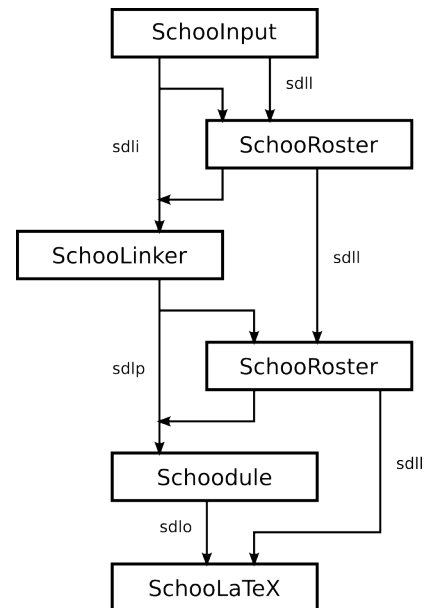# Schoodule manual

Schoodule is a set of programs to create schedules for schools. It is mainly meant for the Flemish educational system but it might be useful for other systems as well. It is written in java so you will need the latest java runtime environment to run it. All the file formats are in XML and the output can be converted to LaTeX format, from which you can generate a pdf. You can download LaTeX here.

Work flow

Schoodule consists of five programs: SchooInput, SchooLinker, SchooRoster, Schoodule and SchooLaTeX. These programs need to be used in a particular order as shown in the diagram. SchooInput generates two files: an input file (*.sdli) and a layout file (*.sdll). SchooLinker can open an input file and generates a puzzle file (*.sdlp). SchooRoster can work with input or puzzle files and also needs the layout file. Schoodule has the puzzle file as input and an output file (*.sdlo) as output. Finally SchooLaTeX takes the output file and the layout file and generates a LaTeX file (*.tex). With this LaTeX file you can generate a pdf.

Functionality of each program

With SchooInput you define the actors, rooms and subjects. Actors are generally classes or teachers but they can also represent other entities that have a roster, for example the cleaning lady. You also define the roster template with this program, so you can set how many days and hours per day there are. Finally you define which information gets put in the output rosters with the slot layout.

With SchooLinker you create links between the actors or rooms and the subjects. So you use this program to define which classes follow which subjects and which teachers teach them.

With SchooRoster you can partially fill in the rosters. If you open an input file you can only reserve free places in the roster or add text elements to the roster. This can be used to fill in things that aren't subjects. If you open a puzzle file you can also fill in subjects.

Schoodule is used to do the actual generation of the rosters. This is a completely automated process, so you just have to sit back and wait until the program is finished.

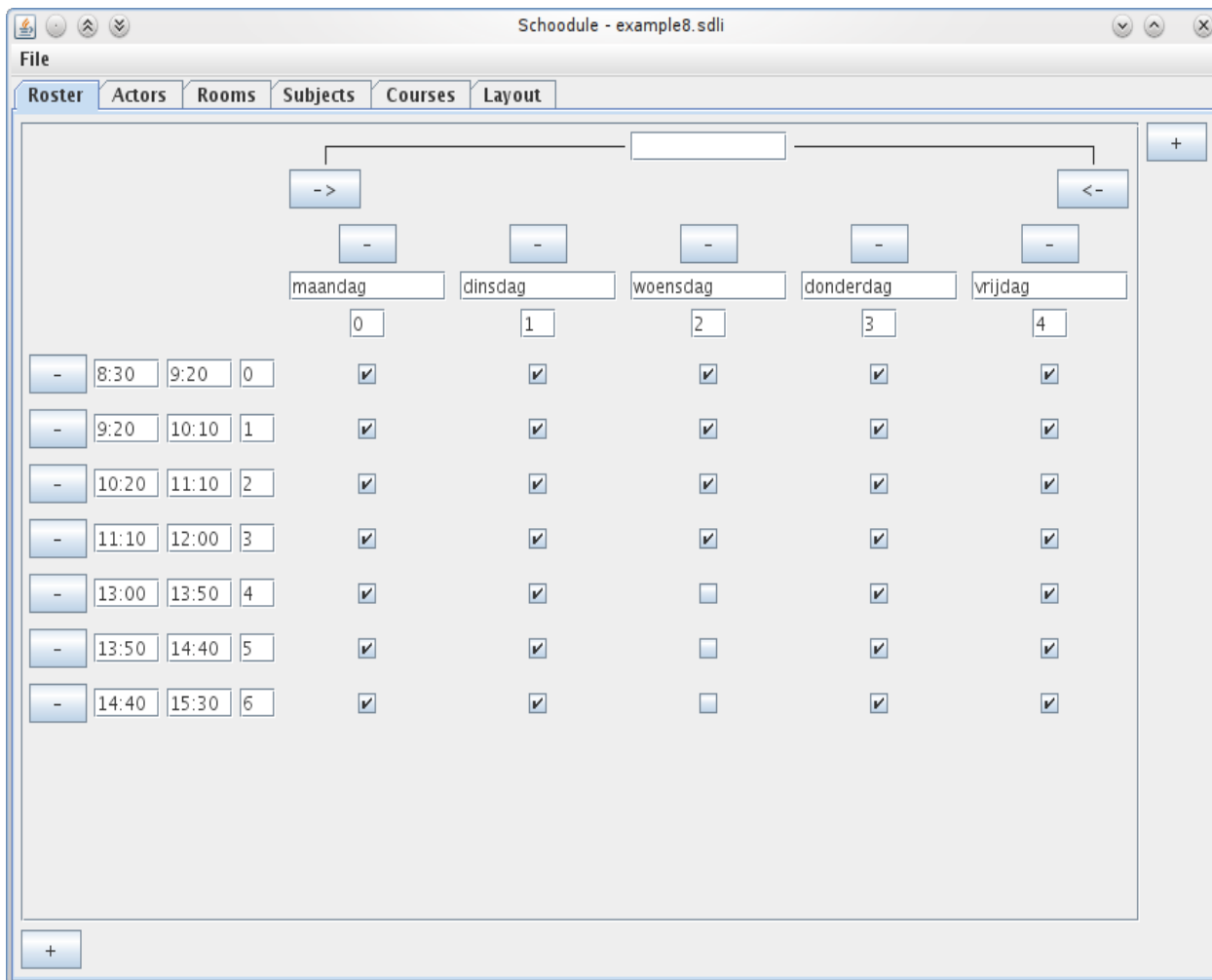Finally SchooLaTeX is used to create a LaTeX file, which you can convert to the pdf format.

