How to open a local electronics laboratory for remote access
Part 3

Administration and experiment start up
I will start with how to log in and start an experiment and then discuss what must be made to prepare labs.
As we saw in part 1, the VISIR laboratories are composed of four distinct parts – Experiment client, Web Interface, database, and lab equipment. The Equipment Server hosts the instruments in the electronics laboratory.

The Web Interface manages resources and keeps track of when and by whom the laboratory is used. Now we will concentrate on the web interface.
Before the Internet appeared a scheduled supervised lab session took always place in a local laboratory where the students performed a number of experiments described in a lab instruction manual using the workbenches and a Component Set delivered by the instructor. The components of the Component Set are listed in the bill of materials of the lab instruction manual. Using an online workbench it is possible to move the lab sessions into a computer room or the students as well as the instructor can be scattered all over the globe.
Main actors in the VISIR laboratory

- The head of the BTH Open laboratories maintains the software distribution and authorizes administrators.
- An administrator creates rules for the virtual instructor, inputs basic course data and authorizes a teacher for each course.
- The teacher in charge of a course schedules lab sessions, defines component sets, and authorizes students enrolled.
- Authorized students are entitled to perform experiments in their courses.
- Guests are entitled to perform experiments when there is free time in the laboratory.

The head of the BTH Open Laboratories is the manager of the laboratory. He or she authorizes administrators and guaranties together with laboratory staff that the laboratory is up and running.

The teacher schedules lab sessions or other events of a course he or she will be teaching. S/he authorizes students who are enrolled in the course to make seat reservations and to participate in the lab sessions or other events of the course. The teacher must create rules for the virtual instructor for each experiment of the labs. If such rules are missing for an experiment and there are no other applicable rules made for other experiments this experiment can not be performed.

Students that are enrolled in a course are entitled to participate in the lab sessions of that course. However they have to make seat reservations. They are also entitled to perform experiments on their own or together with others before the course ends. Distant students can work together using appropriate communication means. Students can also make time reservations for future own experiments. However such reservations have lower priority than reservations made by teachers.

All labs are accessible to guests when there are free time in the laboratory. The laboratory schedule is also accessible but no time reservations are permitted. Only a special lab course describing a few experiments are available for guests.
Everybody who wants to perform experiments in the laboratory needs to log in. In the next few slides I will demonstrate how a student enrolled in a course starts up an experiment.
The student logs on. The user id. and user type are stored in the database.
Now I am logged in as a student. A student can only see the courses s/he is enrolled in.
“My reservations” lists future time reservations I have made. When such a time reservation occurs it will be moved to “My ongoing reservations”.
When I select the “Start Experimenting” link in the preceding slide the web browser reads an HTML page containing the experiment client module as an embedded object.
Now the virtual breadboard is displayed on the client computer screen. The lab sessions defined for the course are listed under the heading of “Prepared experiments”.

The heading “Prepared experiments” requires an explanation. The goal of the research is to create a workbench that mimics the workbench in an local laboratory for electrical experiments where students perform experiments described in lab instruction manuals during a supervised lab session using components originating from a supplied set. In principle it would be possible for a lab instructor not only to deliver a component set to each workbench in a local laboratory but to wire a circuit or parts of a circuit on the breadboards of the workbenches before a lab session starts. This possibility is seldom used because it would require extra working hours for the instructor. However, the VISIR platform supports such prepared experiments without extra hours for the instructor. Thus the heading “Prepared experiments” indicates the list could be more than a list of labs.
When the student selects a lab the component set belonging to that lab is displayed and the student can start experimenting using the lab instruction manual. The virtual breadboard emulates a detachable one. A circuit can be saved and restored using the save/load buttons.
A course will not be visible for others than administrators before the start and after the end.
Adding a course

OpenLabs Electronics Laboratory

Edit course

<table>
<thead>
<tr>
<th>Name</th>
<th>Example course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>2009-10-01</td>
</tr>
<tr>
<td>End</td>
<td>2009-11-01</td>
</tr>
<tr>
<td>Max Users</td>
<td>10</td>
</tr>
</tbody>
</table>

Add
This form will be displayed when you click on the course name in the course list. Here it is possible to update course data or to remove the course and to add teachers.
All users listed in the “User” frame are entitled to perform experiments of the labs of the course. Thus students added will show up in the “User” list.
Adding students

- E-Mail: student1@bth.se
- Student name and email addresses are listed:
  - student1@bth.se
  - student2@bth.se
  - student3@bth.se
  - student4@bth.se
  - student5@bth.se
  - student6@bth.se

- User Type: Student

Separate multiple users by newline

Add button
Usually there are a number of labs in each course. A lab instruction manual and a component set belong to each lab. The lab instruction manuals are not stored in the laboratory. Use the link “Start client in teacher mode” to create the component set of the lab. How to create this set will be shown in the next slide.

The “Experiment File” contains either a Component Set or a prepared circuit.
By clicking the + sign in the lower right corner of the component box the Component Library is displayed. The Component Library contains a description of each component defined for the VISIR platform. The description includes a photo of the component. The Component Library is a part of the VISIR open source distribution. All members of the VISIR group are welcome to add new components.

The teacher is supposed to create a Component Set using the bill of materials in the lab instruction manual for each lab session of his or her course. S/he must also check that all items in a Component Set are listed in at least one maxlist described later in part 3. Finally the teacher presses the save button to store the Component set. Please note that it is possible to store not only a component set but a wired circuit.
Usually there are a number of labs in each course. A lab instruction manual and a component set belong to each lab. The lab instruction manuals are not stored in the laboratory. Use the link “Start client in teacher mode” to create the component set of the lab. How to create this set will be shown in the next slide.

The “Experiment File” contains either a Component Set or a prepared circuit.
Just click the hour wanted if there is a seat available. The next slide will show how you can select number of hours and number of student seats.
Reservation details

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Teacher scheduled reservation

- 2009-09-14 8:00
- Hours: 1
- Number of seats: 10
- Commit
The teacher scheduled lab sessions show up in the students’ course view and the student can do seat reservations.