PLC DocGen

User Manual - 1.0

www.itris-automation.com

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Chapter 1

PLC DocGen: Auto generation of documentation and workflow

1.1 General overview

PLC DocGen is a reverse-engineering tool that allows you to generate information from an existing PLC source code. This tool examines and analyzes the PLC structure and functions. The generated information allows you to have a better understanding of what the PLC code does.

Working on an undocumented program is always a major loss of time:

1. Commissioning teams miss a clear link between functional specifications and the algorithms in the code, thus wasting hours during setup and debugging.
2. Maintenance technicians, working in end-user's PLC controlled facilities, have to be able to quickly fix erroneous programs so that production may restart as soon as possible. Thus, they need a clearly documented high-level model of the behavior of the program.
3. Modernization teams wanting to convert and potentially rewrite an existing legacy program for a more current hardware shall refer to the original specification and design documentation to make sure that they stay consistent with the intended behavior of the system.
4. Finally, project managers which have to estimate workloads based on high level specifications may not be able to fully understand the actual complexity of the job if they don't have access to a more detailed documentation closer to the program itself.

This is why it is crucial to use PLC DocGen during the whole life-cycle of your projects. By using PLC DocGen you get a clearer picture of the whole PLC program. It provides you with all the variables in the program and allows you to easily maneuver around in the program and get a visual overview of its functioning. PLC DocGen can be used, for example, for maintenance, code revue, audit, or code debugging.

PLC DocGen is a web-powered tool. It generates html files that you can easily display in your browser (Requires support for Cross origin requests that is available in some browsers like firefox, IE9, and IE10).

1.2 PLC DocGen features

The main features can be presented as product-oriented and service-oriented features. Product-oriented features are provided by using the tool directly. Service-oriented features are those, that Itris Automation automation engineers generate for a specific PLC application.

Product-oriented features are presented as follows:

- Results are generated as a web application that users can display easily in their browsers
- Listing

- Easy to share results with collaborators
- In compliance with PLC source code whenever the tool is launched

Regarding the service-oriented features, they are for advanced uses of PLC DocGen capabilities such as:

- Listing
- Paper document in A4 or A3
- Different format SVG or PDF
- Possible background animation which results from interaction between the generated SVG graphs (e.g. grafcet, ladder) and simulation or runtime execution of PLC Code
- In compliance with PLC source code whenever the tool is launched

1.3 Supported PLC brands

The current version of product-oriented PLC DocGen supports the following PLC brands that you can launch directly from our Platform or from the eclipse-based tool.

- 3S - Codesys (versions 3.1-3.5)
- Mors Technologies - OMEGADCN/TANAGRA (MIP-xx)
- PLCOpen (XML format)
- Rockwell - RSLogix 5000 (ControlLogix, CompactLogix, . . .)
- Rockwell - RSLogix500 (Allen-Bradley SLC500, Micrologix)
- Rockwell - RSLogix5 (Allen-Bradley PLC5)
- Schneider-Electric - XTEL (Telemecanique - PL7-3 serie 7)
- Schneider-Electric - Unity-Pro (Premium, Quantum, M340)
- Schneider-Electric - PL7-Pro (Micro, Premium)
- Schneider-Electric - Orphee (April 2000, 3000, 5000, 7000)
- Schneider-Electric - VPSOFT/EDIDOS (April SMC)
- Siemens - Simatic Step5 (S5-090, S5-100, S5-900)

For service-oriented PLC DocGen, the following PLc Brands are supported. To generate documentation you will need to contact us to send your PLC application.

- Mitsubishi - GXWorks 2
- Omron - Sysmac Studio v1.0.3 (NJ-series)
- Schneider-Electric - CDE1000 (Merlin-Gerin PB80-PB600)
- Siemens - Simatic Step7 (S7-300, S7-400, C7)

If you need to use the tool for other PLCs, please send us an email at support@itris-automation.com by specifying your PLC brand.

Chapter 2

Presentation of PLC DocGen

2.1 How to generate documentation

PLC DocGen can be launched through PLC DocGen Assistant available in our PaaS (Platform as a Service). It can also be used from our eclipse-based product.

2.1.1 Platform as a Service

First of all, users need to be registered to access features and tools provided on Itris' platform. After that, you will need to login and then from dashboard page click on the New PLC DocGen button to display the wizard. Follow the step-by-step instructions as illustrated in the figures below.

