Component Wizard

User Manual

version 1.55

CONTENTS

1. Introduction

Component Wizard is a tool dedicated to the edition of Embedded Components.
It provides a graphical interface for the composition of new components, and generates component files.

Benefits

Using Component Wizard, the user can create new components very quickly and easily, with the guarantee that there will be no errors in the generated files. The user only needs to determine Properties, Methods and Events and make the necessary implementation of methods and events. Component Wizard generates the declaration files such as header files in C or definition files in Modula, as well as the structure of the source code. Consequently, only the contents of methods and events remains to be written.
Component Wizard facilitates the reusability of existing Components, and helps edit the source code (quick location, editor, ...).

Quick Links

- Basic terms
- Available versions of Component Wizard
- 'How To...' guides
- User interface description
- Tutorial courses

2. Basic Terms

This chapter explains the basic terms used within Component Wizard and Processor Expert applications.

Component

A ***component*** is an object with defined function. A component can be accessed by a properties, methods and events.
Properties can be changed in design-time only. Properties define the

- component initialization state
- component settings and features supported in runtime
- component connection to the CPU (only for hardware components)

Using ***methods*** you can set the component state and read the component results.

If you select any ***event*** in the component you must specify the name of the procedure - event handler. This procedure will be called by a component driver when something important happens in the system (for example hardware interrupt or some error, etc.)

A ***driver*** of a component contains the implementation of the component's methods and calling of the component's events.

A *Software component* is the component with no direct access to hardware in the driver code. Access to hardware (initialization and control) can be done using inheritance of any hardware component.

A *Pure software component* is the component with no access to hardware at all (doesn't even inherit any hardware component).

Driver

A **driver** contains source codes of all methods and events of a component. Every component (except the CPU driver) has a driver associated with it. After creation of a new component, user has to write the code of all its new (not inherited) methods into the driver of the component. The code is written in special macro-language.

- For details on macroprocessor see chapter *5.11.2 Macroprocessor*.
- For further details on drivers see the chapter *5.11 Drivers Page*.
- To discover how to edit the code of methods and events in driver see the chapter *4.8 Editing drivers*.

Inheritance

Inheritance allows to use and/or redefine methods and events of another component. This simplifies and speeds-up a process of creation of the new embedded components and allows user to develop a platform independent components by inheriting the platform independent components included in Processor Expert. For details on inheritance see chapter *2.1 Inheritance*.

Template

A ***Template*** holds the state of component's properties, methods and events settings.

A template can additionally contain:

- default value of each property, method *(selected/unselected)* and event *(selected/unselected)*
- read-only feature: if user can change the value of the property, method, event

Every template contains association to a component that the template was created for (or from). This association allows to use a template as a "component representative". Like a component, the template can be added to user's project. The template acts like an ordinary component with the only exception - it is already initialized.

Note: in Components Wizard you cannot select hardware dependent value of the component (for example pin or serial channel). These templates can be edited in Processor Expert.

There are two types of templates:

- **Local templates** - These templates can be used only by local interfaces that are stored in the same directory as the template (the directory of a component which is using that interface)
- **Global Template** - These templates are visible for all interfaces. These templates are stored in the special directory **Processor Expert base directory\templts** . A change in this template has an influence to all interfaces that use it.

Interface

Inheritance is important for the components inheritance. See *2.1 Inheritance* for details. To inherit functionality of other component in a new component, an *interface* has to be specified. Interface is a list of methods and events that must be implemented by the ancestor (inherited) component. If a component implements any interface (so it is suitable for inheritance), it can be registered into this interface. If the component is registered in any interface it is offered to user in Processor Expert.

Note: If you specify any interface, be sure that all methods and events from the interface will be implemented by inherited component. You can call inherited methods from the driver and you must implement all inherited events in your driver.

Often, specific initial settings of the ancestor component instance are required so a template can be registered in interface instead of a component. *Registration* of components or templates into the interface can is done in Component Wizard during the interface creation/modification.

There are two types of interfaces:

- **Local interfaces** - These interfaces can be used only by components where these interfaces are stored (the interface is stored with a component in the same directory).
- **Global interfaces** - These interfaces are visible for all components. These interfaces are stored in directory **Processor Expert base directory\components** which is the base directory for all components. A change in this interface has an influence to all components which use this.

2.1. Inheritance

In order to create hardware-independent components, it is necessary to implement them for every processor you may use. Without the inheritance process, this would mean a lot of fastidious coding.
The basic hardware components provided within Processor Expert cover the entire functionality of processors and are hardware independent (In fact they are hardware dependent but you have drivers for all CPUs supported in your version of Processor Expert). By inheriting from these components, you don't need anymore to deal with the low-level part of your components. Writing the high-level part of the algorithm, using inherited hardware-independent methods and events of components, will keep the new component hardware independent.

Component Wizard allows to pre-configure the basic components you want to use (by creating templates), and select the methods and events to inherit (by creating interfaces).
Your own components, can also be used for further inheritance by another components, providing a high level of re-usability to your work.

For further details see chapter *4.5 Inheriting from a component*.

Comparison with object oriented languages:

In PE, the inheritance is implemented in quite different way than in most object oriented languages. Of course, a component (descendant) can inherit another component (ancestor) - but the background of the inheritance process is slightly different from what would an C++ or Object Pascal programmer expect. The main difference is that a descendant (newly created) component can replace his ancestor component with another one and this can be done any time after the new component was created. In standard object oriented languages, the ancestor object is declared in the definition of a new object, and from that moment it can not be changed.

How the ancestor component can be selected ?

When a component is inherited and it's interface is created or specified, there is still no binding between it (the ancestor) and the descendant component - the interface is only a list of methods and events. To create a binding, the component must be registered into the interface. Then, usually during the component setup in Component Inspector window, the Processor Expert will allow user to choose any component that supports (is registered for) the desired interface to be the ancestor component.

How are the Templates and Interfaces used in the Inheritance process ?

A component template represents a real component. This representation is used in the inheritance mechanism in the following way:
Because user usually wants the inherited component to be already initialized (in a project, he wants to set only some properties of the descendant), *the template for that component must be registered instead of the component itself in the interface*.

For easier understanding of inheritance and bindings between templates and interfaces see chapter *2.1.1 Inheritance scheme*.

Details for practical use of inheritance:

- **Interfaces**
  - Interface selection is done in Component Wizard (component design-time)
  - Interface specifies the methods and events needed by a new component, which is using this interface
- **Templates**

- Template selection is done in Processor Expert (component "run"-time, usage of the component)
- Template settings should be CPU independent, because Component Wizard cannot set CPU-dependent properties.
- Template is the group of initialization values of the component for selected interface
- There is a possibility to disable editing of value of any property, method or event for chosen interface. This can be done by setting the property, method or event to "Read Only" in the template.

Options of Methods and Events Inheritance

According to the MethodsScope/Evenscope feature in interface, the Methods/Events can be inherited as Private, Override or Published. The **Private** methods and events are intended for a use within the descendant component only. Methods and Events selected as **Override** or **Published** automatically appear in the descendant component. See the description of individual options in chapters *2.1.2 Options of Methods Inheritance* and *2.1.3 Options of Events Inheritance*.

2.1.1. Inheritance scheme

This example shows a component (descendant) inheriting two other components via selected interface and template (registered for this interface).

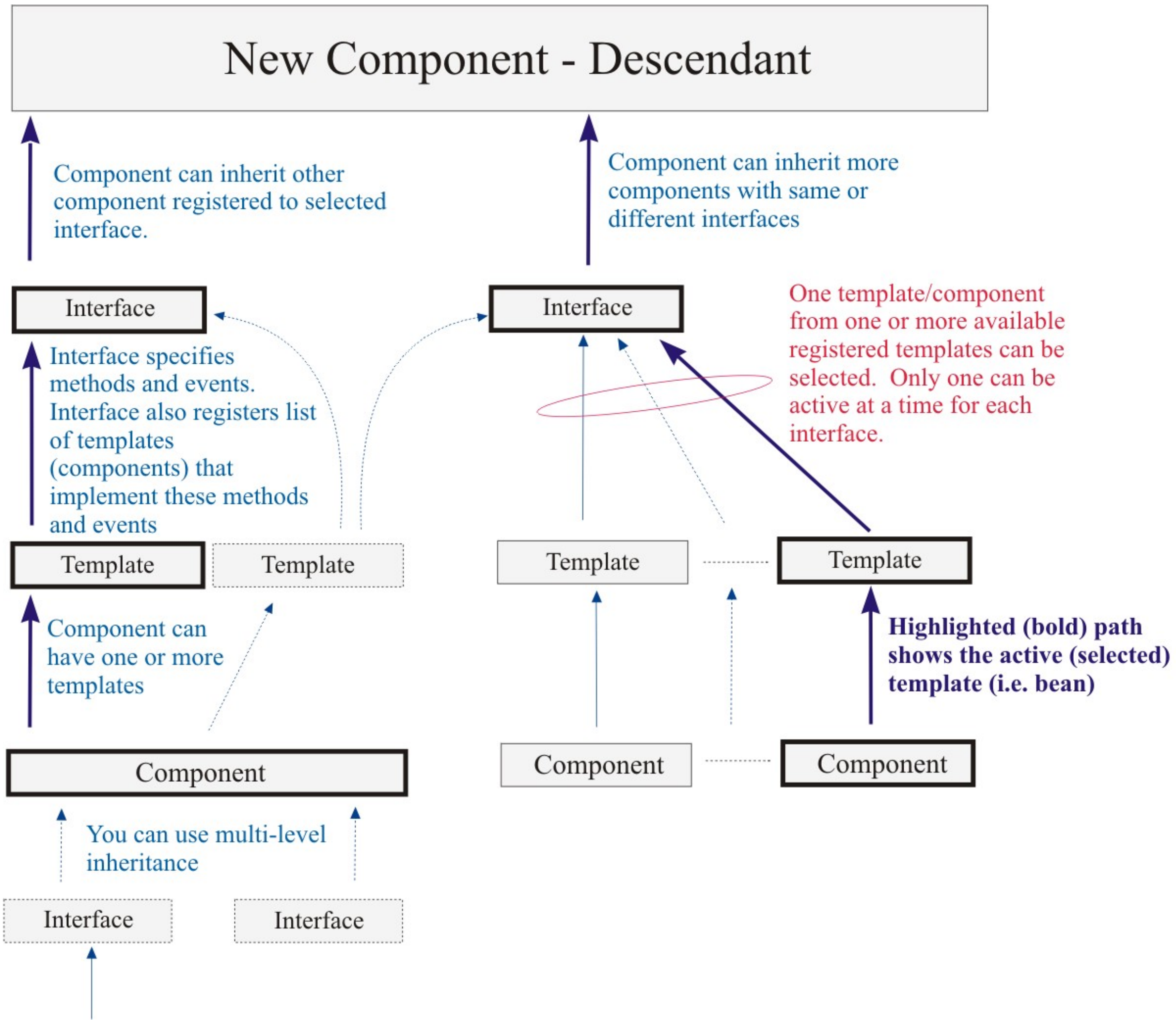
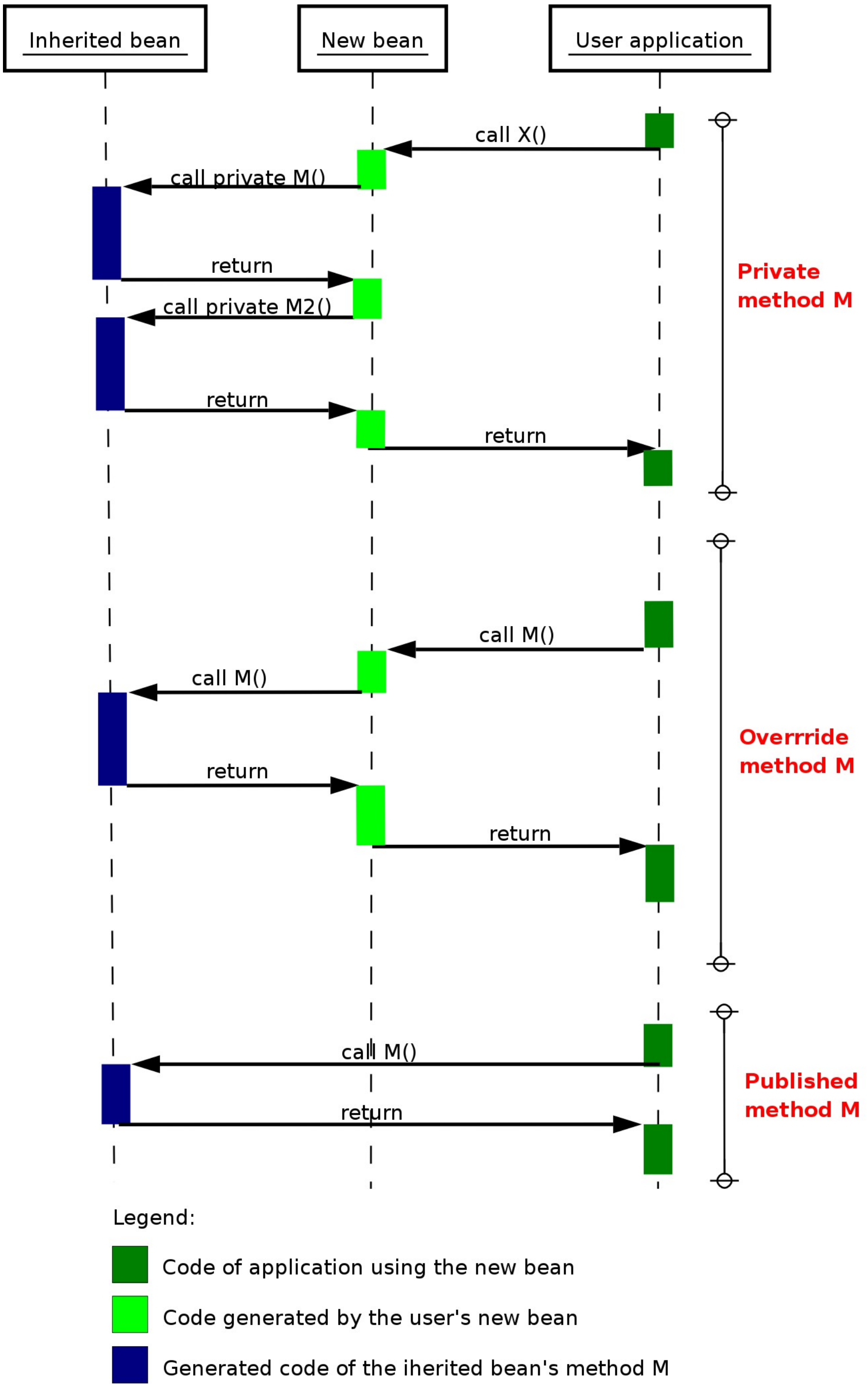

New Component - Descendant
Component can inherit other component registered to selected interface.
Component can inherit more components with same or different interfaces
Interface
Interface
One template/component from one or more available registered templates can be selected. Only one can be active at a time for each interface.
Interface specifies methods and events. Interface also registers list of templates (components) that implement these methods and events
Template
Template
Template
Template
Component can have one or more templates
Highlighted (bold) path shows the active (selected) template (i.e. bean)
Component
Component
Component
You can use multi-level inheritance
Interface
Interface

Figure 2.1 - Inheritance Scheme

2.1.2. Options of Methods Inheritance

This chapter explains possible ways of inheriting methods from an ancestor component. Lets assume that a chosen ancestor component has a method M. The inheritance process requires an interface to be created (see chapter *4.2 How to create an Interface ?* for details). There are the following options (values of MethodScope) that are available for the ancestor's method M in the interface (please see also a corresponding part of the picture below):

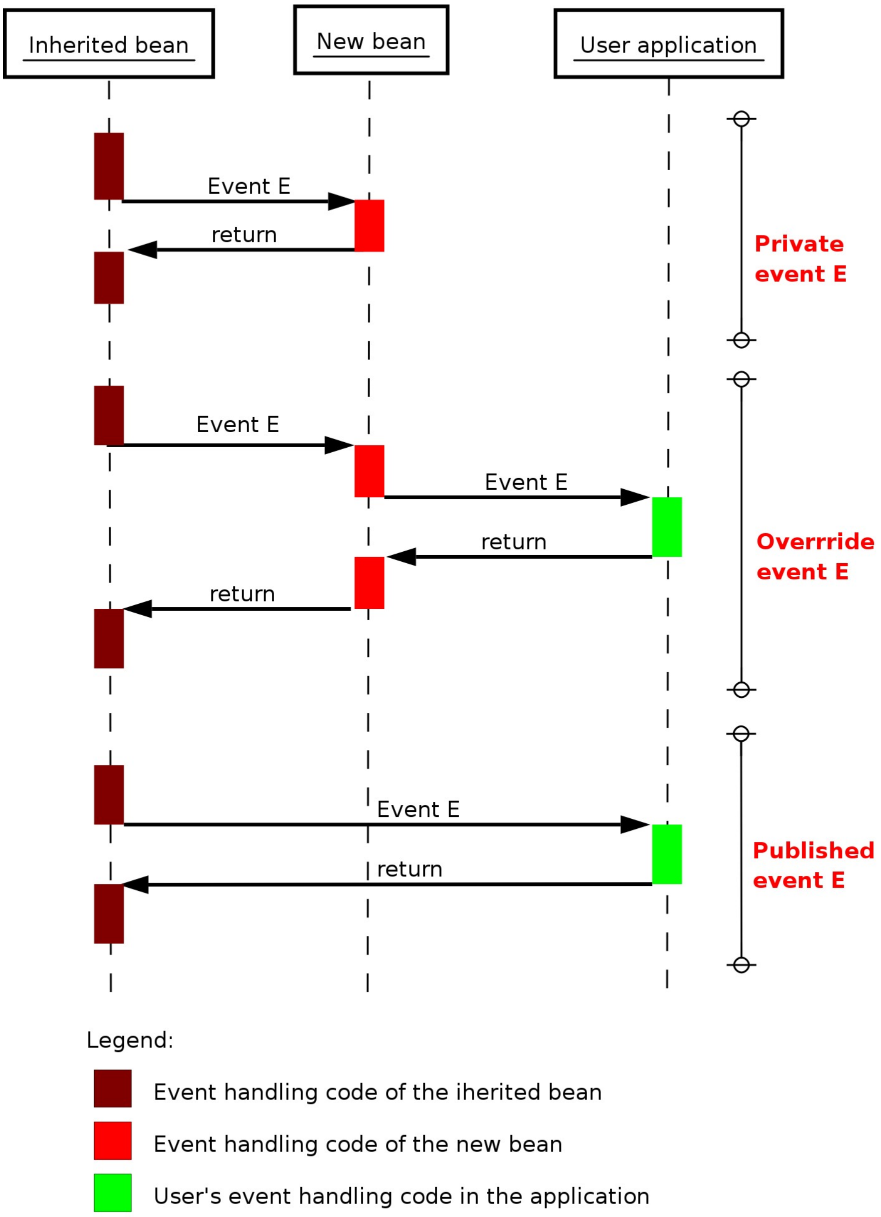
- **Private** - The method M does not appear in the descendant's methods list (in the component inspector of the descendant component) and should be called only from the code of the descendant component. This option is suitable when we want to only use the component without publishing it's methods to user.
- **Override** - The method M appears in the descendant methods list (in the component inspector of the descendant component) but user can write his/her own code to change it's function (and also call the original method M of the ancestor if is is reasonable).
- **Published** - The method M behaves like the native method of the descendant component. This approach doesn't mean any overhead, the method is generated as a macro calling the ancestor's method.


Inherited bean
New bean
User application
call X()
call private M()
return
call private M2()
return
return
Private method M
call M()
call M()
return
return
Overrride method M
call M()
return
Published method M
Legend:
🟩 Code of application using the new bean
🟩 Code generated by the user's new bean
🟦 Generated code of the iherited bean's method M

2.1.3. Options of Events Inheritance

This chapter explains possible ways of inheriting events from an ancestor component. Lets assume that a chosen ancestor component has an event E. The inheritance process requires an interface to be created (see chapter *4.2 How to create an Interface ?* for details). There are the following options (values of EventScope) that are available for the ancestor's event E in the interface (please see also a corresponding part of the picture below):

- **Private** - The event E does not appear in the descendant component events list and should be used for internal processing of the events from the ancestor component.
- **Override** - The event E appears in the descendant component events list and component author can write his/her own code before and/or after calling the user's event handling routine.
- **Published** - The event E appears in the descendant component events list and the event behaves like the native event of the descendant component. User's event handling routine is called directly.



3. Versions

There are two versions of Component Wizard:

- **Basic Component Wizard**
- **Professional Component Wizard**

Basic version

The basic version of Component Wizard is designed for the creation of software components, i.e. hardware independent. These components are written in high-level programming languages (MODULA, ANSI C, ...). You can create pure **software components** (associated to other software modules), such as component for computing Fast Fourier Transform, or you may create software components which are indirectly dealing with hardware, using inheritance. You can, for example, create a component for controlling EEPROM by inheriting methods and events from the input/output hardware components and using them in your code. As input/output components are written for all processors of Processor Expert's database, your EEPROM control component is hardware independent and you may use it with each processor of Processor Expert's database.

In this version you cannot change existing hardware components (for example input/output components, timers, etc). You may only inherit from them by creating templates and interfaces.

You have a smaller choice of properties (properties which you don't need are hidden) and some pages of Component Wizard are not available.

Professional version

The Professional version of Component Wizard is designed for creating software and hardware components. This is the full version of Component Wizard.

4. How to work with Component Wizard

The following sub-chapters show the usual tasks the Component Wizard is used for.

- How to create a component ?
- How to create a component from existing ANSIC source ?
- How to create a template ?
- How to create an interface ?
- How to modify an existing interface (add/remove methods)?
- How to apply an interface to a component ?
- How to use inheritance ?
- How to share component ?
- How to edit drivers ?
- How to distribute component ?
- How to create simple component without inheritance? See tutorial, course no. 1

See also

- Details about driver syntax and Processor Expert macroprocessor

4.1. How to create a Template ?

In order to create a template, you must have a component loaded in Component Wizard. Then, you can modify the settings of the properties, methods and events, and save the new settings as a template (**File - Convert To - Template**).

One Bit I/O Component Template Example

We will make a template of the component allows only the output direction (a simple One Bit Output). For steps of creation of this component please see the chapter *4.9 Component Creation*.

- At first we load the *One Bit I/O* component into the Component Wizard (Menu File | Open | Component). Then, we go into the Property page, and we modify the settings of the *Direction* property.
- We change the main *Direction* setting on the left side window; we set it to **output.** After selecting the *Direction* property on the left side window, we can see its settings displayed on the right side window.
- The **ReadOnly** setting need to be switched to **True** (so that Direction cannot be modified in the Processor expert environment).
- Now, we can save these settings in a template (Menu File - Create Template) that we call *One Bit Output*.

4.2. How to create an Interface ?

An interface can be created from a component currently loaded in Component wizard (Menu **File - Create Interface**), or may also be created as an empty interface (Menu **File - New Interface**), following a process close to that of the creation of a component. In both cases, the creation of an interface require to have created at least one template. We will illustrate the creation of an interface from a component, using the example developed in the section How to create a Component? We will make an interface for the ouput facility.

Example

Creation of an interface from the One bit I/O Component

In order to create an interface, we need a template.

- So we first create a template from the *One Bit I/O* component, following the procedure described in the section 'How to create a template ?'.
- Then we can create an interface (Menu **File - Create Interface**) and open it. Go into the Templates page, in order to select and add the *One Bit Output* template to the interface.
- The right side window displays the list of existing templates. We select the *One Bit Output* template and click on the **left arrow** button in order to add the template to the interface.
- Then, we go into the Methods page, in order to delete the useless methods: *GetVal, GetDir and SetDir*.To delete the methods, you need to select them and push on the **Delete Method** button.
- Finally, we save the interface as *OneBitOutput* (File Menu - Save/Save Interface As).

4.3. Modifying interfaces

Adding or removing method/event into/from an interface

Example:

You have an interface with component registered via template. The interface has defined list of methods and events which registered component supports. But the component has more methods than the interface uses and you want to use them as well (e.g. those methods or events were added after the interface was created).

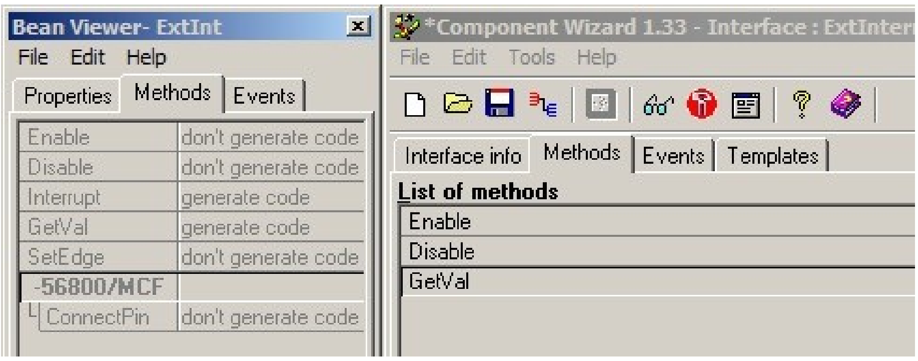
There are two ways:

- **Difficult** - open interface and add methods in pages Methods and Events with their parameters, types and hints,... this solutions expects you know the correct syntax of those methods and it is not effective.
- **Easy and fast** - you can use the fact, that those methods are already specified by the component which is registered into this interface or other component. With using the View component utility you can easily drag and drop feature and drag them from component into the interface.
  Steps:

  a. Open existing interface - menu **File - Open - Interface**. The open dialog appears, select the interface and confirm it by button `OK`.
  b. Open existing component into the view component utility - menu **Tools View component On/Off**. If the View component utility has not been used yet, the open dialog appears, select the component and confirm it by button `OK` or use local menu described here.

c. Switch to the page methods in both - View component utility and opened interface.

d. Drag & drop desired methods.


Bean Viewer- ExtInt
File Edit Help
Properties Methods Events
*Component Wizard 1.33 - Interface : ExtInter
File Edit Tools Help
Interface info Methods Events Templates

Enable	don't generate code
Disable	don't generate code
Interrupt	generate code
GetVal	generate code
SetEdge	don't generate code
-56800/MCF	
ConnectPin	don't generate code

List of methods

Enable

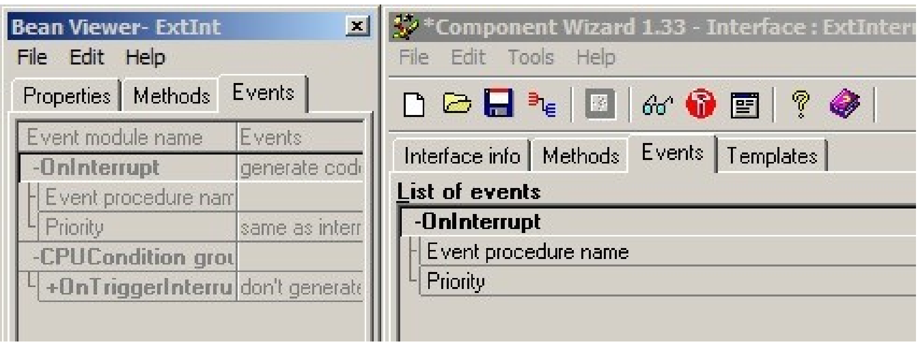
Disable

GetVal

Figure 4.1 - Modifying interfaces

e. Switch to the page events in both - View component utility and opened interface.

f. Drag & drop desired events.


Bean Viewer- ExtInt
File Edit Help
Properties Methods Events
*Component Wizard 1.33 - Interface : ExtInter
File Edit Tools Help
Interface info Methods Events Templates

Event module name	Events
-OnInterrupt	generate cod
Event procedure nam	
Priority	same as interr
-CPUCondition grou	
+OnTriggerInterru	don't generate

List of events

-OnInterrupt

Event procedure name

Priority

Figure 4.2 - Modifying interfaces

g. Save the interface - menu **File - Save**.

See also

Common problems with inheritance

4.4. Interface Application

How to apply an interface to a component ?

You can make a component inherit the methods and events of one or more component(s) by the mean of interfaces. There are **two ways to apply an interface** to a component. You can create a component from an interface currently loaded in Component wizard (Menu **File - Create Component**), or you can create a new component (Menu **File - New Component**) and apply later the interface.
We will illustrate this last process by the example of the creation of a Two Bit Output component, using the interface defined in the section How to create an interface ?

Example

Creation of a Two Bit Output Component using an Interface

- Let us start from a new component (Menu **File - New Component**).
- To apply an interface, we need to go into the Properties page and add the two properties corresponding to the two output pins.
- In order to add the first property, we click on the **Add Down** button. A menu appears where we can select the type of the first property. The property needs to be of the **Inherited component (interface**) type.
- Then, we modify the setting **InterfaceName** on the right side window.
- In the setting menu, we need to select *OneBitOutput*, the name of the interface to be applied. Finally, we repeat the procedure for the second property.

From now, the component can inherit the methods and events specified in the interface and apply them to each of the two output pins. We need finally to define the methods for the Two Bits Output (PutVal, SetVal, NegVal and ClrVal). The advantage is that we can use the One Bit Output Methods when we write the code for the Two Bit Methods (see section How to edit drivers ?).

4.5. Inheriting from a component

Procedure for inheriting

You may let the Inheritance Wizard guide you through the inheritance process. If you want to inherit component into the existing component, you can use the fast inheriting.
The next steps should be followed by advanced users only:
(for more details on inheritance and bindings between templates and interfaces see chapters *2.1 Inheritance* and *2.1.1 Inheritance scheme*.

1. Open the component from which you want to inherit.
2. Create a new template (dialog Save template appears) and modify eventually its settings.
3. Create an interface (dialog Save interface appears) from this component
4. Open this interface and insert the previously created template
5. Delete the methods and events which you do not need for your new component.
6. Save the interface
7. Open your new component
8. In the properties page add an **inherited component (interface)** property.

9. In feature **InterfaceName**, select the name of the created interface
10. Now you have inherited from the first component. Learn here how to use the inherited methods and events.

Setting of an enabled Speed mode for inherited components

All inherited components have disabled (read only) settings of an enabled speed modes. This setting is performed in the main (root) component. If the main component doesn't have these items for this settings, the implicit values for all modes are "Enabled". You can copy this properties from existing component (e.g. from inherited component which is time dependent). These properties are usualy if group "**Speed modes**". You can copy them by using Component Viewer utility by drag & drop this group.

See also

Common problems with inheritance

4.6. Problems with inherintance

If you inherit some component and you have difficulties in the Processor Expert when this (or similar) error occurs in the inherited component:

`Method is required by the interface, but is disabled by component settings or by template.`

You have probably conflict with the settlings in the interface and by settings in the CHG file.
Typical situation is when you want to inherit some method/event, but the component itself disables this method/event because of its settings.

Example 1: You have turned off some property detecting some interrupts, so the component disables generating of some events, but you have these events in the interface as ALWAYS REQUIRED (default value) i.e. interface says that the inherited (ancestor) component must have this method and must be generated.

Example 2: You have AsynchroSerial component and you define the input buffer as 0 (zero). So the component disables the method RecvBlock, but you have this method in your interface as ALWAYS REQUIRED (default value) - i.e. - see previous Example 1.

There are several solutions: The method/event with the error:

Situation	Solution
I don't use the method/event in my descendant component.	1. Open the interface for the inherited component e.g. from descendant component using popup menu on the "Inherited component" property in page Properties 2. Delete this method/event 3. Save the interface 4. Open the descendant component and save if it is needed.
I use the method/event but only if it is generated (i know when it is and when it isn't and I have correct condition in my driver). The Method/Event scope is " Private", i.e. this method cannot be inherited again.	1. Open the interface for the inherited component e.g. from descendant component using popup menu on the "Inherited component" property in page Properties 2. Select this method/event 3. Select the feature Mode and select OWNER_MUST_EXIST. 4. Save the interface 5. Open the descendant component and save if it is needed.
I use the method/event but only if it is generated (i know when it is and when it isn't and I have correct condition in my driver). The Method/Event scope is " Published" or "Override" i.e. this method can be inherited again.	1. Open the interface for the inherited component e.g. from descendant component using popup menu on the "Inherited component" property in page Properties 2. Select this method/event 3. Select the feature Mode and select "SAME_AS_OWNER". 4. Save the interface 5. Open the descendant component and save if it is needed.

4.7. Sharing a component

Procedure for sharing a component

Sharing components is similar to inheriting components. But the difference between inheriting and sharing is:

- Every component using inheritance will have their own inherited components: i.e. if you have got **two** instances of component LCDDisplay, which inherits **two** BitIO (input/output component), there will be allocated **four** BitIOs!
- Component using sharing components has the access to methods and properties of a component, which can be shared by another component (or not). Example is a component uses components which want to have a shifted access to serial line. This serial line can be only one, but the number of components sharing it can be more than one. Access is done by methods define in the interface.

If you want to share a component , you can use the fast inheriting/sharing.
The next steps should be followed by advanced users only:
(for more details of inheritance and bindings between templates and interfaces see the inheritance scheme.

1. Open the component from which you want to inherit.
2. Create a new template (dialog Save template appears) and modify eventually its settings.
3. Create an interface (dialog Save interface appears) from this component
4. Open this interface and insert the previously created template
5. Delete the methods which you do not need for your new component.
6. Delete ALL events. Shared component cannot have the events in the interface. The implementation of these events is made in the Processor Expert for the shared component.
7. Save the interface
8. Open your new component
9. In the properties page add an **Link to component** property.
10. In feature **InterfaceName**, select the name of the created interface
11. Now you have inherited component from the first component. Learn here how to use the shared methods.

Setting of an enabled Speed mode for inherited components

All inherited components have disabled (read only) settings of an enabled speed modes. This setting is performed in the main (root) component. If the main component doesn't have these items for this settings, the implicit values for all modes are "Enabled". You can copy this properties from existing component (e.g. from inherited component which is time dependent). These properties are usualy if group "**Speed modes**". You can copy them by using Component Viewer utility by drag & drop this group.

See also

Common problems with inheritance

4.8. Editing drivers

After having defined a component (properties, methods, and events), it's necessary to implement the methods and events in at least one language section of one driver. We will illustrate the creation of a language section of a driver, using the example of the *Two Bits Output component* presented in the section How to apply an interface to a component ?.
See also detailed information about driver syntax.

Example

1. Switch to the Drivers page. When the component is saved first time, the Component wizard offers to create a new driver for the user. If you have confirmed that and there is the *sw/TwoBitOutput.drv* in the *List of drivers for component*, please follow to the next step. Otherwise, click on **Add driver** button. In the **list of drivers for Component**. The name *sw/TwoBitOutput.drv* appears in the list.
2. Now, double-click on **Edit code of method/event** in the right-bottom corner. A list of methods and events for the component appears.

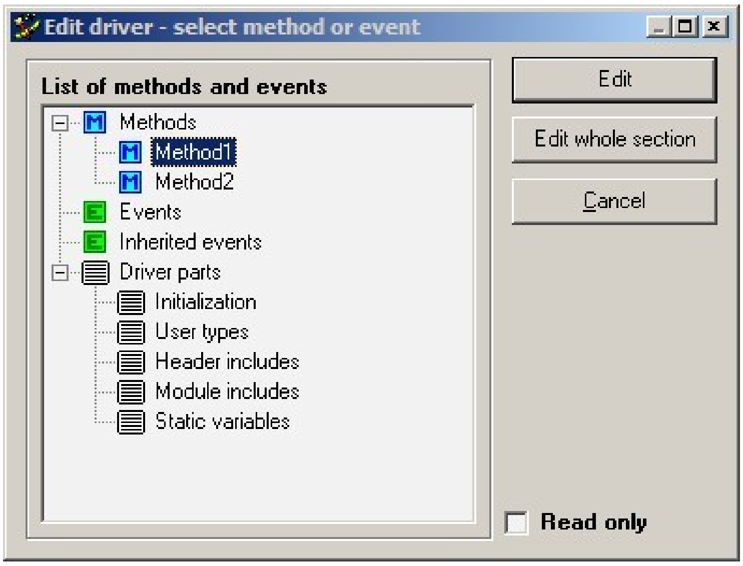
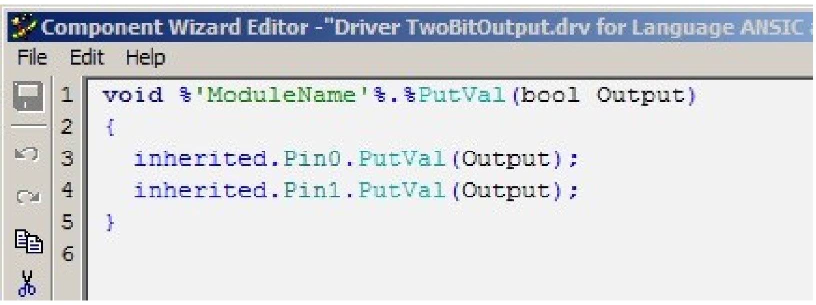


Figure 4.3 - Editing drivers

See *5.11.5 Edit code* for details.

3. Select the *PutVal* method and click "**Edit**". It opens the body of the method and we may now make the implementation.
4. As explained in the How to apply an interface ? example section, the TwoBitOutput component inherited twice from the BitIO component. That means that we have two "Inherited" properties in the Properties page. We change their **Symbol** feature to *Pin0* and *Pin1*.
Inherited methods are named with the following convention:
***inherited*.name_of_the_inherited_property.name_of_the_method(*parameters*);**
For example, our two inherited *PutVal* methods are called *inherited.Pin0.PutVal* and *inherited.Pin1.PutVal* .

Remark: In the Component Wizard Editor, you must not make changes in method header (name of the method or name and types of parameters). You may do such changes only in Component Wizard.


Component Wizard Editor - "Driver TwoBitOutput.drv for Language ANSIC
File
Edit
Help

```
void %'ModuleName'%.%PutVal(bool Output)
{
  inherited.Pin0.PutVal(Output);
  inherited.Pin1.PutVal(Output);
}
```

Figure 4.4 - Editor window

Hint: If you write the left paranthesis by the name of function/procedure, hint with the list of parameters of function/procedure is displayed.

4.9. Component Creation

There are several ways to create a new component. You can create a component

- from scratch (menu **File - New Component**),
- existing component (Menu **File - Open - Component**) that you modify,
- create component from existing ANSI-C source. See *5.1.8 Create Component* for details.
- from an interface (menu **File - Conver To - Component**, when the interface is currently loaded). In this case the component gets methods and events from the interface.
- **The Inheritance Wizard** may also help you to create a component inheriting from other components. See *5.1.4 Inheritance Wizard* for details.

The specification of a component is decomposed in 9 pages in Professional Component Wizard and in 6 pages in Basic Component Wizard. In order to describe the procedure, we will use the example of the creation of a component corresponding to a simple one bit output.

Installation to Processor Expert

Updating changes of a component in Processor Expert:
If you are editing a component in Component Wizard while working in Processor Expert on a project including this component, you may update the component in your project by following these steps:

1. Save the component in Component Wizard
2. Save and reopen the current project in Processor Expert

Now is the component in Processor Expert updated.

Example

One bit Input/Output Component

In the Common page, we put a hint like *General 1- bit input/output* in the **Short Hint** edit item, and we put our names in the **Author** edit item (the default **Version** number 1.0 is correct, since we are creating the component). We then click on the **Open...** button next to the **Icon** edit item. A standard File Open menu appears, and we go into the component's directory. There, we select our icon file, *BitIO.bmp*, that we had previously stored in the component's directory. Notice that the icon file must be stored to the same directory as that of the component, using the appropriate format (see the section Icon in the Common Page Help).

In the Properties page, we add the necessary properties by clicking on the **Add Down** button. Every time, a menu appears where we can select the right property type.
Here is the list of the properties we add, with their associated type:

- *Pin for I/O* [**Pin/Port**]
- *Pull Mode* [**Pull Resistor**]
- *Direction* [**Direction Input/Output/Input-Output**]
- *Initialization* [**Group of Items**]

Initialization is a group of properties. We can start adding properties to this group by clicking on the **Add to Group** button. Then, we can use the **Add Down** button again inside the group to add the next properties of the group.
So we add the following properties to the group:

- *Init Direction* [**Boolean yes/no**]
- *Init Value* [**Boolean yes/no**]

For every property, we can modify the default settings, which appear on the right side window. These settings determine the features of the property item within the Processor Expert environment. After selecting a property on the left side window, the list of settings appear on the opposite window and we can modify some features, such as **ItemName** and **Hint**.
In our case, the **TypeSpecName** setting of the *Pull Mode, Direction, InitValue and Init Direction* properties must be set to **TypePull**, **TypeDir**, **TypeOneZero** and **TypeInputOutput**, respectively.

In fact, at this moment the **TypeOneZero** type doesn't exist yet. We must create it in the Property types page.
So, in the Property types page, we click on the **AddBoolEnum** button in order to create an Enumeration of only two items.
In the **Name** edit item, we write *TypeOneZero* and we change the default name of the items into *1* and *0* in the **List** window.
In the Methods page, we can add the names of the necessary methods (*PutVal, GetVal, GetDir, SetDir, SetVal, NegVal, ClrVal*). To that purpose, we have to click on the **Add method** button and type the name of the method.
The right side window displays the properties of the method, that is currently selected in the opposite window. We have there to add a parameter *Value* to the properties of the PutVal and GetVal methods. So we need to click on the **Add Parameter** button, and then change the **Parameter-Name** setting into *Value*.
There are no events, so we don't need to consider the Events page.

Now, the Component structure is complete and we can save it (Menu **File - Save**).

See also

How to create simple component without inheritence? See tutorial, course no.1

4.10. Distributing component

It is possible to export the component as a one file which holds all the files which the component consists of. See the Exporting/Importing component page for details.

5. User Interface

The Component Wizard application user interface consists of the pull-down menu and the page tabs that users could switch using the mouse.

Menu

Main menu of the application. See the chapter Main Menu description.

Icons

- opens a new empty component
- opens a list of components and loads the selected component
- saves the currently opened component/template/interface
- creates a new interface. See *2.1 Inheritance* for details.
- opens the list of revisions. See *5.1.7 Revisions* for details.
- shows the component in the component viewer.
- opens the Component Manager. See *5.1.3 Component manager* for details.
- opens the options dialog. See *5.1.1 Options* for details.
- opens the Component Wizard help chapter related to the currently active page.
- opens Component Wizard help contents page.

- ***Pages***

Component/Template

- Common page
- Properties page
- Global properties page (Professional Component Wizard only)
- Property types page
- Methods page
- Events page
- User types page
- Drivers page
- Help page

Interface

- Interface info page
- Methods page
- Events page
- Templates page

5.1. Component Wizard Menu

Description of Main menu items

File

- **New**
  - **Component** - starts the creation of a new component
  - **Component using Inheritance Wizard** - starts the creation of a component by using the Inheritance Wizard.
  - **Interface** - starts the creation of a new interface
- **Open**
  - **Component** - loads a component
  - **Interface** - loads an interface
  - **Template** - loads a template
- **Save** - saves the currently opened object. If changes have been made, a dialog listing the changed files can be shown. For more details please see the *Confirm all file changes* option in the chapter *5.1.1 Options*.
- **Save As** - saves the currently opened object with the new name
- **Import**
  - **Create component from ANSIC module** - converts existing ANSI C source into the component. Displays open dialog for *.c and *.h sources for conversion. See here for more information.
  - **Import components from package...** - displays open dialog for selecting component package. Then appears import dialog.
- **Export**
  - **Export component to package** - exports the current component into the package. Dialog for exporting components appears. For more details see here.
- **Convert To**
  - **Component** - creates a component from the current interface
  - **Interface** - creates an interface from the current component. See here for more information.
  - **Template** - creates a template from the current component. See here for more information.
- **Open Recent** - allows to open previously edited objects.
- **Exit** - closes the application

Edit

- **Undo (change description)** - restores the state of the item (specified in the brackets) to the state before the change.
  Note: The Undo / Redo functions are available only for property, methods and events changes.
- **Redo (change description)** - restores again the state of the item (specified in the brackets) to the state after the change.
- **Edit driver abstract** - opens editor windows with a short description of the component. This text is used for component comment (section Abstract:) in the driver and in the text help file. Editing is enabled if at least

one language section exists. This file is independent on selected language and compiler, it is common for all implementations. See *5.11 Drivers Page* for details.

- **Edit driver settings** - plain text file with macros reading components settings. The text resulting from preprocessing of this file is generated as a comment to component header file, component implementation file and project text help file.
- **Edit chg file** - Opens editor window with the CHG file. See *5.11.4 CHG file* for details.
- **Edit external file** - allows to open any text file into the Component Wizard editor.
- **Component revisions** - opens the Revisions window allowing to view/edit the component history

Tools

- **Options** - opens the Options window for setting Component Wizard preferences and default values
- **Properties configuration** - opens the Properties window for renaming or deleting available properties
- **Always on Top** - makes Component Wizard's window stay on top of all windows
- **View component On/Off** - starts the Component viewer and displays the load component dialog
- **Delete Backups** - erases backup files
- **Component Manager** - opens the Component Manager window for managing components, templates, interfaces and includes.

