



The Generation of Different Teaching Resources Using a Single Source of Information (ICECE'2007)

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Introduction

- Presenting a course requires a number of different teaching resources, for example:
 - *Lecture Slides* presented during lectures (using Microsoft PowerPoint), and
 - *Lecture Notes* containing more detailed information (using Microsoft Word).
- There is a possibility for *inconsistencies* as both resources are created *separately*.
- A solution would be to have the lecture slides and lecture notes generated from the *same source of information*.
- The same source could be used to generate *lecture slide notes* and an *online version*.
- This also provides *consistency* between various resources.
- A system using the methodology just described has been developed and been made available for download (in the near future).
- Referred to as the *Teaching Resource System*.
- Provides other functionality including *grading* and assessment.
- Runs under *Linux* (also *Cygwin*) and uses publicly available packages.
- All source files are *plain text*.

Introduction (2)

- The following items will be covered:
 - Document Preparation Tools
 - The Teaching Resource System
 - Practical Application:
 - * Course Information
 - * Lecture
 - * Tutorial and Laboratory
 - * Examination
 - * Assessment
 - * Web Site
 - Further Development
 - Conclusion

Document Preparation Tools

- Two main tools required for presenting a course of study are a *presentation package* and a *word processor*.
- Microsoft PowerPoint and Microsoft Word have some additional versatility:
 - Both can generate *online versions*, and
 - PowerPoint allows for *notes to be added to slides*.
- There are other document preparation packages which are in the public domain
- One particular public domain package is *LaTeX*.
- The main benefit of LaTeX is that documents are described using *plain text files*.
- LaTeX source files can be easily *manipulated* using programs such as Perl and Sed.
- Source files are compiled to produce *PDF documents*.

The Teaching Resource System

- The basis of the Teaching Resource System is *LaTeX*.
- Software used includes:

<i>Tool</i>	<i>Use</i>
LaTeX	Document preparation (PDF)
LaTeX2HTML	Online resources (HTML)
Perl	Programming language
Sed	Stream editor
GNU Make	Coordinate compilation
GNU Emacs	Editing the source files

- The *framework* for all the teaching resources are provided.
- LaTeX source files are *plain text*.
- Can use any plain text editor, for example, *Emacs*.
- *Directives* are used to generate different documents.
- Each source file is used to generate a *number of different documents*.
- *Online versions* of documents can also be created *automatically*.

The Teaching Resource System (2)

- The course web site is used to provide an *entry point* for all the resources.
- *Student assessment* is also included as part of the system.
- *Colour* is used in documents to make them *easier to read*.
- However, printing coloured documents on *monochrome printers* can be problematic.
- This has been overcome by setting colours either to *black or white*.

Practical Application

- Teaching resources used for a course depend on the *structure of the course*.
- Some resources are generally common to all courses.
- A practical example is *ELEC4605 Computer Engineering*.
- This course consisted of lectures, tutorial and laboratory exercises and examinations.
- A list of the source information for most of the course material are:

<i>Resource Source</i>	<i>Number of Source Files</i>
Course Information	One only
Lecture	One for each topic
Tutorial	One for each tutorial session
Laboratory	One for each laboratory session
Examination	One for mid-semester and one for final
Assessment	One for each form of assessment
Web Site	One only
Other	One for each additional resource

- Go through each resource in turn.

Course Information

- Document is handed out to students.
- Source file compiled to PDF and to HTML.
- This is a simple case where both resources contain the *same information*.
- A monochrome version is *automatically generated* for photocopying.

