INSTRUCTION

„BASIC CONCEPT" Tutorial

CONTENT

'BasicConcept' tutorial is an example that shows basic functionality of nxtStudio software, according IEC61499, in a simple model. It demonstrates how to make the ready-to-use application run virtually on your computer and describes the handling in short words.

This application contains two pneumatic driven cylinder which can be controlled with one control unit. The distribution on several devices is shown in a simple way.

Where can you find the finished "Basic Concept" application for download?

You can download the nxtONE-file **here**.

How to make the application work?

1. Open the demo-file

The demo-file is an archive file. Start the program nxtStudio (Version 2.0, demo-version can be downloaded **here.**) at first and click on **File/Unarchive Solution** in the main menu bar. In the opened dialogue you will be asked for the archive location. After that the solution will be opened from nxtStudio automatically.

2. Handling

» **Starting the SoftPLCs, loading the devices to the PLCs**

After the solution has been opened, double-click on entry **'System'** within the opened node **'BasicConceptDemo'** in the 'Solution Overview'. This represents the basis for all further actions. Change to **tab 'Devices'** now and choose **'(Local Test)'** at **'Active Network Profile:'** at the toolbar of the editor.
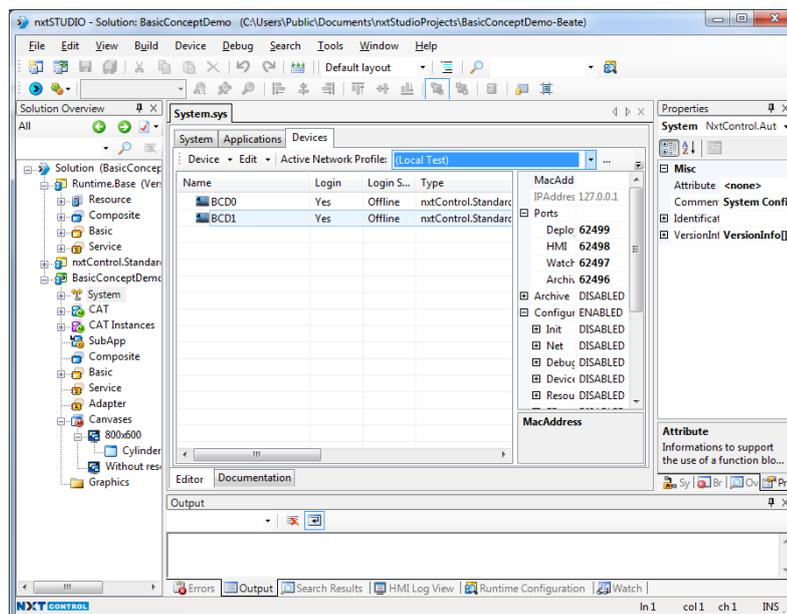

Figure 1.

Be sure now that **'Yes'** is adjusted in column **'Login'** for both devices. If not, click into the column in the respective row. A button appears that enables you to select the desired adjustment.
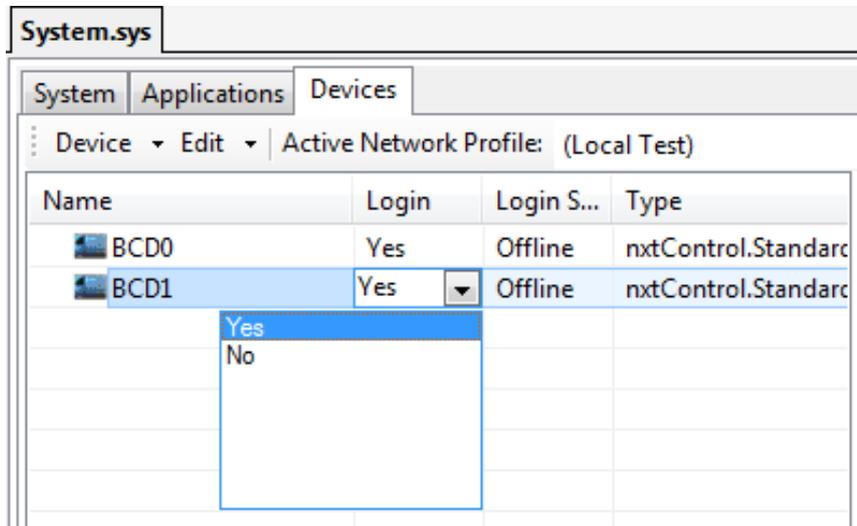

Figure 2.

