


OSLab Course Author Guide

Attila Weyland and Torsten Braun

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	<p>Operating System Laboratory</p> <p>Course Author Guide</p>	<p>v 1.01 July 25, 2006</p>
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Course Author Guide^{*}

Attila Weyland and Torsten Braun

Institute of Computer Science and Applied Mathematics
University of Bern
Neubrückstrasse 10, 3012 Bern, Switzerland
Email: weyland@iam.unibe.ch

Abstract

OSLab is the third generation in a series of distance learning courses established by mostly Swiss and some international universities. The underlying didactics have been developed in the VITELS project and written down in a didactics and design guide. The guide has been further extended in the EuQoS project. This document tries to reduce the guide to a reasonable size and incorporate the experiences made during the operation of the VITELS course.

In the creation process of a learning course, we identified two possible roles: module authors and course authors. A module author creates a learning module. A course author maintains the structure and design of the course as well as the modules. This document guides you through the process of creating a learning course for the Operating System Laboratory and therefore addresses course authors.

CR Categories and Subject Descriptors

[K.3.1 Computer Uses in Education]: Distance learning; [K.3.2 Computer and Information Science Education]: Computer science education

General Terms

Documentation, Design, Management

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1 Introduction

OSLab is based on a constructivist learning approach, which is well suited for hands-on focused courses. This section motivates the didactical concepts and explains the main components, such as the specified course and module structure and the employed learning tools.

1.1 Course Structure

The OSLab course structure is based on highly modularized learning content according to subjects and can be consumed according to the learners needs. Figure 1 shows the course structure.

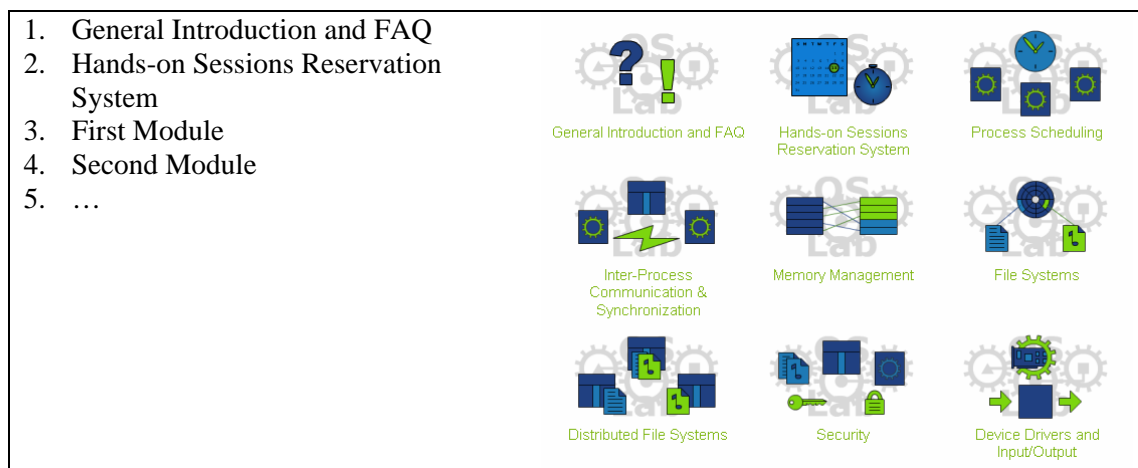
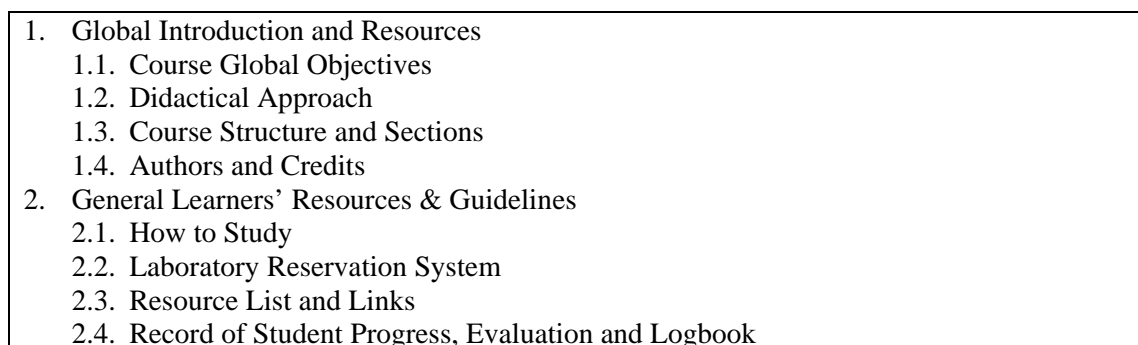



Figure 1: Course Structure

The initialization module (General Introduction and FAQ) explains the course objective, didactic concept, and so forth. The link to the laboratory reservation system (Hands-on Sessions Reservation System) allows the learners to book time slots for hands-on sessions using real hardware. Then follow the different learning modules. We describe the structure of the initialization and learning modules in the next two sections.

1.2 Initialization Module Structure

The OSLab course contains an initialization module called “General Introduction and FAQ”. In it, the methods and tools of the course are explained in detail to the learners. Figure 2 shows the structure of the “General Introduction and FAQ”.



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- 2.5. Discussions
- 2.6. Help Pyramid
- 2.7. General FAQ
- 2.8. Survey

Figure 2: Initialization Module Structure

The structure of the “General Introduction and FAQ” is completely fixed. The content is generated by the provided tools from predefined text. It is your task as course author to maintain these texts as described in Section 4.1 on page 20.

1.3 Learning Module Structure

Each module consists of four chapters: introduction, theory, knowledge application/ exploration as well as evaluation of acquired knowledge and skills. The first chapter “Introduction” motivates the module content and places it into context with other modules of the course. In the second chapter “Theory”, the learners acquire the knowledge to solve the practical exercises. In the third chapter “Knowledge Application/ Exploration”, the learners solve programming or configuration tasks in a simulated, emulated or real environment. The fourth chapter “Prove Your Knowledge and Skills” evaluates the acquired knowledge of the learners. Figure 3 shows the module structure.

- 1. Introduction
 - 1.1. Welcome
 - 1.2. The Goals and How to Reach Them
 - 1.3. Module Vicinity
 - 1.4. My Goals
 - 1.5. Tips
 - 1.6. FAQ
- 2. Theory
 - 2.1. Theoretical Basics
 - 2.2. Readings
 - 2.3. Self Test
 - 2.4. Quiz
- 3. Knowledge Application/Exploration
 - 3.1. Introduction
 - 3.2. Hands-on Session
- 4. Prove Your Knowledge and Skills
 - 4.1. Personal Synthesis
 - 4.2. Final Quiz
 - 4.3. Survey

Figure 3: Module Structure

The module structure is almost fixed. That means no changes are allowed by the module author except for three points and only starting from the third-level. Therefore, the module author can only add sub-sections to “2.1 Theoretical Basics”, “3.1 Introduction” and “3.2 Hands-on Session”. However, he has to create content for almost all of these predefined sections. Some content is generated by the provided tool from predefined texts. These texts are maintained by you, the course author as described in Section 4.2 on page 29.

1.4 Learning Tools

We use different tools to keep track of the learners' progress. These tools are available at different stages of the learners' path throughout a module and graded according to their purpose. Table 1 gives an overview on the tools and the achievable points.

Table 1: Point Distribution

Chapter				Evaluation Tools	Points	Share
1	2	3	4			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Discussion	0	0%
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Logbook	25	18%
<input type="radio"/>				My Goals	20	14%
	<input type="radio"/>			Self Test	0	0%
	<input type="radio"/>			Quiz	30	21%
		<input type="radio"/>		Personal Synthesis	20	14%
		<input type="radio"/>		Final Quiz	40	29%
		<input type="radio"/>		Surveys	5	4%
Total					140	100%
Traditional					70	50%
Modern					70	50%

We distinguish between traditional and *modern* tools for learning. Traditional tools are known from offline courses. Modern tools take advantage of the new possibilities offered by an online infrastructure.

The traditional tools consist of self test, quiz and final quiz. The self test allows the learners to determine his knowledge state without being graded. In the quiz, the learners have to prove his knowledge acquired in the theory chapter. With the final quiz the learners summarize their results obtained by performing the practical tasks from the hands-on chapter.

The modern tools consist of discussion, logbook, my goals, personal synthesis and survey. The discussion forum helps learners to exchange knowledge and obtain support from other learners or the tutor(s). The logbook lets the learners to keep track of their learning progress and note things for future reference. The discussion and logbook are available throughout the whole module. The section "My Goals" requires the learners to formulate their learning goals based on the introduction and thereby activates prior knowledge. The personal synthesis helps the learners in structuring the acquired knowledge from the theory and the hands-on chapter. It also allows the comparison of the initially specified and the finally achieved goals. The survey helps the tutor to adapt and improve the module.

1.5 Implementation Procedure

In this section, we describe the common procedure of implementing the presented course and module structure. As mentioned earlier, we identified two roles in the creation process of a learning course: course and module author. Table 2 lists the two roles and their respective tasks.

Table 2: Course and Module Author Tasks List

Task	Module Author	Course Author
Learning module creation & integration	o	
Course design maintenance		o
Learning module predefined text maintenance		o
Initialization module predefined text maintenance		o
Course preparation (creation, design, learning tool templates)		o
Initialization module integration		o

The module author is solely responsible for the creation of content for his learning module(s). The course author is responsible for the maintenance of the overall course design, the predefined text of the learning modules and the initialization module. In addition he has to prepare the course in the course platform, i.e. creating it, establishing the common design as well as creating the template for the learning tools. Last, the course author has to integrate the initialization module.

To help the module author concentrate on the task of writing and illustrating the topic, we separated the creation of content and the layout, while a tool merges this content into a predefined framework. The tool is called file framework generator & formatter, ffgf [4]. It takes a table of contents and the according content files (both written by a module author) as well as the formatting information and predefined content (specified by the course author) as input. From this, the tool generates formatted HTML [5] pages as output. The layout is based on Cascading Style Sheets, CSS [6] and invisible tables.

To support the module author in the creation of content, a graphical editor has been developed, which is called Guided Content Editor, GCED [7]. The GCED is a Java-based WYSIWYG editor, which provides basic HTML formatting functionality. It also helps in the specification of a valid table of contents for the ffgf. Both, ffgf and GCED are available in a development bundle [8]. Figure 4 illustrates the interaction of the different components in the content creation process.

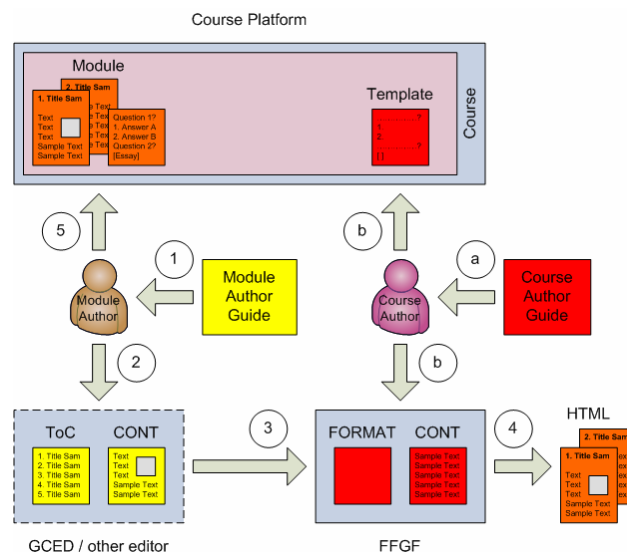



Figure 4: Course Implementation Process

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Initially the course author specifies the format and the predefined content for the ffgf as well as prepares the course inside the course platform (b) in accordance with the course author guide (this document) [9] (a). The module author specifies the table of contents and creates the module content (2) in accordance with the module author guide [10] (1) and by using the GCED. Next, the GCED invokes the ffgf (3), which finally creates the resulting HTML pages (4). Last the module author integrates the module into the course platform (5). It is possible to use a different editor and directly invoke the ffgf. Section 2 explains both possibilities in detail.

2 OSLab Development Bundle

The OSLab Development Bundle, ODB [8] is an archive which includes the Guided Content Editor, GCED, the file framework generator & formatter, ffgf as well as some graphics. FFGF requires Perl [11]. The script to generate a PDF file from the HTML pages requires HTMLDOC [12].

