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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:

Tool	*Use*
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:

Resource Source	*Number of Source Files*
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.

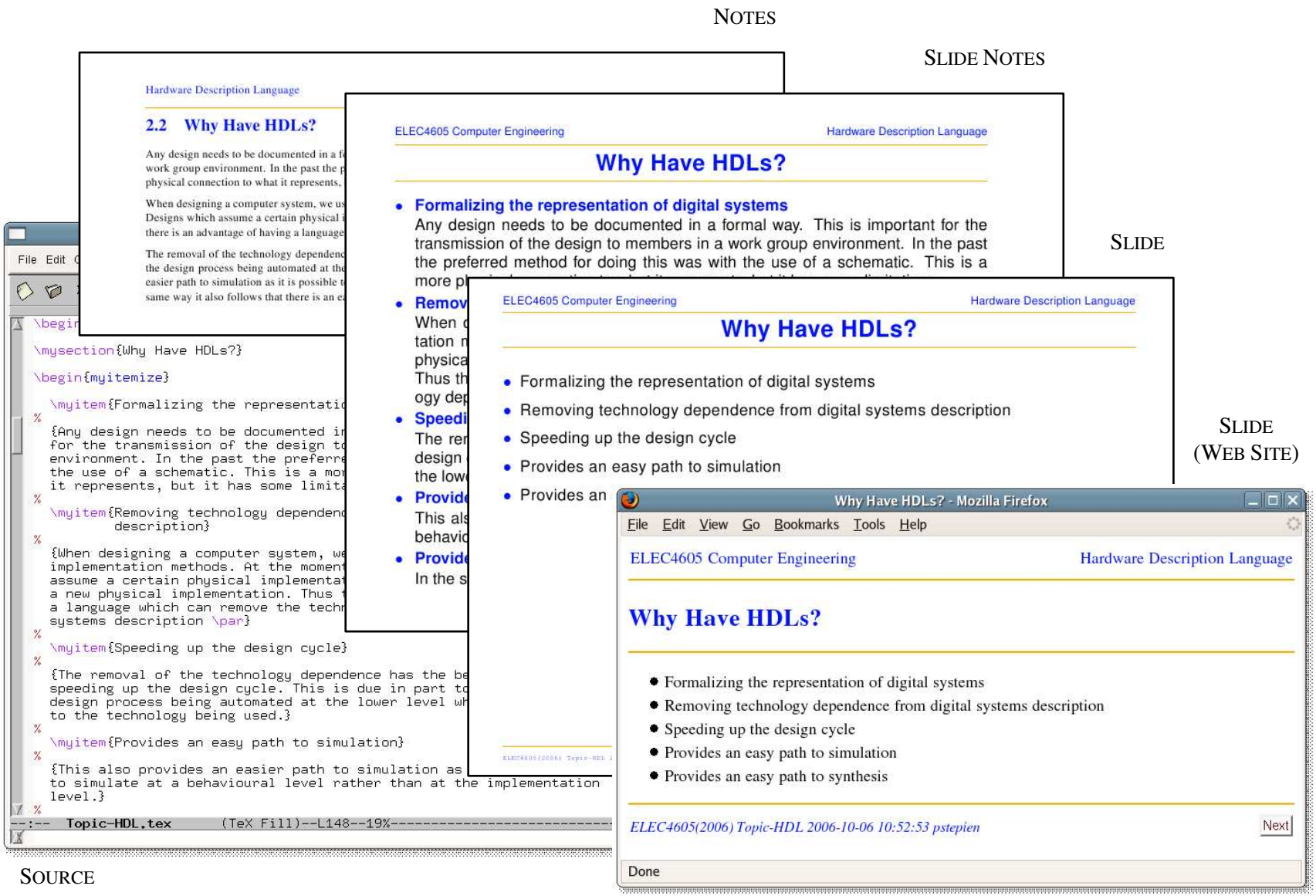
Lecture

- 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)


NOTES
SLIDE NOTES
SLIDE
SLIDE (WEB SITE)
SOURCE
Hardware Description Language
2.2 Why Have HDLs?
ELEC4605 Computer Engineering
Hardware Description Language
Why Have HDLs?
Formalizing the representation of digital systems
Removing technology dependence from digital systems description
Speeding up the design cycle
Provides an easy path to simulation
Provides an
Why Have HDLs? - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
Provides an easy path to synthesis
ELEC4605(2006) Topic-HDL 2006-10-06 10:52:53 pstepien
Next
Done
\mysection{Why Have HDLs?}
\begin{myitemize}
\myitem{Formalizing the representation
{Any design needs to be documented in a formal way. This is important for the transmission of the design to members in a work group environment. In the past the preferred method for doing this was with the use of a schematic. This is a more physical representation, but it has some limitations.}
\myitem{Removing technology dependence from digital systems description}
{When designing a computer system, we usually assume a certain physical implementation. Designs which assume a certain physical implementation methods. At the moment there is an advantage of having a language which can remove the technology dependence from digital systems description \par}
\myitem{Speeding up the design cycle}
{The removal of the technology dependence has the benefit of speeding up the design cycle. This is due in part to the design process being automated at the lower level which is not dependent to the technology being used.}
\myitem{Provides an easy path to simulation}
{This also provides an easier path to simulation as it is possible to simulate at a behavioural level rather than at the implementation level.}
--:-- Topic-HDL.tex (TeX Fill)--L148--19%

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:

Resource	*Description*
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`

Note: Peter Stepien is currently working for ResTech Pty Ltd at the University of Newcastle, Australia.