TYX CORPORATION

Productivity Enhancement Systems

Reference	TYX_0051_9
Revision	1.1b
Document	PawsIOHowTo2.doc
Date	October 9, 2003

Binary I/O exe resource without MFC tutorial

This document will help with making the Binary input-output interface without MFC.

Studio version used:
1.20.0

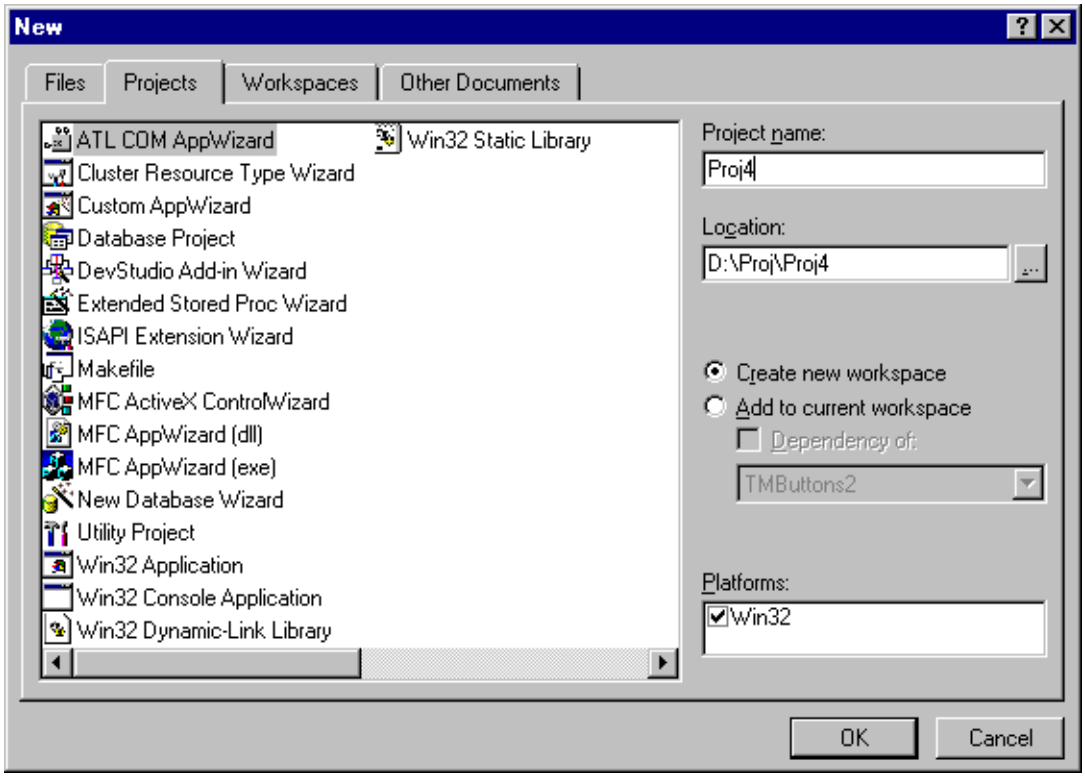
Requirements:
Studio 1.10.x or above. Backward and forward compatibility between the COM build with one version of the Studio library and other Studio version is not guarantied.

Introduction:
First we will address the issue of what to do with the exe that we wish to link to the Atlas with a Binary IO. Other documents will address the issue of using the support of Text IO and the usage of GUI within the COM environment. Then we will see the Atlas and what it takes with a 416 environment to make use of it.

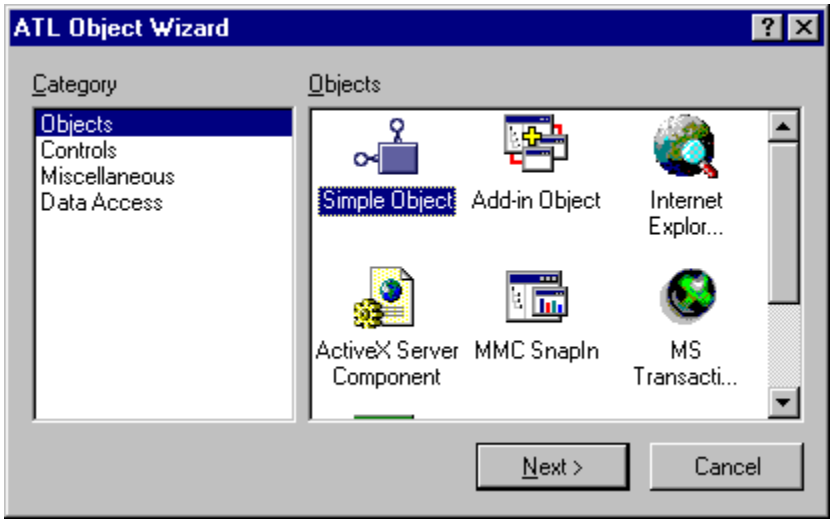
Dll versus Exe:

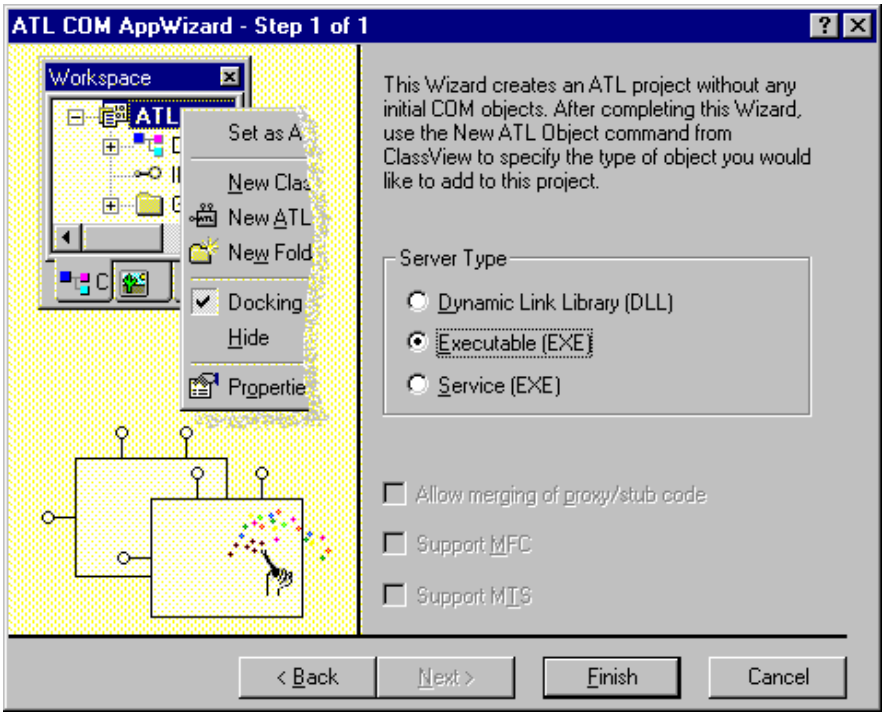
1. **Advantage of Dlls versus Exe:**
   - **The Dll uses fewer resources than the Exe.**
   - **The Dll can easily remain on top of the Wrts.**
   - **The accelerators are directly passed on to the Wrts without additional code. When the Exe has the focus, it will need some code in order to pass on the accelerator destined for the Wrts.**
   - **The message loop for painting… is taken care of by the Wrts. For the Exe, the code needs to be placed into the Exe which may be done by the wizard to some extent.**
   - **The Dll will be slightly faster than the Exe. This will however only make a difference for repeated transfer of a large amount of data.**
2. **Advantage of the Exe versus Dll:**
   - **The Exe is more isolated than the Dll and if it crashes, it will not affect the Wrts. This may be an issue if the Exe links to code that is not stable.**
   - **The Exe can be moved in front or behind the Wrts at will.**
   - **The Exe can be run remotely.**

1 1 When generating a COM .exe with MSVC 6++



- From **File/New**…, select an **ATL COM AppWizard** and select a project name as seen below:
- Click on **OK**

