PRETEXT

AN INTRODUCTION

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ACCESSING HIGHER GROUND, WORKSHOP N

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WHAT IS PRETEXT?

- An authoring and publishing system:
  - Extensive support for mathematics (and STEM)
  - Designed to create openly licensed materials
- An abstract specification of a scholarly document
- Markup for scholarly documents (markup—“the process or result of correcting text in preparation for printing”)
- All disciplines: mathematics, computer science, physics, engineering, music theory, economics, college writing, children's books, …
- Implementations of conversions to various formats
- A modern replacement for LaTeX
- A commitment to creating accessible materials
- A community of instructors, authors, and publishers
- Guided by 11 principles, e.g. …
- Principle #10: PreTeXt recognizes that scholarly documents involve the interaction of authors, publishers, scholars, curators, instructors, students, and readers, with each group having its own needs and goals.

KEY IDEA: WRITE ONCE

The PreTeXt authoring language captures an author's intent and document structure, AS THE AUTHOR WRITES.

An author concentrates on CONTENT and is not able to influence PRESENTATION.

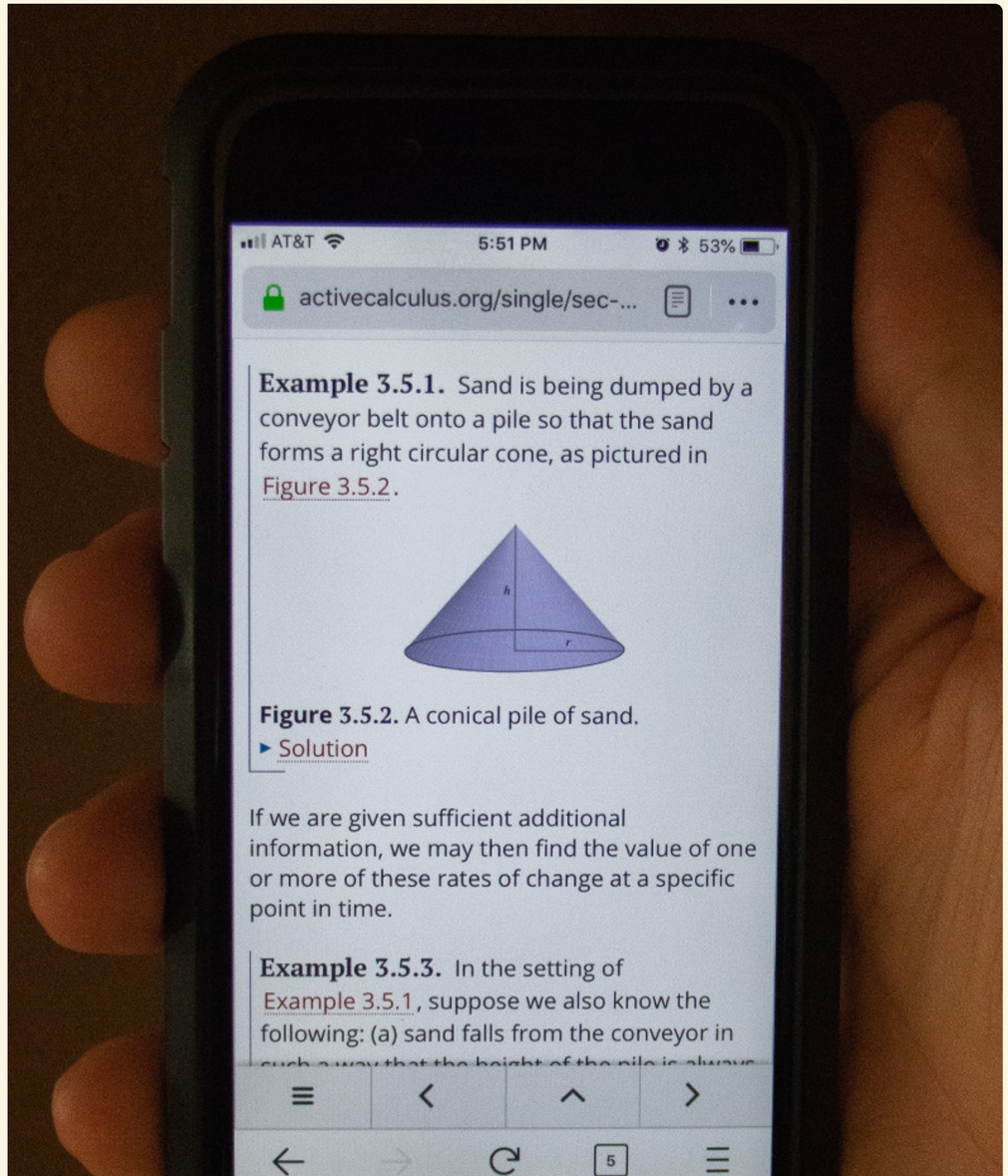
Principle #1: PreTeXt captures the structure of textbooks and research papers.