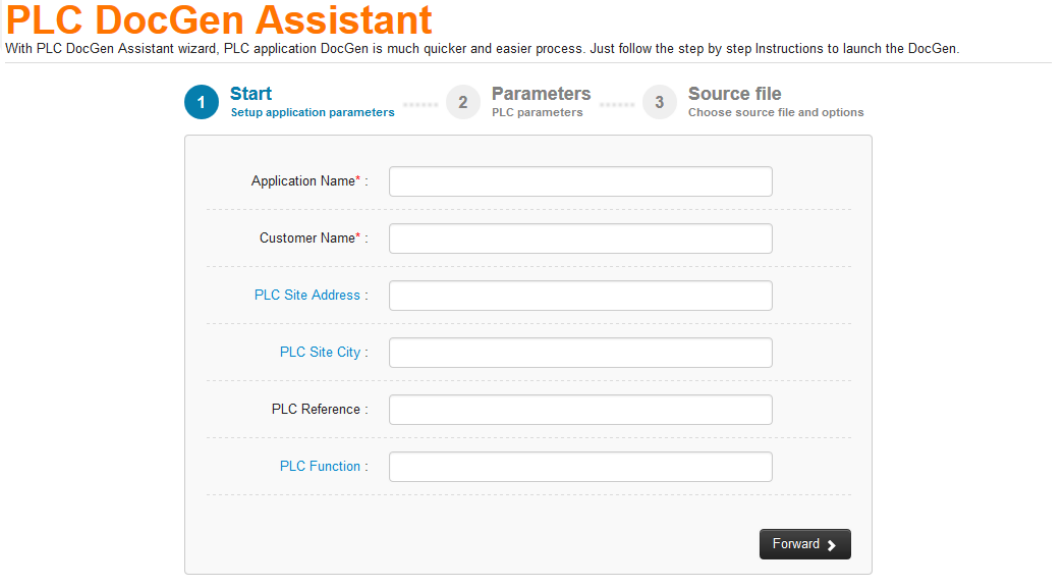

Figure 2.1: PLC DocGen Assistant application information

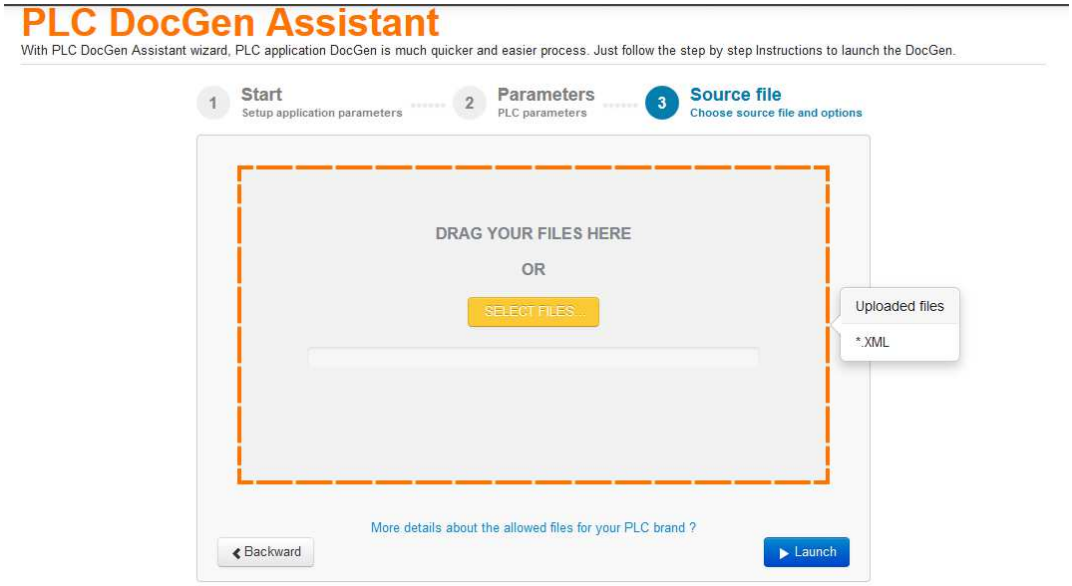

Figure 2.2: PLC DocGen Assistant file upload

Before starting to launch PLC DocGen, ensure that you have sufficient rights to do it, otherwise contact our sales service by email at sales@itris-automation.com to order new licenses.

When launching the wizard, results will be displayed in another web interface as depicted in the figure below.