SchooInput

Roster template

Your first task is to create the roster template. This is done with the tab shown below.

You add days by clicking on the "+" button on the right. To remove a day you can click on the "-" button above the day. You need to fill in the name of the day, you can do this with the text box below the "-" button. The index gets assigned automatically.

You add slots (hours) by clicking on the "+" button at the bottom. To remove a slot you can click on the "-" button at the left. The three text boxes at the start of each slot are used to fill in the start times, end times and indices. For advanced usages you can skip an index (see the Subjects section), note however that the indices must be assigned sequentially.

With the check boxes you can leave out slots for certain days. In the image above all the slots for Wednesday afternoon are left out.

At the top of the roster template there are some controls to split up the roster in two or more weeks. If you do this each week will get its own page in the output of SchooLaTeX. To add a week simply click the arrow buttons at the top to move the start or end of the week, a new week will be added automatically if needed. You can also fill in the name of the week with the text box at the top. This name will be shown next to the roster owner in the output.
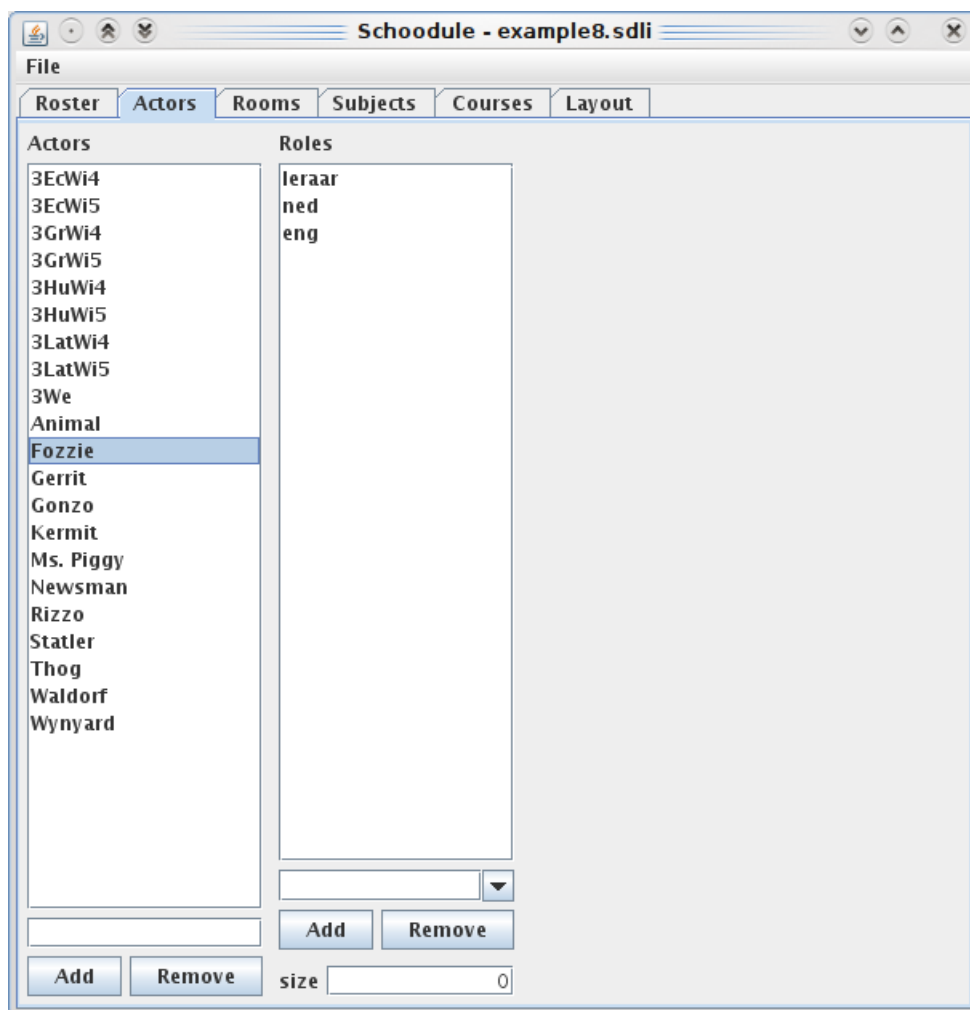
Actors

Actors are used to represent the teachers and classes (or class groups). Schoodule will generate a roster for each actor. Each actor has a name that has to be unique. You enter the name with the text box at the bottom left, after that you can click "Add" or press enter to add the actor to the list. To remove an actor, select him in the list and click the "Remove" button.

To edit the properties of an actor you must select him in the list.

You can give the actor a number of roles. These are used to filter the actors in SchooLinker and in

the slot layout. For the slot layout it is probably useful to give the classes a role "class" and the teachers a role "teacher". For SchooLinker it is useful to give the teachers a role for each subject they teach and the classes a role with their grade number. Note that roles may not contain spaces.

