SLD-Tree Generator
Documentation
Web-Interface

by Andreas Pollhammer
6. Jänner 2017

Inhaltsverzeichnis

1 SLD-Tree Generator

1.1 Some comments

Answer

By double-clicking on a leave node of a successful branch, the correct answer for this branch will be displayed. This answer is the substitution restricted to the variables of the query and should be the same as if you would execute the query directly in SWI-Prolog. Variables which stay unbounded will be displayed like X=_G123456, where _G123456 is the internal variable name of SWI-Prolog.

If you double-click on an inner node, or on a leave node of a failing branch, then there also will be an answer displayed. In this case the answer is not a correct answer-substitution, but the substitution calculated so far, when reaching the selected node. That means that this answer will either be incomplete or a wrong answer on the way of finding all correct answers to the query.

Node-Limit

There is a limit of 1000 nodes which can be generated at most in one single calculation step. If a tree contains more (or infinitely many) nodes, you can subsequently generate more parts of the tree (where each part is limited to 1000 nodes).

In the case, that not all child nodes for a node can be generated because of the node limit, you should reduce the number of levels for the generated parts of the tree. (This can be done by clicking on Menu/Settings, s. section 2.1.)

Cuts

Cuts are simply ignored. So allways the full sld-tree will be calculated (with respect to the node limit and the maximum number of levels).

The `If->Then;Else` construct is interpreted as `If,!,Then;Else`. This is not the correct way, because there should be also a cut in the else case. But because we disregard cuts anyway this doesn't seem to be a big issue. But mind that as a result of ignoring the cut, always both branches are followed, the `Then` and the `Else` branch. This may generate two branches of the tree both ending in a `true` node in contrast to the fact that the `If` condithion can only be true for one of the branches and must be false for the other one. Therefor the generated sld-tree will probably have successful branches which are wrong, when using `If->Then;Else` or cuts in general.

Built-in predicates

Only a small part of the Built-in predicates are available. And there are some limitations.

There is no clause number for built-in predicates, so the displayed number is 0.

Available predicates are:

- ,
- ;

- =

- is

- Term comparisons

- Arithmetic comparisons

Not available are:

- I/O predicates

- Meta predicates

- and all others

Lists can be used with the [ ] syntax.
The dot-operator '.' may not be working.

1.2   Setup

There is not much of setup to do. The sld-tree-generator (the prolog part as well as the web-interface) is independent of the operating system and does not require any third party libraries or code besides of processing.js. You only need to have SWI-Prolog installed on your computer. When you run the sld-tree-generator for the first time processing.js will automatically be downloaded.

The download may fail, if you don't have a recent version of SWI-Prolog, or if you don't have https-support enabled. In that case manually download processing.js from http://processingjs.org/download/ and copy it to `extern/processing/processing.js`.

1.3   Running on localhost

1. Navigate to the base-directory of sld-tree-generator:

   `$ cd sld-tree-generator/`

2. Compile and run the sld-tree-generator:

   `$ swipl sld.pl`

3. Start the http-Server:

   `?- start.`

   If you don't have port 5000 available, or want to use a different port, call `?- server(Port)`, where `Port` is the port number (and do not call `?- start.`).

4. Open the web-interface at http://localhost:5000/sld/ with your favorite browser.

Note that all the files (html, js, pde and css) served by swi-prolog will be available publicly, while requests for generating sld-trees will only work from localhost.