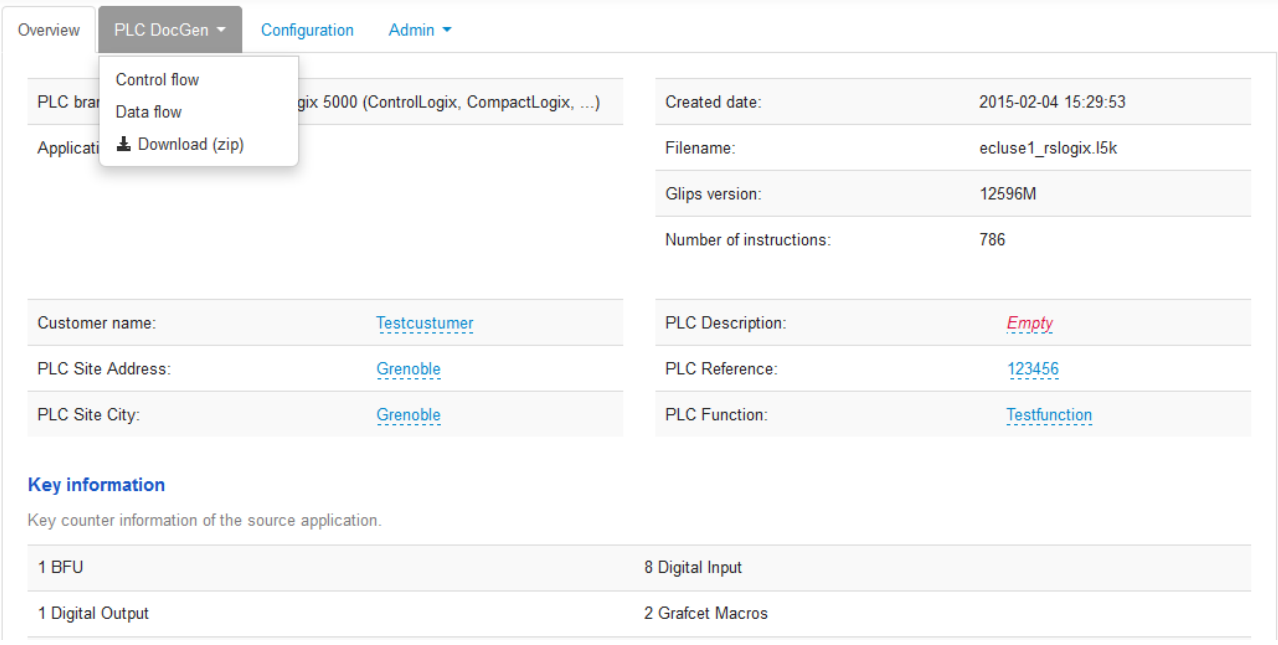

Figure 2.3: PLC DocGen result page

You can then display the results directly in a web page or download the generated information and display them in your browser in an off-line mode.

2.1.2 Eclipse-based product

Please contact us for more details about how to use PLC DocGen in eclipse-based product.

2.2 Generated data description

PLC DocGen takes as input your PLC program and provides you with a folder that contains html files. The figure below shows the structure of PLC DocGen results.

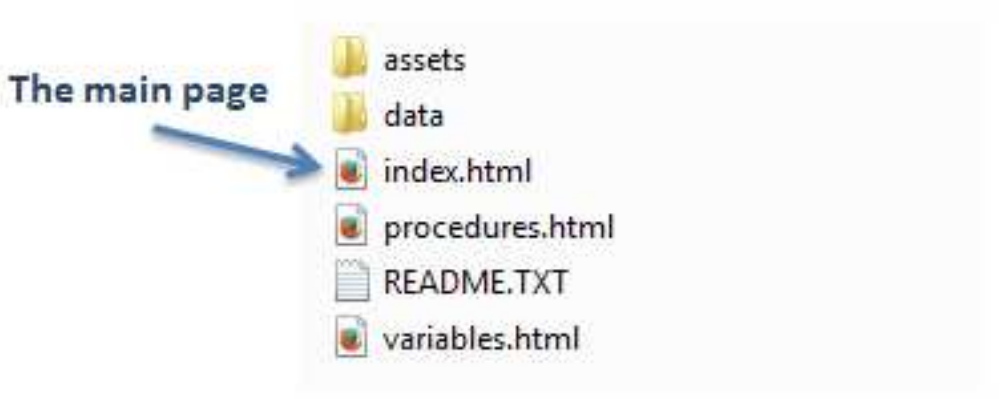

Figure 2.4: Generated folder content

There are two different views you can open in PLC DocGen, the data flow view and the control flow view. When you open the data flow view you get a visual overview of all the variables in the program and you can easily browse in the program by choosing your preferred settings of display.

