

Using the Radio Button and Check Box Objects

Implementation Specifications or Requirements

Category	Item
Software	IWS Version: 6.0 and later
	Service Pack: N/A
	Windows Version: WinXP/2000/NT and Windows CE
	Web Thin Client: Yes
Equipment	Panel Manufacturer: N/A
	Panel Model: N/A
	Other Hardware: N/A
	Comm. Driver: All
	Controller (e.g.: PLC) All
	Application Language: N/A
Software Demo Application	N/A

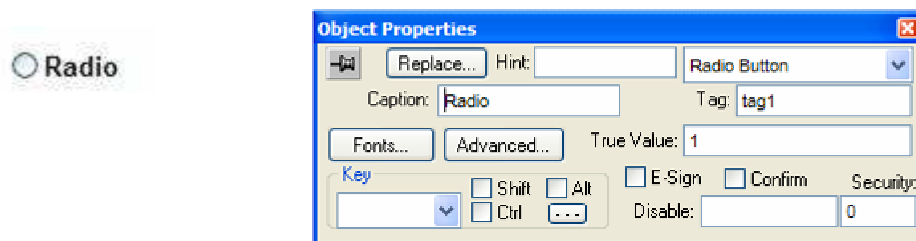
Summary

InduSoft Web Studio's (IWS's) development toolbox includes a Radio Button object and a Check Box object. Frequently, developers confuse the operation of these objects. This application note explores the operation of the Radio Button object and the Check Box object.

The Radio Button Object

The Radio Button is a graphical user interface that allows a user to choose one of a predefined set of options. Radio buttons got their name from the buttons used on radios to select a preset station. Once the button was pressed, pressing it again (generally) does not change the selection. Only by pressing another radio button could the selection be changed. The IWS radio button works in this manner, and is consistent with the functioning of radio buttons in Microsoft Windows.

The Radio Button and its Object Properties dialog box appear as follows:



The "Radio" caption can be changed to any valid caption. An IWS tag defined in the Tag field is assigned the value in the True field when the radio button is selected.

In the example above, the IWS tag is Tag1, and the True value is 1. If the Radio Button is selected, Tag 1 will be assigned a value of 1. In a runtime setting, assuming Tag1 has an initial setting of 0 and the Radio Box has not been selected, the Radio Button will have a clear center. When the Radio Button is selected, Tag1 will be assigned a value of 1 (i.e. the value in the True Value field) and there will be a small black dot in the center of the Radio Button.

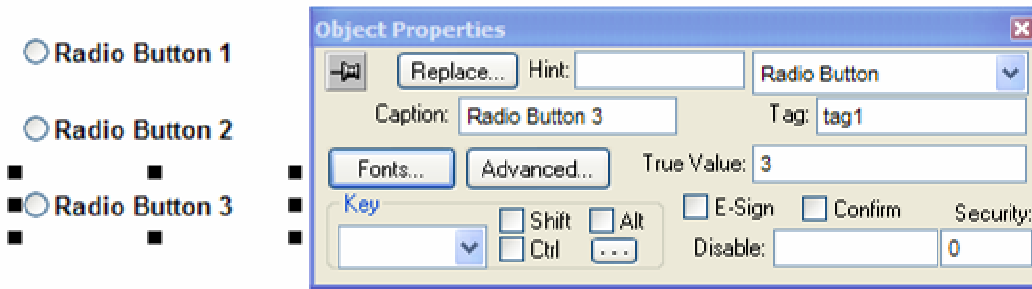
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Note that repeatedly selecting the Radio Button will not toggle the value of the tag defined in the Tag Field. Every time the Radio Button is selected, it will be assigned the value indicated in the True Value field (in this example, Tag1 will be assigned a value of 1). However, if another IWS object or script (Math or VBScript) resets the tag to a value of 0, the Radio Button will be deselected.

If you want to create a group of Radio Buttons that interact with each other, this can be easily done by creating multiple Radio Buttons that use the same Tag but have different values in the True Value field. At runtime, if each Radio Button has a different True Value, then only one Radio Button will be selected at a time.



An interesting feature of the IWS Radio Button is the Tri-State option. This option can be selected by first pressing the Advanced button in the Object Properties dialog box. A new dialog box pops up that allows the developer to enter advanced settings for the Radio Button object.