2.1 Installation

Unzip the ODB archive into a directory of your choice. After unpacking the archive, you find the following main directory structure:


doc/	Module and Course Author Guide, GCED
gced_ffgf/	GCED JAR, FFGF start script, README
gced_ffgf/etc/	configuration and template files
gced_ffgf/etc/guides	section hints used by GCED
gced_ffgf/etc/static	predefined learning module text
gced_ffgf/etc/static/introduction	predefined initialization module text
gced_ffgf/etc/template	page templates, pictures and design
gced_ffgf/input/	input files (Table of Contents)
gced_ffgf/output/content	generated content files
gced_ffgf/output/htmlCE	generated HTML files for WebCT CE
gced_ffgf/output/htmlVista	generated HTML files for WebCT Vista
graphics/	OSLab (module) logos, position map
pdf/	PDF generation script based on htmldoc

2.2 Configuration

As course author you will have to change the configuration file of the ffgf. It is called `ffgf.conf` and located in the `gced_ffgf/etc` directory. In particular, when you need to generate the initialization module, the introduction mode in ffgf needs to be activated (`intro=1`). When you want to generate a learning module, ffgf needs to be in normal mode (`intro=0`).

2.3 Usage

There exist two possibilities for creating content. The first is to use the GCED, which provides a nice interface to modify the table of contents file and to write to the respective content files. It also invokes the ffgf automatically upon changes. This is the preferable way for module authors. The second is to directly edit these files using another editor of your choice. This is the preferable way for course authors, especially since the GCED does not support the creation of the initialization module. The GCED is based on the Java HTML EditorKit [13], which exposes some weird behavior. If

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you have difficulties in adjusting, the second option might be your choice. In the following two sections, we describe both possibilities. In the third section, we describe how to generate PDF with the provided script.

2.3.1 GCED & FFGF


The next steps give an overview on how to create a learning module using the GCED. The given references lead to the detailed descriptions and must be followed. The documentation for the GCED can be found in `doc/Introduction_to_GCED.pdf`.

1. Change into the directory `gced_ffgf`.
2. Create your module's table of contents file in the directory `gced_ffgf/input` from the file `Template.txt`, e.g. copy `Template.txt` to "`Module Name.txt`". You can adjust the table of contents within GCED.
3. In case this is your first time using this table of contents,
 - a. Start the ffgf: `perl ffgf.pl`.
 - b. Select the table of contents file of your module from the list.
 - c. If requested enter the module author(s) and/or the module name (these values are saved in a `gced_ffgf/input/*.stat` file).
 - d. Quit the ffgf by entering "q" in the "Options" menu.
4. Start the GCED: `java -jar GCED-*version*.jar`.
5. In case this is the first time starting GCED, you will be asked to specify the location of the FFGF.
6. Open your module via the menu "Project->Open", choose from the drop down list the respective module, GCED will display a table of contents on the left and the concatenation of all content file in the middle.
7. Adjust the table of contents from the menu "Project->Edit structure". The red entries indicate the places where you can add files below the current level. Adapt the duration of the chapter entries. The rest is not editable. Click "Update Project" to commit the changes.
8. Write your module content to the files based on Section 3 using the elements and format options from Sections 3.4 and 3.2.2 respectively and stay in compliance with the rules defined in Section 3.3.
9. Save your project and zip the output for your module located under directory `htmlVista/module_name` to `module_name.zip`. Don't include the base directory, i.e. your root in the zip must look like `1 2 3 4 doc pictures`. WebCT Vista will create a folder based on your zip archive name upon unzipping.
10. Integrate your module into WebCT Vista as described in Section 5.

2.3.2 FFGF

The following steps describe how to create a learning module relying solely on the ffgf. The given references lead to the detailed descriptions and must be followed. The ffgf offers text-based menu navigation. It calls external programs to for the editing or display functionality. The external programs to be used can be configured in `gced_ffgf/etc/ffgf.conf`.

1. Change into the directory `gced_ffgf`.

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2. Create your module's table of contents file in the directory `gced_ffgf/input` from the file `Template.txt`, e.g. copy `Template.txt` to "`Module Name.txt`" and modify the content accordingly.
3. Start `ffgf`: `perl ffgf.pl`.
4. Select the table of contents file of your module from the list (You can skip this step by passing the table of contents file name directly when calling the script, e.g. `perl ffgf.pl input/Module Name.txt`).
5. In case this is your first time using `ffgf`
 - a. enter the module author(s) and/or the module name (these values are saved in a `gced_ffgf/input/*.stat` file).
6. Change to the "Editing/Viewing" menu by entering "e" in the "Options" menu.
7. Adjust the table of contents file by entering "T" in the "Editing/Viewing" menu. Note that you are only allowed to add subsections below Section 2.1, 3.1 and 3.2. As soon as you leave the editor, `ffgf` checks for changes and updates the files accordingly.
8. You can access every content file from the "Editing/Viewing" menu. Write your module content to the files based on Section 3 using the elements and format options from Sections 3.4 and 3.2.2 respectively and stay in compliance with the rules defined in Section 3.3.
9. You can view the result by entering "V" in the "Editing/Viewing" menu.
10. Save your project and zip the output for your module located under directory `htmlVista/module_name` to `module_name.zip`. Don't include the base directory, i.e. your root in the zip must look like `1 2 3 4 doc pictures`. WebCT Vista will create a folder based on your zip archive name upon unzipping.
11. Integrate your module into WebCT Vista as described in Section 5.


2.3.3 Generate PDF

The next steps describe how to create a PDF file from the HTML pages generated by the `ffgf`. The script requires `HTMLDOC` [12] to be installed. Only the source code version is available free of charge. The script calls `HTMLDOC` with `gced_ffgf/output/htmlVista/Your Module/all/Your Module.html` as input and creates `gced_ffgf/output/htmlVista/Your Module/doc/Your Module.pdf` as output. Therefore, it is important that you first run `ffgf` and generate the output structure for your module.

1. Change into the directory `pdf`.
2. Create your module's title file in the same directory from the file `Template.title`, e.g. copy `Template.title` to "`Module Name.title`" and modify the content accordingly.
3. Start the script: `./generate_pdf "Module Name"`

2.4 Maintenance

The ODB is also used by the module authors. It is important, that it stays in a coherent state and that changes are synchronized. There exist dependencies between the GCED [7], the `ffgf` [4] as well as the course [9] and module author guide [10].

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The hints given to the module authors in the GCED must be identical to the ones written in the module author guide. These text files are located in the `guides` directory of the GCED development tree [7]. They are included in the GCED JAR file. Upon start the GCED replaces differing files in the `gced_ffgf/etc/guides` directory. The GCED JAR also includes a version of the `ffgf` called `new-ffgf.pl` located in the `src` directory in the development tree. Upon start the GCED replaces a differing `ffgf.pl` in the `gced_ffgf` directory.

The predefined text of the initialization as well as the learning module from Section 4 is located in the `gced_ffgf/etc/static` and the `gced_ffgf/etc/static/introduction` directories.

The page templates and CSS file described in Section 3 is located in the `gced_ffgf/etc/template` directory.

3 Design Maintenance

The highly modularized content provided by different partners requires the specification of a uniform look and feel for each learning module. As described in Section 1.5 on page 4, the course design and the content creation have been separated, to ensure the common look and feel. This section explains the maintenance of the course design specifications.

3.1 Design Templates

Ffgf relies on predefined templates for pages and sections. The outer frame provides spans a rectangle in which the content is placed. The chapter and section overview lists the corresponding (sub)-sections on the first lower level. The schedule illustrates the chapter and course duration in form of progress bars. In the following, we describe the realization of each template, give a rendered example and show the corresponding source code.

3.1.1 Outer Frame

The outer frame consists of a table, which contain a horizontal and a vertical transparent dummy image. These two images span a white rectangle, which provides the frame for the page content as shown in Figure 5. Listing 1 presents a source code example of the outer frame. The actual template file is called `webctvista.txt` and can be found in the `gced_ffgf/etc/templates` directory.

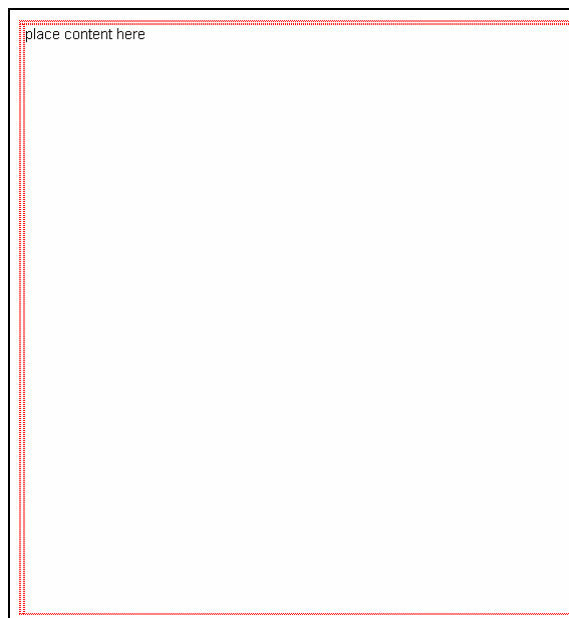


Figure 5: Outer Frame Example

Listing 1: Outer Frame Source Code Example

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html>
<head>
<title>Welcome</title>
<meta name="Author" content="Attila Weyland"/>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1"/>
<link href="../Template.css" rel="stylesheet" type="text/css"/>
<link href="../../design/oslab.css" rel="stylesheet" type="text/css"/>
</head>
<body>
<!-- outer frame -->
<div class="frame">
<table border="0" cellspacing="0" cellpadding="0">
<tr><td colspan="2"></td></tr>
<tr>
<td></td>
<td valign="top">
<!-- outer frame -->

place content here

<!-- outer frame -->
</td>
</tr>
</table>
</div>
<!-- outer frame -->
</body>
</html>
```

3.1.2 Chapter Overview Page

The chapter overview page consists of a module title and logo as well as a table of contents of the first level sections in the chapter. The formatting is mainly based on CSS classes. The background is colored according to the current chapter as illustrated in Figure 6. Listing 2 shows a source code example of a chapter overview page. We omit the outer frame presented in Listing 1. The actual template file is called `chapter_page.txt` and can be found in the `gced_ffgf/etc/templates` directory.

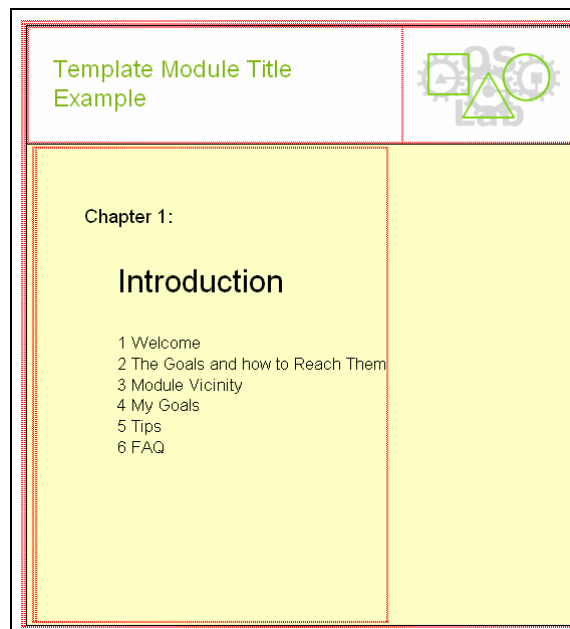


Figure 6: Chapter Overview Page Example

Listing 2: Chapter Overview Source Code Example

