

Documentation

OpenGPI User Guide

v0.4

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March 6, 2017

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1 Introduction

1.1 What offers OpenGPI for you?

OpenGPI (Open Generic Parameter Interface) is meant to be a generic configuration editor and was first developed for a few internal projects (HiFlow and OpenLB).¹

What does it offer for users?

Before OpenGPI was developed, users in other projects had to write configuration files by hand, without any help being provided. OpenGPI will guide you through changing your parameter settings by limiting dependent parameters to sensible ranges, offering useful informations of your parameters or eliminating nonsensical combinations. If you finished your parameter settings, you can save your changes in another XML-File. Later, you can run your executable directly in OpenGPI, using your choosen parameter settings. Start- and Stop-Buttons for your executable process are included. Since version 0.4, OpenGPI is able to compile your executable with a new Make-Button and to show your simulation files, similar to a gif. Start- and Stop-Buttons for your simulation process are also included and different simulation options has been added as well.

What does it offer for developers?

OpenGPI takes the often boring and tedious task of creating useful configuration interfaces and extracts this function in a program, thereby reducing development time. OpenGPI also supports those developers writing specifications for it with check scripts and validators to help in debugging. It has a fully specified XML Schema Description (XSD) to support it in this task, and to be extensible and easily editable with most common XML editors.

1.2 Project participants

Former Developers: Jonas Fietz, Martin Wlotzka, Uwe Zeltmann

Mathias J. Krause (active): ideas and supervision

Albert Mink (active): bug fixing, user guide

Nikita Bogutzki (active): bug fixing, runpage, user guide, web design

¹www.openlb.net

2 Compile and Execute

Support includes Ubuntu and other Debian based linux distributions. The package manager might differ from distribution to distribution.

2.1 Package Dependency

OpenGPI is written in c++ using Qt 5.

```
sudo apt-get install qt5-default qt5-qmake
```

No other dependencies are existent.

2.2 Build OpenGPI

Create the directory where OpenGPI should be build.

```
mkdir build
```

Navigate to `opengpi/build/`. The Makefile is created through qmake and is generated by:

```
qmake ../src/OpenGPI
```

Then you should have a Makefile in the directory `opengpi/build/`. Executing the Makefile is not a big deal:

```
make
```

2.3 Execute OpenGPI

Go back to your OpenGPI folder:

```
cd ..
```

Then execute OpenGPI by:

```
build/OpenGPI
```

Optionaly you can execute OpenGPI with a description file. Then OpenGPI will show up with the keypage.

```
build/OpenGPI description_example.xml
```

Now, a new OpenGPI session should be shown up.

3 How to use OpenGPI

Since you installed OpenGPI successfully we can discuss how OpenGPI is used correctly. OpenGPI is structured in different pages which have their own functionalities. The session starts with the LoadPage, where you can choose your description file. Parameter settings are made at the KeyPage, chosen settings are saved at the ExportPage and executing your program is possible at the Runpage.

3.1 LoadPage

Use the Next- and Back-buttons to navigate through OpenGPI. During your sessions you can always check your current settings with the Current-Settings-button. Figure 3.1 shows the LoadPage. At this point, you need to specify the directory where the description file should be load from. Simply edit the text entry with a path or browse for your description file with the Browse-button. Hint: Only description files with a name like

`description_*.xml`

will be accepted. Otherwise you won't be able to proceed since the Next-button will be disabled.

3.2 KeyPage

Figure 3.2 shows the KeyPage. At this point, you can change key values to your needs. On the left hand side there is a treeview, that displays the structure of your description file. On the right hand side, there is the a list with keys and an infobox. If a key is chosen, the infobox will show a short description about the chosen key. Simply change key values by doubleclick at the key area and edit the text entry. Hint: If a key has an invalid value, the key section will be lightened in red color and you won't be able to proceed since the Next-button will be disabled.

3.3 ExportPage

Figure 3.3 shows the ExportPage. At this point, you need to export your chosen settings by specifying the name (*.xml) and path where the export file should be saved. Simply edit the text entry with a path and name or browse towards your destination path with the Browse-button. Hint: If your name or path is invalid, you won't be able to proceed since your next-button will be disabled.

