Addition of New - TKSCALE Block with Improved Functionalities

Pulkit Mittal
Ekalavya Summer Internship - 2016
Indian Institute of Technology, Bombay
Mumbai, India
mittal.pulkit08@gmail.com

Abstract

In the latest stable version of Scilab-5.5.2, there is no way to distinguish between various Tk Source windows that open up on simulation. This document describes the way to add the New Tkscale block containing the improved functionalities.

Keywords—interfacing; computational; utility function

I. INTRODUCTION

Scilab [1] is free and open source software for numerical computation providing a powerful computing environment for engineering and scientific applications. In particular, Scilab provides users with standard palettes and blocks to design hybrid dynamical systems models. However, the current implementation of TKSCALE block does not contain the way by which the various Tk Source windows can be distinguished.

In this work, I present a New-TKSCALE block which not only distinguishes the various Tk Source windows but also provides user the ability to name the Tk Source windows as per their convenience. The TKSCALE block is comprised of two functions namely interfacing function and computational function. These functions are modified along with other files to improve the current version (scilab-5.5.2) of TKSCALE block.

II. CREATING A SCICOS BLOCK

Each Scicos block [2] is defined by two functions. The first one is the interfacing function, it is written in Scilab and it defines the geometry of the block (input, outputs, Icon, size, shape). It is also the function that handle the user interface (parameters, states,..). The second function is the computational function which defines the behaviour of the block during the simulation phase.

A. Interfacing function

The interfacing function of new TKSCALE is to be added at *SCI/modules/scicos_blocks/macros/Sources/NEW_TKSCALE.sci.* To add the label field to block parameters so as to distinguish variuos Tk Sources, I provided a field "***Name of TKSCALE***" of type "***str",1*** in the scicos_getvalue() [3] function. Figure 1. shows the corresponding code of NEW_TKSCALE.sci. Also, inside the "*define*" case, use the *exprs* to pass the vector of strings including formal expressions as shown in Figure 2.

B. Computational function

The computational function of new TKSCALE is to be added at *SCI/modules/scicos_blocks/macros/Sources/new_tkscaleblk.sci.* The various Tk Source windows can be distinguished if they are labeled as 1,2,3,…..,n. So, to get the current block number I used the utility functions [4] provided by Scilab namely curblock() [5] . This function returns the current called xcos block during simulation. The changes done in the new_tkscaleblk.sci file are shown in Figure 3. Also use the variable *labelling* to get the default label of Tk Source windows. Variable *label_new initially contains the sentinel value and is used to get the label entered by the user. The corresponding code is shown in Figure 4.*

III. CHANGING SOUCES.COSF FILE

Sources.cosf file contains the default values for the block parameters and is present at the location *SCI/modules/scicos/palettes/Sources.cosf.* I included the lines of code for new TKSCALE block in this file as shown in Figure 5.

```
function [x,y,typ]=NEW_TKSCALE(job,arg1,arg2)
    //Source block; output defined by tk widget scale
    x=[];
    y=[];
    typ=[];
    select job
    case "set" then
        x=arg1;
        graphics=arg1.graphics;
        exprs=graphics.exprs
        model=arg1.model;

        /* Add a label 'Name of TKSCALE' of type 'str' and set its dimension to 1
         * This adds a new field where the title of Tk Source can be changed
         *
         * @autor Pulkit Mittal        <mittal.pulkit08@gmail.com>
         *
         */
        [ok,a,b,f,name_tk,exprs]=scicos_getvalue("Set scale block parameters",..
        ["Min value";"Max value";"Normalization";"Name of TKSCALE"],..
        list("vec",1,"vec",1,"vec",1,"str",1),exprs)

        // tk widget returns a scalar, the value is divided by
        // Normalization factor
        if ok then
            graphics.exprs=exprs
            model.rpar=[a;b;f]

            /* Use a scilab object of type model and include the field label which can be used to identify a
             * block in order to access or modify its parameters
             *
             * @author Pulkit Mittal      <mittal.pulkit08@gmail.com>
             *
             */
            model.label=string(name_tk);
            x.graphics=graphics;
            x.model=model
        end
    case "define" then
```
-- INSERT --   62,1   44%

FIGURE 1 : ADD NAME OF TKSCALE FIELD


```
             * block in order to access or modify its parameters
             *
             * @author Pulkit Mittal      <mittal.pulkit08@gmail.com>
             *
             */
            model.label=string(name_tk);
            x.graphics=graphics;
            x.model=model
        end
    case "define" then
        a=-10;
        b=10;
        f=1;
        name_tk="NIL";// default parameter values
        model=scicos_model()
        model.sim=list("new_tkscaleblk",5)
        model.out=1
        model.evtin=1
        model.rpar=[a;b;f]
        /* Set the label field of model object equal to the name given by user
         *
         * @author Pulkit Mittal        <mittal.pulkit08@gmail.com>
         *
         */
        model.label=string(name_tk)
        model.blocktype="d"
        model.dep_ut=[%f %f]
        /*
         * exprs a vector of strings including formal expressions
         */
        exprs=[sci2exp(a);sci2exp(b);sci2exp(f);string(name_tk)]
        gr_i=[]
        x=standard_define([3 2],model,exprs,gr_i)
    end
endfunction
```
-- INSERT --   72,4-11   Bot