```
<div class="box_title">
<table border="0" cellspacing="0" cellpadding="0">
<tr>
<td class="fill" valign="middle"><div class="moduleTitle">Template Module Title Example</div></td>
<td align="right" valign="middle"></td>
</tr>
</table>
</div>
<div class="box_content">
<div class="titleColor1">
<table border="0" cellspacing="0" cellpadding="0">
<tr>
<td></td>
<td valign="top">
<div class="chapterChapter">Chapter 1:</div>
<div class="chapterTitle">Introduction</div>
<div class="firstSectionTitle">1 Welcome</div>
<div class="firstSectionTitle">2 The Goals and how to Reach Them</div>
<div class="firstSectionTitle">3 Module Vicinity</div>
<div class="firstSectionTitle">4 My Goals</div>
<div class="firstSectionTitle">5 Tips</div>
<div class="firstSectionTitle">6 FAQ</div>
</td>
</tr>
</table>
</div>
</div>
```

3.1.3 Section Overview Page

The section overview page is similar to the chapter overview page, except that it lists the sub-sections of a section on the first level in a chapter. An example is displayed in Figure 7. Listing 3 shows the corresponding source code of a section overview page. Again, we omit the outer frame presented in Listing 1. The actual template file is called `2_1_or_3_2.txt` and can be found in the `gced_ffgf/etc/templates` directory.

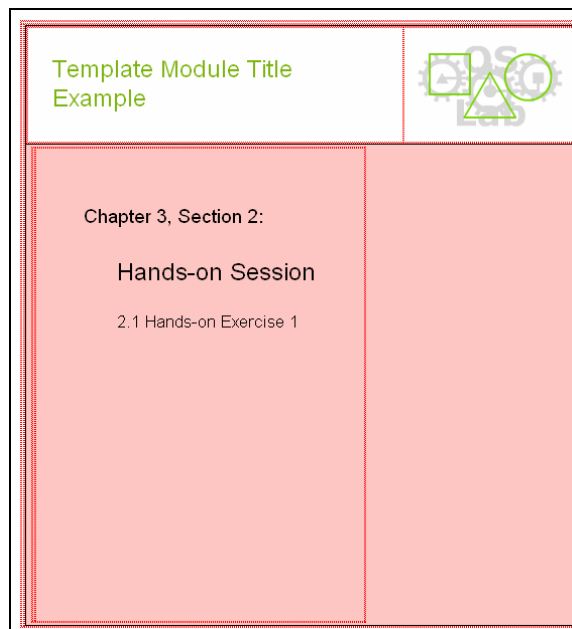


Figure 7: Section Overview Page Example

Listing 3: Section Overview Page Source Code Example

```
<div class="box_title">
<table border="0" cellspacing="0" cellpadding="0">
<tr>
<td class="fill" valign="middle"><div class="moduleTitle">Template Module Title Example</div></td>
<td align="right" valign="middle">

</td>
</tr>
</table>
</div>
<div class="box_content">
<div class="titleColor3">
<table border="0" cellspacing="0" cellpadding="0">
<tr>
<td></td>
<td valign="top">
<div class="chapterChapter">Chapter 3, Section 2:</div>
<div class="sectionTitle">Hands-on Session</div>
<div class="firstSectionTitle">2.1 Hands-on Exercise 1</div>
</td>
</tr>
</table>
</div>
</div>
</div>
```


3.1.4 Schedule

The schedule page consists of tables and four different images. The concatenation of these images results in the progress bars as illustrated in Figure 8. The proportion is calculated by the ffgf and based on the durations given in the table of contents. Listing 4 shows a source code example. We omit the outer frame and most of the images (1..). The actual template file is called `schedule.txt` and can be found in the `gced_ffgf/etc/templates` directory.

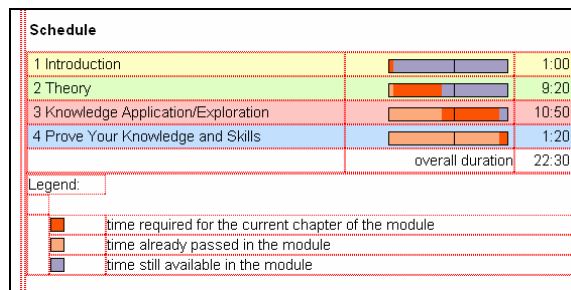



Figure 8: Schedule Example

Listing 4: Schedule Source Code Example

```
<h2>Schedule</h2>
<table class="fullWidth" border="0" cellspacing="0" cellpadding="0">
<tr>
<td class="titleColor1" align="left" valign="top">1 Introduction</td>
<td class="titleColor1" align="right" valign="bottom">
[.]
</td>
<td class="titleColor1" align="right" valign="top">1:00</td>
</tr>
<tr>
<td class="titleColor2" align="left" valign="top">2 Theory</td>
<td class="titleColor2" align="right" valign="bottom">
[.]
</td>
<td class="titleColor2" align="right" valign="top">9:20</td>
</tr>
<tr>
<td class="titleColor3" align="left" valign="top">3 Knowledge Application/Exploration</td>
<td class="titleColor3" align="right" valign="bottom">
[.]
</td>
<td class="titleColor3" align="right" valign="top">10:50</td>
</tr>
<tr>
<td class="titleColor4" align="left" valign="top">4 Prove Your Knowledge and Skills</td>
<td class="titleColor4" align="right" valign="bottom">
[.]
</td>
<td class="titleColor4" align="right" valign="top">1:20</td>
</tr>
<tr>
<td colspan="3">&nbsp;</td>
<td align="right">overall duration</td>
<td class="titleColorNo" align="right">22:30</td>
</tr>
</table>
<table class="fullWidth" border="0" cellspacing="0" cellpadding="0">
<tr><td colspan="2" align="left">Legend:</td></tr>
<tr><td colspan="2">&nbsp;</td></tr>
<tr>
<td rowspan="3" valign="top">&nbsp;</td>
<td>
[.]
</td>
<td align="left">time required for the current chapter of the module</td>
</tr>
<tr>
<td>
[.]
</td>
<td align="left">time already passed in the module</td>
</tr>
</table>
```

	<p style="text-align: center;">Operating System Laboratory</p> <p style="text-align: center;">Course Author Guide</p>	<p style="text-align: right;">v 1.01 25 July 2006</p>
---	--	---

```

<tr>
<td>

</td>
<td align="left">time still available in the module</td>
</tr>
</table>

```

3.2 Cascading Style Sheets Classes

We use Cascading Style Sheets, CSS [6] classes to define the design. We distinguish between private and public CSS classes. The first specify the overall course layout, the latter can be used by the module authors to emphasize text parts. In the following two sections we describe these CSS classes. The CSS classes are defined in the `oslab.css` file, which is located in the `gced_ffgf/etc/templates/design` directory.

3.2.1 Private CSS Classes

The private CSS classes define the overall course layout. Listing 5 shows the specification for links, global font settings, page body, headers, the outer frame and tables. Listing 6 displays the definition of the chapter overview format. The usage and the resulting look of the private CSS classes can be found in Section 3.1.1 to 3.1.4.

Listing 5: Private CSS Classes Definition (Part 1)

```

/* anchor settings */
a {
  text-decoration: none;
}
a:link {
  color: rgb(124, 181, 15);
}
a:visited {
  color: rgb(124, 181, 15);
}
a:hover {
  background-color: rgb(220, 225, 215);
}
/* default font settings */
a,body,div,h1,h2,h3,h4,li,ol,p,pre,span,table,t
d,th,tr,ul {
  font-family: Arial, Helvetica, sans-serif;
  font-size: 11pt;
  line-height: 120%;
}
/* body settings */
body {
  background-color: rgb(64, 129, 32);
  color: Black;
}
/* title settings */
h1 {
  background-color: transparent;
  border-color: rgb(0, 0, 0);
  border-style: solid;
  border-width: 1px;
  color: rgb(0, 0, 0);
  margin: 0em 0.2em 2em;
  text-align: left;
  width: 97%;
}
/* sub-title settings */
h2 {
  text-align: left;
  text-indent: 0.2em;
}
/* table classes */
table.fullWidth {
  width: 100%;
}
table.center {
  margin-left: auto;
  margin-right: auto;
}
/* main frame settings */
div.frame {
  background-color: White;
  padding: 10px;
  width: 550px;
}
img.dummyHorizontalRuler {
  width: 550px;
  height: 1px;
}
img.dummyVerticalRulerChapterPage {
  width: 1px;
  height: 470px;
}
img.dummyVerticalRulerNormalPage {
  width: 1px;
  height: 585px;
}

```

Listing 6: Private CSS Classes Definition (Part 2)

```

/* box for chapter page */
.box_title {
  border-color: rgb(0, 0, 0);
  border-style: solid;
  border-width: 1px 1px 0px;
  margin: 0em;
  text-align: left;
}
.titleColor4 {
  background-color: rgb(195, 223, 255);
}
/* chapter page */
.moduleTitle {
  background-color: White;
  color: rgb(124, 181, 15);
}

```



```
width: 100%;
}
.box_content {
  border-color: rgb(0, 0, 0);
  border-style: solid;
  border-width: 1px;
  margin: 0em;
  text-align: left;
  width: 100%;
}
/* chapter padding */
.titleColor0,.titleColor1,.titleColor2,
.titleColor3,.titleColor4,.titleColorNo {
  padding: 2px 5px;
}
/* chapter colors */
.titleColor0 {
  background-color: rgb(255, 228, 195);
}
.titleColor1 {
  background-color: rgb(252, 255, 195);
}
.titleColor2 {
  background-color: rgb(222, 255, 195);
}
.titleColor3 {
  background-color: rgb(255, 198, 195);
}

font-size: 18pt;
padding: 1em 1em;
}
.moduleLogo {
  padding: 10px;
}
.chapterChapter {
  font-size: 14pt;
  padding: 3em 2.5em 1em;
}
.sectionTitle {
  font-size: 18pt;
  padding: 0.5em 2em 1em 80px;
}
.chapterTitle {
  font-size: 24pt;
  padding: 0.5em 2em 1em 80px;
}
.firstSectionTitle {
  font-size: 13pt;
  padding: 0em 0em 0em 80px;
}
.title {
  font-size: 13pt;
  font-weight: bold;
  padding-left: 5px;
}
```

3.2.2 Public CSS Classes

The public CSS classes are mentioned in the module author guide [10]. They provide font and source code formatting and must be used by the module authors. Listing 7 shows the public CSS classes, Figure 9 illustrates a rendered example and Listing 8 presents the corresponding source code.

Listing 7: Public CSS Classes Definition

```
/* font classes */
.serif {
  font-family: "Times New Roman", Times, serif;
}
.sansSerif {
  font-family: Arial, Helvetica, sans-serif;
}
.monospace {
  font-family: "Courier New", Courier,
monospace;
}
.italic {
  font-style: italic;
}
.bold {
  font-weight: bold;
}
.left {
  text-align: left;
}
.center {
  text-align: center;
}

.right {
  text-align: right;
}
.justify {
  text-align: justify;
}
/* class to display code snippets */
.code {
  background-color: rgb(228, 195, 255);
  border-color: rgb(63, 0, 128);
  border-style: solid;
  border-width: thin;
  color: Black;
  font-family: "Courier New", Courier,
monospace;
  padding: 5px;
  white-space: pre;
  width: 540px;
}
```

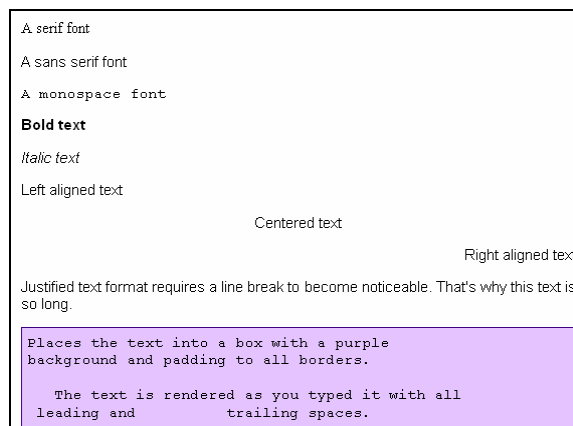


Figure 9: Public CSS Class Examples

Listing 8: Public CSS Class Example Source Code

```
<p class="serif">A serif font</p>
<p class="sansSerif">A sans serif font</p>
<p class="monospace">A monospace font</p>
<p class="bold">Bold text</p>
<p class="italic">Italic text</p>
<p class="left">Left aligned text</p>
<p class="center">Centered text</p>
<p class="right">Right aligned text</p>
<p class="justify">
Justified text format requires a line break to become
noticeable. That's why this text is so long.
</p>
<p class="code">Places the text into a box with a purple
background and padding to all borders.