The figure below presents the main page of PLC DocGen tool (i.e. by double-clicking on index.html from your folder). From this page, you can access to the data flow and control flow views.

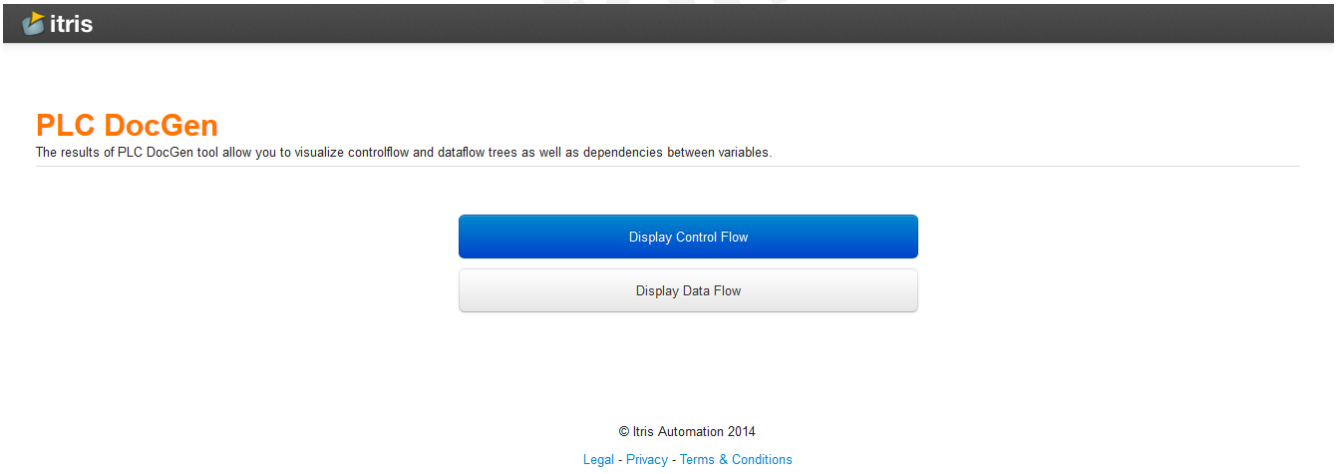

Figure 2.5: Main page of PLC DocGen generated documentation

Chapter 3

Data flow

The data flow view displays the relationship between variables of a PLC program. By clicking on ”Display Data Flow” from the main page of PLC DocGen, you will display the data flow view depicted in the figure below. As we can see, it consists of four parts that are : variable list, cross reference, dependency tree, and filters.