FIGURE 2: PASS VECTOR OF STRINGS USING EXPRS

File Edit View Search Terminal Help

```
function block=new_tkscaleblk(block,flag)

    /*
     * Get the current called  xcos block during simulation using curblock() utility function of Scilab
     *
     * @author Pulkit Mittal    <mittal.pulkit08@gmail.com>
     */
    blk=curblock();

    if flag == 1 then
        // Output update

        slider = get(block.uid + "#slider");

        if slider <> [] then
            // calculate real value
            value = (block.rpar(1) + block.rpar(2) + get(slider,"value")) / block.rpar(3);

            w = get(block.uid);
            if w <> [] then
                set(w, "info_message", string(value));
            end

            block.outptr(1) = value;
        end
    elseif flag == 4 then
        // Initialization


        /* Use the variable labelling to set the default label of Tk Source window
         * Also typecast the blk (block no) obtained into the string object
         * Variable label_new is used to get the default sentinel value present in Name of TKSCALE block
         *
         * @author Pulkit Mittal       <mittal.pulkit08@gmail.com>
         *
         */
        labelling = "Tk Source: "+string(blk);
        label_new=string(block.label);
```

-- INSERT --   61,1   21%

Menu   TKSCALE - Adjust co...   Home   new_tkscaleblk.sci (/...   2014_04_msw_a4_fo...   Terminal   [Pictures]   11:54 AM

FIGURE 3: Using utility function curblock()

File Edit View Search Terminal Help

```
    /* Check if user has given some name to Tk Souce and change it
     *
     * @author Pulkit Mittal        <mittal.pulkit08@gmail.com>
     *
     */
    answer = strcmp(label_new,"NIL");
    disp("answer of comparison= "+string(answer));
    if answer ~= 0 then
            //h=get("current_figure");      //get the handle of current graphic window
            //h.figure_name=label_new;      //set the figure name to new value given by user
            labelling=label_new;
    end

    f = figure("Figure_name",labelling, ...
    "dockable", "off", ...
    "infobar_visible" , "on", ...
    "toolbar", "none", ...
    "menubar_visible", "off", ...
    "menubar", "none", ...
    "backgroundcolor", [1 1 1], ...
    "default_axes", "off", ...
    "figure_size", [180 350], ...
    "layout", "border", ...
    "figure_position", [40 40], ...
    "Tag", block.uid);

    frame_slider = uicontrol(f, ...
    "style", "frame", ...
    "constraints", createConstraints("border", "left", [180, 0]), ...
    "border", createBorder("line", "lightGray", 1), ...
    "backgroundcolor", [1 1 1], ...
    "layout", "gridbag");

    // slider
    bounds = block.rpar(1:2);
    initial = mean(bounds);
    uicontrol(frame_slider, ...
    "Style", "slider", ...
    "Tag", block.uid + "#slider", ...
```

-- INSERT --   106,1   64%

Menu   TKSCALE - Adjust co...   Home   new_tkscaleblk.sci (/...   2014_04_msw_a4_fo...   Terminal   [Pictures]   11:54 AM

FIGURE 4: Code to change new label of Tk Source window

FIGURE 5: ADDING CODE FOR NEW TKSCALE BLOCK IN SOURCES.COSF

IV. ADD NEW_TKSCALE.PNG

The NEW_TKSCALE.png is the image which is reflected on the palettes browser. It needs to be added at the location *SCI/modules/xcos/images/palettes/NEW_TKSCALE.png.*

V. CHANGE PALETTES.XML FILE

The palettes.xml file present at the location *SCI/modules/xcos/etc/palettes.xml* is used for internal storage of the standard blocks and palettes. So, modify the file to contain the entry for the new TKSCALE block as shown below:

```
<block name="NEW_TKSCALE">

<icon variable="SCI"
path="/modules/xcos/images/palettes/NEW_TKSCALE.png">

</block>
```

VI. CHANGE XCOS-STYLE.XML FILE

The Xcos-style.xml file present at the location *SCI/modules/xcos/etc/Xcos-style.xml* is used to display the block with label when block is used in the diagram. So, modify the file to contain the entry for the new TKSCALE block as shown below:

```
<add as="NEW_TKSCALE" extend="blockWithLabel">

    <add as="displayedLabel" value="NTkScale">

</add>
```