The text is rendered as you typed it with all
leading and          trailing spaces.
</p>
```

3.3 Design Rules

These rules must be followed, when creating content. They are listed in the module author guide [10].

When you prepare module content you must follow certain rules of good design.

1. Keep your content short and simple
2. Limit the numeration hierarchy of the Table of Contents entries (recommended depth of 3, maximum 4 numbers)
3. Limit the number of different font families and formats per page (maximum 3)
4. Limit the amount of different colors per page (maximum 5)
5. Reuse font formats and colors in the same context

Especially when creating graphics or animations try to apply these rules:

1. Respect the maximum width of 540 pixel in your graphic/animation
2. Use color selective (emphasize key elements, keep the surroundings black/white/grey)
3. Use light, appealing colors (not too dark or somber)
4. Limit the amount of gradients
5. Use the JPEG format for real-life images (photographs, paintings, etc.) and

the PNG format for computer generated graphics (charts, flows, diagrams etc.). Do NOT use the GIF format!

3.4 HTML Elements

We restrict the number of HTML elements, which are allowed in the creation of content. They are listed in the module author guide [10] and available in the GCED [7]. Table 3 describes the available HTML elements. Figure 10 shows a rendered example of the elements and Listing 9 contains the corresponding HTML code.

Table 3: HTML Elements

GCED Element	HTML element	Description
normal text	<p>	In the default writing mode, the text is placed within a paragraph element.
Header	<h3>	Formats the selected text as header. <u>Important:</u> A heading must be formatted after some text has been written below.
Hyperlink	<a>	Transforms the selected text into a hyperlink pointing to a given address.
Table	<table>	Inserts a table with the specified number of rows and cells.
Picture		Inserts a picture from the module's picture repository. The GCED offers a menu entry to manage the pictures of a module. <u>Important:</u> A picture can only be added inside a paragraph. It is currently not possible to add Flash animations via the GCED. Instead, you have to add them manually.
Ordered List		Creates an ordered list and inserts the first element.
Ordered List Item		Adds an additional element to the ordered list.
Unordered List		Creates an unordered list and inserts the first element.
Unordered List Item		Adds an additional element to the unordered list.

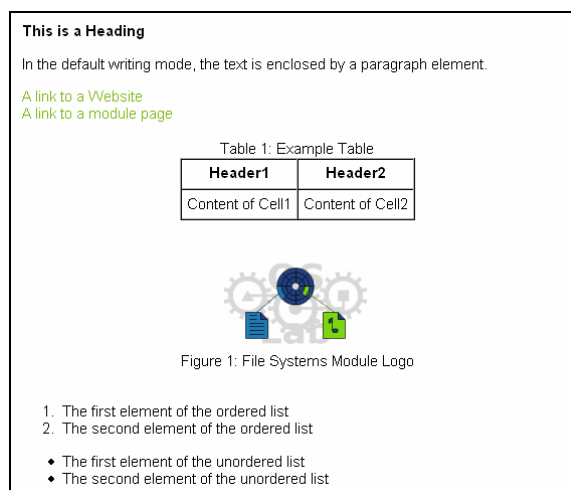



Figure 10: HTML Elements Example

Listing 9: HTML Elements Example Source Code

```
<h3>This is a Heading</h3>
<p>In the default writing mode, the text is enclosed by a paragraph element.</p>
<a href="http://www.oslab.ch/" target="_blank">A link to a Website</a><br/>
<a href="..../2/2_4_0_quiz.html">A link to a module page</a><br/><br/>
<div class="center">Table 1: Example Table</div>
<table class="center" border="1" cellpadding="5" cellspacing="0">
```

	<p align="center">Operating System Laboratory</p> <p align="center">Course Author Guide</p>	<p align="right">v 1.01 25 July 2006</p>
---	--	--