To add a role to an actor you need to type it in, in the box at the bottom right (above the "Add" and "Remove" buttons). This box supports auto complete so the text that you type will be completed with suggestions from roles you have previously used.

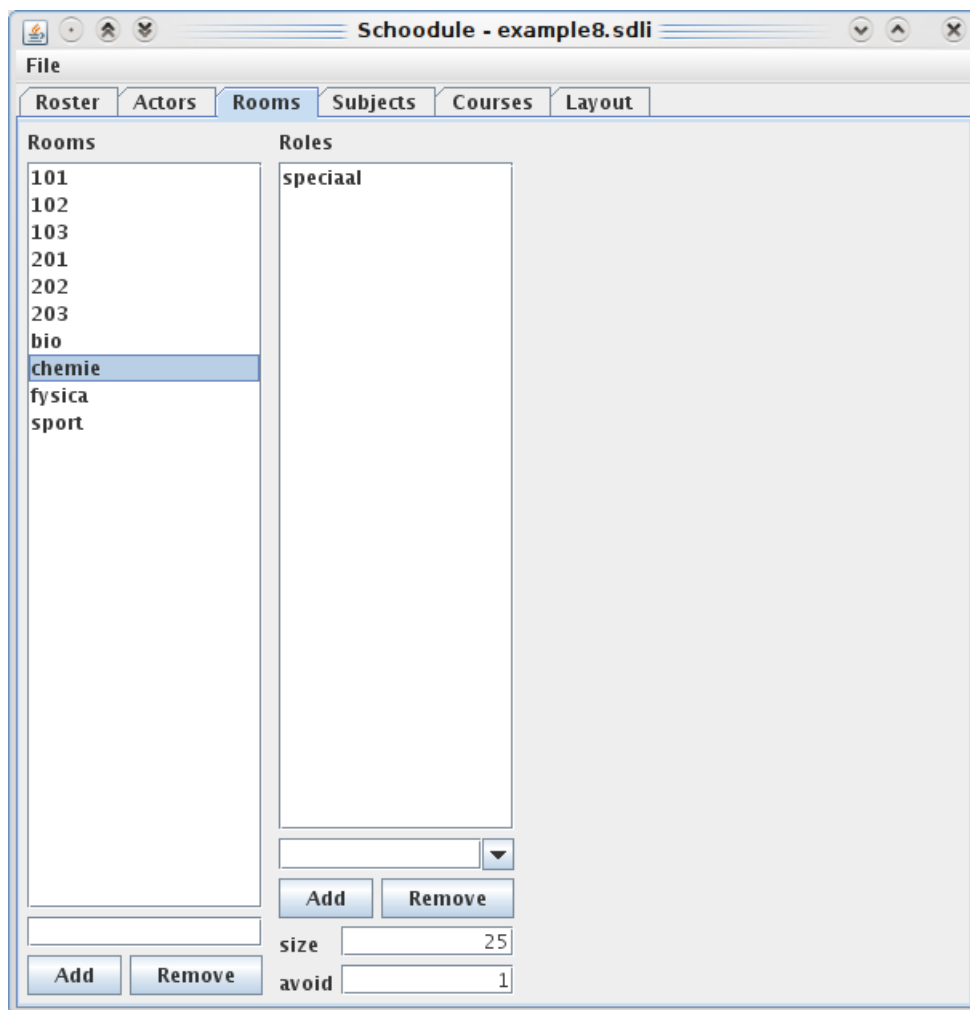To remove a role, select it from the list and click the "Remove" button.

You can also set the size of the actor with the text box at the bottom right. This is only needed for classes and represents the number of students in the class. It is used when assigning rooms so that the number of students always fits the number of places in the room. For teachers this is best left zero as they don't fill a place in the room.

Rooms

Schoodule will generate a roster for each room defined here. You can define regular rooms that will be assigned to subjects by Schoodule or you can define special rooms (like a physics room) that you can link with a subject with SchooLinker. If you do the latter that subject will always be thought in that room. If you don't define any rooms Schoodule will still work except that there won't be any room assignments.

To add a room you need to fill in the name in the text box at the bottom left and then click the

"Add" button. To remove a room, select it from the list and click "Remove". To edit the room properties select it from the list.