Select both devices within the device list (click with pressed Ctrl-button or drag a rectangle over both icons) and open a context menu by a **right-click** into the selected area. Choose item **'Start Soft PLC'** out of that menu. The machine starts both soft PLCs, which is evident because two windows will pop up. Minimize them, or simple click in the nxtStudio window to get a free view on the solution again. Reopen the menu as described above and choose item **'Deploy ⚙ ▾ advanced …'**.
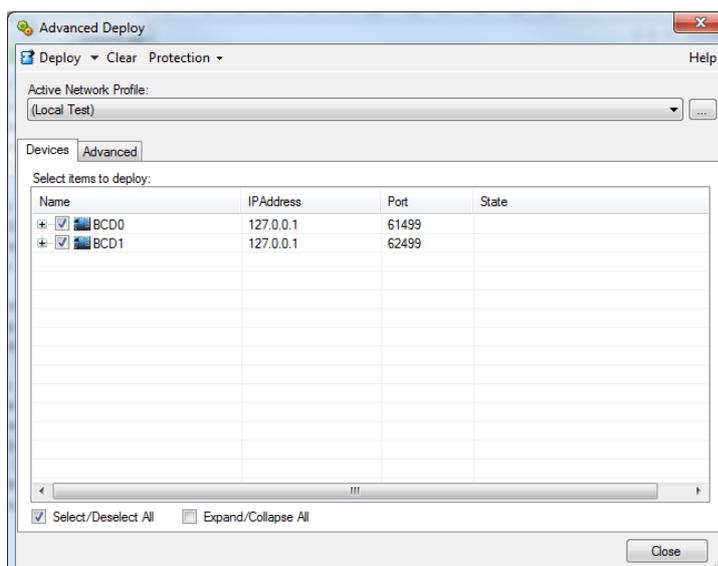

Figure 3.

Select both devices in the opened dialogue **'Advanced Deploy'** (checkmarks in the checkboxes) and click on **'Deploy'**. Then you can close the dialogue. The project is running on the soft PLCs now.

In that case that another demo-file has been running before and an error message as *'BCD1:ID=55, Action=START:INVALID_STATE, Detail: 532 Stored persistent data does not match this project, delete it and start over'* appears, it is necessary to delete persistent data from your soft PLCs at first. For this purpose just right-click on the affected device within the above mentioned dialogue 'Advanced Deploy' and choose 'Delete Persistent Data' from context menu. Now deploy once again.

» **Start HMI**

In the next step we will start the Test HMI to visualize the functionality. To do so, **open** node **'Canvases'** within the **'Solution Overview'**. This contains the relevant resolutions according to the type of HMI. In our case we choose item **800x600** with a **right-click** and then click on item   **'Test HMI Runtime on Local Computer'**.
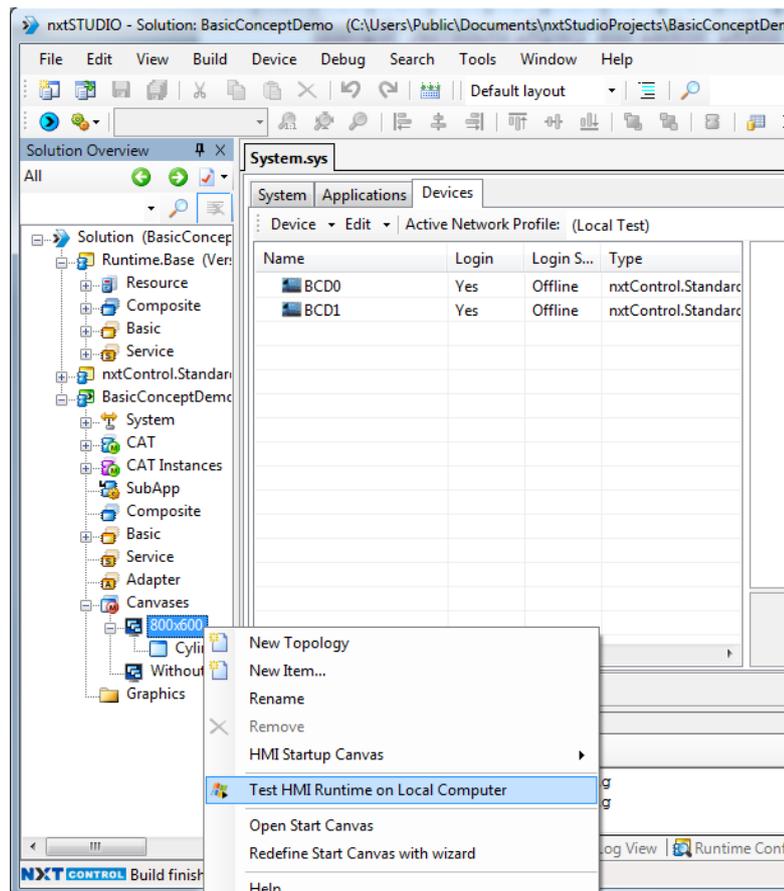

Figure 4.