```

<tr><th>Header1</th><th>Header2</th></tr>
<tr><td>Content of Cell1</td><td>Content of Cell2</td></tr>
</table>
</div>
<br/><br/>
<div class="center">
<br/>
Figure 1: File Systems Module Logo
</div>
<br/>
<ol>
<li>The first element of the ordered list</li>
<li>The second element of the ordered list</li>
</ol>
<ul>
<li>The first element of the unordered list</li>
<li>The second element of the unordered list</li>
</ul>

```

4 Predefined Content Maintenance

In the following, we describe the content templates for both the initialization module “General Introduction and FAQ” as well as for the basic learning module. The templates are used by the ffgf to fill dedicated pages with content during each run (initiated by the GCED or manually).

The content generation by the ffgf is based on structural data, temporal data or on predefined text. Structural data is used to create an outline of a chapter (section) by listing the (sub)-sections. Temporal data is used to create a schedule of the chapter duration in a learning module. The predefined text is used to create descriptions, which cover course or module related topics, e.g. the usage of a learning tool.


The predefined text has been written by Marc-Alain Steinemann under guidance of Jacques Viens within the VITELS project. It is the task of the course author to maintain it and keep it up to date.

4.1 Initialization Module

The initialization module consists of two chapters. The goal is to introduce the learners to the module structure, explain the common part of a module and provides answers to frequently asked questions. Table 4 lists the sections of the initialization module with their respective content creator.

Table 4: Initialization Module Sections and their Content Creator

Section	Content Creator (Content Type)	
	Course Author	ffgf
1 Global Introduction and Resources		o (outline)
1.1 Course Global Objectives	o (description)	
1.2 Didactical Approach	o (description)	
1.3 Course Structure and Sections	o (description)	
1.4 Authors and Credits	o (description)	
2 General Learners' Resources & Guidelines		o (outline)
2.1 How to Study	o (description)	
2.2 Laboratory Reservation System	o (description)	
2.3 Resource List and Links	o (description)	
2.4 Record of Student Progress, Evaluation and Logbook	o (description)	
2.5 Discussions	o (description)	
2.6 Help Pyramid	o (description)	
2.7 General FAQ	o (description)	

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---	--	---

In the following, we motivate each section and list its according predefined text. Some pages are generated automatically, which we emphasize accordingly. The predefined text is emphasized with a rippled frame. The actual files are located in the `gced_ffgf/etc/static/introduction` directory.

4.1.1 Global Introduction and Resources

The “Global Introduction and Resources” chapter consists of four sections. Its goal is to state the course objectives, motivate the didactical approach, the course and module structure as well as to give the course authors credit.

Important: The content of this page is generated automatically and lists the sections of this chapter.

4.1.1.1 Course Global Objectives

In this section the learners get to know the mission of the OSLab course. The description includes the type of the targeted audience (e.g. computer science students) as well as the scope of a module in the OSLab course.

The Operating System Laboratory, OSLab e-learning course is a hands-on sessions’ oriented Internet-based course framework. The audiences are computer sciences learners, learners from technical universities and industrial learners such as users and engineers. Each OSLab module introduces one or more concepts, which have a relation to operating systems. The most important aspects are discussed and introduced with theory, exercises and at least one hands-on session scenario using simulations, emulations or real hardware.


OSLab provides knowledge through trial-and-error approaches.

4.1.1.2 Didactical Approach

This section describes the way of teaching in the OSLab course to the learners.

OSLab is designed for persons that have already acquired a two year’s knowledge in computer sciences or similar branches, engineers or persons who need a theoretical background in operating systems but have a base knowledge in. This already existing knowledge provides the foundations for understanding each module’s new lecture material. It also helps learners to develop the autonomy and initiative required by e-learning, more specifically during the exploration of the laboratory activities. Autonomy and initiative development is supported by providing guidelines and reflexive activities.

The OSLab e-learning course framework is an extension to traditional teaching activities in universities and industrial further education. OSLab course modules should help learners to go beyond traditional expository teaching. After the mastering of the basic knowledge, learners are asked to effectively analyze and solve problems from real existing situations. All those situations are taken out of the life of telecommunications and Internet experts. These hands-on sessions allow learners to apply their theoretical knowledge in a trial-and-error process. Hence, by learning in simulated, emulated and real network environments, learners can develop skills for self-directed problem-based learning which will help them throughout their life. To do so, each module includes at least one hands-on session scenario. The content of the modules, from the introduction to the tests is designed to fully integrate the hands-on

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session.

OSLab modules combine the delivery of basic knowledge and the exploration of real tasks in order to develop effective know-how. In addition, reflective processes, which permit to make sense of exploration and problem solving, are supported by note taking in a personal logbook throughout the modules' activities.

4.1.1.3 Course Structure and Sections

In this section, the module structure is introduced to the learners.

The OSLab course is a framework of in itself closed modules and the modules can be visited independently from each other. All OSLab course modules are similarly designed to allow easy navigation and orientation. The modules' structure with short explanations is listed below:

Introduction

The introduction leads you to the topic of the module. Among many other useful stuff you find special requirements, the learning goals and a module specific FAQ. In this section you write a short description of your personal expectations and goals for this module.

Basic Knowledge Acquisition

The basic knowledge acquisition section is the place where you have to study theory. You start with theory and interactive exercises. Another part of this section is scientific reading, which gives you an insight in the scientific notation of the module's topic. The Self Test helps you to minimize the theoretical work by giving you the answers immediately and additionally pointing you to further readings in case of wrong answers. The Self Test is also a place to check if you have to read through the whole theory or not. This section ends with a quiz that is graded by a tutor.

Knowledge Application/Exploration


Knowledge application and exploration is the place to apply the previously acquired skills. This is the section with the hands-on session scenarios. The situations in the hands-on session can be simulated, emulated or real. This is also the section where you can work in a team during the hands-on session. It is not forbidden to discuss your understanding of the results/explorations with other learners. You finally use the same results for your *individual* interpretation in the final quiz.

Evaluation of Acquired Knowledge and Skills

A first task is to write a synthesis by using your personal notes. You try to self-evaluate your degree of mastering your personal and the chapter's goals. This helps you to prepare your final quiz. This section ends with a final quiz that lets the tutors see if you have met the goals listed in the introduction section of the module.

The Basic Knowledge Acquisition and the Knowledge Application/Exploration chapters may contain special content only devoted for a special audience. You may also work through this supplementary content but you will use more than the estimated duration for the base module. You can easily identify this content by its markers on the top right side in the header. The markers contain the name of the addressed audience, such as engineers, university students or others.

There is one glossary for all the modules integrated in the course platform.

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Articles of text references are contained in the Recommended Readings Section.

4.1.1.4 Authors and Credits

The authors and credits section lists the staff of the course. It includes their role as well as their contact information. Module authors are listed in their respective modules.

Course Didactics, Design and Infrastructure

Marc-Alain Steinemann, Attila Weyland, Thomas Bernoulli and Thomas Staub
info@oslab.ch

Module Authors

The author information for specific modules can be found on the Welcome page located at the beginning of each module.

4.1.2 General Learners' Resources & Guidelines

The “General Learners' Resources & Guidelines” chapter consists of eight sections. Its goal is to explain the available learning resources and give guidance on how to use them.

Important: The content of this page is generated automatically and lists the sections of this chapter.

4.1.2.1 How to Study

This section introduces learners to the new learning modalities of studying online.

Online courses lack many well known features of studying.

Think on text markers or the possibility to take notes in scripts. Less important but still, in conventional learning you can study almost everywhere, you can even take your script and read through while sitting in a hot bathe. If you want to keep the script you simply store it together with all your personal notes and probably with the exam too. If you need it one day, maybe ten years later, you simply open a cartoon box and have it at your fingertips again. Conventional learning has a lot of advantages and one of the most important is: you are used to it.


But studying online is getting more and more popular. Tutors can, for example address a bigger audience without a loss of teaching quality. There are many advantages for you too: You study whenever you like to. This course is open 24/24h and 365 days a year. It offers interactive content where you apply and increase your skills. You get pointers to additional lecture and content and are able to access it at once. Many useful tools are integrated, such as a glossary or a discussion board.

Comparing conventional and online learning, there is still a lot to improve in online learning. But already now, online learning offers a rich environment with many useful and interesting contributions.

Human beings are creatures of habit. Therefore it is not surprising if you do not like your first experiences with the new learning style. With a little effort from your side you should start feeling comfortable in the new learning environment soon.

4.1.2.2 Laboratory Reservation System

In this section the learners get to know the reservation system for modules with restricted hardware resources.

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In some modules it is necessary to reserve time slots for the hands-on sessions in the laboratories because the expensive laboratory devices are available only in limited numbers. The laboratory reservation system does not affect anything else than the admission to the laboratory devices of the respective modules. Everything else of these modules is accessible all the time.

This course has a reservation system to manage the restricted equipment capacities of those laboratories.

You find the link to the reservation system on the course homepage and in all the modules where you have to book time slots.