You can assign roles to a room in the same way as you did with the actors. These roles are only used by SchooLinker. Since a subject has only one room there is no need to filter them in the slot layout.
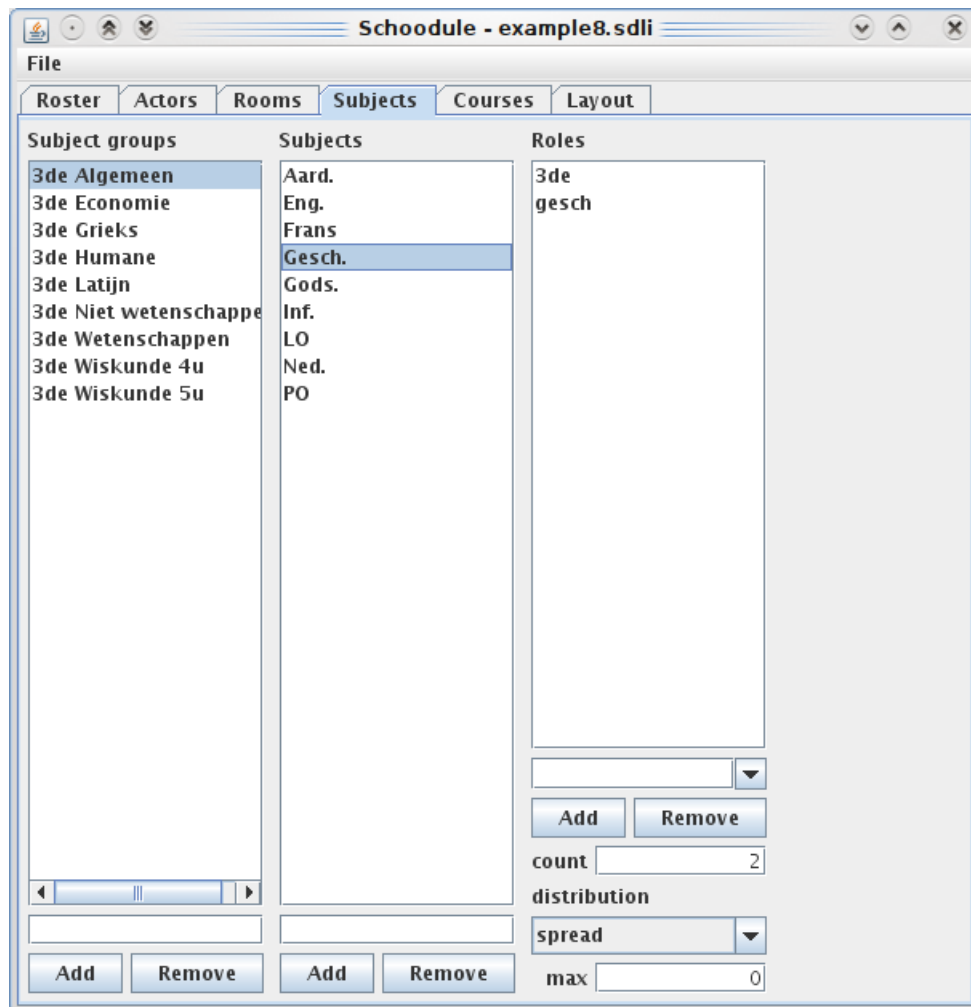
You also need to set the size of the room. You do this with the first text box at the bottom right. The size represents the number of places in a room.

Finally you can set the avoid factor with the second text box at the bottom right. This is used for rooms that have a special purpose like the physics room. By choosing an avoid factor higher than zero that room won't be used when Schoodule assigns the rooms unless there is no other choice. If you have a gym and a physics room it is best that you give the gym an avoid factor of 2 and the physics room 1. This way the physics room will be chosen if they are the only two options.

Subjects

Subjects are grouped in subject groups. Later on these subject groups are combined to form courses. This is done to avoid duplicate work. It is best that you put all the subjects, that are thought to all the students of a certain grade, in one subject group. Then you only need to create extra subject groups for the subjects that are only thought to some students.

To add a subject group, fill in the name at the bottom left and click "Add". To remove it, select it from the list and click "Remove".

To add subjects to a group, first select the subject group, then fill in the subject name below in the middle, finally click "Add". To remove a subject, select it and click on the "Remove" button.

When you select a subject you can add roles to it in the same way as with actors and rooms. These are again used by SchooLinker. It is a good idea to set the subject itself as a role. This might appear strange but if you use the same tag as with the teachers you can easily filter both of them in SchooLinker.

You can also set some properties for the subject. First there is the count. This determines the number of times a subject is thought in a week. If the count is greater then one you can also set the distribution. The values are spread if the subject is to be spread out over the week and group if the subject is to be grouped together in blocks. If you choose group as distribution, you can set the maximum size of the blocks with the max field. If max is 0, there is no maximum.
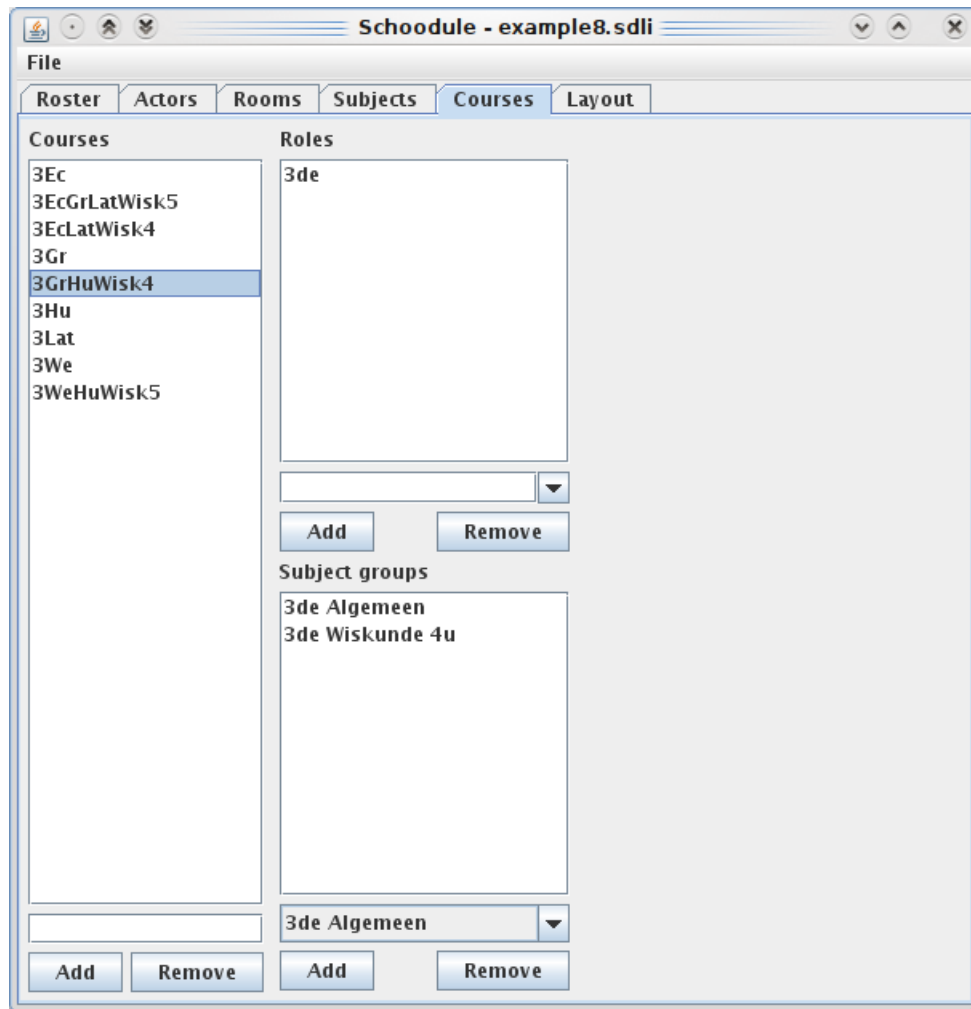
It might also be useful if subjects aren't grouped together over a break. To do this you must skip an index for the slots in the roster template. So for example, if there is a break after slot 3, just give the slot after that index 5 and subjects will not be grouped together over those two slots.