» **Control**

As soon as the HMI is running and has connected correctly, the movement of the two double-acting cylinder can be controlled by moving the joystick, located in the lower left corner of the HMI. A horizontally movement of the joystick will cause the left cylinder to move, a vertically movement will move the right one. If one of the endpoints is reached the corresponding control led lights up. If the mouse key is released, the control element remains in that position. To bring it back on zero position just double-click in the white, circular operating area.
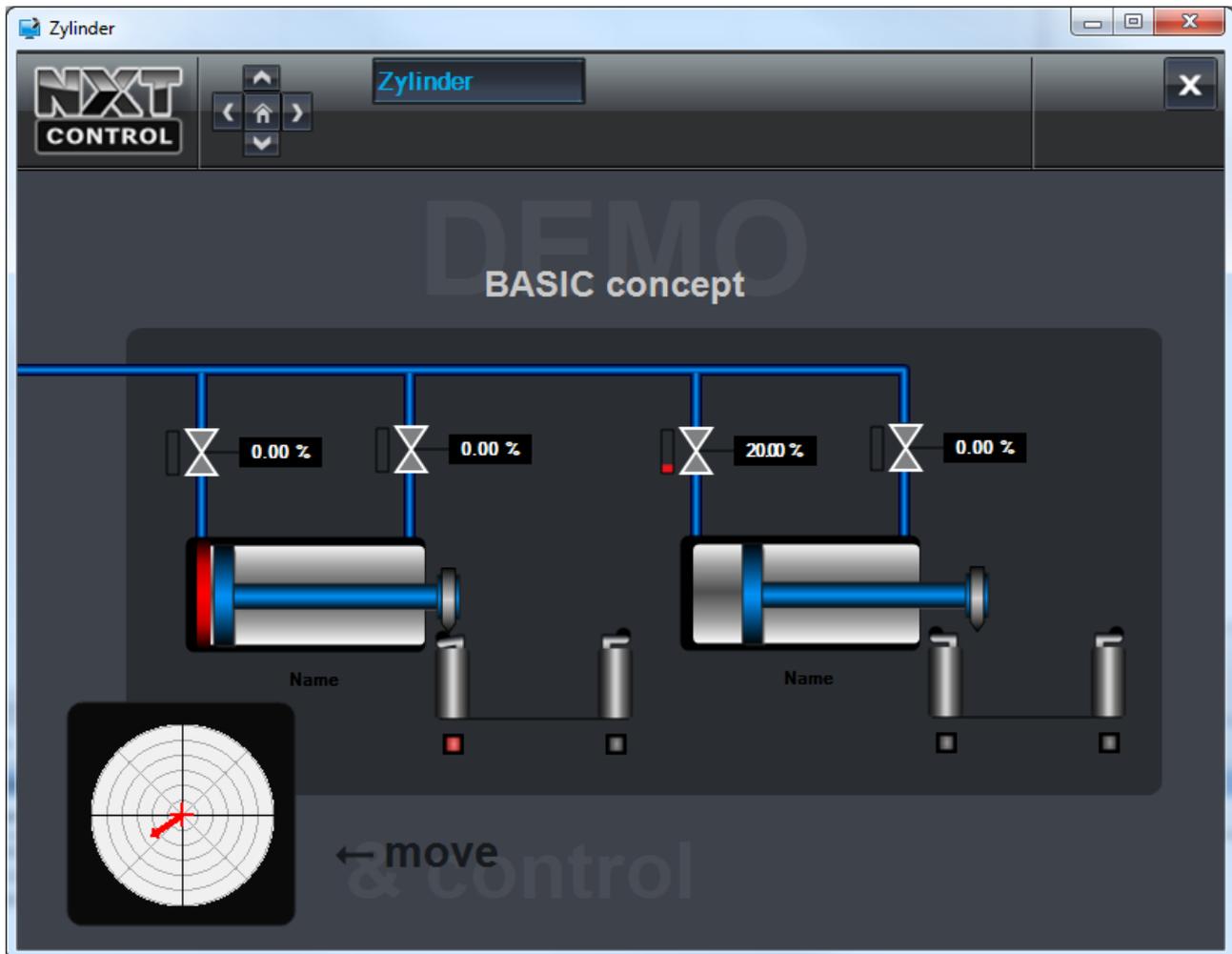

Figure 5.