You authenticate with your authentication and authorization infrastructure credentials. This is normally the user name and password assigned to you by your home organization.

We advice you to only book two time slots per module and week. You can book in advance and have the opportunity to get your preferred time slot. It is possible to reserve additional time slots if you need to: If there are still free slots one day before the day you are allowed to book them. Remember that you presumably cannot work concentrated during more than one slot.

You can and should free time slots that you are not going to use.

4.1.2.3 Resource List and Links

This section provides additional sources of information regarding the course. The course author must maintain this list and keep it up to date.

The links presented here are of general nature and not module specific.

<http://www.oslab.ch>

<http://www.euqos.org>

<http://www.vitels.ch>

<http://www.whatis.com>

<http://www.swissvirtualcampus.ch>

<http://www.cisco.com>


Each module has an own resource list and links section.

4.1.2.4 Record of Student Progress, Evaluation and Logbook

In this section the learners get familiar with the available learning tools, in particular the logbook. The course author must maintain this text.

When working through the course modules you encounter different tools that help evaluating your knowledge level. Most of them are evaluated by tutors and you can earn points:

- Discussions 0
- Logbook 25
- My Goals 20
- Self Test 0
- Quiz 30
- Personal Synthesis 20

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- Final Quiz 40
- Surveys 5

All of the above mentioned tools are required to complete a learning module.

A helpful tool is the logbook. You might be familiar with this tool from real laboratories. The logbook is a virtual note book, where you add comments and notes made during the learning process. You start using the logbook at the very beginning until the very end of the module. Each module has its own logbook ready for you.

Click on Quiz in the Action Menu at the top and choose Logbook. You get to the Quiz dialog and then you can start.

There are no time limitations for this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Hint: You can take notes with WebCT's "take notes" tool and then copy and paste them to the logbook at the end.

Evaluation criteria for the logbook:

You can earn a total of 25 points for this task:

- 5 points for a correct syntax and language
- 20 points for the quantity and the quality of the content

4.1.2.5 Discussions

This section motivates the importance of discussions for the learners as the major opportunity where they can experience teamwork.

Discussions are a major part of daily life and of this course. Throughout the whole course you encounter minor and major problems that can block your progress. A good way to get help is in the discussion board. It is also the place where you can help others.

Evaluation criteria:

You can earn a total of 0 points for this task in each module.

4.1.2.6 Help Pyramid

In this section, the learners are given directions where and how to seek help in case of problems.

You as a student expect a fast response in the case of problems such as hardware failures but also in other cases where you are stuck. We suggest a help pyramid where the personal help of a tutor is located on the top. Each step of the pyramid represents an instance where you can look for answers to your problem. You start with the frequently asked questions section of the course or the respective module. In the second step you browse the discussion board and if the problem is not urgent, you post a question. If this does not help, you write an Email to your tutor or other responsible person indicated in the respective module. As a last step, only recommended in very urgent cases, you use the telephone support of your tutor.

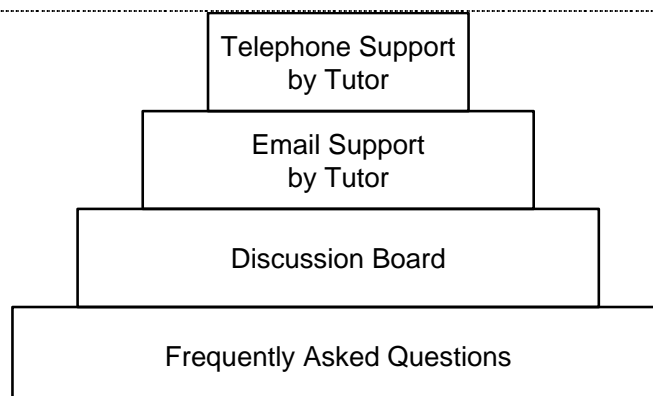


Figure 1: Help Pyramid

4.1.2.7 General FAQ

This section gives answers to general questions that concern all modules of the course. The list is categorized into course and software related questions. The course author must maintain this list and keep the answers up to date (e.g. number of points, list of modules, which require the reservation system).

Course

Q: How can I shorten the theory section, I think I already know most things?

A: There is a self-test and if you pass the self-test without problems you probably pass the quiz without any problems.

Q: Is there an order in the modules?

A: Yes there is. If you start with module one and do all the modules you always learn the necessary things for the next modules. The base knowledge for module one is two years of computer science studies at university. You are free to make the modules in any order you prefer.

Q: Do I have to work through all the modules?

A: No, you attend only the modules that you like or that your tutor declares as required.

Q: What is the maximal amount of points I can get in a module?

A: The maximum is 140 points. 0 points for postings in the discussions, 25 points for the logbook, 20 points for the verbalization of the personal goals, 30 points in the quiz about the theoretical section, 20 points for the synthesis and 40 points for the final quiz. Another 5 points are added for each survey.

Q: How many points do I absolutely need to pass one module?


A: You can get a maximum of 140 points. To pass the module you need 84 points.

Q: Do you have to write the essay and log books in each module?

A: Yes. If you look up the storyboard you see how much time you can spend in each section. This time includes the time you spend for writing the essay, logbook, and surveys. The essay and the logbook help you to memorize better the learned methods.

Q: We work together in the hands-on session. Can we make only one quiz for both?

A: No. You are encouraged to discuss theory and as well the together made hands-on session.

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But the quizzes, although they probably build on the same results, must be solved independently. You memorize more of the studied content when you solve the quizzes at your own.

Q: Is there a PDF that contains the whole theory of a module?

A: Yes, each module contains a PDF of the theory section in recommended readings section.

Q: Where do I need the reservation system?

A: You need the reservation system for the modules FILLME.

Q: What is the preferred language for my activities?

A: Try to answer in English. This helps you for your later work, especially writing articles. If you feel uncomfortable, you may also reply in German or French.

Q: I have problems with WebCT. What can I do?

A: WebCT is run by University of Bern. You should read the help pages on <http://webct.unibe.ch>.

Software

Q: How can I keep the output of the MindTerm shell for later use?

A: You can save the output of the MindTerm shell to a file by enabling the option “Capture To File...” from the “File” menu.

Q: When the MindTerm Applet starts up the first time, the “License agreement” window is displayed without any action buttons. How do I proceed?

A: You need to maximize the “License agreement” window to make the action buttons visible.

Q: In a previous lab session I saved my MindTerm settings while being connected to host A. Now, whenever I click on host B, MindTerm connects to host A. What shall I do?

A: You should delete your MindTerm settings and reconnect without saving any settings. Although this problem seems to be related to an older version of MindTerm, it is generally not recommended to save your MindTerm settings.

4.1.2.8 Survey

This survey helps the tutor to get an impression of the learners and their experience.

This survey helps us to know more about you and your overall experience from this module. You should do this survey at the end of the course. So please come back here after you have taken the number of modules specified by your tutor. We need your feedback to adapt and improve this course. Please fill out all the fields.

Evaluation criteria:

You can earn a total of 5 points for this task:


- each not answered question reduces the total points by 1

The questions presented to the learner within the course system are given below. They must be maintained by the course author to reflect the current state of the art.

- | | |
|-------------------------------------|---|
| 1. What is your gender:
- Female | 10. Where did you perform the lab work?
(multiple selections possible) |
|-------------------------------------|---|



- | | |
|--|---|
| <p>- Male</p> <p>2. What is your first language? (multiple selections possible)</p> <ul style="list-style-type: none"> - English - French - German - Italian - Portuguese - Spanish - Other <p>3. Where do you work or study?</p> <ul style="list-style-type: none"> - University - Technical University - Commercial Enterprise - Other <p>4. What kind of computer did you use for this course? (multiple selections possible)</p> <ul style="list-style-type: none"> - Home Computer - Workstation - Laptop - Other <p>5. Which operating system(s) do you use?</p> <ul style="list-style-type: none"> - Windows 2000 / XP - Linux - Unix - Mac OS X - Other <p>6. What is your study branch?</p> <ul style="list-style-type: none"> - I do not study. - Computer Sciences - Mathematics - Physics - Electrical engineering - Other <p>7. How did you connect to the course? (multiple selections possible)</p> <ul style="list-style-type: none"> - ADSL - Cable Modem - ISDN - Other <p>8. What kind of web browser did you use? (multiple selections possible)</p> <ul style="list-style-type: none"> - Firefox - Internet Explorer - Safari - Other <p>9. Where did you perform your pre lab work? (multiple selections possible)</p> <ul style="list-style-type: none"> - Home - Office - University/School | <ul style="list-style-type: none"> - Home - Office - University/School <p>11. Where did you perform your post lab work? (multiple selections possible)</p> <ul style="list-style-type: none"> - Home - Office - University/School <p>12. What was the best pedagogical* contribution or strength of the course? Why? * Pedagogical simply explained: think of a video game and the parts of it as pedagogical contributions. The story is one; the graphics and the sound are others.</p> <ul style="list-style-type: none"> - (essay) <p>13. What was the worst pedagogical* contribution or strength of the course? Why? * Pedagogical simply explained: think of a video game and the parts of it as pedagogical contributions. The story is one; the graphics and the sound are others.</p> <ul style="list-style-type: none"> - (essay) <p>14. What kind of learning activities could have been added?</p> <ul style="list-style-type: none"> - (essay) <p>15. What kind of learning tools could have been added?</p> <ul style="list-style-type: none"> - (essay) <p>16. Is there any additional need that you perceived as you worked and that was not fulfilled?</p> <ul style="list-style-type: none"> - (essay) <p>17. Do you have any suggestion to enrich our learning activities / learning tools?</p> <ul style="list-style-type: none"> - (essay) <p>18. Could you recommend this course to others?</p> <ul style="list-style-type: none"> - Yes - Rather yes - I'm not sure - Rather no - No |
|--|---|

	<p align="center">Operating System Laboratory</p> <p align="center">Course Author Guide</p>	<p align="right">v 1.01 25 July 2006</p>
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4.2 Learning Module

As we described in Section 1.3 on page 5, the learning module structure is almost fixed. Some content has to be written by the module author and some content is generated automatically when running the ffgf. Table 5 lists each section of the basic learning module structure and the respective content creator.

Table 5: Learning Module Sections and their Content Creator

Section	Content Creator		
	Module Author	Course Author	ffgf
1 Introduction			o
1.1 Welcome	o		
1.2 The Goals and How to Reach Them	o		o
1.3 Module Vicinity	o		
1.4 My Goals		o	
1.5 Tips	o		
1.6 FAQ	o		
2 Theory			o
2.1 Theoretical Basics			o
2.2 Readings		o	
2.3 Self Test		o	
2.4 Quiz		o	
3 Knowledge Application/Exploration			o