Courses

Courses consist of a number of subject groups. For each course all the subjects in the groups will be dublicated, so if a subject group appears in two courses those subjects will be thought twice.

To add a course, give it a name in the bottom left text box and click the "Add" button. To remove a

course, select it from the list and click the "Remove" button.

Courses can also have roles, just as actors, rooms and subjects. It is probably useful to give a course a role with the grade number it is to be thought in.
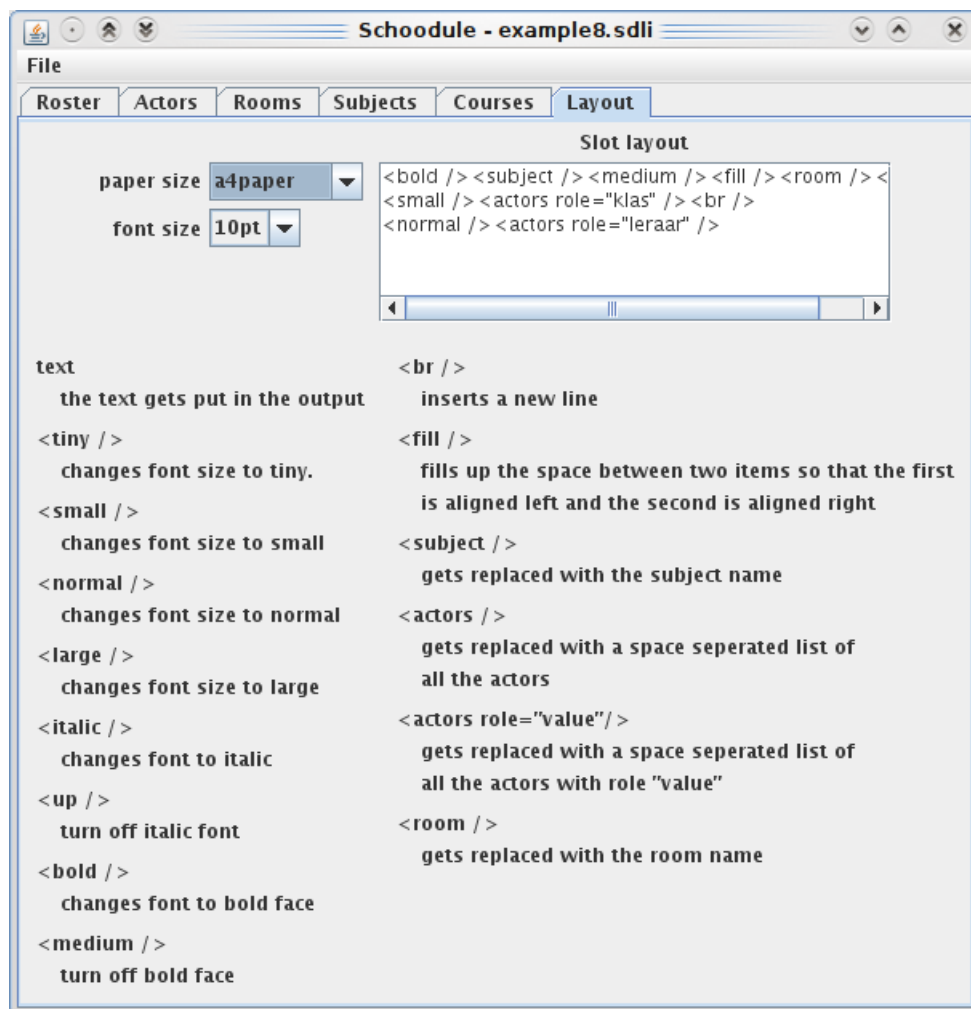
To add a subject group to a course select it from the box at the bottom right and click "Add". To remove a subject group, select it from the list and click "Remove".

Layout

With the layout tab you can set the slot layout, additionally you can choose the paper size and the font size. For the slot layout you can use several elements that are explained below.