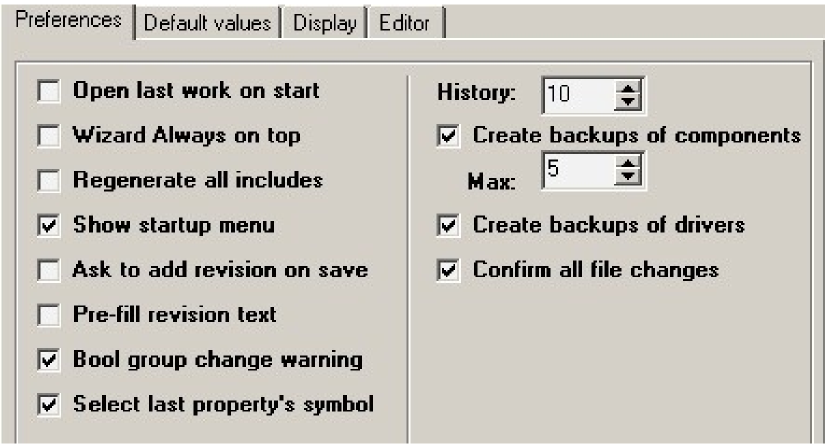
Help

- **Contents** - opens this help file
- **Help** - opens this help file - shows help for active page in Component Wizard.
- **About** - displays the *About* box

5.1.1. Options

This dialog window allows to customize behaviour of the Component Wizard. It can be invoked using the command **Tools - Options**

Preferences page

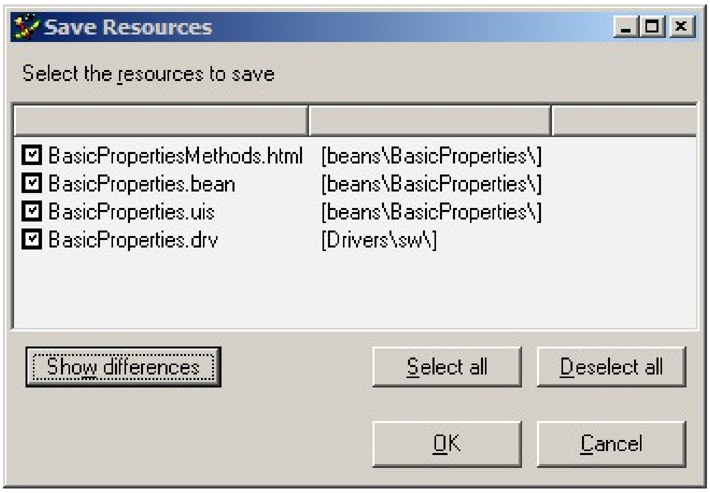


□ Open last work on start
□ Wizard Always on top
□ Regenerate all includes
☑ Show startup menu
□ Ask to add revision on save
□ Pre-fill revision text
☑ Bool group change warning
☑ Select last property's symbol

History: 10
☑ Create backups of components
Max: 5
☑ Create backups of drivers
☑ Confirm all file changes

Figure 5.1 - Preferences

- **Open last work on start** - last edited file is automatically opened when Component Wizard is started
- **Wizard Always on top** - makes Component Wizard's window stay on top of all windows
- **Regenerate all includes** - all includes are regenerated, regardless of their header line. (Usually, includes are regenerated only if the header line of the includes has not been removed by the user)
- **Show startup menu** - when Component Wizard is launched, a startup menu proposes to start directly with Inheritance Wizard or not.
- **Ask to add revision on save** - if this option is enabled, after each save command the Component Wizard shows a dialog allowing to add a new revision information.
- **Pre-fill revision text** - If this option is enabled, the Component Wizard shows offers a revision description text based on the changes made.
- **Bool group change warning** - If enabled, a warning is shown when the value of Expanded feature of Boolean group is changed by the user. This helps the user to avoid to forget to set it back.
- **Select last property's symbol** - after loading a component, selects the property with the same ymbol as the last property selected before the component has been loaded.
- **History** - maximal number of history items in menu **File - Reopen**
- **Create backups of drivers** a backup file is made (when saving the component) for each driver modified after opening the component. The backup file contains the initial state of the driver (before the component modification).
- **Confirm all file changes** - if enabled, after the save command is invoked, a dialog summarizing changes within all files that are about to be updated. The user can select files and check the changes using the button **Show changes** and individually select/unselect which files should really be written.



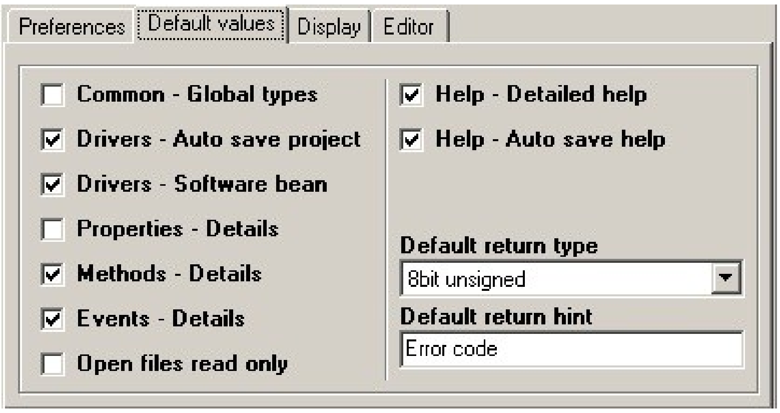
Save Resources

Select the resources to save

☑ BasicPropertiesMethods.html [beans\BasicProperties\]
☑ BasicProperties.bean [beans\BasicProperties\]
☑ BasicProperties.uis [beans\BasicProperties\]
☑ BasicProperties.drv [Drivers\sw\]

Figure 5.2 - Confirm changes dialog

Default values page



□ Common - Global types
☑ Drivers - Auto save project
☑ Drivers - Software bean
□ Properties - Details
☑ Methods - Details
☑ Events - Details
□ Open files read only
☑ Help - Detailed help
☑ Help - Auto save help

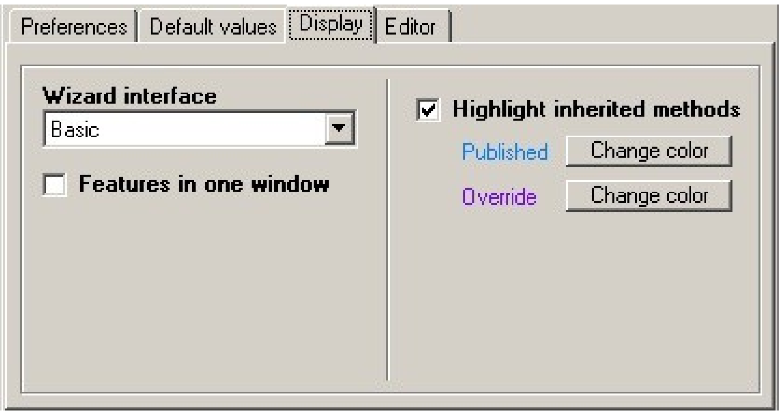
Default return type: 8bit unsigned

Default return hint: Error code

Figure 5.3 - Default values

- **Common - Global types** - default setting of the *Global types* check box of the Common page
- **Drivers - Auto save project** - default setting of the *Auto save project* check box of the Drivers page
- **Drivers - Software Component** - default setting of the *Software Components* check box of the Drivers page
- **Properties - Details** - default setting of the *Detail on/off* check box of the Properties page
- **Open files read only** - default value for opening components, templates and interfaces. If you want to open them in read only mode almost every time, check this. You can explicitly open files in read only mode or not in the open dialogs.
- **Help - Detailed help** - default setting of the *Detailed help* check box of the Help page
- **Help - Auto save help** - default setting of the *Auto save help* check box of the Help page
- **Default return type** - default **return type** of methods. When you add new method, it will have set this return type.
- **Default return hint** - default text of the **return hint** of methods. When you add new method, it will have set this text in return hint.

Display page



Wizard interface: Basic

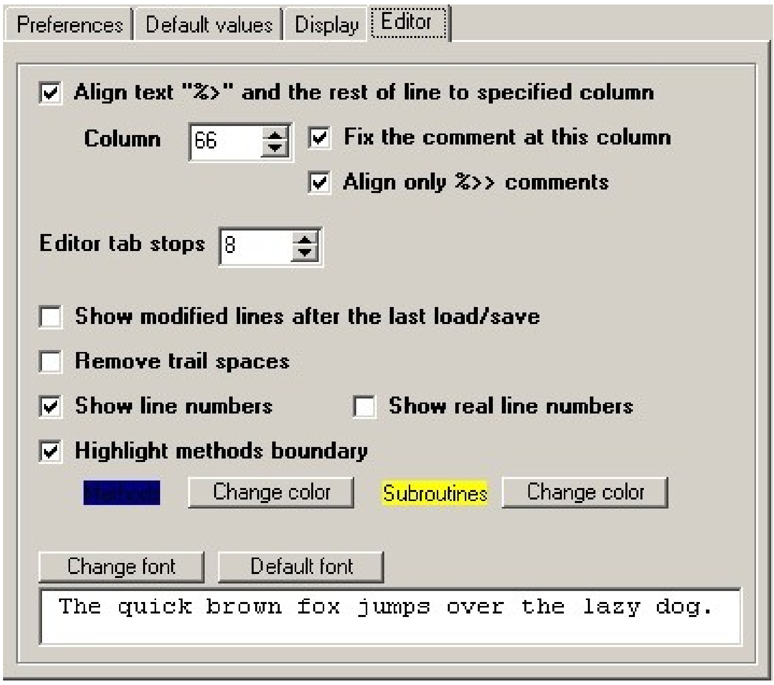
□ Features in one window

☑ Highlight inherited methods

Figure 5.4 - Display

- **Wizard interface** - level of component edition:
  - Basic - presents only the important pages and information
  - Professional - presents all pages and input objects (Professional Component Wizard only)
- **Features in one window** - presentation style for the Properties page features.
- **Highlight inherited methods** - show inherited methods or events with a different color in Methods and Events pages for component and Interface methods and Interface events pages for interface.
  - Published methods - select color for published methods
  - Override - select color for overridden methods

Editor page



☑ Align text "%>" and the rest of line to specified column

Column 66 ☑ Fix the comment at this column

☑ Align only %>> comments

Editor tab stops 8

☐ Show modified lines after the last load/save

☐ Remove trail spaces

☑ Show line numbers ☐ Show real line numbers

☑ Highlight methods boundary

The quick brown fox jumps over the lazy dog.

Figure 5.5 - Editor

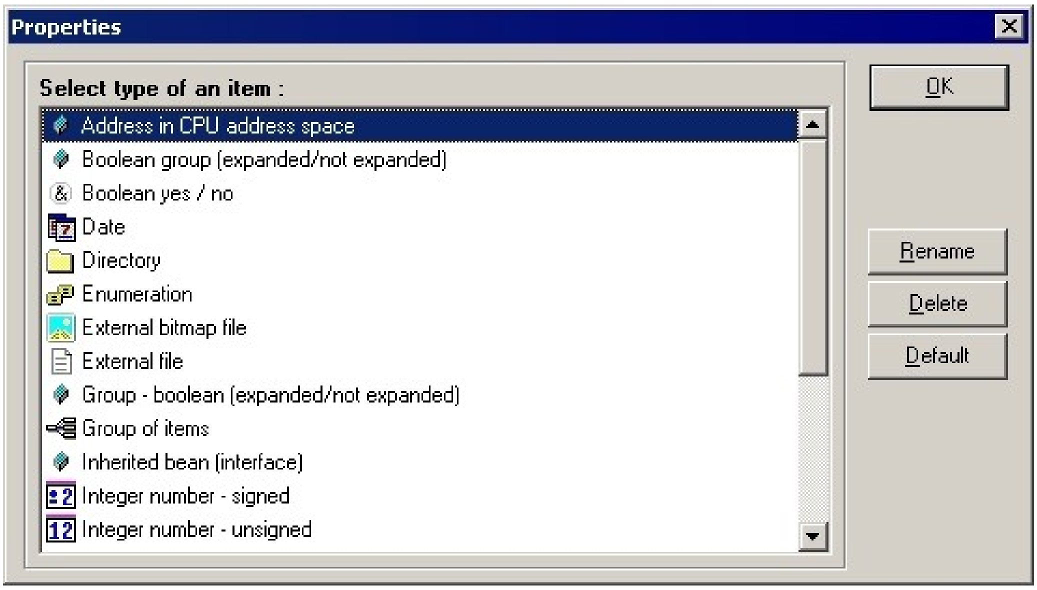
- **Align text "%>" and the rest...** - Align Macroprocessor comment at specified column - only visual enhancement - code is more readable with aligned comments. When you type **%>**, the cursor will be moved with the comment to the specified column.
  - **Column** - Column position for macroprocessor comment
  - **Fix the comment at this column** - if checked, anything you write before the **%>** won't cause moving the comment to the left or to the right.
  - **Align only %>> comments** - align only "%>>" comments (i.e. do not align e.g. "%> 40")
- **Editor tab stops** - number of spaces when TAB key is pressed.
- Show modified lines after the last load/save - if enabled, the editor shows changed lines/letters with different color.

- **Remove trail spaces** - when the document is saved, possible spaces after the end of every line are removed.
- **Show line numbers** - enables/disables line numbers display besides every line.
- **Show real line numbers** - show a real line numbers, even if only a part of the file is edited.
- **Highlight methods boundary** - highlights beginning of the method definition/implementation.
- **Change font** - change the font in the internal editor. In the bow below is visible your selected font.
- **Default font** - change the font in the internal editor to the default settings.

5.1.2. Properties

This dialog window lists the properties you can add to the Properties page of a component. Is is invoked using the **Tools - Properties config** menu command.

Property names can be changed (click the **Rename** button after selecting a property), and unnecessary properties may be deleted (click on **Delete**). The default state (all properties and their default names) may be restored by clicking the **Default** button.



Select type of an item :

Address in CPU address space
Boolean group (expanded/not expanded)
Boolean yes / no
Date
Directory
Enumeration
External bitmap file
External file
Group - boolean (expanded/not expanded)
Group of items
Inherited bean (interface)
Integer number - signed
Integer number - unsigned

Figure 5.6 - Properties dialog

5.1.3. Component manager

The Component manager allows to easily manage available components, templates, interfaces and includes.

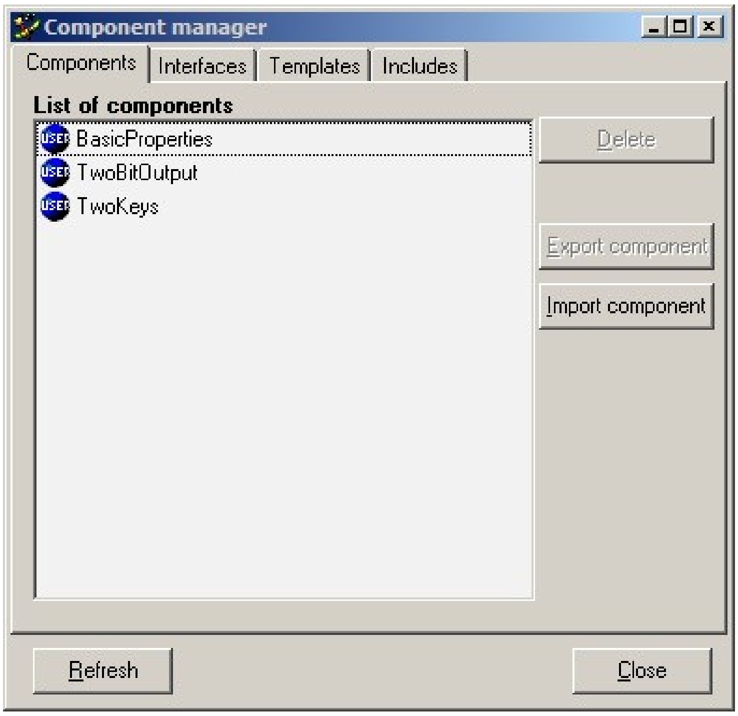


Figure 5.7 - Component Manager with the components page active

General common buttons:

- **Refresh** - refreshes the Component manager (the current state of files on disc)
- **Close** - closes the Component manager

Components page

Buttons:

- **Delete** - opens a window displaying the list of files used by this component. You may then select the files you wish to delete. You can delete only one component at a time.
- **Export component** - opens a window where you can package the selected component. You can select one or more components.
- **Import component** - opens a dialog window for loading a new component from a package

Interface page

Buttons:

- **Delete** - removes the selected Interfaces from your disk.
- **Select unused** - selects Interfaces which are not associated with any existing component
- **Unselect all** - cancels the selection

Remark: There are hints over each interface. If the interface contains some errors (interface is marked with red letter "E") they are displayed in hint too.

Templates page

Buttons:

- **Delete** - removes the selected Templates from your disk.
- **Select bad** - selects Templates which are not associated with any existing component
- **Select unused** - selects Templates which are not used by any interfaces
- **Unselect all** - cancels the selection

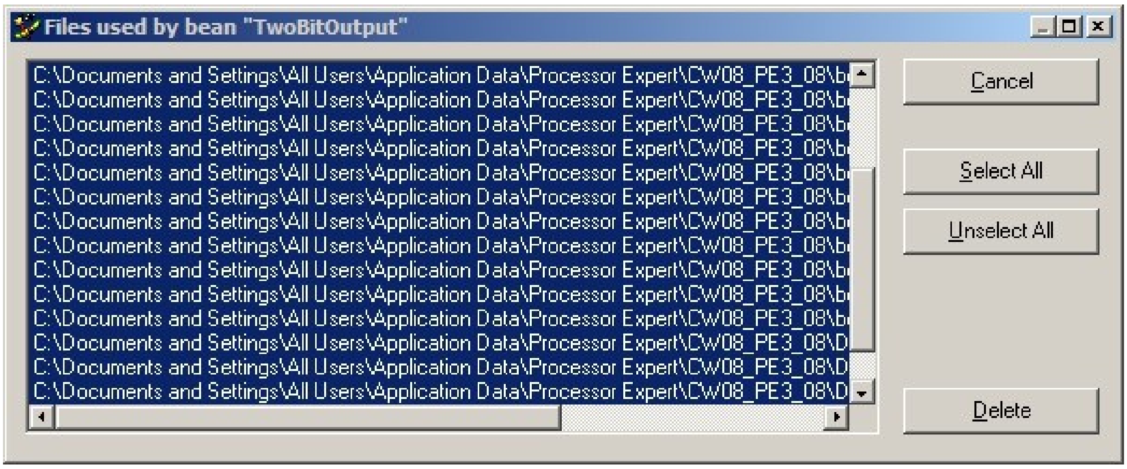
Includes page

Description:
With often manipulating components (copying, deleting, importing, etc.) there may be unused includes on th disk. To find them, click button **Find unused**. It displays includes on disk which are no longer referenced from drivers. It also shows (in lower window) those drivers which want some includes which are not available on disk.

Buttons:

- **Delete** - removes selected include files from your disk
- **Find unused** - Search in all drivers on your disk for used includes and displays unused include files. Also displays references to non existing includes.
- **Select all** - selects all include files
- **Unselect all** - cancels the selection
- **Include is used if its name begins like name of some driver** - If it is checked, Component Manager assumes, that includes which have the same beginning of their names like the name of some driver are used. It is recommended to check this button.

5.1.3.1. Deleting components



```
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\b
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\D
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\D
C:\Documents and Settings\All Users\Application Data\Processor Expert\CW08_PE3_08\D
```

Figure 5.8 - Deleting window

This window appears when you request to delete a component with the Component manager. This window lists all the files used by the component you have selected in the Component manager. You can then select the files you wish to delete. Initially, Component wizard automatically selects the files which you may safely delete.

Meaning of buttons:

- **Cancel** - cancels the deletion and shuts this window
- **Select All** - selects all listed files
- **Unselect All** - cancels the selection
- **Delete** - deletes all selected files

5.1.3.2. Exporting / Importing a component

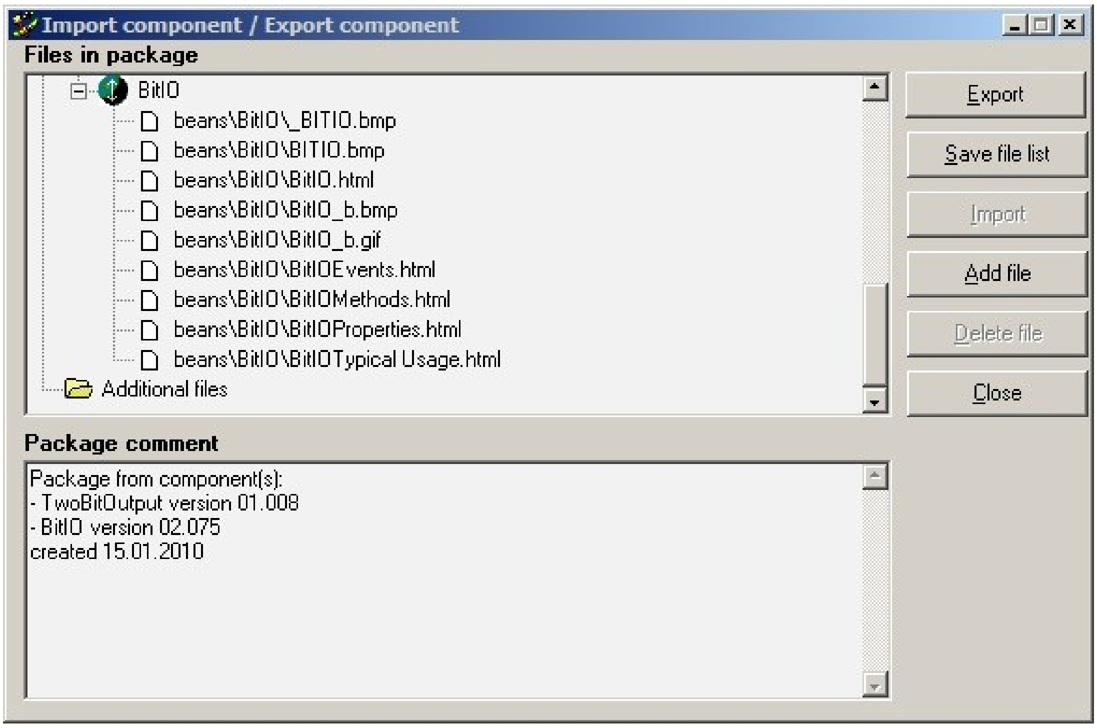
This function allows to export/import one file (package) with all component files for one or more components. When you wish to distribute a component (or several components), you may use this approach instead of distributing manually the numerous files related to the component. You can also add your own files into the package and you can add a comment about this package which will be displayed to the user when he/she will import your component. This package is automatically compressed to save space on your disk.

The export function is accessible using :

- Component Manager where you specify the list of components you want to add into a package and click the **Export component** button.
- Component Wizard main menu **File - Export - Export component to package**

Remark: Exporting components package is suitable for creating backups of components too.
The import function is accessible using :

- Component Manager after click on the **Import component** button.
- Component Wizard main menu **File - Import - Import components from package...**



```
BitIO
    beans\BitIO\_BITIO.bmp
    beans\BitIO\BITIO.bmp
    beans\BitIO\BitIO.html
    beans\BitIO\BitIO_b.bmp
    beans\BitIO\BitIO_b.gif
    beans\BitIO\BitIOEvents.html
    beans\BitIO\BitIOMethods.html
    beans\BitIO\BitIOProperties.html
    beans\BitIO\BitIOTypical Usage.html
Additional files
```

Package from component(s):
- TwoBitOutput version 01.008
- BitIO version 02.075
created 15.01.2010

Figure 5.9 - A component export window

Component Export Mode

Meaning of buttons:

- **Export** - creates a package file containing all files which are displayed in left window
- **Save file list** - creates a text file with the list of files that are displayed in the *Files in package* field to be in the package.
- **Import** - *disabled for exporting*
- **Add file** - add a file into the additional files list
- **Delete file** - deletes selected additional file from the list
- **Close** - closes this window and returns to the Component Manager

Component Import Mode

Files in the package which are older are displayed with red colour. There is possibility to get information about file date/time by positioning mouse cursor above the red filename.

Meaning of buttons:

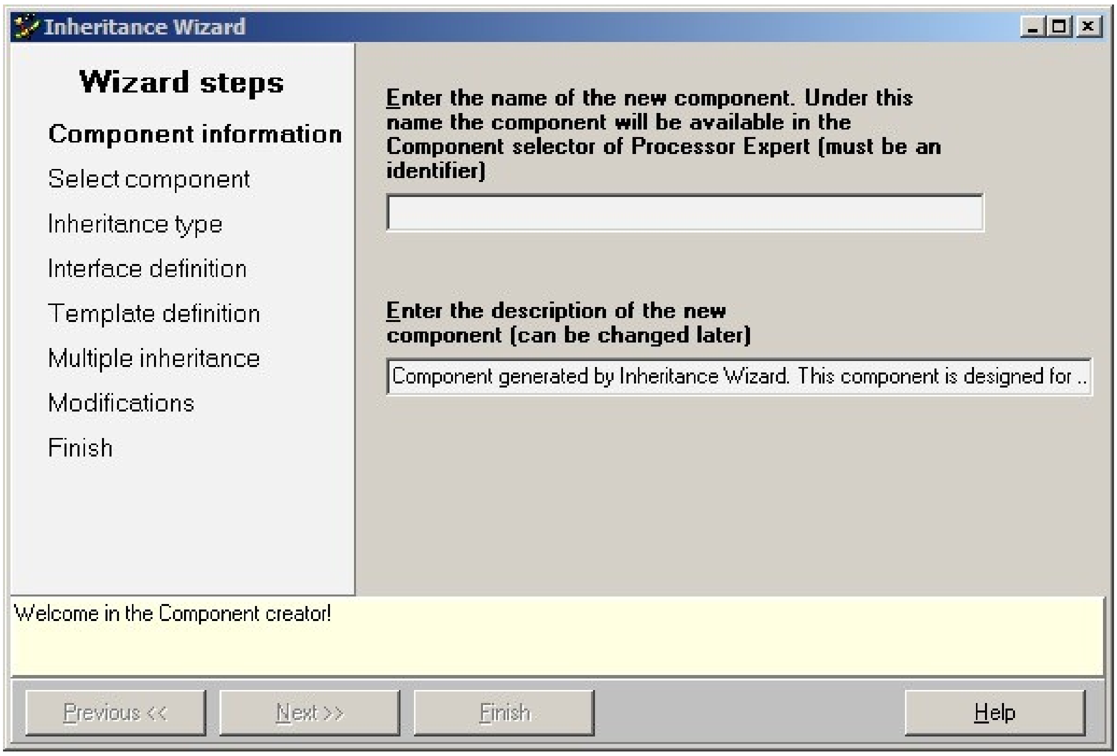
- **Export** - *disabled for importing* in left window
- **Save file list** - creates a text file with the list of files that in the package.
- **Import** - copies files from the package into the disk.
    - If current file is newer than in the package, the confirmation about replacing this file appears.
    - If the package contains more than one component, you will be prompted to select the components you want to import from package.

- **Add file** - *disabled for importing*
- **Delete file** - *disabled for importing*
- **Close** - closes this window and returns to the Component Manager

5.1.4. Inheritance Wizard

The Inheritance Wizard is designed for easy creation of new components that inherit functionality from other components. It guides the user through the whole inheritance process.

For details on inheritance see chapter *2.1 Inheritance* . The functionality of the Inheritance Wizard is demonstrated in tutorial *7.3 Tutorial, Course 3*.



Enter the name of the new component. Under this name the component will be available in the Component selector of Processor Expert (must be an identifier)

Enter the description of the new component (can be changed later)

Component generated by Inheritance Wizard. This component is designed for ..

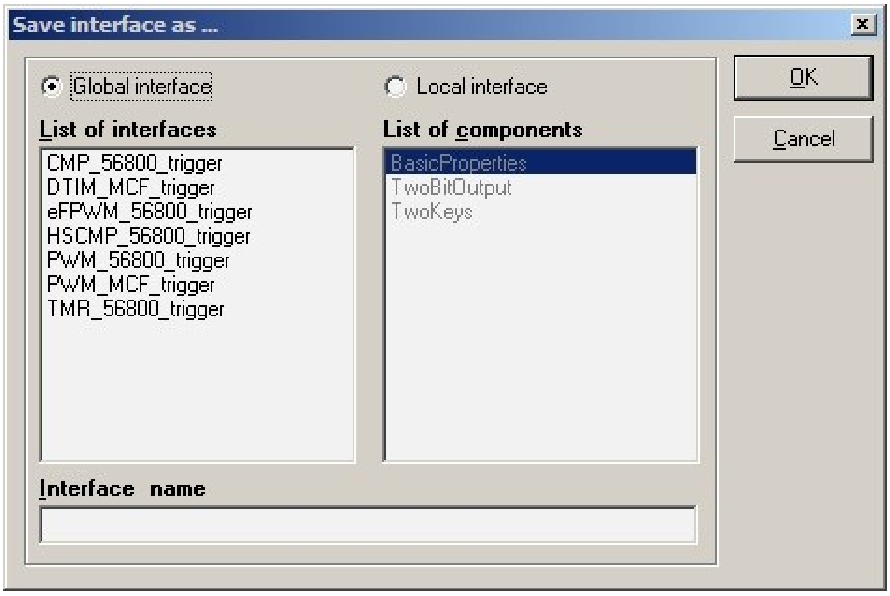
Welcome in the Component creator!

Figure 5.10 - Inheritance Wizard Window

5.1.5. Save Interface Dialog

This dialog appears when an interface is created or saved.

When you are creating new interface, you have to know if the interface will be local or global. For more details about interfaces please see the chapter *2 Basic Terms*



Save interface as ...

● Global interface

○ Local interface

List of interfaces

CMP_56800_trigger
DTIM_MCF_trigger
eFPWM_56800_trigger
HSCMP_56800_trigger
PWM_56800_trigger
PWM_MCF_trigger
TMR_56800_trigger

List of components

BasicProperties
TwoBitOutput
TwoKeys

Interface name

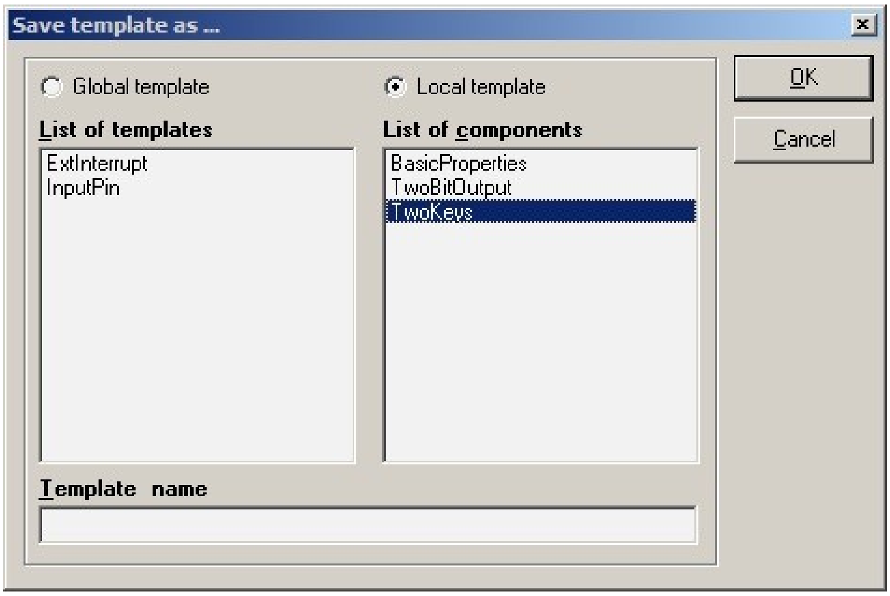
Figure 5.11 - Dialog window

If you want to save the interface as:

- **Local**
  Select the radio button **Local interface** and in the right part of this dialog select the component which will use this interface. (I.e. the component must exists). There is the list of local interfaces for selected component in the left part of this dialog. Enter the name of the new interface (or existing - confirm rewriting of the old file) and click on the button **OK**.
- **Global**
  Select the radio button **Global Interface**.There is the list of global interfaces in the left part of the dialog. Enter the name of the new interface (or existing - confirm rewriting of the old file) and click on the button **OK**.

5.1.6. Save Template Dialog

This dialog window appears when the template is created or saved. When you are creating a template from a component, you have to know if the template will be local or global. For more details about templates look to Basic terms - chapter Templates.



○ Global template ● Local template

ExtInterrupt
InputPin

BasicProperties
TwoBitOutput
TwoKeys

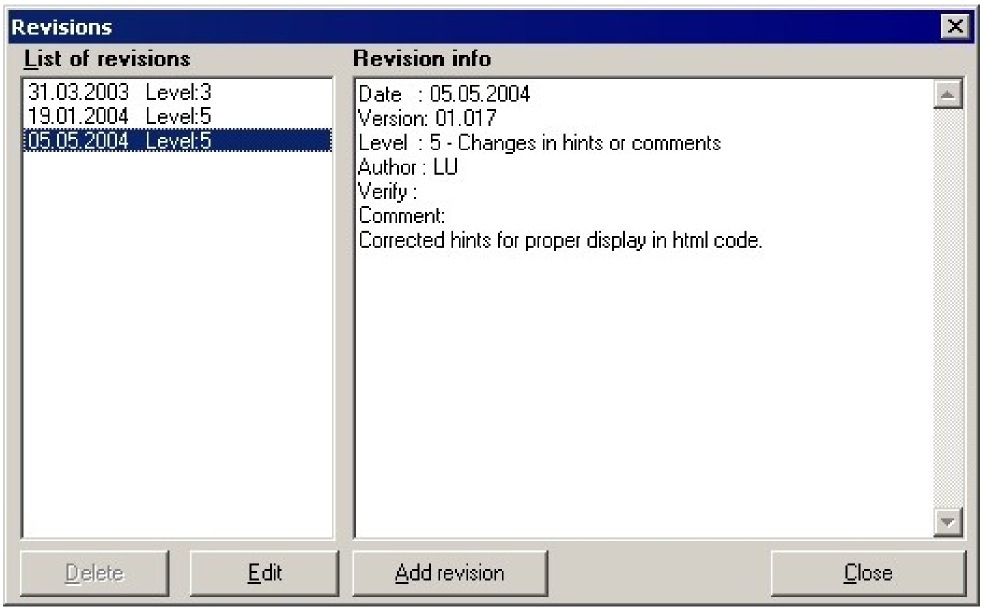
Figure 5.12 - Dialog window

If you want to save the template as:

- **Local**
  Select the radio button **Local template** and in the right part of this dialog select the component where you want to store this template. (I.e. the component must exists). There is the list of local templates for selected component in the left part of this dialog. Enter the name of the new template (or existing - confirm rewriting of the old file) and click on the button **OK**.
- **Global**
  Select the radio button **Global Template**.There is the list of global templates in the left part of the dialog. Enter the name of the new template (or existing - confirm rewriting of the old file) and click on the button **OK**.

5.1.7. Revisions

Revisions are intended for logging changes during the development of a component, ie. the bugs, change of functionality, new features, etc.



31.03.2003 Level:3
19.01.2004 Level:5
05.05.2004 Level:5

Date : 05.05.2004
Version: 01.017
Level : 5 - Changes in hints or comments
Author : LU
Verify :
Comment:
Corrected hints for proper display in html code.

Figure 5.13 - Revision window

Meaning of buttons:

- **Delete** - deletes selected revision. Only new revisions can be deleted. Once the revision is saved together with the component, it cannot be modified.
- **Edit** - edit selected revision. Only new revisions cad be modified. Like button **Delete**. Displays dialog described in **Add/Edit revision chapter**.
- **Add revision** - displays dialog for adding new revision. See **Add/Edit revision chapter**. it is not possible to delete it.
- **Close** - closes window with revisions. To remember changes in revisions save the component.

Add/Edit Revision Dialog

This dialog is common for adding new revisions and for editing already existing revisions.

Meaning of fields:

- **Author** - who made the change
- **Verify** - who checked that the change is correct
- **Comment** - Notes about the revision
- **Date** - date of the revision
- **Change level** - it tells how serious the change is.

  There are six levels of component change:

  - **0 - Fatal change** - total change of component functionality

- **1 - Changes of a method/event** - new methods, method renamed, new or deleted method/event parameters, modified parameters, etc.
- **2 - Property added/removed** - new, deleted or modified properties
- **3 - Property types. init. value** - changes in property types or initialization values
- **4 - User Types, CHG file change** - changes in User types or in CHG file
- **5 - Changes in hints or comments** - only the minor changes (hints of methods, events, parameters, properties and etc.)

Meaning of buttons:

- **OK** - applies changes in new/edited revision
- **Cancel** - cancels the changes in new/edited revision

5.1.8. Create Component

Description

Component Wizard allows to import *.c and *.h module and automatically convert it to the component. The code is analyzed:

1. exported methods (extern methods defined in header file) are inserted into the component (page Methods)
2. text from *.c and *.h is modified:
   - exported methods and variables are renamed to names used in normally generated drivers:
     - method *MethodName* is renamed into *%'ModuleName'%.%MethodName*
     - variable *var* is renamed into *%'ModuleName'%.var*
   - all occurrences of renamed methods (callings) are renamed too
   - exported methods become conditional generated methods
   - include "H module" in C file is commented. This include will be generated automatically, depending on the name of the component.
3. the result is inserted into the driver with macroprocessor language.
4. user definitions of types (by *typedef*) from header file are inserted into the User types page.

After this component is ready for modifications, like:

- define methods description
- adding properties
- adding methods
- adding events
- creating HTML help
- etc..

For an example of importing ANSIC source see here.

Requirements

Requirements on imported code :

1. ANSI-C compatible
2. Limited length of identifiers of functions to 32 characters
3. All methods are defined in one module *.C and exists correct header file *.h. Name of the C and H module must be the same.
4. Macros can be used only for constants definitions
5. No interrupts may be defined in the code
6. No pragmas (#pragma) may be used in the code
7. Conditional macros like #if, #ifdef, etc. can be used only inside of the body of the methods or just only outside of the methods. It is not allowed this construction:

   ```
   #ifdef XXX
         void myFunc(void)
   #else
         int myFunc(int par)
   #endif
   { ... }
   ```

   This construction is allowed:

   ```
   #ifdef XXX
   /* this function is NOT in the header *.h */
        int localFun(int par)
   {
         /* code */
         return ...;
   }
   #endif
   /* this function can be exported in the header *.h */
   void myFunc(int par)
   {
   #ifdef XXX
         int variable=myFunc(par);
   #else
         int variable=0;
   #endif
   }
   ```

8. Return types of methods and types of theirs parameters must be types supported by Component Wizard or must be defined in the H module.
9. macro #include "header_name" can contain only ANSI standard libraries:
   - assert.h
   - complex.h
   - ctype.h
   - errno.h
   - fenv.h
   - float.h

- inttypes.h
- iso646.h
- limits.h
- locale.h
- math.h
- setjmp.h
- signal.h
- stdarg.h
- stdbool.h
- stddef.h
- stdint.h
- stdio.h
- stdlib.h
- string.h
- tgmath.h
- time.h
- wchar.h
- wctype.h

If other user libraries are used, they must be in the path of the imported module. The user is also responsible for setting right paths for these libraries in the Processor Expert project.

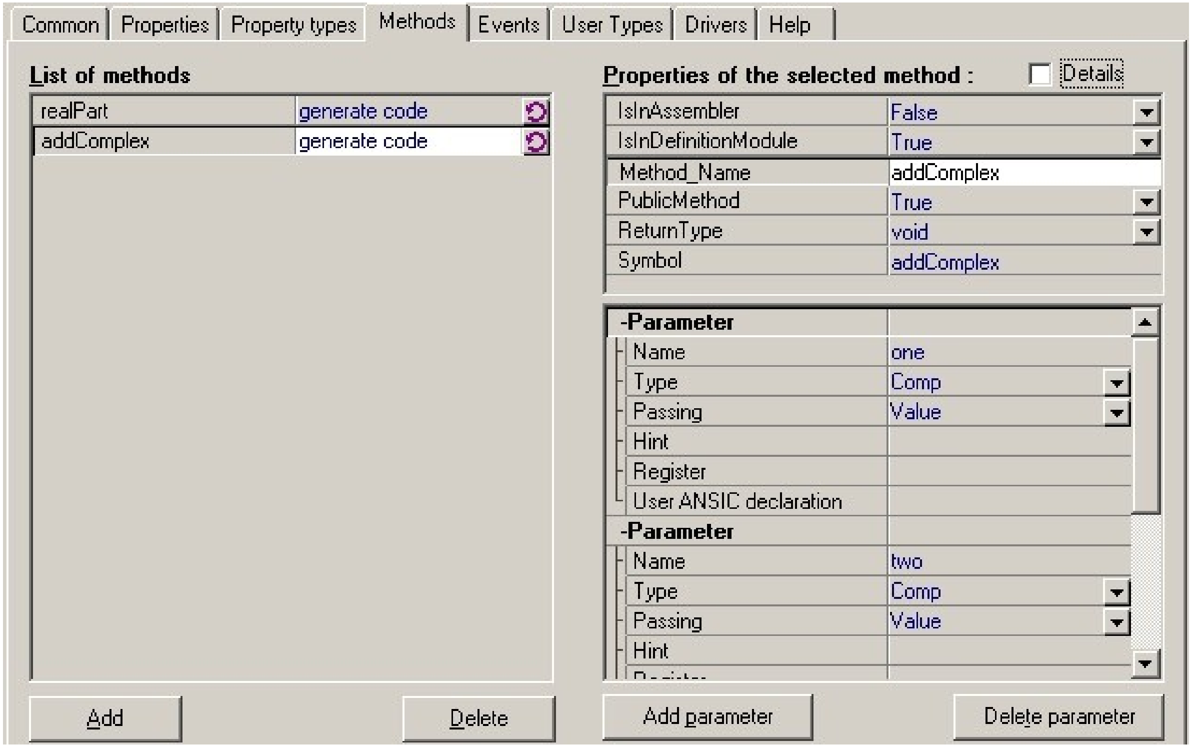
5.1.8.1. Import ANSIC example

Description

Here is a simple example of converting ANSIC source into the component. Bellow you can see:

- H source - importc.h
- C source - importc.c
- generated driver (modified H source and C source). The name of the component is Complex (this name is used for macros %include).
  This driver was generated by these steps:
  - run Component Wizard, or if it is running, choose **File - New Component**
  - choose menu **File - Import - Create component from ANSI C module**
  - browse for file importc.c
  - choose menu **File - Save Component As**. Type Complex.

The following screenshot from page Methods after the import shows two methods created from the functions.



List of methods

realPart	generate code
addComplex	generate code

Properties of the selected method :

IsInAssembler	False
IsInDefinitionModule	True
Method_Name	addComplex
PublicMethod	True
ReturnType	void
Symbol	addComplex

-Parameter	
Name	one
Type	Comp
Passing	Value
Hint	
Register	
User ANSIC declaration	
-Parameter	
Name	two
Type	Comp
Passing	Value
Hint	

Figure 5.14 - Methods page

Example Header File 'importc.h'

```
/* complex number - declare it */
#ifndef __Comp
#define __Comp
typedef struct {
  float Re;
  float Im;
  } Comp, *CompPtr;
#endif

/* return real part of complex number */
float realPart( Comp num );

/* add two complex numbers */
void addComplex( Comp one, Comp two, Comp* result );

/* global variable */
extern Comp globalComp;
```

Example C File 'importc.c'

```
#include "importc.h"

/* global variable */
Comp globalComp;

/* return real part of complex number */
float realPart( Comp num ) {
  return num.Re;
}

/* add two complex numbers */
void addComplex( Comp one, Comp two, Comp* result ) {
  result->Re = one.Re + two.Re;
  result->Im = one.Im + two.Im;
  return;
}
```

Generated driver

Remark: Original lines are marked **bold**.

```
%-Driver generated by the Component Wizard
%-
%- WARNING !
%-
%- Do not make changes to these lines (if you make some changes,
%- you damage this driver)
%- which begins with:
%-
%-  %-STARTUSERTYPES
%-  %-ENDUSRTYPES
%-  /* END %ModuleName. */
%-  /* MODULE %ModuleName. */
%-  %-INTERNAL_METHOD_BEG
%-  %-INTERNAL_METHOD_END
%-  %-INHERITED_EVENT_BEGIN
%-  %-INHERITED_EVENT_END
%-  %-BW_METHOD_BEGIN
%-  %-BW_METHOD_END
%-  %-BW_DEFINITION_START
%-  %-BW_DEFINITION_END
%-  %-BW_IMPLEMENT_START
%-  %-BW_IMPLEMENT_END
%-  %-BW_EVENT_DEFINITION_START
%-  %-BW_EVENT_DEFINITION_END
%-  %-BW_EVENT_IMPLEMENT_START
%-  %-BW_EVENT_IMPLEMENT_END
```

```
%-
%-
%- These lines are not comments, but they are necessary for Component Wizard

%- If you change these lines, Component Wizard will not be responsible for loosing or
%- damaging your code!
%-
%-
%- readyCPU ...
%- readyDEVICE ...
%-
%define DriverAuthor  Author
%define DriverVersion 01.00
%define DriverDate    22.01.2002
%if Language='ANSIC'
%-
%-
%INTERFACE
%define! Settings Common\ComplexSettings.Inc
%define! Abstract Common\ComplexAbstract.Inc
%include Common\Header.h

#ifndef __%ModuleName
#define __%ModuleName

%ifdef SharedModules
/*Include shared modules, which are used for whole project*/
  %for var from IncludeSharedModules
#include "%'var'.h"
  %endfor
%endif
/* Include inherited components */
%ifdef InhrSymbolList
  %for var from InhrSymbolList
#include "%@%var@ModuleName.h"
  %endfor
%else
  %for var from ModuleList
#include "%'var'.h"
  %endfor
%endif

#include "%ProcessorModule.h"

%-STARTUSERTYPES - Do not modify lines between %-STARTUSERTYPES and %-ENDUSRTYPES
%-ENDUSRTYPES
/* MODULE %ModuleName. */

%-STARTUSERTYPES - Do not modify lines between %-STARTUSERTYPES and %-ENDUSRTYPES
```

```
%-ENDUSRTYPES

%-BW_DEFINITION_START
/* complex number - declare it */
#ifndef __Comp
#define __Comp
typedef struct {
  float Re;
  float Im;
  } Comp, *CompPtr;
#endif
/* return real part of complex number */
%-BW_METHOD_BEGIN realPart
%ifdef realPart
float %'ModuleName'%.%realPart( Comp num );
%define! Parnum
%define! RetVal
%include Common\ComplexrealPart.Inc
%endif realPart
%-BW_METHOD_END realPart

/* add two complex numbers */
%-BW_METHOD_BEGIN addComplex
%ifdef addComplex
void %'ModuleName'%.%addComplex( Comp one, Comp two, Comp* result );
%define! Parresult
%define! Partwo
%define! Parone
%include Common\ComplexaddComplex.Inc
%endif addComplex
%-BW_METHOD_END addComplex

/* global variable */
extern Comp %'ModuleName'%.globalComp;
%-BW_DEFINITION_END
/* END %ModuleName. */

#endif /* ifndef __%ModuleName */
%include Common\Header.End
%-
%-BW_EVENT_DEFINITION_START
%-BW_EVENT_DEFINITION_END
%IMPLEMENTATION
%define! Settings Common\ComplexSettings.Inc
%define! Abstract Common\ComplexAbstract.Inc
%include Common\Header.C
```

```
/* MODULE %ModuleName. */

%for var from EventModules
#include "%var.h"
%endfor
#include "%'ModuleName'.h"

%-BW_IMPLEMENT_START
/* #include "importc.h" BW has commented this line */

/* global variable */
Comp %'ModuleName'%.globalComp;

/* return real part of complex number */
%-BW_METHOD_BEGIN realPart
%ifdef realPart
%define! Parnum
%define! RetVal
%include Common\ComplexrealPart.Inc
float %'ModuleName'%.%realPart( Comp num ) {
  return num.Re;
}
%endif realPart
%-BW_METHOD_END realPart

/* add two complex numbers */
%-BW_METHOD_BEGIN addComplex
%ifdef addComplex
%define! Parresult
%define! Partwo
%define! Parone
%include Common\ComplexaddComplex.Inc
void %'ModuleName'%.%addComplex( Comp one, Comp two, Comp* result ) {
  result->Re = one.Re + two.Re;
  result->Im = one.Im + two.Im;
  return;
}
%endif addComplex
%-BW_METHOD_END addComplex
%-BW_IMPLEMENT_END
/* END %ModuleName. */

%include Common\Header.End
%-
%-
%-BW_EVENT_IMPLEMENT_START
%-BW_EVENT_IMPLEMENT_END
%INITIALIZATION
  /* ### %DeviceType "%DeviceName" init code ... */
```

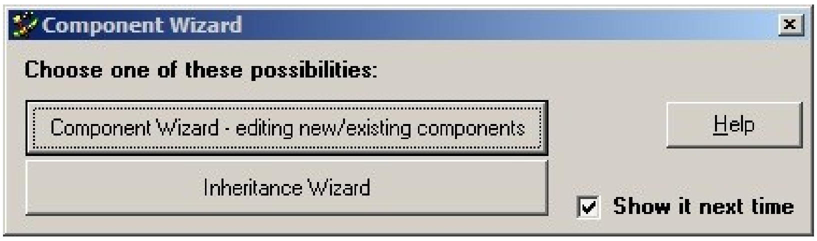
```
%CODE_BEGIN
%CODE_END
%-
%else %- Language (& Compiler)

  %error^ This component is not implemented in selected language & compiler !
%endif %- Language (& Compiler)
%-
%DEBUG
%ALL_SYMBOLS
%-
```

5.2. Startup menu

This window opens if it is enabled in Options. The default state is enabled.