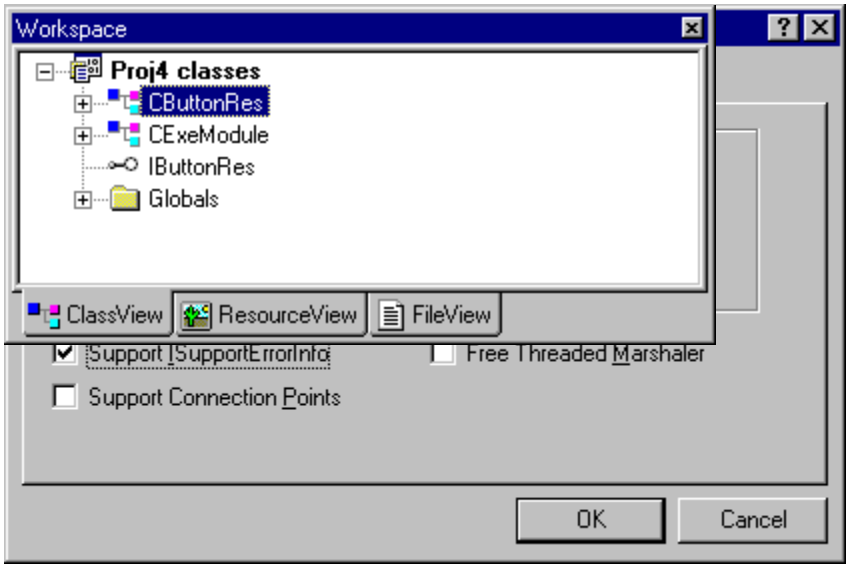


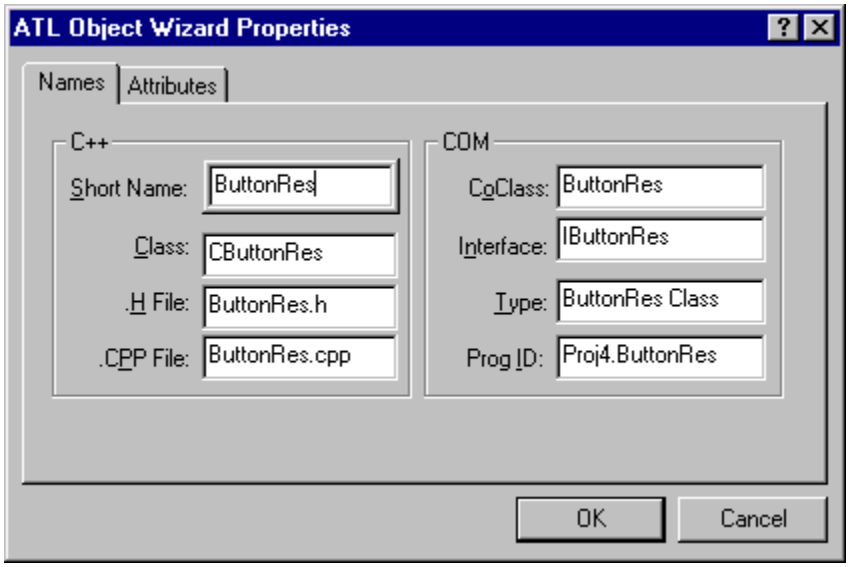


- Then select **Executable (EXE)** as seen below

- Click on **Finish** on the window above, and **OK** on the window that will appear after that.
- From the Studio, select **insert/New ATL Object…** Select **Simple Object** as seen below and click on **Next**.

- You will then see the following window. In the **Short name:** box, enter the name of the ATL object that you wish to create. The other boxes will fill in by themselves. In this case, we chose the name **ButtonRes**. Don't chose "**IOResource**" because it's already used by the system and it will prevent you from building the COM exe.
  Also, take note of the name in **Prog ID**: In this case **Proj4.ButtonRes** (exe name followed by the short name). This will be used as an entry in the Wrts options.