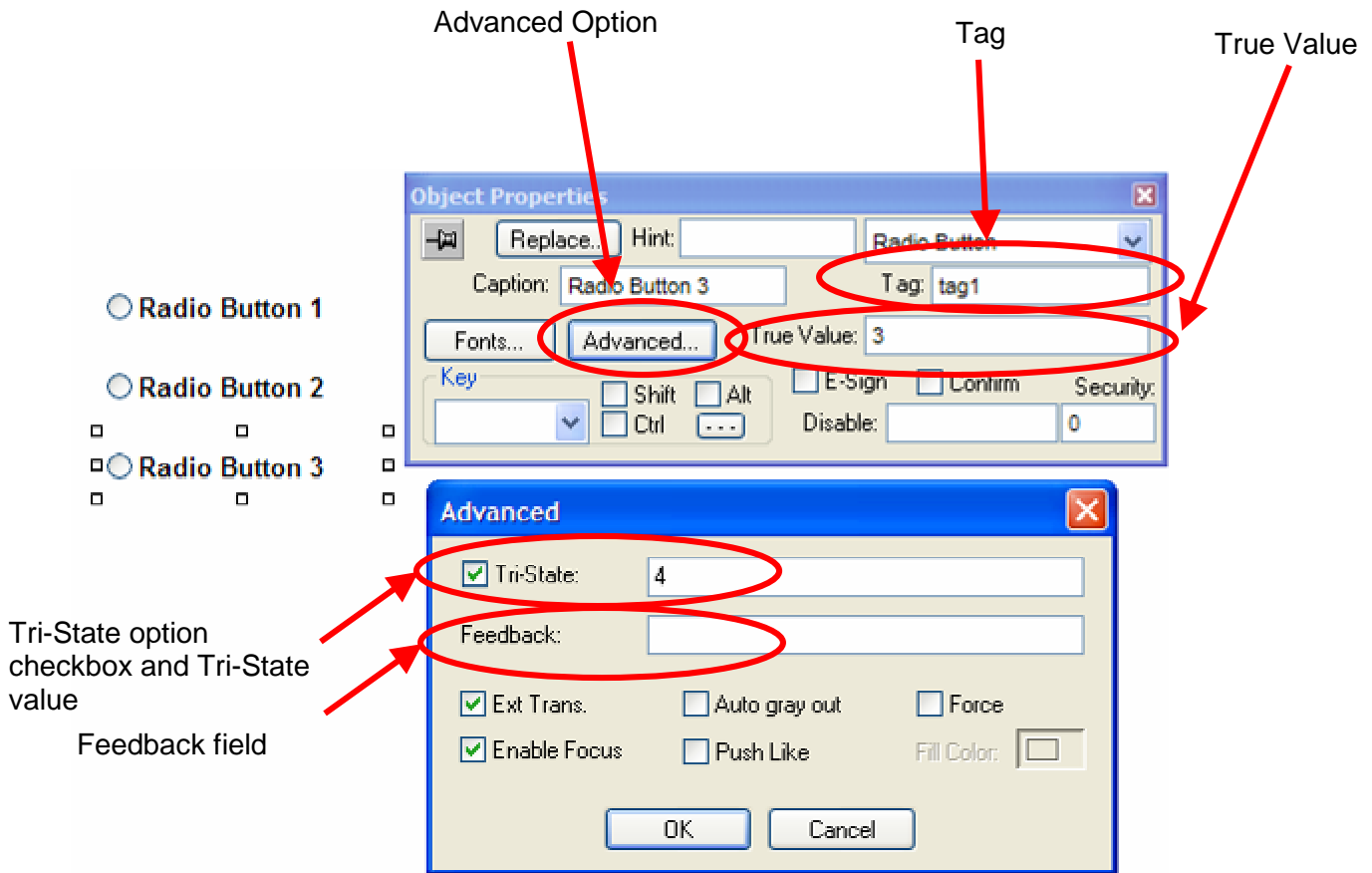
If the Tri-State option is not selected (i.e. it is unchecked), the Radio Button operates in a Normal Mode (as described above). Only two states are allowed; either selected (when the Radio Button is clicked on, or when the tag specified in the Tag field is set to a value as specified in the True Value field) or unselected (when the tag specified in the Tag field has a value different that the value specified in the True Value field).