It serves as a startup menu - what you want to do. You may choose from:

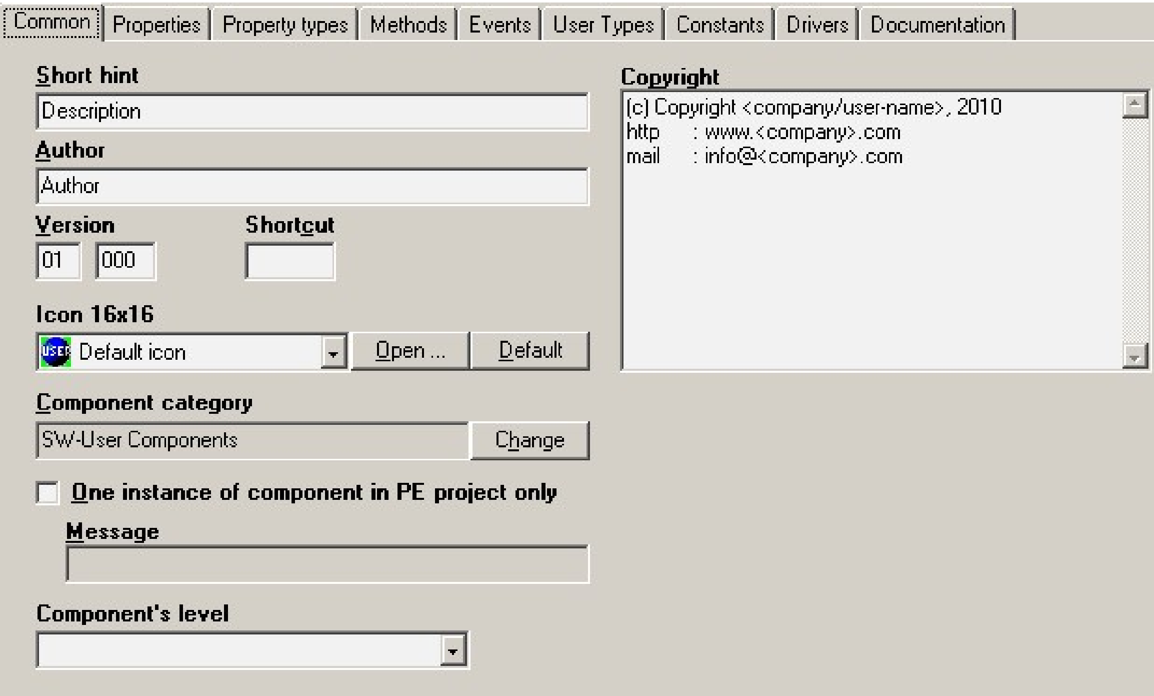
- **Start with Inheritance Wizard** - opens the Inheritance Wizard which is used for inheriting components. For more details look here.
- **Open classic Component Wizard** - opens the Component Wizard which is used for editing and creating components, interfaces and templates. Details of all available pages and functions of the Component Wizard are described here. If this startup menu is disabled, this is selected as a default choice.


Component Wizard
Choose one of these possibilities:
Component Wizard - editing new/existing components
Inheritance Wizard
Help

☑ Show it next time

Figure 5.15 - Startup menu window

5.3. Common page



Short hint: Description

Author: Author

Version: 01 000

Shortcut:

Icon 16x16: Default icon

Component category: SW-User Components

□ One instance of component in PE project only

Message:

Component's level:

Copyright:
(c) Copyright <company/user-name>, 2010
http : www.<company>.com
mail : info@<company>.com

Figure 5.16 - Common Page Picture

Description

- **Short hint** - short description of the component, which is used as hint in Processor Expert
- **Author** - author's name, which will appear in the source code header
- **Version** - version number of the component. To indicate a beta version, use format 00.9X. With every saving the Component Wizard automatically increases the version.
- **Icon** - file name of the icon which will represent the component in the Processor Expert environment. The file must be stored in the same directory as that of the component. The icons must have ".BMP" as extension. All icons must be in 16x16 pixels/16 colors format. If you want to specify a 256 colors icon for the 256 color version of Processor Expert, put the bitmap file of the icon into the directory of the component. The name of icon file must be the name of the 16 colors icon, preceded by the underscore sign. For example, if the 16 colors icon is named "BitIO.bmp", the 256 colors icon must be named "_BitIO.bmp".
- **Shortcut** - This field is optional - when it is filled, this text is used for creating name of the component in the Processor Expert project.
- **Component category** - This field describes the category of the component Software (SW), Hardware (HW), etc. Processor Expert sorts components by categories and displays them in its component selector. This fild is read only, to change category click button Change, dialog Select component category with tree of categories appears.
- **One instance of component in PE project only** - This field is optional - when checked this component can be inserted only once in Processor Expert project.
  If you want one instance of some set of components, every component from this set must have identical message, which is below the checkbox. If the message is empty it affects instances from this component only.
- **Component's level** - This field is optional and it describes the level of the component:

- High Level Component - The basic set of components designed carefully to provide functionality of most microcontrollers on the market.
- Low Level Component - The components dependent on the peripheral structure to allow user to benefit from the non-standard features of a peripheral.
- Peripheral Initialization Component - The lowest level of abstraction. These components cover all features of the peripherals and were designed for initialization of these peripherals.

This information is also displayed in documentation when selected.

See also

Interface info page

5.3.1. Component category

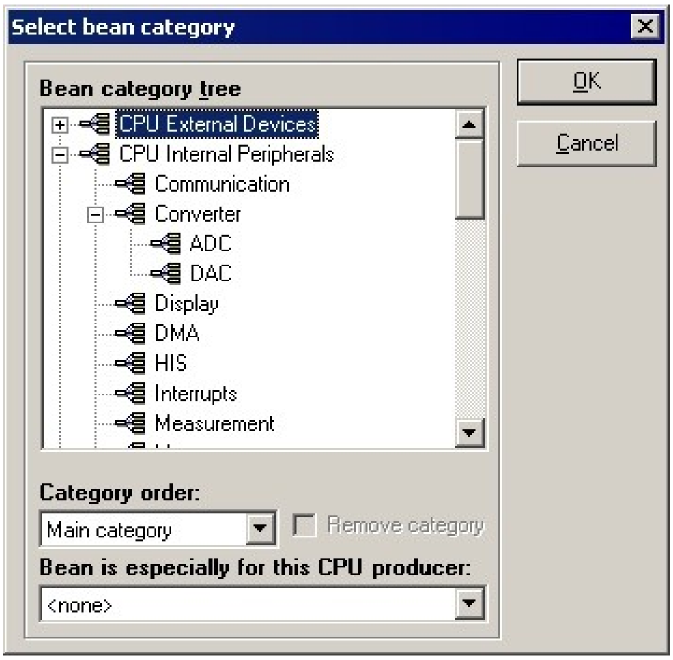


Figure 5.17 - Component category dialog window

Description

- **Component category tree**
  Every component can be sorted into some logic groups accordingly of the function. For example component fast Fourier belongs to SW-Math, component for encapsulating some display device belongs to HW-Display. Select the right category in the tree and click OK.
  Thi dialog window is accessible from page Common.
- **Category order** - The component can be shown in several categories. As the component has to be at least in one category, the *Main category* is mandatory. Other categories are optional.
- **Remove category** - if checked, after the dialog is confirmed by OK button, the category selected in *Category order* field is cleared.
- **Component is especially for this CPU producer** - each category in the tree can be divided into subgroups described by CPU producer. If the component is available for one only CPU producer, select it here. If not, select < *none* >

Remark: Processor Expert sorts components by their category and creates logical groups in the Component selector.

Component Categories

Current categories are:

- HW
  - Sensor
  - Display
  - Communication
  - Converter
  - ADC
  - DAC
  - Memory
  - Keypad/Keyboard
  - Port I/O
  - Peripherals
- SW
  - Virtual peripheral
  - OS configuration
  - Security
  - En/Decryption
  - (De)compression
  - Browser
  - Resource management
  - DSP
  - Controlling
  - Communication
  - Tutorials and demonstrations
  - Data
  - Math
- Internal peripherals
  - Port I/O
  - Interrupts
  - Timer
  - Communication
  - Measurement
  - Converter
  - ADC
  - DAC

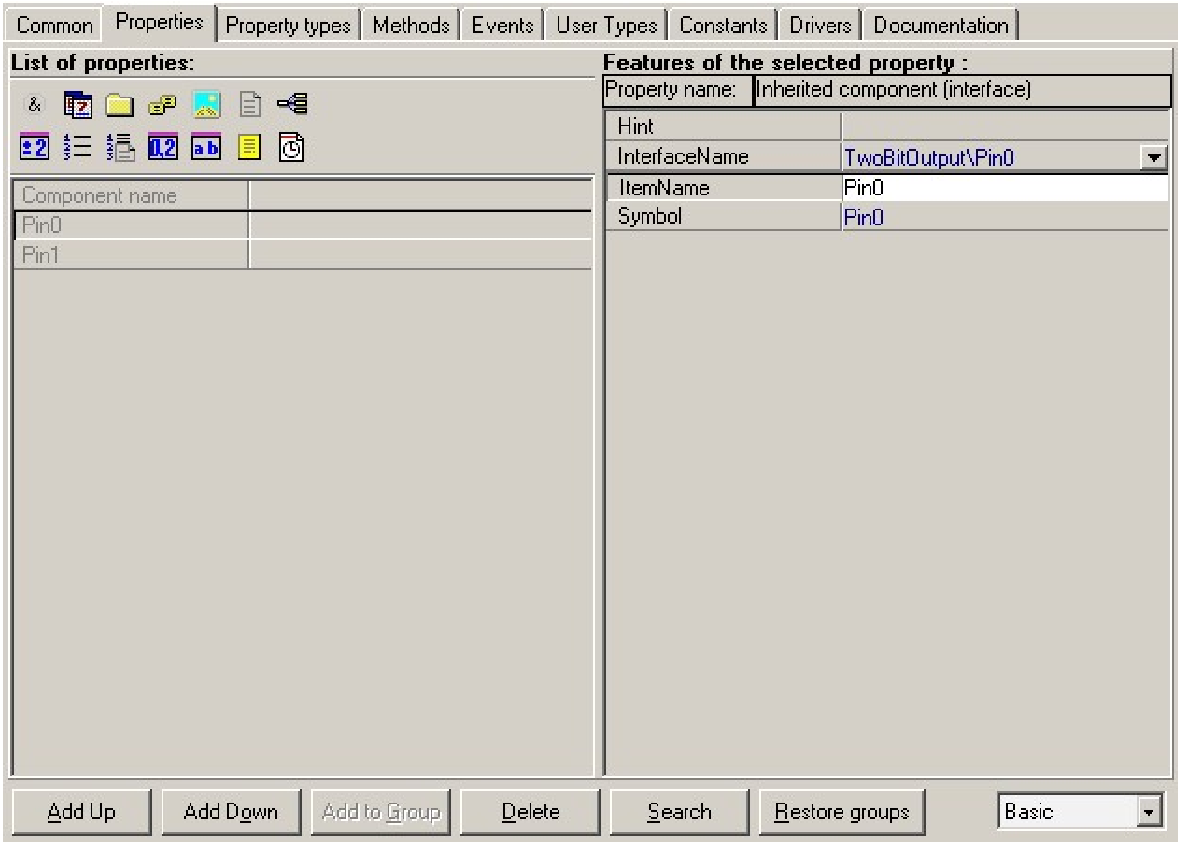
- Memory

CPU producers

Current possible CPU producers:

- < none > - i.e. no CPU producer
- Atmel
- Fujitsu
- Freescale
- Toshiba
- National Semiconductor

5.4. Properties page



Property name: Inherited component (interface)

Component name	
Pin0	
Pin1	

Hint	
InterfaceName	TwoBitOutput\Pin0
ItemName	Pin0
Symbol	Pin0

Figure 5.18 - Page Picture

Description

On this page, you can view, create and modify the properties of the component.

The panel on the left contains the list of the properties and the features of the currently selected property are displayed on the right side. These features influence the behaviour of the property in Processor Expert environment. You can change the amount of shown features from basic ones (Basic) to complete list (Expert) by switching the drop-down selector in the bottom right corner of the window.

Remark: *Each component must have the property Component name, which allows within the Processor Expert environment to delete the component or move it to another position.*

Creating Properties

The basic commonly used properties can be added by clicking one of the icons at the top of the left panel. For description, see the hint available when mouse is placed at icon.

You can also add properties above (**Add Up** button) or below the selected property (**Add Down** button).

If the selected property is a group of properties, you can add a property to this group by pushing the **Add to Group** button.

Properties Management

The selected property can be deleted by clicking the **Delete** button or by pressing the *Delete* key on the keyboard. If the selected property is a group of properties, all the properties in the group will be deleted too.

Search button allows to find a property, by giving the content of its symbol item.

Restore groups button restores the expanded/collapsed state of all groups into the state as the component was loaded.

For easier manipulation of the properties, there are also copy and move functions available:

Moving: To move a property, simply drag and drop it (with left mouse button) inside the left window (list of properties).
If you are moving to a property which belongs to a group, the moved property will be dropped in the same group. To move an item to an empty group, hold "Shift" key down.

Copying: To copy a property, simply drag and drop it (with left mouse button) while holding "Ctrl" key down.
If you are copying to a property which belongs to a group, the copied property will be dropped in the same group. To copy an item to an empty group, hold "Shift" and "Ctrl" keys at the same time.

It is also possible to use the drag and drop facilities of the View Component utility.

Mouse Operations And Context Menus

It is possible to use context menus for the manipulation of properties.

Simple right click

Clicking the right mouse button opens the context menu for Adding and Deleting a property.

Meaning of the menu items:

- Items
  - **Add Up**
  - **Add Down**
  - **Add To Group**
  - **Delete**

  have the same meaning as the buttons in the properties page.
- **Duplicate** - duplicates the selected property (It will create new property of the same type as the selected and
- **Create as new property** - it will save the settings of the selected property and it will be new virtual property. Next time you will add new property item, this property will be in the list of all properties. (For example you can create an *Integer number* property, set the minimal and maximal value to 0 to 255 and store it as *Integer number* - *Byte*. Next time when you add property *Integer number* - *Byte*, this property will have set the minimal and maximal value). it will copy the settings (features) of the existing property into the new property).
- **Add item from ListItemFromFile** - creates a property which is defined in file which was created by the previous action - **Create item of ListItemFromFile**.
- **Create item of ListItemFromFile** - you can save the settings of the property into the file. This file can be used by property *List of items (item is defined in file)*. The link to the file is by the feature *ItemsFile*. Save it into the directory where the component is.
- Submenu **List of items defined in file** - if the selected property is List of items (item is defined in file) this submenu is enabled:
  - **Create new item description** - you can create the *.item file. First of all file dialog appears for specifying the target file name and after that edit modal window appears, the same like this page Properties. There you can edit the type of the item (i.e. properties) for selected List of items (item is defined in file) property.
  - **Edit item description** - you can edit the *.item file. If feature **ItemsFile** is set this menu is enabled and modal window appears, the same like this page Properties. There you can edit the type of the item (i.e. properties) for selected List of items (item is defined in file) property.

  For more details see List of properties and property List of items (item is defined in file) (TListItemFromFile).
- Submenu **Inherited item/Link to component** - if the selected property is *Inherited component (interface)* or *Link to component* (it is used for sharing components), this submenu is enabled:
  - **Inherit component (fast)** - you can quickly inherit a component (create Interface and Template) in a few seconds. If you select this menu item, dialog for fast inheriting appears.
  - **Open interface** - if the property has assigned some interface, you may easily open it and edit it. Save the changes in the component first.

Drag and drop with right mouse button

When you drag and drop with the right mouse button, a context menu for Copying and Moving appears.

Meaning of the menu items:

- **Copy Up** - it copies the source property before the destination property
- **Copy Down** - it copies the source property below the destination property
- **Copy To Group** - if the destination property if *Group property*, it copies the source property into this group

of properties.

- **Move Up** - it moves the source property before the destination property
- **Move Down** - it moves the source property below the destination property
- **Move To Group** - if the destination property if *Group property*, it moves the source property into this group of properties.
- **Assign** - it copies the settings of the features of the selected property to the destination property (if a feature is in source property and it isn't in destination property, this feature is skipped)

Properties and macros

Every property generates macro from its feature**Symbol** and some properties have detailed information which are defined as macros too. For more details see page Macros defined from property.

See also

List of properties

5.4.1. Property List

There is a full list of component properties and properties features. ***Feature*** is "property of the property", settings of one feature of the property. Features influences behaviour of the property in Processor Expert.
List of properties and features is different for Basic and for Professional version.

See also which macros are defined from properties.

Properties in Basic version

List of properties in Basic version

<table>
<tr><td colspan="3"><b>Address in CPU address space</b> - input of any address from the CPU address space. Feature <i>FixedSize</i> defines size of the requested address range or number of the allocated bit if addrONEBIT is selected in <i>AddrType</i>. Processor Expert checks if selected address is inside target CPU address space and type of the memory at the specified address corresponds the component requests. See example in component BasicProperties</td></tr>
<tr><td><i>Feature name</i></td><td><i>Description</i></td><td><i>Templ.</i></td></tr>
<tr><td><b>AddrType</b></td><td>Address Type: EXTERNAL - address in external address space, INTERNAL - address in internal address space (internal memory), RAM, ROM, FLASH, EEPROM - memory type, FIRMWARE - address in internal memory for firmware, IO - I/O space for controll registers, CODE - address only in code memory, DATA - address only in data memory, ONETYPEONLY - address rnage must be selected only in one memory type, ALLOCATE - address range is allocted, e.g. exclusivelly used (cannot be shared for example with compiler), ONEBIT - only one bit (see feature SizeOrBitNum), MULTIBITS - several bits (see feature NumOfBits)</td><td>No</td></tr>
<tr><td>EnabledRadix</td><td>supported number system: binaty, octal, decadic, hex</td><td>No</td></tr>
<tr><td><b>FixedSize</b></td><td>fixed memory size in addresable units; the value is valid only if feature "SizeOrBitNum" is not assigned</td><td>No</td></tr>
<tr><td><b>Hint</b></td><td>item's description, simple HTML formating is supported (see Component Wizard user documentation for details)</td><td>No</td></tr>
</table>

ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxValue	maximal value, value is valid only if >=MinValue otherwise it is ignored	No
MinValue	minimal value, always valid	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes
ValueRadix	selected number system for items value (see also feature EnableRadix)	Yes

Group - boolean (expanded/not expanded) - group of items, possible values are "Enabled" or "Disabled". You can change *TypeSpecName* to change these two possible values. You can edit new type in Property types page.
See example in component BasicProperties

Feature name	*Description*	*Templ.*
DefineSymbol	determines way how the item value will be defined for macroprocessor: either value yes/no, or defined/undefined symbol or text value of the item	No
Expanded	determines if the group is expanded	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
TypeChangeAble	determines if the item's type (see feature TypeSpecName) may be changed in CHG script	No
TypeSpecName	name of the item's type, type contains additional informations for the item, it is supported for items {TEnumItem}, {TBoolItem}, {TBoolGrupItem}, {TEnumGrupItem}	No
Value	item's value (group is enabled/disabled)	Yes

Boolean yes / no - input of boolean value, possible values are "yes" or "no". You can change *TypeSpecName* to change these possible values. You can edit new type in Property types page. See example in component BasicProperties

Feature name	*Description*	*Templ.*
GetTextValueIndex	determines if the item define index otherwise text value. This feature is ignored if the item's type contains user defined symbols for each item. If this feature is TRUE for boolean item, symbol is defined/undefined according to item's value.	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No

ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
TypeChangeAble	determines if the item's type (see feature TypeSpecName) may be changed in CHG script	No
TypeSpecName	name of the item's type, type contains additional informations for the item, it is supported for items {TEnumItem}, {TBoolItem}, {TBoolGrupItem}, {TEnumGrupItem}	No
Value	item's value	Yes

External bitmap file - external bitmap file, supported format: "BMP". You can restrict number of colors in selected file by setting up the feature *BitmapFormat*. See example in component BasicProperties		
Feature name	*Description*	*Templ.*
BitmapFormat	determines required picture format: - Any - no limitations, - BW - black&white, - Color - color, - Col16 - 16 colors, - Col256 - 256- colors	No
FileDefine	determines way how the item defines its value: NONE, BINARY, TEXT	No
Filter	determines filter for file selection	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes

Date - input of date. You can specify possible date range using features *MinDateValue* and *MaxDateValue*. Date is displayed/editable in format specified in Regional setting of your Windows Operating System (short date format). See example in component BasicProperties		
Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxDateValue	the newest supported date in Windows format	No
MinDateValue	the oldest supported date in Windows format	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Text	item's initial value	Yes

Directory - selection of directory on the disk. See example in component BasicProperties

Feature name	*Description*	*Templ.*
ExcludeTrailBackSlash	format of the value	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes

Enumeration - selection of one of predefined values. You can edit type (list of items) in Property types page. You can choose type of the item in *TypeSpecName*. See example in component BasicProperties

Feature name	*Description*	*Templ.*
GetTextValueIndex	determines if the item define index otherwise text value. This feature is ignored if the item's type contains user defined symbols for each item. If this feature is TRUE for boolean item, symbol is defined/undefined according to item's value.	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
Index	index of items value	Yes
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ItemsCount	number of items in the popup list	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
TypeChangeAble	determines if the item's type (see feature TypeSpecName) may be changed in CHG script	No
TypeSpecName	name of the item's type, type contains additional informations for the item, it is supported for items {TEnumItem}, {TBoolItem}, {TBoolGrupItem}, {TEnumGrupItem}	No

External file - external file. See example in component BasicProperties

Feature name	*Description*	*Templ.*
FileDefine	determines way how the item defines its value: NONE, BINARY, TEXT	No
Filter	determines filter for file selection	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No

ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes

Group of items - simple group of items. Feature *Expanded* defines the group default setting (expanded/not expanded). See example in component BasicProperties

Feature name	*Description*	*Templ.*
Expanded	determines if the group is expanded	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Text	item's initial value	No

Inherited component (interface) - link to inherited component. The inherited component is described by interface specified by feature *InterfaceName*.

Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
Index	index of items value	Yes
InterfaceName	name of interface	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
ShowInheritedMethodsEventsInPrjTree	display all methods and events of inherited component in the project tree	No
Symbol	identifier, unique item's identification in the list	No
Value		Yes

Link to component - link to shared component. The shared component is described by interface specified by feature *InterfaceName*

Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No

InterfaceName	name of interface	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
SortStyle	setting for sorting of values in popup list (criteria are listed from lowest to highest priority): - ALPHA - alphabetically, - DONT_PUT_DOWN_INTERNAL_SIGNALS - internal signals shout NOT be placed at the end of the list, - USED - used peripherals should be at the end of the list, - EICON - values with exclamation mark, that is not possible to use, at the end	No
Symbol	identifier, unique item's identification in the list	No

Integer number - signed - input of signed integer value. Input value can be written in enhanced format supported in version 2.34 or higher: *{format}:{number}*, where *{format}* is ***H*** for hexadecimal numbers, ***D*** for decimal numbers, ***O*** for octal numbers and ***B*** for binary numbers and *{number}* is value is specified format. For example: H:F0, D:240 and B:1111111100000000 are the same values.See example in component BasicProperties

Feature name	*Description*	*Templ.*
EnabledRadix	supported number system: binaty, octal, decadic, hex	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxValue	maximal value, value is valid only if >=MinValue otherwise it is ignored	No
MinValue	minimal value, always valid	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes
ValueRadix	selected number system for items value (see also feature EnableRadix)	Yes

List of items - input of several items of the same type. Type of the item is defined in the *ItemsType* feature (see below). User can modify number of these items. See example in component BasicProperties

Feature name	*Description*	*Templ.*
Expanded	determines if the group is expanded	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ItemsName	prefix of names of list items	No
ItemsSymb	prefix of symbols of list items (item has no meaning for values inside group)	No

ItemsType	type of list item	No
ItemsTypeSpecName	setting for list item feature TypeSpecName	No
MaxItems	max number of items in the list	No
MinItems	min number of items in the list	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Text	item's initial value	No

List of items (item is defined in a file) - input of several items of the same type. Type of the item is defined in external file (*.item). The file may be created and modified using the commands from properties popup menu. User can modify number of these items.
*Remark:*The *.item file can contain only one property in the root. If you need more properties in each item record, you have to create property **Group of items** in the root and all properties you need put into this group.

Feature name	*Description*	*Templ.*
Expanded	determines if the group is expanded	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ItemsFile	relative path and file name, that contains definition of the list item	No
ItemsName	prefix of names of list items	No
ItemsSymb	prefix of symbols of list items (item has no meaning for values inside group)	No
MaxItems	max number of items in the list	No
MinItems	min number of items in the list	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Text	item's initial value	No

Real number - input of real number value.

Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxValue	max items' value	No
MinValue	min item's value	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No

Value	item's value	Yes

Speed mode setting (Enable/Disable) - speed mode enabled/disabled - necessary for components which inherit from time- dependent hardware components. It is better to drag&drop group of these items from any time-dependent Processor Expert component than edit this item manually.See example in component BasicProperties

Feature name	*Description*	*Templ.*
GetTextValueIndex	determines if the item define index otherwise text value. This feature is ignored if the item's type contains user defined symbols for each item. If this feature is TRUE for boolean item, symbol is defined/undefined according to item's value.	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
TypeChangeAble	determines if the item's type (see feature TypeSpecName) may be changed in CHG script	No
TypeSpecName	name of the item's type, type contains additional informations for the item, it is supported for items {TEnumItem}, {TBoolItem}, {TBoolGrupItem}, {TEnumGrupItem}	No
Value	item's value	Yes

String - input of string. See example in component BasicProperties

Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxLength	max string length	No
MinLength	min string length	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Value	item's value	Yes

String list - input of text with multiple lines. See example in component BasicProperties

Feature name	*Description*	*Templ.*
AcceptNonPrintChars	determines if non-printable characters are supported by the item	No

DefineList	determines if the list of list of characters (i.e. list of lines, each line is list of characters) is defined (as macro symbol with suffix List).	No
ExternEditorEnabled	determines if it is supported external editor for item's value	No
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
ReadOnly	determines if the item's value is only for reading	Yes
StringList	item's value	Yes
Symbol	identifier, unique item's identification in the list	No

Time - input of time. You can specify allowed time range using features *MinTimeValue* and *MaxTimeValue* . See example in component BasicProperties

Feature name	*Description*	*Templ.*
Hint	item's description, simple HTML formating is supported (see Component Wizard user documentation for details)	No
ItemLevel	item's view level: BASIC, ADVANCED, EXPERT, HIDDEN	Yes
ItemName	item's name displayed in first column	No
MaxTimeValue	the newest supported time	No
MinTimeValue	the oldest supported time	No
ReadOnly	determines if the item's value is only for reading	Yes
Symbol	identifier, unique item's identification in the list	No
Text	item's initial value	No

Legend:
Feature marked as **bold** are compulsory. It has no default value and has to be configured.
Feature name - name of the feature
Description - description of the feature
Templt. - if the feature is shown in templates

Example

There is complete component BasicProperties in this version of Component Wizard. This component contains all properties provided in Basic version of Component Wizard.

5.4.1.1. Feature link

Component Wizard - Links (Professional Component Wizard only)

Description

Some property features need to be linked to a specific property. For example, the **direction** feature of a **Pin** (Pin/Port) property needs to be linked to a **Direction** property. Thus, when you create a **Pin** property, you need to create also a **Direction** property. In the **direction** feature of the **Pin** property, you will then select the symbol of the **Direction** property.

The features of many properties can be linked to the same property. For example, the **direction** feature of 8 **Pin** properties can be linked to the same **Direction** property. As a consequence, they will all have the same direction.

Some links are already available within Processor Expert. For example for the **direction** feature of a **Pin** Property, you can select **_PE_OutputDir** (output only) or **_PE_InputDir** (input only). In this case, you do not need to create a **Direction** property. These links are listed in the next paragraph.

Available Links

- **_PE_OutputDir**: Direction property fixed to output
  - Type=TDrctItem
  - Symbol=_PE_OutputDir

- **_PE_InputDir**: Direction property fixed to input
  - Type=TDrctItem
  - Symbol=_PE_InputDir

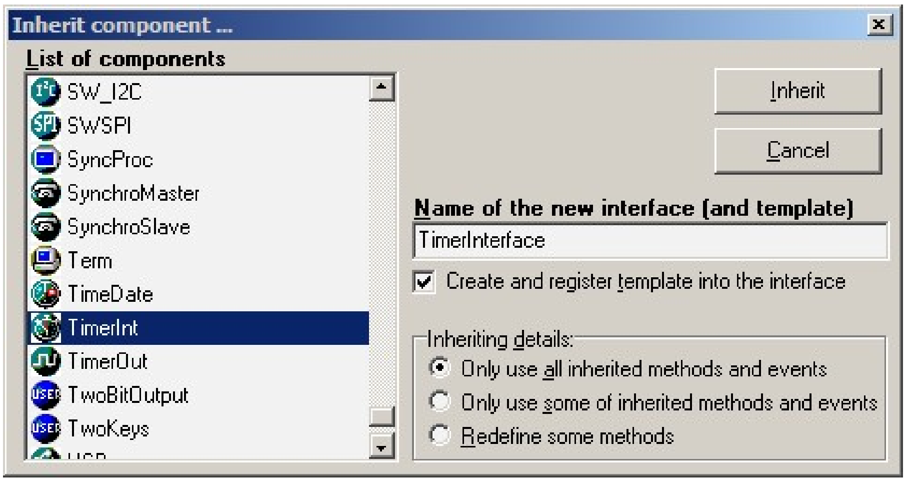
- **_PE_False**: Boolean property fixed to false
  - Type=TBoolItem
  - Symbol=_PE_False

5.4.2. Fast Inheriting

If you want to inherit/share components into a new component, you should use the Inheritance Wizard. For details on inhteritance see chapter *2.1 Inheritance*. Fast inheriting offers a simplified and quick method of inheriting/sharing a component.

1. Switch to page Properties
2. Add new property **Inherited component (interface)** for inheriting a component or property **Link to component** to share a component.
3. Click with the right mouse button on this property and the context menu will appear.
4. Select the submenu **Inherited item** and then click on the menu item **Inherit component (fast)**
5. The dialog appears (see bellow) - select the component you want to inherit and fill the edit line (name of the interface and template)
6. Click the button **Inherit**

Dialog Description



Name of the new interface (and template)
TimerInterface

☑ Create and register template into the interface

Inheriting details:
● Only use all inherited methods and events
○ Only use some of inherited methods and events
○ Redefine some methods

Figure 5.19 - Fast inheriting dialog

Meaning of the buttons:

- **Inherit** - creates an interface and template, modifies the property **inherited component** and closes this window.
- **Cancel** - cancels the fast inheriting - closes this window.
- **Create and register template into the interface** - if checked the template is created and registered. If not, the component is registered directly into the interface. If you want to later set/change the properties of the inherited component or set some methods/events as read only, etc. create the template.
- **Inheriting details** - you can specify for what the component will be used and what changes in the inherited component you will do:

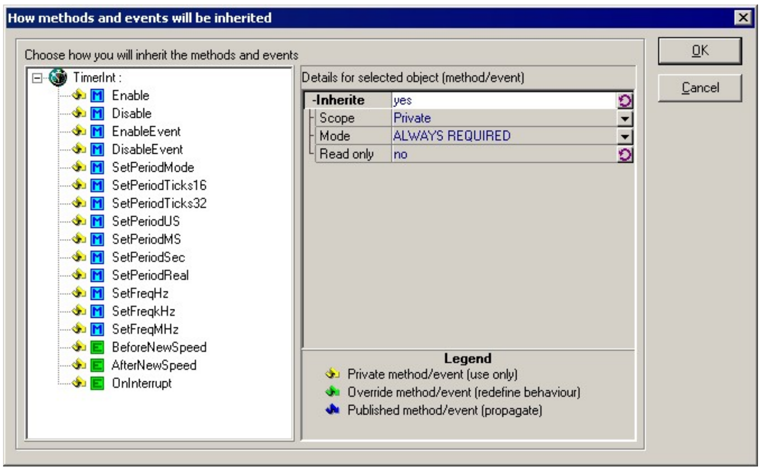
  a. Only all inherited methods and events - the component will be used only for calling already existing methods.

  b. Only use some of inherited methods and events - the component will be used only for calling already existing methods but inherite all methods is not necessary. See inheriting details picture for more details. This dialog appears after click on button OK.

  c. Redefine some methods - the component will be inherited for changing behaviour and/or extending its functionality for another inheriting. See inheriting details picture for more details. This dialog appears after click on button OK.

Edit line **Name of the interface and template** - Enter the file name (without extension) of the interface and the template. If the collision of the names occurs, then similar names will be used.

Fast Inheriting Configuration Dialog



How methods and events will be inherited

Choose how you will inherit the methods and events

TimerInt :
- Enable
- Disable
- EnableEvent
- DisableEvent
- SetPeriodMode
- SetPeriodTicks16
- SetPeriodTicks32
- SetPeriodUS
- SetPeriodMS
- SetPeriodSec
- SetPeriodReal
- SetFreqHz
- SetFreqkHz
- SetFreqMHz
- BeforeNewSpeed
- AfterNewSpeed
- OnInterrupt

Details for selected object (method/event)

-Inherite	yes
Scope	Private
Mode	ALWAYS REQUIRED
Read only	no

Legend
- Private method/event (use only)
- Override method/event (redefine behaviour)
- Published method/event (propagate)

Figure 5.20 - Inheriting details picture

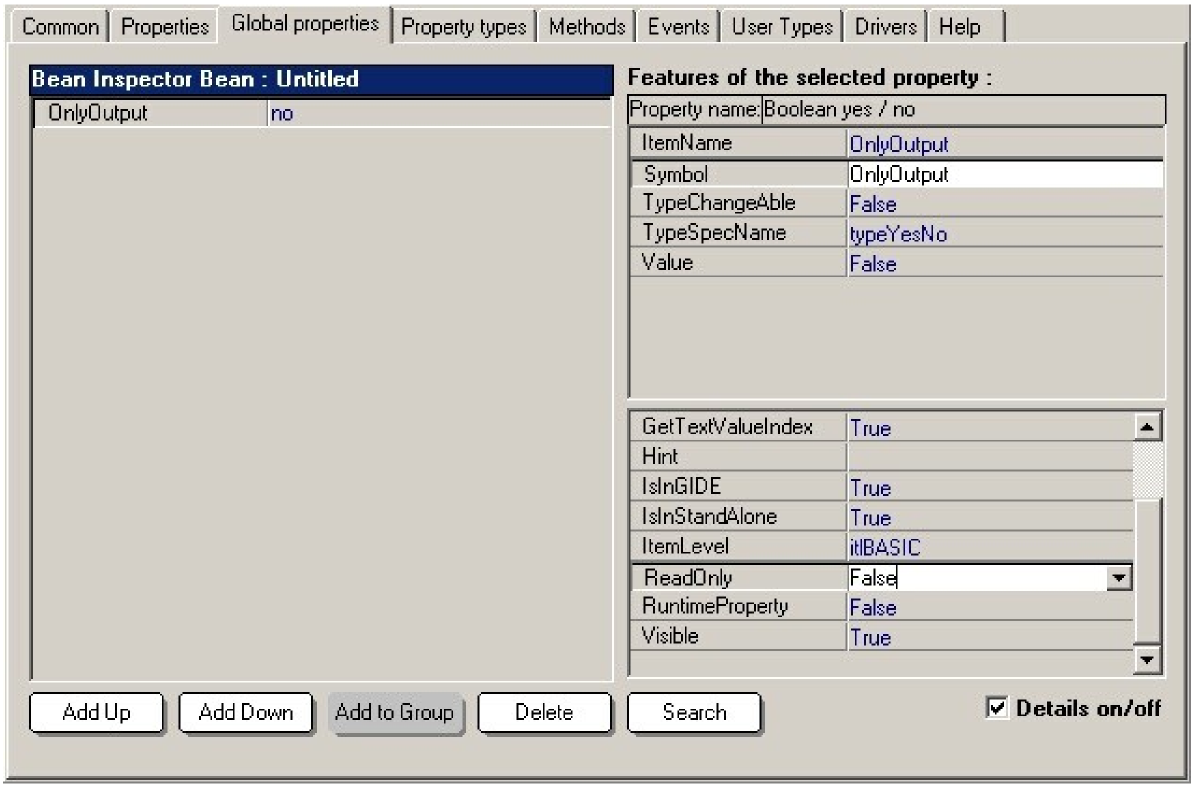
In this dialog you can configure the interface, i.e. how the inherited methods will be inherited if they will be inherited. The panel with a tree on the left contains the list of component's methods. The inheritance parameters for the selected method or event can be configured in the panel on the right.

For more details about scope and mode see chapters *5.14 Methods page* and *5.15 Events page*.

*Note:*The automatically created interface can also be modified later.

5.5. Global properties page

Notice: This page is available in Professional Component Wizard only



Bean Inspector Bean : Untitled

OnlyOutput	no

Features of the selected property :

Property name: Boolean yes / no

ItemName	OnlyOutput
Symbol	OnlyOutput
TypeChangeAble	False
TypeSpecName	typeYesNo
Value	False

GetTextValueIndex	True
Hint	
IsInGIDE	True
IsInStandAlone	True
ItemLevel	itlBASIC
ReadOnly	False
RuntimeProperty	False
Visible	True

Figure 5.21 - Page Picture

Description

On this page, you can create the global properties of the component.

Difference between "properties" and "global properties":
Global properties are not visible within the Processor Expert environment. You may create as global properties the properties that are used as links for the features of other properties and that do not require to be visible for the user. As a result, you increase the readability of your properties page within Component Wizard.

Let's give an example. The **Direction** feature of a **Pin** (Pin/Port) property needs to be linked to a **Direction** (Direction Input/Output/Input-Output) property. If the direction of the pin is not to be modified within Processor Expert, and thus, has to be invisible, you may create the **Direction** property into the Global properties page.

Remark: *in fact, this is not a typical example, because some links (input only and output only) for the direction feature of Pin properties are already included into Processor Expert, and you might not have to create a Direction property*.
Remark: *It is also possible to create invisible properties into the properties page, by setting the feature **Visible** to **False**. The advantage of creating them into the Global Properties page is that you separate the visible properties from the others and get subsequently a clearer overview.*

In the rest of the description, for simplification, global properties will just be called properties.

The created properties are listed on the left side and the features of the selected property are displayed on the other side. These features are the features of the property edit item in the Processor Expert environment. You may visualize only the essential features by unchecking the **Details on/off** check box.

You can add properties above (**Add Up** button) or below the selected property (**Add Down** button). If the selected property is a group of properties, you can add a property to this group by pushing the **Add to Group** button.

The selected property can be deleted by clicking the **Delete** button or by pressing the Delete key of the keyboard. If the selected property is a group of properties, all the properties of the group will be deleted too. **Search** allows to find a property, by giving the content of its symbol item.

For easier manipulation of the properties, there are also copying and moving facilities.

Moving: To move a property, simply drag and drop it (with left mouse button) inside the left window (list of properties).

If you are moving to a property which belongs to a group, the moved property will be dropped in the same group. To move an item to an empty group, hold "Shift" key down.

Copying: To copy a property, simply drag and drop it (with left mouse button) holding "Ctrl" key down.

If you are copying to a property which belongs to a group, the copied property will be dropped in the same group. To copy an item to an empty group, hold "Shift" and "Ctrl" keys at the same time.

It is also possible to use the drag and drop facilities of the View Component utility.

Remark: *It is possible to use context menus for the manipulation of properties. Clicking the right mouse button opens the context menu for Adding and Deleting a property. And when you drag and drop with the right mouse button, a context menu for Copying and Moving appears.*

5.6. Component Property type page

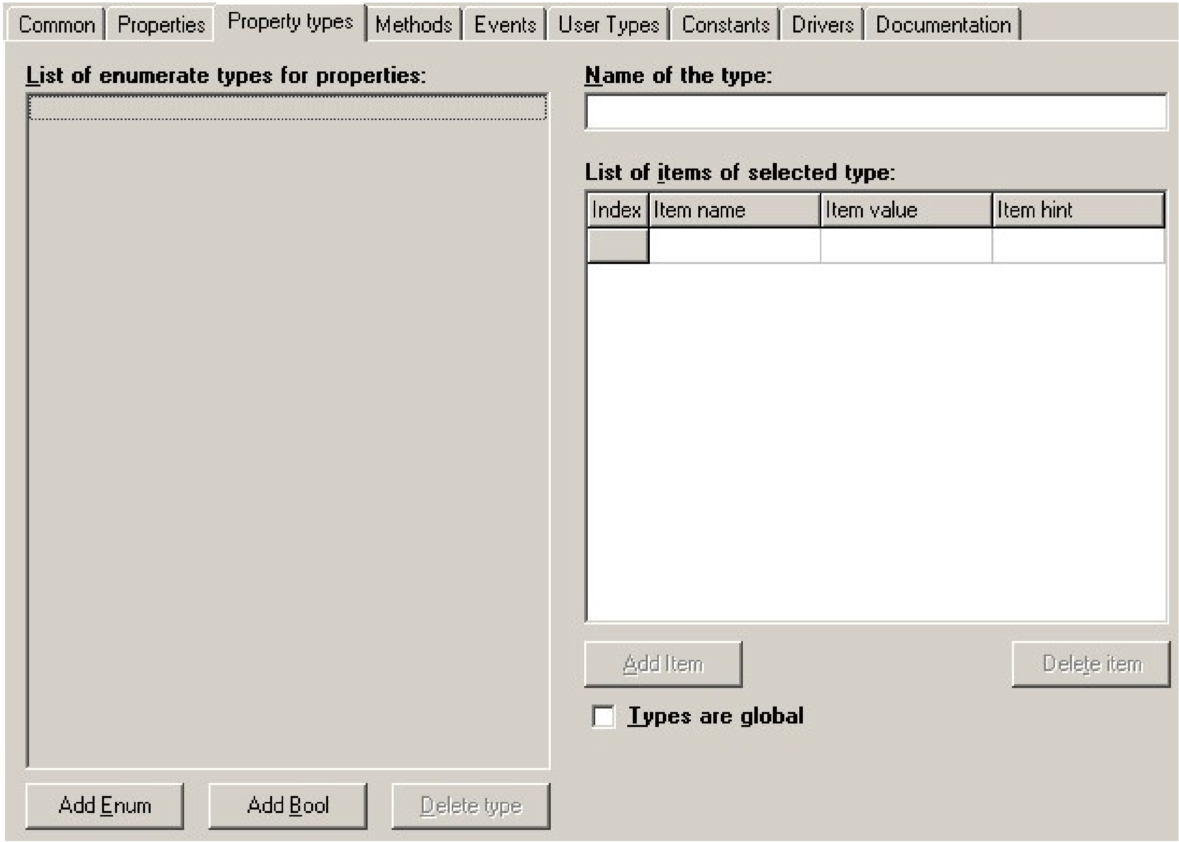


Figure 5.22 - Property types page

Description

In this page, you can create your own enumerate types.