3.1 Introduction	o		
3.2 Hands-on Session			o
4 Prove Your Knowledge and Skills			o
4.1 Personal Synthesis		o	
4.2 Final Quiz		o	
4.3 Survey		o	


In the following, we only list the sections, which have to be maintained by the course author. That means all updates to the predefined text in this guide must also be applied to the respective files from the ffgf. The predefined text is emphasized with a rippled frame. For a description of the content to be written by the module author, we refer to the module author guide [10]. The actual files are located under `gced_ffgf/etc/static` directory.

4.2.1 Logbook (always available)

The logbook helps the learner to keep track of his learning progress and note things for future reference. It is available throughout the learning module and must be accessible from each section page via the methods of the course system. The text of the task description can be found in Section 5.4.1.

4.2.2 My Goals (1.4)

This section activates previous knowledge of the learners and informs the tutor about the learners' expectations. The text of the task description can be found in Section 5.4.2.

	<p align="center">Operating System Laboratory</p> <p align="center">Course Author Guide</p>	<p align="right">v 1.01 25 July 2006</p>
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You are now invited to formulate your personal expectations from this module.
This short essay helps us to see what you expect after reading the module's topic.

When you think about your expectations and goals for this module, you activate your already existing knowledge.

At the end of this module you can compare your own goals with the reached ones.

Evaluation criteria:

You can earn a total of 20 points for this task:

- 4 points for a correct syntax and language
- 16 points for the quantity and the quality of the content

4.2.3 Readings (2.2)

In the readings section the learners can find heavier literature related to the current module. The module author provides the literature and divides it into two subsections of required (2.2.1) and recommended (2.2.2) readings respectively.

You have now reached the readings section that is subdivided into required and recommended readings.

Required readings are articles taken out of real life, originating from the area of the theory section.

Recommended readings are interesting and fit the theory but are not a must; they are intended for people more interested into the study matter.

With these readings you get used to the style of scientific writing.

It is not easy to read and understand scientific articles. If you start reading with the abstract you get an overview of the work presented. The introduction leads to the presented facts and helps understanding them. The most important section is the discussion. That is where the gained results are brought into context.

4.2.4 Self Test (2.3)


The self test helps learners to discover missing parts in their knowledge before taking the graded quiz. The module author creates the questions with feedback.

The Self Test helps you to decide whether you are ready for the Quiz or not. In case of wrong answers you get links to additional information where you can improve your knowledge. The Self Test is not reviewed. It is for your personal use and benefit only.

Click on Self Test in the Action Menu at the top and start with the test.
There are no time limitations to this task and you can always come back.

Evaluation criteria:

No points can be earned for this task.

	<p align="center">Operating System Laboratory</p> <p align="center">Course Author Guide</p>	<p align="right">v 1.01 25 July 2006</p>
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4.2.5 Quiz (2.4)

The quiz supports the tutor in the decision whether learners are allowed to access the hands-on session or not by assessing the learners' knowledge. The module author creates the questions with predefined solutions for the tutor.

If you feel ready for the hands-on session and you are satisfied with your Self Test results, solve the Quiz. The Quiz results will be reviewed and evaluated by your tutor. You must finish the Quiz before proceeding to the hands-on session!

Click on Quiz in the Action Menu at the top and choose Quiz. You get to the Quiz dialog and then you can start.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 30 points for this task:

- each question gives a certain amount of points

4.2.6 Personal Synthesis (4.1)

The personal synthesis allows learners to express in their own words, what they did. The text of the task description can be found in Section 5.4.5.

You are now asked to write your personal synthesis. The form is a short essay in which you describe the acquired knowledge made in the theory and in the hands-on session.

Describe newly adopted strategies and the observed results.

Describe also what you would like to have done additionally for satisfying your personal interest of the module topic.

Click on Quiz in the Action Menu at the top and choose Personal Synthesis. You get to the Quiz dialog and then you can start with the essay.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 20 points for this task:


- 4 points for a correct syntax and language
- 16 points for the quantity and the quality of the content

4.2.7 Final Quiz (4.2)

In the final quiz, the learners' results from the hands-on session are assessed by the tutor. The module author creates the questions with the predefined solutions for the tutor.

In the Final Quiz you reply less theoretical than practical questions. Major parts of this quiz are the results and log files gained and saved during the hands-on session.

This is the last evaluated task of this module. Nevertheless it is also required to fill the module survey.

	<p align="center">Operating System Laboratory</p> <p align="center">Course Author Guide</p>	<p align="right">v 1.01 25 July 2006</p>
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Click on Quiz in the Action Menu at the top and choose Final Quiz. You get to the Quiz dialog and then you can start.

There are no time limitations to this task and you can always come back. Another entry point to this task is via Evaluation on the Navigation Bar on the left hand side.

Evaluation criteria:

You can earn a total of 40 points for this task:

- each question gives a certain amount of points

4.2.8 Survey (4.3)

The survey collects impressions from the learners about their experiences and equipment. This information can be used by the module/course author to improve the module/course respectively. The text of the task description can be found in Section 5.4.7.

This survey helps us to adapt and improve this module. Please fill out all the fields.

Evaluation criteria:

You can earn a total of 5 points for this task:

- each not answered question reduces the total points by 1

5 Course Preparation

This section explains how to prepare the course for the use by the module authors. The descriptions are based on the course platform WebCT Vista [14] version 3.0.6.17. In the following you learn how to access WebCT Vista, create a course, upload the common design and pictures as well as create the templates of the learning tools.

5.1 WebCT Access

WebCT Vista is operated by EduTech [15] and SWITCH [16]. You can access it via the portal page [17], where you should also check your browser for compatibility with WebCT Vista.

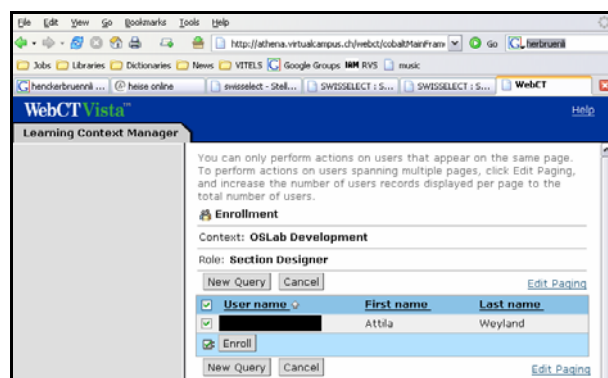
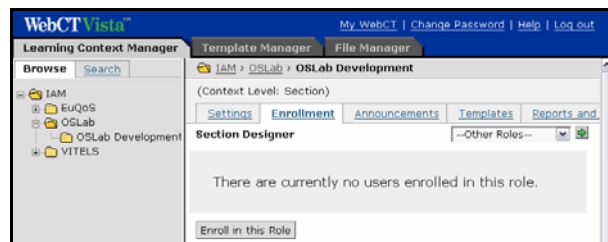
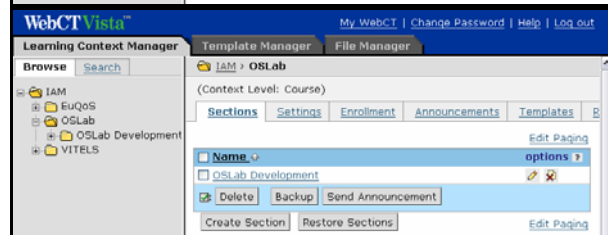
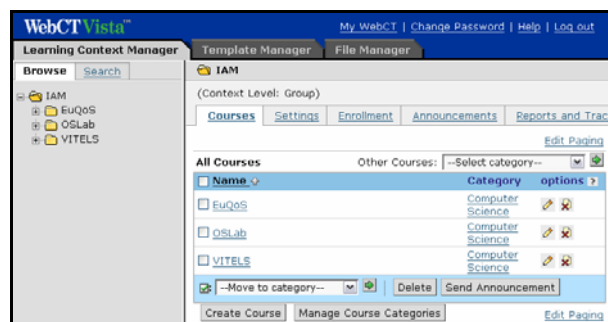
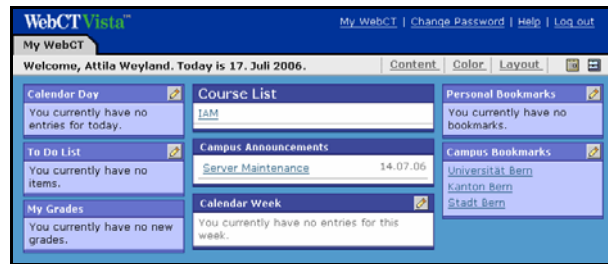
1. Access the WebCT Vista portal. Select your institution from the “Institution Listing”. Log in with your provided account information. After you log in, you’ll see the page “My WebCT”.

5.2 Course Creation

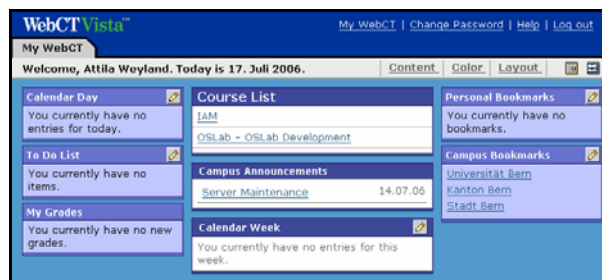
The first step is to create a new course within WebCT Vista. It provides several hierarchy levels, starting with group, then course and finally section. The group represents the institutional level, e.g. Institute of Computer Science and Applied Mathematics, IAM. A group can have several courses, e.g. VITELS, EUQoS and OSLab. A course can contain sections, e.g. OSLab Development. A section is a specific version of a course. Each level supports different roles. For the preparation of a new course, an account with the role section designer in this course is sufficient. The next steps describe how to create a new section and enroll a user:



1. Select the group, under which you want to add your course, e.g. "IAM". If you keep the mouse over a course list entry, your role pops up. After you selected the group, the learning context manager on the group level appears.
2. Click on the course "OSLab" to enter the course context level. The list of available section appears.
3. Click "Create Section". A new page appears. Enter the title of your new section, e.g. "OSLab Development" and click "Save". The learning context on the level course appears again. Click the newly created section. The "Enrollment" page appears.
4. Click the roll you want to assign to an account, i.e. "Section Designer". A section designer is allowed to modify a section. Click "Enroll in this Role". The "Enrollment - Query User" page appears.
5. Enter the account name you want to enroll and click "Run Query". A list with the matching results of your query appears. Mark the checkbox in front of the account name and click "Enroll". The "Enrollment" page appears again showing an increased number behind the corresponding role. Click "My WebCT" on top of the page.



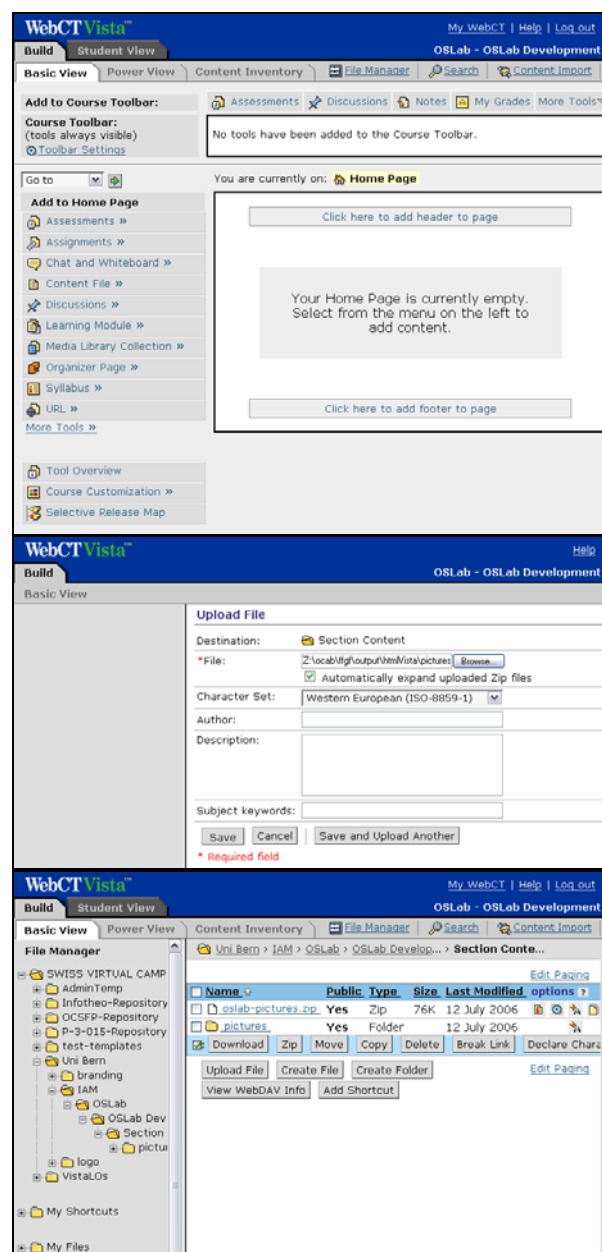
- Select the newly created section, e.g. “OSLab – OSLab Development” from the course list. After you selected the course, its homepage appears.



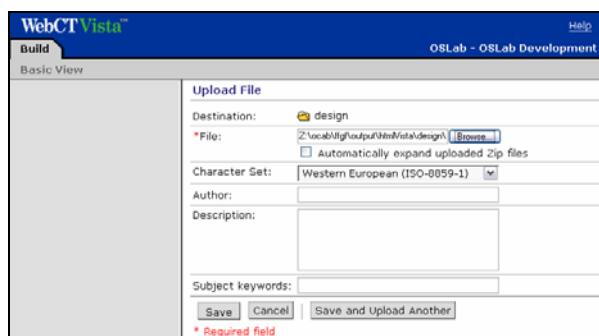
5.3 Design and Pictures Integration

The following steps describe how to add the cascading style sheet file as well as the common pictures.

- On the course homepage, select “File Manager” from the menu bar on the top. The file manager view of the section content appears. Click “Upload File”. An “Upload File” page appears.
- Browse for the local zipped OSLab pictures. Mark the check box “Automatically expand uploaded Zip files” and click “Save”. The “File Manager” appears. It lists the zip and a newly created folder, which contains all the files.
- Rename the newly created folder by clicking the eraser character symbol in the options column and enter “pictures” as name.
- Select “Create Folder” and enter as folder name “design”. Enter the folder by clicking on it.
- Click “Upload File”. An “Upload File” page appears.



6. Browse for the local OSLab course cascading style sheet, e.g. oslab.css and click "Save". The "File Manager" appears again.



5.4 Learning Tools Template Integration

This section describes how to prepare the learning tools presented in Section 1.4 on page 6, so that module authors can base their work on templates. These templates are created and maintained by the course author. Table 6 gives an overview of the didactic learning tools and how we mapped them to the WebCT Vista learning tools.

Table 6: Learning Tools Representation

Availability	Learning Tool	Points	WebCT Vista Representation
Always	Discussion	0	Discussions – Discussion Topic
Always	Logbook	25	Assessment – Quiz
1.3	My Goals	20	Assessment – Quiz
2.3	<i>Self Test</i>	0	<i>Assessment - Self Test</i>
2.4	<i>Quiz</i>	30	<i>Assessment – Quiz</i>
4.1	Personal Synthesis	20	Assessment – Quiz
4.2	<i>Final Quiz</i>	40	<i>Assessment – Quiz</i>
4.3	Survey	5	Assessment – Quiz

We only use discussions and assessments (of type quiz or self test). An assessment can contain multiple questions (of type Paragraph or Multiple Choice). We distinguish between common and *specific* assessments. The first category (Logbook, My Goals, Personal Synthesis, and Survey) are identical for each module, because they contain exactly the same question(s). The module authors adopt these assessments as they stand including the question(s) for their own module. The second category (Self Test, Quiz and Final Quiz) contains specific questions formulated by the module author. Here the module authors only adopt the assessment settings and include their own questions.