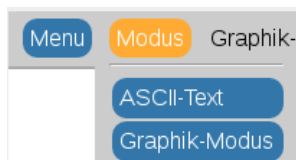# 2 Web-Interface

2.1 Graphical Elements
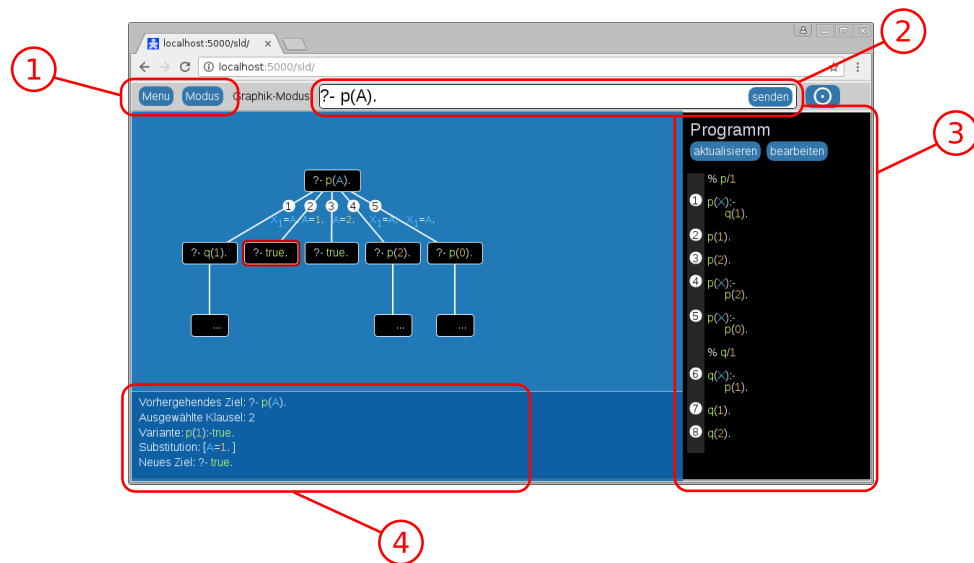
Menu

① This area offers some menu options.

- for menu 'Menu':

  - 'Einstellungen' opens the dialogue to edit settings.
  - 'Programm eingeben' opens a window to edit the program.
  - 'Debug' opens a windows with debug options.
  - 'Hilfe' opens a window with some help about the program.

- for menu 'Modus':

  - 'ASCII-Text' switches to txt-mode, to display trees using ASCII characters.
  - 'Graphik-Modus' switches to the mode for graphical output.

Input Line

② Enter a query here and click on 'senden' (engl. send) to generate a tree for this query.

Program Listing

③ This is the listing of the currently loaded prolog program. A click on 'bearbeiten' (engl. edit) opens window where you can edit your program. Clicking on 'aktualisieren' (engl. refresh) refreshes the listing.

Node Info

④ This area shows some information about the currently selected node. (s. section 2.4)

Incomplete trees

A node with the text '...' represents a not jet calculated subtree. You can double-click this node to calculate this subtree, or at least a part of it. By subsequently double-clicking '...'-nodes you will generate a larger and larger part of the complete (possibly infinit) sld-tree.
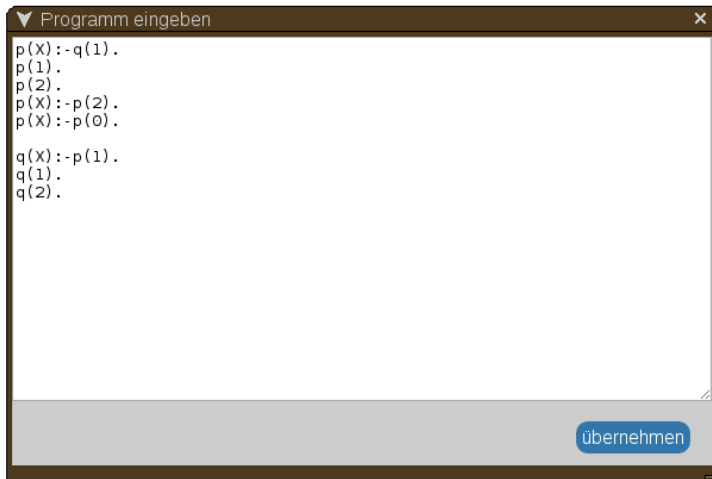
Reset Display

Click on this element to reset the zoom of the display and scroll to the selected node. This is helpful, if the tree is completely scrolled out of the view.
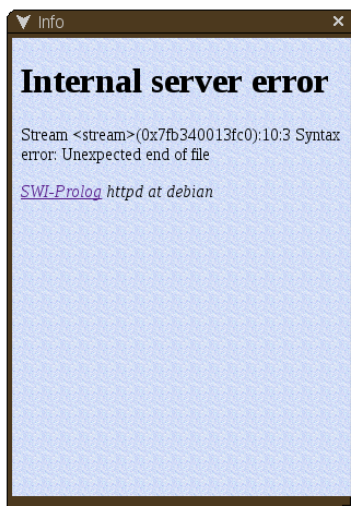
2.2 Entering a Program
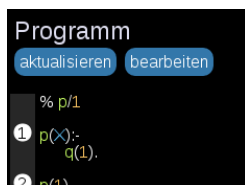
If you click on 'bearbeiten' (engl. edit) you will get the following window.

```
▼ Programm eingeben                          ✕
p(X):-q(1).
p(1).
p(2).
p(X):-p(2).
p(X):-p(0).

q(X):-p(1).
q(1).
q(2).




                                  übernehmen
```