You can use the buttons or the context menu in order to add and delete enumeration types/items.

There are two types of enumerate types :

- Enumeration of 1 or more item(s) - **Add Enum** button
- Enumeration of 2 items only. It is used for boolean based properties. - **Add Bool** button

These two types are used by the properties of the **Enumerate** type.

Every item for enumeration have these subitems:

- **Item name** - compulsory - fill in the name of the item - it is displayed in Processor Expert
- **Item value** - optional - The **Enumeration property** in a Macroprocessor language defines its value from the **Item value** if defined otherwise from the **Item name**.
  Remark: All **Item value** must be empty or defined at a time for current property type. It's not allowed to have some **Item value**s defined and the others not!
- **Item hint** - optional - hint for this item - this text will be displayed in processor expert as a context help.

Changing the order of the items:
You can change the order using the drag and drop function on the left grayed column (the column with the indexes). Drag the desired row and drop at the new position.

Remark: If you are currently using a created type in the "Properties" page, you cannot delete it.
Types are global - this check box determines whether the user types will be local or global. If the box is checked, the types will be global and other components share this file and the file is located in the directory "*Beans*.tps*". If you want to keep these types hidden from other components, make the file local. The file is then located in the same directory as that of the component.

User enumerate type file - name of the file, which will contain the global enumeration types. By default, it is the name of the component. The created file will have the extension "*.TPS*", which is automatically added to the input name.

*Remark: To use already created global types check "**Types are global**" and select the wished user types after clicking **Open** button. These types will be loaded automatically.*

Context menus

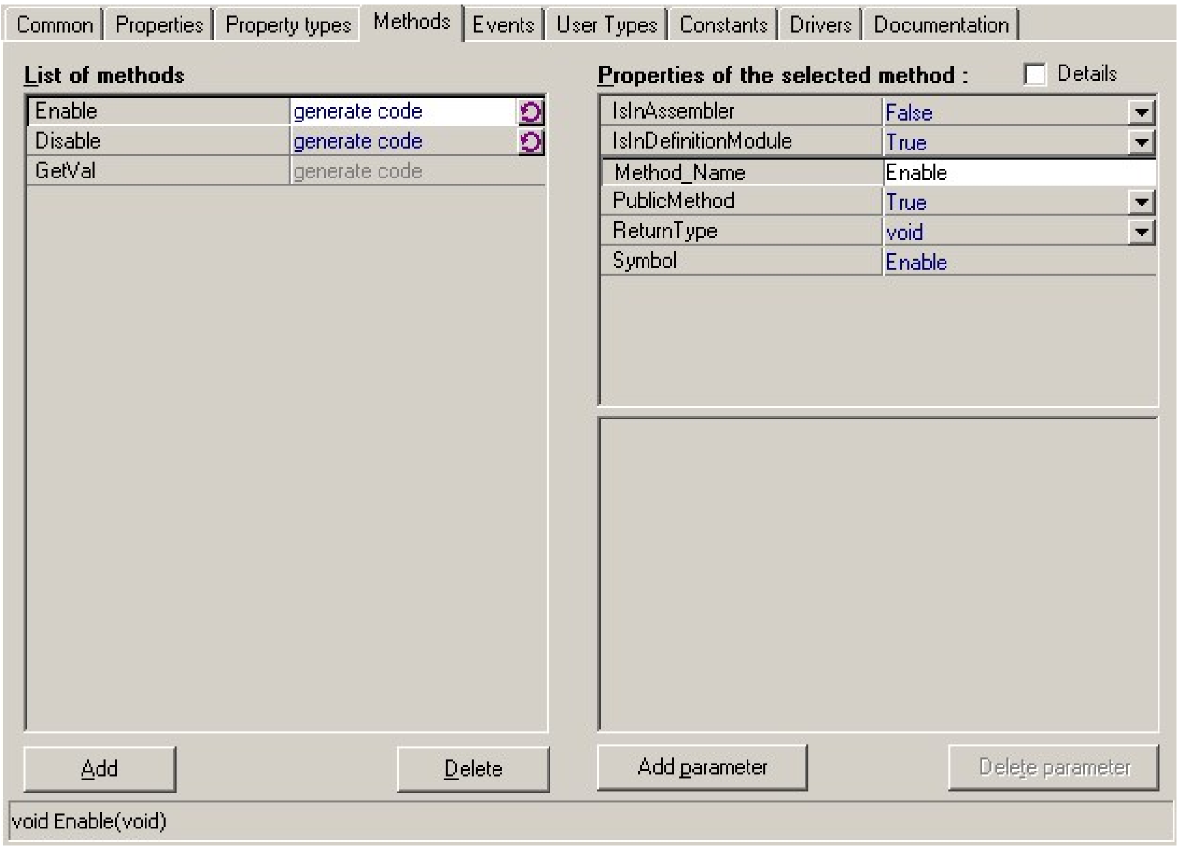
It is possible to use context menus for the manipulation of property types.

Simple right click

Clicking the right mouse button (in the list box *List of enumeration types for properties*) opens the context menu for Adding and Deleting a property type.

- **Add Enum** - add Enumeration of 1 or more item(s) - the same action as **Add Enum** button
- **Add Boolean Enum** - add Enumeration of 2 items only - the same action as **Add Bool** button
- **Delete Enum** - delete selected enumeration - the same action as **Delete type** button

5.7. Methods page



Enable	generate code
Disable	generate code
GetVal	generate code

IsInAssembler	False
IsInDefinitionModule	True
Method_Name	Enable
PublicMethod	True
ReturnType	void
Symbol	Enable

void Enable(void)

Figure 5.23 - Methods page

Description

On this page, you can create and configure the methods of the component. The created methods are listed on the left side and properties of the selected method are displayed on the other side.

A method has the following properties :

Meaning of buttons:

- **Details** - shows or hides details for selected method. Necessary features to set are always visible.
- **Add** - adds new method
- **Delete** - deletes selected method
- **Add parameter** - adds new parameter to selected method
- **Delete parameter** - deletes selected parameter for current method

Properties of selected method :

- **Symbol** - name of the method (the same name as in the left window)
- **Method_Name** - the same as **Symbol** (it is a synonym)
- **Hint** - hint displayed in the Processor Expert environment and method description of the help file. See Help Page.

- **IsInAssembler**- if the method is implemented in assembler
- **IsInDefinition module** - if it is in the definition module (when the method is not public)
- **PublicMethod** - if the included method is public
- **ReadOnly** - if the method is in Processor Expert read only, i.e. the **Value** cannot be changed (*generate code* or *don't generate code*)
- **ReturnHint** - hint for the return type, displayed in the Processor Expert environment (default value you may set in Options - Default values page)
- **ReturnType** - type of the returned value. (void means that the method has no return value) (default value you may set in Options - Default values page)
- **Selected** - generation source code into the driver (in Processor Expert Code design). There are four possibilities:
  - **selYES** - Method will be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to true)
  - **selNO** - Method will not be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to false)
  - **selNEVER** - Method will not be generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to false)
  - **selALWAYS** - Method will be always generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to true)
- **Value** - if the method is included in the component (it will be generated into the driver or not - in Processor Expert Code design)
- all other method properties which are not described here, are described in properties' features.
- **UserMethodName** - If you want to display another name in the Processor Expert. It is recommended for advanced users only!

Properties of each parameter :

- **Name** - name of the parameter displayed and used in Processor Expert
- **Type** - type of the parameter (selected from the list)
- **Passing** - how the parameter is passed to the method
- **Hint** - hint for the parameter displayed in the Processor expert environment and parameter description in help files. See Help Page.

You can use the buttons to add and delete methods/parameters.

It is also possible here to use the drag and drop facilities of the View Component utility.

If you have filled the driver and language sections of the Drivers page, Component Wizard can automatically find a method in the driver by right clicking on the method (in the left window). A context menu appears, where you can select either the definition, implementation or the help part of the selected driver and language. Using double-click (left mouse button), you may automatically go to the implementation part of the selected driver. Before editing drivers, you have to save the component (You can check the **Autosave** check box in the Drivers page).

Context menus

Clicking with the right mouse button on the method opens the context menu for working with selected method:

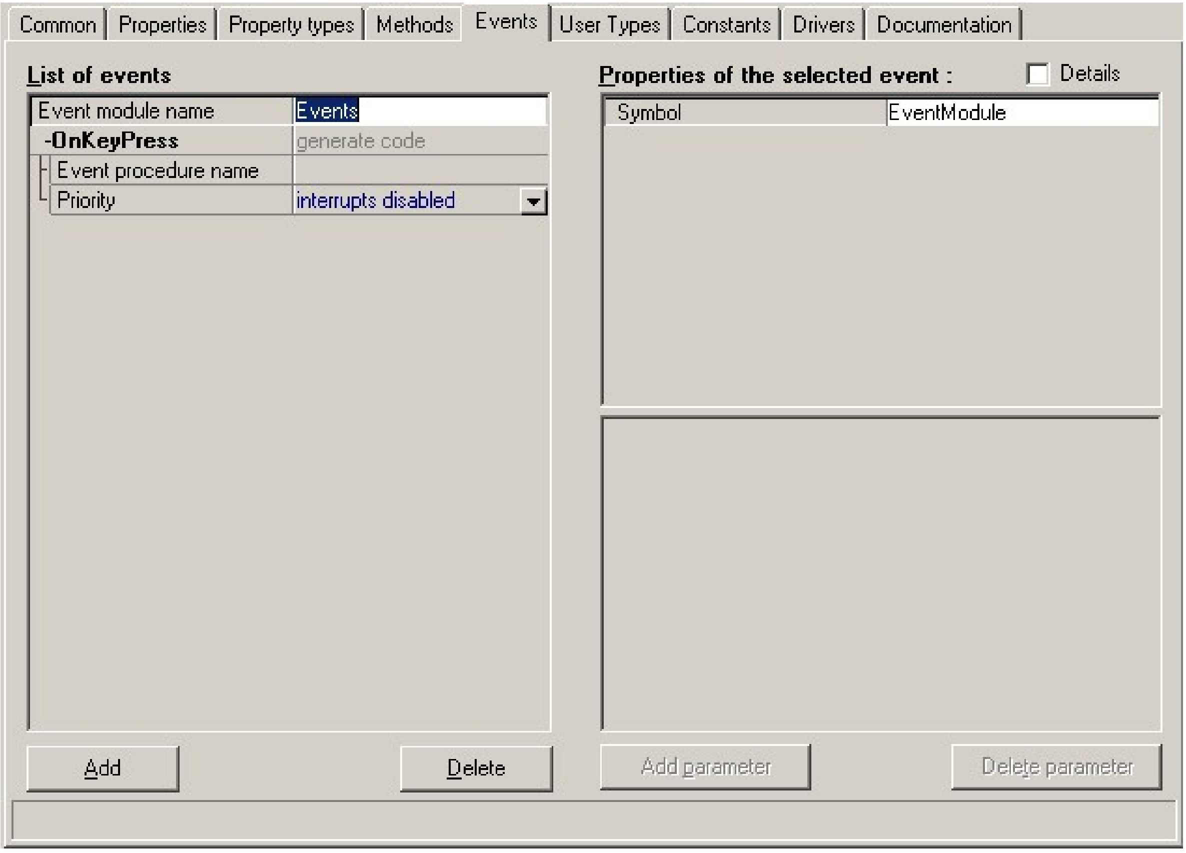
Meaning of the menu items:

- **Go to Definition module** - if a driver is already created and selected in page Drivers, you can edit the definition of the method in the driver. (for experienced users)
- *Go to INTERFACE module* - this command is available for events only.
- **Go to Implementation module** - if a driver is already created and selected in page Drivers, you can edit the implementation of the method in the driver.
- **Edit include** - if a driver is already created, you can edit the include for selected method
- **Go to Help page** - opens the help page with the method selected. See *5.12 Documentation page* for details.
- **Include all** - sets the property "**Value**" to "yes" for all methods
- **Exclude all** - sets the property "**value**" to "no" for all methods
- **Add** - creates a new method
- **Delete** - deletes the methods from the component
- **Duplicate** - duplicates the method (hints, parameters, ...)

Clicking with the right mouse button on the method's parameter will open the following context menu:

- **Move Up** - the parameter is moved to be closer to the beginning.
- **Move Down** - the parameter is moved to be closer to the end.
- **Delete** - removes the parameter definition.

5.8. Events page



List of events

Event module name	Events
-OnKeyPress	generate code
Event procedure name	
Priority	interrupts disabled

Properties of the selected event :

Symbol	EventModule

Figure 5.24 - Events page

Description

On this page, you can create the events of the component.

The created events are listed on the left side and properties of the selected event are displayed on the other side. An event has the following properties :

Meaning of buttons:

- **Details** - shows or hides details for selected event. Necessary features to set are always visible.
- **Add** - adds new event
- **Delete** - deletes selected event
- **Add parameter** - adds new parameter to selected event
- **Delete parameter** - deletes selected parameter for current event

Properties of selected event :

- **Symbol** - name of the event (the same name as in the left window)
- **HasPriority** - if the event has priority. If true, event has subitem Priority (in the left window)
- **Hint** - hint displayed in the Processor Expert environment and event description of the help file. See Help Page.
- **IsInAssembler**- if the event is implemented in assembler
- **ReadOnly** - if the event is in Processor Expert read only, i.e. the **Value** cannot be changed (*generate code* or *don't generate code*)

- **Selected** - generation source code into the driver (in Processor Expert Code design). There are four possibilities:
  - **selYES** - Event will be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to true)
  - **selNO** - Event will not be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to false)
  - **selNEVER** - Event will not be generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to false)
  - **selALWAYS** - Event will be always generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to true)
- **Value** - if the event is included in the component (it will be generated into the driver or not - in Processor Expert Code design)
- all other event properties which are not described here, are described in properties' features.

Properties of selected Priority:

- **MainPriority** - Link to the Priority property in the page Properties. In the Basic version of Component Wizard this property is not available.
- all other properties which are not described here, are described in properties' features.

Properties of each parameter :

- **Name** - name of the parameter displayed and used in Processor Expert
- **Type** - type of the parameter (selected from the list)
- **Passing** - type of passing parameter to the method
- **Hint** - hint for the parameter displayed in the Processor expert environment and parameter description in help files. See Help Page.

You can use the buttons to add and delete events/parameters.

It is also possible here to use the drag and drop facilities of the View Component utility.

If you have filled the driver and language sections of the Drivers page, Component Wizard can automatically find a event in the driver by right clicking on the event (in the left window). You can select either the definition, implementation or the help part of the selected driver and language. Using double-click (left mouse button), you may automatically go to the implementation part of the selected driver. Before editing drivers, you have to save the component (You can check the **Autosave** check box in the Drivers page).

Context menus

Clicking with the right mouse button at event opens the context menu for working with selected event:

Meaning of the menu items:

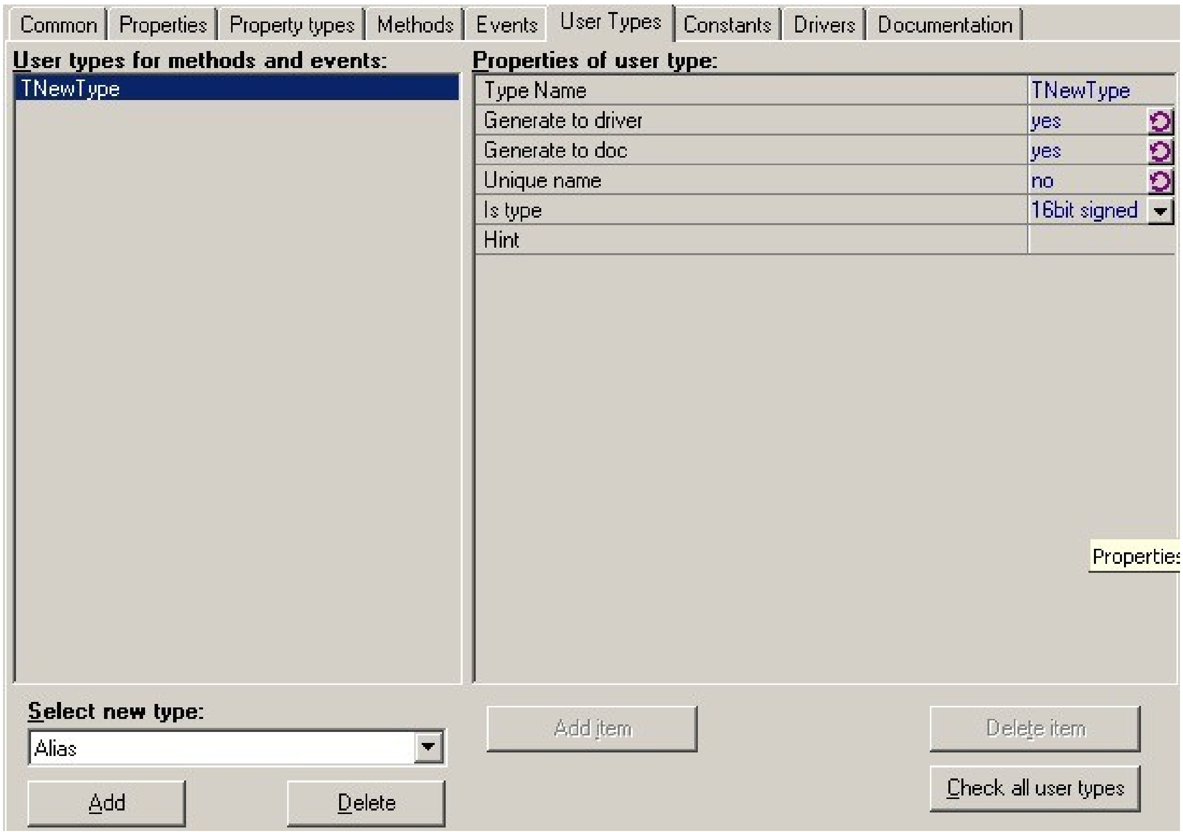
- **Go to INTERFACE module** - if a driver is already created and selected in page Drivers, you can edit the definition of the event in the driver. (for experienced users)
- **Go to Implementation module** - if a driver is already created and selected in page Drivers, you can edit the implementation of the event in the driver.
- **Edit include** - if a driver is already created, you can edit the include for selected event

- **Go to Help module** - if a driver is already created and selected in page Drivers, you can edit the help part of the event in the driver (for experienced users)
- **Include all** - sets the property "**Event included**" to "yes" for all event
- **Exclude all** - sets the property "**Event included**" to "no" for all event
- **Duplicate** - duplicates the event (hints, parameters, ...)

Clicking with the right mouse button on the event's parameter will open the following context menu:

- **Move Up** - the parameter is moved to be closer to the beginning.
- **Move Down** - the parameter is moved to be closer to the end.
- **Delete** - removes the parameter definition.

5.9. User types page



Type Name	TNewType
Generate to driver	yes
Generate to doc	yes
Unique name	no
Is type	16bit signed
Hint	

Figure 5.25 - Page picture

Description

For advanced components, you may need to create your own types in this page.

List of types you can create:

- Aliases
- Arrays
- Records
- Pointers
- Enums
- User definitions

Properties of selected type:(these properties are common to every user type)

- **Type Name** - type name as it will be stored in the types list (for *Parameter Type* feature in Methods page and Events page, and for parameters type and return types of functions).
- **Generate to driver** - if the declaration is generated in the drivers
- **Unique name** - if set to 'yes', the type will have the unique name, which will consist of the name of the of the component and the **Type Name**. Two instances of one type of the component will have two different declarations of this type.
  Example: Our component is **MyBean**. This component has one user type **MyType** which has selected option **Unique name** to 'yes'. We have two instances in Processor Expert **MB1** and **MB2**. After Generation code there will be declared two user types:
  - **MB1_MyType**
  - **MB2_MyType**

  Remark: this property has no influence on type **User definition**
- **Hint** - description of the selected type. It is used in help files. See Help page

Properties of type Alias:

- **Is type** - Alias type is the same type as selected type

Properties of type Array:

- **Low index** - Low index of the array. The size of array is (high-low+1).
- **High index** - High index of the array. The size of array is (high-low+1).
- **Of type** - Type of array

Properties of type Record:

- **Item Name** - Name of the variable in the record
- **Item Type** - Type of variable
- **Is pointer to type** - is the variable pointer to **Item Type**
- **Item Hint** - Description of the variable. It is used in help files. See Help page
  Note: The order of the items of the record can be changed using drag&drop on **-Item** line.

Properties of type Pointer:

- **Is pointer to this type** - This user type is a pointer to the selected type.

Properties of type Enum:

- **List of enum values** - There is a list of values stored in the enum. You can add or delete them. But at least one value must be in the list.

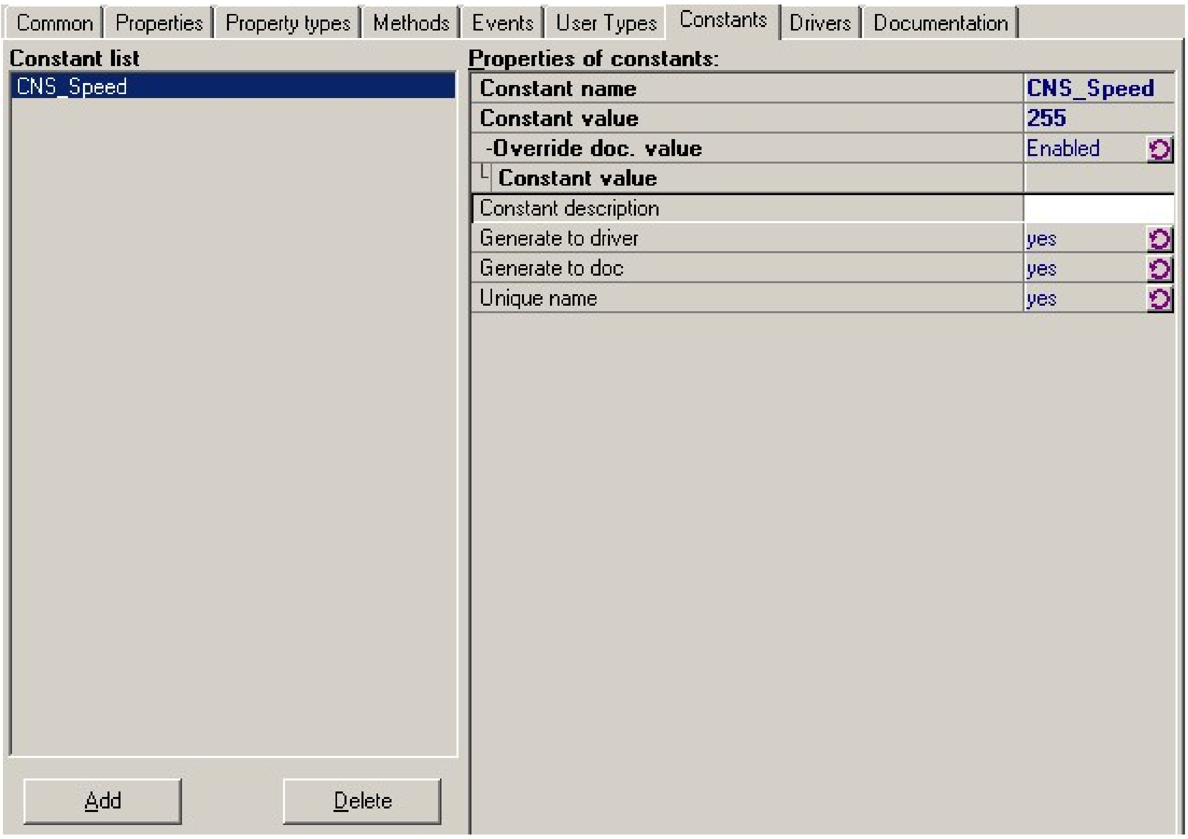
Properties of type User:

- **Type** - There is a user definition. All responsibility is left on user, he has full control of the user type. There can be defined either simple or complicated types, e.g.

- `typedef int *TIntPtr;`
- `typedef struct { float real; float imaginary; } TComplex;`

Attention: If you use this *User definition* fill in the property **Type Name** with the correct type. In these examples it will be `TIntPtr` or `TComplex`.

5.10. Constants



Constant name	CNS_Speed
Constant value	255
-Override doc. value	Enabled
Constant value	
Constant description	
Generate to driver	yes
Generate to doc	yes
Unique name	yes

Figure 5.26 - Constants page

Description

In this page, the user can define a constants that will be available to the user of the component and will be documented in the documentation.

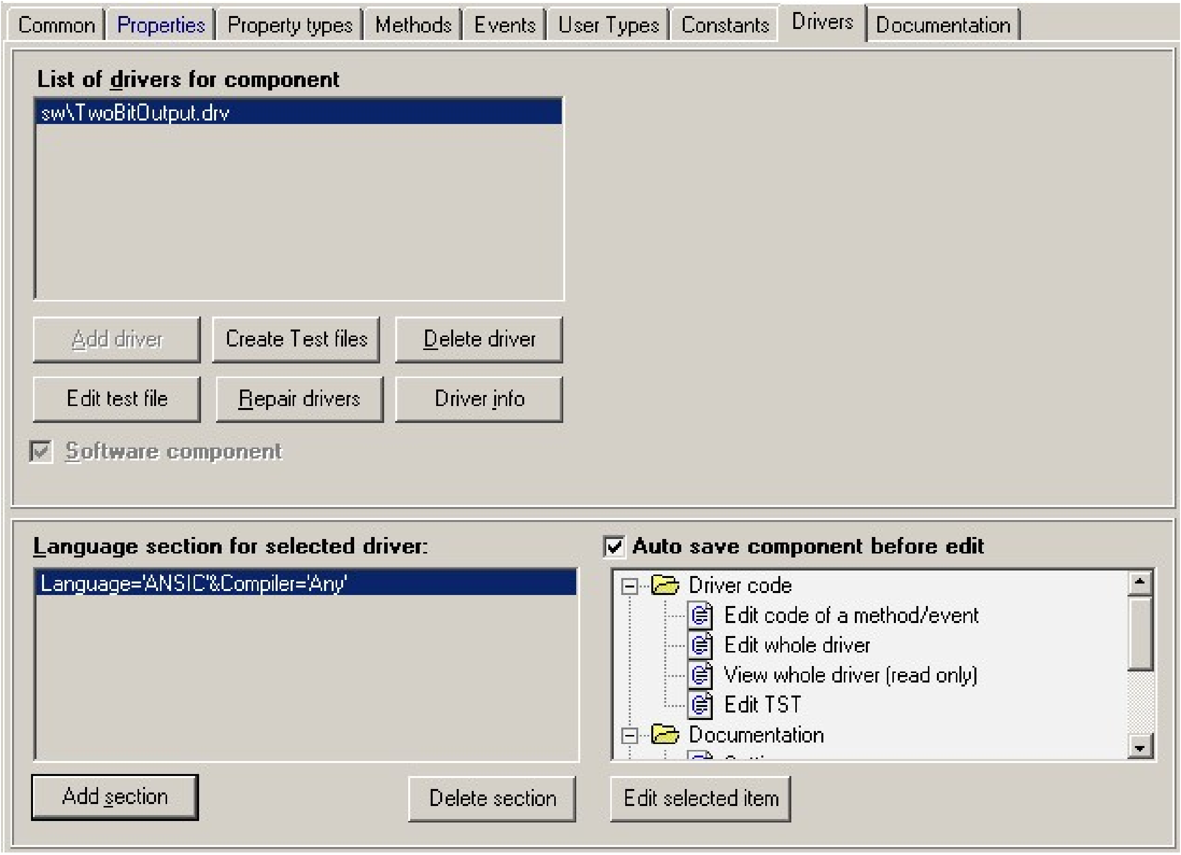
The left panel contains a list of the constants and the right contains a value and other properties of the currently selected constant in the left panel.

Constants can be added or removed by pressing the button Add / Delete.

Each constant has the following properties:

- **Constant name** - speficifies a indentifies that will be used in the generated code.
- **Constant value** - a value that will be assigned to the constant.
- **Override doc. value** - a value of the constant that will be used in the documentation instead of the value defined in the property Constant value.
- **Constant description** - a text used for the documentation.
- **Generate to driver** - if the constant will be placed in the generated into the driver automatically.
- **Generate to doc** - enables generation of the constant into the documentation.
- **Unique name** - enables generation of the constant with unique name. If there will be more instances of one component, each will contain a different constant name (usually there will be a prefix of the component name).

5.11. Drivers Page



List of drivers for component

sw\TwoBitOutput.drv

☑ Software component

Language section for selected driver:

Language='ANSIC'&Compiler='Any'

☑ Auto save component before edit

- Driver code
  - Edit code of a method/event
  - Edit whole driver
  - View whole driver (read only)
  - Edit TST
- Documentation

Figure 5.27 - Drivers Page

Description

Driver page is divided into two parts. In the upper part, there is the list of drivers. The lower part allows to configure languages and compilers supported by the component an open any part of the driver or related files in editor.

If the component isn't a software component (i.e. hardware dependent - **Software component** unchecked), there is also a list of CPUs for which the selected driver is applicable. (CPU producer and family of the processor - one driver can be applicable to many processors).

Remark: In Basic Component Wizard you can create only software components, i.e. in this case you cannot uncheck the check box **Software component**.

Drivers Management

This panel is placed in upper part of the window. It contains a list of drivers currently assigned to the component and control buttons.

Meaning of buttons:

- **Add driver** - adds a driver to the component. If the component is a software component, there can be only one driver, which is added to the right directory automatically. Otherwise, a dialog box is displayed where you select the directory of the processor for which you want to make an implementation.
- **Delete driver** - removes the driver from the component. If the component is not empty (has at least one language section) it is NOT deleted on disk. Otherwise, it is removed from component and deleted from disk.
- **Create test files** - creates files needed by Processor Expert. See *5.11.3 TST file* for details.
- **Edit Test file** - opens test file for selected driver. If the test file doesn't exist, then it is created
- **Driver info** - Information about selected driver (driver author and driver version)
- **Repair drivers** - Checks if every method and event (defined in page Methods and Events) is defined in driver. If not, the missing part is added (or updated). (This is useful e.g. if you are editing whole driver and you delete the implementation of some method/event and don't delete the method/event in page Methods/Events)

*Notice: The extension of the driver file is *.DRV, but in the demo version of the Processor Expert the extension of drivers is changed into *.DMO.*

Driver Content Panel

This panel occupies the lower part of the window. It contains a list of programming languages that the selected driver supports. At the moment, only ANSI-C is supported. You can select the compiler for the selected language. You may also set the language as compiler independent (set the compiler to "Any").

The panel also contains the tree with the parts of the driver code. These part may also be specific for the language/compiler pair selected in the language selection area. See *5.11.1 Driver Processing* for details. The part part of the driver or a related file can be opened in editor by clicking the **Edit selected item** button. Before each editing you have to save the whole project to disk. To avoid the dialog window whether you want to save the component, check the **Auto save component before edit** check box. The component will then be saved every time you click on **Edit code** button.

Meaning of buttons:

- **Add section** - displays a window where you can choose the language and compiler for the section. It will add the corresponding language section to the driver.
- **Delete section** - removes the selected language section from driver.
- **Edit selected item** - opens selected item for the selected language and compiler in the editor. If a driver part is edited, a window appears (see details in chapter *5.11.5 Edit code*) allowing you to select the method or event you want to edit. After selecting one method or event, you enter the Component Wizard Editor, where you may make the implementation. *4.8 Editing drivers*

See also

Detail information about drivers, macroprocessor, TST file and CHG file
How to - Editing drivers
How to - Editing method/event code

5.11.1. Driver Processing

Driver, sections

Every component has a least one driver. The drivers consists of sections. **Sections** is component implementation for one compiler and language. Sections consist of subsections. Text or code is generated into file specified by **subsection** name or parameters. See *5.11.2.2 Macroprocessor Commands* for details.

Macroprocessor

The text of the component driver is processed by Processor Expert macroprocessor . This is special macroprocessor designed for this kind of component drivers. The output from the component driver can be generated to several files. See *5.11.2.2 Macroprocessor Commands* for details.

Commands

If the line starts with character `%` as a first non-space character on the line, macroprocessor consider following word as a command. See complete list of supported commands.

Predefined macros

There are some predefined macros by Processor Expert. See topics:

- list of globals macros
- list of local macros
- macros defined from a property
- list of special macros and directives

Testing of component setting

You can write a script files TST file and CHG file for testing of component setting.

SRC file

Driver or TST file are included to the Processor Expert from SRC file. SRC file is located in directory *ProcessorExpert\Drivers\* and has the same name as the component. If there are more drivers for one component, SRC file contains conditional translation which choose the right driver.

See also

Drivers page
List of macroprocessor commands
Predefined local macros, global macros and special macros
Macros defined from a property
TST file and CHG file

5.11.2. Macroprocessor

Description

The text of the component driver is processed by Processor Expert macroprocessor. This is special macroprocessor designed for this kind of component drivers. The macroprocessor supports:

- conditional translation - see list of commands.
- includes - see list of commands.
- evaluation of simple expressions - see list of commands.
- lists - see list of commands.
- for cycles - see list of commands.
- error output - see list of commands.
- global macros - the same for all components in project, defined by Processor Expert
- local macros
  - *Local macros* are defined by Processor Expert and contain setting of the component in Processor Expert. This macros cannot be changed by a driver.
  - New *local macros* can be defined and modified by a driver.
- generating to several part - see commands - subsections.

Macro

is an identifier which holds any value. Identifier of a macro can contain characters: `a..z`, `A..Z`, `0..9`, _ and cannot start with a digit. The value can be string, number of list. If macro's value is a number or a string, the macro identifier can be directly replaced by its value in the driver text.

`%{`*`def_name`*`}, %'{`*`def_name`*`}', %~{`*`def_name`*`}~` will be replaced by its value.

Example

```
%define MyMacro local_value
MyMacro=%MyMacro
MyMacro=%'MyMacro'_3333
```

after processing by macroprocessor the result will be

```
MyMacro=local_value
MyMacro=local_value_3333
```

There are several **types of macros**:

- global - defined by Processor Expert, the same for all components during code generation, cannot be changed by driver. Driver can define new global macro but cannot modify them.

- local - two types:
  - defined by Processor Expert for each component, cannot be changed by a driver. Some of them are defined for each component and the others depends on component's properties, methods and events.
  - defined by driver and can be changed by a driver.
- special macros and directives

Command

starts with character `%` as a first non-space character on line. The commands ends at the end of line. See list of supported commands.

See also

Details about drivers
List of macroprocessor commands
Predefined local macros, global macros and special macros
Macros defined from a property

5.11.2.1. Macroprocessor Denotation

This chapter describes the denotation used in description of macroprocessor.

Basic Denotation

- `{def_name}` - name of a macro, case-sensitive identifier, can contain characters: `a..z`, `A..Z`, `0..9`, `_` and cannot start with a number
- `{text}` - text to the end of line
- `{number}` - decimal number
- `{string}` - string inside quotation marks, ""
- `{def_list}` - name of a macro which contains list of items
- `{filename}` - name of external file with relative path
- `{eventname}` - name of any event of the component

Operator

`{operator}` is

- `=` assignment (the same as command `%define!`)
- `+=` addition
- `-=` substraction
- `/=` division
- `\=` integer division (integer operation)
- `%=` modulo (integer operation)
- `*=` multiplication
- `|=` bit or (integer operation)
- `&=` bit and (integer operation)
- `~=` bit xor (integer operation)
- `>=` bit shift to the right (integer operation)

- `<=` bit shift to the left (integer operation)
- `^=` power of
- `$=` round, returns closest integer number
- `.=` truncate
- `@=` exponent,(8@=2 returns 3)

Condition

`{condition}` is

- `{condvalue}` is {*def_name*} or {*string*} or element from list (see macro `%[`)
- `{condition}` is
  - `defined({def_name})` condition is true if macro {*def_name*} is defined
  - `ndefined(<def_name>)` condition is true if macro {*def_name*} is not defined
  - `{condvalue} = {condvalue}` string compare
  - `{condvalue} <> {condvalue}` string compare
  - `{condvalue} != {condvalue}` string compare
  - `{condvalue} > {condvalue}` string compare
  - `{condvalue} < {condvalue}` string compare
  - `{condvalue} >= {condvalue}` string compare
  - `{condvalue} <= {condvalue}` string compare
  - `{condvalue} >N {condvalue}`
  - `{condvalue} <N {condvalue}`
  - `{condvalue} >=N {condvalue}`
  - `{condvalue} <=N {condvalue}`
    - if *N* is number 1..9 then string are formatted to length *N* characters - there are inserted spaces to the begin of string or end of string is cuted. Strings are compared after the formatting.
    - if *N* is number 0 then strings are formatted to the same length - to the begin of shorter string are inserted spaces. Strings are compared after the formatting.
    - if *N* is decimal point then strings are converted to real number and these numbers are compared.
  - `{condvalue} =^ {condvalue}` string compare, {*condvalue*} are converted to uppercase before compare.
  - `{condition} | {condition}` logical or, {*condition*} can not contain `&` operator. If the first {*condition*} is true then the result is true.
  - `{condition} & {condition}` logical and, {*condition*} can not contain `|` operator. If the first {*condition*} is false then the result is false.
  - `for_last` condition is true if the actual for variable is the last from list
  - `{string} in {def_list}` condition is true when {*string*} is element of list {*def_list*}. {*def_list*} is name of variable.

See also

Component driver
List of macroprocessor commands
Macroprocessor

5.11.2.2. Macroprocessor Commands

Macroprocessor **command** starts with character `%` as first non-space character on line. Then follows command-identifier and parameters. The rest of line is ignored and can be used as a comment.
Here is complete description of commands supported in basic version of Component Wizard. Commands are divided into several groups according to its function.

Conditional translation

- `%ifdef {`*`def_name`*`}` conditional translation. Following lines are generated to output only if macro {*def_name*} is defined. This command must be finished by command `%endif`, `%else` or `%elif`.
- `%ifndef {`*`def_name`*`}` conditional translation. Following lines are generated to output only if macro {*def_name*} is not defined. This command must be finished by command `%endif`, `%else` or `%elif`.
- `%if {`*`condition`*`}` conditional translation. Following lines are generated to output only if condition {*condition*} is true. This command must be finished by command `%endif`, `%else` or `%elif`.
- `%elif {`*`condition`*`}` conditional translation. Following lines are generated to output only if condition {*condition*} is true. This command must be finished by command `%endif`, `%else` or `%elif`.
- `%else` conditional translation. Following lines are generated to output only if all previous conditions of `%if` commands were false. This command must be finished by command `%endif`.
- `%endif` ends conditional translation.

Example

```
%ifndef Macro1
     %ifdef Macro1Value
           %error Macro1Value is defined without Macro1
     %else
           %error Macro1 is not defined
     %endif
%elif Macro1='yes'
     %define Macro1Value 1
%elif Macro1='no'
     %define Macro1Value 0
%else
     %error Unrecognized value in Macro1
%endif
```

Macros definition

- `%define {`*`def_name`*`} [{`*`text`*`}]` this command defines a new local macro called {*def_name*} with value { *text* }. The macro will exist only during processing of current driver. The command raise error if macro already exists with another value. Macro can be defined also without value.
- `%define! {`*`def_name`*`} {`*`text`*`}` this command is same as the previous one, but is macro already exists it is redefined without any error.
- `%define_prj {`*`def_name`*`} {`*`text`*`}` defines new global macro with value {*text*}. This macro will be defined to the end of generation of all drivers.
- `%undef {`*`def_name`*`}` removes macro definition. This command raise error if macro {*def_name*} does not exits.
- `%undef! {`*`def_name`*`}` removes macro definition. If macro does not exist, it does nothing.

Example

```
%define      MyFirstMacroDefinition Value
%define!   MyFirstMacroDefinition Value redefinition
%undef         MyFirstMacroDefinition
%undef!      MyFirstMacroDefinition
```

Including external file

- `%include {`*`filename`*`}` includes file {*filename*} to the current position of text. {*filename*} must be with relative path from directory *ProcessorExpert\Drivers\*.
- `%include {`*`filename`*`} ({`*`par1`*`},{`*`par2`*`},..)` is the same as simple `%include` command and additionally parameters are accessible using macros `%1, %2, ...` Parameter *par?* is defined as all characters between separators `(,,)`.

Example

```
%include SubProg.prg (Value)
```

Contents of *ProcessorExpert\Drivers\SubProg.prg*

```
%if MyMacro!=%1
     %define! MyMacro %1
%endif
```

Comments and text formatting

- `%+[{`*`string1`*`}[{`*`string2`*`}]]{`*`text`*`}` appends {*string2*}{*text*} to the end of previous generated line. But if the new line would be too long it produces a new line: {*string1*}{*text*}. {*strings*} are not required and they must be closed with quotation marks.
- `%>{`*`number`*`}` set the current output position of the text to column {*number*}. At least one space will be inserted.
- `%-` comment to the end of line

Example

```
%- Comment: This is assembler formatting
%>20 ADD A,20
%>20 SUB A,B
```

Errors

All following messages will be displayed in Processor Expert Error window.

- `%error {text}` produces error message {*text*}.
- `%error!{text}` the same as `%error` and the error message will contain file name and line number.
- `%error^{text}` the same as `%error` and generation is stopped for current driver.
- `%warning {text}` produces warning message If there exists a TST file for current component the warning from the driver will not be displayed.
- `%hint {text}` produces hint. If there exists a TST file for current component the hint from driver will not be displayed.

Example

```
%error I'm sorry but this driver is not finished yet.
%warning This configuration is not useful.
%error! Internal error in the driver. Please contact your distributor.
```

Lists

Macroprocessor supports macros with list as a value. You can have several items in a list.

- `%add {def_list} {text}` add item {*text*} to the list {*def_list*}. If the list is not defined then will be created. Item cannot be empty string. There is duplicate checking, if the item is already in the list, this command does NOT add a new one. List {*def_list*} is a global macro for while project. But you can not modify lists defined by Processor Expert.
- `%append {def_list} {text}` add item {*test*} th the list {*def_list*}. If the list is not defined then will be created. Item cannot be empty string. There is not duplicate checking, if the item is already in the list, this command add a new one. List {*def_list*} is a global macro for while project. But you can not modify lists defined by Processor Expert.
- `%apploc {def_list} {text}` the same as `%append`, but the macro is local - defined only for current driver.
- `%addloc {def_list} {text}` the same as `add`, but the macro is local - defined only for current driver.
- `%for {def_name} from {def_list}`
  `{block of text}`
  `%endfor` {*block of text*} is several lines of text. This block will be generated for each value in the list {*def_list*} and during each generation the macro {*def_name*} will have value of one item from list. Macro {*def_value*} cannot be defined before this command and will not be defines after the end of command.
  You can use notation: `[{number}..{number}]` instead {*def_list*} macro.
- `%for {def_name} fromdown {def_list}`
  `{block of text}`
  `%endfor` the same as command *for ... from ...* , but the items from the list are selected from the last item to the first one.

Example

```
%apploc MyFirstList Item1
%apploc MyFirstList Item2
%apploc MyFirstList Item2
```

```
%for i from MyFirstList
     Report: List Item is "%i"
%endfor
%for i from [0..7]
     %i
%endfor
```

Expressions

Evaluation of expressions is done in real numbers. For integer operations the value is rounded to 32-bit signed integer.

- `%:{`*`def_name`*`}{`*`operator`*`}{`*`number`*`}[;{`*`text`*`}]` *text* is ignored. Expression is evaluated and the result is assigned to macro *def_name*
- `%:{`*`def_name`*`}?={`*`number`*`},{`*`number1`*`}:{`*`number_1`*`},{`*`number2`*`}:{`*`number_2`*`}, .. ;` converts value *number* using table: if *number* is equal to *number1* then the result is *number_1*, if *number* is equal to *number2* then result is *number_2* etc. The result is assigned to macro *def_name*. Error is reported to Processor Expert Error window if the value is not found in the table.

Example

```
%:a=0
%:a+=1
%:b?=%a,0:3.1415,1:6.2830
```

Subsections

- `%INITIALIZATION` - component initialization code, this code will be inserted into CPU initialization procedure
- `%INTERFACE` - component header file, this file must contain interface of all selected methods
- `%IMPLEMENTATION` - component implementation file, this file must contain implementation of all selected methods
- `%INTERFACE {`*`eventname`*`}` - interface of selected event, this part will be inserted into interface of events module
- `%IMPLEMENTATION {`*`eventname`*`}` - implementation of selected event, this part will be inserted into events implementation module
- `%FILE [{`*`dir`*`}]{`*`filename`*`}` - text from this subsection will be saved to the specified file

See also

Macroprocessor
Denotation of description of macroprocessor
Component driver
Predefined local macros, global macros and special macros
Macros defined from a property

5.11.2.3. Predefined Macros and Directives

To replace a macro by its value, write the name of macro after character `%`. Each line of the driver is processed from the right side to the left side and all macros are replaced.