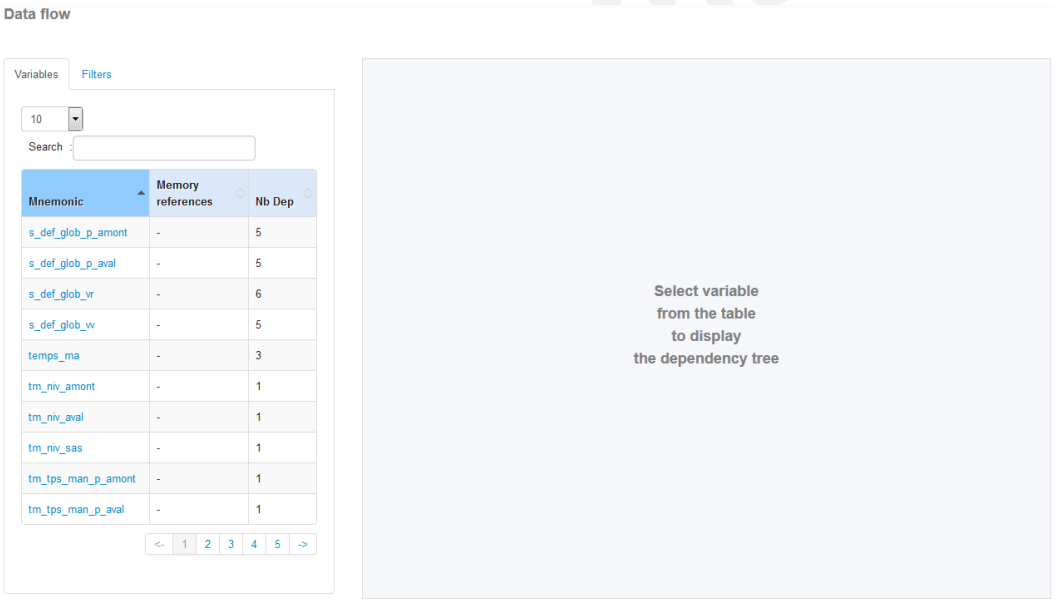

Figure 3.1: Data flow view

The variable list is displayed on the left, and when a variable is selected from the list, the variables influencing it are branching out on the right in the cross reference part and on the middle in the dependency tree part (see the figure below).

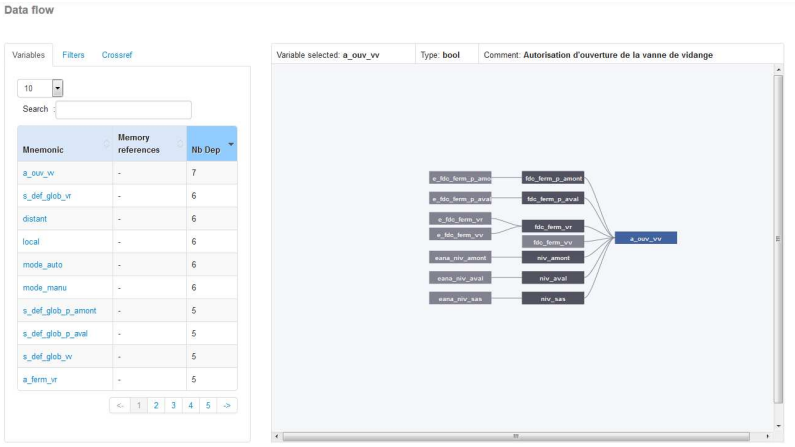

Figure 3.2: Data flow view of selected variable

This makes it easier to see which variables are affected if you change something in the program, or to look for an error in an output.

Each part of the data flow view is described in the following sections.

3.1 Filters

In Filters part, you can do some settings for displaying the dependency tree and variables :

- Display the written flow of selected variable
- Display the read flow of selected variable
- Choose to display two levels or one level in the tree

3.2 Variables list

The list of variables of the PLC program is presented as a table (as illustrated by the figure below) in which you can sort elements in a specific column and search a specific variable by its name or its address.

Variable list

25 Rechercher :

Mnemonic	Memory ref.	N° Dep
e_bp_acq_def	%I0.2.0	1
e_bp_au	%I0.2.1	1
e_fdc_ferm_p_amont	%I0.2.10	1
e_fdc_ferm_p_aval	%I0.2.11	1
e_fdc_ferm_vr	%I0.2.12	1
e_fdc_ferm_vv	%I0.2.13	1
e_fdc_ouv_p_amont	%I0.2.14	1
e_fdc_ouv_p_aval	%I0.2.15	1
e_fdc_ouv_vr	%I0.2.16	1

Figure 3.3: Variable list

The variables are listed by :

- Mnemonic : name of the variable
- Memory Reference : memory address of the variable if available
- Nb Dep : Number of dependencies for the variable

3.3 Dependency tree

This area displays the variable you have chosen from the variables list, and the variables that are influenced by this selected variable. The blue box is the selected variable, the light grey ones are variables that don't influence any other variables, the dark grey ones are the variables that influence other variables, and when you mouse over some variables some boxes become green to show that the green variable is present more than once in the tree. The figure below shows all these cases.