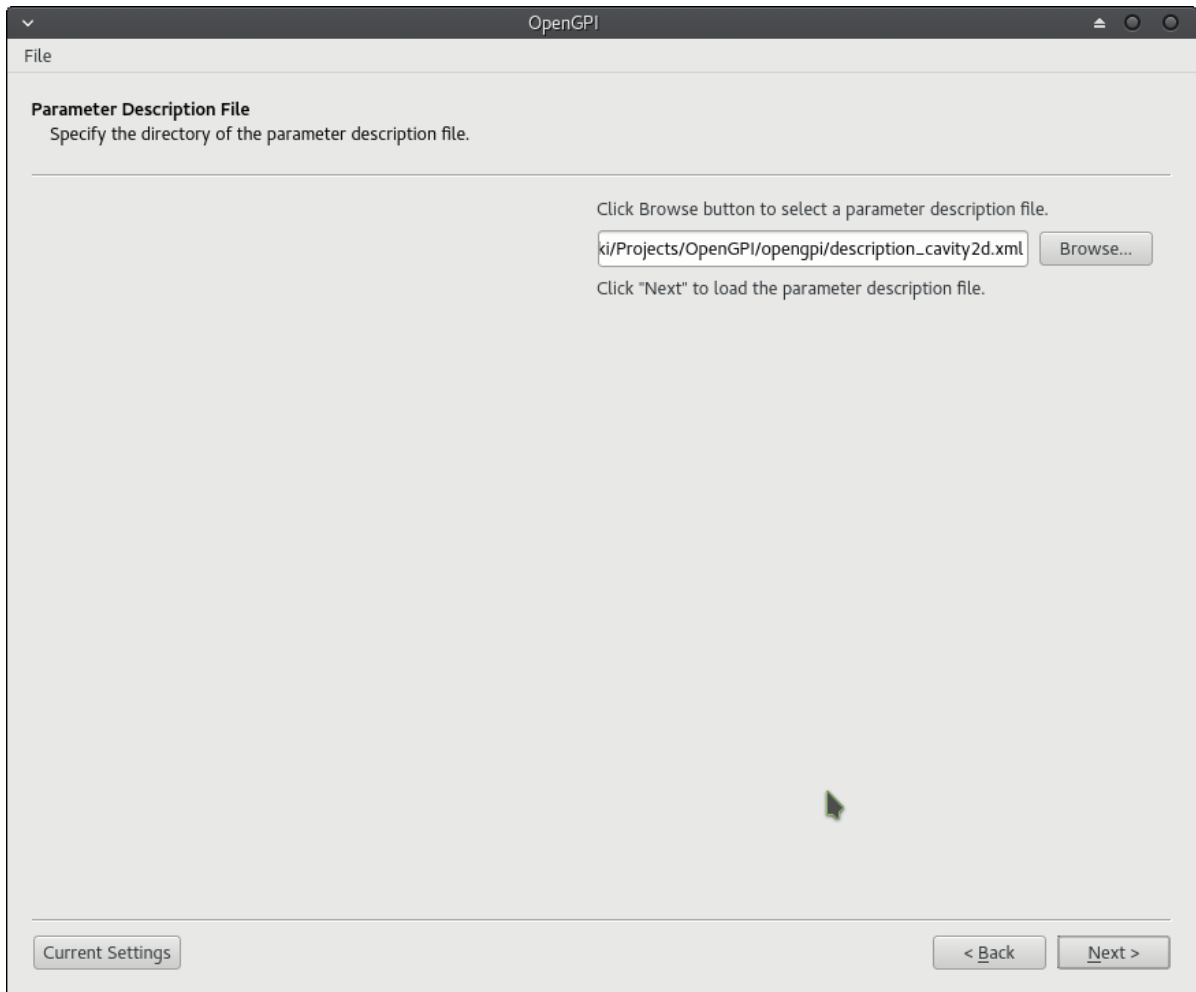


Figure 3.1: The LoadPage with a valid description file. The Next-button is enabled.