PAYOFF: READ ANYWHERE

- PDF: print and electronic versions
- HTML: highly interactive, amazingly accessible
- EPUB/Kindle: an improvement on PDF
- Jupyter notebooks: popular for data science, Python programming
- Runestone: open-source hosting of open textbooks, with LMS, more interactivity
- Braille: embossable and electronic, 100% automated, no transcriber
- Slideshows: you are viewing one now
- Principle #3: PreTeXt documents serve as a single source which can be easily converted to multiple other formats, current and future.

ONLINE (HTML) OUTPUT

"Write Once, Read Anywhere" (Principle #3)



- Adheres to standards
- Very careful, appropriate use of CSS
- Extremely accessible (Principle #11)
- MathJax is the enabling technology

HIGHLY ACCESSIBLE ONLINE (HTML) OUTPUT

- Accessiblity is Principle #11
- Use HTML standards
- HTML could render *without* CSS, Javascript
- “Skip to Main Content”
- Strict Hierarchy of `hN` headings
- Math with MathJax's Speech Rule Engine: visual, speech, Nemeth braille
- Scales uniformly for low-vision (SVG images)

PDF, PRINT OUTPUTS AND MORE

3.5.1 Related Rates Problems

In problems where two or more quantities can be related to one another, and all of the variables involved are implicitly functions of time, t, we are often interested in how their rates are related; we call these *related rates* problems. Once we have an equation establishing the relationship among the variables, we differentiate implicitly with respect to time to find connections among the rates of change.

Example 3.5.1 Sand is being dumped by a conveyor belt onto a pile so that the sand forms a right circular cone, as pictured in Figure 3.5.2.

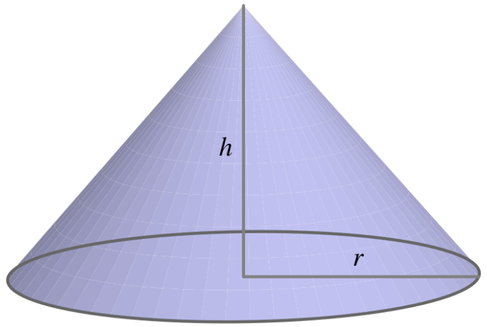


Figure 3.5.2: A conical pile of sand.

Solution. As sand falls from the conveyor belt, several features of the sand pile will change: the volume of the pile will grow, the height will increase, and the radius will get bigger, too. All of these quantities are related to one another, and the rate at which each is changing is related to the rate at which sand falls from the conveyor.

We begin by identifying which variables are changing and how they are related. In this problem, we observe that the radius and height of the pile are related to its volume by the standard equation for the volume of a cone,

$$V = \frac{1}{3}\pi r^2 h.$$

Print and PDF output via LaTeX

- Two conversions: print-on-demand, electronic PDF
- Extensive use of the `tcolorbox` package (CSS-like)
- Evolving styling/themes

Other outputs:

- Hosting at Runestone (a LEAP)
- EPUB, Kindle
- Jupyter notebooks
- Braille

XML

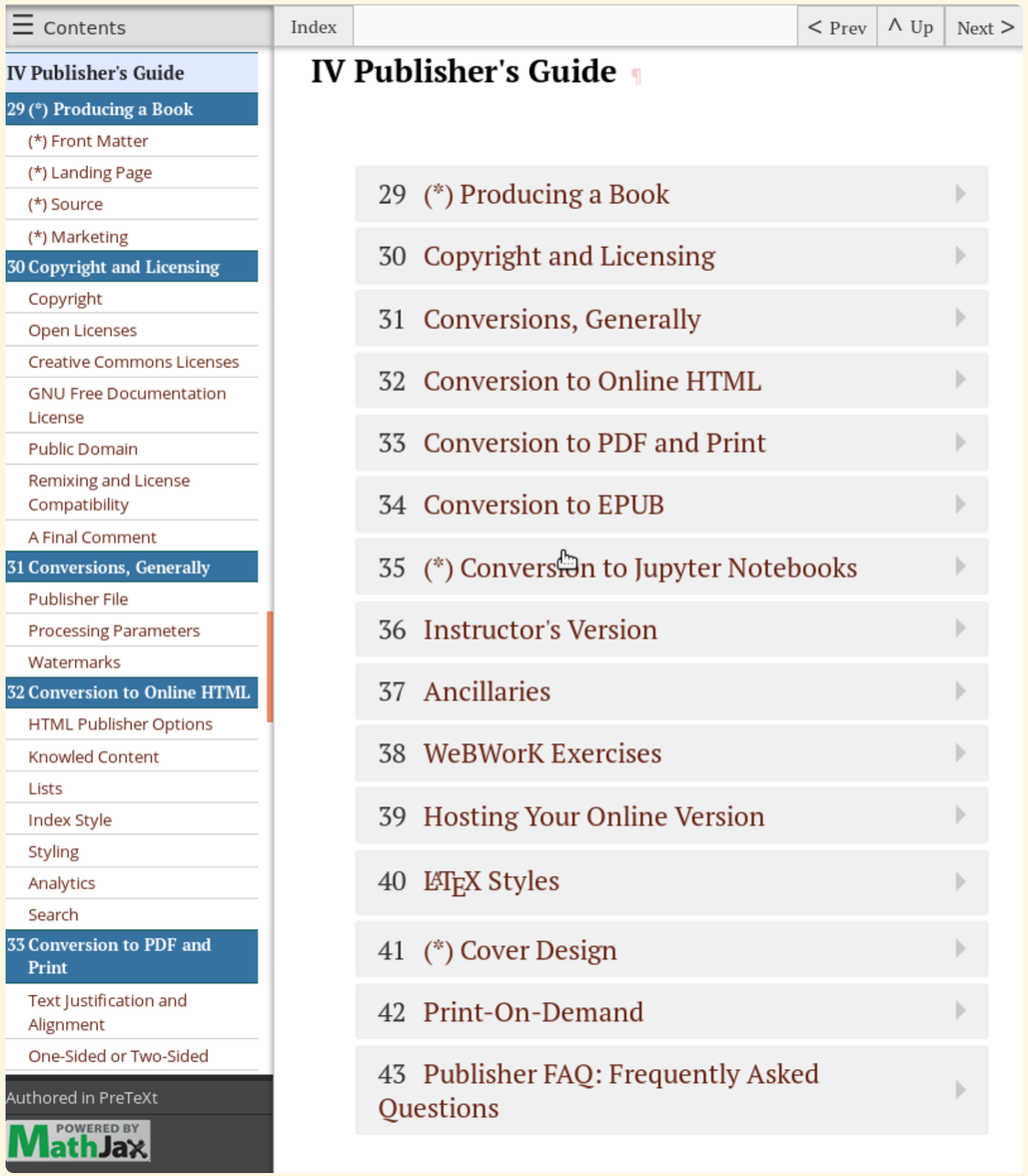
How do we accomplish all this?

- XML syntax is a nested hierarchy (a tree)
  - `<foo>...</foo>`
  - `<bar/>`
  - `<baz qux="corge">`
- Does not have to be *UGLY*!
- PreTeXt is “author-friendly” (Principle #2)