Special macros and directives

- `%%` - character %
- `%{`*`def_name`*`}, %'{`*`def_name`*`}', %~{`*`def_name`*`}~` - is replaced by *def_value*.
- `%for_index,%'for_index'` is replaced by index of actual variable of for-cycle from range: 1..number of items in the list.
- `%for_index_0` is replaced by index of actual variable of for-cycle from range: 0..number of items in the list-1.
- `%list_size({`*`def_list`*`})` - number of items in the list.
- `%str_length({`*`string`*`})` - string length, number of characters in the string
- `%str_length({`*`def_name`*`})` - string length, number of characters of the macro value. Macro cannot be a list.
- `%short_path({`*`value`*`})` - convert path to short path for MS-DOS 16-bit application. *value* must be macro or string between brackets. Path should exist on the disk.
- `%[{`*`index`*`},{`*`def_list`*`}]` - returns item from the list *def_list* with index equal to *index*. Index of first items is 1. Result is empty string if the requested index if out of range. *def_list* must be defined.
- `%;` is replaced by sequence of characters which defined comment to the end of line. See also global macro %CommentLine.
- `%.` is replaced by separator of module name and method name. The separator is defined according to selected language, usually it is character _ (underscore).
- `%{` is replaced by sequence of characters which begins a multi-line comment.
- `%}` is replaced by sequence of characters which ends a multi-line comment.
- `%#{`*`srcf`*`}{`*`dstf`*`}[-]{`*`number`*`}` - contents signed 32-bit integer number from *srcf* to *dstf* format. Supported formats of *srcf*:
  - *nothing* - decimal number
  - `2` - binary number

  Supported formats of *dstf*:
  - `h` - selected format of high level language
  - `a` - selected format of assembler - data
  - `aa` - selected format of assembler - address
  - `ab` - selected format of assembler - binary data
- `%#b{`*`number`*`}` - converts 8-bit number (0..256) from decimal to hexadecimal format (without prefix or suffix)
- `%#w{`*`number`*`}` - converts 16-bit number (0..65535) from decimal to hexadecimal format (without prefix or suffix)
- `%#l{`*`number`*`}` - converts 32-bit number from decimal to hexadecimal format (without prefix or suffix)

Access to inherited items

- `%@{`*`inhr_property`*`}@{`*`def_name`*`}` - value of macro *def_name* from inherited component pointed by property *inhr_property*.
- `%[@{` *`inhr_property`* `}@{` *`index`* `},{` *`def_list`* `}]` - returns item from the list from inherited component, with item's index equal to *index*.
  inhr_property is a symbol of property for inheritance.

See also

Component driver
Macroprocessor
List of macroprocessor commands
Predefined local macros and global macros
Macros defined from a property
Denotation

5.11.2.4. Predefined global macros

Global macros are macros defined by Processor Expert for the whole project. They are the same for all components in the project and they are not changed during code generation.

Language, compiler, version

- **Language** - identification of selected target language: `MODULA`, `ANSIC`, `JAVA`, `ASM`.
- **Compiler** - identification of selected target compiler.
- **CommentLine** - is defined if there is sequence of characters which starts comment to the end of line for selected target language. Value of the macro is this sequence.
- **PEversion** - version of Processor Expert, format XX.XX.
- **TimeStamp** - date and time of code generation.

CPU, interrupt vector table

- **CPUvariant** - selected target CPU type (from CPU properties).
- **CPUtype** - type of the target CPU component.
- **CPUfamily** - target CPU family.
- **CPUproducer** - producer of the target CPU.
- **InterruptTableType** - type of the interrupt vector table.
- **InterruptVectorType** - type of the interrupt vector.

Clock, speed modes

- **Xtal_kHz** - frequency of Xtal of the CPU, integer number.
- **HighClock_kHz** - clock frequency in front of system prescaler in high speed mode, integer number.
- **LowClock_kHz** - clock frequency in front of system prescaler in low speed mode, integer number.
- **SlowClock_kHz** - clock frequency in front of system prescaler in slow speed mode, integer number.
- **CPUsystem_ticks** - number of ticks behind system prescaler, list of three values for every speed mode.
- **CPUrunSpeedModeNum** - number of supported speed modes in the target CPU.
- **SetHighSpeedMode** - defined if high speed mode is supported in the target CPU (high speed mode must be supported).
- **SetLowSpeedMode** - defined if low speed mode is supported in the target CPU.
- **SetSleepMode** - defined if slow speed mode is supported in the target CPU.
- ***names of all common prescalers*** - initialization value, names depend on the CPU description database.

Modules

- **ProjectName** - name of the project.
- **ProjectModule** - name of the main module.
- **ProcessorModule** - name of the PCU module.
- **ProcessorName** - name of the CPU component.
- **ModuleList** - list of all component modules in the project (without CPU module).
- **EventModuleList** - list of all event modules in the project.
- **ExternalModules** - list of all external programs in the project.
- **ExternalModuleExts** - list of corresponding extensions of external programs.
- **ExternalModuleDir** - list of corresponding directories of external programs.
- **ExternalModuleRelDir** - list of corresponding relative directories of external programs.
- **DriverExtension** - extension of driver filename, `DRV` or `DMO` or `TST`.

Directories

- **Dir_Project** - directory of the current project.
- **DirRel_Events, DirRel_Binary** relative path from project-directory to drivers-directory and binary-directory.
- **DirRel_EventToBinary** - relative path from code-directory to binary-directory.
- **Dir_Drivers, Dir_Events, Dir_Binary** - absolute path for drivers, event modules and binary files. You should always use relative paths.
- **Dir_Compiler** - absolute path of external compiler is it is defined as external tool.

Registers

- **Register *??* List** - list of all names of 8-, 16- and 32-bit CPU control registers, dependent on the CPU description database.
- **Reg *??* AddrList** - list of all addresses of 8-, 16- and 32-bit CPU control register, dependent on the CPU description database.
- ***?????* Addr/Reg** - address and register name of system and common prescalers, dependent on the CPU description database.

See also

Component driver
Macroprocessor
List of macroprocessor commands
Predefined global macros and special macros
Macros defined from a property

5.11.2.5. Predefined local macros

Local macros are macros defined by Processor Expert individually for each component. Component can define its own local macros. These macros can be also changed in the driver. Other components have no access to macros defined by other components.

Each driver should define following macros:

- **DriverVersion** - version of the driver, format XX.XX
- **DriverAuthor** - name of author of the driver
- **DriverDate** - date of last modification of the driver, format: DD.MM.YYYY

There are local macros defined for every component dependent on list of component's properties, methods and events. Macros defined by Processor Expert cannot be changed by driver. Other components have no access to macros of another component with exception of inheritance.

List of macros defined for each component:

- **DeviceType** - type of the component.
- **DeviceName** - name of the component.
- **ModuleName** - name of the component driver. It must be identifier.
- **Comment** - user comment to the component. List of strings. It is if user do not enter any text.
- **runHighSpeed** defined if component is supported in high speed mode.
- **runLowSpeed** defined if component is supported in low speed mode
- **runSleep** defined if component is supported in slow speed mode
- **runSpeedMode** list of supported speed modes, three values: Yes/No.
- **runSpeedModeNum** number of supported speed modes.
- ***method*** - For each method of the component which must be implemented in the driver (User requests ti\o use the method in his code), the name of the method is defined as a macro. Value of the macro is same as the name.
- ***method*_Hint** - hint for the corresponding method.
- ***event*** - For each event user requests to handle in his code, the name of event is defined as a macro. Value of

the macro is name of event handler function.

- ***event*Prior** - event priority. It is defined only if the event support priority.
- ***event*Module** - event module of corresponding event.
- ***event*_Hint** - hint for the event
- **MethodList** - list of requested methods
- **MethodHints** - list of corresponding hints for the requested methods
- **EventList** - list of requested events
- **EventModules** - list of corresponding event modules

See also

Component driver
Macroprocessor
List of macroprocessor commands
Predefined local macros and special macros
Macros defined from a property

5.11.2.6. Macros Defined From a Property

Every property must have defined unique symbol in the component (it should not begin with the character underscore '_'). This symbol is name of macro defined for the component driver in the Processor Expert. The value of the macro is value of the property set in Processor Expert Component Inspector.

Note: Integer values are always defined as decimal numbers.

Some properties have detailed information defined as macros. The name of the macro is completed from the name of the property (feature Symbol) and the suffix. The suffix depends on the type of the property. The following properties have defined the detailed information:

- **List of items**
  suffixes:
  - **NumItems** - the number of the items in list
  - **MaxItem** - the maximal index of the item (i.e. **NumItems**-1)
- **Date**
  suffixes:
  - **Day** - the day of the date stored in property (range from 1 to 31)
  - **Month** - the month of the date stored in property (range from 1 to 12)
  - **MonthLong** - the name of the month (language depends on the current country which is set in windows)
  - **MonthShort** - the name of the month (language depends on the current country which is set in windows) - short version
  - **Year** - the year of the date stored in property (format is XXXX)
  - **DayOfWeek** - the day in the week (range from 0-monday to 6-sunday)
  - **DayOfWeekLong** - the name of the day (language depends on the current country which is set in windows)
  - **DayOfWeekShort** - the name of the day (language depends on the current country which is set in windows) - short version

- **Time**
  suffixes:
  - **Hour** - the hour of the time stored in property
  - **Min** - the minute of the time stored in property
  - **Sec** - the second of the time stored in property
- **String list**
  Macro without suffix - the list of lines of the text. If user do not enter any text, macro is not defined.
  suffixes:
  - **Len** - list of corresponding lengths of lines in the string-list (number of characters on each line).
  - **Lines** - the number of the lines in the string-list.
  - **List** - list of lines, every line is defined as a list of characters (This macro is available if the feature **DefineList** is set to value *True*)
- **External file**
  suffixes:
  - **FileName** - only the name of the file (without the path)
  - **ShortPath** - the whole name of the file (with the path) for DOS applications
  - **Value** - binary values in a file (depends on th settings of the feature FileDefine)
  - **ValueList** - binary values in a file (depends on th settings of the feature FileDefine)
- **External bitmap file**
  suffixes:
  - **Width** - width of the picture
  - **Height** - height of the picture
  - **Size** - the size of the picture (the number of the occupied bytes in a memory)
- **Directory**
  suffixes:
  - **_**(one character underscore) - the directory ends with '\'
  - **__**(two characters underscore) - the directory doesn't end with '\'
- **Address in CPU address space**
  suffixes:
  - **_External** - *"yes"* if any address from selected address range is inside external memory, *"no"* otherwise.
  - **_Internal** - *"yes"* if any address from selected address range is inside internal memory, *"no"* otherwise.
  - **_RAM** - *"yes"* if any address from selected address range is inside RAM, *"no"* otherwise.
  - **_ROM** - *"yes"* if any address from selected address range is inside ROM, *"no"* otherwise.
  - **_FLASH** - *"yes"* if any address from selected address range is inside FLASH, *"no"* otherwise.
  - **_EEPROM** - *"yes"* if any address from selected address range is inside EEPROM, *"no"* otherwise.

Example

There is complete component BasicProperties in this version of Component Wizard. This component contains all properties provided in Basic version of Component Wizard.

See also

Component driver
Macroprocessor
List of macroprocessor commands
Predefined local macros, global macros and special macros

5.11.3. TST file

TST file is a script which describes implementation-dependent tests of the component setting. It is run from Processor Expert only if the component is set-up correctly. Component modules won't be generated if any error is reported from the *TST file*.

The TST file is stored in the same directory as the driver, the file-name is also the same and the file-extension is *TST*. You can edit TST file directly in Component Wizard, see Drivers page.

The list of macros defined for the TST file is the same as macros for the driver. You can use all macroprocessor commands (See details in chapter *5.11.2.2 Macroprocessor Commands*) in the TST file as in the component driver. Messages from the TST script are reported using the commands `%error, %warning, %hint` to Processor Expert Error window. The TST script cannot define any global macros accessible from other TST files or drivers.

Warning: If you write any *TST file* for your component, any warning and hint will NOT be generated from the driver. All warnings and hints should be generated from the *TST file*.

Example

```
%if Property1="MASTER"
      %error Sorry - this feature is not implemented yet.
%endif
%-
%if Property2="0"
      %hint Define buffer for better performance.
%endif
```

There is complete component BasicProperties in this version of Component Wizard. This component contains example of TST file and CHG file.

See also

Component driver
CHG file
Macroprocessor commands

5.11.4. CHG file

CHG file is a script for testing of component settings and control the component behaviour in the Component Inspector window in Processor Expert.

This file should implement implementation-independent tests and report errors if the component setting is incorrect (component function is not defined for this component settings). For example, the CHG file can generate error if the buffer size if lower than 16 bytes.

CHG file is placed in the same directory as the component (ProcessorExpert\Beans\*[BeanName]*\\), the file-name is the same as the component name and the file-extension is *CHG*. You can edit *CHG file* directly in Component Wizard, see Drivers page. The CHG script is run from Processor Expert every time user change the component setting even if the setting is not correct. There may miss any macros because of incorrect setting, you should test if macro is defined before its usage. You should never use global macros in the *CHG files*.

You can generate error messages using commands: `%error, %warning, %hint` or you can change or read the value of any property/method/event using special commands `%set` and `%get`. These command can be used only in *CHG files*.

Set Command

Syntax:
`%set {Symbol} {FeatureSymbol} {Value}`

Description:

- `{Symbol}` is a symbol of any property, method or event
- `{FeatureSymbol}` is a symbol from following list
- `{Value}` is a new value for the feature. Value is text to the end of line.

List of *FeatureSymbols*:

- **ReadOnly** - you can enable/disable changing of value of any property.
  `{Symbol}` must be symbol of any property.
  `{Value}` must be `yes` or `no`.
- **Selection** - you can enable/disable changing of selection of any method or event, e.g. if method will be generated to the driver and if event will be called from the driver.
  `{Symbol}` must be symbol of any method or event.
  `{Value}` must be
  - `always`(the method/event must be selected) or
  - `never`(the method/event cannot be selected) or
  - `enable`(you can change selection).
- **Value** - you can change value of any property.
  `{Symbol}` must be symbol of any property.
  `{Value}` must be value for the property (the same as you can enter in the Processor Expert Component

Inspector). Integer value can be expressed in enhanced format, see Property Signed integer number for details.

- **MinValue, MaxValue** - you can change the minimal and maximal possible value of the property.
  `{Symbol}` must be symbol of property of type: integer number, real number or list of items.
  `{Value}` must be decimal number.

Warning: If you change any value of the property, the macros are NOT changed to the end of CHG file. You can read the value of any property using `%get` command.

Get Command

Syntax:
`%get({Symbol},{FeatureSymbol})`

List of known symbols is the same as for `%set` command. Result is value of selected feature.

Example

```
%if defined(Property1) & Property1="MASTER"
      %error Sorry - this feature is not implemented yet.
%endif
%-
%if defined(OutputBufferSize) & OutputBufferSize="0"
      %set SendData Selection never
%else
      %set SendData Selection enable
%endif
```

There is complete component BasicProperties in this version of Component Wizard. This component contains example of CHG file and TST file.

Configuring Methods and Events of Inherited and Shared Components

For OPTIONALLY REQUIRED methods/events (see the description of the *mode* property and its values in the chapter *5.14 Methods page* or *5.15 Events page*) it is possible to use the following commands in the descendant component:

- `%set @{InhrSymbol}@{Symbol} Selection always` - The generation of the method/event will be enabled without a possibility to enable it by the Processor Expert user. It is necessary for example if the descendant needs the method/event.
- `%set @{InhrSymbol}@{Symbol} Selection enable` - This option can be used to enable the method/event if the descendant doesn't need the method/event.
- `%set @{InhrSymbol}@{Symbol} Selection never` - The generation of the method/event will be disabled without a possibility to enable it by the Processor Expert user. **This command is available for inherited components only.**

Description of the symbols:

- `{InhrSymbol}` is a symbol of the inherited component (interface) property.
- `{Symbol}` is a name of the method/event.

See also

Component driver
TST file
Macroprocessor commands

5.11.5. Edit code

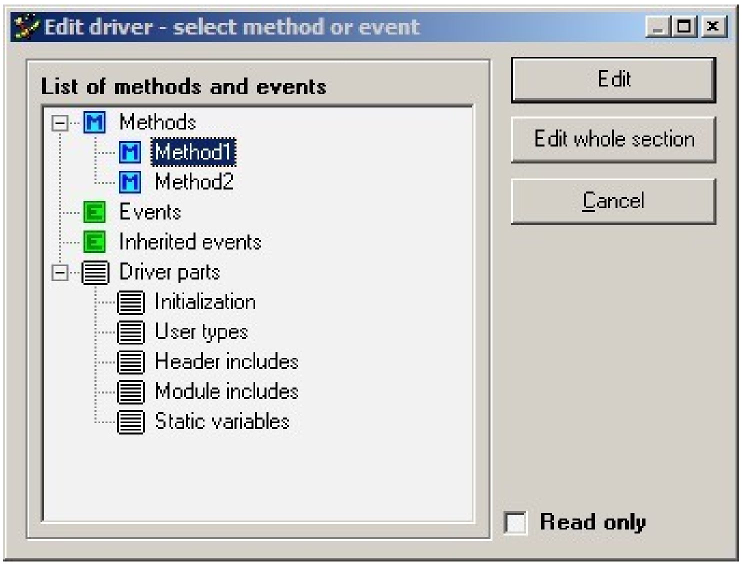


Figure 5.28 - Selection of the code to edit

Tree structure:

- **Methods** - methods defined by the component
- **Events** - events defined by the component
- **Inherited events** - serve inherited events here
- **Driver parts** - Drivers from Component Wizard 1.14 have some parts of the driver marked with special Component Wizard keywords. It allows you to insert your own includes, global variables into the driver with editing necessary part of the driver only.
  - Initialization - Initialization of the driver. Write a code here for driver initialization. This code will be generated into the initialization method of the CPU component which is executed at the beginning of the "main" routine.
  - User types - here in this section you can write your own user types which cannot be made by Component Wizard (page User Types)
  - Header includes - there you can write includes for you libraries. These part will be in the header file generated bellow includes generated by Component Wizard. Also here you can import/export global variables into/from your module.
  - Module includes - there you can write includes for you libraries. These part will be in the module generated bellow includes generated by Component Wizard.
  - Static variables - Do you need global variables if your module? Write them here.

Meaning of buttons:

- **Edit** - displays source code for selected method/event or selected part of the driver only.
- **Edit whole section** - displays source code for selected driver, the cursor is set to the selected method/event or selected part.
- **Read only** - driver will be open in read only mode
- **Edit whole section** - you will see the whole language section.

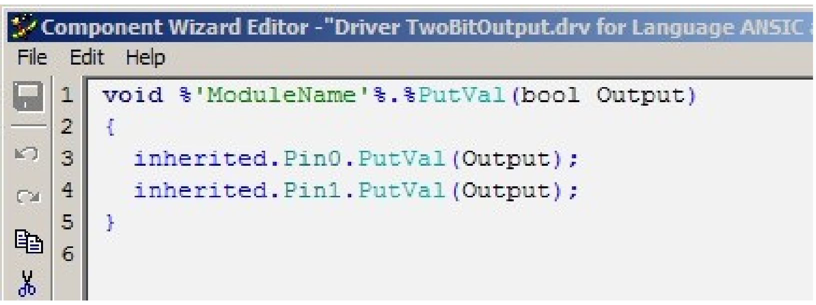
See also

Detail information about drivers, macroprocessor, TST file and CHG file
How to - Editing drivers

5.11.6. Driver editor

See also

Drivers page
How to - Editing drivers
Detail information about drivers, macroprocessor, TST file and CHG file


Component Wizard Editor - "Driver TwoBitOutput.drv for Language ANSIC
File
Edit
Help

```
void %'ModuleName'%.%PutVal(bool Output)
{
  inherited.Pin0.PutVal(Output);
  inherited.Pin1.PutVal(Output);
}
```

Figure 5.29 - Editor picture

Description

Built-in editor serves for editing implementation of methods, events, includes, HTML help files and other files generated by Component Wizard.
Editor has these enhanced features:

- syntax highlight for selected language (if editing driver) and for macroprocessor language, e.g. when editing CHG files.
- simple syntax highlight when editing html files
- 10 bookmarks accessible by context menu or by shortcuts **Ctrl+Shift+Number** (where **Number** is from 0 to 9) to set the bookmark and **Ctrl+Number** to goto the bookmark.

Toolbar description:

- 💾 - Save the file to disc
- ↶ - Undo the previous action
- ↷ - Redo the previous action

- 📄 - Copy the selected text into the clipboard
- ✂ - Cut the selected text into the clipboard
- 📋 - Paste the text from the clipboard into the editor where the cursor is
- 🖨 - Print the entire text in the editor
- ⚡ - Paste the name of the macro/method/event or inherited method/event into the editor. For more details see Auto complete chapter. Accessible also usng short cut **Ctrl+SPACE**
- 🔍 - Find the text in the editor
- ⇄ - Replace the text in the editor
- ? - Displays help for Macroprocessor language.

Statusbar description:

- **Line and column position** - There is information about the line (with prefix L:) and column (with prefix C:) where the cursor is. If you are editing only part of the driver, there is also information about line number in the brackets in respect of beginning of the file.
- **Write mode** - displays actual mode - insert or overwrite mode.

Context menus

The context menu is available using the right button mouse click and offers the following commands:

- **Edit**
  - **Undo** - restores the text to the state before the last change made by the user.
  - **Redo** - restores the text back to the state after the last change made by the user.
  - **Cut** - cuts the select text into the clipboard.
  - **Copy** - copies the select text into the clipboard.
  - **Paste** - places the text from the clipboard at the cursor position.
  - **Cut** - cuts the select text into the clipboard.
  - **Delete** - removes selected text.
  - **Select All** - cuts the select text into the clipboard.
  - **Delete line** - removes the line with the cursor.
- **Search**
  - **Find...** - invokes a "find" dialog that allows to find specified phrase in the text.
  - **Find next** - continues to search next occurrence of searched phrase
  - **Replace** - invokes a "replace" dialog allowing to find and replace a specified phrase.
- **Bookmark** - serves for setting bookmarks in the text. The line with the bookmark is marked with the small circle with the number of the bookmark on left side of the editor window.
  - **Set/Clear** - sets the select bookmark on the line with cursor
  - **Goto** - goes to the line with selected bookmark
- **Use component method/event** - the same as in the "flash" toolbar button - Paste the name of the macro/method/event or inherited method/event into the editor. For more details see Auto complete chapter. Accessible also usng short cut Ctrl+SPACE
- **Open file...** - allows to open any file into the editor.

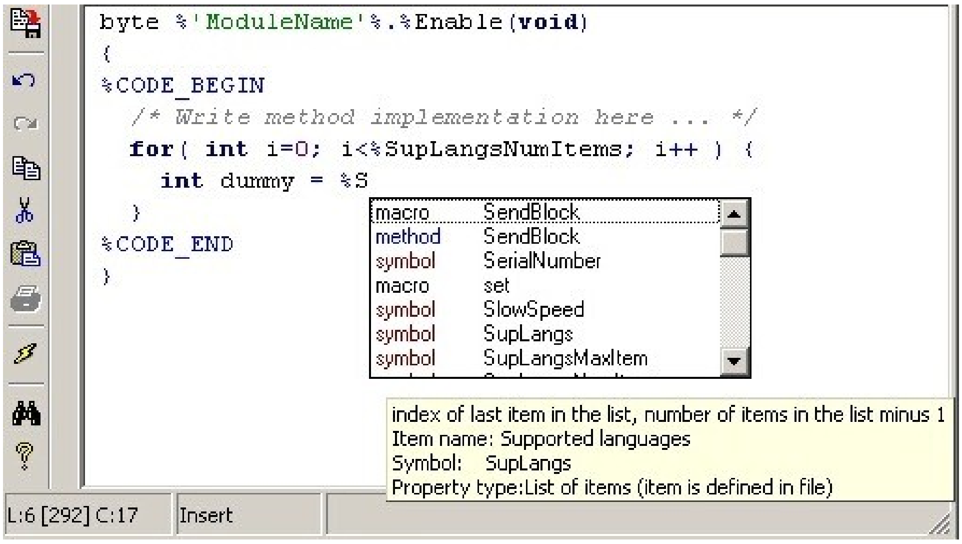
Auto complete

Auto complete

For easy writing drivers the Auto complete function has been integrated into the Editor driver.
Advantages:

- **Fast typing** - you don't have to type long macro names, just write the first part of macro and press Ctrl+SPACE
- **Case sensitive** - Programming languages (e.g. ANSI C) and Macroprocessor are case sensitive. No you don't have to remember the exact macro names. With this you can avoid keying mistakes and errors reported by compiler.
- **Hints** - each macro defined from property, method or event displays context help when you roll over it.

Auto complete function is accessible using short cut **Ctrl+SPACE**. Only what you have to do is write the beginning of the macro e.g. %S and press **Ctrl+SPACE**. Editor will offer the list of macros which starts with %S. See picture bellow.



```
byte %'ModuleName'%.%Enable(void)
{
%CODE_BEGIN
  /* Write method implementation here ... */
  for( int i=0; i<%SupLangsNumItems; i++ ) {
    int dummy = %S
  }
%CODE_END
}
```

macro	SendBlock
method	SendBlock
symbol	SerialNumber
macro	set
symbol	SlowSpeed
symbol	SupLangs
symbol	SupLangsMaxItem

index of last item in the list, number of items in the list minus 1
Item name: Supported languages
Symbol: SupLangs
Property type:List of items (item is defined in file)

L:6 [292] C:17 | Insert

Figure 5.30 - Editor window

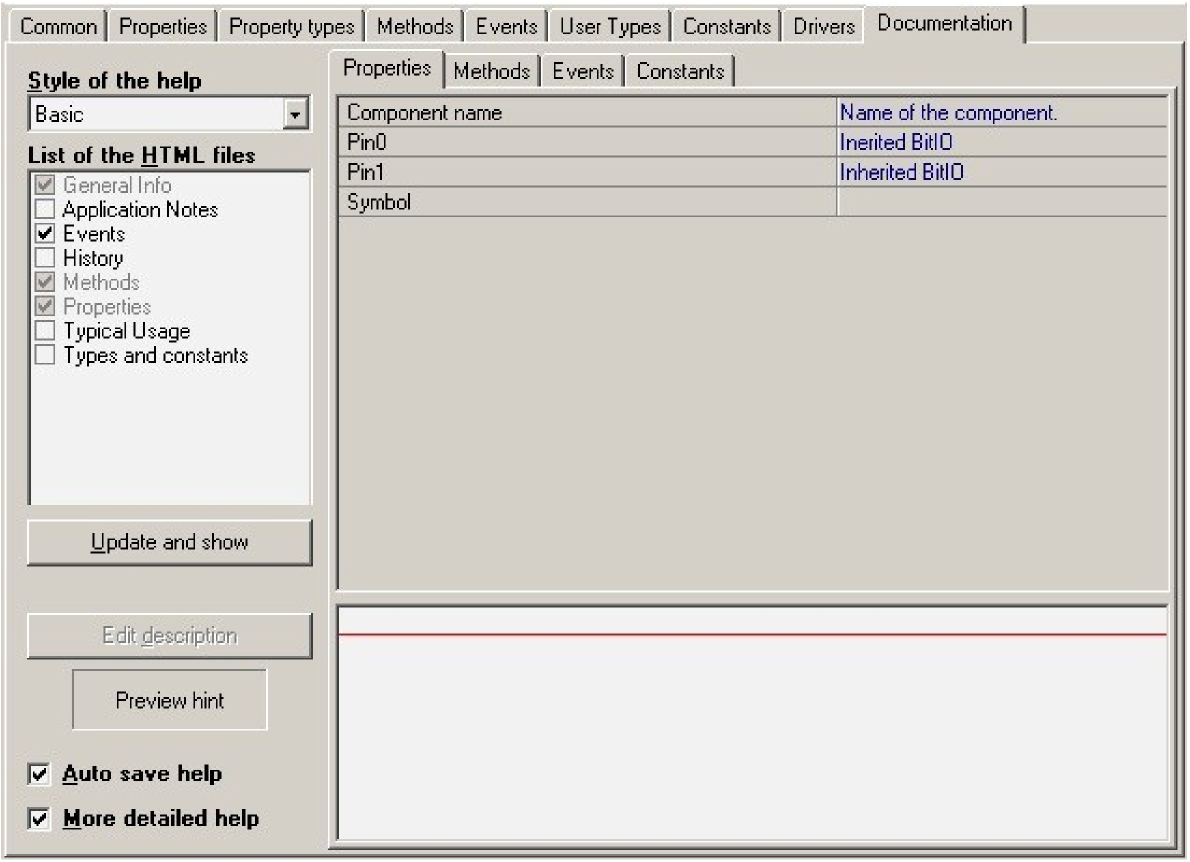
Hot keys

List of hot keys:

- **Ctrl+PgUp** - go to the first line on the screen.
- **Ctrl+PgDn** - go to the last line on the screen.
- **Home, End, PgUp, PgDn, arrows** - cursor movement (Shift marks a block).
- **Ctrl+left/right** - move cursor to the beginning of the word left/right to the current position.
- **Ctrl+Home** - go to the beginning of file.
- **Ctrl+End** - go to the end of file.
- **Ctrl+C,Ctrl+Ins** - copy.
- **Ctrl+V,Shift+Ins** - paste.
- **Ctrl+X,Shift+Del** - cut.

- **Ctrl+Del** - delete.
- **Alt+left/right** - indent/unindent selected block.
- **Ctrl+Alt+left/right** - indent/unindent macroprocessor inside selected block.
- **Ctrl+K+I** - indent selected block.
- **Ctrl+K+U** - unindent selected block.
- **Alt+P** - search backward for the first similar word like the word at the cursor and replace the word at the cursor with the found.
- **Alt+N** - search forward for the first similar word like the word at the cursor and replace the word at the cursor with the found.

5.12. Documentation page



Style of the help: Basic

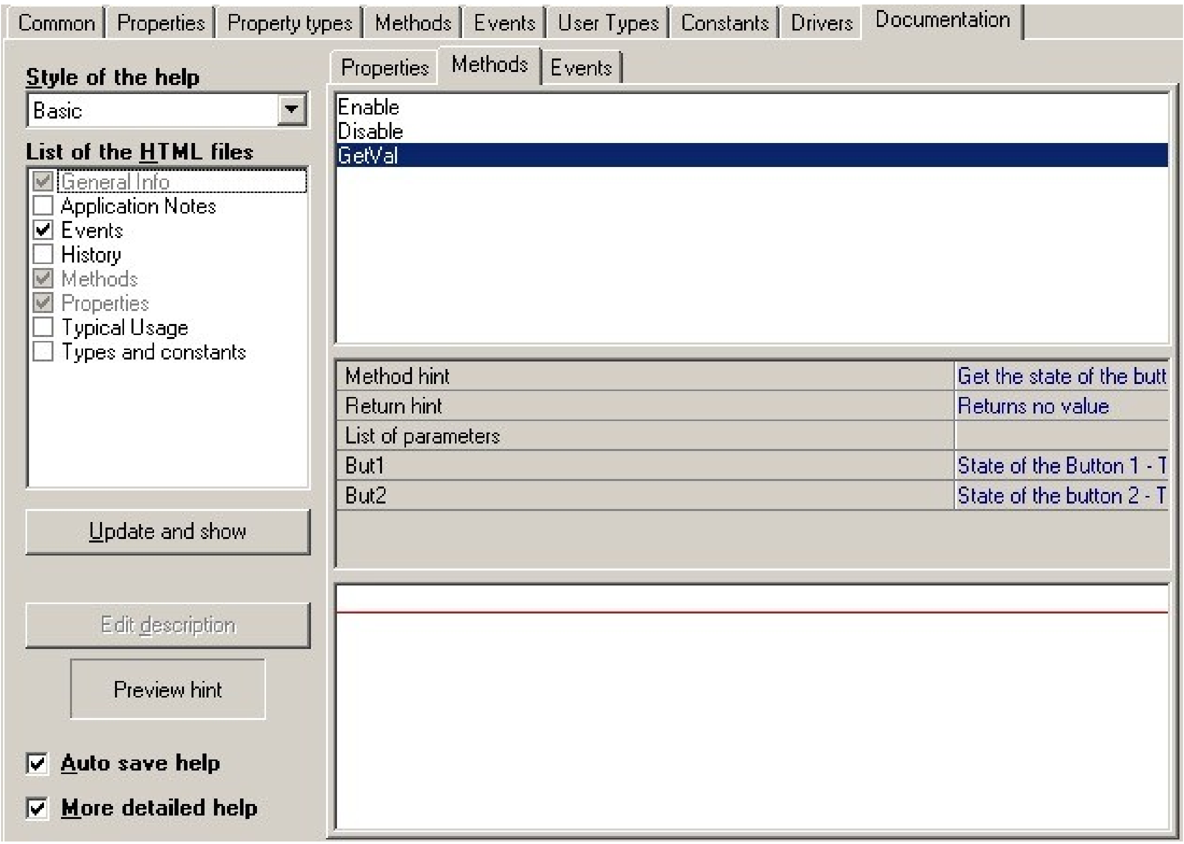
List of the HTML files:
- ☑ General Info
- □ Application Notes
- ☑ Events
- □ History
- ☑ Methods
- ☑ Properties
- □ Typical Usage
- □ Types and constants

Component name	Name of the component.
Pin0	Inerited BitIO
Pin1	Inherited BitIO
Symbol	

☑ Auto save help

☑ More detailed help

Figure 5.31 - Properties sub-page



Style of the help: Basic

List of the HTML files

- ☑ General Info
- □ Application Notes
- ☑ Events
- □ History
- ☑ Methods
- ☑ Properties
- □ Typical Usage
- □ Types and constants

Enable
Disable
GetVal

Method hint	Get the state of the butt
Return hint	Returns no value
List of parameters	
But1	State of the Button 1 - T
But2	State of the button 2 - T

☑ Auto save help

☑ More detailed help

Figure 5.32 - Methods sub-page

Description

This page is designed for fast creation of documentation (help) for your components in HTML format, respectfully of the style of Processor Expert Help.

The Help files describe the properties, user types, methods, and events of the component. The hint associated with the items - properties, user types, methods or events - defines the content of the items' description.

This page regroups the hints for all the items defined in the Properties, User Types, Methods, and Events pages. If you edit hints in this page, the changes are immediately reflected on the corresponding hint fields in the Properties, User Types, Methods or Events page (and vice versa).

You can visualize how the hint will look by placing the mouse over the **Preview hint** square.

If auto-creation of help is enabled ("**Enable auto save help**" check box) or if you click on the "**Preview**" button, help files (in HTML format) will be created.

Help styles

For each component can be set different style of HTML help. Each style has different list of generated files. The basic set of these files is:

- **General** - general information about the component, displayed as help for the component in Processor Expert - Compulsory page.

- **Methods** - list of methods and their description (hints) - Compulsory page.
- **Events** - list of events and their description (hints)
- **Properties** - list of properties of the component and their description (hints) - Compulsory page.
- **UserTypes** - list of user types of the component and their description (hints)
- **Typical usage** - typical usage of the component (to edit this page select this file and press button **Edit component description**)
- **History** - list of revisions of the component

You can choose predefined style or check/uncheck the desired file in the **List of the HTML files**. Some of these are compulsory, you cannot uncheck them (those check boxes are grayed).

Creating own styles

To create you own or customize the styles, please see the chapter *5.12.1 Help styles* see here for more information.

Editing help files

You can edit the file selected in "**List of the HTML files**" by clicking the "**Edit html code**" button. You may also edit this files manually (without the editor), but normally it is not necessary. If you want to edit these files manually, please don't change the lines marked "**DON'T CHANGE THIS LINE**".
The "**General**" file includes a description of the component. To avoid editing the whole file, there is a "**Edit component description**" check box . The description is then inserted into the file.

Other settings

If **more detailed Help** is checked, the help files contain more details, such as the description of parameters, etc...
If **Enable auto save help** is checked, every time you save the component, the Component Wizard regenerates the help files. Subsequently, manual changes to the help files are lost. The **Type of the help files** roll down menu selects the template used for the help creation. In this version, only the Basic template is available.

Context menu

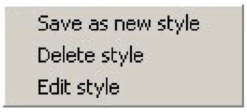
Using the context menu in the text field area (in the bottom part of these three pages) it's possible change text formatting or simply paste hypertext references to the component's properties, methods or events in the edited text.

5.12.1. Help styles

Editing/creating Documentation styles

Description

Every component can have different style of the generated help. Some styles are predefined and other can be easily created.
Creating/editing and deleting styles is accessible on the Documentation Page in context menu on the combo box **Style of the help** or List box **List of the HTML files**:



- Save as new style - current style - (set files) saves as new style - dialog for creating style appears - see paragraph Creating/Editing help style
- Delete style - delete current style.
- Edit style - edit current style - you can edit description and the order of the generated files.

Creating/Editing help style

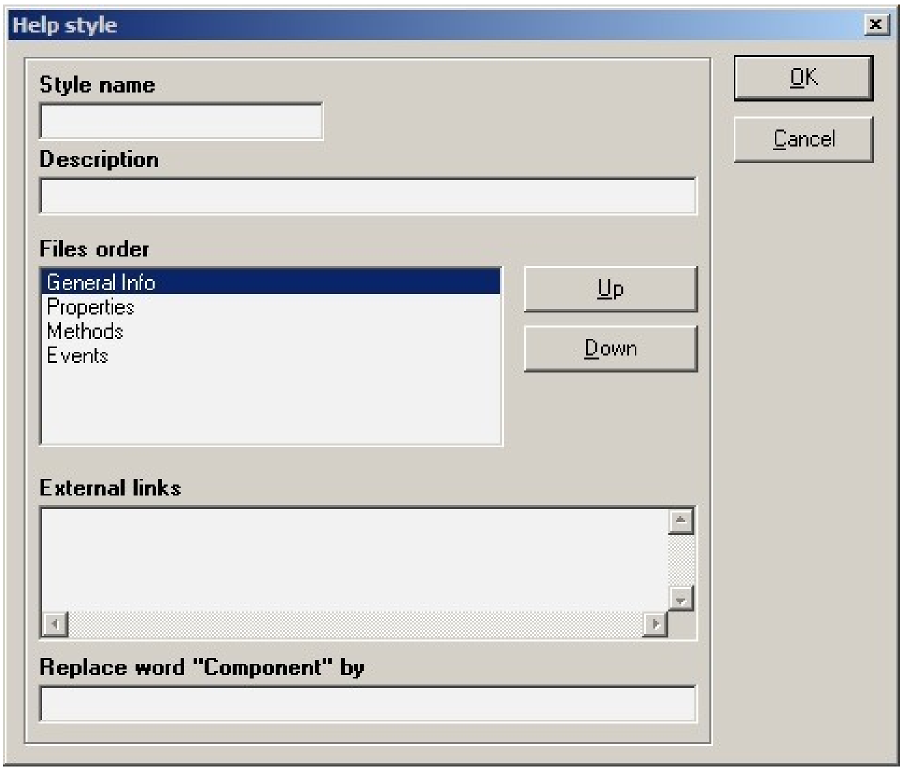


Figure 5.34 - Creating/Editing help style

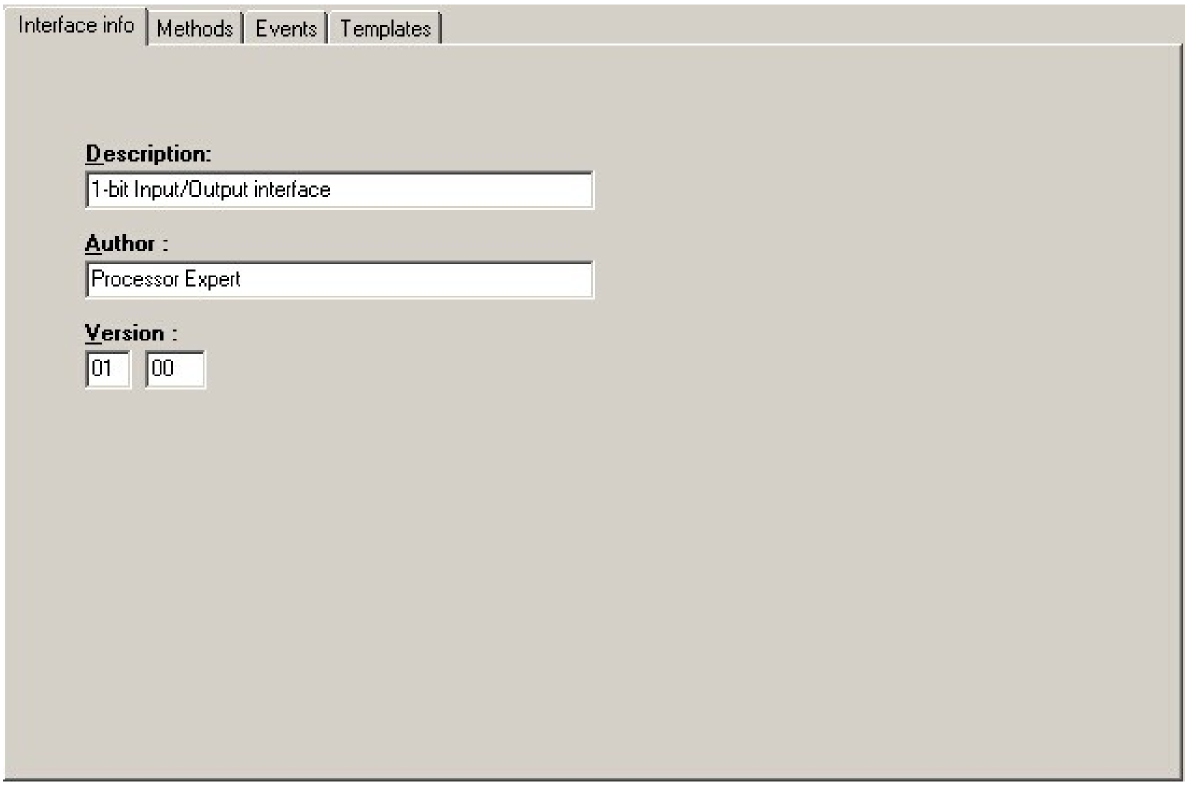
Controls:

- **Style name** - name of the style (There cannot be two styles with the same name)
- **Description** - notes about the style (optional)
- **Files order** - if you want to change the order of the generated files, select the file and move it up or down using buttons **Up** and **Down**.
- **External links** - html code for external links to files or web pages. The links will appear in the left menu column of the documentation. (e.g. <a href="http://www.google.com">Google</a>)

5.13. Interface info page

See also

Common page



Description:
1-bit Input/Output interface
Author :
Processor Expert
Version :
01 00

Figure 5.35 - Page Picture

Description

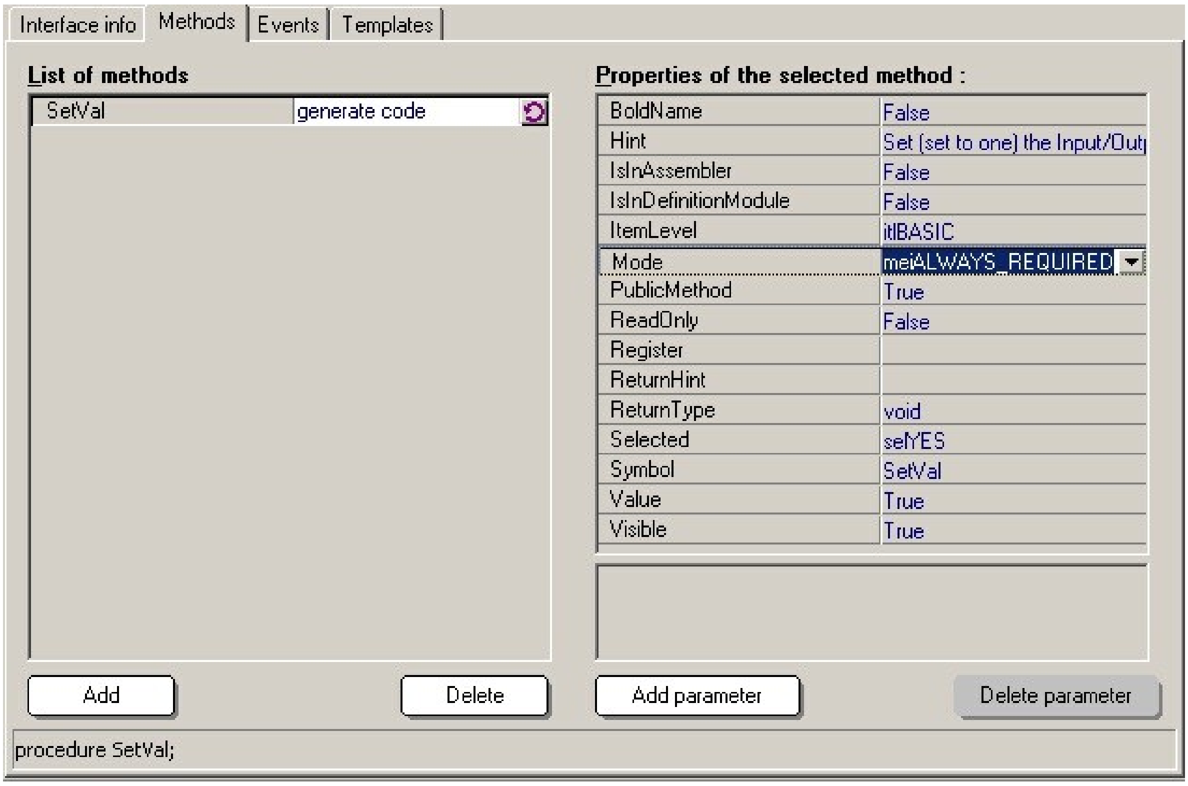
Short hint - short description of the interface which is used as hint in Processor Expert
Author - author's name which will appear in the source code header
Version - interface's version number. To indicate a beta version use format 00.9X

5.14. Methods page

Interface Methods page

See also

- How to create an interface ?
- How to modify an existing interface (add/remove methods)?
- How to apply an interface to a component ?