3.4 RunPage

Figure 3.4 shows the RunPage. Before running your executable, you are able to compile it comfortably by choosing the Makefile and activating the Make-button. Now, you can execute your program with your chosen settings. Simply edit the text entry with the path and name of your executable or browse after your executable with the Browse-button. Then you can execute your program by clicking the Start-button. The results of the whole procedure can be found in the text box below. If you want to stop your process, simply click the Stop-button. If you are finished with your executable, you can continue with choosing one of your simulation files by clicking the second browse-button or by typing in the absolute path. You can start the simulation process by clicking the start-button. OpenGPI will now search for images in the directory of your chosen file and show them in small time steps. The presentation order is defined by the names of your simulation files. Three options are available: "All" will show every image of your simulation folder, "Last image only" will show the latest image created by your

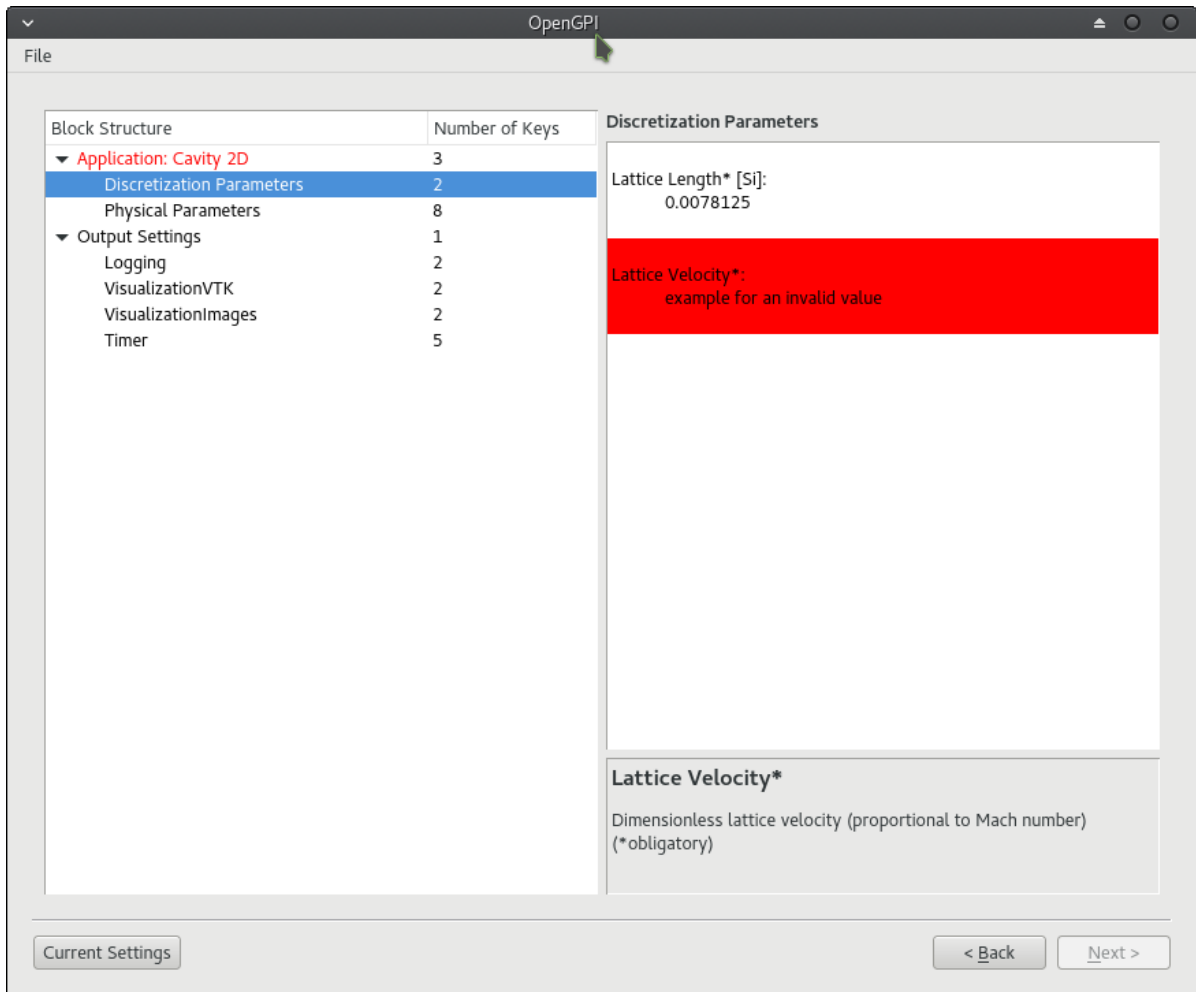


Figure 3.2: The KeyPage with an invalid key. Lattice Velocity is a decimal number and not from typ text. Therefore, the Next-button is disabled.

executable, "Selected only" will show just your chosen image. While simulating, the option box is disabled. If you want to change your current simulation setting, simply stop the simulation process and click on your wanted simulation option. For stopping the simulation process, click at the stop-button. You can end your session by clicking the finish-button. Otherwise you can load a new description file or change your settings by clicking back to the page which is needed.

