CSCE 222
Discrete Structures for Computing

LaTeX

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Based on slides by Andreas Klappenecker
Tripitaka Koreana

- Palman Daejanggyeong ("Eighty-Thousand Tripitaka")
- South Korean collection of Buddhist scriptures
- Carved onto 81,258 wooden printing blocks in the 13th century
- The world's most comprehensive and oldest intact version of Buddhist canon in Hanja script, with no known errors or errata in the 52,382,960 characters
Haeinsa - UNESCO World Heritage Site
Gutenberg

- Johannes Gutenberg
- Introduced movable metal type to Europe (in around 1439)
- Invented the printing press
- Started a revolution in printing in Europe
Gutenberg demonstrated his printing technology by printing a complete bible.

The Gutenberg bible was produced at a significantly lower cost than hand copying.

Still, cost: about 3 years salary of a clerk per bible.

1978: Copy sold for $2.2 million
Genitus.

...nominatibusque nos genitori dium

A principio creavit deus celum. et terram.

Terra autem erat inanis et vacua: et erant in usu solus abisit: et spiritus dei creabatur super aquas.

Dixit deus: fiat lux. Et fuit lux.

Et vidit deus lucem et erat bonus: et dividit lucem a terra et superna a speciebus noctem.

Dixit deus: fiat firmamentum in medio aquarum: et dividat aquas ab aquis.

Et fecit deus firmamentum: et dividit aquas quae erant sub firmamento: et creavit super firmamentum: datum est ei.

Dixit deus: fiat super terra et mare dies deum.

Et fecit deus terra et mare.

Hic erat solus in locum unius et apparebat arida.

Et fecit deum, et appellavit deum lucem.

Et videbatur deus a terra e fine mensis et semel e fine mensis.

Hic erat solus in locum unius et apparabat arida.

Et fecit deus terra et mare.

Hic erat solus in locum unius et apparabat arida.

Et fecit deus terra et mare.

Hic erat solus in locum unius et apparabat arida.
Fast Forward to 1974

Academic books often a mix of handwritten symbols (e.g. formulas) and typeset symbols.

Note the arrows...
Fast Forward to 2011
(Homework Submission)

The scan is a faithful reproduction of the submission! It remains a mystery how the TA was able to read it.
Late 70's: Don Knuth invents TeX

2 Features

Both \TeX{} and \LaTeX{} allow for àçcéûts, and excel at typesetting mathematical equations, in-line or displayed on a line by itself. For instance, an article on quadratics may need

\[ax^2 + bx + c = 0 \implies x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a},\]

or an article on complex analysis may include \(e^{i\theta} = \cos \theta + i \sin \theta\).
Knuth

Don Knuth illustrates the mathematical typesetting with TeX by writing the bible of computer programming:

Four volumes published so far:
1984: LaTeX

In 1984, Leslie Lamport writes the markup language LaTeX that makes TeX particularly easy to use.

Key feature: The document is organized according to its structure (e.g. Title, Chapter, Sections, etc.)

The language is easy to learn

Available on virtually all computing platforms
Computer programmers will feel right at home: The document is produced by a program.

The language can be customized with macros.

Typesetting of formulas is easy: Once you understand the main features, most formulas are quickly written in LaTeX.

Much faster than any formula editor.
Structure of a LaTeX Document

```latex
\documentclass{article}
% macro definitions
\begin{document}
% text comes here
\end{document}
```

- Comments begin with `%`
- Commands start with `\`

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LaTeX Example

\documentclass[12pt]{article}
\usepackage{amsmath}
\title{LaTeX}
\date{}
\begin{document}
\maketitle
LaTeX is a document preparation system for the \TeX{} typesetting program. It offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout, bibliographies, and much more. \LaTeX{} was originally written in 1984 by Leslie Lamport and has become the dominant method for using \TeX{}; few people write in plain \TeX{} anymore. The current version is \LaTeX{}e.

\begin{quote}
\$\text{This is a comment; it will not be shown in the final output.}\$
\begin{quote}
\text{The following shows a little of the typesetting power of LaTeX:}\n\begin{align}
E &= mc^2 \\
(m &= \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}})
\end{align}
\end{quote}
\end{quote}
\end{document}
Emphasizing Text

This is a \textbf{bold} text
This is a \textit{text} in italics
This is a \textsl{slanted} text

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This is a \textit{text} in italics
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You can write a text and within the text you can have inline mathematical formulas, such as $\sqrt{x^2+1}$, that are simply enclosed in single dollar signs.

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Displayed Mathematics

Important equations can be set in double dollar signs, for example

\[ y = \sqrt{x^2 + 1}, \]

and will be displayed as a centered equation.

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Numbering Equations

A numbered equation
\begin{equation}
\label{eqn}
\begin{align*}
    z^2 &= x^2 + y^2.
\end{align*}
\end{equation}
It follows from equation (\ref{eqn}) that ...

\begin{equation}
    z^2 = x^2 + y^2. \quad (1)
\end{equation}

It follows from equation (??) that ...
Compiling LaTeX Documents

Suppose you have written a LaTeX document, say homework.tex

Compiling the document, typesetting, and creating a pdf file:
\texttt{pdflatex homework.tex}

View your document homework.pdf with some pdf viewer (e.g., ghostview homework.pdf, preview homework.pdf, ...)

LaTeX Distributions

- Windows: MikTeX
- Mac: MacTeX
- Unix: Tex Live

Further information: http://www.ctan.org/

Already installed on unix.cs.tamu.edu
Homework

Our problem sets will be assigned using a LaTeX file, say hw1.tex

The file will typically contain 10 problems

You add the solutions, your name, and all the resources that you have used.

Submit your homework solution to ecampus: hw1.tex and hw1.pdf (BOTH!!!)

Submit a hardcopy version of your hw1.pdf in class (no need to print out hw1.tex).