Additionally, it is possible to watch the trend of the cylinders via distance-time diagrams. With a click on a cylinder the respective window opens to show the trend graphically. A part of the trend can also be enlarged for a more detailed view. For this purpose, drag a rectangle with pressed left mouse key, from top left to bottom right, right over the area to be enlarged. To zoom out again, just drag a rectangle in the opposite direction, from bottom right to top left.
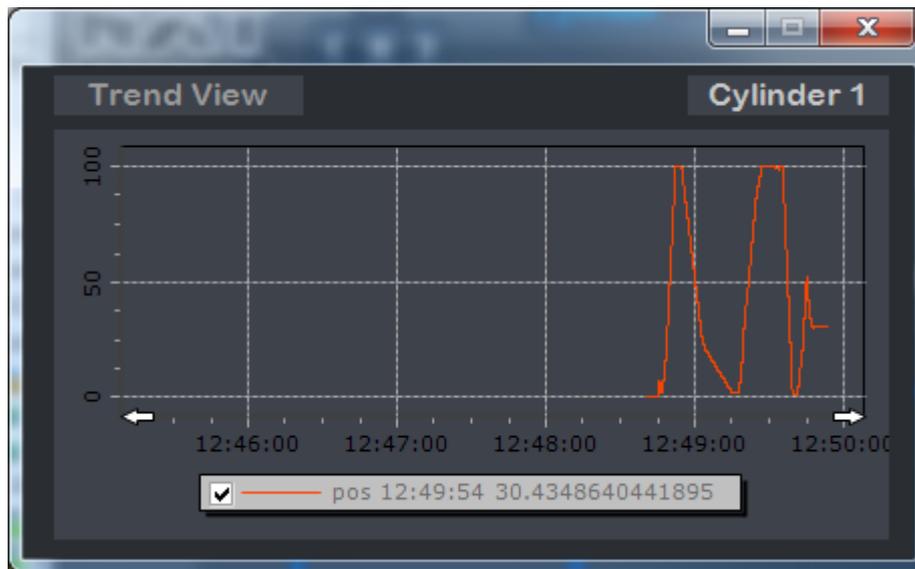
Figure 6.

» **Project distribution among two devices**

The fact, that the project is distributed among two devices, can be proved in an easy way by closing one of the soft PLCs, what causes the same effect as we would power off a real hardware PLC. The functionality of that part of the solution deployed on the second PLC, that is still running, will be kept fully intact.

> **Please note:** That part of the solution that is no longer connected will be displayed **pink**.

If the PLC, containing the functionality of the joystick, is closed while the right cylinder is moving, this cylinder will continue its movement until it reaches the endpoint, because the lastly used value is still active at the input. After that, no controlling is possible because the joystick symbol does not have any connection now. When the PLC is started and deployed anew, the symbols soon will be displayed normally and the solution has its full functionality again.

If the other PLC is closed, which runs the cylinder located on the right side of the HMI, the functionality of the left cylinder as well as the functionality of the joystick remains intact. Now it is only the right cylinder, that is not controllable.

» **Add Watch**

All interfaces of the function blocks can be watched, what is essential for error analysis on one hand and on the other side it serves to get detailed information on the process of the project.