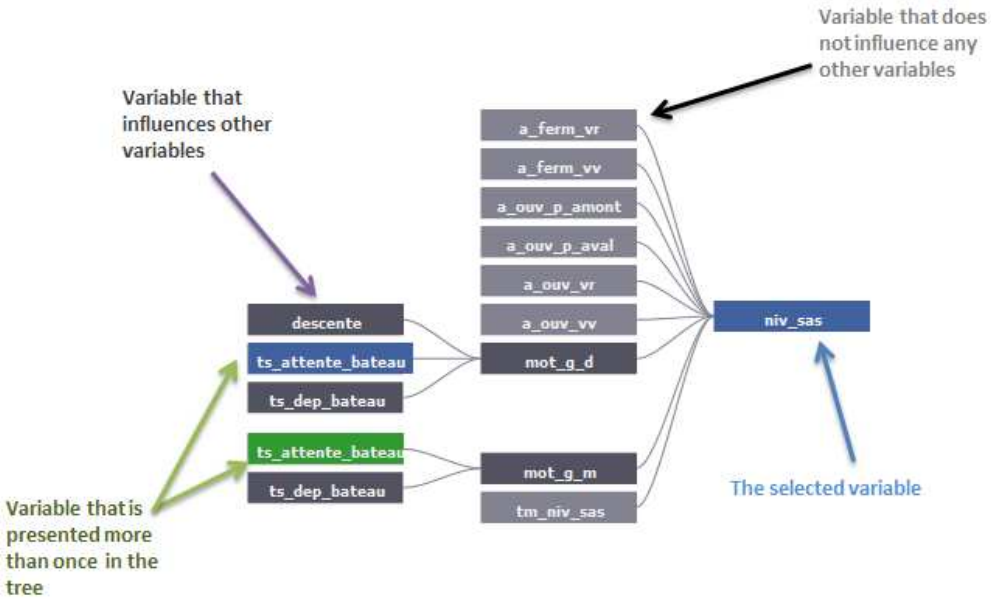

Figure 3.4: Dependency tree

By clicking on one of the boxes in the tree, a new variable is selected and then you see what this variable influences in the different areas.

3.4 Cross reference

In the cross reference area, you can see the instructions that concern the selected variable. Each instruction is presented by its location and its related source code.

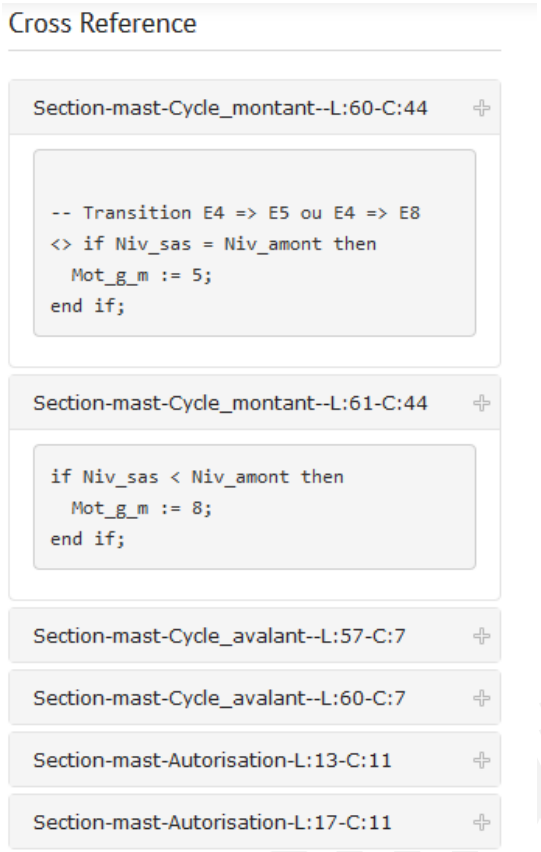

Figure 3.5: Cross reference area

In some cases, this area shows also the Memory information if the variable has a data structure type. The figure below shows the Memory information of a DFB type variable.

Cross Reference

Code | Memory

Total size : 63

Name	Offset	Size	Read
CMD_VANNE_Vidange	0	6	0
Cde_ouv	6	1	2
Cde_ferm	7	1	2
Def_ttlo	8	1	2
Def_ttlf	9	1	2
CMD_VANNE_Vidange	10	18	0
Temps_ma	28	16	0
CMD_VANNE_Vidange	44	19	0

Figure 3.6: Cross reference area with memory information

Chapter 4

Control flow

The control flow view of a program refers to the order in which the function or procedure calls are executed or evaluated. By clicking on “Display Control Flow” from the main page of PLC DocGen, you will display the control flow view depicted in the figure below.