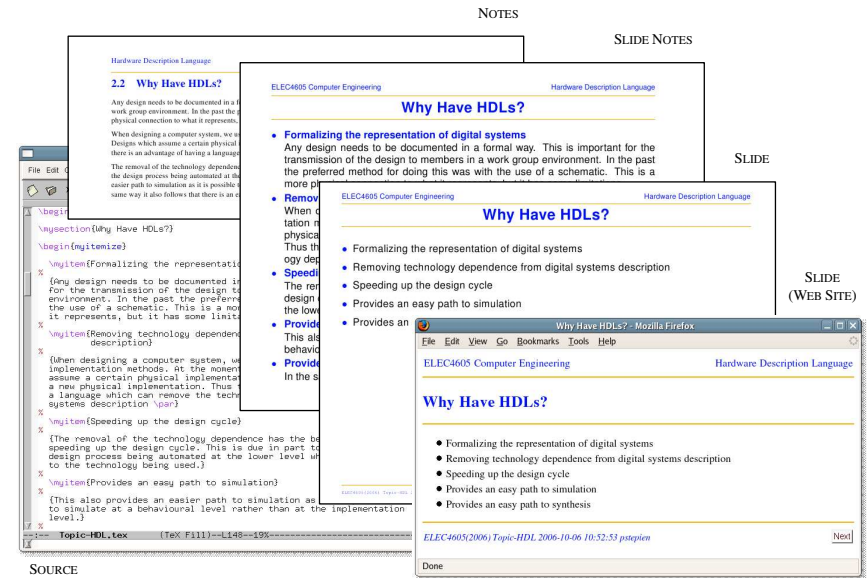
Lecture

- The lecture resources represent the *best example*.

Resource	Description
Lecture Notes	Detailed description of material presented in lectures
Lecture Slides	The slides presented in lectures
Lecture Slide Notes	Notes to help the lecturer present the material

- An example of the *three lecture resources generated* is shown on the following slide.
- The lecture slides are also made available in *HTML*.

Lecture (2)



Lecture (3)

- Example shows how parts of the source file contribute to create the various resources.
- Source file has key points along with a detailed description of the key points.
- Lecture notes only contain the detailed description.
- Lecture slide contains only key points.
- Slide notes that include both the key points and the detailed description.
- An online version of the lecture slides for the course web site.
- A HTML version is convenient since it does not require a PDF browser.
- Various parts of the source are used by default in different resources.
- Can add directives to include certain information into a particular resource.
- All of the information for the various resources are contained in the *same source file* and *kept together*.

Tutorial and Laboratory

- A single source file is used to generate three different resources:

Resource	Description
Work Sheet	Instructions and questions for students to complete
Solutions	Solutions for students to check their own work
Tutor Notes	Detailed solutions and instructions for tutors

- Source file is structured in a similar way to the lecture resources only that there are three different sets.
- Tutor notes contain the questions and the solutions as well as extra information to help tutors answer student questions.
- Students receive the work sheet and solutions in both PDF and HTML.

Examination

- A single source file is used to generate three different resources:

<i>Resource</i>	<i>Description</i>
Questions	The examination paper
Solutions	Solutions to the examination questions
Extracts	Parts of the examination paper such as the title page

- The source file contains both the questions and the solutions.
- Solutions document contains the questions along with the solutions.
- Parts of the examination paper can be extracted for inclusion on the course web site.

Assessment

- The Teaching Resource System has been extended to include *maintaining student results*.
- Student details are contained in a plain text file.
- Information is extracted using a Perl script to generate LaTeX source for compilation.
- Student roles, marking sheets and overall student result documents can be created.
- Can be difficult to update the details of a particular student.
- Can be overcome if results to be entered are in order.
- Another alternative method allows unsorted results to be entered along with a partial student identification number.

Web Site

- Web site is used to provide an *entry point* for all the resources students use in the course.
- Web site pages are formatted similar to the PDF documents.
- The *complete top level of the web site* is also available as a PDF document.
- Documents are also provided in two or four pages on one sheet in an effort to save paper.
- Most of the resources generated for a course of study are made available on the course web site.
- Certain resources are also available as HTML.

Future Development

- The Teaching Resource System is being developed on a continuous basis.
- Main aim is to make the source documents as simple as possible.
- Update version control to use Concurrent Versions System (CVS).
- Improve the deployment of the course web site.
- Store student records using a database program.

Conclusion

- Using a *single source* of information guarantees that there is *consistency* between resources.
- *Quick and convenient* to add or modify teaching material.
- Teaching resources are created in a *systematic manner*.
- The Teaching Resource System described provides a *complete solution* for generating all teaching resources and also for recording student assessment.
- Have a look at <http://www.cel.usyd.edu.au/~pstepien/TRS1000>

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