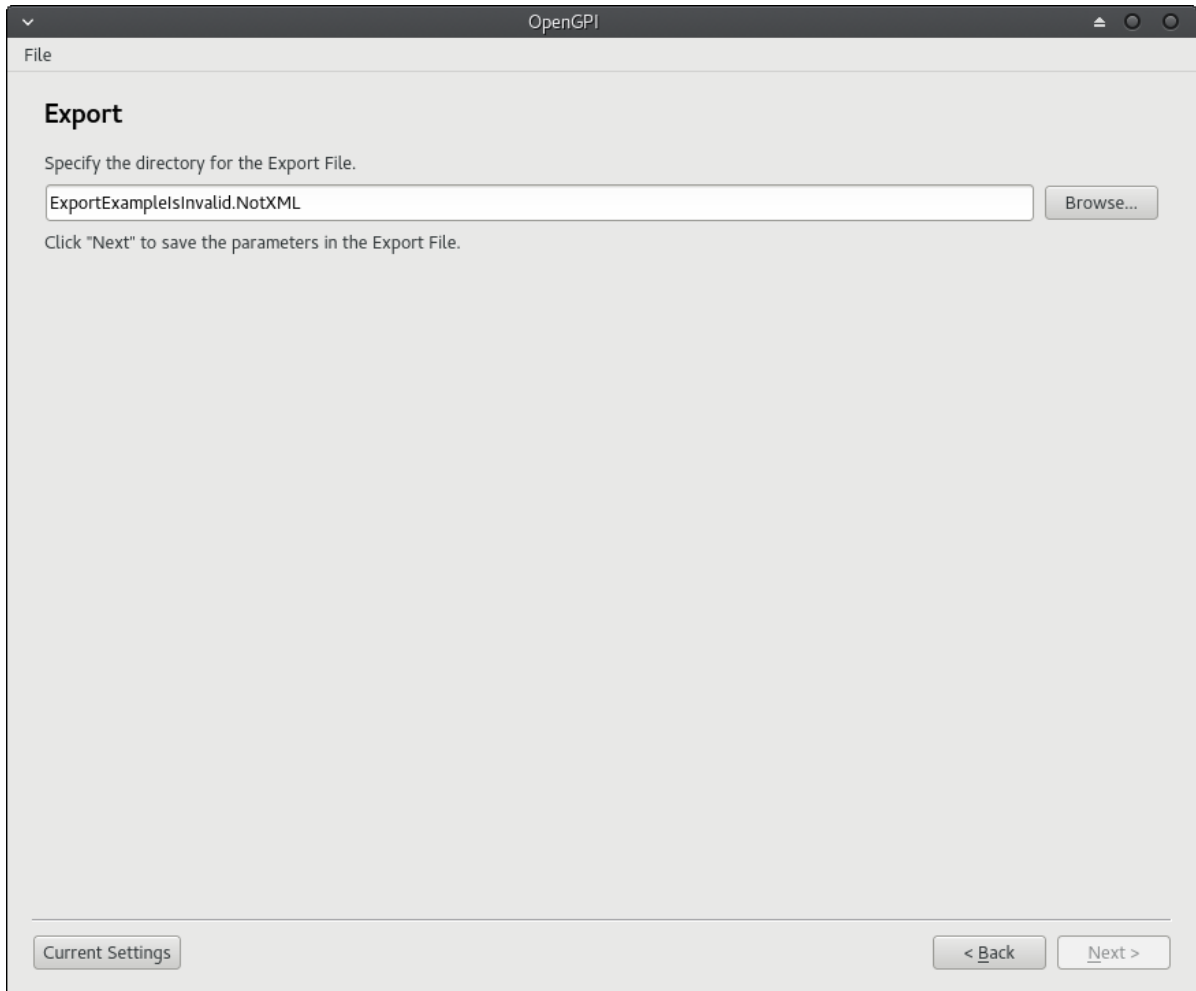


Figure 3.3: The ExportPage with an invalid path/name. The export file is not a xml file and therefore, the Next-button is disabled.