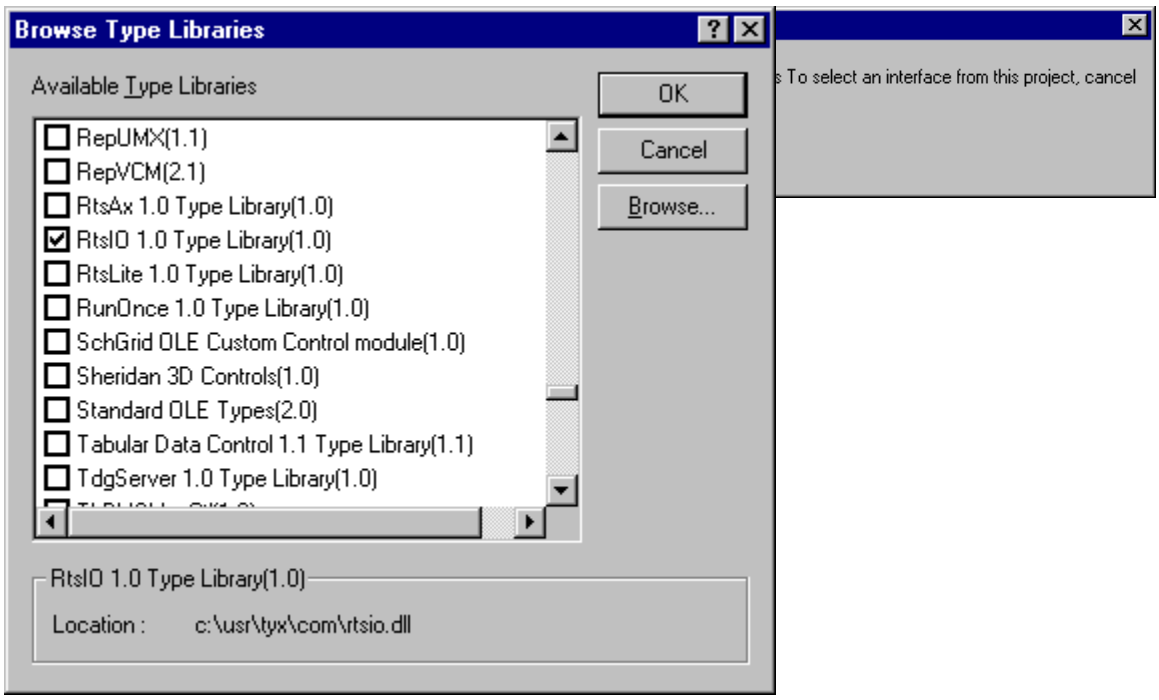




- In the list of attributes, as shown below, all defaults can be acceptable. You may want to add the option of **Support IsupportErrorInfo**.
  These options make more sense for those that are familiar with COM.

- Click on **OK**.
- Now we are back to the Studio.
- Now you need to link the project to an interface, which in this case relates to the Wrts capabilities. In the workspace, you should right-click on the Class that starts with **C<short name**>, where short name is from the **ATL Object Wizard Properties**. In our case **CButtonRes** as seen below.

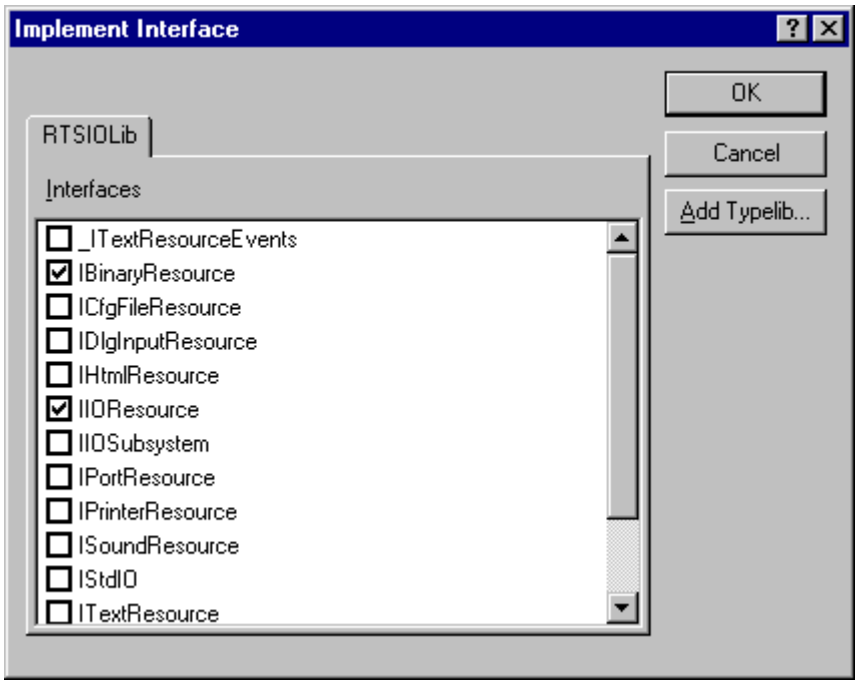
- After right clicking on **CbuttonRes**, Select **Implement interface…**



- • You will get the following message and then click on **OK**.

- • Select the **RtsIO** for Wrts input-output library and then click on **OK**. If you do not see RtsIO, it's because you are using a version of the TYX Stutio that is older than 1.10.x.

- • In the following window, you need to check **IIOResouce** and **IBinaryResource** (for text IO resources) and then click on **OK**.