VII. CONCLUSION

The NEW TKSCALE block has been successfully added to the standard palette browser as shown in Figure 6 by following the above steps and is ready for future use.
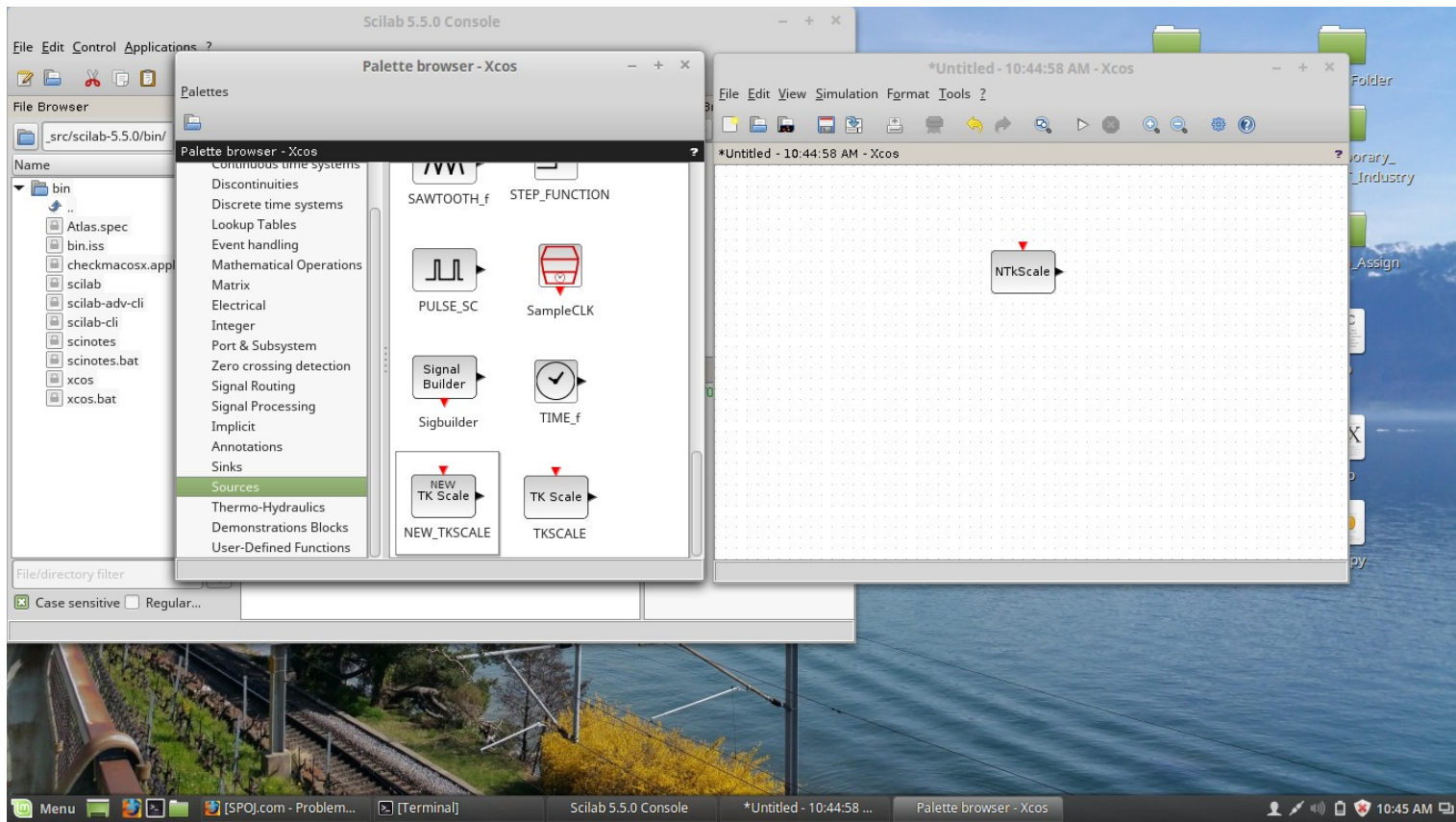
FIGURE 6: NEW TKSCALE BLOCK ADDED TO PALETTE BROWSER

REFERENCES

[1] http://www.scilab.org/scilab/about

[2] Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah, in Modeling and Simulation in Scilab/Scicos, Mathematics Subject Classification (2000): 01-01, 04-01, 11 Axx, 26-01

[3] https://help.scilab.org/doc/5.5.2/en_US/scicos_getvalue.html

[4] https://help.scilab.org/docs/5.5.2/en_US/section_6f6a29e0017e54eaef57 65cf4c986d9e.html

[5] https://help.scilab.org/docs/5.5.2/en_US/curblock.html