Here you can enter (or edit) your program. When done, click on 'übernehmen' to save your changes. In case of syntax errors you will get an error message like this.

```
▼ Info                           ✕

Internal server error

Stream <stream>(0x7fb340013fc0):10:3 Syntax
error: Unexpected end of file

SWI-Prolog httpd at debian
```

2.3 Asking a Query

After you have entered your program, you can generate a sld-tree by asking a query.

```
?-                                senden
```

Just click an the input element, type your query and click on 'senden' (engl. send), to send your query to prolog.

If everything works, then the sld-tree (or a part of it) should be displayed. Otherwise you get an error message. In this case please check the syntax of your query and try it again.

## 2.4 Selecting nodes and displaying additional information

You can select a node by simply clicking on it. Or you can navigate through the sld-tree from node to node using your keyboard. Please see section 2.6 for a List of all keyboard commands. The currently selected node is marked with a red border (see image below).
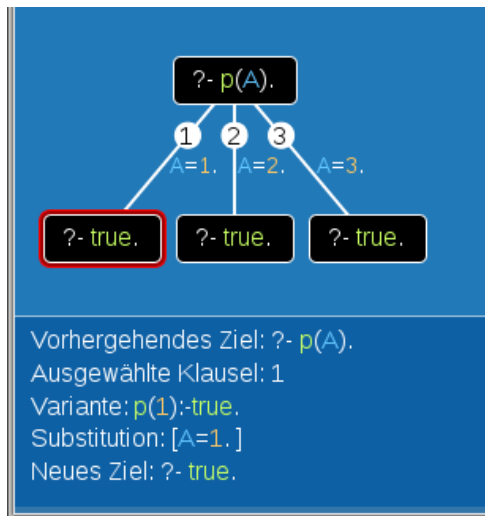
The info-area on the bottom of the window shows some information about the selected node. In the example above the leftmost leave node is selected. The following information is displayed for this node.

- 'Vorhergehendes Zeil':
  This is the previous goal. In the example it is the goal of the root node: `?- p(A)..`

- 'Ausgewählte Klausel':
  This is the number of the clause which was selected in the resolution step to reach this node. The number is also displayed in the sld-tree. In this example we have three edges created by the clauses 1, 2 and 3. The edge to the selected node is associated to clause 1.

- 'Variante':
  This is the variant of the clause used for unification. You can also look up the clause by its number within the listing on the right side. The difference between the variant and the original clause is, that variables are renamed with indexes to avoid duplicate names for different variables.

- 'Substitution':
  This is the substitution performed in the last resolution step which generated this node.

- 'Nächstes Ziel':
  This is the next goal to call after the resolution step. Successful branches end with `?- true.`

Here is another example, which also shows the answer (ger. Antwort) to a success node of the sld-tree. You can display the answer for each node by double-clicking on the node, or pressing <Enter>.
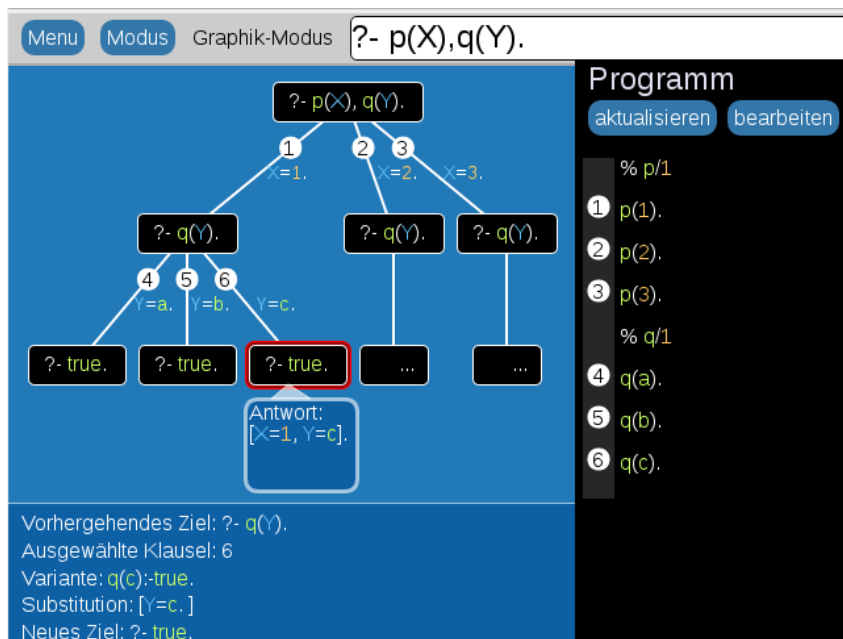
2.5 Settings