- Now you will need to modify the source of what has been made available to you. In our case, double click on **CbuttonRes**, or **C<short name>** as shown below:

- This will give you the following text:

```
// ButtonRes.h : Declaration of the CButtonRes

#ifndef __BUTTONRES_H_
#define __BUTTONRES_H_

#include "resource.h"       // main symbols
#import "c:\usr\tyx\com\rtsio.dll" raw_interfaces_only, raw_native_types, no_namespace, named_guids

/////////////////////////////////////////////////////////////////////////////
// CButtonRes
class ATL_NO_VTABLE CButtonRes :
        public CComObjectRootEx<CComSingleThreadModel>,
        public CComCoClass<CButtonRes, &CLSID_ButtonRes>,
        public ISupportErrorInfo,
        public IDispatchImpl<IButtonRes, &IID_IButtonRes, &LIBID_PROJ4Lib>,
        public IBinaryResource,
        public IIOResource
{
public:
        CButtonRes()
        {
        }

DECLARE_REGISTRY_RESOURCEID(IDR_BUTTONRES)

DECLARE_PROTECT_FINAL_CONSTRUCT()

BEGIN_COM_MAP(CButtonRes)
        COM_INTERFACE_ENTRY(IButtonRes)
        COM_INTERFACE_ENTRY(IDispatch)
        COM_INTERFACE_ENTRY(ISupportErrorInfo)
        COM_INTERFACE_ENTRY(IBinaryResource)
        COM_INTERFACE_ENTRY(IIOResource)
```

```
END_COM_MAP()

// ISupportsErrorInfo
        STDMETHOD(InterfaceSupportsErrorInfo)(REFIID riid);

// IButtonRes
public:
// IBinaryResource
        STDMETHOD(Read)(LONG lType, VARIANT * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;

                return E_NOTIMPL;
        }
        STDMETHOD(Write)(LONG lType, VARIANT val)
        {
                return E_NOTIMPL;
        }
// IIOResource
        STDMETHOD(Open)(BSTR bstrName, LONG lMode)
        {
                return E_NOTIMPL;
        }
        STDMETHOD(Close)()
        {
                return E_NOTIMPL;
        }
        STDMETHOD(Flush)()
        {
                return E_NOTIMPL;
        }
        STDMETHOD(Abort)()
        {
                return E_NOTIMPL;
        }
        STDMETHOD(Seek)(LONG lOffset, SHORT sOrigin)
        {
                return E_NOTIMPL;
        }
        STDMETHOD(get_name)(BSTR * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;

                return E_NOTIMPL;
        }
        STDMETHOD(get_Mode)(LONG * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;

                return E_NOTIMPL;
        }
        STDMETHOD(get_Size)(LONG * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;

                return E_NOTIMPL;
        }
        STDMETHOD(get_Position)(LONG * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;

                return E_NOTIMPL;
        }
        STDMETHOD(get_Eof)(VARIANT_BOOL * pVal)
        {
                if (pVal == NULL)
                        return E_POINTER;
```

```
            return E_NOTIMPL;
        }
        STDMETHOD(get_State)(LONG * pVal)
        {
            if (pVal == NULL)
                return E_POINTER;

            return E_NOTIMPL;
        }
};

#endif //__BUTTONRES_H_
```

- What you will want to do first, is to change the exit code for all of those functions, from **E_NOTIMPL** which is the return for "Error, not implemented", to **S_OK** for an ok return value.
  - For example: For the **Open** and **Close** functions, you will get:

```
STDMETHOD(Open)(BSTR bstrName, LONG lMode)
{
    return S_OK;  // Changed
}
STDMETHOD(Close)()
{
    return S_OK;  // Changed
}
```

  Those particular functions are called by the Wrts upon loading and unloading the program with the Wrts. This is where you would put the code that you wish to see executed when the Wrts loads and unloads an Atlas program.

- You will also want to delete the following line on line **17**:

```
public IIOResource
```

  in order to avoid compilation problems. Make sure that you also delete the comma at the end of line **16**.

- You will also want to return an end of file true statement in the get_Eof method:

```
STDMETHOD(get_Eof)(VARIANT_BOOL * pVal)
{
    if (pVal == NULL)
        return E_POINTER;
    *pVal = VARIANT_TRUE;               // Added
    return S_OK;                        // Changed
}
```

- The code below is where the binary input and output are being handled. Some code has been added in order to achieve the goal that we have set ourselves in this example, which is to pass on and retrieve an integer. Typically, you will implement your own code as a function of your own requirements:

```
// IBinaryResource
    STDMETHOD(Read)(LONG lType, VARIANT * pVal)
    {
        if (pVal == NULL)
            return E_POINTER;

        pVal->vt = VT_I4;      // Changed
        pVal->lVal = 17;       // Changed

        return S_OK;           // Changed
    }
    STDMETHOD(Write)(LONG lType, VARIANT val)
```

```
    {
            int lParam = val.lVal;          // Added
            Beep(lParam*1000, 1000);        // Added

            return S_OK;                    // Changed
    }
```

For **Read**, we will first want to initialize the variant to an integer type. This corresponds to the first changed line. The second line sets the variant to the value **17**.
For **Write**, the first line change corresponds to retrieving the integer value from the **val** variant. The **Beep** has been added to show that it actually executes the Write method when the Atlas inputs.