In the following section we describe how to create the templates for both common and specific assessments in WebCT Vista. The creation of a discussion does not require a template. We start with a detailed description for the creation of the logbook template. For the remaining assessments we only mention the differences to the logbook creation. The predefined text of the task description is emphasized with a rippled frame.

5.4.1 Logbook

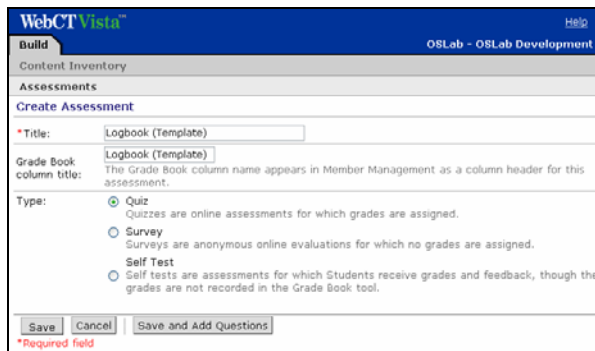
The task description shown to the learner in the course system is given below:

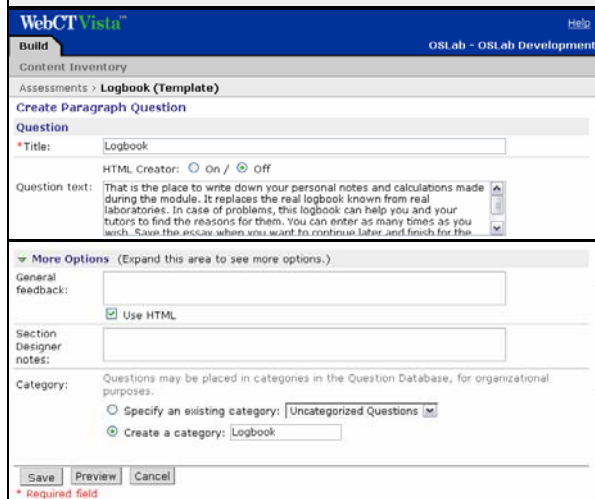
That is the place to write down your personal notes and calculations made during the module. It replaces the real logbook known from real laboratories. In case of problems, this logbook

can help you and your tutors to find the reasons for them. You can enter as many times as you wish. Save the essay when you want to continue later and finish for the evaluation by your tutor.

The following steps explain how to create the logbook assessment:

1. Click “Content Inventory” on the menu bar. The content inventory page appears. Select “Assessments”. The assessment page appears. Choose “Create Assessment”. A new page appears. Enter the name of the common assessment and mark it as template, i.e. Logbook (Template). Click “Save and add Questions”. The assessment inventory page appears.
2. Select “Paragraph” from the “Create Questions” menu on the left. A new page appears.
3. Enter the title “Logbook” and enter the appropriate question text given above. Unfold the section “More Options” and create a new category for this question type, i.e. “Logbook”. Click “Save”. The assessment inventory page appears again.







4. On the assessment inventory page, adjust the points of the question to give a total which corresponds to the value listed in Table 6, i.e. 25. Select “Edit Settings” (small gear) from the top menu. An “Edit Assessment Settings” page appears.
5. Change the “Duration” and “Attempts allowed” option to “unlimited”. Set the “Student score release” option to “... questions have been graded.” Expand the “Submission Settings” and enter a nice feedback message as well as a valid e-mail address.

The top screenshot shows the 'WebCT Vista' interface with the 'Content Inventory' tab selected. Under 'Assessments > Logbook (Template)', there is a table with one row: '1. Logbook' with 25 points and a 'Paragraph' type. The 'Total Points' is 25. Below the table are buttons for 'Add Question Alternates' and 'Remove'.

The bottom screenshot shows the 'Edit Assessment Settings' page for the 'Logbook (Template)' assessment. It includes sections for 'Settings', 'Question titles', 'Question delivery', 'Duration', 'Attempts allowed', 'Attempts separation', 'Student score release', 'Submission Settings', and 'Security Settings'. The 'Duration' is set to 'Unlimited', 'Attempts allowed' is 'Unlimited', and 'Student score release' is set to 'Release the score once the assessment has been submitted and all of the questions have been graded.' The 'Submission Settings' section has a text area for a message and an email address field.

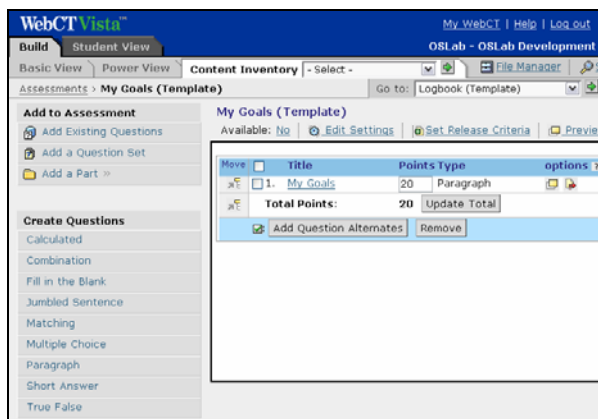
5.4.2 My Goals

The task description shown to the learner in the course system is given below:

Write a short essay of at least 10 but not more than 20 lines where you formulate your own goals for this course module with the knowledge and expectations you have. Please do this before going on with the lecture of the module. You can enter as many times as you wish. Save the essay when you want to continue later and finish for the evaluation by your tutor.

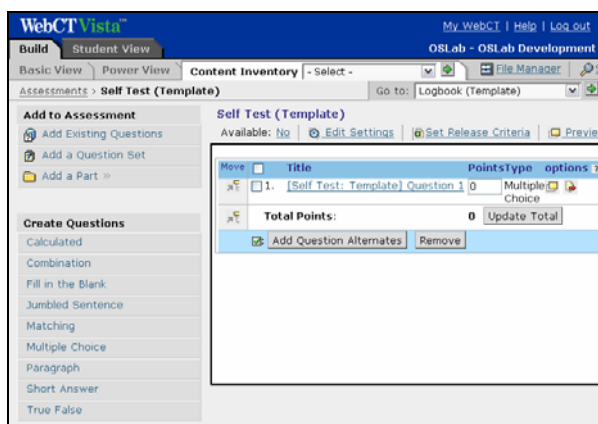


1. Repeat all the steps described in Section 5.4.1. Use “My Goals” instead of “Logbook” for the assessment and question title as well as the question category. Use the appropriate question text from above. Set the total points for the assessment to 20.



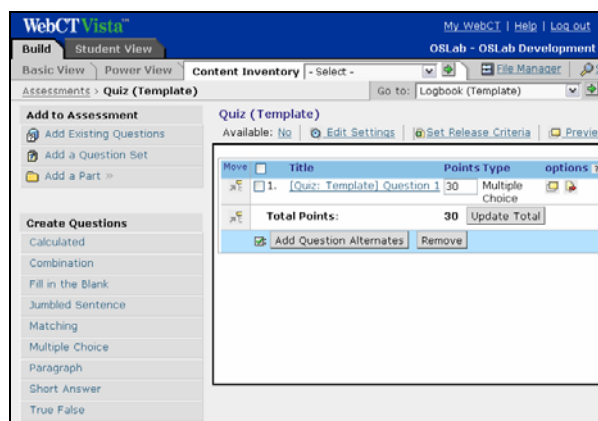
5.4.3 Self Test

1. Repeat all the steps described in Section 5.4.1. Select “Self Test” as assessment type. Use “Self Test” instead of “Logbook” for the assessment title and the question category. Create a dummy question with title “[Self Test: Template] Question 1” and of type “Multiple Choice” to fill the self test. No points are given for the self test.



5.4.4 Quiz

1. Repeat all the steps described in Section 5.4.1. Use “Quiz” instead of “Logbook” for the assessment title and the question category. Create a dummy question with title “[Quiz: Template] Question 1” of type “Multiple Choice” to fill the quiz. Set the total points for the assessment to 30.



5.4.5 Personal Synthesis

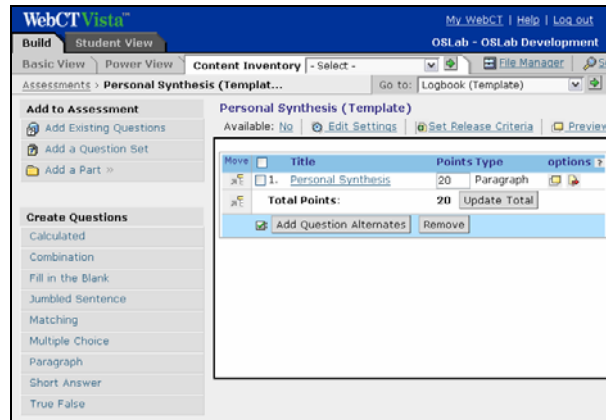
The task shown to the learner in the course system is given below:

Please write down your experiences that you have made in the theory and hands-on sections. You can focus on one topic or on several topics. Write about new discovered topic relations or unresolved issues. You should express in your learning process in your own words. Write at least 20 lines but not more than 50. You can enter as many times as you wish. Save the essay when you want to continue later and finish for the evaluation by your tutor. You can



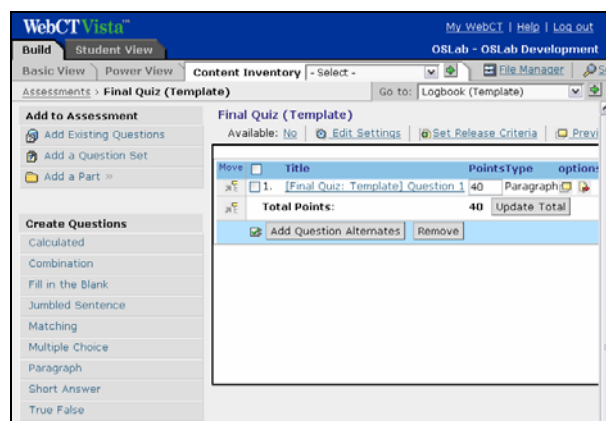
enter as many times as you wish. Save the essay when you want to continue later and finish for the evaluation by your tutor.

1. Repeat all the steps described in Section 5.4.1. Use “Personal Synthesis” instead of “Logbook” for the assessment and question title as well as the question category. Use the appropriate question text from above. Set the total points for the assessment to 20.



5.4.6 Final Quiz

1. Repeat all the steps described in Section 5.4.1. Use “Final Quiz” instead of “Logbook” for the assessment title and the question category. Create a dummy question with title “[Final Quiz: Template] Question 1” of type “Paragraph” to fill the quiz. Set the total points for the assessment to 40.



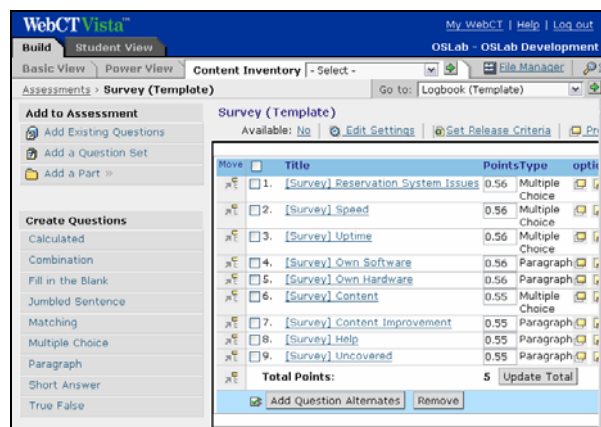
5.4.7 Survey

The questions presented to the learner within the course system are given below:

1. Did you experience any problems with the reservation system for this module?
 - No
 - Yes
2. What is your impression about the download speed of the course content?
 - It was fast enough.
 - It was too slow
 - I could drink 3 coffees until a page had loaded.
3. Were the course server and especially the module servers available when you wanted to access?
 - Mostly not
 - Mostly
 - No
5. Did you experience problems with your own hardware during this module?
 - (essay)
6. Was the content adapted to the learning objectives? (multiple selections possible)
 - Too few
 - Too much
 - No
 - The content didn't help for reaching the goals
 - Yes
7. How could the content for this module be improved?
 - (essay)
8. Is there anything about this module that was not covered above?

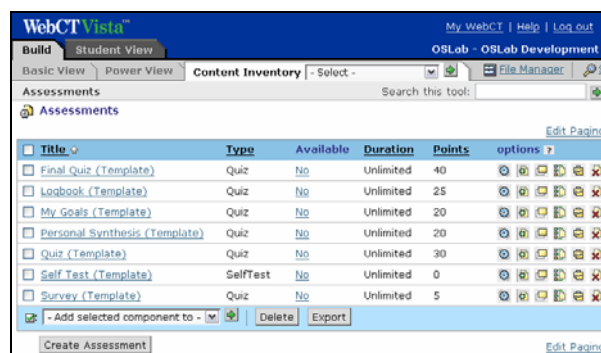
- | | |
|--|------------------|
| <p>- Yes</p> <p>4. Did you experience problems with your own software during this module?</p> <p>- (essay)</p> | <p>- (essay)</p> |
|--|------------------|

- Repeat all the steps described in Section 5.4.1. Use “Survey” instead of “Logbook” for the assessment title as well as the title and category of all questions. Under the assessment settings, set the question delivery to “... one at a time and allow ... revisited.”. Use the questions from above. Note the two question types “Multiple Choice” and “Paragraph”. Set the total points for the assessment to 5.



After creating the templates for all the assessments, you should obtain the following summary page:

- Click “Content Inventory” on the menu bar. The content inventory page appears. Select “Assessments”. The assessment page appears.



6 Initialization Module Integration

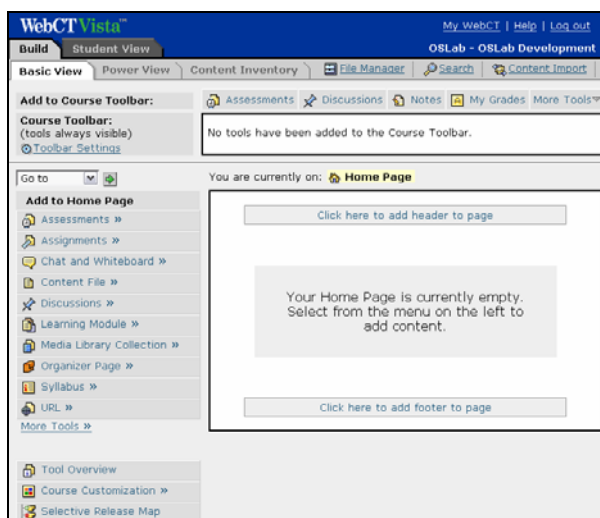
This section describes how to integrate the initialization module into a course platform and take advantage of the provided learning tools, such as essays and quizzes. The descriptions are based on the course platform WebCT Vista [8] version 3.0.6.17.

6.1 Content Subscription

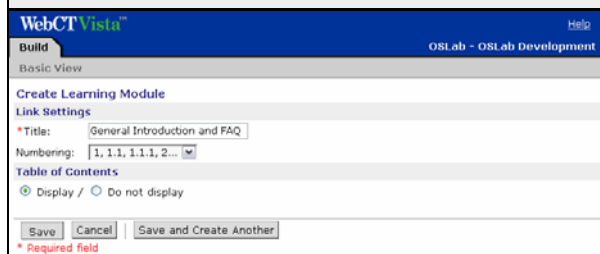
This section explains how to index your content inside a learning module. Notice the different tabs on the top of the page, which allow you to switch between different views. The following operations are all for the “Build” tab. The “Student View” tab allows you to preview your module.



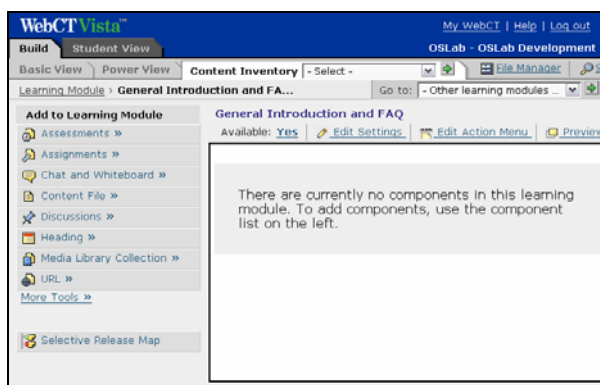
1. On the course homepage, select “Learning Module” from the “Add to Home Page” menu on the left. In the unfolding dialogue choose “Create Learning Module”. A “Create Learning Module” page appears.



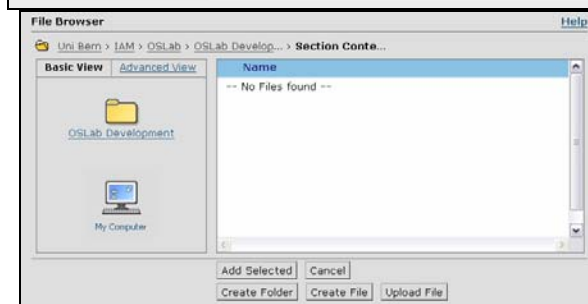
2. Type the title of your module, e.g. “General Introduction and FAQ”, keep the other settings unchanged and click “Save”. The course homepage appears again. Click on your newly added module and select “Edit” from the popup menu. The content inventory of your learning module appears.



3. Select “Content File” from the “Add to Learning Module” menu on the left. In the unfolding dialogue choose “Select File”. The “File Browser” loads in a separate page.



4. Select “Upload File”. An “Upload File” page appears.





5. Browse for your local zipped learning module. Mark the check box “Automatically expand uploaded Zip files” and click “Save”. The “File Browser” appears. It lists your zip and a newly created directory, which contains all your files.
6. Select all files inside a chapter and click “Add Selected”. The “File Browser” disappears and the content inventory lists the newly added files.
7. Indent the files according to their position in the table of contents. Repeat the processes described in 6 and 7 for each chapter.
8. On the module homepage click “Course Customization”. In the unfolding menu choose “Page Layouts”. The layout page appears. Click on the icon of your module and select “Replace Icon” from the popup menu. The “File Browser” appears.

Upload File

Destination: Section Content

*File: Z:\oclab\output\html\Meta\General\ Browse

☒ Automatically expand uploaded Zip files

Character Set: Western European (ISO-8859-1)

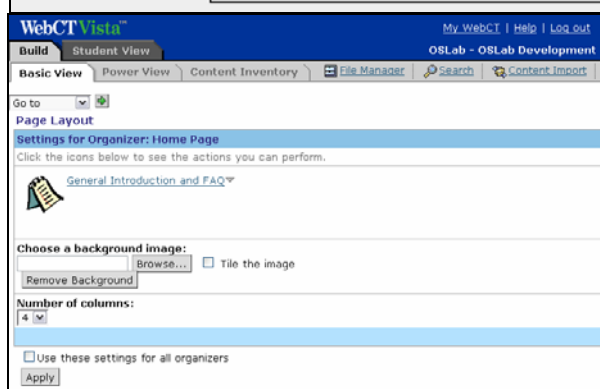
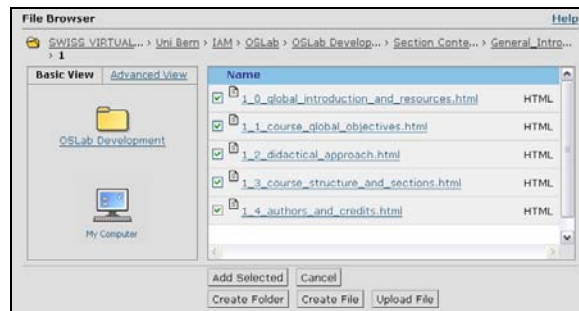
Author:

Description:

Subject keywords:

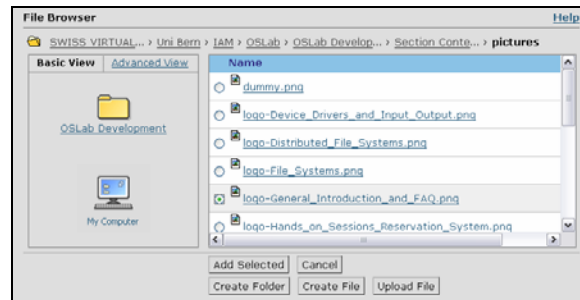
Save Cancel Save and Upload Another

* Required field





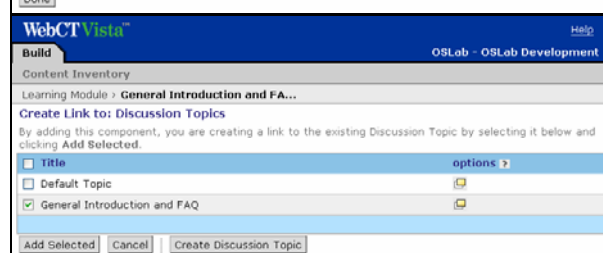
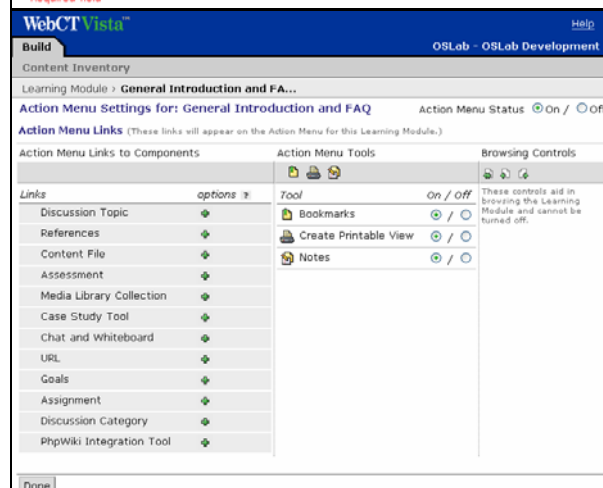
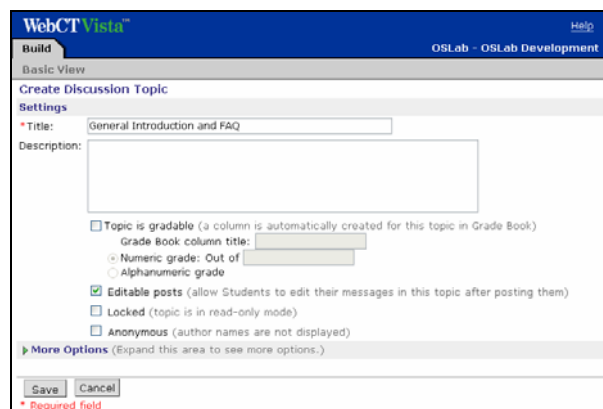
9. Select the logo corresponding to your module from the pictures directory and click “Add Selected”. The “File Browser” disappears and the layout page is now updated. Click “Basic View” to return to the module homepage.




6.2 Learning Tool Application

This section explains how to link the learning tool (discussion) with the initialization module content. The integration is done via the action menu provided by WebCT Vista. The discussion must be available throughout the whole initialization module.

1. Click “Content Inventory” on the menu bar. The content inventory page appears. Select “Discussions”. The discussions page appears. Choose “Create Topic”. A new page appears. Enter the name of your module and click “Save”.
2. Click “Basic View” on the menu bar. The module homepage appears. Click on your module and select “Edit” from the popup menu. The module inventory page appears. Select “Edit Action Menu” from the top of the content list. The action menu settings page appears.
3. Select “Create Link to Component” by clicking the plus behind the entry “Discussion Topic”. A new page appears. Select the topic for your module, e.g. “Demo Module” and click “Add Selected”. The action menu



	<p style="text-align: center;">Operating System Laboratory</p> <p style="text-align: center;">Course Author Guide</p>	<p style="text-align: right;">v 1.01 25 July 2006</p>
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settings page appears again.

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