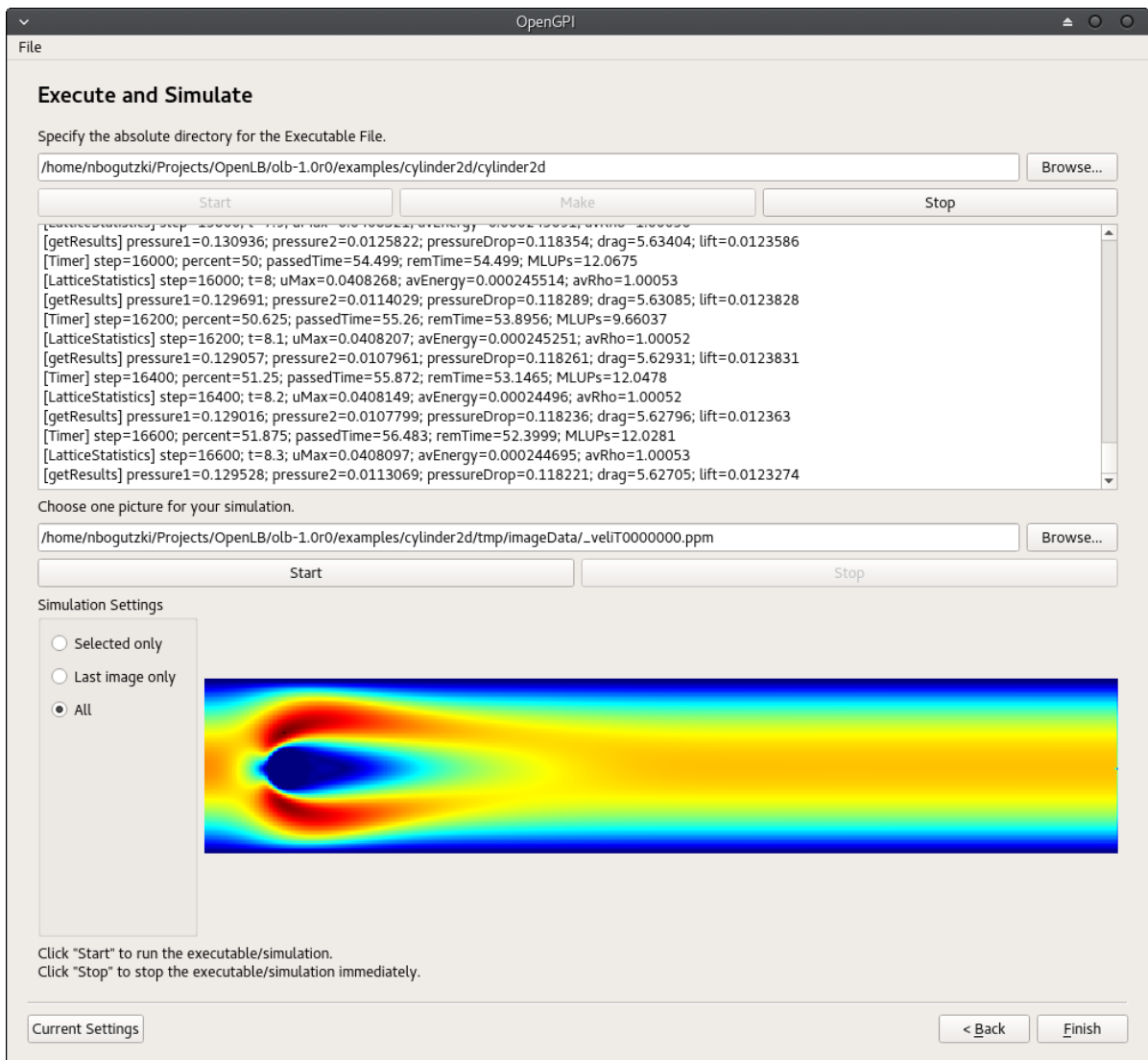


Figure 3.4: The RunPage with an already chosen executable. The process has been finished, so the results of the process are shown in the text box. Below, a simulation file has been chosen and the simulation process has been started and stopped later on. The associated images are presented. Since the simulation process isn't running, the option box is enabled.