The Output on the other hand will display the content of the output string from the Atlas.

- You are now ready to build the COM exe with the option **Build/Build**, by using the icon bar, or by pressing **F7**.
- You may register your exe manually or do it from within your project in the **Custom Build** setting.
  To register is manually, you need to execute **Proj4 /RegServer** from a command line from the **Proj4.exe** location.

- **Note for advanced users:** If you are not an advanced COM user, you may skip this note.
  If you want to make use of more than one IO resource, such as text and binary, you may have a compilation problem unless you correct some code.
  In the file **<Short Name>.h** from the **ATL Object Wizard Properties**, **ButtonRes.h** in our case, in the **COM_MAP** section, you may have an uncertainty about the mapping between the **IIOResource** and the resource that you want to use. In our case, you will have the code below:

```
BEGIN_COM_MAP(CButtonRes)
    COM_INTERFACE_ENTRY(IButtonRes)
    COM_INTERFACE_ENTRY(IDispatch)
    COM_INTERFACE_ENTRY(ISupportErrorInfo)
    COM_INTERFACE_ENTRY(IBinaryResource)
    COM_INTERFACE_ENTRY(IIOResource)
END_COM_MAP()
```

  If you had another resource such as text, you will have to tell **IIOResouce** which resource to use in order to satisfy the compiler. To do that, you will need to change the **COM_INTERFACE_ENTRY** for **IIOResource** to the line below.

```
BEGIN_COM_MAP(CButtonRes)
    COM_INTERFACE_ENTRY(IButtonRes)
    COM_INTERFACE_ENTRY(IDispatch)
    COM_INTERFACE_ENTRY(ISupportErrorInfo)
    COM_INTERFACE_ENTRY2(IIOResource, IBinaryResource)  // Necessary to point to the
                        // desired class since there are two of them (Text and Binary).
    COM_INTERFACE_ENTRY(ITextResource)
    COM_INTERFACE_ENTRY(IBinaryResource)
END_COM_MAP()
```

- That will ensure that your code will build properly, and you may then make use of both IO resource types.

2 2 What to do in the TYX Studio?

- At this point, you will need to have an Atlas program that makes use of that COM resource and to setup the Wrts in order to link that Atlas IO device to you COM exe.

2.1 2.1 Sample for Atlas 416:

Note: The version of the Atlas 416 has to be high enough to include the **INPUT** and **OUTPUT** commands. Earlier versions of 416 Atlas do not include those commands.

```
 001000 BEGIN, ATLAS PROGRAM 'BUTTONS'                          $
 001010 REQUIRE, 'TM_BUTTON', I-O DEVICE,
            CAPABILITY,
            FILE-SIZE 80 WORDS                                  $
C                                                               $
 001020 DECLARE, INTEGER, STORE, 'TM1'                          $
C 'TM1' value relets to the frequency of the beep, which occurs $
C everytime when the BINARY IO gets it's parameter sent         $
 001025 DECLARE, INTEGER, STORE, 'TMSTATUS'                     $
C                                                               $
E010000 DISPLAY, MESSAGE, THE START
------------
                                                                $
C                                                               $
C*****************************************************     $
C                                                               $
 010005 CALCULATE, 'TM1' = 2                                    $
 010010 DISPLAY, MESSAGE, *** OUTPUT TM1 = 2 ***
                                                                $
 010011 OUTPUT, USING 'TM_BUTTON', ('TM1')                      $
 010012 CALCULATE, 'TM1' = 4                                    $
 010013 DISPLAY, MESSAGE, *** OUTPUT TM1 = 4 ***
                                                                $
 010014 OUTPUT, USING 'TM_BUTTON', ('TM1')                      $
 010015 DISPLAY, MESSAGE,------------
                                                                $
C                                                               $
 010020 INPUT, USING 'TM_BUTTON', 'TMSTATUS'                    $
C                                                               $
 010022 DISPLAY, MESSAGE, *** INPUT ***
                                                                $
        DISPLAY, MESSAGE, RETURNED VALUE: ***$
        DISPLAY, RESULT, 'TMSTATUS'
                                                                $
        DISPLAY, MESSAGE,  ***
------------
THE END                                                         $
 010040 TERMINATE, ATLAS PROGRAM 'BUTTONS'                      $
```

This atlas will simply do two things:
It will output a message box to the Binary IO with the value ‘2’ and it will input an Integer that has been hard-coded in the COM exe as ‘17’.