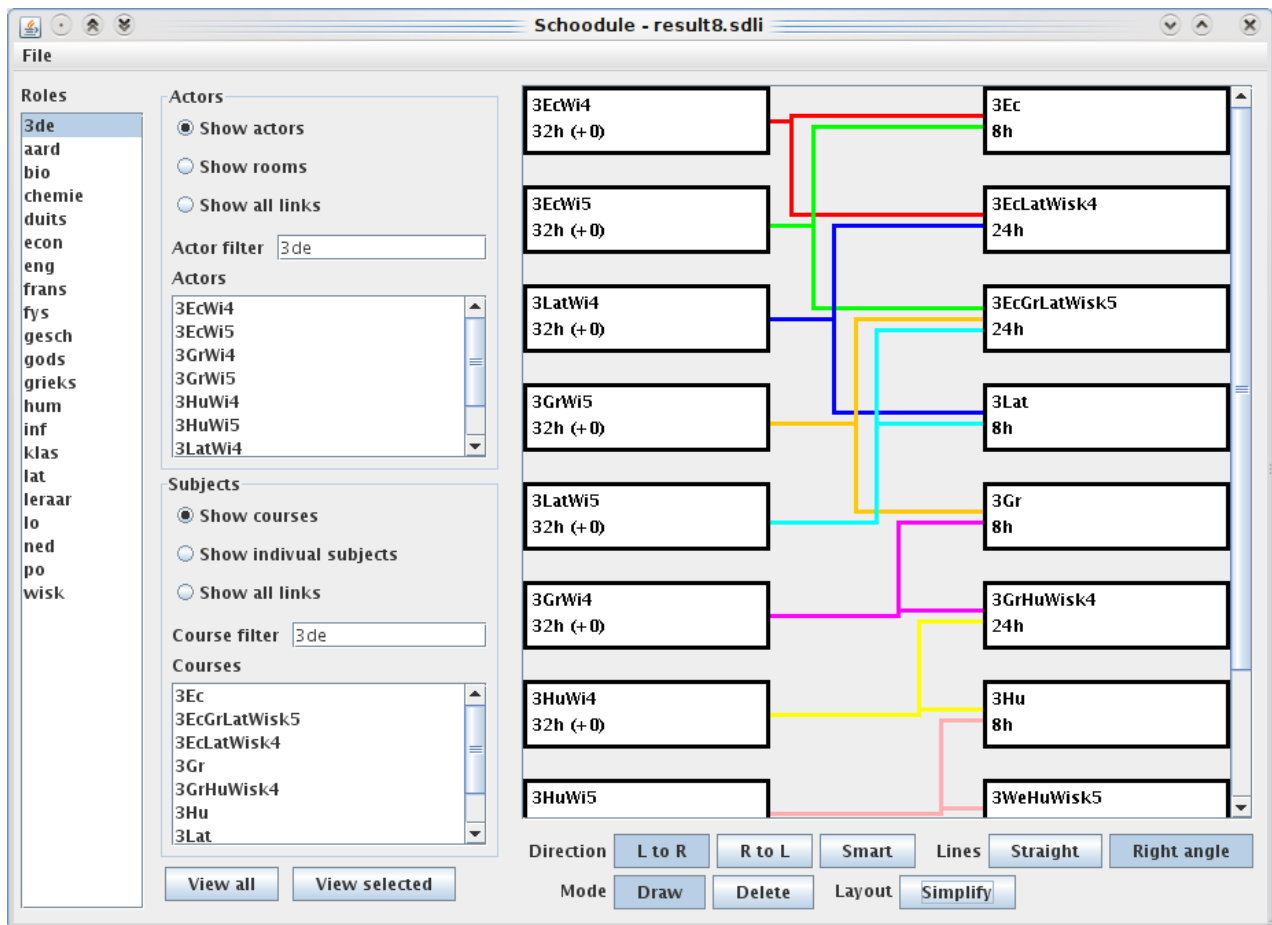| Tag	Meaning
Text	The text gets put in the output.
<tiny />	Changes the font size to tiny.
<small />	Changes the font size to small.
<normal />	Changes the font size to normal.
<large />	Changes the font size to large.
<italic />	Sets the font to italic.

Tag	Meaning
<up />	Turns off italic font.
<bold />	Sets the font to bold face.
<medium />	Turns off bold face.
 	Inserts a new line.
<fill />	Fills up the space between two items so that the first is aligned left and the second is aligned right.
<subject />	Gets replaced with the subject name.
<actors />	Gets replaced with a space separated list of all the actors.
<actors role="value" />	Gets replaced with a space separated list of all the actors with role "value".
<room />	Gets replaced with the room name.

SchooLinker

With SchooLinker you create the links between the actors (or rooms) and the subjects that you created with SchooInput. The program consists of three parts. At the left you have a list with all the roles. Besides that you have the control panel, with this you can set which actors (or rooms) and

which subject are to be shown. At the right you have the link panel where you create the links and below that is the view options panel that you use to alter the view of the links panel.

Control panel

The control panel consists of two parts, at the top you can choose which actors or rooms are shown, at the bottom you choose which subjects are shown.

At the top you can choose between "Show actors" or "Show rooms". These will be shown at the left side of the links panel. With the "Actor filter" you can filter based on roles. If you click on a role in the roles list it will automatically be filled in in both the actor and course filters. You can also use "and" and "or" in these filters.

At the bottom you can select if the courses or the individual subjects are shown. It is best that you show the courses when linking with classes and show individual subjects when linking with teachers.

Finally you need to click "View all" to show all the filtered elements in the links panel. You can also use "View selected" to only show the elements that you have selected from the two lists. You can select multiple elements by holding down the ctrl key while clicking on an item.

The actors and subjects part also both have an option to "Show all links". If you choose this option all the linked items from the other side will be shown regardless of the filter or the selection. This is useful to review everything after you created all the links.

Links panel

You create links by clicking on an element and dragging (hold down the mouse button) to an

element at the other side. If you move the mouse at the top or bottom of the panel while dragging, the view will scroll automatically. To delete a link switch the mode to delete at the bottom and click on the link.

You can change the view of the links panel at the bottom. With the direction you can set if the lines are drawn from left to right, from right to left or smart. If you use smart the direction will be chosen so that a minimum of colors has to be used. With the lines you can set if the lines should be straight or with right angles. Finally you can simplify the layout, this rearranges the elements so that a minimum of lines cross each other.