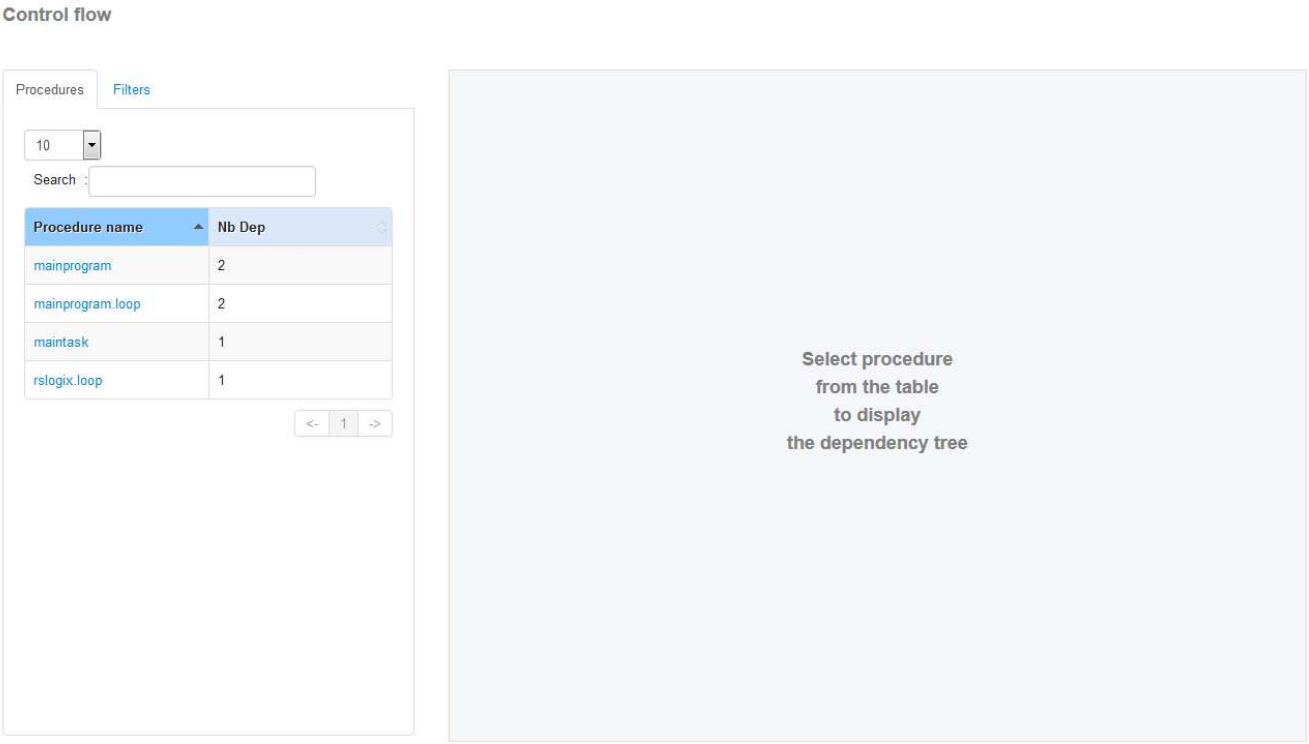

Figure 4.1: Control flow view

The procedures or functions list is displayed on the left, and when a procedure/function is selected from the list, the procedures/functions influencing it are branching out on the right in the cross reference part and on the middle in the dependency tree part. Each part of the data flow view is described in the following sections.

4.1 Filters

The filters allow you setting the display of the procedures :

1. When you chose Display tasks only, it allows displaying only the tasks, if not, tasks and other procedures/routines are displayed.

2. When you chose Display all nodes, it shows all the direct or indirect linked routines, if not, only the direct linked routines are displayed.

4.2 Procedures list

The list of procedures of the PLC program are presented as a table as illustrated by the figure below in which you can sort elements in a specific column and search a specific procedure by its name.

The procedures are listed by :

1. Procedure names
2. Number of dependencies

By clicking on procedure name, the cross reference and dependency tree areas are updated with the new data.

4.3 Dependency tree

Here you can see the procedure you have chosen from the list, and the procedures that are called from this selected procedure. By clicking on one of the boxes, you see what this procedure calls.

As in Data Flow view, the light grey boxes are procedures that do not call any other procedures, the dark grey boxes are procedures that call other procedures, and the green boxes are the procedures that are present more than once in the tree.

4.4 Cross reference

This displays all instructions that concern the selected procedure. Each instruction is preceded by its location and contains the source code related to the selected procedure.

For any question or information about Itris Automation products, contact-us by phone at +33(0) 476234320 or by email at sales@automationsquare.com.
For technical inquiries send an email to support@automationsquare.com.