To do so, open a **device** by a **double-click** on one of the two entries within the device list and then on the function block **EMB_RES (RES0)**, which represents the resource, or click on **tab 'System'**. In this case it is possible to choose the more directly way via the button ⬚ System Tree in the upper left corner of the editor.
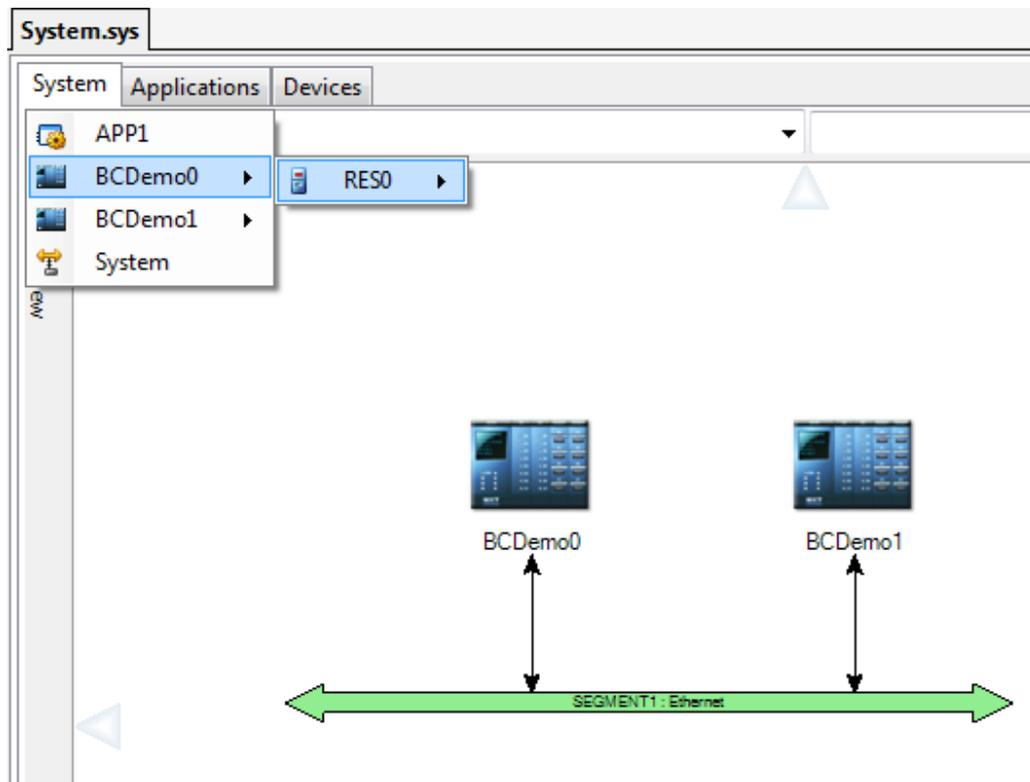

Figure 7.

A click on the button 🔵 **'Login'** establishes a connection to the watch server. Now it is possible to choose **'Add Watch'** from the context menu, by a **right-click** on one or more **selected function blocks**. After that, the values of the particular interfaces can be watched. Changed values will be displayed red, values that are left unchanged will toggle between black and blue. In the same way it is possible to open one of the function blocks with a double-click, to show its content and add watch points on some of this function blocks. Similarly to that it is also possible to use this functionality in the application view.
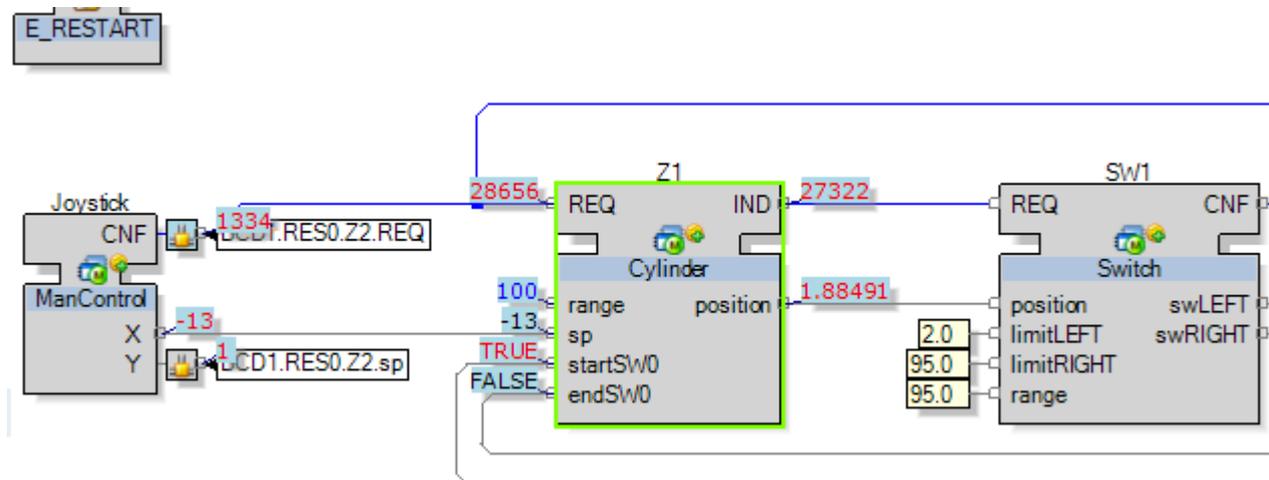
Figure 8.

As you can see, solutions, engineered with nxtStudio software, provide maximum control and overviews of all parts of the project.

This short example gave you a quick summary of the basic structure and functionality of nxtStudio software.

If you are interested in the potentialities provided by nxtStudio software, please contact us:

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