Export puzzle file

When you created all the links you have to export the puzzle file. You can do this with the option "Export to puzzle file …" in the file menu. When you do this the program will perform a couple of checks to see if the puzzle file is solveable.
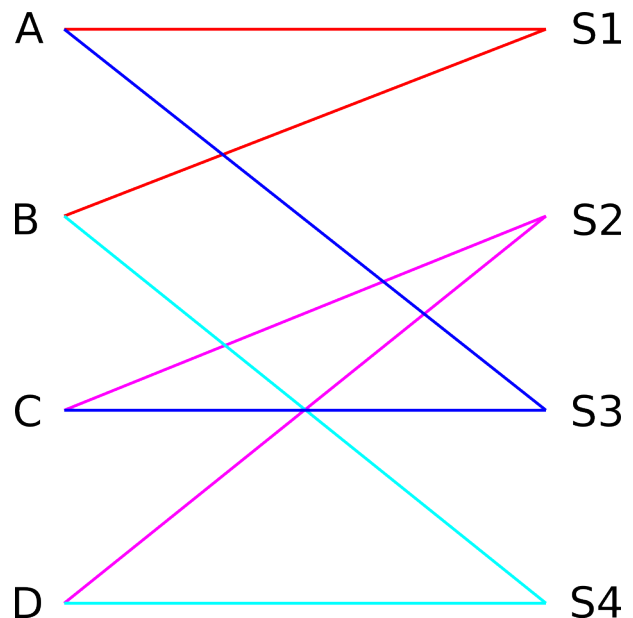
There is a check to see if no actors have more subjects linked then there are slots available.

Then it is checked if no actors or subject remain unlinked.

The last two checks have to do with cluster sizes. When you have 4 actors A, B, C and D and 4 subjects S1, S2, S3 and S4 that are linked as follows. A and B are linked with S1, C and D are linked with S2, A and C are linked with S3 and B and D are linked with S4. Then S1 and S2 form a cluster because they have to be thought parallel to each other. And S3 and S4 form a cluster.

The first cluster check is to see if the total count of the subjects in all the cluster groups isn't greater than the available slots.

The second cluster check is to see if an actor hasn't has more subjects linked within one cluster then the size of the cluster.
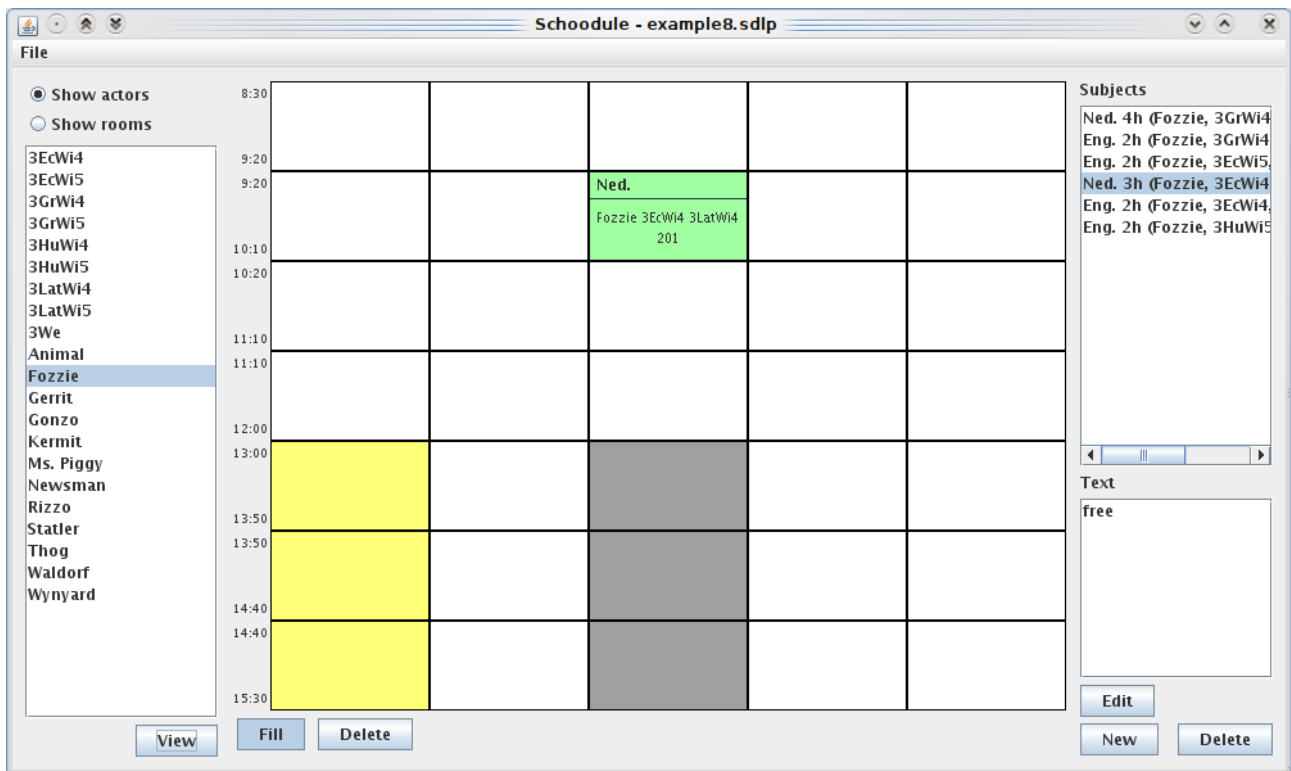
SchooRoster

With SchooRoster you can partially fill in the rosters. You can open puzzle or input files. If you open an input file however, you can't assign subjects to the roster.