4 How to make an XML-File

OpenGPI tries to simplify and speed up the creation of configuration editors. To enable a certain kind of flexibility, developers can write the specification for their configuration menu as a simple XML file. Using a good editor will be quite advantageous, because it can assist with autocomplete and other features.

4.1 Basic Terms

OpenGPI uses files named "descriptions" to create its interfaces. These descriptions consist of two basic elements: Blocks and keys. Blocks are just a way to organize the keys in sub-groups, similar to what is done in most configuration files today, anyway. Keys are the values which you want to edit in OpenGPI. To give you an impression of the syntax, let's look at the most basic description file we can create:

```
<?xml version="1.0"?>
<description xmlns="http://optilb.org/openlb/">
  <version>0.3</version>
  <block>
    <name>BasicBlock</name>
    <enabled>true</enabled>
    <key>
      <name>MeshFile</name>
      <enabled>true</enabled>
      <type>spinbox</type>
      <default>1</default>
    </key>
  </block>
</description>
```

4.2 Possible Tags

A tag is a keyword assigned to a piece of information, helping to structure the data. All the following elements are block elements, i.e. they contain other elements. These child

elements are listed here, each with their description following. The general structure can also be looked up in data/description.xsd.

4.2.1 description

This is the most basic block all descriptions contain. Needed children:

`<block>`

Allowed children:

`<version>` Set the string to version your description files

4.2.2 block

This element may contain other *block* or *key* elements. Needed children:

`<name>` The reference name.

Displayed, when no display name is given

`<enabled>` Decides if this block is enabled,
i.e. shown. May be 'true' or 'false'

Allowed children:

`<displayname>` The name to display for this block
other `<block>`s

`<key>` elements, see section "`<key>`"

4.2.3 key

This is the most important tag for us. Needed children:

`<name>` The name, also used to reference.

Displayed if there is no display name

`<enabled>` Decides if this key is enabled, i.e. shown.
May be 'true' or 'false'

`<type>` The type of this key.

May be 'text', 'combobox', 'spinbox', 'file', 'decimal'

`<default>` The default value for this key

Allowed children:

`<dep>` Dependencies triggered by certain values of this key

`<displayname>` The name to display for this key

`<info>` An explanation which may be provided to the user

Depending on the type, there may be additional children elements. WARNING: Compatibility between type and the children is not currently being checked by the script. Needed children for *combobox*:

`<defaultlist>` The list of default options (see `<itemlist>`)

Allowed children for *combobox*:

`<currentlist>` Depending on the current values in the defaults for all keys, you can provide an adjusted list of options to be displayed (see `<itemlist>`)

Allowed children for *spinbox*:

`<defaultmin>` Minimum to set when evaluating all dependencies
`<defaultmax>` Maximum to set when evaluating all dependencies
`<min>` Minimum value for the default settings.
Usually not needed to be applied
`<max>` Maximum value for the default settings.
Usually not needed to be applied

4.2.4 itemlist

Itemlists are used for the default- and currentlist tags. Itemlists contain *item*-tags. To enable easier reference, one may supply the attribute 'value' to the item."

`<item value="itsValue">Its display value</item>`

4.2.5 dep

Dependencies are specified for certain values in each key. Needed children:

`<value>` The value for which to execute this dependency
`<target>` Reference to the targets.
This may have arbitrarily many

4.2.6 target

Depending on the action, the target tag may contain only a *targetblock*, or an additional *targetkey*. It also contains an *action*. For all actions except "enableblock", a *targetkey* is needed.

4.2.7 action

This tag may contain one of each of the following:

`<enableblock>` This will enable a block
`<enablekey>` This will enable a key
`<setvalue>` Set the key to this value
`<setmin>` Set the minimum for this key to this value
`<setmax>` Set the maximum for this key to this value
`<insertitems>` Add these items to the option list
`<removeitems>` Remove these items from the option list

Be careful that for one target, you only specify either insertitems or removeitems. Specifying both does not have a specified behaviour, and the implemented one may change.

4.2.8 default

If you want to create a key which should be obligatory, then create a default value. The key will be lightened red if its value is empty.

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