You can note that for IEEE416 Atlas, you may use the same COM resource for input and output only with newer versions of 416 and only with a Binary IO.

You will need to compile this Atlas and have it ready to run.

2.2 2.2 Sample for Atlas 716.89/95:

```
 001000 BEGIN, ATLAS PROGRAM 'BUTTONS'                          $
 001010 DECLARE, VARIABLE, 'TXT_DATA' IS STRING(80) OF CHAR     $
     12 DECLARE, VARIABLE, 'OUT' IS FILE OF UNTYPED             $
C                                                               $
 001020 DECLARE, VARIABLE, 'TM1' IS INTEGER                     $
C 'TM1' value relets to the frequency of the beep, which occurs $
```

```
C everytime when the BINARY IO gets it's parameter sent         $
 001025 DECLARE, VARIABLE, 'TMSTATUS' IS INTEGER                $
C                                                               $
E010000 OUTPUT, C'THE START'                                    $
 OUTPUT, C'------------'                                        $
C                                                               $
C*******************************************************       $
C                                                               $
 010005 CALCULATE, 'TM1' = 2                                    $
 010006 ENABLE, I-O NEW C'TM_BUTTON', VIA 'OUT'                 $
 010010 OUTPUT,  C'*** OUTPUT TM1 = 2 ***'                      $
 010011 OUTPUT, TO 'OUT', 'TM1'                                 $
 010012 CALCULATE, 'TM1' = 4                                    $
 010013 OUTPUT, C'*** OUTPUT TM1 = 4 ***'                       $
 010014 OUTPUT, TO 'OUT', 'TM1'                                 $
 010015 OUTPUT, C'------------'                                 $
C                                                               $
 010020 INPUT, FROM 'OUT', INTO 'TMSTATUS'                      $
C                                                               $
 010022 OUTPUT, C'*** INPUT ***'                                $
        OUTPUT, C'RETURNED VALUE: ***', 'TMSTATUS', C'***'      $
        OUTPUT, C'------------'                                 $
 010030 OUTPUT, C'THE END'                                      $
 010040 TERMINATE, ATLAS PROGRAM 'BUTTONS'                      $
```

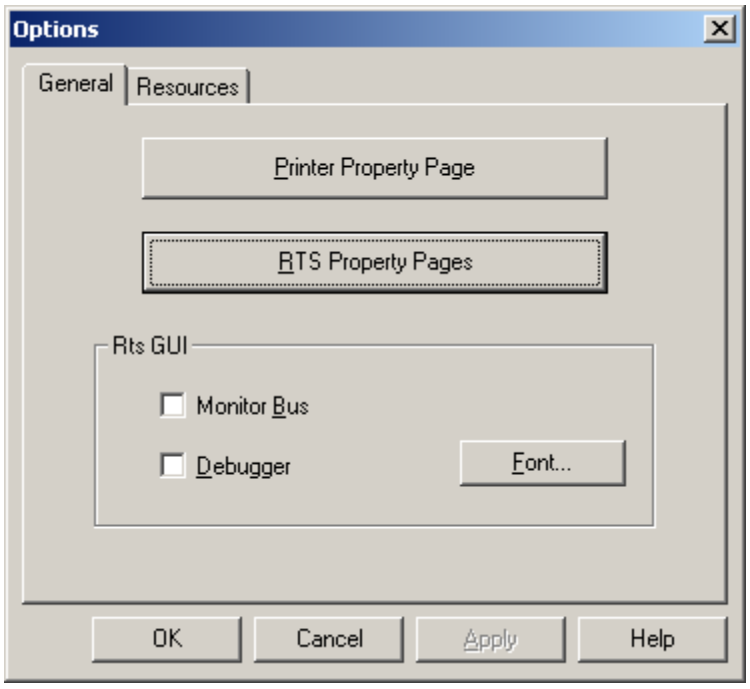
This atlas will simply do two things:
It will output a message box to the Binary IO with the value ‘2’ and it will input an Integer that has been hard-coded in the COM exe as ‘17’.

You can note that for IEEE716.89 Atlas, you may use the same COM resource for input and output.