If the Tri-State option is selected, the Radio Button works in the following manner:

- Assuming the value of the tag specified in the Tag field (Tag1 in our example) is not equal to either the True Value or the Tri-State Value, the Radio Button is not selected (clear center).
- The first time the Radio Button is selected, the tag specified in the Tag field will be set to the True Value. The center of the Radio Button will have a small black circle indicating it is selected.
- The next time the Radio Button is selected, assuming the tag specified in the Tag Field has not changed its value from the True Value, the tag (e.g. Tag1) will be assigned the Tri-State value. Additionally, the circle and black center will be grayed out. Note that if the tag value (e.g. Tag1) changes from the True Value before the Radio Button is pressed again (i.e. when it would normally be set to a Tri-State value), when the Radio Button is pressed again, it will be set to the True Value, not the Tri-State value.

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The tag specified in the Tag Field can be any IWS tag type (Boolean, Integer, Real, or String), but it is essential that the value in the True Field and the Tri-State field (if used) must be consistent with the tag data type. If the Tri-State value is used, it must not be the same value as the True Value, and if the tag is a String tag type, the Tri-State Value must not be an empty string.

The application above uses the same tag in the Tag Field of each Radio Button, demonstrating one method of using a combination of Radio Buttons to select one of a multiple of options. Using this approach, only one Radio Button in the combination could be selected at a time. This method results in the tag being set to a value corresponding to the option selected.

Another method of using Radio Buttons is with the Feedback field. The Feedback field is accessed in the Advanced dialog box. The Feedback field contains a tag of the same data type used in the True Value field and the Tri-State field (if it is used) of the Radio Button. The Feedback field works in the following manner:

- If the value of the tag in the Feedback field equals the value of the tag in the True Value field, the Radio Button state is set to True. A small black circle will appear in the Radio Box.
- If the value of the tag in the Feedback field equals the value of the tag in the Tri-State value field, the Radio button will be set to Tri-State. A small black circle will appear in the Radio Box and the entire circle will be grayed out.
- If the neither of the above conditions is satisfied, the Radio Button state is set to False.

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When using the Feedback field, it is important to note that the Radio Button does not operate in a Normal state. Consider the first example above, which shows Normal operation of the Radio Button. The parameters were set as follows:

- Radio Button Tag = Tag1 (tag type integer)
- True Value = 3
- Tri-State box checked
- Tri-State value = 4
- Feedback field empty

When Radio Button1 is selected, Tag1 is set to a value of 1. When Radio Button2 is selected, Tag1 is set to a value of 2. When the Radio Button 3 object is selected the first time, Tag1 will be set to a value of 3 (the True Value). When the Radio Button 3 is selected a second time, without another object changing Tag1's value, the Tag1 value will be set to a value of 4 (the Tri-State value). If Radio Button 3 is selected again, without another object changing Tag1's value, Tag1 will be set to a value of 3 (the True Value). Additional selections of the Radio Button 3 object will toggle Tag1's value between the Tri-State value and the True Value. Once Tag1 is set to a different value (the another Radio Button object, another object or by Script), the first subsequent selection of the Radio Button 3 object will set Tag1's value to 3.

Now consider the functioning of the Radio Button when a tag is specified in the Feedback field. For example, we will create a new tag called Tag2 (tag type integer) and specify this in the Feedback field. All other parameters as specified above remain the same. The displayed state of Radio Button3 object will follow the value of Tag2; i.e.

- If Tag2 = 3, Radio Button3 displays as True
- If Tag2 = 4, Radio Button3 displays as Tri-State
- For all other values of Tag2, Radio Button3 displays as False

When Radio Button1 is selected, Tag1 is set to a value of 1. When Radio Button2 is selected, Tag1 is set to a value of 2. When the Radio Button 3 object is selected the first time, Tag1 will be set to a value of 3 (the True Value). **However**, two things are now different from the Normal operation:

1. The display state of Radio Button3 object will follow Tag2's value, not change based on Radio Button3 being selected.
2. Despite whatever Tag2's value is set to (False, True, or Tri-State), when the Radio Button3 object is selected, Tag1 value will be set to 3. Repeated selections of the Radio Button3 object **will not** toggle between the True Value and the Tri-State value. Only the True Value will be used to set Tag1's value (until set to a different value by another object or Script).