STRUCTURE OF SCHOLARLY DOCUMENTS

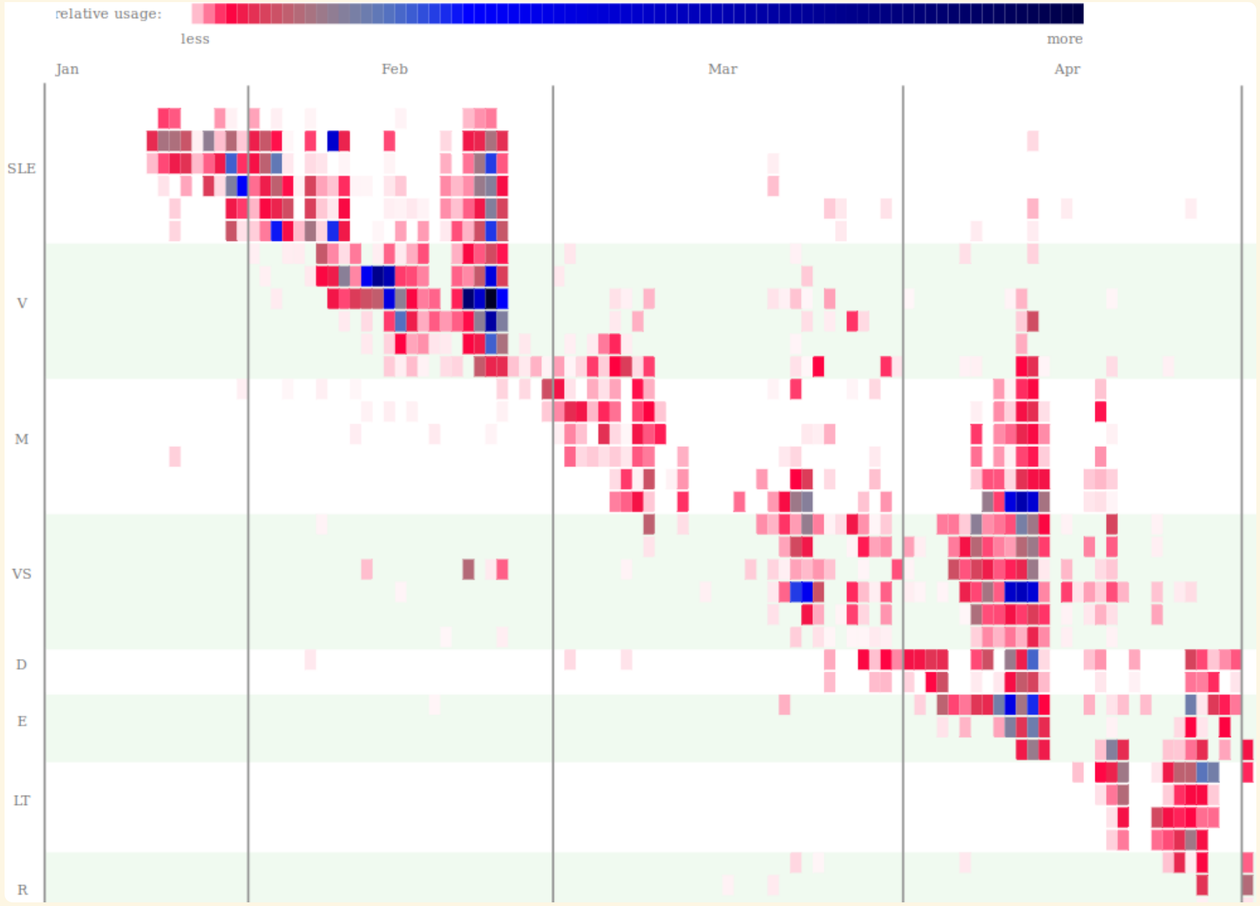
- PreTeXt “captures the structure of textbooks and research papers” (Principle #1)
- *Strictly* separates content and style
- `<book>`, `<article>`, `<memo>`, `<slideshow>`, ...
- `<chapter>`, `<section>`, `<subsection>`, ...
- `<example>`, `<remark>`, `<theorem>`, ...
- `<figure>`, `<table>`, `<listing>`, ...
- Mathematics: LaTeX inside `<m>`, `<me>`, `<md>`
- Slideshow: you are watching one now; it uses
- `<section>`, `<slide>`, `<subslide>`, ...

COMMUNITIES AROUND TEXTBOOKS



Principle #10: “PreTeXt recognizes that scholarly documents involve the interaction of authors, publishers, scholars, instructors, students, and readers, with each group having its own needs and goals.”

RESEARCH ABOUT TEXTBOOKS



- Structured source means structured HTML
- Structured HTML means precise data analytics
- By subsection, by example, by exercise, by interactive
- By student, by the second

CONCLUSION

Principle #8: PreTeXt is free: the software is available at no cost, with an open license. The use of PreTeXt does not impose any constraints on documents prepared with the system.

Links

- pretextbook.org
- runestone.academy
- buzzard.ups.edu/talks.html
- Twitter: #PreTeXtBook, #PreTeXtGang
- Mastodon: @PreTeXt

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