The program has three parts. At the left you have a list with all the actors or rooms. In the middle you get the roster and at the right you have two lists with elements that can be assigned to the roster. At the top you have the subjects and below that you have text elements.

To edit a roster you have to select it from the list at the left and then click the "View" button below that list. You can add elements to the roster by dragging them from one of the lists at the right to one of the slots in the middle. If you assign a subject to a slot you will be asked to choose a room for that subject. To delete a subject you have to set the roster to "Delete" mode at the bottom and then simply click on the slot you want to clear.

If you want to add text elements you first have to create them. You do this with the "New" button at the bottom right. You have to give the element a tag and a text. Note that the tag may not start with "sbj". The text gets put in the output roster. You can use the following elements in the text:

Tag	Meaning
Text	The text gets put in the output.
<tiny />	Changes the font size to tiny.
<small />	Changes the font size to small.
<normal />	Changes the font size to normal.
<large />	Changes the font size to large.
<italic />	Sets the font to italic.
<up />	Turns off italic font.
<bold />	Sets the font to bold face.
<medium />	Turns off bold face.
 	Inserts a new line.
<fill />	Fills up the space between two items so that the first is aligned left and the second is aligned right.

There also is a special text element "free". If you use this, the slot in the output roster will be grayed out. You can use this to give teachers a free day.

Schoodule

You are now ready to run Schoodule and generate the rosters. Schoodule doesn't have a GUI however, so you will have to use the command prompt to run it. If you have never used a command prompt before you can read the next section to get you started.

Working with the command prompt

The easiest way to open the command prompt is by opening the run command dialog (click start and then run) and typing "cmd". Alternatively you can open the command prompt in the "Accessories" menu in the start menu.

When you open the command prompt you see a line with the following text. This is the folder you are currently working in.

```
C:\documents and settings\gerrit>
```

To view the contents of this folder use the "dir" command and press enter.

```
C:\documents and settings\gerrit>dir
```

To navigate to a folder use "cd folder", to go up one folder (navigate back) type "cd .." and press enter.

```
C:\documents and settings\gerrit> cd "My Documents"
C:\documents and settings\gerrit\My Documents>cd..
```

Running Schoodule

First you have to navigate to the folder where Schoodule is installed (replace the path below with the actual path).

```
cd C:\path\to\Schoodule
```

Once you're in this folder type the following to run Schoodule:

```
java -jar Schoodule.jar inputFile.sdlp outputFile.sdlo
```

In this command you need to replace inputFile with the name of your input file (eg. example8.sdlp) and outputFile with the filename where you want to store the output. When Schoodule runs you see a progress bar that indicates how many subjects are assigned. The program also reports the number of steps it takes to add a subject, this is the number of assigned subjects that may be moved when adding a new one. The default value is 2. As this number increases the time it takes to add a subject increases exponentially. When all the subjects are assigned you get a second progress bar that shows how many rooms are assigned.

You can also pass some options to Schoodule. To set the number of steps it may take to add a subject use the option -n=<integer> or --nbSteps=<integer>. For the number of steps it may take to assign a room there is the room factor option, this is a floating point number between 0,0 and 1,0. With a value of 0,0 it may only take 1 step to assign a room, with a value of 1,0 the number of steps equals the number of rooms. You set this option with -r=<float> or --roomFactor=<float>. You can also set that the program may use multiple threads with the option -m=<integer> or --multiThreaded=<integer>. Set this option to the number of processors or cores in your computer. Finally you can turn on extra debug information with the option -d or --debug.

```
java -jar Schoodule.jar -n=3 -r=0.5 -m=2 -d inputFile.sdlp
outputFile.sdlo
```

In the command above the number of steps equals 3, the room factor is 0,5, the program uses 2 threads and the debug information is turned on.

SchooLaTeX

Before you can convert the output of SchooLaTeX to pdf you first need to install the proTeXt package (this contains LaTeX). You can download proTeXt here. When you start the proTeXt installer first it will extract all the files and then it will open a pdf. Scroll to page 8 of this pdf and click on the link "Click here to install MiKTEX" to continue the installation process.

To run SchooLaTeX type the following in the command prompt:

```
java -jar SchooLaTeX.jar layoutFile.sdll inputFile.sdlo
```

In this command you need to replace layoutFile with your layout file which was generated by SchooInput (eg. example8.sdll) and inputFile with the output of the Schoodule command. The command will generate the file inputFile.tex, which you can convert to a pdf with the following command (don't put the ".tex" in the command):

```
pdflatex inputFile
```

For SchooLaTeX you can also set two options. First you have the version text. This text is put at the bottom of each roster. It might be a good idea to use the date that the schedules where generated as the version text. This way you can easily distinguish the rosters when you generate a new version for the same school year. You set the option as follows -v=<text> or --version=<text>.

The other option is -f or --fixed. With this you set that the height of each slot in the roster is the same and not proportionate to the duration of the slot. The breaks in the roster will be represented by a double line instead of a gray area whose height is proportionate to the duration of the break.

```
java -jar SchooLaTeX.jar -v="01/09/11" -f layoutFile.sdll
inputFile.sdlo
```

In the command above the version text is set to "01/09/11" and the fixed option is turned on.

Special usage

Cleaning lady

To clean a room it has to be free. The best way to make sure that all the rooms are free during on period of the week is the following. Create an actor called "cleaning lady" and give her the teacher role. Create a subject group called "cleaning" that has a subject of one period for each room that has to be cleaned. Finally create a course that holds this subject group.

Then you link the cleaning lady with the course and each room with one of the individual subjects. If you do this the cleaning lady will get a roster with all the rooms she has to clean. Note that if there are more rooms than there are slots available in the roster, you will need two cleaning ladies, two subject groups and two courses.