The Check Box Object

The Check Box object is another graphical user interface that permits a user to make a selection or set of selections when multiple Check Boxes are used. By convention, when multiple Radio Boxes are used, only one selection is allowed, whereas by convention multiple Check Box selections are allowed. However, this is not an absolute requirement.

With IWS, a Check Box can have one of 3 possible states; False (empty box), True (checked box), or Tri-State (grayed out box), as illustrated below.



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In its normal state, the Check Box object will toggle between the False and True state. If the Tri-State option is enabled, the Check Box will toggle between the False, True and Tri-State states.

Table of False, True and Tri-State Result Values Stored in Tag (Tag field)

Data Type	True Value	Tri-State Value	Result False	Result True	Result Tri-State
Boolean* ¹	1	n/a	0	1	n/a
Integer	2	n/a	0	2	n/a
Integer	2	4	0	2	4
Real	5.3	n/a	0	5.3	n/a
Real	5.3	7.8	0	5.3	7.8
String	"Hello"	n/a	1.0000	"Hello"	n/a
String* ²	"Hello"	"Goodbye"	<Null>	"Hello"	"Goodbye"

*¹ Do not use the Tri-State option if the tag type is Boolean. Unexpected results can occur.

*² It is recommended to use the Tri-State option if the tag type is String. The Tri-State value can be set to any valid string value. Do not use a null string value (""), otherwise the Check Box will not toggle properly. However, the Tri-State value can be set to a blank if desired (" ").

Advanced Option

Tag field

True Value

Object Properties

Replace... Hint: Check Box

Caption: Check1 Tag: tag1

Advanced... True Value: 1

Key

Shift Alt E-Sign Confirm Security: Disable: 0

Advanced

Tri-State: 2

Feedback:

Ext Trans. Auto gray out Force

Enable Focus Push Like Fill Color:

OK Cancel

Tri-State option checkbox and Tri-State value

Feedback field

Check1 Check2 Check3

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Note: One major difference between the Check Box and the Radio Button control is that the Check Box will toggle between the False and True states (or False, True and Tri-State states if the Tri-State option is enabled), whereas the Radio Button will not toggle unless the tag specified in the Tag field is changed by another object.

When the Check Box object is selected, the value of the tag specified in the Tag field toggles between the False value and True Value, or between False value → True Value → Tri-State value → False (and so on) if the Tri-State option is enabled.

If a tag is placed in the Feedback field, the toggling between states will operate differently. Similar to the operation of the Radio Button object, the value of the Check Box's Feedback tag will control the display of the Check Box (i.e. empty box, checked box or grayed out check box). The value of the Feedback tag will determine the display state of the Check Box as well as its actual state and the next toggle state. For example, if a tag (e.g. Tag 2) is specified as the Feedback tag and its value equals the True Value as specified in the Check Box's Object Properties, the next toggle state will be either the False value (when operating in a Normal mode) or the Tri-State state (when the Tri-State option check box is enabled). If the Tri-State option is enabled and the value of the Feedback tag (e.g. Tag 2) is equal to the Tri-State value, then the next toggle state will be the False state. If the Feedback tag does not equal either the True Value or the Tri-State value (if the Tri-State option is enabled), then the Check Box state is false and the next toggle state will be True.

Note: If a tag is specified in the Feedback field, the value of this tag will determine the current state of the Check Box. If the Check Box is selected, the tag specified in the Tag field will be advanced to the next state. However, repeated selection of the same Check Box will not advance the Check Box state further. This can only be accomplished by changing the value of Feedback tag. A representative state table is below.

Table of States for a Check Box with an Integer Tag & Tri-State Option Enabled

Action	True Value	Tri-State Value	Tag 1 (Tag)	Tag2 (Feedback)	Displayed State
Initial settings	1	2	0	0	Unchecked
Tag 2 set to 2	1	2	0	2	Grayed Out
Check Box Selected	1	2	0	2	Grayed Out
Check Box Selected again* ¹	1	2	0	2	Grayed Out
Tag 2 set to 0	1	2	0	0	Unchecked
Check Box Selected	1	2	1	0	Unchecked
Check Box Selected again* ¹	1	2	1	0	Unchecked
Tag 2 set to 1	1	2	1	1	Checked
Check Box Selected	1	2	2	1	Checked
Check Box Selected again* ¹	1	2	2	1	Checked

*¹ Has no result (i.e. does not change Tag1 (Tag) or displayed state of the Check Box).