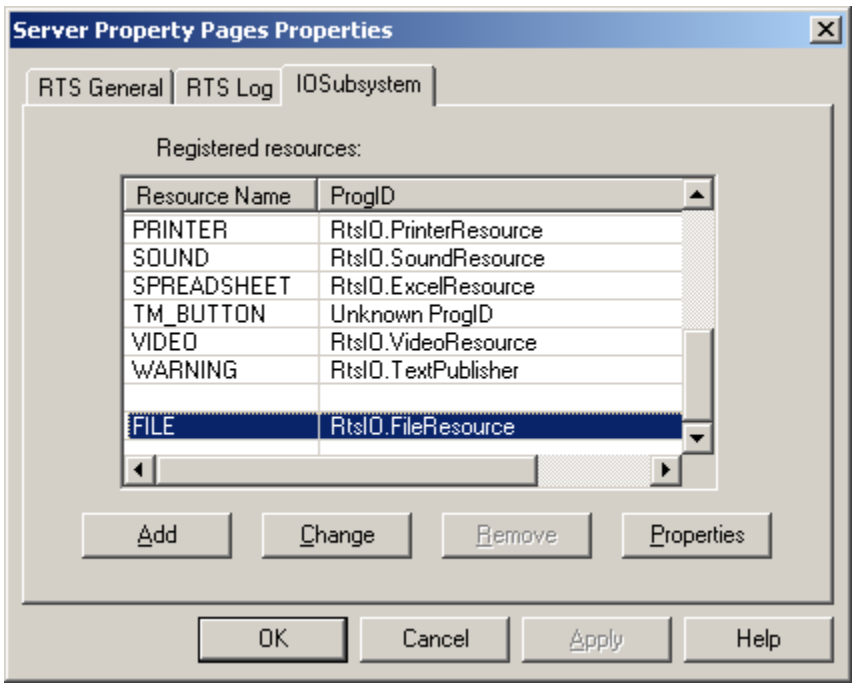
You will need to compile this Atlas and have it ready to run.

2.3 2.3 Wrts Settings

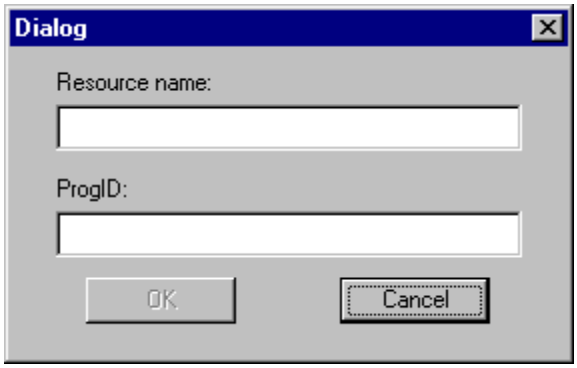
- Now that Atlas is ready to run, you should launch the Wrts.
- Go into **Control/Options…**



- Now Click on **RTS Property Pages** and select **IOSubsystem**



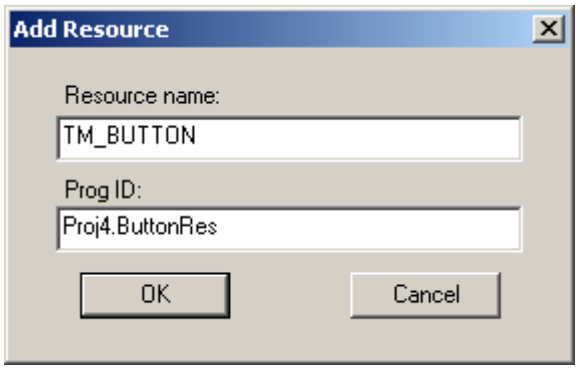
- You now need to create the link between your Atlas IO resource and the COM resource that you wish to link to. Go into the list of Resource Names. If **TM_BUTTON** is already there with an unknown **ProgID**, remove it by selecting it and



by pressing **Remove**.

- Press **Add** and you will see the following window:

- The **Resource name** is the one that you have defined in your Atlas. In out case **TM_BUTTON**.
- Your **ProgID** will be the one that you will have remembered from **Atlas Object Wizard Properties** in the previous task of generating the COM exe source.
- In this case, you will want to use **TMButtons2.ButtonResource**:



- Click on **OK** on this window and the one that will appear after that.
- Your Wrts is now ready to link your Atlas IO resource to your COM exe.

Note: The effect will take place the next time you will reopen the Wrts, so close the Wrts and reopen it.

You may now run the Atlas program and the COM exe will be invoked when necessary. The location of the COM exe does not matter because it has been registered in your system.

3 3 How to debug the Com exe?

- First, you put the breakpoints where you want them in your exe COM source code. You would now run the COM exe in debug mode from MSVC++ by going into **Build/Start debug/Go** or by pressing **F5**.
- Now you would go into the TYX studio and run the Wrts.

The run time system would execute until it used the IO Com exe that you have running in debug mode. The execution of the Wrts would stop at your breakpoints in the COM exe source.