The most important option in the settings-dialogue ('Max. Tiefe (je Berechnungsschritt)') allows to change the maximum number of levels that are calculated within one calculation step. For broad trees it is recommanded to set a low limit of one or two. For smaller trees you can set a larger limit to calculate the whole tree within one calculation step.
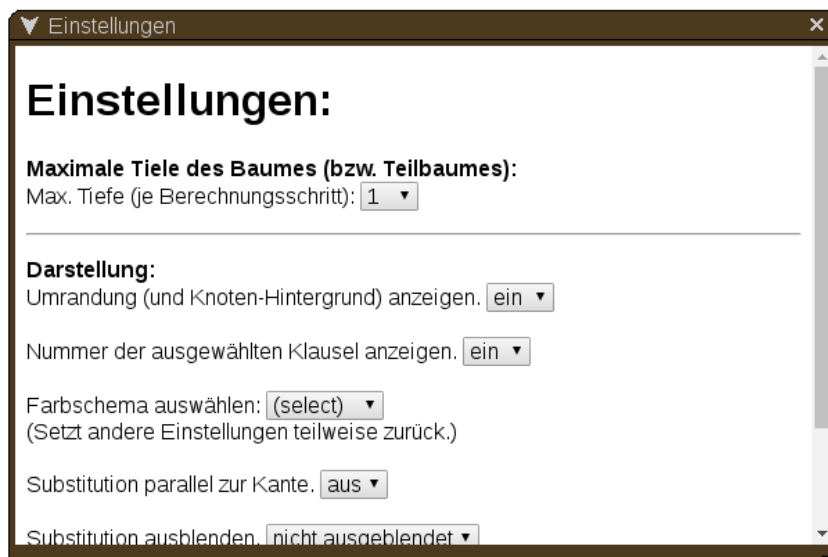
The other options manipulate style and colors of the output.

2.6 Keyboard commands

Moving from node to node

key	explanation
↑	Move from the currently selected node to its parent node.
↓	Move to the first (leftmost) child of the currently selected node.
←	Move to the left neighbor of the currently selected node.
→	Move to the right neighbor of the currently selected node.

Scrolling

key	explanation
I	Scroll upwards.
M	Scroll downwards.
J	Scroll to the left.
K	Scroll to the right.
Shift + I	Scroll upwards (in bigger steps).
Shift + M	Scroll downwards (in bigger steps).
Shift + J	Scroll to the left (in bigger steps).
Shift + K	Scroll to the right (in bigger steps).
O	Resets the scroll position.
F	Finds the selected node.
	(Scrolls the display to move the selected node into the view.)

Zooming

key	explanation
+	Zoom in.
–	Zoom out.

Manipolating trees

key	explanation
X	Removes all subtrees of the currently selected node.
C	Removes the part of the tree above the selected node.
	(cuts the upward edge)

Calculating subtrees and answers

key	explanation
Enter	If a '...'-node is selected, typing Enter or ↓ will calculate an additional part of the tree. Otherwise typing Enter will calculate and display the answer substitution correspondig to the selected node.
↑	If an upward parts of the tree has been cut away, ↑ lets you recalculate these parts.

Open dialog windows

key	explanation
H	Opens the help-dialog.
P	Opens the window for editing the program.
S	Opens the settings-dialog.

Keyboard focus

Please mind that the above keyboard commands are only working, if the graphical output area (where the tree is drawn) has the focus. Otherwise the keyboard commands are directed to the browser allowing the normal browser interaction. Click on the graphical output area to put it into the focus. You will notice a change of the color indicating the change of the focus.

2.7   Mouse interaction

All commands are for the left mouse button.

Scrolling: Press and hold the left mouse button while moving the mouse will scroll the tree.

Selecting nodes: Click on a node to select it. (Additional information of the selected node will be displayed in the info area on the bottom of the window, s. section 2.4.)

Answer: Double-click on a node to calculate and display the answer corresponding to this node.

Subtrees: Double-clicking a '...'-node will calculate an additional part of the tree.