SetVal | generate code

BoldName	False
Hint	Set (set to one) the Input/Out
IsInAssembler	False
IsInDefinitionModule	False
ItemLevel	itlBASIC
Mode	meiALWAYS_REQUIRED
PublicMethod	True
ReadOnly	False
Register	
ReturnHint	
ReturnType	void
Selected	selYES
Symbol	SetVal
Value	True
Visible	True

procedure SetVal;

Figure 5.36 - Page Picture

Description

On this page, you can create the methods of the interface.
The created methods are listed on the left side and properties of the selected method are displayed on the other side. A method has the following properties :

Hint:
For adding new methods and events into the interface, the best and the fastest way is:

- Select Interface Templates Page
- Use popup menu on registered template/component and open it in Component Viewer.
- Go back to this (Interface methods or events) page.
- Drag and drop desired methods/events from Component View into the opened interface.

If you have difficulties with inheriting see Common problems with inheritance.

Properties of selected method :

- **Symbol** - name of the method (the same name as in the left window)
- **Hint** - hint displayed in the Processor Expert environment and method description of the help file. See Help Page.
- **IsInAssembler**- if the method is implemented in assembler
- **IsInDefinition module** - if it is in the definition module (when the method is not public)
- **PublicMethod** - if the included method is public
- **ReadOnly** - if the method is in Processor Expert read only, i.e. the **Value** cannot be changed (*generate code* or *don't generate code*)
- **ReturnHint** - hint for the return type, displayed in the Processor Expert environment (default value you may set in Options - Default values page)
- **ReturnType** - type of the returned value. (void means that the method has no return value) (default value you may set in Options - Default values page)
- **Selected** - generation source code into the driver (in Processor Expert Code design). There are four possibilities:
  - **selYES** - Method will be generated, it can be changed in Processor Expert (sets **ReadOnly** to false and **Value** to true)
  - **selNO** - Method will not be generated, it can be changed in Processor Expert (sets **ReadOnly** to false and **Value** to false)
  - **selNEVER** - Method will not be generated, it cannot be changed in Processor Expert (sets **ReadOnly** to true and **Value** to false)
  - **selALWAYS** - Method will not generated, it cannot be changed in Processor Expert (sets **ReadOnly** to true and **Value** to true)
- **Mode** - There are seven values:
  - **ALWAYS_REQUIRED** - ALWAYS REQUIRED - Method/event must be in the ancestor and is always generated.
  - **REQUIRED_IF_EXIST** - REQUIRED IF EXIST - Method/event is generated if it exists in the ancestor.
  - **OPTIONAL_MUST_EXIST** - OPTIONALLY REQUIRED, BUT MUST EXIST - Method/event must exist in descendant, it may not be set for generating (code design), but it can be changed in the CHG file of the descendant component. See *5.11.4 CHG file* for details.
    Remark: The method cannot be published, i.e. - feature MethodScope cannot be mePUBLISHED.
  - **OPTIONAL_IF_EXIST** - OPTIONALLY REQUIRED, MAY NOT EXIST - Method/event may not exist, but if it exists it may not be set for generating (code design), but it can be changed in the CHG file of the descendant. See *5.11.4 CHG file* for details.
    Remark: The method cannot be published, i.e. - feature MethodScope cannot be mePUBLISHED.
  - **OWNER_MUST_EXIST** - MAY NOT EXIST, GENERATE IF OWNER - Method/event may not exist, if exists it will be generated if will be generated method/event with the same name in the descendant.
  - **OWNER_IF_EXIST** - MUST EXIST, GENERATE IF OWNER - Method/event must exist, it will be generated only if descendant has method/event with the same name.

    - **SAME_AS_OWNER** - The method may not exist in ancestor component and is generated if it is required in descendant component and ancestor component can generate it. The settings of descendant component method is updated automatically.
    - **UNDEFINED** - Reserved
- **MethodScope** - scope of the method - the visibility and reimplementation of the method.
    - **PRIVATE** - the method is implemented in an ancestor and descendant can call it. This method is not visible in the descendant (in the page Methods).
    - **PUBLISHED** - the method is implemented in an ancestor. It is also visible in the descendant (the same like if it was method of the descendant), but is read only, i.e. you cannot change its name, parameters, etc. The descendant generates only macro which calls the ancestor.
    - **OVERRIDE** - combination of previous two ones, i.e. method is implemented in an ancestor but descendant overrides this implementation.

- all other method properties which are not described here, are described in the chapter properties' features.

Properties of each parameter :

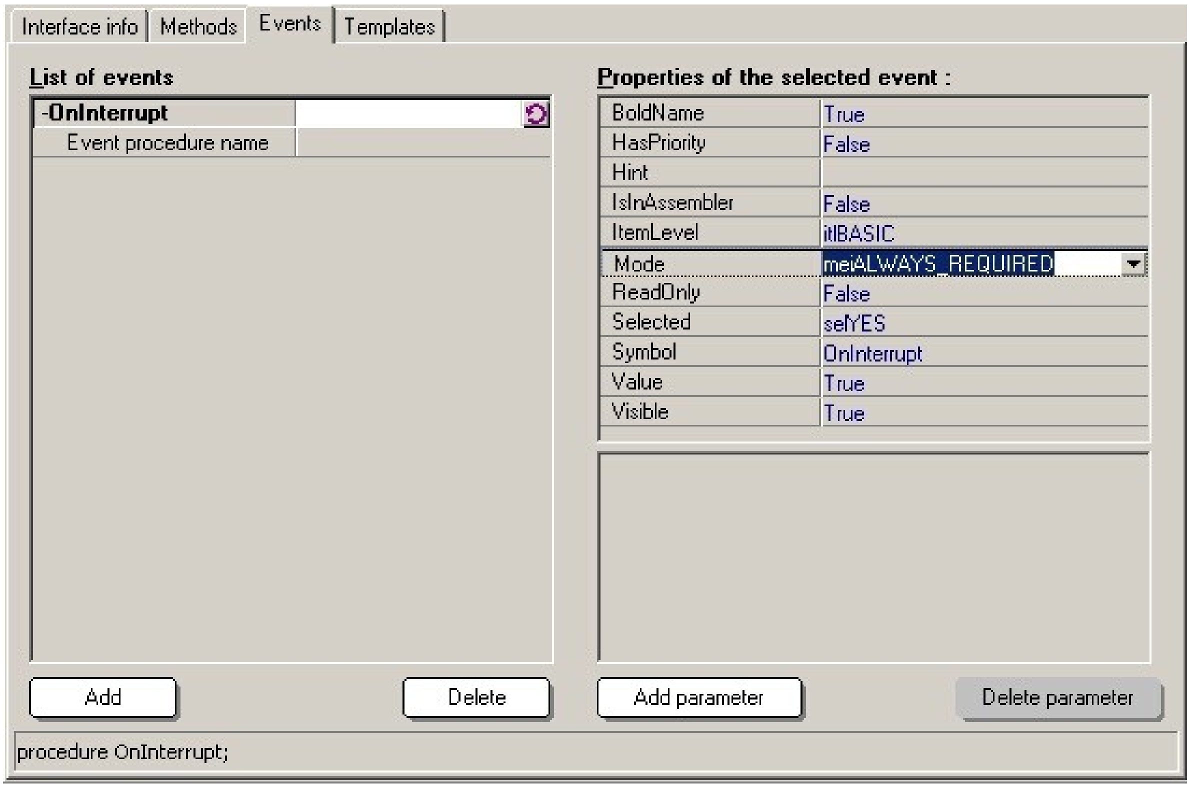
- **Name** - name of the parameter displayed and used in Processor Expert
- **Type** - type of the parameter (selected from the list)
- **Passing** - how the parameter is passed to the method
- **Hint** - hint for the parameter displayed in the Processor expert environment

You can use the buttons to add and to delete methods/parameters.
It is also possible here to use the drag and drop facilities of the View Component utility.
If you have filled the driver and language sections of the Drivers page, Component Wizard can automatically find a method in the driver by right clicking on the method (in the left window). A context menu appears, where you can select either the definition, implementation or the help part of the selected driver and language. Using double-click (left mouse button), you may automatically go to the implementation part of the selected driver. Before editing drivers, you have to save the component (You can check the **Autosave** check box in the Drivers page).

5.15. Events page

See also

- How to create an interface ?
- How to modify an existing interface (add/remove methods)?
- How to apply an interface to a component ?



List of events	
-OnInterrupt	
Event procedure name	

Properties of the selected event :	
BoldName	True
HasPriority	False
Hint	
IsInAssembler	False
ItemLevel	itlBASIC
Mode	meiALWAYS_REQUIRED
ReadOnly	False
Selected	selYES
Symbol	OnInterrupt
Value	True
Visible	True

```
procedure OnInterrupt;
```

Figure 5.37 - Page Picture

Description

On this page, you can create the events of the interface.
The created events are listed on the left side and properties of the selected event are displayed on the other side.
An event has the following properties :

Hint:
For adding new methods and events into the interface, the best and the fastest way is:

- Select Interface Templates Page
- Use popup menu on registered template/component and open it in Component Viewer.
- Go back to this (Interface methods or events) page.
- Drag and drop desired methods/events from Component View into the opened interface.

If you have difficulties with inheriting see Common problems with inheritance.

Properties of selected event :

- **Symbol** - name of the event (the same name as in the left window)
- **HasPriority** - if the event has priority. If true, event has subitem Priority (in the left window)
- **Hint** - hint displayed in the Processor Expert environment and event description of the help file. See Help Page.
- **IsInAssembler**- if the event is implemented in assembler
- **ReadOnly** - if the event is in Processor Expert read only, ie. the **Value** cannot be changed (*generate code* or

don't generate code)

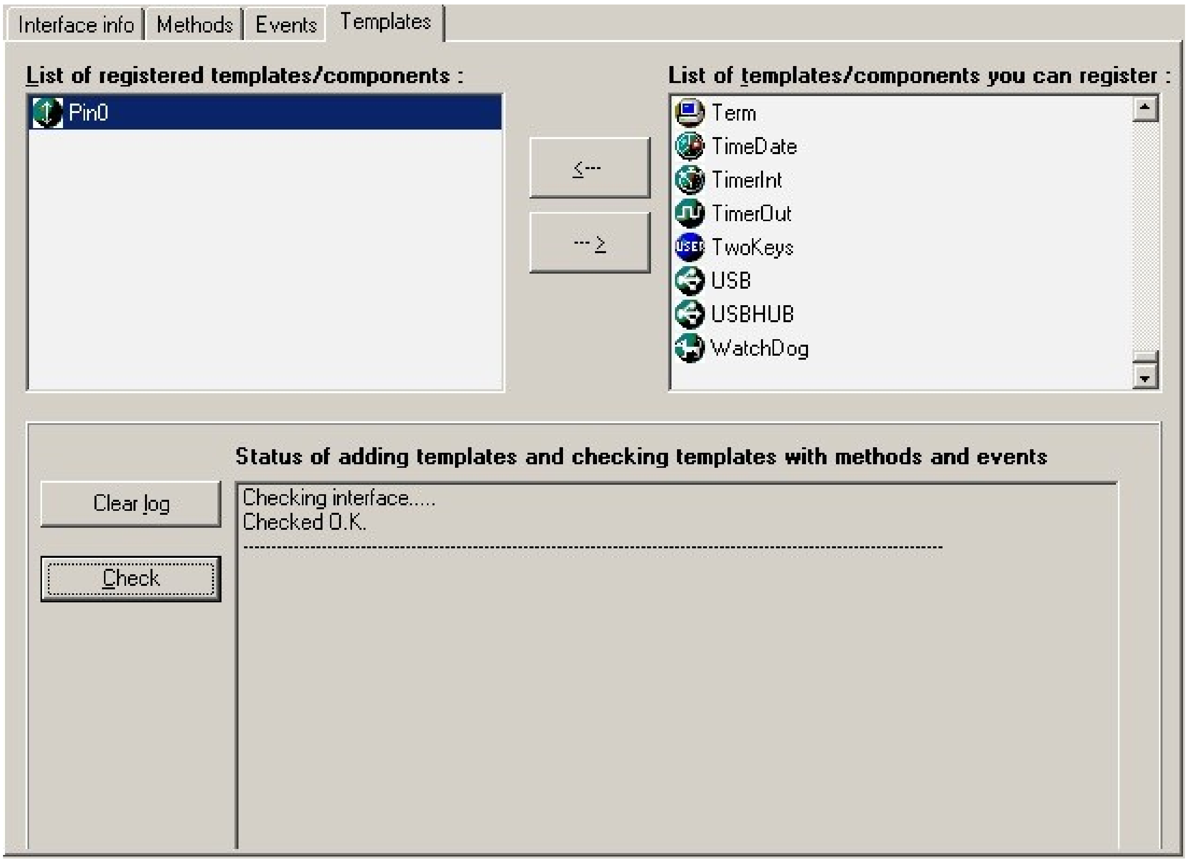
- **Selected** - generation source code into the driver (in Processor Expert Code design). There are four possibilities:
  - **selYES** - Event will be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to true)
  - **selNO** - Event will not be generated, it can be changed in Processor Expert (sets ReadOnly to false and Value to false)
  - **selNEVER** - Event will not be generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to false)
  - **selALWAYS** - Event will not generated, it cannot be changed in Processor Expert (sets ReadOnly to true and Value to true)
- **Mode** - There are seven values:
  - **ALWAYS_REQUIRED** - ALWAYS REQUIRED - Method/event must be in the ancestor and is always generated.
  - **REQUIRED_IF_EXIST** - REQUIRED IF EXIST - Method/event is generated if it exists in the ancestor.
  - **OPTIONAL_MUST_EXIST** - OPTIONALLY REQUIRED, BUT MUST EXIST - Method/event must exist in descendant, it may not be set for generating (code design), but it can be changed in the CHG file of the descendant. See *5.11.4 CHG file* for details.
    Remark: The method cannot be published, i.e. - feature MethodScope cannot be mePUBLISHED.
  - **OPTIONAL_IF_EXIST** - OPTIONALLY REQUIRED, MAY NOT EXIST - Method/event may not exist, but if it exists it may not be set for generating (code design), but it can be changed in the CHG file of the descendant. See *5.11.4 CHG file* for details.
    Remark: The method cannot be published, i.e. - feature MethodScope cannot be mePUBLISHED.
  - **OWNER_MUST_EXIST** - MAY NOT EXIST, GENERATE IF OWNER - Method/event may not exist, if exists it will be generated if will be generated method/event with the same name in the descendant.
  - **OWNER_IF_EXIST** - MUST EXIST, GENERATE IF OWNER - Method/event must exist, it will be generated only if descendant has method/event with the same name.
  - **SAME_AS_OWNER** - The event may not exist in ancestor component and is generated if it is required in descendant component and ancestor component can generate it. The settings of descendant component event is updated automatically.
  - **UNDEFINED** - Reserved
- **EventScope** - scope of the event - the visibility and reimplementation of the event.
  - **PRIVATE** - the event is called from ancestor and descendant must handle it. Event is not visible in the descendant (in the page Events).
  - **PUBLISHED** - the event is called from ancestor and descendant must handle it. It is also visible in the descendant (the same like if it was event of the descendant), but is read only, i.e. you cannot change its name, parameters, etc. Setting event ih the decendant automaticaly sets event in the ancestor and vice versa.
  - **OVERRIDE** - the event is called from ancestor and handled in descendant and he can call this event again (to its descendant). It is also visible in the descendant (the same like if it was event of the descendant), but is read only, i.e. you cannot change its name, parameters, etc.
- all other event properties which are not described here, are described in properties' features.

Properties of each parameter :

- **Name** - name of the parameter displayed and used in Processor Expert
- **Type** - type of the parameter (selected from the list)
- **Passing** - type of passing parameter to the method
- **Hint** - hint for the parameter displayed in the Processor expert environment and parameter description in help files. See Help Page.

You can use the buttons to add and delete events/parameters.
It is also possible here to use the drag and drop facilities of the View Component utility.
If you have filled the driver and language sections of the Drivers page, Component Wizard can automatically find a event in the driver by right clicking on the event (in the left window). You can select either the definition, implementation or the help part of the selected driver and language. Using double-click (left mouse button), you may automatically go to the implementation part of the selected driver. Before editing driver, you have to save the component (You can check the **Autosave** check box in the Drivers page).

5.16. Templates page


Interface info
Methods
Events
Templates
List of registered templates/components :
Pin0
<---
--->
List of templates/components you can register :
Term
TimeDate
TimerInt
TimerOut
TwoKeys
USB
USBHUB
WatchDog
Status of adding templates and checking templates with methods and events
Clear log
Check

```
Checking interface.....
Checked O.K.
--------------------------------------------------------------------------------------------------------
```

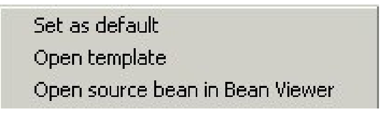
Figure 5.38 - Page Picture

Description

In the upper part of the tab, there are two windows containing a list of accessible templates and all components. The left list is the list of templates and components, that the interface contains. The right list is the list of all possible templates and components you can add (register). Before adding a template or a component, the Component Wizard checks automatically, whether the template or component can be used in the interface. If it can be used, it is added, otherwise it is not added and some explanations are displayed in the lower window.
The **Check** button is used for checking if the interface is correctly created.
In order to be valid, the methods of the interface should be common to all the templates of the interface.

Context menus

It is possible to use context menus for the manipulation of the registered templates/components. Clicking the right mouse button opens the context menu for working with selected template:



Meaning of the menu items:

- **Set as default** - set selected template/component as the default template/component
- **Open template** - opens the selected template in Component Wizard. If the interface is not saved, dialog for saving appears.
- **Open source component in Component Viewer** - opens the registered component in Component Viewer e.g. for drag and drop methods and events into the interface.

6. Component Viewer

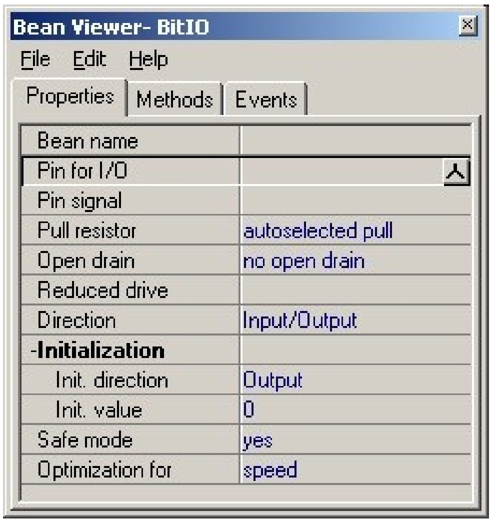
Component Viewer - drag&drop properties, methods or events to your component

Description

The Component Viewer is designed for viewing existing components. It displays the properties, methods and events of the component. It provides the possibility to **drag and drop** these properties, methods and events into the Component Wizard environment, where it is allowed.

Note 1: To drag and drop switch to desired page in both - Component Viewer and Component Wizard. E.g. to drag and drop methods switch to the page Methods in the Component Viewer and to the page Methods in the main window of Component Wizard.

Note 2: In Basic Component Wizard some properties, methods or events couldn't be possible to drag and drop because not all properties are available in this version e.g. if you view component supplied with Processor Expert.



Bean name	
Pin for I/O	
Pin signal	
Pull resistor	autoselected pull
Open drain	no open drain
Reduced drive	
Direction	Input/Output
-**Initialization**	
Init. direction	Output
Init. value	0
Safe mode	yes
Optimization for	speed

Figure 6.1 - View utility Picture

Main Menu

File :

- **Load component** - loads existing component from disk into this viewer.

Edit :

- **Copy all properties** - copies all properties into Component Wizard properties page and erases all existing properties in Component Wizard's properties. A dialog box will request confirmation.
- **Copy all methods** - copies all methods into Component Wizard methods page and erases all existing methods in Component Wizard's methods. A dialog box will request confirmation.
- **Copy all events** - copies all events into Component Wizard events page and erases all existing events in Component Wizard's events. A dialog box will request confirmation.

Help :

- Help - Displays this page.

7. Tutorial Courses

List of tutorial courses

See also

Component Wizard Introduction

Tutorial courses

List of tutorial courses

1. How to create my first component - two-digit 8-segment LED display
2. Usage of basic properties - ready to use example
3. Usage of Inheritance Wizard for inheritance
4. Usage of inheritance without Inheritance Wizard

7.1. Tutorial, Course 1

My First Component, two-digit 8-segment LED display

Contents

In this course you will create a simple two-digit 8-segment LED display component without inheritance. You will learn step-by-step:

- how to edit general component information (Common page)
- how to design properties and methods of the component
- how to create and edit driver of the component
- how to create HTML help

The course is divided into the following steps:

1. Definition of Component Function
2. Component Creation
3. Design of Properties
4. Design of Methods
5. Creating driver
6. Editing driver
7. Generating help
8. Component Installation

Example Ready to use

You can see complete example of the software component ***BWcourse1_S2D*** with driver prepared in accordance with this course.
This component is not installed in the Processor Expert.

Links

First step >> | List of Tutorial Courses | Component Wizard Introduction

7.1.1. Tutorial, Course 1, Step 1: Specification of Component Function

Simple two-digit 8-segment LED display

Contents

Definition of component function - two-digit 8-segment display

Description

This component shall encapsulate simple two-digit 8-segment LED display. The display is connected to the external bus of the CPU and chip-select of the display is implemented in the external hardware. The display has only one 16- bit control register accessible using external bus. This register holds information which segments of the display are light on. The address of control register will be set up in the component properties. Also initialization value of the control register will be set as a component's property.

Component will have one method to change the display contents and no events. Help for the component will be generated automatically by Component Wizard.

Links

Next step >> | Contents of This Course | List of Tutorial Courses | Component Wizard Introduction

7.1.2. Tutorial, Course 1, Step 2 - Component Creation

Component Wizard - New component, Common page

Contents

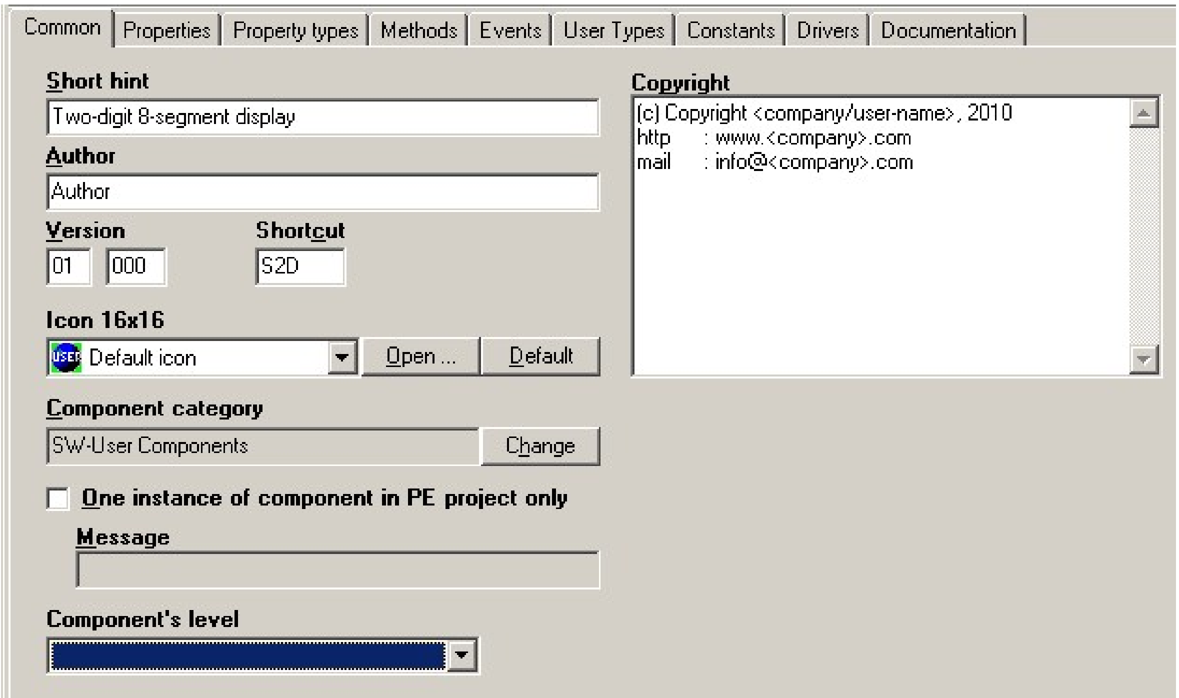
In this step you can learn how to ...

- Start up Component Wizard
- Create a new component
- Fill up the basic information about the component
- Save the component to the disk

Description

Any inherited component will be not needed for accessing the hardware. The access of the display control register will be written directly in ANSI-C language inside component driver.

1. Run *Component Wizard* from Windows "Start" menu (if you are using standalone version) or using CodeWarrior menu command **Processor Expert - Tools - Component Wizard**. Select Component Wizard in the introductory dialog (do not use *Inheritance Wizard* because you do not need inheritance in this example).
2. Choose **File | New | Component** from Component Wizard main menu.
3. Select `Common` page in the Component Wizard workspace
4. Fill in following items:
   - *Short hint* - simple component description, `Two-digit 8-segment display`
   - *Author* - your name
   - *Version* - version of the component, `01.000`
   - *Shortcut* - short component name (max. 4 characters), `S2D`
   - If you have a *icon* of the new component (16x16 pixels, BMP format, 16 colors), you can specify the file name.
5. Choose **File - Save** from Component Wizard main menu to save the component to the disk. Write file name of the component: `S2D`. File name is always the same as the component name. Choose 'no' on question dialog 'Do you want to create a software driver?'. If you successfully save the component, the new component name appears in the Component Wizard window title.



Short hint: Two-digit 8-segment display

Author: Author

Version: 01 000

Shortcut: S2D

Icon 16x16: Default icon

Copyright:
(c) Copyright <company/user-name>, 2010
http : www.<company>.com
mail : info@<company>.com

Component category: SW-User Components

□ One instance of component in PE project only

Message:

Component's level:

Figure 7.1 - Content of the Common page

Links

<< Previous step | Next step >> | Contents of This Course | List of Tutorial Courses | Component Wizard Introduction

7.1.3. Tutorial, Course 1, Step 3 - Design of Properties

Tutorial, Course 1, Step 3 - Design of Properties

Contents

Design of component's properties

Description

The new display component shall have the following properties:

- Component name - this is the default property and can not be changed or removed. It must be present in every component.
- Address of display control register
- Display initialization value

To define these properties follow the steps:

1. Select `Properties` page in the component workspace. There is an already defined the default property - Component name. This property can not be modified or removed.
2. Press button `Add down` to add new property. The dialog box with list of all available types appears. Choose requested type of the new property.
   Select the type *Address in CPU address space*.
3. You can change features of this property in the right side of the Component Wizard workspace.

   Select *Advanced* in the drop-down list in the right-bottom corner of the Component Wizard workspace to see the optional features needed in following steps.

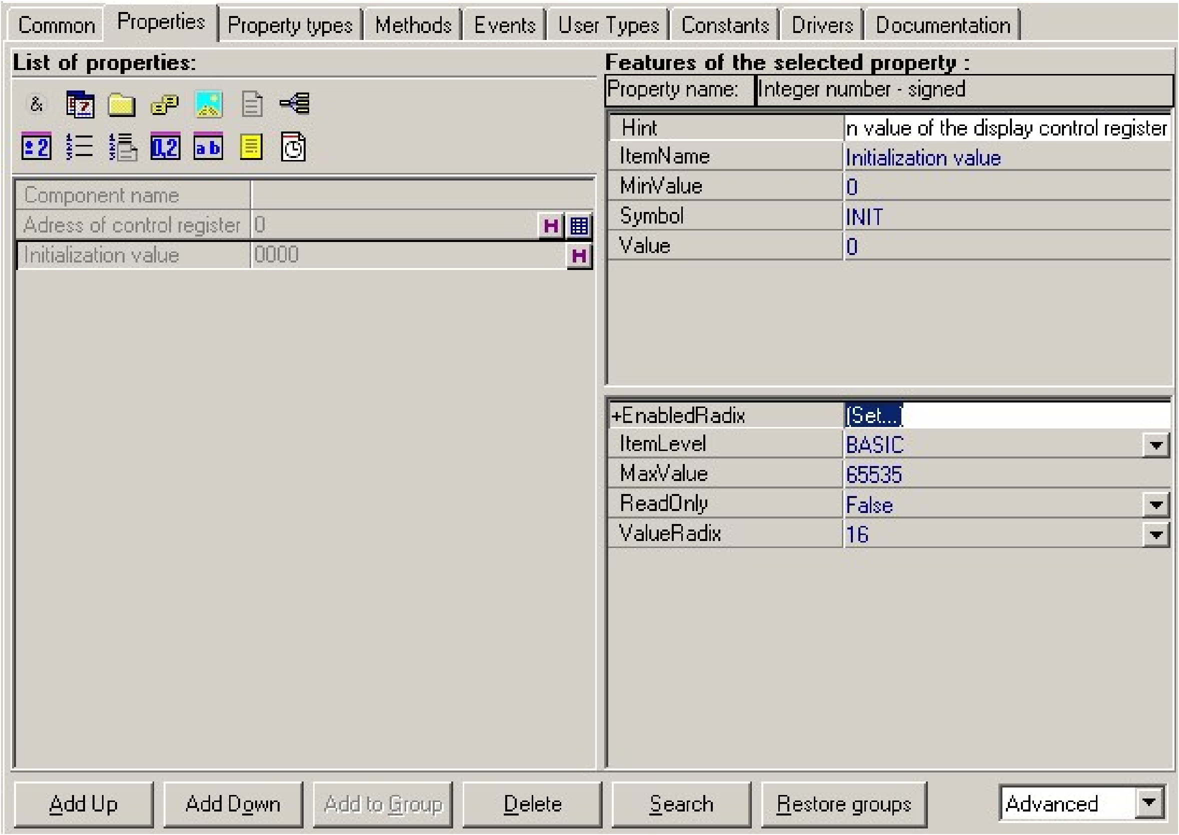
   Fill in the following features:

   - *FixedSize* - size of address range, write `2` (because of 16-bit width control register)
   - *ItemName* - name of the property, write the value `Address of control register`
   - *Symbol* - name of macro with value of the property, this macro you can use in the component driver, value: `ADDR`. See description of macroprocessor for details.
   - *Hint* - description of the property, `Address of display control register in external CPU address space`
   - *ValueRadix* - select the `16`, default value will be displayed as hexadecimal number.
   - *AddrType* - type of the address. Unfold the group by clicking the '+' and type the value *True* for flags *addrEXTERNAL* and *addrALLOCATE*.

   This property will required address from external address space of the CPU, 2 byte width. Address range will be protected from usage by other components.
4. Press the icon *Integer number - signed* (±2) to add a new property of the type 'signed integer number'.
5. Fill in the following features:

- *ItemName* - `Initialization value`
- *Symbol* - `INIT`
- *Hint* - `Initialization value of the display control register`
- *EnabledRadix* - set flags: *radix2*, *radix10*, *radix16* to True
- *MaxValue* - `H:FFFF` (H introduces hexadecimal number)
- *ValueRadix* - `16`

6. Other features should stay without any change.



List of properties:

Component name		
Adress of control register	0	H
Initialization value	0000	H

Features of the selected property :

Property name: Integer number - signed

Hint	n value of the display control register
ItemName	Initialization value
MinValue	0
Symbol	INIT
Value	0

+EnabledRadix	[Set...]
ItemLevel	BASIC
MaxValue	65535
ReadOnly	False
ValueRadix	16

Figure 7.2 - Properties page after adding the properties

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7.1.4. Tutorial, Course 1, Step 4 - Design of Methods

Design of Component's Methods

Contents

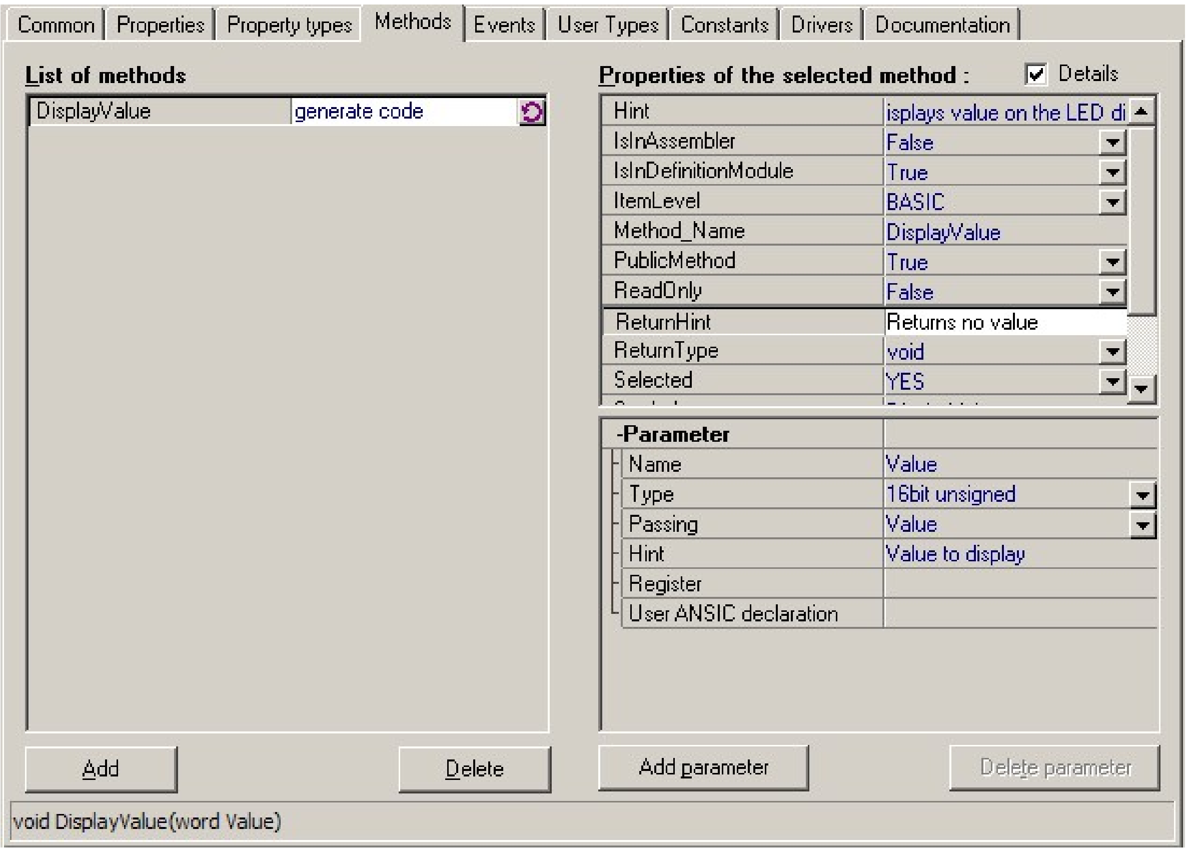
Design of the component's methods. The method will allow the user to control the operation during runtime.

Description

The component will be controlled by one method. This method (DisplayValue) will set the display content using a direct write to the display control register. The methods will have one parameter - a 16-bit value for the control register.

To define the method, follow these steps:

1. Select the page `Methods` in the Component Wizard workspace
2. Click on the button `Add` to add a new method to the component
3. Enable detailed options by checking the *Details* check-box.
4. Set up the following method's properties:
   - *Symbol* - `DisplayValue`
   - *Hint* - `Displays value on the LED display`
   - *ReturnType* - `void`
   - *ReturnHint* - `Returns no value`
5. Click on the button `Add parameter` to add a new parameter to the selected method
6. Set up the following parameter's features:
   - *Name* - `Value`
   - *Type* - `16-bit unsigned`
   - *Passing* - `Value`
   - *Hint* - `Value to display`



List of methods

DisplayValue	generate code

Properties of the selected method :

Hint	isplays value on the LED di
IsInAssembler	False
IsInDefinitionModule	True
ItemLevel	BASIC
Method_Name	DisplayValue
PublicMethod	True
ReadOnly	False
ReturnHint	Returns no value
ReturnType	void
Selected	YES

-Parameter	
Name	Value
Type	16bit unsigned
Passing	Value
Hint	Value to display
Register	
User ANSIC declaration	

void DisplayValue(word Value)

Figure 7.3 - Methods tab after adding the method

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7.1.5. Tutorial, Course 1, Step 5 - Creating Driver

Creating Component's Driver

Contents

Creationg a simple component driver.

Description

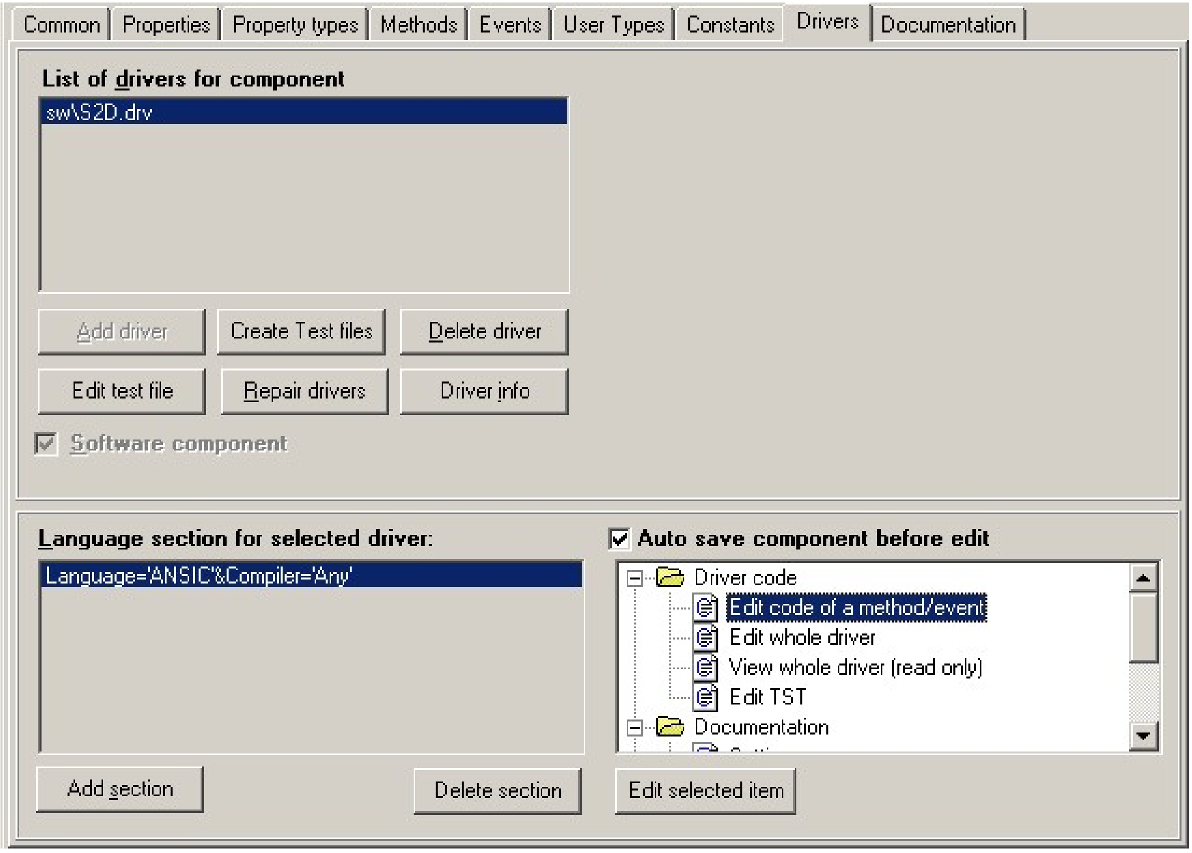
The component is now prepared for the creation of the driver. Component driver is the source file/script from which is generated:

- interface of all generated component methods (header file)
- implementation of all component methods (implementation file)
- part of CPU initialization (optionally)
- part of project text help file
- interface and implementation of all component events

Please follow these steps:

1. Select the `Drivers` page on the Component Wizard workspace and click on the button `Add driver`. *Note: software component can have only one driver (in the directory ProcessorExpert\Drivers\SW\).*

2. The *Add language section* dialog pops up. Specify language and compiler of the new section: language = `ANSI-C`, compiler = `any`. Click OK, skip the *Revision update* and the section is prepared for editing and writing the implementations of component's methods.



sw\S2D.drv

☑ Software component

Language='ANSIC'&Compiler='Any'

☑ Auto save component before edit

Figure 7.4 - Drivers page after adding a driver

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7.1.6. Tutorial, Course 1, Step 6 - Editing Driver

Editing Component's Driver

Contents

How to edit the component's driver

Description

The component's driver can be modified in Component Wizard internal editor. You can edit implementation of one method or whole section of one language/compiler.

The section with empty method skeletons was generated by Component Wizard. The following parts shall be edited only:

- Implementation of method *DisplayValue*
- Initialization of the component

Steps

1. Select the item *Edit code of a method/event* in the bottom-right part of the window and click the button *Edit selected item.* A dialog with the driver part selection appear.
2. Select the method *DisplayValue* method and click the *Edit* button. The skeleton of the DisplayValue method's code will be displayed in the internal code editor.
3. Fill in the implementation of method *DisplayValue*: (added code is displayed as a bold.)

   ```
   void %'ModuleName'_DisplayValue(word Value)
   {
      (*(word*)%#h%'ADDR'UL) = Value;
   }
   ```

   where

   - `%'ADDR'` is value of *Address* property of the component. The value is represented as a value of a macro named as a feature *Symbol* of property.
   - `%#h` is a numbers formatting directive. User can choose formatting of numbers in Processor Expert.
   - `UL` is C directive for integer numbers, it defines that number is unsigned long.
   - `(word*)` is typecast to the pointer to word.
   - `Value` is parameter of the method.

   The method writes the value to the display control register (at address specified in the component properties).

4. Select **File - Save** to save file and close the window.
5. Click the button *Edit selected item* again.
6. Select the part *Driver parts / Initialization* and click the *Edit* button.
7. Write the implementation line of component initialization at the place marked by comment */* Write code here ... */*:

   ```
      (*(word*)%#h%'ADDR'UL) = %INIT;
   ```

where

- `%INIT` is initialization value of control register specified in the component properties.

The initialization value is written to the display control register in the component initialization.

Close the editor window and confirm the question 'Accept changes ?' by selecting Yes.

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7.1.7. Tutorial, Course 1, Step 7 - Generating Help

Generating Documentation For the Component

Description

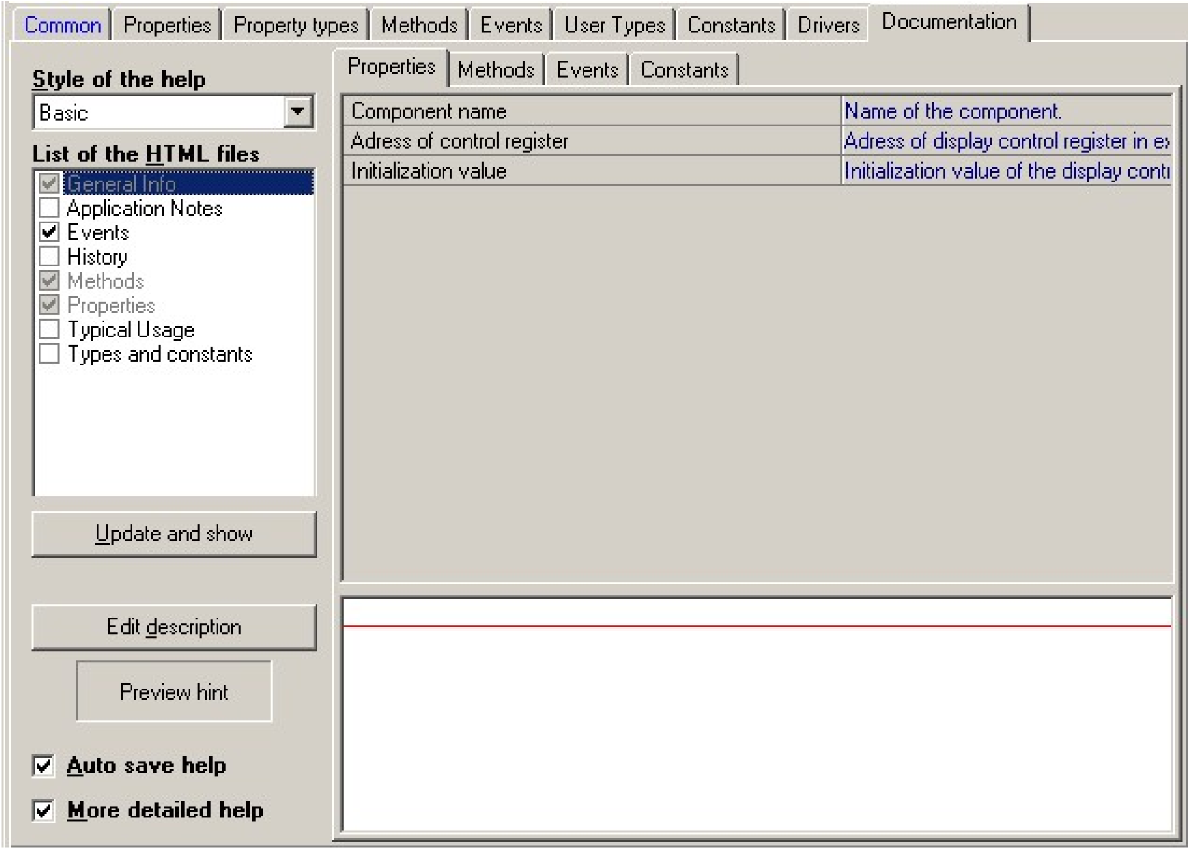
The html documentation can be automatically generated from the Component Wizard. Help files contain all information about the component created in previous steps.
The documentation has usually four pages:

- *General info* - general component information, description of component function.
- *Properties* - description of all properties.
- *Methods* - list of all methods.
- *Events* - list of all events.

