_ep(). This procedure is executed by choosing of the menu,and displays the choose value on the label:[newvlab_011].

- A demonstration of the list

  The button which displays "Add" has a event procedure which trigger is WSEV_ACTIVATE and which function is btn3_ep(). This procedure is executed by clicking of the button,and adds a string to the list:[newlist_012].

  The button which displays "Clear" has a event procedure which trigger is WSEV_ACTIVATE and which function is btn4_ep(). This procedure clears the list:[newlist_012].




[A view of the application window]

## 6.3 Sample:3 (label)

The following is a demonstration of the event procedure about labels.

The source code is ws/samples/C/labelwork/labelwork.prj. Please load it and build it by the application builder.

this sample shows the following things.

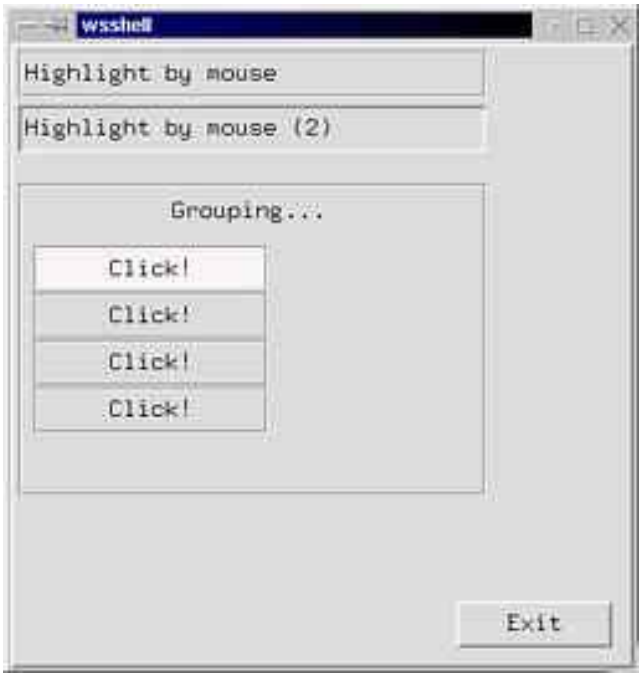
- To highlight the label by mouse

  implemented by normal event procedures.

- To highlight the label by mouse(2)

  implemented by an initialize procedure and sub-procedures.

- To group the labels by an event procedure




[A view of the application window]

- To highlight the label

  The button which displays "highlight by mouse" has two event procedures with WSEV_MOUSE_IN trigger and WSEV_MOUSE_OUT trigger.

  The WSEV_MOUSE_IN procedure stores the original back-color to WSNuserString and stores the highlight color to WSNbackColor.

  The WSEV_MOUSE_OUT procedure gets the original back-color from WSNuserString and stores it to WSNbackColor.

- To highlight the label (2)

  The button which displays "highlight by mouse(2)" has an event procedures with WSEV_INITIALIZE trigger which setups sub-procedures which trigger is WSN_MOUSE_IN and WSN_MOUSE_OUT.

  The initialize procedure like this simplifies because it not require that the instance has many procedures for one-function.

- To group the labels by an event procedure

  The button which displays "Click!" has a event procedures which trigger is WSEV_MOUSE_PRESS. This procedure make a group of the labels which

has it by storing selected label to the parent instance : form or window. Then the labels highlights cooperated.

## 6.4 Sample:4 (A calculator)

This is a demonstration of calculator using by the array of the buttons.

The source code is ws/samples/C/labelwork/wscalc.prj. Please load it and build it by the application builder.

this sample shows the following things.

- To demonstrate the calculation with the operator:+,-,/,*

  (Notice)The specification of the calculator is not strict.


[A view of the application window]

- The number button

  Input the number to the indicator.

- The operator button

  Stores the operator if the button is "+","-","/","*", Calculates by the stored information if the button is "=",

- The other

  The resize event procedure adjusts size/place of the buttons when the window is resized.