Description of properties, methods and events is generated from the hints. Besides that, the user should briefly describe on the *General Info* page how the component works and how it's intended to be used.

Steps

1. Select page `Documentation` on the Component Wizard workspace
2. Select *Style of the help*: `Basic`.
3. Check options: *More detailed help* and *Auto save help*.
4. Select the *General info* from the list of HTML files
5. Click on `Edit description` button to edit the component description in the General Info pages.
6. Write the text file in the editor.
7. Close the internal editor and click on `Update and show` button
8. Generated help file will be opened in default html viewer



Style of the help: Basic

List of the HTML files

☑ General Info
☐ Application Notes
☑ Events
☐ History
☑ Methods
☑ Properties
☐ Typical Usage
☐ Types and constants

Component name	Name of the component.
Adress of control register	Adress of display control register in ex
Initialization value	Initialization value of the display conti

☑ Auto save help

☑ More detailed help

Figure 7.5 - Picture of the help page

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7.1.8. Tutorial, Course 1, Last Step - Installing Component

A new Component in Processor Expert

Contents

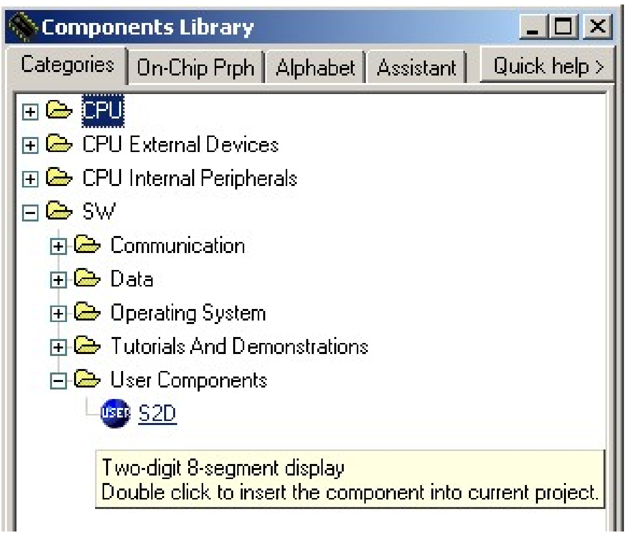
Where to find the new component in Processor Expert.

Description

The new component is prepared for usage in Processor Expert. It appears in the component selector window.

The component can be used for code generation in Processor Expert. It supports languages (and compilers) specified in the page `Drivers`.

Do not forget to **save** the last component state before switching to Processor Expert.



Two-digit 8-segment display
Double click to insert the component into current project.

Figure 7.6 - The created component in Processor Expert

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7.2. Tutorial, Course 2

Course 2 - Usage of basic properties

Contents

In this course you will learn:

- how to use macros defined from the properties
- how to create component settings file
- how to use comment and output text formatting, `macro %>N`
- how to use conditional translation, macros `%ifdef, %ifndef`

Description

There is ready-to-use example ***BasicProperties* component**. This component contains all properties supported in Basic version of Component Wizard. Open the Basic Properties component in Component Wizard.
The component-settings file contains most of macros generated from the properties. To see its content, select Driver page tab and select *Documentation / Settings* in the tree in bottom-right part of the window. Then click on the **Edit selected item** button.
You can see also CHG file and TST file of this component.

Contents of the Component Settings file

This file is included into Component driver several times. The text from this file is generated as a comment to component header file, component implementation file and project text help file.

```
%-Address in CPU address space
%;**%>12Address in CPU address space
%;**%>17Address%>40: %#h%ADDR
%;**%>17Address is external%>40: %ADDR_External
%;**%>17Address is internal%>40: %ADDR_Internal
%;**%>17Address is in RAM%>40: %ADDR_RAM
%;**%>17Address is in ROM%>40: %ADDR_ROM
%;**%>17Address is in FLASH%>40: %ADDR_FLASH
%;**%>17Address is in EEPROM%>40: %ADDR_EEPROM
%-
%-Boolean group
%ifndef BOOLGROUP
%;**%>12Boolean group%>40: macro is not defined
%elif BOOLGROUP=''
%;**%>12Boolean group%>40: macro is defined
%else
%;**%>12Boolean group%>40: %BOOLGROUP
%endif
%-
%-Boolean yes/no
%ifndef BOOL
%;**%>12Boolean yes/no%>40: macro is not defined
%elif BOOL=''
%;**%>12Boolean yes/no%>40: macro is defined
%else
%;**%>12Boolean yes/no%>40: %BOOL
%endif
%-
%-Date
%;**%>12Date:
%;**%>17Day%>40: %DATEDay
%;**%>17Month%>40: %DATEMonth
%;**%>17Month long%>40: %DATEMonthLong
%;**%>17Month short%>40: %DATEMonthShort
%;**%>17Year%>40: %DATEYear
%;**%>17Day of week%>40: %DATEDayOfWeek
%;**%>17Day of week long%>40: %DATEDayOfWeekLong
%;**%>17Day of week short%>40: %DATEDayOfWeekShort
%-
%-Directory
%;**%>12Directory:
%;**%>17Input value%>40: "%DIR"
%;**%>17Absolute path\%>40: "%DIR_"
%;**%>17Absolute path%>40: "%DIR__"
```

```
%-
%-Enumeration (color)
%;**%>12Enumeration%>40: %ENUM
%-
%-External bitmap file
%;**%>12External bitmap file
%;**%>17Input%>40: %BITMAP
%;**%>17Extension%>40: %BITMAPFileExt
%;**%>17File name%>40: %BITMAPFileName
%;**%>17Absolute file%>40: %BITMAPFilePath
%;**%>17Short path%>40: %BITMAPShortPath
%;**%>17Height%>40: %BITMAPHeight
%;**%>17Width%>40: %BITMAPWidth
%;**%>17Size%>40: %BITMAPSize
%-
%-External file
%;**%>12External file
%;**%>17Input%>40: %FILE
%;**%>17Extension%>40: %FILEFileExt
%;**%>17Name%>40: %FILEFileName
%;**%>17Absolute file%>40: %FILEFilePath
%;**%>17Absolute short%>40: %FILEShortPath
%-
%-Group of items
%;**%>12Group of items%>40: no macros
%-
%-Integer - signed
%;**%>12Integer - signed%>40: %INT
%-
%-Integer - unsigned
%;**%>12integer - unsigned%>40: %WORD
%-
%-List of items
%;**%>12List of items
%;**%>17Number of items%>40: %LISTNumItems
%;**%>17Maximal index%>40: %LISTMaxItem
%for i from [0..%LISTMaxItem]
%;**%>17Real%i%>40: %REAL%i
%endfor
%-
%-String
%;**%>12String%>40: %STRING
%-
%-String list
%;**%>12String list
%;**%>17Number of lines%>40: %STRLISTLines
%-
%-Time
%;**%>12Time
```

```
%;**%>17Hour%>40: %TIMEHour
%;**%>17Min%>40: %TIMEMin
%;**%>17Sec%>40: %TIMESec
%-
%-Speed modes
%;**%>12Speed modes
%;**%>17Number of speed modes%>40: %runSpeedModeNum
%;**%>17High speed mode%>40: %runHighSpeed
%;**%>17Low speed mode%>40: %runLowSpeed
%;**%>17Slow speed mode%>40: %runSleep
```

Links

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7.3. Tutorial, Course 3

Course 3 - My first component with inheritance - keyboard

Description

There is description of creation of simple component with inheritance (using Inheritance Wizard) in this course. The new component is keyboard with two keys.

The creation is done in following steps:

1. Definition of Component Function
2. Component Creation
3. Selection of the component for inheriting
4. Interface creation
5. Template settings
6. Inheriting cycle
7. Inheriting again
8. Configuring template
9. Design of methods
10. Design of events
11. Code writing
12. Generating help, Installing component

Example Ready to use

You can see complete example of the software component ***TwoKeys*** with driver prepared in accordance with this course.

Links

First step >> | List of Tutorial Courses | Component Wizard Introduction

7.3.1. Tutorial, Course 3, Step 1: Specification of Component Function

Simple two-key keyboard

Contents

Definition of component function - two-key keyboard

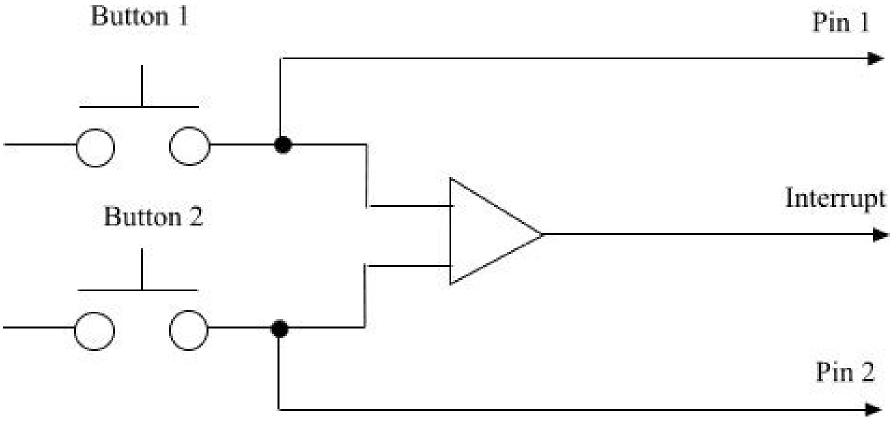
Description

This component should encapsulate simple two-key keyboard. The keyboard is connected to the 2 input pins and to one external interrupt which informs about the key press. The information which key is pressed is read from two pins.

For connecting the keyboard to the CPU we will use two types of components:

- BitIO - This component implements a one-bit input/output. It uses one bit/pin of a port
- ExtInt - This component implements an external interrupt. The interrupt is caused by a signal level/edge on a pin.

Component will have three methods for enable and disable the keyboard event and one method for reading status of the keys, and one event occuring when some key is pressed. The simple schema follows:



Help for the component will be generated automatically by Component Wizard.

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7.3.2. Tutorial, Course 3, Step 2 - Component Creation

Tutorial, Course 3, Step 2 - Component Creation

Contents

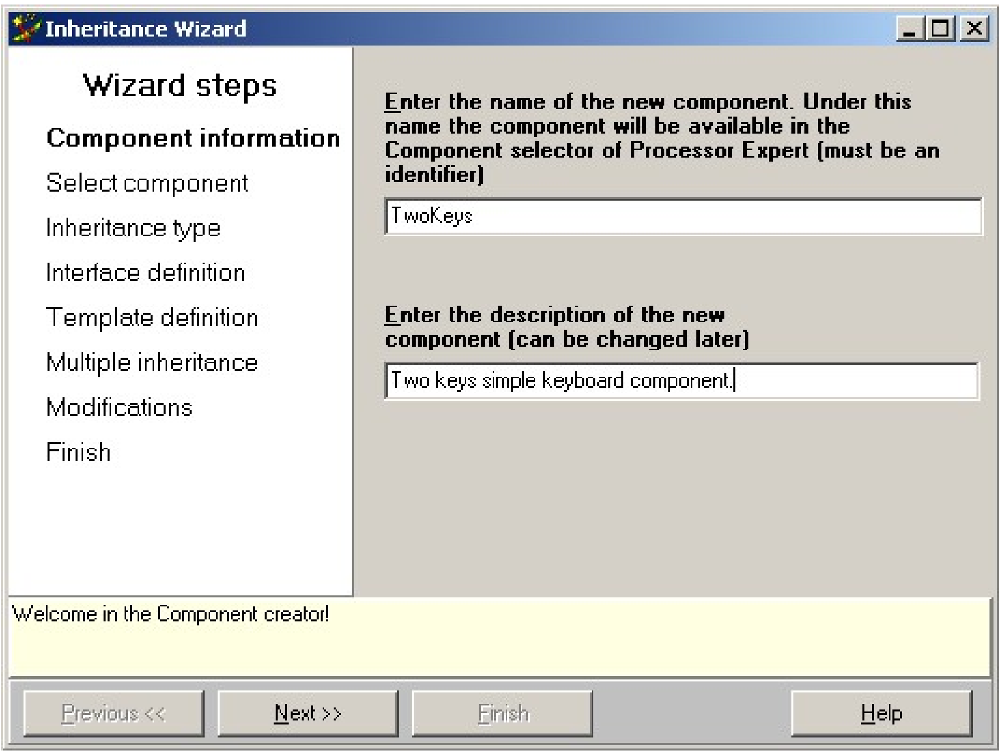
In this step you can learn how to ...

- Start up Component Wizard
- Create a new component with Inheritance Wizard
- Fill up the basic information about the component - name of the component

Description

The component will inherit another component for that will provide a user-configurable CPU-independent access to a hardware.

1. Run *Component Wizard* and select the *Inheritance Wizard* from startup menu. If the startup menu is turned off or the Component Wizard is already running, select **File | New | Component using Inheritance Wizard** from main menu.



Enter the name of the new component. Under this name the component will be available in the Component selector of Processor Expert (must be an identifier)

TwoKeys

Enter the description of the new component (can be changed later)

Two keys simple keyboard component.

Welcome in the Component creator!

2. Fill the item **Enter the name of the new component** - enter the name of the new component - **TwoKeys**. (Note: If the edit line is empty or some component of this name exists, the button **Next** is disabled.)
3. Fill the description of the component: *Two keys simple keyboard component.*

4. Click button **Next** for next page.

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7.3.3. Tutorial, Course 3, Step 3 - Inherited component selection

Tutorial, Course 3, Step 3 - selection of the inherited component

Contents

Inheriting components.

Description

Now we are ready to inherit three components - two input pins and one external interrupt. Let's start with the first input pin for **Button 1**.

1. Select the component **BitIO**
2. Fill up the **Description for the inherited component** - enter the name for the first button (e.g. First button).
   Fill up the **Identifier for the inherited component** - enter **Button1** - this name will be used as symbol which we will use in driver (calling inherited methods).
3. Click button **Next** for the *Inheritance type* page.
4. Select **Exclusive usage of component methods and event**.
5. Click button **Next** for next page.
   Answer 'No' on the question/message *There are methods or events that exists only for specific CPUs. Include them into the interface ?*. We won't need such methods or events.

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7.3.4. Tutorial, Course 3, Step 4 - Interface Creation

Tutorial, Course 3, Step 4 - interface creation

Contents

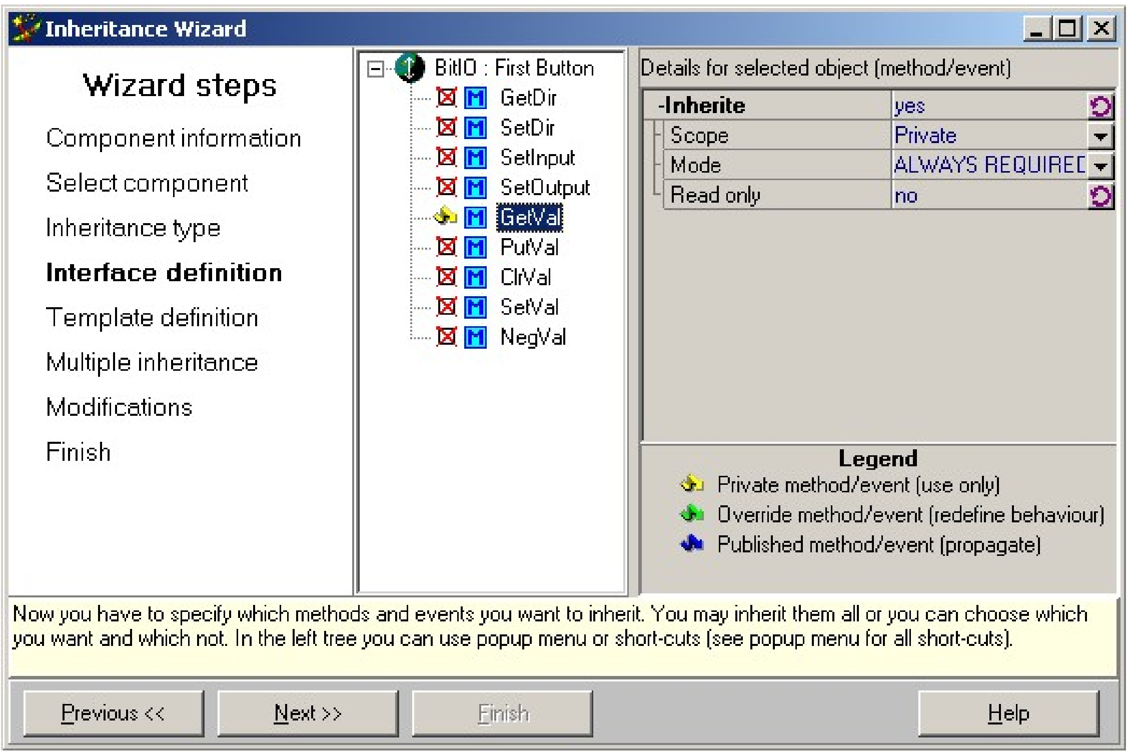
In this step you can learn how to ...

- Define the interface (specify the list of inherited methods and events).

Description

Now we have selected the component we are inheriting from. We have to specify methods and events of inherited component we want to use in our new component. We will use only one method **GetVal** for reading the state of the button.

1. Select the method **GetVal**



-Inherite	yes
Scope	Private
Mode	ALWAYS REQUIREI
Read only	no

Now you have to specify which methods and events you want to inherit. You may inherit them all or you can choose which you want and which not. In the left tree you can use popup menu or short-cuts (see popup menu for all short-cuts).

2. Keep other setting in default state and click the button **Next** to go to the next page.

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7.3.5. Tutorial, Course 3, Step 5 - Template Creation

Tutorial, Course 3, Step 5 - template settings

Contents

In this step you can learn how to ...

- Select template options.

Description

Now we have defined the interface for which we will later create and set the template for inherited component. The template allows to pre-configure state of properties, methods or events of the inherited component.

1. Select **Create template** option.
2. Click button **Next** for next page.

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7.3.6. Tutorial, Course 3, Step 6 - Inheriting cycle

Tutorial, Course 3, Step 6 - inheriting cycle

Contents

In this step you can learn how to ...

- Inherit other required components

Description

We have finished inheriting of one component. Now there are the next two components to inherit.

1. We will repeat the inheritance cycle - choose radio button **Inherit another component**.
   Click button **Next** for next page.
2. *Now we are inheriting I/O pin for* ***Button 2****. This is the same like in Step 3, except the name of the second inherited component.*
   Choose the component **BitIO again**
3. Fill in the **Button2** as identifier of the inherited component and fill in its description (e.g. "Second button").
4. Click **next** to go to Inheritance type selection page.
5. *Because the buttons will be identical, we will use the interface already created for the Button1*.
   Select **Existing interface** usage mode and click on the **Next** button.
6. Answer **No** on the 'There are methods... for specific CPU. Include them into the interface question.
7. Select **TwoKeys\Button1** interface from the list of all suitable interfaces. Click the **Next** button.

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7.3.7. Tutorial, Course 3, Step 7 - Inheriting again

Tutorial, Course 3, Step 7 - inherited third component - external interrupt

Contents

Inheriting another different component.

Description

We have finished with inheriting of two button components. The last inherited component will implement an interrupt from the keyboard. For this purposes we can use the component **External interrupt** . For this component we will create a new interface/template. From the component **External interrupt** we will use all methods and events which it offers (Enable, Disable, GetVal, OnInterrupt).

1. Select radio button **Inherit another component**.
   Click button **Next** for next page.
2. Select the component **ExtInt**.
   Fill the description of the component: **Keyboard interrupt** and write **InterruptPin** as identifier.
   Click button **Next** for next page.
3. Select **Exclusive usage of component methods and events**.
   Click button **Next** for next page.
4. Answer 'No' to the question about CPU specific methods and events.
5. Enable all methods and events by double-clicking on them. Then click the **Next** buton.
6. Select **Create template (...)** option in *Templace definition* step.
7. Select **Continue without another multiple inheritance...** and click on the **Next** button.
8. Click on the **Finish** button. Now the component is ready and we are back in Component Wizard main window.

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7.3.8. Tutorial, Course 3, Step 8 - Configuring component template

Tutorial, Course 3, Step 8 - configuring the templates

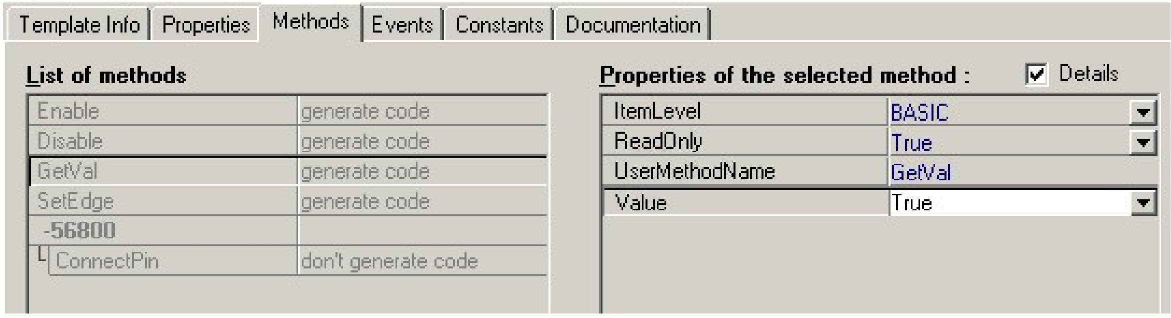
Contents

Configuring the automatically created templates to match our needs.

Description

We have created the component that inherits three components - two ButIO and one ExtInt. There were automatically created the templates for each interface (Button1 and InterruptPin) that will modify the default values of inherited components.
Now we will configure these templates as it will be needed for the component driver. Because we are using the IO pins for input only, we pre-set the inherited BitIO component for input only (we will disable the possibility to change the IO pin to output). The used method **GetVal** of these components is necessary, so we enable this method and we will remove the ability to disable it by the user - its state will be *read only*.
For the ExtInt component we will setup all methods to be always generated and preset the property Generate interrupt.

1. Select the menu command **File | Open | Template**
2. Find the template **TwoKeys\Button1** and click OK.
3. Switch to Properties tab (if it isn't already open). Select the property **Direction** and set its features (in the right panel):
   - Feature **Index** to **0** (the Feature Text after this changes to Input)
   - Feature **Read Only** to **True**
4. Select the property **Init. direction** and set its features :
   - Feature **Value** to **True**(input only)
   - Feature **Read Only** to **True**
5. Switch to **Methods** tab. Select the method **GetVal**. Enable **Details** check-box in the right panel. Set its feature **ReadOnly** to **True**.
6. Save the template using the main menu command **File | Save** .
7. Select the menu command **File | Open | Template**
8. Find the template **TwoKeys\InterruptPin** and click OK.
9. Switch to the **Properties tab** and select the **Generate Interrupt on** property. Set it's feature **Read only** to **True**.
10. Switch to the **Methods tab** and for all methods select the features:
    - Feature **Value** to **True**.
    - Feature **Read only** to **True**.



List of methods

Enable	generate code
Disable	generate code
GetVal	generate code
SetEdge	generate code
-56800	
ConnectPin	don't generate code

Properties of the selected method : ☑ Details

ItemLevel	BASIC
ReadOnly	True
UserMethodName	GetVal
Value	True

Figure 7.10 - Methods setup in the InterruptPin template

11. Save the template using the main menu command **File | Save** .

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7.3.9. Tutorial, Course 3, Step 9 - Design of Methods

Design of Component's Methods

Contents

Design of component's methods

Description

Now will return to the component TwoKeys. Component will offer to the user three methods and one event. Methods are intended for enabling or disabling this component and for reading status of buttons. Event informs about press or release of the buttons. We will create these three methods:

- `void Enable(void)` - enables interrupt (event) from buttons.
- `void Disable(void)` - disables interrupt (event) from buttons.
- `void GetVal(bool *But1,bool *But2)` - reads the buttons' states (pressed, not pressed).

1. Re-open the component TwoKeys using the menu command **File | Open recent | Component TwoKeys**.
2. Select the page **Methods** in the Component Wizard workspace
3. Click on the button **Add** to add a new method to the component
4. Set up the following method's properties (enable the detailed view by checking the Details check-box):
   - *Symbol* - **Enable**
   - *Hint* - **This method enables the component**
   - *ReturnType* - **void**
   - *ReturnHint* - **Returns no value**
5. Click on the button **Add** to add a another method to the component
6. Set up the following method's properties:
   - *Symbol* - **Disable**

- *Hint* - **This method disables the component**
- *ReturnType* - **void**
- *ReturnHint* - **Returns no value**

7. Click on the button **Add** to add a third new method to the component
8. Set up the following method's properties:

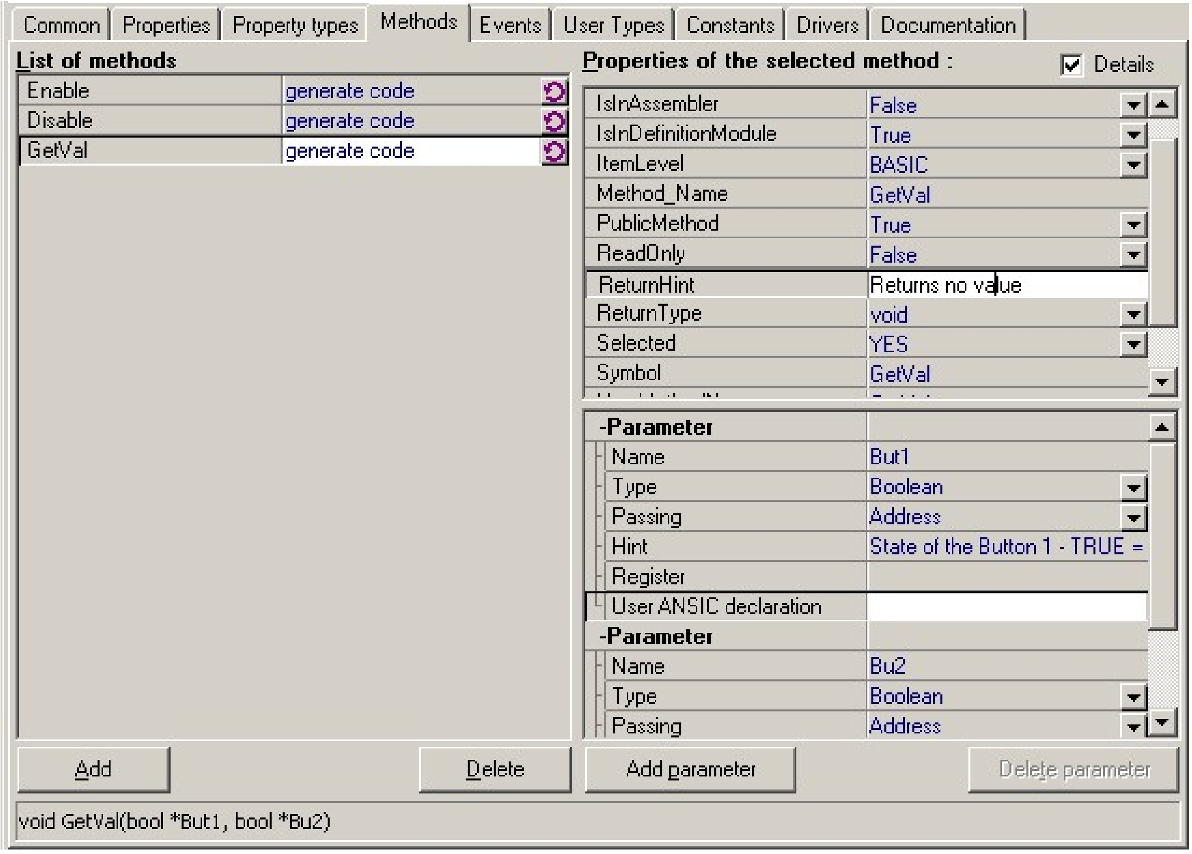
- *Symbol* - **GetVal**
- *Hint* - **Get the button states**
- *ReturnType* - **void**
- *ReturnHint* - **Returns no value**

9. Click on the button **Add parameter** to add a new parameter to the GetVal method
10. Set up the following parameter's features:

- *Name* - **But1**
- *Type* - **Boolean**
- *Passing* - **Address**
- *Hint* - **State of the Button 1 - TRUE = pressed**

11. Click on the button **Add parameter** again to add a second new parameter to the selected method
12. Set up the following parameter's features:

- *Name* - **But2**
- *Type* - **Boolean**
- *Passing* - **Address**
- *Hint* - **State of the Button 2 - TRUE = pressed**



List of methods

Enable	generate code
Disable	generate code
GetVal	generate code

Properties of the selected method :

IsInAssembler	False
IsInDefinitionModule	True
ItemLevel	BASIC
Method_Name	GetVal
PublicMethod	True
ReadOnly	False
ReturnHint	Returns no value
ReturnType	void
Selected	YES
Symbol	GetVal

-Parameter	
Name	But1
Type	Boolean
Passing	Address
Hint	State of the Button 1 - TRUE =
Register	
User ANSIC declaration	
-Parameter	
Name	Bu2
Type	Boolean
Passing	Address

```
void GetVal(bool *But1, bool *Bu2)
```

Links

<< Previous step | Next step >> | Contents of This Course | List of Tutorial Courses | Component Wizard Introduction

7.3.10. Tutorial, Course 3, Step 10 - Design of Events

Design of Component's Events

Contents

Design of component's events

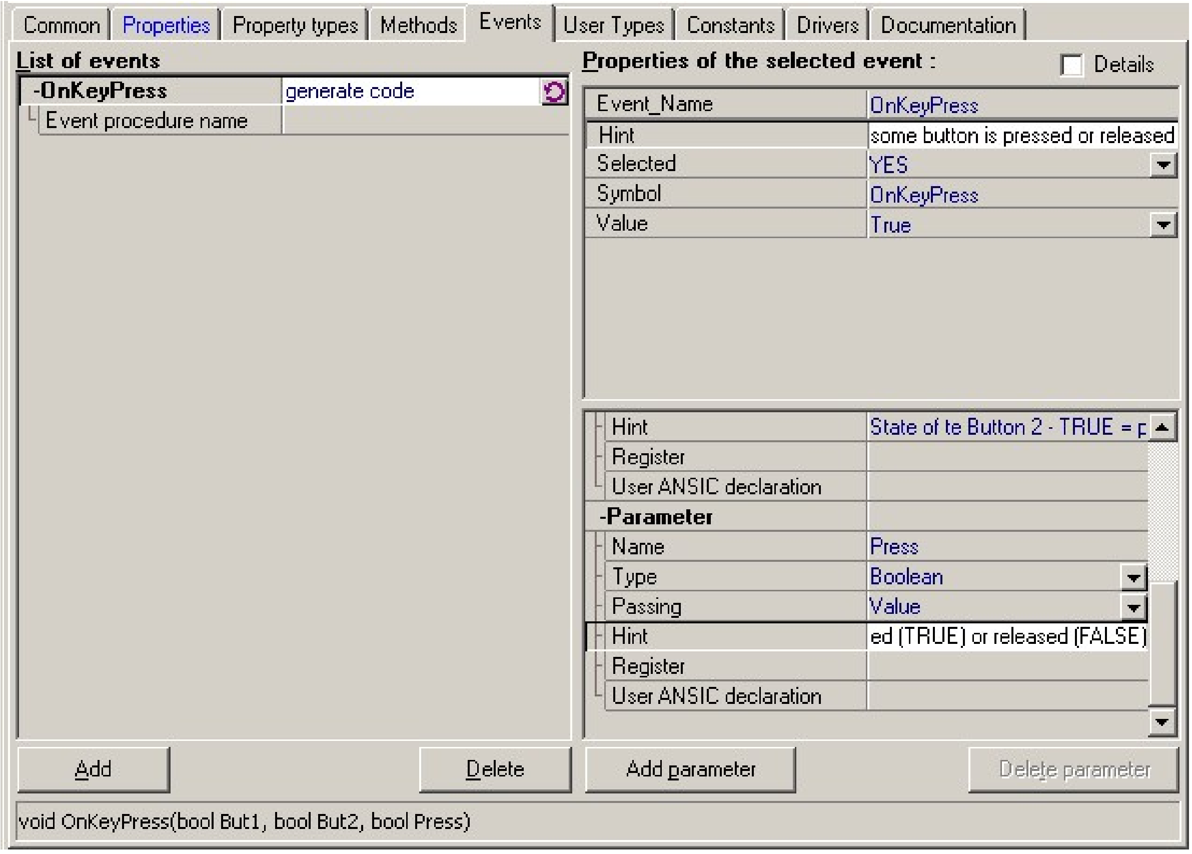
Description

Now we will create the event informing about a pressing and releasing of buttons.

Follow these steps:

1. Select page **Events** in the Component Wizard workspace
2. Click on the button **Add** to add a new event to the component. This event will inform about the press or release of some button - `void OnKeyPress(bool But1,bool But2,bool Down)`
3. Set up the following event's properties:
   - *Symbol* - **OnKeyPress**
   - *Hint* - **This event is called when some button is pressed or released**

4. Click on the button **Add parameter** to add a new parameter to the selected event
5. Set up the following parameter's features:
   - *Name* - **But1**
   - *Type* - **Boolean**
   - *Passing* - **Value**
   - *Hint* - **State of the Button 1 - TRUE = pressed**
6. Click on the button **Add parameter** again to add a second new parameter to the selected method
7. Set up the following parameter's features:
   - *Name* - **But2**
   - *Type* - **Boolean**
   - *Passing* - **Value**
   - *Hint* - **State of the Button 2 - TRUE = pressed**
8. Click on the button **Add parameter** again to add a third new parameter to the selected method
9. Set up the following parameter's features:
   - *Name* - **Press**
   - *Type* - **Boolean**
   - *Passing* - **Value**
   - *Hint* - **Determines if the button is pressed (TRUE) or released (FALSE)**



List of events

-OnKeyPress	generate code
Event procedure name	

Properties of the selected event : □ Details

Event_Name	OnKeyPress
Hint	some button is pressed or released
Selected	YES
Symbol	OnKeyPress
Value	True

Hint	State of te Button 2 - TRUE = p
Register	
User ANSIC declaration	
-Parameter	
Name	Press
Type	Boolean
Passing	Value
Hint	ed (TRUE) or released (FALSE)
Register	
User ANSIC declaration	

void OnKeyPress(bool But1, bool But2, bool Press)

Links

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7.3.11. Tutorial, Course 3, Step 11 - Code writing

Implementing component's methods and events

Contents

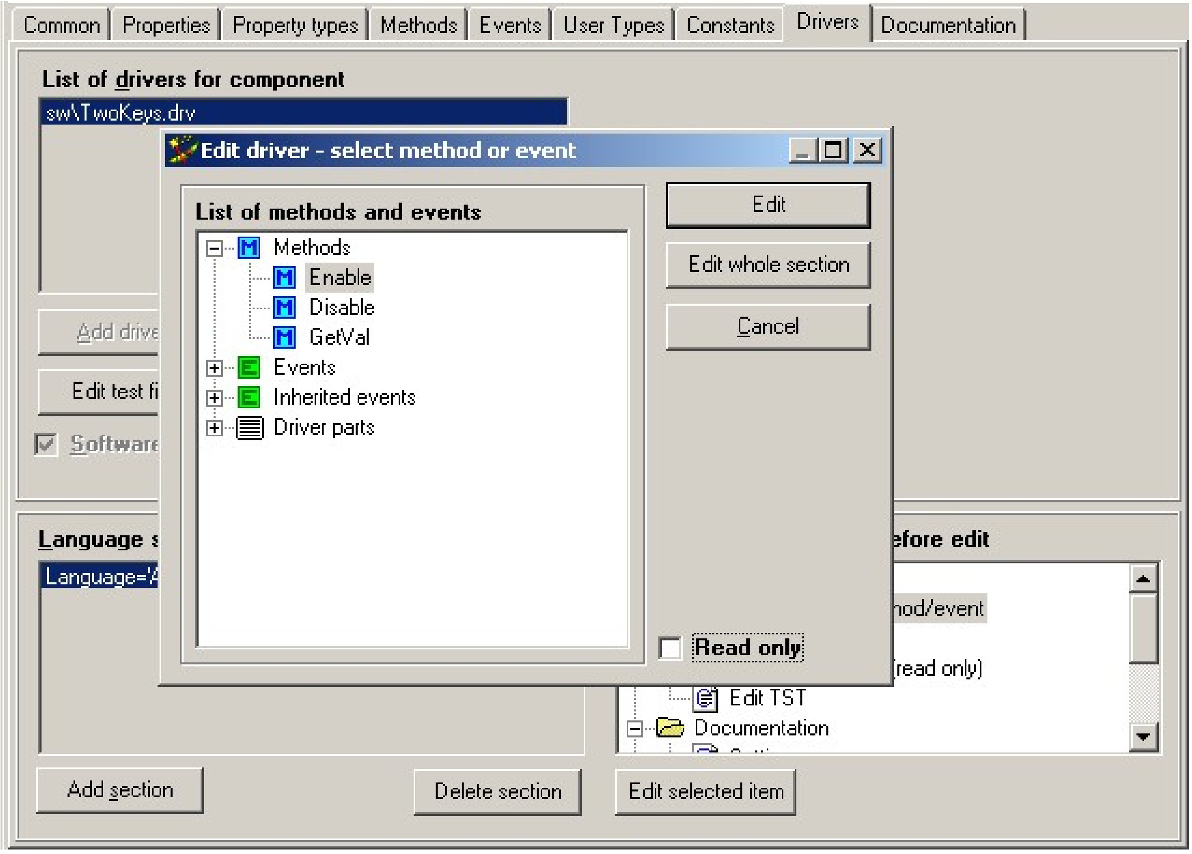
Implementing of the component's methods and events. Here we will use the inherited method and implement inherited events.

Description

The component is complete except the implementation. With using inheritance it is fast and easy.

To write code into the driver (created by Inheritance Wizard) select the **Driver** page on the Component Wizard workspace.

Select *Edit code of a method/event* and click the *Edit selected item* button.



The list of implemented methods follows:

Now select a method, click the *Edit* button and fill in the source code below (Changed code is displayed as a bold) and repeat this step for each method.

Implementation of method Enable

```
void %'ModuleName'_Enable(void)
{
   inherited.InterruptPin.Enable();
}
```

Implementation of method Disable

```
void %'ModuleName'_Disable(void)
{
   inherited.InterruptPin.Disable();
}
```

Implementation of method GetVal

```
void %'ModuleName'_GetVal(bool *But1,bool *But2)
{
   *But1 = inherited.Button1.GetVal();
   *But2 = inherited.Button2.GetVal();
}
```

Implementation of inherited event OnInterrupt

```
void inhrsym.InterruptPin.OnInterrupt(void)
{
   bool But1, But2, press;
   %'ModuleName'_GetVal( &But1, &But2 );
   press = inherited.InterruptPin.GetVal();
   %OnKeyPress( But1, But2, press );
}
```

Links

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7.3.12. Tutorial, Course 3, Last step - Generating help, Installing component

Tutorial, Course 3, Last step - Generating help, Installing component

Contents

- Automatic generation of component's html help and
- Where to find the component in Processor Expert and how to use it.

Description

Please follow according to the steps described in Tutorial 1, step 7 and Tutorial 1, Last step

Links

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7.4. Tutorial, Course 4

Course 4 - My first component with inheritance - keyboard

Description

There is description of creation of simple component with inheritance (without using Inheritance Wizard) in this course.
The new component is keyboard with two keys.
The creation is done in following steps:

1. Definition of Component Function
2. Component Creation
3. Design of component's properties, inheriting
4. Template and Interface setting
5. Design of methods
6. Design of events
7. Code writing
8. Generating help, Installing component

Example
Ready to use

You can see complete example of the software component ***TwoKeys*** with driver prepared in accordance with this course.

Links

First step >> | List of Tutorial Courses | Component Wizard Introduction

7.4.1. Tutorial, Course 4, Step 1: Specification of Component Function

Simple two-key keyboard

Contents

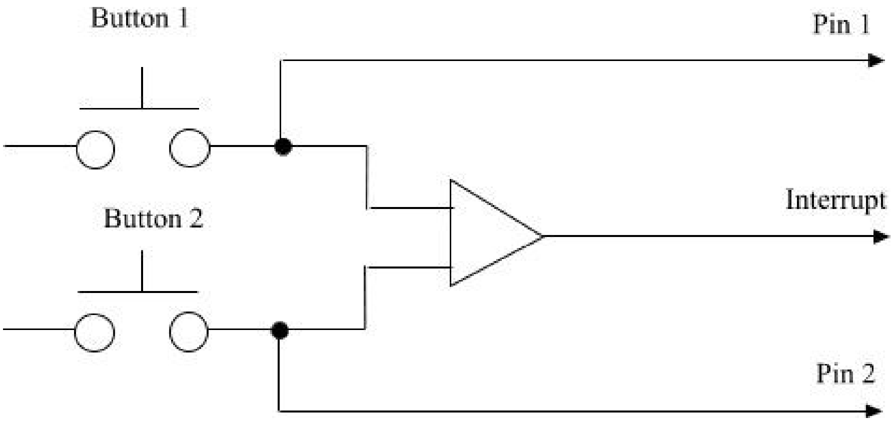
Definition of component function - two-key keyboard

Description

This component should encapsulate simple two-key keyboard. The keyboard is connected to the 2 input pins and to one external interrupt which informs about the key press. The information which key is pressed is read from two pins.
For connecting the keyboard to the CPU we will use two types of components:

- BitIO - This component implements a one-bit input/output. It uses one bit/pin of a port
- ExtInt - This component implements an external interrupt. The interrupt is caused by a signal level/edge on a pin.

Component will have three methods for enable and disable the keyboard event and one method for reading status of the keys, and one event occurring when some key is pressed. The simple schema follow:



Help for the component will be generated automatically by Component Wizard.

Links

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7.4.2. Tutorial, Course 4, Step 2 - Component Creation

Tutorial, Course 4, Step 2 - Component Creation

Contents

In this step you can learn how to ...

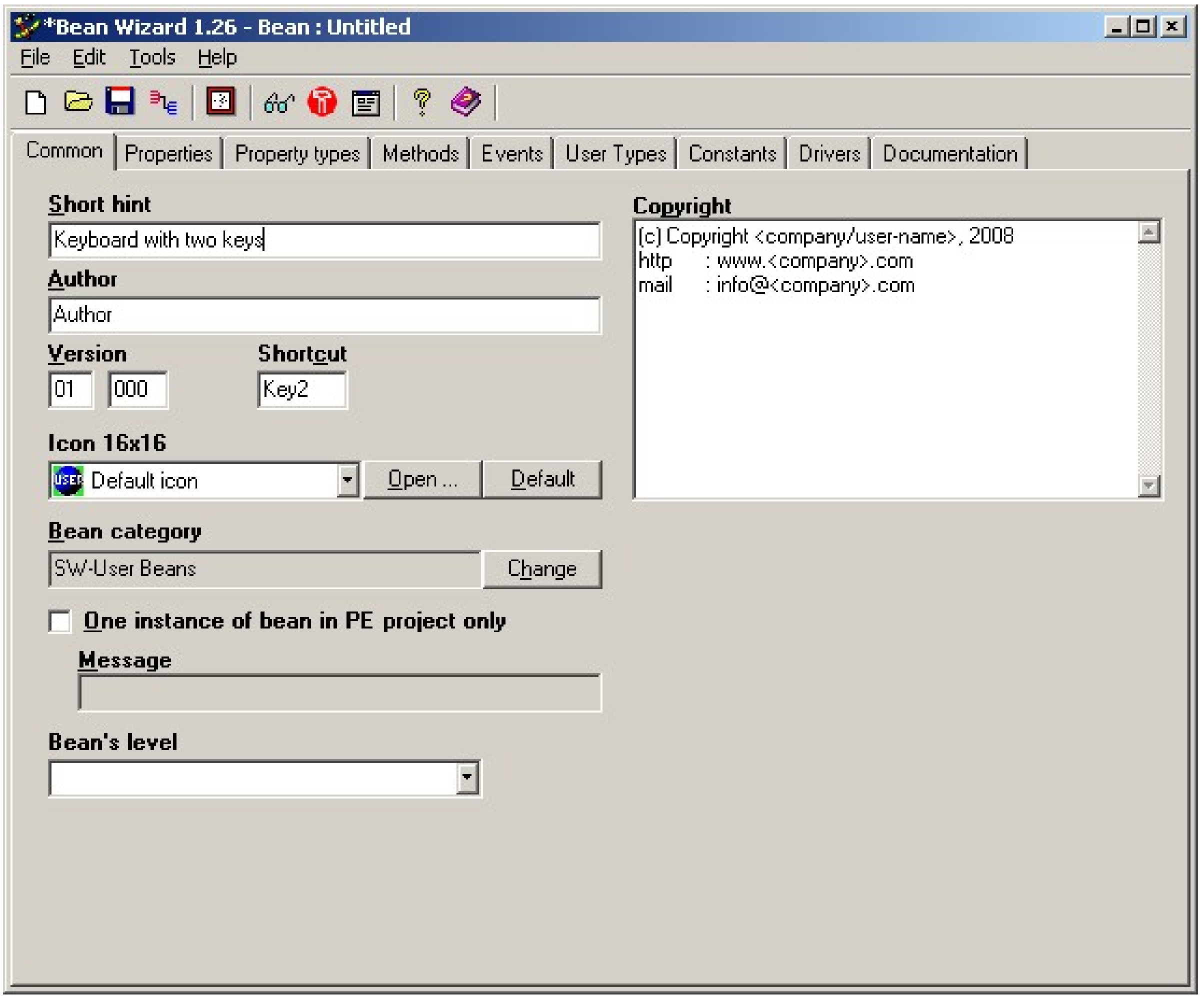
- Start up Component Wizard
- Create a new component with Inheritance Wizard
- Fill up the basic information about the component - name of the component

Description

Inherited components will be needed for CPU independent accessing the hardware. The access to keyboard will be written directly in ANSI-C language inside component driver.

1. Run *Component Wizard* and select *Component Wizard - editing new/existing components* from startup menu. (iff the startup menu is not turned off).
2. Select **File - New - Component** from main menu.
3. Select `Common` page in the Component Wizard workspace if it's not already active.
4. Fill in following items:
   - *Short hint* - simple component description, `Keyboard with two keys`
   - *Author* - your name
   - *Version* - version of the component, `01.000`
   - *Shortcut* - short component name (max. 4 characters), `Key2`
   - If you have a *icon* of the new component (16x16 pixels, BMP format, 16 colors), you can add it using the **Open..** button.
5. Choose **File - Save** from Component Wizard main menu to save the component to the disk. Write file name of the component: `TwoKeys`. File name is always the same as the component name. Confirm the dialog "Do you wan to also create SW driver?" by clicking on **Yes** button. If you successfully save it, the new component name appears in the Component Wizard window title.

Picture


*Bean Wizard 1.26 - Bean : Untitled
File Edit Tools Help
Common | Properties | Property types | Methods | Events | User Types | Constants | Drivers | Documentation
Open ... | Default | Change

Short hint: Keyboard with two keys

Author: Author

Version: 01 000

Shortcut: Key2

Icon 16x16: Default icon

Bean category: SW-User Beans

□ One instance of bean in PE project only

Message:

Bean's level:

Copyright:
(c) Copyright <company/user-name>, 2008
http : www.<company>.com
mail : info@<company>.com

Links

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7.4.3. Tutorial, Course 4, Step 3 - Design of Properties, Inheriting

Tutorial, Course 4, Step 3, Design of component's properties, Inheriting

Contents

In this step you can learn how to ...

- Create inherited property
- Inherit a component
- Fill up the basic information about inherited property

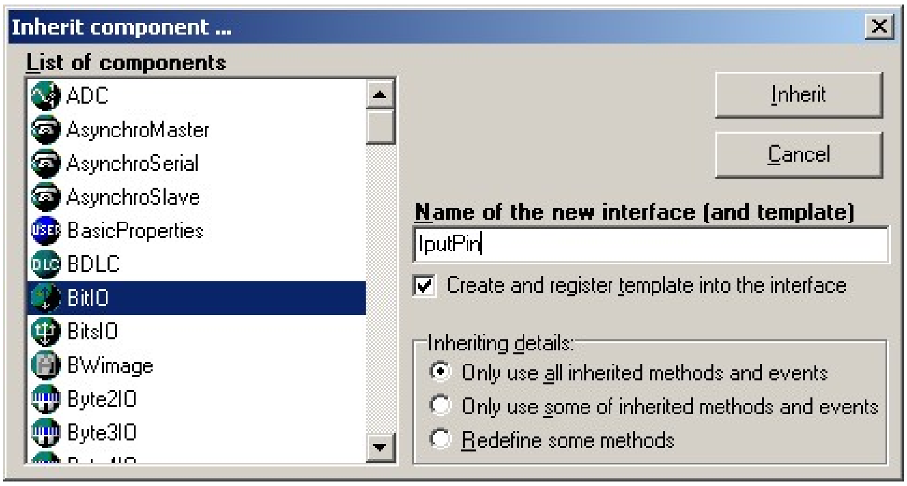
Description

New TwoKeys component will have following properties:

- Component name - this is the default property and can not be changed or removed. It must be present in every component.
- Inherited component for Button1
- Inherited component for Button2
- Inherited component for external interrupt

To define these properties follow the steps:

1. Select `Properties` page in the component workspace. These is already defined the default property - Component name. This property is set by saving the component and cannot be modified and removed.
2. Press button `Add down` to add new property. The dialog box with list of all available types appears. Choose requested type of the new property. Select type *Inherited component (interface)*. Select 'Yes' in the dialog asking "*Do you wan to inherit new component now ? ...*".
3. The dialog for inheriting appears:



Inherit component ...

List of components

ADC
AsynchroMaster
AsynchroSerial
AsynchroSlave
BasicProperties
BDLC
BitIO
BitsIO
BWimage
Byte2IO
Byte3IO

Name of the new interface (and template): IputPin

☑ Create and register template into the interface

Inheriting details:

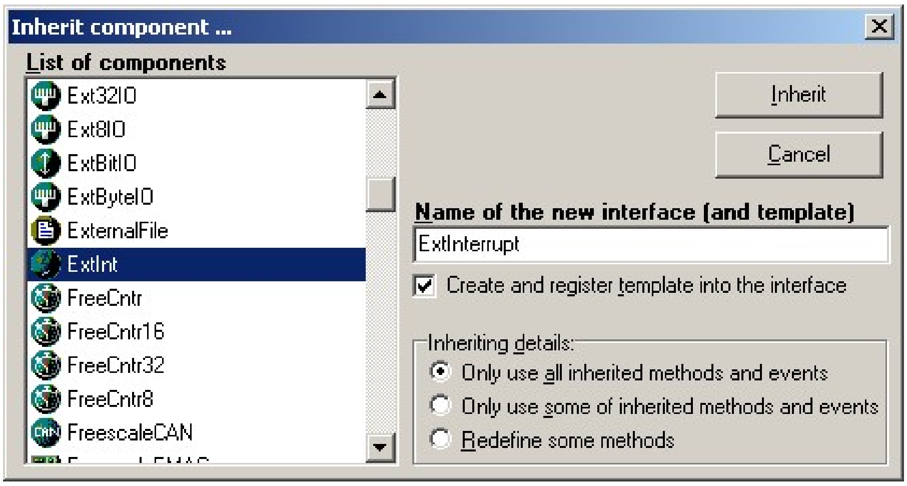
● Only use all inherited methods and events
○ Only use some of inherited methods and events
○ Redefine some methods

Select the `BitIO` component for inheriting. Fill the edit line with `InputPin`, i.e. the name of the local interface and local template. Press button `Inherit` . The dialog is closed and the interface and template have been created and the feature *InterfaceName* of this property has value `TwoKeys\InputPin`.

4. You can change features of this property in the right side of the Component Wizard workspace. Some more advanced features can be displayed by switching Basic/Advanced/Expert view mode in the bottom-right corner of the Component Wizard workspace. Select *Advanced* mode. Fill in the following features:
   - *ItemName* - name of the property, write value `Button1`
   - *Hint* - description of the property, `Inherited component BitIO`
   - *Symbol* - name of macro with value of the property, this macro you can use in the component driver, value: `Button1`. See description of macroprocessor for details.
5. Press button `Add down` to add new property. The dialog box with list of all available types appears. Select the same as in previous case - *Inherited component (interface)*. Select 'No' in the dialog "Do you want to inherit a new component now? ...". Fill in the following features:

- *InterfaceName* - name of the interface - select the already created interface, value: `TwoKeys\InputPin`.
- *ItemName* - name of the property, write value `Button2`
- *Hint* - description of the property, `Inherited component BitIO`
- *Symbol* - name of macro with value of the property, this macro you can use in the component driver, value: `Button2`.

6. Press button `Add down` to add new property. In the dialog box with list of all available types appears, select again the same *Inherited component (interface)* and select 'Yes' in the dialog "Do you want to inherit a new component now? ...".
7. The dialog for inheriting appears:



Name of the new interface (and template): ExtInterrupt

☑ Create and register template into the interface

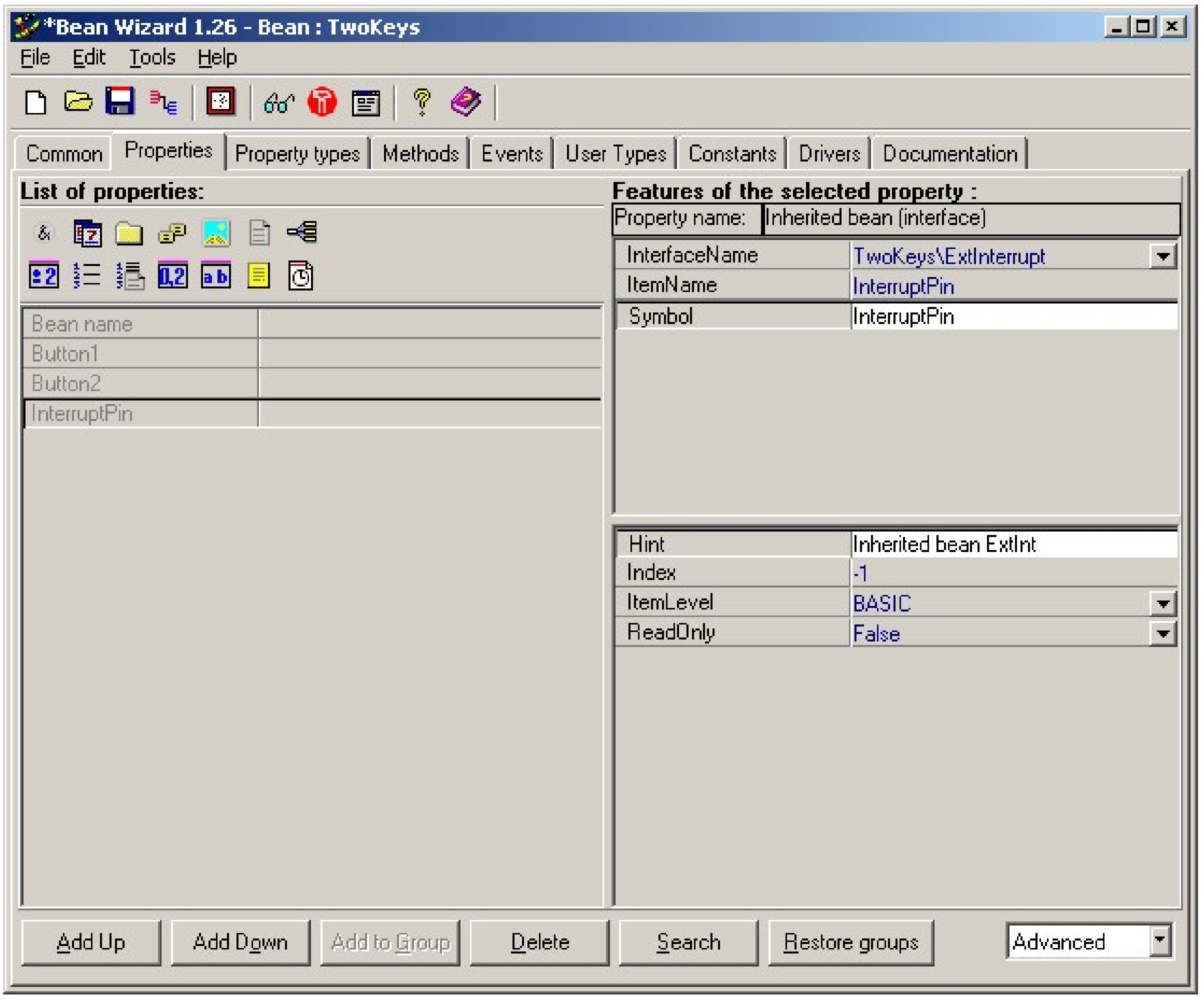
Inheriting details:
● Only use all inherited methods and events
○ Only use some of inherited methods and events
○ Redefine some methods

Select the `ExtInt` component for inheriting. Fill the edit line with `ExtInterrupt`, i.e. the name of the local interface and local template. Press button `Inherit` . The dialog is closed and the interface and template have been created and the feature *InterfaceName* of this property has value `TwoKeys\ExtInterrupt`.
Fill in the following features:

- *ItemName* - name of the property, write value `InterruptPin`
- *Hint* - description of the property, `Inherited component ExtInt`
- *Symbol* - name of macro with value of the property, this macro you can use in the component driver, value: `InterruptPin`.

8. Other features should stay without any change.

Picture



*Bean Wizard 1.26 - Bean : TwoKeys
File Edit Tools Help
Common Properties Property types Methods Events User Types Constants Drivers Documentation
List of properties:
Add Up Add Down Add to Group Delete Search Restore groups Advanced

List of properties:
Bean name
Button1
Button2
InterruptPin

Features of the selected property :

Property name: Inherited bean (interface)

InterfaceName	TwoKeys\ExtInterrupt
ItemName	InterruptPin
Symbol	InterruptPin

Hint	Inherited bean ExtInt
Index	-1
ItemLevel	BASIC
ReadOnly	False

Links

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7.4.4. Tutorial, Course 4, Step 4 - Template and Interface Setting

Tutorial, Course 4, Step 4, Template and Interface Setting

Contents

In this step you can learn how to ...

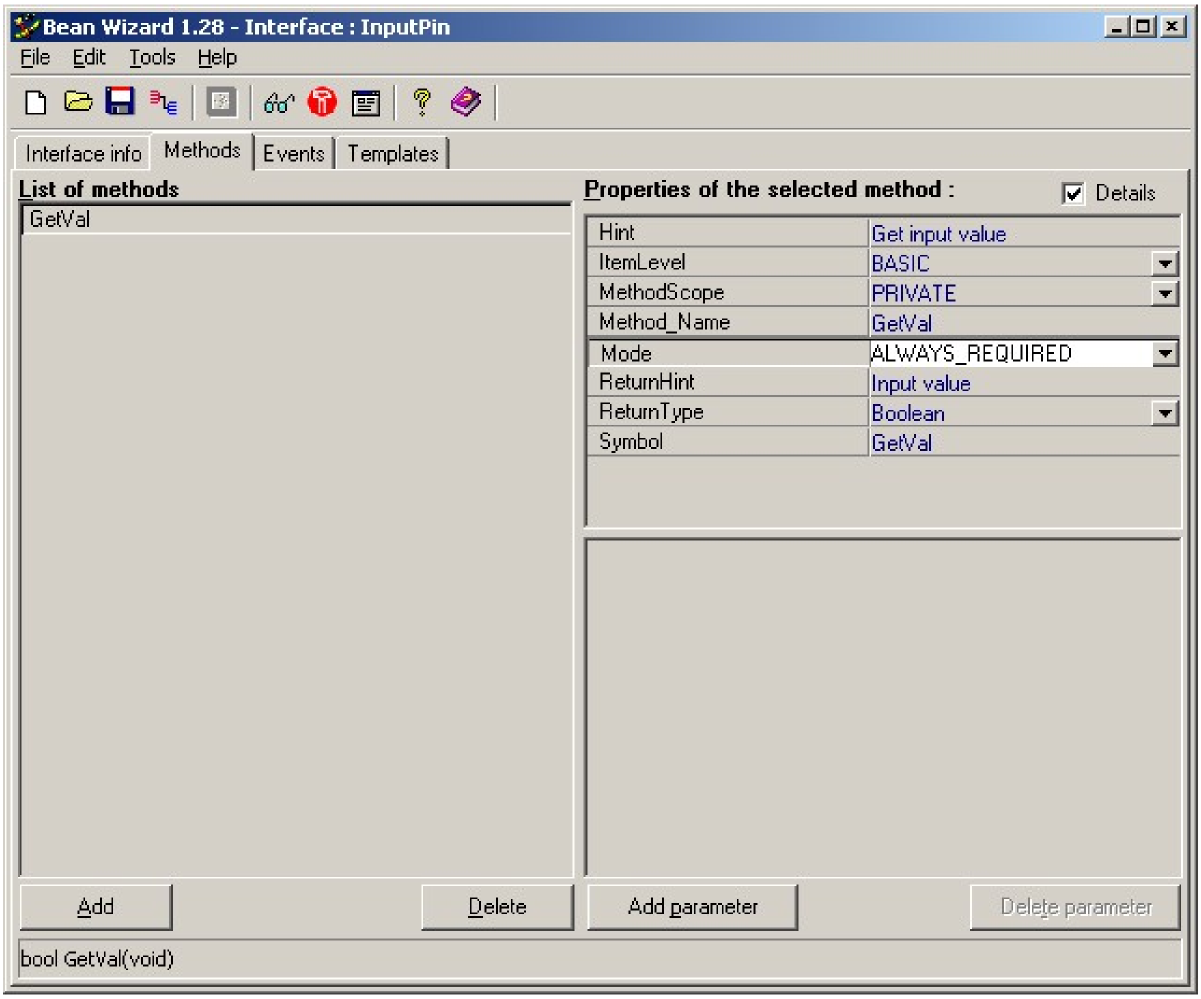
- Create inherited property
- Inherit a component
- Fill up the basic information about inherited property

Description

Now we have defined the interfaces and templates. We will set which methods/events will be generated into the drivers and which not, i.e. which we want to use and which not. We will set also the state of some properties. Because we are using the IO pin for input only, we set the inherited component for input only (we will disable the possibility to change the IO pin to output). We need the used method `GetVal`, so we set to generate this method always and we will set this state as read only.

To configure the interfaces and templates follow the steps:

1. Select property `Button1` and click on this property with right mouse button. in the pop-up menu select **Inherited item/Link to component - Open interface** The *InputPin* interface is opened.
2. Select `Methods` page in the component workspace. Because the pin for a key is for input only, delete all methods except the `GetVal` method for reading of the status of the pin.



List of methods

GetVal

Properties of the selected method : ☑ Details

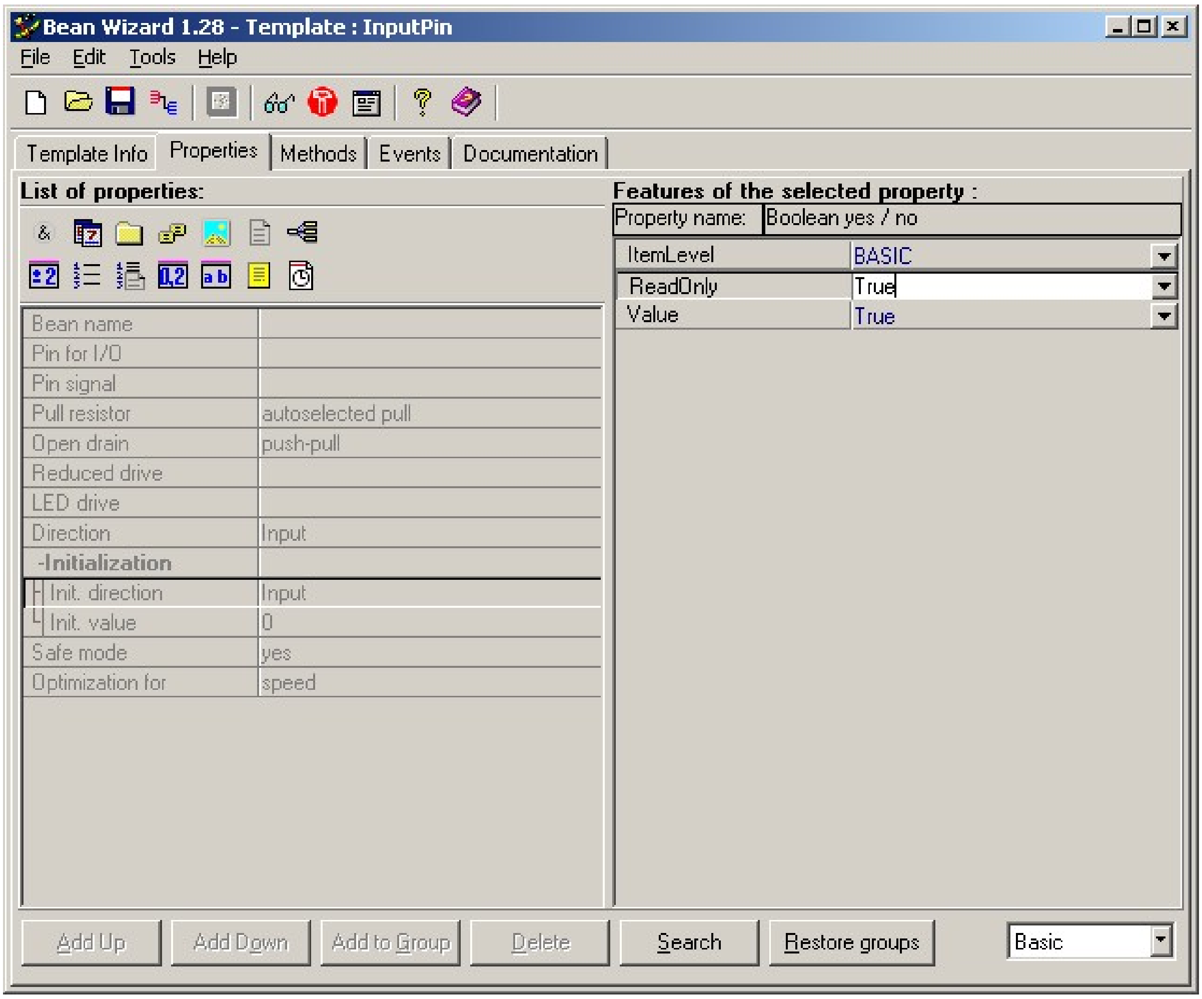
Hint	Get input value
ItemLevel	BASIC
MethodScope	PRIVATE
Method_Name	GetVal
Mode	ALWAYS_REQUIRED
ReturnHint	Input value
ReturnType	Boolean
Symbol	GetVal

bool GetVal(void)

3. Save the interface by pressing `Ctrl+S` or using the command **File - save**
4. Select command **File - Open - Template** from Component Wizard main menu. Select the local template `TwoKeys\InputPin` and open it by clicking on "OK" button.
5. Select `Properties` page in the template workspace.
   - Select the property `Direction` and set these features to:
     - Feature `Index` to `0` (the Feature `Text` after this its value changes to `Input`)

- Feature `Read Only` to `True`

- Select the property `Init. direction` and set these features to:
  - Feature `Value` to `True` (input only)
  - Feature `Read Only` to `True`



Bean name	
Pin for I/O	
Pin signal	
Pull resistor	autoselected pull
Open drain	push-pull
Reduced drive	
LED drive	
Direction	Input
-Initialization	
Init. direction	Input
Init. value	0
Safe mode	yes
Optimization for	speed

Property name: Boolean yes / no

ItemLevel	BASIC
ReadOnly	True
Value	True

6. Select `Methods` page in the template workspace.
7. Select method `GetVal` and set both `Value` and `ReadOnly` to `true` - the method will be always generated. For all others method set the `ReadOnly` to `false` and the `Value` to `false`.
8. Save the template (**File - Save**).
9. Choose **File - Open - Template** from Component Wizard main menu. Select the local template `TwoKeys\ExtInterrupt` and open it.
10. Select `Properties` page in the template workspace.
    - Select the property `Generate interrupt on` and set these features to:
      - Feature `Index` to `0` (the value of this property after this changes to `Rising or falling edge`)
      - Feature `Read Only` to `True`
11. Select `Methods` page in the template workspace. For the *Enable, Disable, GetVal* methods set both the

Read Only and the Value to true.

12. Save the template.

Links

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7.4.5. Tutorial, Course 4, Step 5 - Design of Methods

Design of Component's Methods

Contents

Design of component's methods

Description

Now you are editing component TwoKeys. Component will be controlled by three methods and one event. Methods are for enabling or disabling this component and for reading status of buttons. Event informs about press or release of the buttons. We create these three methods:

- `void Enable(void)` - enables interrupt (event) from buttons.
- `void Disable(void)` - disables interrupt (event) from buttons.
- `void GetVal(bool *But1,bool *But2)` - reads the buttons' states (pressed, not pressed).

To define methods follow these steps:

1. Return to component editing by selecting **File - Open recent - Component TwoKeys**.
2. Select page `Methods` in the Component Wizard workspace
3. Click on the button `Add` to add a new method to the component
4. Set up the following method's properties:
   - *Symbol* - `Enable`
   - *Hint* - `This method enables the component`
   - *ReturnType* - `void`
   - *ReturnHint* - `Returns no value`
5. Click on the button `Add` to add a second new method to the component
6. Set up the following method's properties:
   - *Symbol* - `Disable`
   - *Hint* - `This method disables the component`
   - *ReturnType* - `void`
   - *ReturnHint* - `Returns no value`
7. Click on the button `Add` to add a third new method to the component
8. Set up the following method's properties:
   - *Symbol* - `GetVal`
   - *Hint* - `get the button states`

- *ReturnType* - `void`
- *ReturnHint* - `Returns no value`

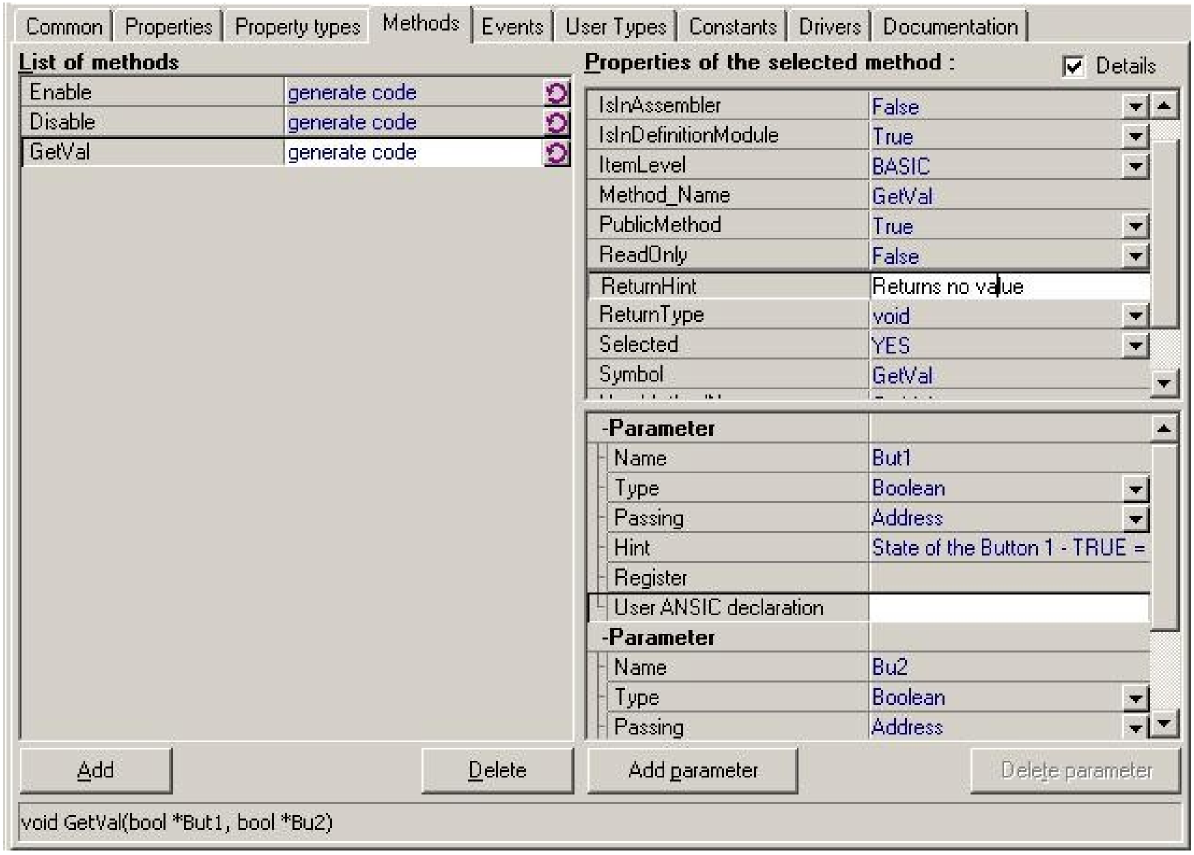
9. Click on the button `Add parameter` to add a new parameter to the selected method
10. Set up the following parameter's features:

- *Name* - `But1`
- *Type* - `Boolean`
- *Passing* - `Address`
- *Hint* - `State of the Button 1 - TRUE = pressed`

11. Click on the button `Add parameter` again to add a second new parameter to the selected method
12. Set up the following parameter's features:

- *Name* - `But2`
- *Type* - `Boolean`
- *Passing* - `Address`
- *Hint* - `State of the Button 2 - TRUE = pressed`

Picture



List of methods

Enable	generate code
Disable	generate code
GetVal	generate code

Properties of the selected method :

IsInAssembler	False
IsInDefinitionModule	True
ItemLevel	BASIC
Method_Name	GetVal
PublicMethod	True
ReadOnly	False
ReturnHint	Returns no value
ReturnType	void
Selected	YES
Symbol	GetVal

-Parameter	
Name	But1
Type	Boolean
Passing	Address
Hint	State of the Button 1 - TRUE =
Register	
User ANSIC declaration	
-Parameter	
Name	Bu2
Type	Boolean
Passing	Address

void GetVal(bool *But1, bool *Bu2)

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7.4.6. Tutorial, Course 4, Step 6 - Design of Events

Design of Component's Events

Contents

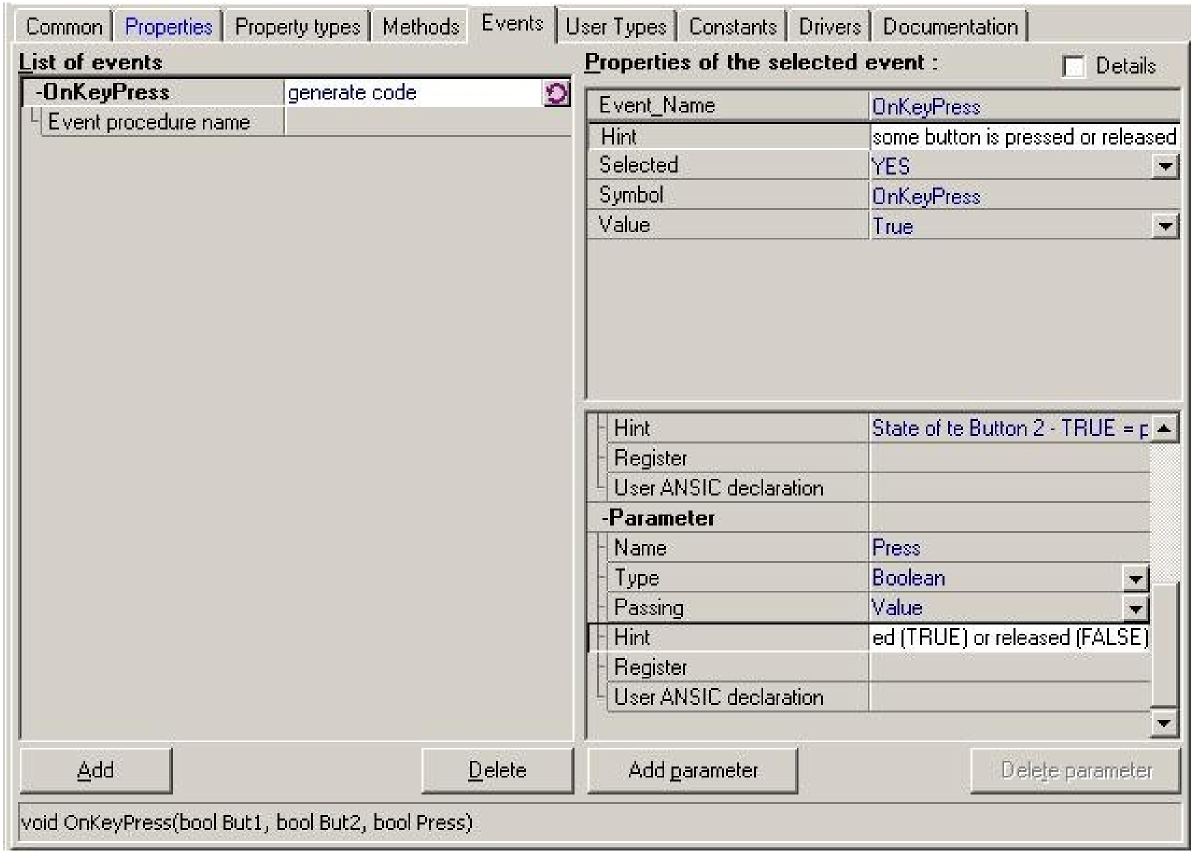
Design of component's events

Description

Now we create the event informing of pressing or releasing of the buttons.
To define methods follow these steps:

1. Select page `Events` in the Component Wizard workspace
2. Click on the button `Add` to add a new event to the component. This event will inform about the press or release of some button - `void OnKeyPress(bool But1,bool But2,bool Down)`
3. Set up the following method's properties:
   - *Symbol* - `OnKeyPress`
   - *Hint* - `This event is called when some button is pressed or released`
4. Click on the button `Add parameter` to add a new parameter to the selected method
5. Set up the following parameter's features:
   - *Name* - `But1`
   - *Type* - `Boolean`
   - *Passing* - `Value`
   - *Hint* - `State of the Button 1 - TRUE = pressed`
6. Click on the button `Add parameter` again to add a second new parameter to the selected method
7. Set up the following parameter's features:
   - *Name* - `But2`
   - *Type* - `Boolean`
   - *Passing* - `Value`
   - *Hint* - `State of the Button 2 - TRUE = pressed`
8. Click on the button `Add parameter` again to add a second new parameter to the selected method
9. Set up the following parameter's features:
   - *Name* - `Press`
   - *Type* - `Boolean`
   - *Passing* - `Value`
   - *Hint* - `Some button is pressed (TRUE) or released (FALSE)`

Picture



List of events

-OnKeyPress	generate code
Event procedure name	

Properties of the selected event :

Event_Name	OnKeyPress
Hint	some button is pressed or released
Selected	YES
Symbol	OnKeyPress
Value	True

Hint	State of te Button 2 - TRUE = p
Register	
User ANSIC declaration	
-Parameter	
Name	Press
Type	Boolean
Passing	Value
Hint	ed (TRUE) or released (FALSE)
Register	
User ANSIC declaration	

```
void OnKeyPress(bool But1, bool But2, bool Press)
```

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7.4.7. Tutorial, Course 4, Step 7 - Code writing

Implementing of component's methods of Component's Events and events

Contents

Implementing of the component's methods and events. Here you learn hot to call inherited method and implement inherited events.

Description

The component is complete except the implementation. With using inheritance it is fast and easy. To write code into the driver (created by Inheritance Wizard) select `Driver` page on the Component Wizard workspace. Click on the button `Driver Info` to specify driver information: driver version and name of the author. Click on the button `Edit code` to edit code of methods. You can edit implementation of one method or whole section. Uncheck option *Whole section* to one method only.

The list of implemented methods follows:

Changed code is displayed as a bold.

Implementation of method Enable

```
void %'ModuleName'_Enable(void)
{
   inherited.InterruptPin.Enable();
}
```

Implementation of method Disable

```
void %'ModuleName'_Disable(void)
{
   inherited.InterruptPin.Disable();
}
```

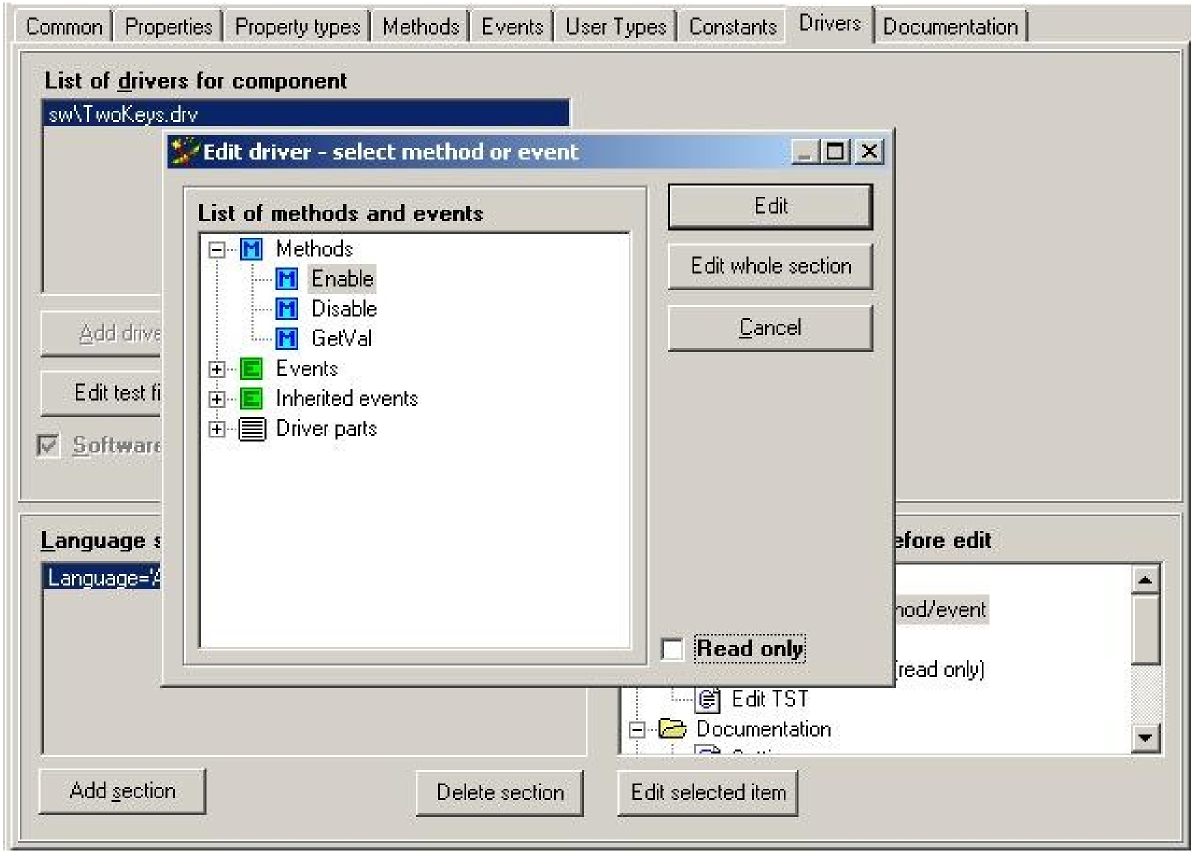
Implementation of method GetVal

```
void %'ModuleName'_GetVal(bool *But1,bool *But2)
{
   *But1 = inherited.Button1.GetVal();
   *But2 = inherited.Button2.GetVal();
}
```

Implementation of inherited event OnInterrupt

```
void inhrsym.InterruptPin.OnInterrupt(void)
{
   bool But1, But2, press;
   %'ModuleName'_GetVal( &But1, &But2 );
   press = inherited.InterruptPin.GetVal();
   %OnKeyPress( But1, But2, press );
}
```

Picture



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7.4.8. Tutorial, Course 4, Last step - Generating help, Installing component

Tutorial, Course 4, Last step - Generating help, Installing component

Contents

- Automatic generation of component's html help and
- How to install the component into Processor Expert and how to use it.

Description

These steps are similar steps described in Tutorial 1, step 7 and Tutorial 1, Last step

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8. Component Wizard - Command line parameters

Running Component Wizard from command line

Note: Command line parameters are not available for CodeWarrior plug-in version of Component Wizard.

Description

Component Wizard accepts these parameters from command line:

```
BeanWizard.exe [/test driver_filename] [bean_filename] [/import headerfile]
[/userdir workingdirectory]
```

Parameters description:

- **/test** - creates test file for driver specified with full path.
- **bean_filename** - full path to component to be opened
- **/import** - imports a ANSI C module into component. For more information see here. Second parameter is source of C module with full path

Remark: Parameters are case sensitive.

Examples

- Open component **mybean**
  ```
  BeanWizard.exe c:\myData\beans\mybean\mybean.bean
  ```
- Import ANSI C module **module.c** located in the directory **c:\users\myData\**
  ```
  BeanWizard.exe /import c:\users\myData\module.c
  ```
- Create test file from the software driver **mybean.drv** located in the directory **c:\programs\PE\drivers\sw\**
  ```
  BeanWizard.exe /test c:\programs\PE\drivers\sw\mybean.drv
  ```

9. Revision List

Revisions of the Component Wizard help

History

- 27.4.2010 **version 1.55**
  - Updated 'Inheritance Scheme' diagram.
  - Updated List of properties table
- 18.9.2009 **version 1.54**
  - Updated main menu, editor, documentation and options chapters.
- 30.6.2009 **version 1.53**
  - Beans renamed to Components.
- 8.4.2009 **version 1.52**
  - Updated page footer
- 23.5.2008 **version 1.51**
  - Minor corrections
- 10.4.2008 **version 1.50**
  - Minor corrections
  - Removed component skeletons
  - Tutorial corrections
  - Options corrections
  - Import dialog updates
- 23.10.2007 **version 1.49**
  - Minor corrections
- 20.12.2006 **version 1.48**
  - The Component creator changed to Inheritance Wizard
  - Updated main menu
  - Added Constants page
  - Updated screens
- 5.10.2005 **version 1.47**
  - CHG file commands for inherited components moved to the CHG file chapter.
- 25.10.2005 **version 1.46**
  - Added Basic Terms/Inheritance chapter
  - Changed look of the pages
  - Updated descriptions and screenshots
- 08.10.2004 **version 1.45**
  - CHM Content file generation (!BWHelp.hhc) corrected.

This help should be used with Component Wizard 1.17

- 01.10.2004 **version 1.44**
  - Minor changes in the help.

  This help should be used with Component Wizard 1.17
- 07.05.2004 **version 1.43**
  - new feel&look of the help.
  - Minor changes (up-to-date screen-shots) in the help.

  This help should be used with Component Wizard 1.17
- 01.12.2003 **version 1.42**
  - Minor changes (up-to-date screen-shots) in the help.
  - Font in the internal editor can be changed in menu Options - page Editor
  - New page Common problems with inheritance

  This help should be used with Component Wizard 1.17
- 29.08.2003 **version 1.41**
  - Minor changes in the help.
  - Only one instance of a component in Processor Expert can be ensured in Common page

  This help should be used with Component Wizard 1.16
- 29.08.2003 **version 1.40**
  - Minor changes in the help.
  - It's now easier to inherite components in page Properties using improved fast inheriting dialog

  This help should be used with Component Wizard 1.16
- 28.04.2003 **version 1.39**
  - Minor changes in the help.
  - It's now easier to add new methods or vents into the interface via Component Viewer using context menus in Interface templates page

  This help should be used with Component Wizard 1.16
- 03.04.2003 **version 1.38**
  - List of properties - added links to the examples in the tutorial Course 2.
  - Link to this page added to the introduction page.

  This help should be used with Component Wizard 1.16
- 28.03.2003 **version 1.37**
  - Dialog Options has a new page for setting of internal editor.
  - Main menu changed - Import beans from package has been added to menu `File | Import.`
  - Tutorial course 3 - screenshots updated to current version of Component Wizard.

  This help should be used with Component Wizard 1.16
- 28.11.2002 **version 1.36**
  - Page Interface Templates changed. Now an interface can register components without creating templates (until now only templates could have been registered)

  This help should be used with Component Wizard 1.15
- 19.11.2002 **version 1.35**

  - New page How to modify existing interface
  - List of hot keys in the driver editor.
  - Page Property types changed.

  This help should be used with Component Wizard 1.14

- 15.10.2002 **version 1.34**
  - Improved Auto complete function
  - New page describing editing code of methods/events/driver parts. See edit code dialog

  This help should be used with Component Wizard 1.14

- 12.09.2002 **version 1.33**
  - New - user help styles - see HTML Help styles
  - Graphical change in the page Help
  - Changes in the Component category

  This help should be used with Component Wizard 1.14

- 31.07.2002 **version 1.32**
  - More details about Editing drivers
  - New page Driver editor
  - New page Command line
  - More information about interfaces in Component Manager page Interfaces
  - Minor changes in page Properties List

  This help should be used with Component Wizard 1.13

- 25.07.2002 **version 1.31**
  - Added description of popup menu in the page Property types

  This help should be used with Component Wizard 1.12

- 20.06.2002 **version 1.30**
  - New inheriting features in the interfaces - MethodScope for Methods and EventScope for Events
  - New highlighting of inherited methods and events in pages Methods and Events. It can be turned on/off in the Options - page Display.
  - components, interfaces and templates can be opened in read only mode - see Options - page Default values
  - Improved user type **Record** in the page User types

  This help should be used with Component Wizard 1.12

- 03.06.2002 **version 1.29**
  - This page has been reorganized; the latest changes are on the top of this page.
  - Page List of properties - added new property List of items (item is defined in file).
  - Page Properties - new context menu for properties.

  This help should be used with Component Wizard 1.11

- 01.03.2002 **version 1.28**
  Minor changes in the help. This help should be used with Component Wizard 1.10

- 11.01.2002 **version 1.27**
  - The component can be created from existing module written in ANSIC. See here for more information.

  - New page How to share component - the difference between sharing and inheriting.

  This help should be used with Component Wizard 1.09

- 20.12.2001 **version 1.26**
  - New User type (User definition).
  - Removed optional background from Component Wizard (page Options changed).
  - The graphic design of editing methods and events changed.
  - Page common changed, component has category classification.

  This help should be used with Component Wizard 1.08

- 30.10.2001 **version 1.25**
  The User types and Importing/Exporting a component pages changed. This help should be used with Component Wizard 1.07
- 25.07.2000 **version 1.24**
  New Tutorial 4 for inheritance process without Component Creator. Inheriting in an existing component. This help should be used with Component Wizard 1.04
- 02.06.2000 **version 1.23**
  New Tutorial 3 for inheritance process with Component Creator This help should be used with Component Wizard 1.04
- 26.05.2000 **version 1.22**
  More detailed description of inheritance process. This help should be used with Component Wizard 1.04
- 21.04.2000 **version 1.21**
  The User Types page is now available for Basic version of Component Wizard too. This help should be used with Component Wizard 1.03
- 13.04.2000 **version 1.2**
  The Revisions page changed. This help should be used with Component Wizard 1.03
- 21.02.2000 **version 1.1**
  This help should be used with Component Wizard 1.03

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